ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES

PHASE I INVESTIGATION

VICTORY PLAZA **SITE No. 754005**

OWEGO (V) **TIOGA (C)**

DATE: MARCH 1990

Prepared for :

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

50 Wolf Road, Albany, New York 12233

Thomas C. Jorling, Commissioner

DIVISION OF HAZARDOUS WASTE REMEDIATION

Michael J. O'Toole, Jr., P.E. – Director

URS Company, Inc.
570 Delaware Avenue
Buffalo, New York 14202

050

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INACTIVE HAZARDOUS WASTE SITES
IN THE STATE OF NEW YORK

PHASE I INVESTIGATION

VICTORY PLAZA

VILLAGE OF OWEGO

TIOGA COUNTY, NEW YORK

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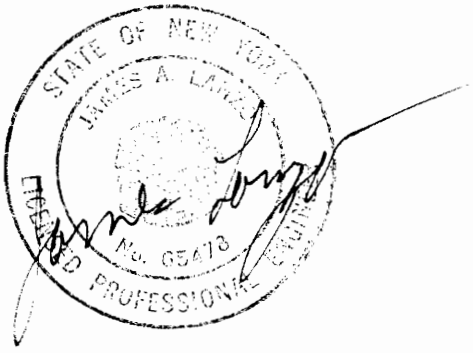

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1.0 EXECUTIVE SUMMARY

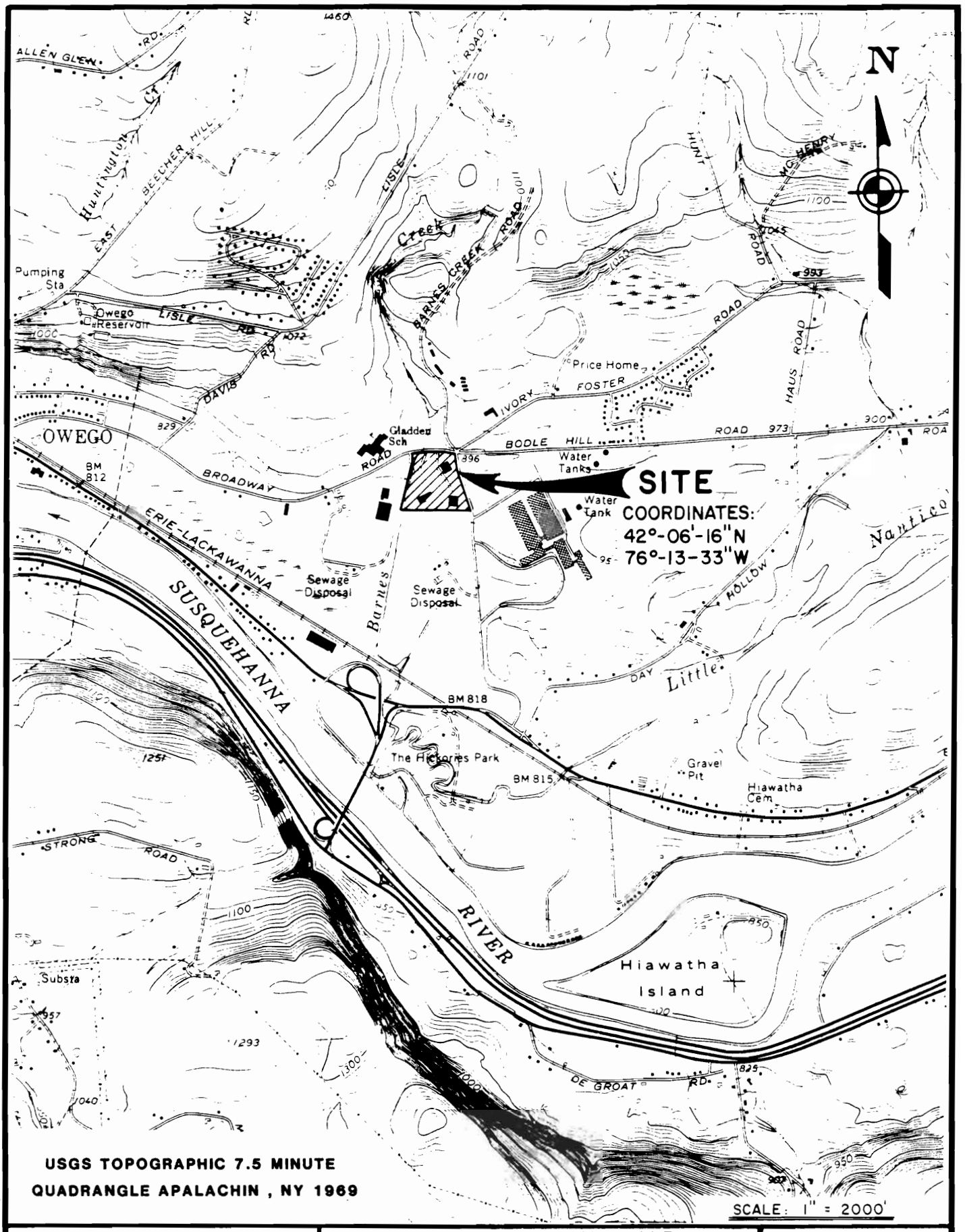
The Victory Plaza site, in the Village of Owego, Tioga County, New York, lies in the Susquehanna River basin (Figure 1). It comprises three parcels: a 9.3-acre property, formerly the site of a food market and presently leased by International Business Machines, Inc. (IBM); a 1.8-acre parcel occupied by Moore's Tire; and a 4-acre parcel occupied by Owego Bowl, a bowling alley. A gasoline filling station formerly occupied a site at the north end of the plaza (Figure 2).

No record of storage or deposition of hazardous waste exists with respect to any of these properties. In 1984 six monitoring wells were installed and sampled by IBM within the northern and southern sections of the Victory Plaza site, from which trichloroethylene (TCE) was detected in groundwater (190 ppb) and soil (1,100 ppb). The site lies downgradient of a source of much higher concentrations of TCE and other contaminants. There is reason to suspect, therefore, that the contamination did not originate on site.

Groundwater as analyzed by NYSDEC at downgradient wells showed no contamination as of January 1987.

The Phase I effort involved the compilation of information gathered from several sources, including, but not limited to, the following: the New York State Department of Environmental Conservation (NYSDEC) - Region 7, the Tioga County Department of Health, and a site inspection conducted by URS Company, Inc. personnel on July 28, 1987. Photographs taken during site inspection are presented in Figure 3.

The intent of the Hazard Ranking System (HRS), as developed by the Mitre Corporation under contract to the U.S. Environmental Protection Agency, is to provide a method by which uncontrolled hazardous waste sites may be systematically evaluated with regard to the potential risk that a site may pose on human health or safety, and/or the environment.



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URS Company, Inc. CONSULTING ENGINEERS NEW YORK NEW JERSEY	SITE LOCATION MAP VICTORY PLAZA	FIGURE 1

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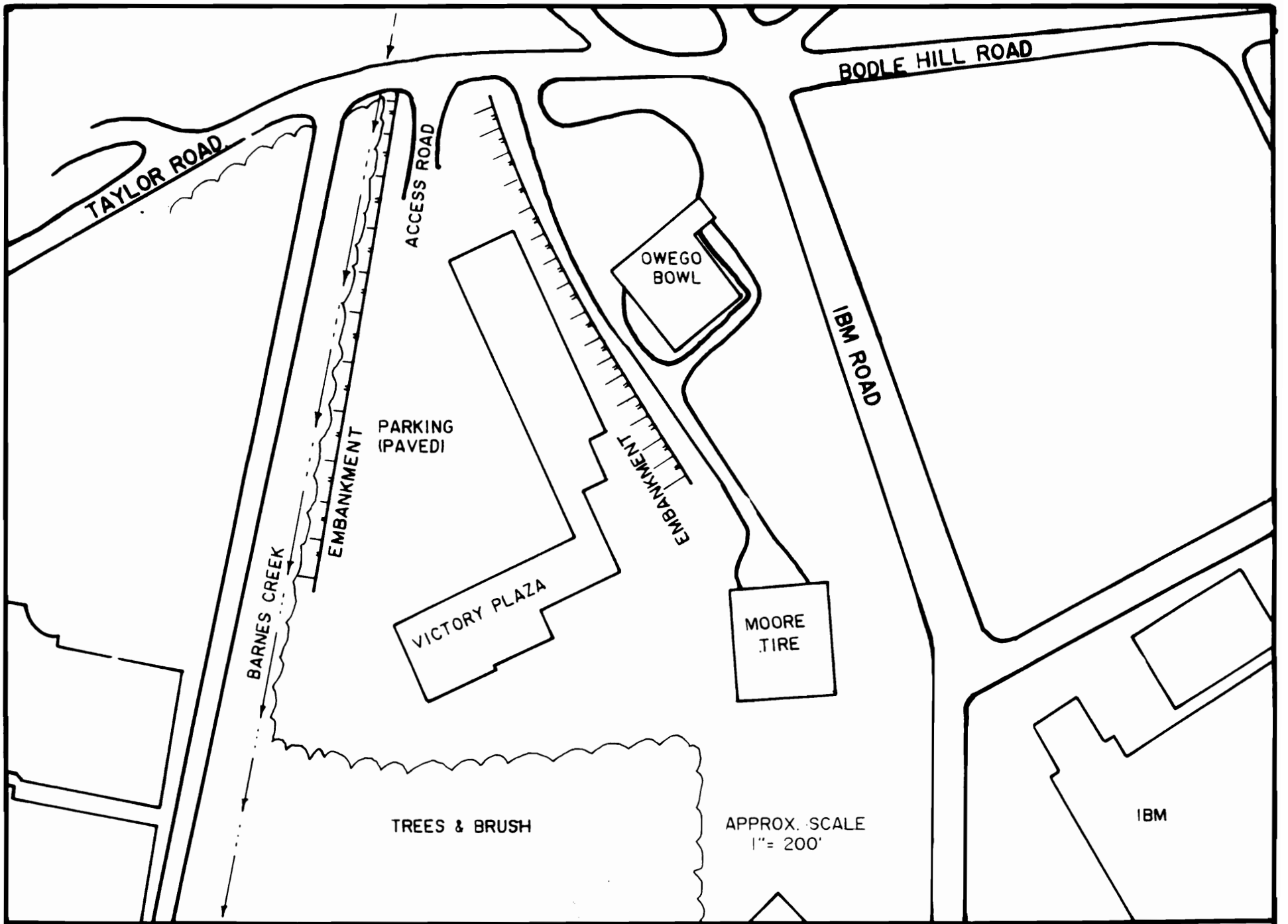

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SITE SKETCH
VICTORY PLAZA

FIGURE 2

FIGURE 3 - SITE PHOTOGRAPHS

July 28, 1987 Victory Plaza
Looking south from near Taylor Road at main parking area.

July 28, 1987 Victory Plaza
Looking south from near Taylor Road at former gas station location (currently paved parking area).

July 28, 1987 Victory Plaza
Looking east at area to rear (south) of Victory Plaza building.

July 28, 1987
Victory Plaza
Stream located along western site boundary.

The HRS is designed to provide a numerical value through an assessment of technical data and information, and relating that information with respect to the following three hazard modes:

- o migration of hazardous substances from the site (S_M)
- o the potential for harm from fire and explosion (S_{FE})
- o the potential for harm from direct contact (S_{DC})

The migration potential (S_M) is determined through the rating of factors associated with three migration routes: groundwater (S_{gw}), surface water (S_{sw}) and air (S_a). The factor categories include observed release, route and waste characteristics, containment and targets. The scored value for each route is composited to determine the risk to humans and/or the environment from the migration of hazardous substances from the site (S_M). The risks involved with the potential for fire and explosion (S_{FE}) and direct contact (S_{DC}) are evaluated according to site specific information, including: waste characteristics, containment, demographics and proximity to sensitive habitats (wetlands, wildlife, etc.).

Based on information gathered during this investigation of the Victory Plaza site, the following HRS scores were obtained:

S_M = 0.00 (S_{gw} = 0.00, S_{sw} = 0.00, S_a = 0.00)
S_{FE} = 0.00
S_{DC} = 0.00

The data available in several areas for this Phase I investigation are considered inadequate for a proper site assessment; therefore, additional data gathering and evaluation is suggested. Proposed Phase II investigation activities, following expansion of the site to embrace adjacent properties, include air monitoring, subsurface investigation utilizing boring logs, monitoring well installation, and groundwater and surface water sampling and analyses.

2.0 PURPOSE OF THE PHASE I INVESTIGATION

The Phase I investigation of the Victory Plaza site on Taylor Road was conducted with the following objectives:

- Compile and review site specific information, including the operational history, in order to assess the site with regard to waste characteristics, routes of contaminant migration, and population and/or environment at risk in order to determine a Preliminary Hazard Ranking System (HRS) score for the site.

- Evaluate the adequacy of available information for the completion of a Final HRS score, with recommendations for additional data as necessary.

3.0 SCOPE OF WORK

The Phase I investigation at the Victory Plaza site on Taylor Road comprised several interrelated tasks as follows:

(a) An extensive data search was conducted, utilizing both site-specific and regional sources. This information was compiled from existing data, as well as new sources, and a preliminary characterization of the site was developed after review.

(b) A site inspection was conducted in order to assess the surface characterization of the site and vicinity, observe evidence (if any) of hazardous substances present, photograph the site, conduct preliminary air monitoring using a Photovac TIP instrument, and confirm information obtained from the initial data search. A USEPA Site Inspection Report (EPA Form 2070-13) and the New York State Department of Environmental Conservation Inactive Hazardous Waste Disposal Site Report were completed following the site inspection.

(c) The preliminary HRS documentation records were prepared, using the information obtained in the data search and site inspection, and a value was computed for each hazard mode.

(d) The adequacy of available information was evaluated and recommendations were made for further data necessary to properly develop a final HRS score.

(e) The Phase I investigation report was prepared according to the terms of the contract.

During the investigation, a number of sources were contacted for information, including but not limited to:

- Science and Engineering Library, University of Buffalo - May 28, 1987, June 1, 1987 and June 24, 1987
  - Geological/hydrogeological information

- Lockwood Library, Government Document Section, University of Buffalo - June 1, 1987
  - 1980 Census information (population data and source of water data)

- Buffalo and Erie County Public Library - June 12, 1987
  - Climatalogical data and 1980 Census information

- New York State Museum of Science Service - July 2, 1987
  - Geological maps

- NYSDEC, Kirkwood Regional Office - Larry Lepak and Frank Trent - July 14, 1987, July 15, 1987
  - Site inspection and general files

- IBM Corporation - Owego - Hank Peters and Jim Ryan - July 21, 1987
  - Site history

- Victory Plaza - Mark Vieira - July 21, 1988
  - Site inspection and site history

- Owego Plaza Associates - Stephen Israel, Attorney and Peter Fishback - July 22, 1987 and September 22, 1987
  - Site inspection and site history

- o Victory Plaza - Donald Cronk - July 23, 1987 and August 5, 1987
  - Site inspection and site history

- o Tioga County Soil and Water Conservation District - Tom Lasater, District Conservationist - August 3, 1987 and August 5, 1987
  - Irrigation and agricultural lands information

- o Moore Tires - Byron Moore - August 5, 1987
  - Site history

- o Tioga County Real Property Tax Office - August 24, 1987
  - Tax map

- o NYSDEC Region 7 - Jane Hines and A.A. Coburn, Division of Regulatory Affairs - September 3, 1987 and September 9, 1987
  - Wetlands map and endangered species information

- o Tioga County Health Department - Gary Rice, Director of Environmental Health - September 24, 1987 and September 28, 1987
  - Source of water information

- o Owego Water Works - Richard Ottens, Jr., Area Manager - September 24, 1987 and September 28, 1987
  - Source of water and depth of wells information

- o Town of Owego Utilities - Barry Wilkins - September 24, 1987 and September 28, 1987
  - Source of water information

- o Town of Owego - Daniel Cronk, Fire Chief - October 21, 1987
  - Fire and explosion threat information

4.0 SITE ASSESSMENT

4.1 Site History

The approximately 15-acre Victory Plaza site comprises three contiguous parcels, all located on Taylor Road at the intersection of the IBM parking lot access road in the Village of Owego, Tioga County, New York (Figure 2). The largest of the three parcels is the 9.3-acre Victory Plaza property, from which the site takes its name. Most of the floor space in the single building on the property (presently an annex of the neighboring IBM Corporation) was formerly occupied by Victory Markets, a chain grocery store. The site gradually ceased operation as a shopping center over a period beginning in the early 1970s and ending in the early 1980s. A filling station reported at the north end of the property closed about 1970. The years of operation of the plaza and gas station are unknown (Ref. 5, 7, 6, and Site Visit).

Victory Plaza was, during the period of operation, owned by Joseph Gerrity and Arrowhead Estates. Mr. Gerrity also owned an adjacent 1.8-acre property, the second of the three site parcels. In 1972 this adjacent piece was sold to James and Byron Moore (presently operating Moore's Tire on this adjacent land), and in 1984 Victory Plaza itself was sold to Owego Plaza Associates of Mineola, New York. Owego Plaza Associates is the present owner. IBM, currently the plaza's sole tenant, has leased increasingly more plaza space as retail operations were phased out. IBM today houses part of its Procurement operation in the plaza. In 1983 IBM, which was at that time interested in purchasing the property, commissioned a hydrogeologic study of the plaza, described in 4.4 (Ref. 6, 8, 5, 9, and Site Visit).

In the northeast corner of the site lies the third parcel, the approximately 4-acre property on which Owego Bowl, a bowling alley, is located. The bowling alley (building and property) is owned by Peter T. Gillespie of Rye, New York, and Mark Vieira, of Binghamton, New York. A

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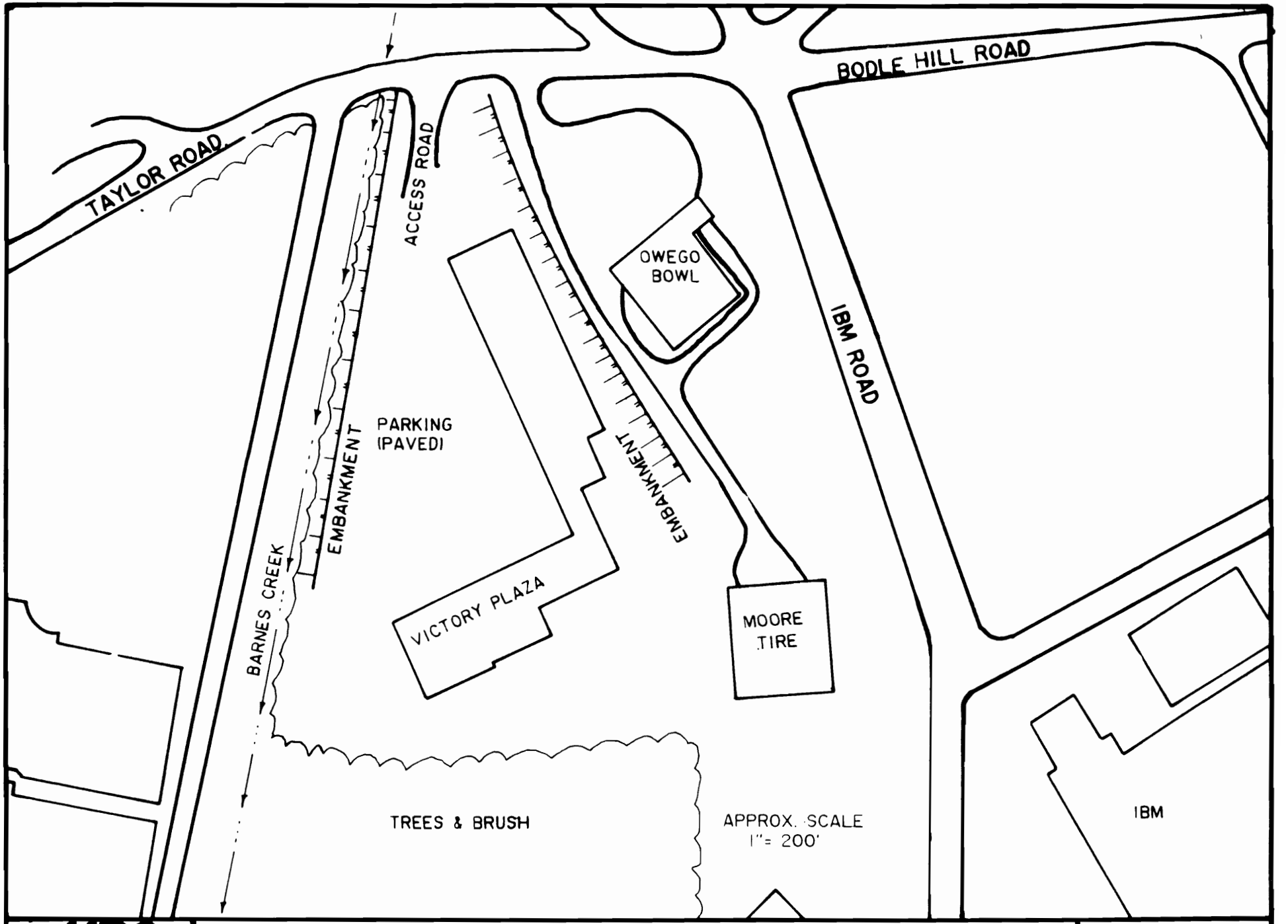


URS CONSULTANTS

SITE SKETCH
VICTORY PLAZA

FIGURE 2

carwash was at one time operated on this property (Ref. 5, 6, and Site Visit).

No record exists of deposition or storage of hazardous wastes on any of these properties, although TCE in concentrations up to 190 ppb was monitored in groundwater beneath the plaza during IBM's 1984 investigation of the site, and at 1,100 ppb in soil at 33 feet below the surface (Ref. 1).

Three 10,000-gal underground gasoline storage tanks at the north end of the plaza, associated with the former filling station, were removed in 1985 by Victory Markets and the area repaved (Ref. 6).

The site is flanked by IBM on the east and south, and by Hadco Corporation, a manufacturer of printed circuit boards, on the west. Both companies have initiated hydrogeologic investigations, and IBM a groundwater remediation program, as described in 4.4 (Ref. Site Visit).

4.2 Site Surface Characterization

The Victory Plaza site is located on the south side of Taylor Road, north of NY route 17C, and just east of Barnes Creek in Owego, New York. The land surface slopes rather sharply overall to the southwest, with the IBM facility elevation about fifty feet higher than the Victory Plaza site, and Hadco Corporation about fifty feet lower. Barnes Creek, just west of the site, flows southward to the Susquehanna River. Two protected wetlands lie within one mile of the site (Ref. 10, 11, and Site Visit).

A large percentage of the site is paved, parking lots having been constructed around the bowling alley, Moore's Tire, and the plaza property. A line of brush and small trees separates the site from Barnes Creek; this brush line curves around the site's southern perimeter as well (Ref. Site Visit).

4.3 Site Hydrogeology

The Victory Plaza site lies within the geomorphic province of the Appalachian Plateau in the Susquehanna River Basin. Across the upland portion of the province, Devonian shale, siltstone, and fine sandstone is dissected by narrow valleys and mantled by till. Stratified glacial drift is confined largely to the broad valleys occupying the remainder of the basin. The Victory Plaza site is located in the portion of the province marked by the presence of stratified drift. Overburden thickness under the site has been measured at 5 to 44 feet. The overburden material is underlain by gray shales and siltstone (Ref. 12, 13, 1, and 14).

Only the coarser sands and gravels within the stratified drift yield enough water to be considered aquifers. The site lies at the northeast edge of the Owego-Waverly aquifer, a continuation of the Endicott-Johnson City-Vestal aquifer to the east. This aquifer consists of unconsolidated sand and gravel deposits. Wells located in this aquifer are likely to yield from 500 to 3,000 gpm, based on values given for the Broome County end of the aquifer. In 1981, municipal wells drawing from the Owego-Waverly aquifer served more than 16,000 persons. Municipal and private wells serving about 8,000 people are found within three miles of the site (Ref. 10, 13, 15, 16, 17, and 24).

Overall, joints, fractures, bedding planes, and gravel provide the principal means for the storage and movement of water (Ref. 18).

Some of the broad valleys in the Susquehanna Basin also contain basal sand-and-gravel aquifers beneath extensive silts and clays, the clay layers being as much as 200 feet thick in places. These basal aquifers tend to be thin or less permeable than the near-surface aquifers and generally yield only moderate quantities of water. The water, affected by the clays, is commonly of inferior quality (Ref. 13 and 12).

Although most high-yield wells in the basin are screened in stratified-drift aquifers, lower-yielding bedrock wells also exist. Many domestic wells are drilled into the siltstone and shale bedrock underlying the entire basin. These are usually more than 100 feet deep; yield is commonly 5-10 gpm, and rarely exceeds 30 gpm. Bedrock monitoring wells drilled on site in 1984 yielded 1-5 gpm. Even though aquifers may be identified at three levels within the basin, the complex stratigraphy of the area requires that all aquifers be considered as part of a single hydrologic unit. The 1984 site data clearly shows that the lower till unit is saturated, and that the zone of saturation extends from water table to bedrock (Ref. 13, 12, and 1).

Pressure has been put on aquifers throughout the region by intensive well development, lining of stream channels (preventing recharge from this source), pavement of recharge areas, leaking landfills, and pipe and tank leaks (Ref. 13).

The natural water table in the glacial deposits conforms to the general topography of the area, the regional dip within the Appalachin Quadrangle being about 90 feet per mile, and in a direction S60°W. Groundwater flow is therefore to low areas such as streams and swamps. Water level measurements in monitoring wells have tended to confirm this, ranging from 1 foot below ground surface at the upgradient side of the site, to nearly 17 feet below ground surface at the downgradient side (Ref. 12, 18, and 1).

Long-term records of groundwater levels when not influenced by pumping show a strong correlation of groundwater level with rainfall pattern, indicating essentially immediate recharge following precipitation events (Ref. 18).

4.4 Site Contamination

A fairly large body of information exists regarding subsurface contamination at and around the Victory Plaza site. Sampling and analysis of soil and/or groundwater has taken place at or near the site regularly since 1978. An outline of these investigations is presented below. Lack of an identifiable onsite source of contamination, coupled with evidence of relatively high upgradient contamination, suggests that contamination beneath the Victory Plaza site has not originated on site.

4.4.1 Voluntary Groundwater Assessment Program: IBM, 1978

In 1978 IBM Owego entered upon a voluntary groundwater assessment program. After discovering chemical contamination of groundwater beneath its Owego facility, the company undertook a more intensive investigation, reporting the presence of three chemicals in the aquifer: TCE, methylene chloride, and methyl chloroform. These chemicals were found in highest concentrations in the bulk chemical storage area, pit area, and waste treatment area. A plume was definable. IBM therefore embarked upon a groundwater treatment program, drilling thirteen groundwater withdrawal wells and building a tower (packed column) for air stripping. The system was operational by February 1983 (Ref. 19, 18, and 2).

In 1982 leaks were discovered at several of IBM's organic solvent storage tanks. Among chemicals being discharged: 1,1,1-trichloroethane, TCE, and methylene chloride (Ref 20).

By June 1983 IBM had signed a Consent Order binding itself to the investigative and treatment program under way. In the Consent Order it is stated that IBM "has determined that the chemicals are being contained within the Facility's perimeters" (Ref. 18).

4.4.2 Hydrogeologic Investigation at Victory Plaza: IBM, 1984

In January 1984, IBM, then leasing the Victory Plaza property, was considering purchase of the property. The company conducted a hydrogeologic survey of the property to determine whether groundwater fell within Federal and State water quality standards. Six bedrock wells were installed in January, and when contamination was indicated, seven others were added (in March). TCE, the only organic found in significant concentrations, reached 190 ppb, with the heaviest concentrations in the northern part of the property. A soil sample at 33 feet below surface showed 1,100 ppb TCE. No benzene, toluene, or xylene was detected, and therefore no analysis was conducted for linear gasoline components. The New York State limit for trichloroethylene in Class GA groundwater is 10 ppb (Ref. 1).

On the strength of this study, a request was made by NYSDEC Region 7 that the Victory Plaza site be put on the New York State Superfund list (Ref. 19).

4.4.3 Groundwater Analysis: Hadco Corporation, 1984

Hadco, which carries out plating and degreasing operations in its manufacture of printed circuit boards, is a generator of hazardous wastes. The firm does not, however, treat, store, or dispose of hazardous wastes on site. Hadco lies downgradient of the Victory Plaza site. In October 1984, after a preliminary investigation of existing groundwater monitoring and solvent management programs at Hadco, current manufacturing operations were adjudged "clean," but more study of groundwater contamination was recommended. Additional wells were installed, and a Phase I investigative program implemented. Groundwater flow patterns were established, as was the fact of subsurface contamination by organics, largely in the southern part of the property. It appeared to investigators that the plume of groundwater contamination was moving in from the northeast, from off site. The primary organic

contaminant was TCE, although 1,1,1-trichloroethane, 1,2-trans-dichloroethylene, 1,2-dichloroethane, and methylene chloride were also seen at upgradient wells (Ref. 20).

Of all organics detected in groundwater, Hadco's Raw Materials Inventory sheet shows (1984) usage of only 1,1,1-trichloroethane and methylene chloride (Ref. 20).

4.4.4 Subsurface Investigation: Hadco Corporation, 1986

In July 1981 two soil borings were made downgradient of the monitoring well showing highest VOC concentrations on the Hadco property. Evidence was suggestive, although not clear-cut, that TCE was the most prevalent and highly concentrated organic compound present. In both borings, concentrations were highest in the 20-35 foot depth interval (Ref. 21).

4.4.5 Offsite Downgradient Well Monitoring: NYS Department of Health, 1987

In January 1987 NYSDOH sampled water in several wells southwest and southeast of the Hadco-Victory Plaza-IBM sites, about one-half mile from the measured plumes. All results were negative (Ref. 22).

4.4.6 Comprehensive Hydrogeologic Assessment: IBM, 1987

In 1987 a number of new monitoring wells were installed on the IBM property. TCE concentrations in excess of 4,000 ppb were measured in two wells (No's 128 and 137) near the Tank Farm Area which is located on the north central portion of the IBM property. Methyl chloroform levels reached 11,000 ppb. Other VOCs were also detected at relatively high levels. Concentrations decreased to the west and south, with the TCE plume being the most extensive. Mention was made of an "east-west trending bedrock valley, extending from the Tank Farm area across the

northwest property boundary". This "bedrock valley" appears, from data presented, to be a preferential pathway for TCE migration. IBM's northwest property boundary is the eastern property line of the Victory Plaza site, although the 1987 TCE plume strikes the boundary somewhat south of where the 1984 plume was detected at Victory Plaza in 1984 (Ref. 2 and 1).

On the basis of these results, IBM has instituted a sitewide groundwater monitoring program to monitor contaminant plumes, to assess the zone of capture for the withdrawal well system, and to determine the potential of offsite or deeper-zone migration (Ref. 2).

NARRATIVE

5.0 PRELIMINARY APPLICATION OF THE HAZARD RANKING SYSTEM

5.1 Narrative Summary

Victory Plaza
Taylor Road
Owego (V) Tioga (T) New York

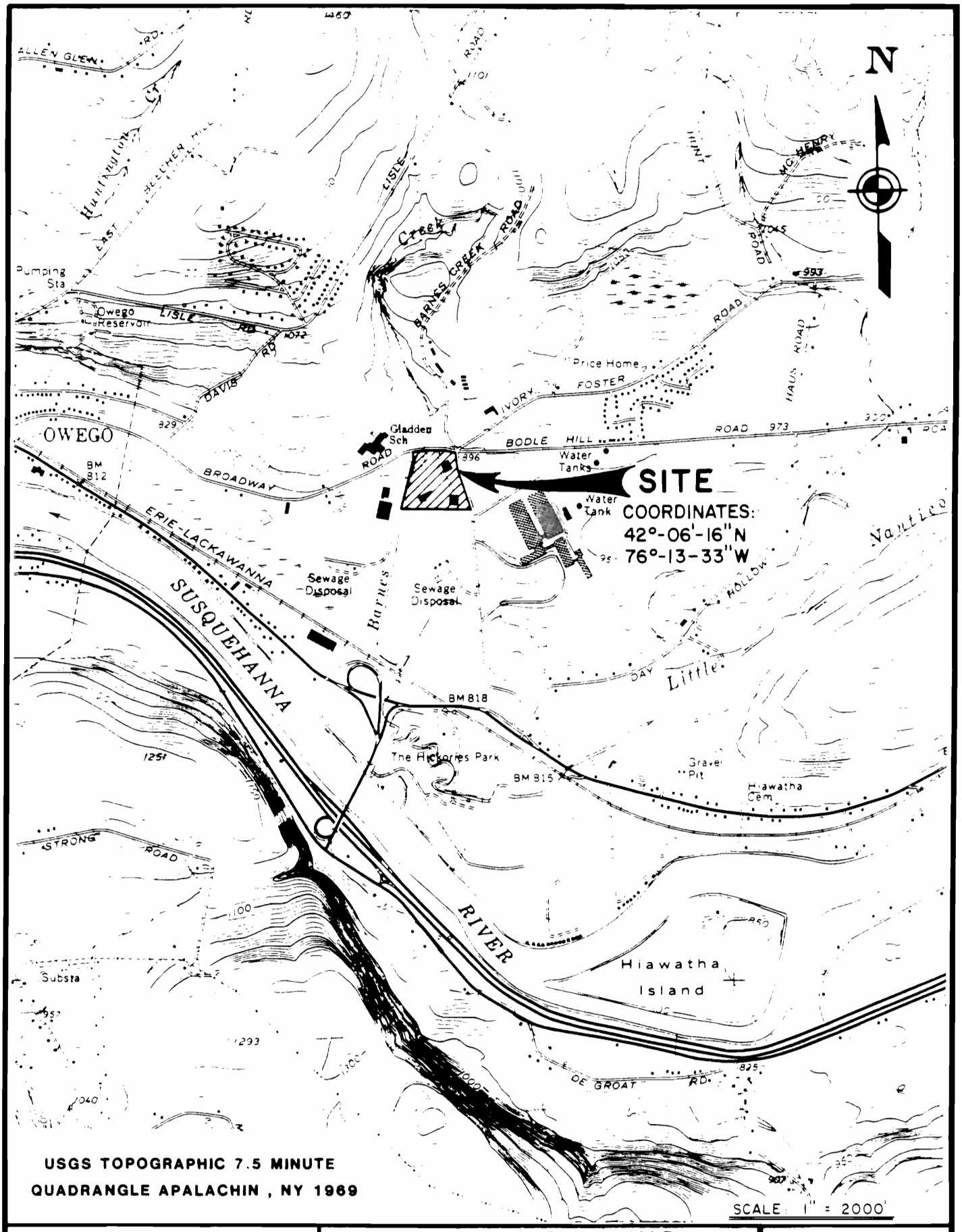
The 15-acre Victory Plaza site lies on the south side of Taylor Road, just east of Barnes Creek, in the Village of Owego, New York. It is the site of a former food market and gasoline filling station. A tire store and bowling alley currently occupy part of the site. IBM, which has a large facility east of the plaza, presently leases the property for office space.

In 1984, IBM, which was considering purchasing the property, performed a groundwater study on site. The study showed levels of trichloroethylene in groundwater to 190 ppb, and in soil to 1,100 ppb. NYSDEC at this point designated the site for a Phase I investigation.

The site lies downgradient of IBM Owego's main facility, at which monitoring and treatment of groundwater has been occurring since 1978. Evidence is strongly suggestive that contaminants beneath Victory Plaza are moving in from an upgradient source. Groundwater at downgradient wells appeared in January 1987 to be unaffected.

The Victory Plaza site is located in a moderately populated rural section of the Village of Owego approximately one mile east of the Town of Owego. Population within one mile of the site is estimated at approximately 1300 people. The plaza is used daily for IBM offices and parking.

LOCATION



USGS TOPOGRAPHIC 7.5 MINUTE
QUADRANGLE APALACHIN , NY 1969

URS Company, Inc. CONSULTING ENGINEERS NEW YORK NEW JERSEY	SITE LOCATION MAP VICTORY PLAZA	FIGURE 1

DWG NO A 2490

HRS WORKSHEETS

Facility name: Victory Plaza

Location: Taylor Road, Owego, New York

EPA Region: II NYSDEC Region 7

Person(s) in charge of the facility: Owego Plaza Associates

Steven Israel (212) 382-3600

Name of Reviewer: URS Corporation Date: 10-13-87

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.)

Approx. 15-acre site embraces former food mart and gasoline filling station; tire store; bowling alley. In 1984 TCE found in groundwater (190 ppb) and deep soil (1,100 ppb). Upgradient studies reveal higher concentrations upgradient of site. No deposition of waste alleged at this site. Site boundaries should be expanded to include adjacent upgradient and downgradient properties.

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

S_{FE} = 0.00

S_{DC} = 0.00

HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	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	
Net Precipitation	(0) 1 2 3	1		3	
Permeability of the Unsaturated Zone	(0) 1 2 3	1		3	
Physical State	(0) 1 2 3	1		3	
Total Route Characteristics Score			0	15	
3 Containment	(0) 1 2 3	1	0	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	(0) 3 6 9 12 15 18	1		18	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score			0	26	
5 Targets					3.5
Ground Water Use	(0) 1 2 3	3		9	
Distance to Nearest Well/Population Served	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1		40	
Total Targets Score			0	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			0	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} = 0.00			

GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1		3	
1-yr. 24-hr. Rainfall	(0) 1 2 3	1		3	
Distance to Nearest Surface Water	(0) 1 2 3	2		6	
Physical State	(0) 1 2 3	1		3	
Total Route Characteristics Score			0	15	
3 Containment	(0) 1 2 3	1	0	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	(0) 3 6 9 12 15 18	1		18	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score			0	26	
5 Targets					4.5
Surface Water Use	(0) 1 2 3	3		9	
Distance to a Sensitive Environment	(0) 1 2 3	2		6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1		40	
Total Targets Score			0	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			0	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{sw} =	0.00		

SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	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		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
Total Targets Score				39	
[4] Multiply [1] x [2] x [3]				35,100	
[5] Divide line [4] by 35,100 and multiply by 100		S_a = 0.00			

AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	0.00	0.00
Surface Water Route Score (S_{sw})	0.00	0.00
Air Route Score (S_a)	0.00	0.00
$S_{gw}^2 + S_{sw}^2 + S_a^2$		0.00
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		0.00
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		0.00

WORKSHEET FOR COMPUTING S_M

NO DOCUMENTED FIRE OR EXPLOSION THREAT

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1		3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Total Targets Score				24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100			S_{FE} = 0.00		

FIRE AND EXPLOSION WORK SHEET

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	0	3	8.2
3 Containment	(0) 15	1	0	15	8.3
4 Waste Characteristics Toxicity	(0) 1 2 3	5	0	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	(0) 1 2 3 4 5	4		20	
Distance to a Critical Habitat	(0) 1 2 3	4		12	
Total Targets Score			0	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			0	21,600	
7 Divide line 6 by 21,600 and multiply by 100		S_{DC} = 0.00			

DIRECT CONTACT WORK SHEET

HRS DOCUMENTATION RECORDS

5.4 HRS Documentation Records

FACILITY NAME: Victory Plaza

LOCATION: Taylor Road
Village of Owego, Tioga County, New York

GROUNDWATER ROUTE

1 OBSERVED RELEASE

o CONTAMINANTS DETECTED (5 MAXIMUM):

Although TCE has been found in groundwater and deep soil at this site, levels in site wells and borings are not sufficiently elevated over upgradient, offsite wells. Therefore, no observed release can be assigned, and TCE in groundwater and soil cannot be attributed to this site (Ref. 1, 2, and 3).

o RATIONALE FOR ATTRIBUTING THE CONTAMINANTS TO THE FACILITY:

N/A

Score 0

***

2 ROUTE CHARACTERISTICS

DEPTH TO AQUIFER OF CONCERN

o NAME/DESCRIPTION OF AQUIFER(S) OF CONCERN:

Owego - Waverly aquifer consisting of glacial sand and gravel (Ref. 15)

o DEPTH(S) FROM THE GROUND SURFACE TO THE HIGHEST SEASONAL LEVEL OF THE SATURATED ZONE [WATER TABLE(S)] OF THE AQUIFER OF CONCERN:

1 foot (Ref. 1)

o DEPTH FROM THE GROUND SURFACE TO THE LOWEST POINT OF WASTE DISPOSAL/STORAGE:

No waste disposal/storage of hazardous waste has been alleged at this site.

Score 0

NET PRECIPITATION

o MEAN ANNUAL OR SEASONAL PRECIPITATION (LIST MONTHS FOR SEASONAL):

44 inches (Ref. 3)

o MEAN ANNUAL LAKE OR SEASONAL EVAPORATION (LIST MONTHS FOR SEASONAL):

28 inches (Ref. 3)

o NET PRECIPITATION (SUBTRACT THE ABOVE FIGURES):

16 inches

Score 0

PERMEABILITY OF UNSATURATED ZONE

o SOIL TYPE IN UNSATURATED ZONE:

Silty Sand and Gravel (Ref. 1)

o PERMEABILITY ASSOCIATED WITH SOIL TYPE:

10^{-3} - 10^{-5} cm/sec (Ref. 3)

Score 0

PHYSICAL STATE

o PHYSICAL STATE OF SUBSTANCES AT TIME OF DISPOSAL (OR AT PRESENT TIME FOR GENERATED GASES):

No waste disposal alleged at this site.

Score 0

***

3 CONTAINMENT

CONTAINMENT

o METHOD(S) OF WASTE OR LEACHATE CONTAINMENT EVALUATED:

N/A

o METHOD WITH HIGHEST SCORE:

N/A

Score 0

***

4 WASTE CHARACTERISTICS

TOXICITY AND PERSISTENCE

o COMPOUND(S) EVALUATED:

No uncontained contaminants have been identified at this site other than TCE in groundwater and deep soil, and this cannot be attributed to this site (Ref. 1, 2 and 3).

o COMPOUND WITH HIGHEST SCORE:

TCE (Ref. 3)

Score 0

HAZARDOUS WASTE QUANTITY

o 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):

No uncontained contaminants alleged at this site.

Score 0

o BASIS OF ESTIMATING AND/OR COMPUTING WASTE QUANTITY:

N/A

***

5 TARGETS

GROUNDWATER USE

o USE(S) OF AQUIFER(S) OF CONCERN WITHIN A 3-MILE RADIUS OF THE FACILITY:

Drinking water with municipal water available (Ref. 17)

Score 0

DISTANCE TO NEAREST WELL

o LOCATION OF NEAREST WELL DRAWING FROM AQUIFER OF CONCERN OR OCCUPIED BUILDING NOT SERVED BY A PUBLIC WATER SUPPLY:

0.5 miles (Ref. 10, 17 and 22)

o DISTANCE TO ABOVE WELL OR BUILDING:

0.5 miles (Ref. 10, 17 and 22)

POPULATION SERVED BY GROUNDWATER WELLS WITHIN A 3-MILE RADIUS

o IDENTIFIED WATER-SUPPLY WELL(S) DRAWING FROM AQUIFER(S) OF CONCERN WITHIN A 3-MILE RADIUS AND POPULATIONS SERVED BY EACH:

Unknown

o COMPUTATION OF LAND AREA IRRIGATED BY SUPPLY WELL(S) DRAWING FROM AQUIFER(S) OF CONCERN WITHIN A 3-MILE RADIUS, AND CONVERSION TO POPULATION (1.5 PEOPLE PER ACRE):

None (Ref. 27)

o TOTAL POPULATION SERVED BY GROUNDWATER WITHIN A 3-MILE RADIUS:

Unknown

Score 0

SURFACE WATER ROUTE

1 OBSERVED RELEASE

o CONTAMINANTS DETECTED IN SURFACE WATER AT THE FACILITY OR DOWNHILL FROM IT (5 MAXIMUM):

None.

o RATIONALE FOR ATTRIBUTING THE CONTAMINANTS TO THE FACILITY:

N/A

Score 0

***

2 ROUTE CHARACTERISTICS

FACILITY SLOPE AND INTERVENING TERRAIN

o AVERAGE SLOPE OF FACILITY IN PERCENT:

3% (Ref. 10)

o NAME/DESCRIPTION OF NEAREST DOWNSLOPE SURFACE WATER:

Barnes Creek (Ref. 10)

o AVERAGE SLOPE OF TERRAIN BETWEEN FACILITY AND ABOVE-CITED SURFACE WATER BODY IN PERCENT:

3% (Ref. 10)

o IS THE FACILITY LOCATED EITHER TOTALLY OR PARTIALLY IN SURFACE WATER?

No. (Ref. 10)

Score 0

o IS THE FACILITY COMPLETELY SURROUNDED BY AREAS OF HIGHER ELEVATION?

No (Ref. 10)

1-YEAR 24-HOUR RAINFALL IN INCHES

2.3 (Ref. 3)

Score 0

DISTANCE TO NEAREST DOWNSLOPE SURFACE WATER

Barnes Creek lies adjacent to the west side of the site (Ref. 10)

Score 0

PHYSICAL STATE OF WASTE

No waste disposal alleged at this site.

Score 0

***

3 CONTAINMENT

CONTAINMENT

o METHOD(S) OF WASTE OR LEACHATE CONTAINMENT EVALUATED:

N/A

o METHOD WITH HIGHEST SCORE:

N/A

Score 0

***

4 WASTE CHARACTERISTICS

TOXICITY AND PERSISTENCE

o COMPOUND(S) EVALUATED

No uncontained contaminants have been identified at this site other than TCE in groundwater and deep soil. The TCE cannot be attributed to this site (Ref. 1, 2, and 3).

o COMPOUND WITH HIGHEST SCORE:

TCE (Ref. 3)

Score 0

HAZARDOUS WASTE QUANTITY

o 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):

No uncontained contaminants alleged at this site.

Score 0

o BASIS OF ESTIMATING AND/OR COMPUTING WASTE QUANTITY:

N/A

*****

5 TARGETS

SURFACE WATER USE

o USE(S) OF SURFACE WATER WITHIN 3 MILES DOWNSTREAM OF THE HAZARDOUS SUBSTANCE:

Irrigation (Ref. 27)

Score 0

o IS THERE TIDAL INFLUENCE?

No

DISTANCE TO A SENSITIVE ENVIRONMENT

o DISTANCE TO 5-ACRE (MINIMUM) COASTAL WETLAND, IF 2 MILES OR LESS:

None

o DISTANCE TO 5-ACRE (MINIMUM) FRESH-WATER WETLAND, IF 1 MILE OR LESS:

2000 ft. (Ref. 11)

o DISTANCE TO CRITICAL HABITAT OF AN ENDANGERED SPECIES OR NATIONAL WILDLIFE REFUGE, IF 1 MILE OR LESS:

Unknown (Ref. 11)

Score 0

POPULATION SERVED BY SURFACE WATER

o LOCATION(S) OF WATER-SUPPLY INTAKE(S) WITHIN 3 MILES (FREE-FLOWING BODIES) OR 1 MILE (STATIC WATER BODIES) DOWNSTREAM OF THE HAZARDOUS SUBSTANCE AND POPULATION SERVED BY EACH INTAKE:

None (Ref. 17)

- o COMPUTATION OF LAND AREA IRRIGATED BY ABOVE-CITED INTAKE(S) AND CONVERSION TO POPULATION (1.5 PEOPLE PER ACRE):

N/A

- o TOTAL POPULATION SERVED:

N/A

- o NAME/DESCRIPTION OF NEAREST OF ABOVE WATER BODIES:

N/A

- o DISTANCE TO ABOVE-CITED INTAKES, MEASURED IN STREAM MILES.

N/A

Score 0

AIR ROUTE

1 OBSERVED RELEASE

o CONTAMINANTS DETECTED:

No observed air release.

o DATE AND LOCATION OF DETECTION OF CONTAMINANTS

No observed air release.

o METHODS USED TO DETECT THE CONTAMINANTS:

No observed air release.

o RATIONALE FOR ATTRIBUTING THE CONTAMINANTS TO THE SITE:

No observed air release.

Score 0

***

2 WASTE CHARACTERISTICS

REACTIVITY AND INCOMPATIBILITY

o MOST REACTIVE COMPOUND:

No observed air release.

o MOST INCOMPATIBLE PAIR OF COMPOUNDS:

No observed air release.

Score 0

TOXICITY

o MOST TOXIC COMPOUND:

No observed air release.

Score 0

HAZARDOUS WASTE QUANTITY

o TOTAL QUANTITY OF HAZARDOUS WASTE:

No observed air release.

Score 0

o BASIS OF ESTIMATING AND/OR COMPUTING WASTE QUANTITY:

No observed air release.

***

3 TARGETS

POPULATION WITHIN 4-MILE RADIUS

o UNDERLINE 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

1326 (Ref. 10)

Score 0

DISTANCE TO A SENSITIVE ENVIRONMENT

o DISTANCE TO 5-ACRE (MINIMUM) COASTAL WETLAND, IF 2 MILES OR LESS:

None

- DISTANCE TO 5-ACRE (MINIMUM) FRESH-WATER WETLAND, IF 1 MILE OR LESS:

2000 ft. (Ref. 11)

- DISTANCE TO CRITICAL HABITAT OF AN ENDANGERED SPECIES, IF 1 MILE OR LESS:

Unknown (Ref. 11)

Score 0

LAND USE

- DISTANCE TO COMMERCIAL/INDUSTRIAL AREA, IF 1 MILE OR LESS:

On site IBM Facility (Ref. Site Visit)

- DISTANCE TO NATIONAL OR STATE PARK, FOREST, OR WILDLIFE RESERVE, IF 2 MILES OR LESS:

None

- DISTANCE TO RESIDENTIAL AREA, IF 2 MILES OR LESS:

2000 ft. (Ref. 10)

- DISTANCE TO AGRICULTURAL LAND IN PRODUCTION WITHIN PAST 5 YEARS, IF 1 MILE OR LESS:

500 ft. (Ref. 27)

- DISTANCE TO PRIME AGRICULTURAL LAND IN PRODUCTION WITHIN PAST 5 YEARS, IF 2 MILES OR LESS:

500 ft. (Ref. 27)

- IS A HISTORIC OR LANDMARK SITE (NATIONAL REGISTER OR HISTORIC PLACES AND NATIONAL NATURAL LANDMARKS) WITHIN THE VIEW OF THE SITE?

None known

Score 0

FIRE AND EXPLOSION

1 CONTAINMENT

o HAZARDOUS SUBSTANCES PRESENT:

No documented fire or explosion threat (Ref. 4).

o TYPE OF CONTAINMENT, IF APPLICABLE

No documented fire or explosion threat.

Score 0

***

2 WASTE CHARACTERISTICS

DIRECT EVIDENCE

o TYPE OF INSTRUMENT AND MEASUREMENTS:

No documented fire or explosion threat.

Score 0

IGNITABILITY

o COMPOUND USED:

No documented fire or explosion threat.

Score 0

REACTIVITY

o MOST REACTIVE COMPOUND:

No documented fire or explosion threat.

Score 0

INCOMPATIBILITY

o MOST INCOMPATIBLE PAIR OF COMPOUNDS:

No documented fire or explosion threat.

Score 0

HAZARDOUS WASTE QUANTITY

o TOTAL QUANTITY OF HAZARDOUS SUBSTANCES AT THE FACILITY:

No documented fire or explosion threat.

Score 0

o BASIS OF ESTIMATING AND/OR COMPUTING WASTE QUANTITY:

No documented fire or explosion threat.

***

3 TARGETS

DISTANCE TO NEAREST POPULATION

On site IBM Facility (Ref. Site Visit)

Score 0

DISTANCE TO NEAREST BUILDING

On site IBM Facility

Score 0

DISTANCE TO SENSITIVE ENVIRONMENT

o DISTANCE TO WETLANDS:

2000 ft. (Ref. 11)

o DISTANCE TO CRITICAL HABITAT:

Unknown (Ref. 11)

Score 0

LAND USE

o DISTANCE TO COMMERCIAL/INDUSTRIAL AREA, IF 1 MILE OR LESS:

On site IBM Facility (Ref. Site Visit)

o DISTANCE TO NATIONAL OR STATE PARK, FOREST, OR WILDLIFE RESERVE, IF 2 MILES OR LESS:

None Known

o DISTANCE TO RESIDENTIAL AREA, IF 2 MILES OR LESS:

2000 ft. (Ref. 10)

o DISTANCE TO AGRICULTURAL LAND IN PRODUCTION WITHIN PAST 5 YEARS, IF 1 MILE OR LESS:

500 ft. (Ref. 27)

o DISTANCE TO PRIME AGRICULTURAL LAND IN PRODUCTION WITHIN PAST 5 YEARS, IF 2 MILES OR LESS:

500 ft. (Ref. 27)

o IS A HISTORIC OR LANDMARK SITE (NATIONAL REGISTER OR HISTORIC PLACES AND NATIONAL NATURAL LANDMARKS) WITHIN THE VIEW OF THE SITE?

None known

Score 0

POPULATION WITHIN 2-MILE RADIUS

4145 (Ref. 10)

Score 0

BUILDINGS WITHIN 2-MILE RADIUS

Approximately 1000 (Ref. 10)

Score 0

DIRECT CONTACT

1 OBSERVED INCIDENT

o DATE, LOCATION, AND PERTINENT DETAILS OF INCIDENT:

None reported or observed.

Score 0

***

2 ACCESSIBILITY

o DESCRIBE TYPE OF BARRIER(S):

None site is open parking lot (Ref. Site Visit)

Score 0

***

3 CONTAINMENT

o TYPE OF CONTAINMENT, IF APPLICABLE:

N/A

Score 0

***

4 WASTE CHARACTERISTICS

TOXICITY

o COMPOUNDS EVALUATED:

No uncontained contaminants have been identified at this site.

o COMPOUND WITH HIGHEST SCORE:

N/A

Score 0

***

5 TARGETS

POPULATION WITHIN ONE-MILE RADIUS

1326 (Ref. 10)

Score 0

DISTANCE TO CRITICAL HABITAT (OF ENDANGERED SPECIES)

Unknown

Score 0

REFERENCES - DOCUMENTATION RECORDS

1. Victory Plaza Analytical Report, MacFarland-Johnson Engineers, Inc., January 1984.

2. Comprehensive Hydrogeologic Assessment Report, IBM Corporation - Owego, New York, O'Brien and Gere Engineers, Inc., July 1987.

3. Uncontrolled Hazardous Waste Site Ranking System, A Users Manual (HW-10), United States Environmental Protection Agency, 1984.

4. Karen A. Hartnett - URS Corporation, telecon to Daniel Cronk, Fire Chief - Town of Owego, October 21, 1987.

REF. (1)

1. BACKGROUND AND PURPOSE

In January of 1984, six groundwater monitoring wells (OW 505-509, 189) were installed on the Victory Plaza property currently leased by the International Business Machines Corporation in Owego, New York and on adjacent IBM-owned property. The purpose of these wells was to determine whether groundwater at the Victory Plaza site was within applicable Federal and State water quality standards.

Chemical analysis conducted during the January investigation revealed concentrations of trichloroethylene (TCE) in two wells (505,506) ranging from 15 to 110 parts per billion (ppb). These concentrations are in excess of the New York State Department of Enviromental Conservation TCE standard of 10 ppb for Class GA groundwater. All fresh groundwaters in New York State are currently classifed as GA.

As a result, IBM authorized the installation of additional monitoring wells in the Victory Plaza area to more fully define the nature and extent of the organic compounds in groundwater. This report summarizes the results of the investigation.

2. MONITORING WELL INSTALLATION

2.1 Drilling Program

Seven monitoring wells were installed in the Victory Plaza area and were drilled in the sequence OW 510 - 516. Drilling commenced on March 19, 1984 and the final well was completed on March 28, 1984. Both hollow stem auger and air rotary methods were utilized in progressing the boreholes. All wells were installed by C. J. Martin's Son Well Drilling of Binghamton, New York.

Split spoon samples were collected at five foot intervals during the drilling of Wells OW 510 and 511. Because of time constraints, in-situ soil sampling was abandoned for the subsequent wells. Boring logs for

Wells 512 - 516 are based upon examination of drill cuttings and observation of drilling progress. All boreholes were advanced into sound bedrock. Drilling equipment was cleaned and washed with tap water between boreholes to minimize cross-contamination. Boring logs for OW 505 - 516 and 189 are included as Appendix A.

All monitoring wells were constructed of 4 inch Schedule 40 PVC pipe with threaded flush joints manufactured by the Atlantic Screen Company. Each well was screened with a 10 foot section of slotted PVC (slot size .040 inch) with threaded fittings. No pipe cement was used in any of the wells.

The screens in all walls were placed so as to include the upper few feet of bedrock and the zone of weathered rock and till which overlies solid rock. OW 510 was completed utilizing a gravel pack (pea gravel) surrounding the screened section. The remaining wells were naturally developed by allowing the formation to collapse around the screen. The borehole above each screen was backfilled with a bentonite-cuttings mixture and a concrete collar placed around the casing at the surface. Well details are summarized in Table 1.

2.2 Well Survey

A field survey was conducted to determine ground elevations for Wells 505 - 516 and 189. Ground and top of casing elevations are given in Table 1. Previous topographic mapping was utilized as the basis for the topographic map of the site included as Plate 1.

3. GEOLOGY AND HYDROLOGY

3.1 Unconsolidated Deposits

The Victory Plaza site is located on the ascending hillslopes which form the valley walls of the Susquehanna River Valley. The plaza is bordered directly on the west by Barnes Creek which is a tributary to the Susquehanna. Surface elevations at the plaza range from 840 to 876 feet.

TABLE 1

WELL DETAILS

Well	Well Depth (Ft.)	Surface Elevation	Top of Casing Elevation	Bedrock Elevation	Screened Interval (Ft.)	Water Elevation (Completion)	Water Elevation (4/2/84)
505	41	866.00	865.92	830.00	36-41	--	857.83
506	41	860.60	860.39	824.60	36-41	--	850.93
507	43	862.00	865.00	824.00	38-43	--	845.33
508	36	861.10	863.60	830.10	31-36	--	855.10
509	36	862.60	865.27	831.60	31-36	--	858.43
189	41	860.10	864.10	824.10	36-41	--	857.26
510	42	857.52	860.85	819.52	30.5-40.5	846.00	850.47
511	50	874.66	876.16	830.60	40-50	866.24	868.49
512	34	874.96	874.63	844.96	24-34	853.46	864.71
513	40	870.96	870.63	836.96	30-40	852.00	860.29
514	40	860.22	859.72	824.22	30-40	853.50	853.55
515	25	875.66	875.66	855.66	15-25	868.66	872.99
516	12	877.96		872.96	2-12	876.46	877.04

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The general geology of the area has been described in detail in previous reports of the main IBM site. Bedrock in the entire area is mantled with unconsolidated deposits of glacial origin. The unconsolidated deposits range in thickness from several feet in the uplands to 100 feet in the center of the Susquehanna River Valley. In the floodplain of the Susquehanna, the unconsolidated deposits consist of fine grained lacustrine deposits which overlie coarse textured sand and gravel (glacial outwash) and glacial till. The sand and gravel comprises a highly productive aquifer in the valley.

In the uplands at elevations above approximately 830 feet, the principal unconsolidated deposit is glacial till which overlies bedrock. In these upland areas, groundwater in the unconsolidated deposits is primarily encountered in a zone of fractured and weathered rock which separates the till and sound bedrock. Bedrock throughout the area is composed of shale and siltstone of Devonian age.

The boring logs of Wells 505 - 516 and 189 were utilized to prepare the geologic cross sections shown on Figures 2-4. Because in situ samples were collected from only two wells, the contacts as shown are approximate.

While the principal unconsolidated deposit underlying the Victory Plaza is glacial till, boring logs indicate that Barnes Creek has had an important influence on the surficial deposits of the area. While Barnes Creek is now a small stream, it undoubtedly carried larger volumes of meltwater from the uplands to the Susquehanna during deglaciation. The boring log of CW 510 (see Figure 2) indicates that 2 major units of surficial deposits are present. The uppermost unit consists of poorly sorted sand, silt and rounded gravel which is not particularly dense. At the base of this unit was a layer of cobbles approximately 3 feet thick. Water was first encountered in this zone. Below this unit was a zone of poorly mixed sand, silt, clay and angular gravel much denser than above which is identified as unaltered glacial till. Below this till is a zone of broken and weathered rock approximately 3 to 5 feet thick which overlies bedrock.

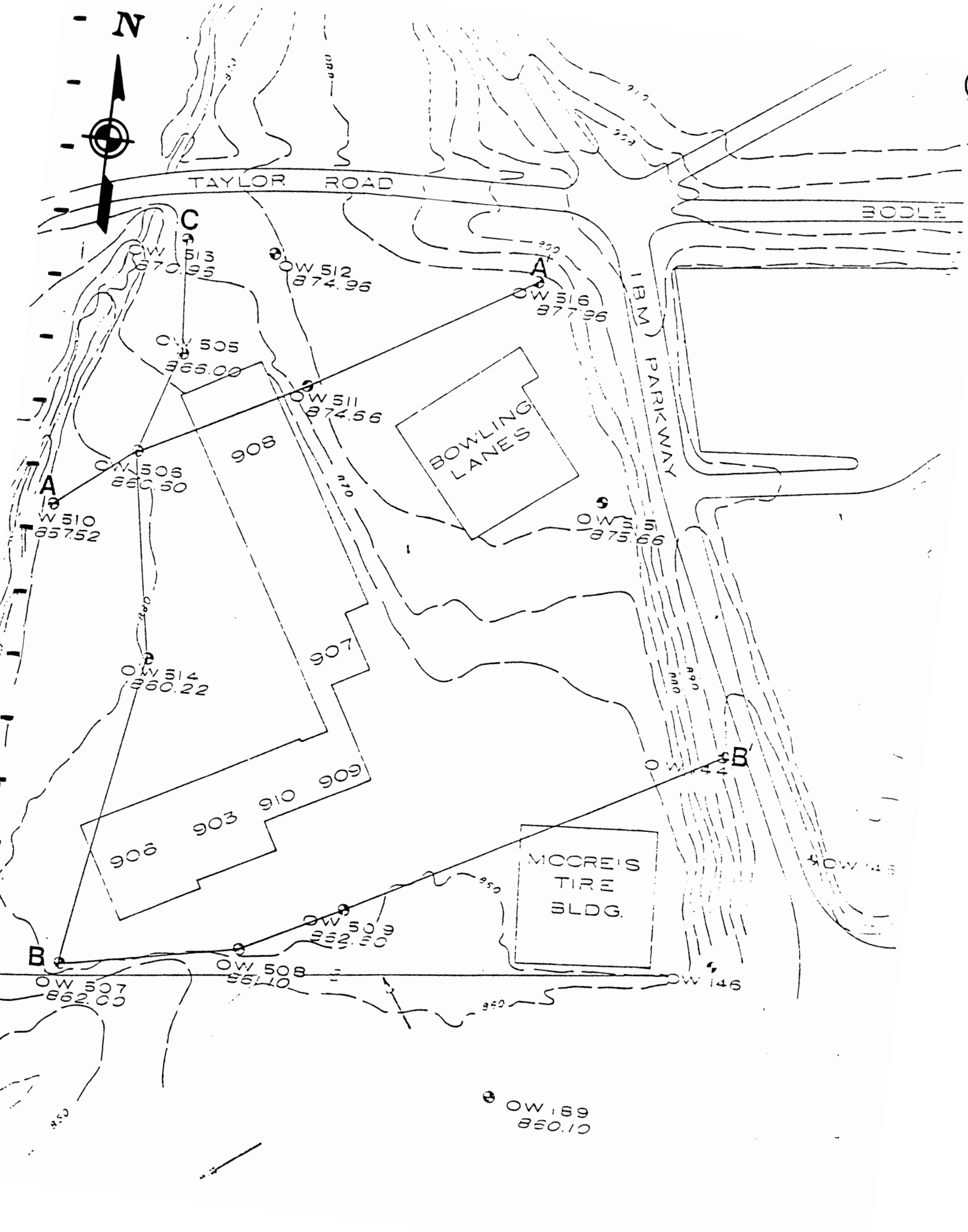
The uppermost unit which appears as "Sand and Gravel and Till" on the cross sections probably represents several different deposits including recent alluvium at the surface and older "reworked till" near the base which represents the alteration of the glacial till by the meltwaters discharging from Barnes Creek. The important distinguishing feature between these two units is that the upper unit is more permeable and less dense than the lower. Groundwater is first encountered at the top of the lower unit because it is less permeable than the upper.

In cross section A-A' (Figure 2), the layer of cobbles and sand and gravel appears to be continuous from OW 510 to Wells 506 and 511 in a direction perpendicular to Barnes Creek. Beyond Well 511, the sand and gravel apparently pinches out and the upper and lower units appear to become continuous.

In cross section B-B' (Figure 5) located further downstream, similar stratigraphy is evident with less dense sand and gravel and till overlying dense till.

Section C-B (Figure 4) is oriented parallel to Barnes Creek and the two units, separated by a more permeable zone of sand and gravel, can be traced from Well 513 to 507. With the exception of the deeper, thicker sand and gravel deposit logged in Well 506, the elevations of the sand and gravel form a smooth, descending profile along the axis of Barnes Creek. This suggests that the sand and gravel deposits noted in the logs of the wells closest to Barnes Creek are continuous and that they are not isolated lenses of material.

To summarize the geology of the unconsolidated deposits of the Victory Plaza area: surficial materials at the site consist of glacial till, sand and gravel and alluvium of Pleistocene and recent age. The deposits are thickest in the vicinity of Barnes Creek, ranging in thickness from 38 feet in OW 510 to 44 feet of OW 511. East of OW 511, overburden thickness decreases as bedrock elevations rise. Overburden thickness is only 5 feet in OW 516.


N
TAYLOR ROAD
BODLE
IBM PARKWAY
C
OW 513
870.95
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OW 505
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874.56
BOWLING LANES
908
A
OW 506
880.50
OW 510
857.52
OW 515
875.66
907
OW 514
860.22
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MOORE'S TIRE BLDG.
OW 509
852.50
B
OW 508
856.10
OW 507
862.00
OW 146
OW 189
850.10

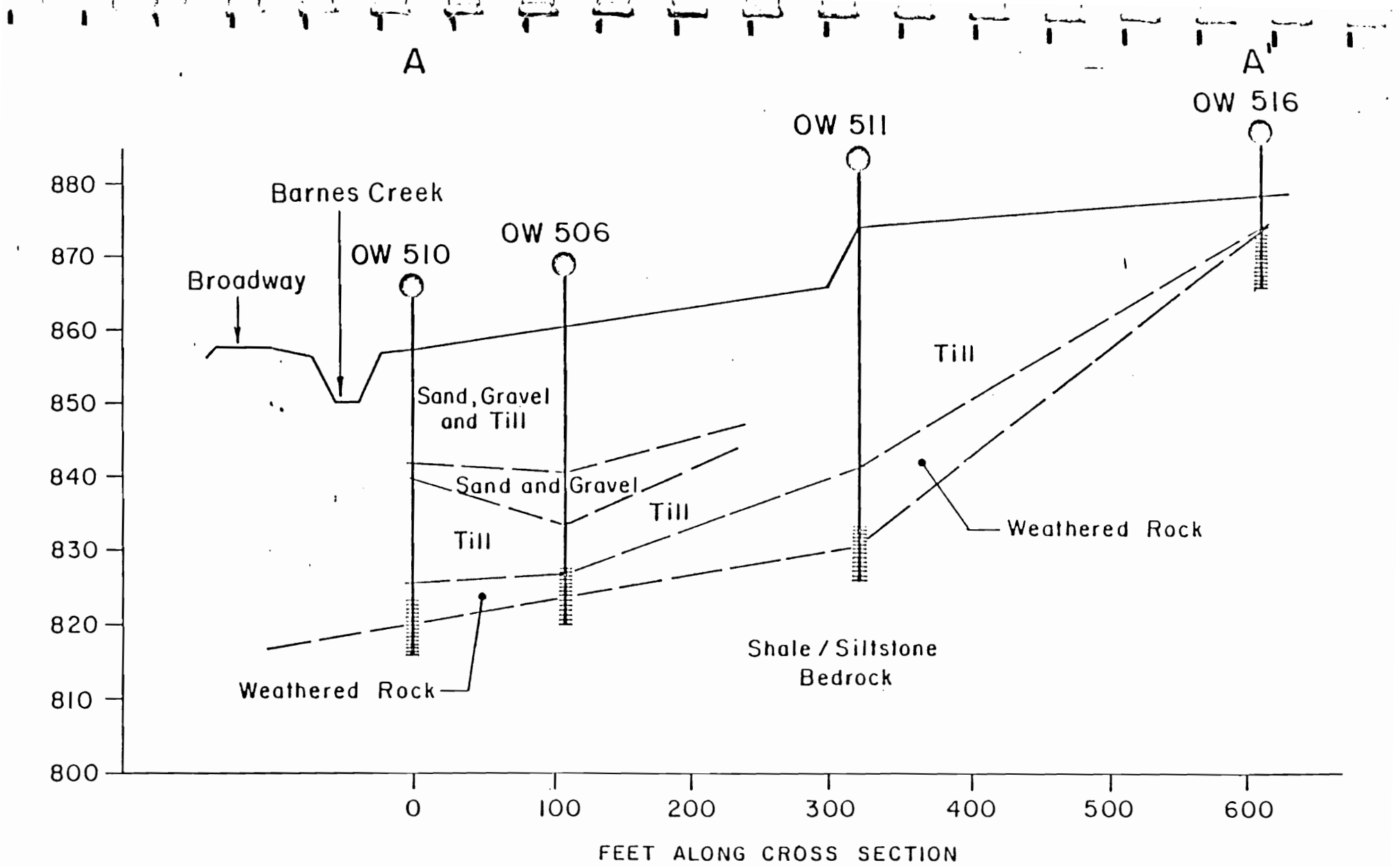


FIGURE 2. CROSS SECTION A - A'

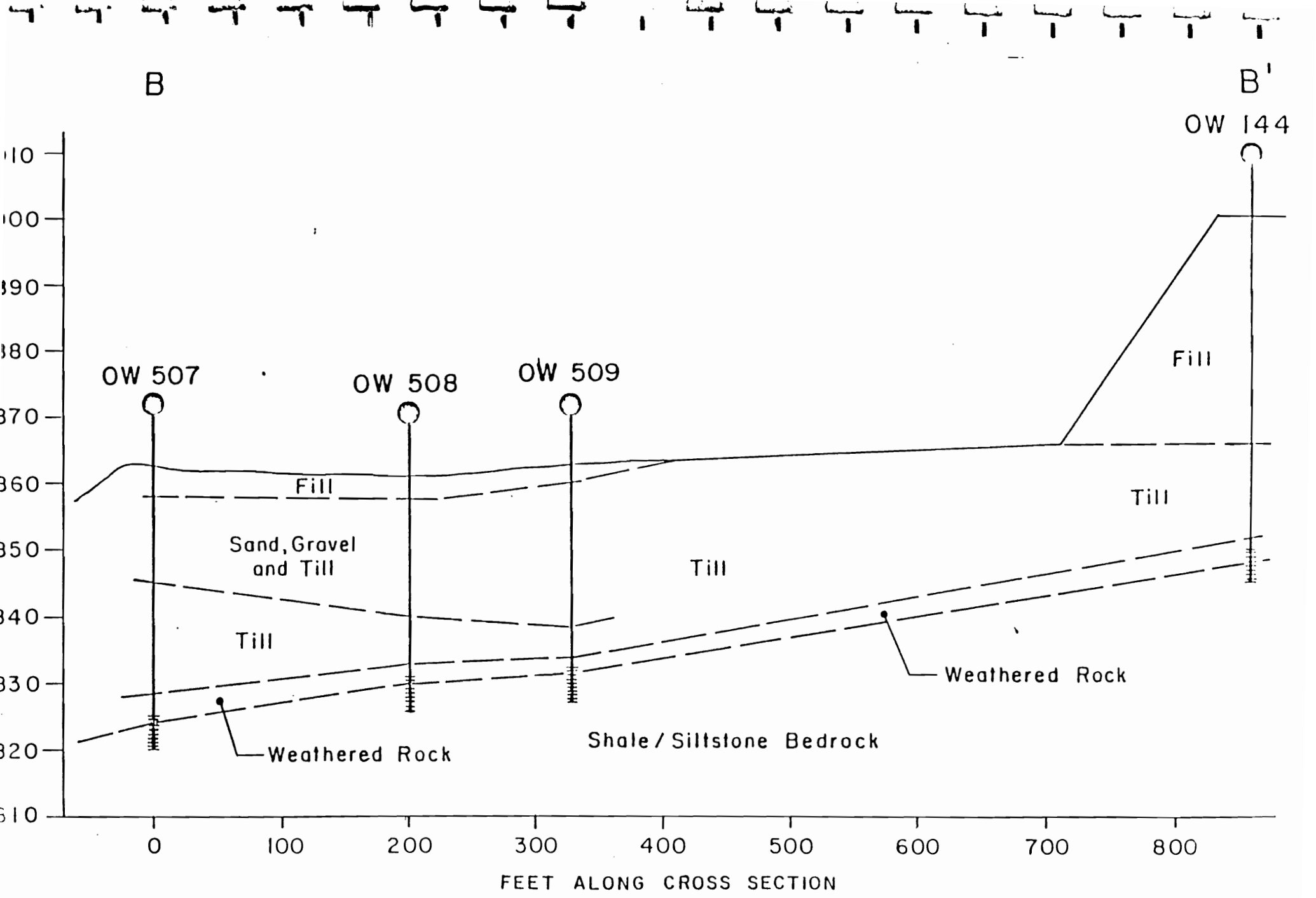


FIGURE 3. CROSS SECTION B-B'

Two principal units are present, an upper zone composed of alluvium, reworked till and sand and gravel and a lower, dense till. These can be distinguished most readily adjacent to Barnes Creek. The units are separated in most areas by a more permeable zone of sand and gravel. East of OW 511, the upper and lower units could not be separated. In all wells, a zone of weathered till and rock was encountered between the lower, dense till and bedrock.

3.2 Bedrock

Bedrock through the area consists of grey shales and siltstones of Devonian age. Depth to bedrock in the plaza area ranges from 5 feet in OW 516 to 44 feet in OW 511. A map of bedrock contours is included as Plate 2.

The plate demonstrates that bedrock contours roughly conform to the surface topography. One bedrock "valley" extends from the vicinity of Wells 507 - 509 eastward to the Alligator Pit. North of Wells 507 - 509, bedrock contours are parallel to the axis of Barnes Creek, conforming to the surface topography of this valley. Based upon available boring data, the Alligator Pit area proper is separated from the northern portion of the Victory Plaza by a bedrock divide which is at an elevation 10 feet higher than the bottom of the pit.

3.3 Hydrology

All of the wells installed during this investigation (510-516) were screened with a 10 foot section of .040 inch plastic screen at the bottom of the hole. All of these wells are screened in the interval that includes the upper few feet of bedrock and the zone of weathered and fractured rock above sound rock.

During drilling, water was first encountered at elvations considerably above the interval that was ultimately screened. This occurred in the layer of permeable deposits that lies above the dense, lower till. Sediment samples of the lower till indicated that these materials are moist

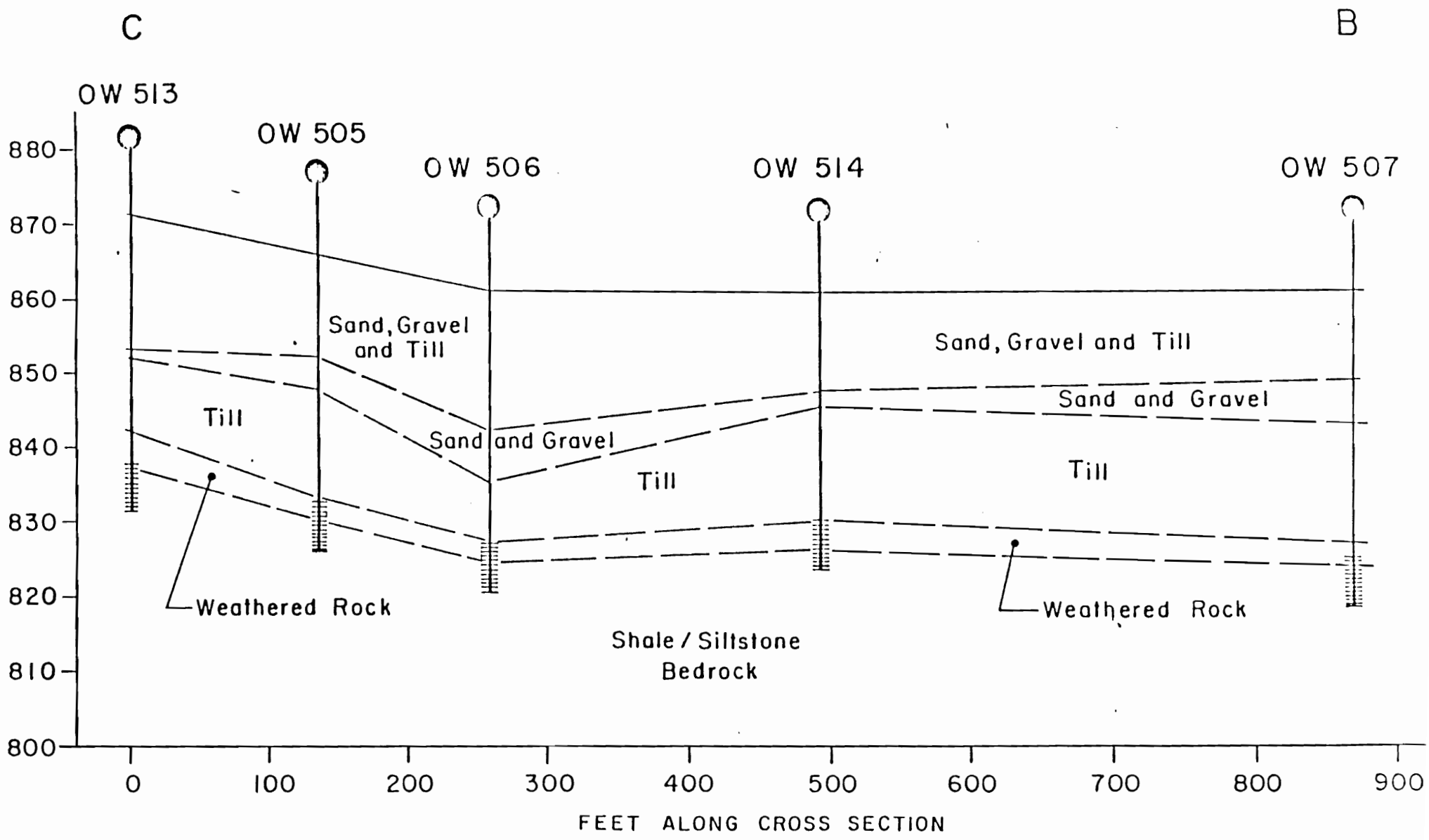


FIGURE 4. CROSS SECTION C-B

or saturated. Thus, the zone of saturation extends from the depth at which water was first encountered to bedrock. The lower till acts as an aquitard which, while saturated, permits groundwater flow at low velocities. It appears that the more significant quantities of water are present in the upper bedrock/weathered rock zone.

Estimated yields of the wells range from less than 1 gpm (512, 513, 515, 516) to 5 gpm (511, 514) and higher (OW 510). OW 510 which is located adjacent to Barnes Creek was pumped at approximately 10 gpm for 1 hour during development with a drawdown of 8.5 feet in the pumping well and 3.6 feet in Well 506. Within 30 minutes, the water level in Well 510 had recovered to within 6 inches of the original static level. It is estimated that OW 510 could produce 25-30 gpm. The high yield of OW 510 is possibly due to both of the following reasons: 1) the screened interval is hydraulically connected to Barnes Creek and the aquifer receives recharge from this source and 2) the bedrock topography suggests that the general area along Barnes Creek is a discharge point for groundwater in the upper portion of the bedrock aquifer.

Water levels in approximately 20 wells were measured on April 2, 1984. This data was utilized in plotting the potentiometric map included as Plate 3. The contours east of the IBM Parkway and south of Well 189 represent groundwater elevations under natural (non-pumping) conditions from previous IBM investigations. The potentiometric map demonstrates contours which are similar in configuration to the topographic and bedrock maps. Water elevations are highest in OW 516 and decrease to the south towards the bedrock depression which extends into the Alligator Pit area and to the west towards Barnes Creek. A water table divide can be approximately located and extends from the vicinity of OW 516 towards the northwest corner of the Moore's Tire Building. This indicates that water from the Alligator Pit flows towards the west and not towards Wells 511, 505, 506 and 510. West of the Victory Plaza boundary (Barnes Creek), it can only be presently presumed that the principal flow direction is towards the west and southwest, although local patterns may be influenced by Barnes

Creek or bedrock topography. In particular, a more southerly flow component may be present along Barnes Creek which would be expected to be most pronounced in the upper portion of the aquifer.

As stated previously, a hydraulic connection may exist between the aquifer and Barnes Creek. Although not conclusive, this is suggested by the high yield and rapid recovery of OW 510. Groundwater elevation in OW 510 is at 850 feet which is approximately the same elevation as the channel elevation of Barnes Creek in this area (849 feet). If a hydraulic connection exists, the recharge-discharge relationship probably varies seasonally with the Creek recharging the aquifer during some periods and the reverse at other times. This relationship could be substantiated by conducting a pump test on OW 510 and by installing a shallower monitoring well at the same location to determine vertical gradients.

4. CHEMICAL ANALYSIS

4.1 Groundwater

All wells installed as part of this investigation were sampled twice. Each well was sampled after completion and analyzed for pH, oil and grease and volatile halogenated organic (VHO) compounds. The analytical laboratory was directed to analyze for gasoline components if benzene, toluene or xylene (BTX) were detected during the VHO scans. Because BTX was not found during any VHO scans, analysis for linear gasoline components was not conducted.

Observation Wells 510 - 516 were also sampled for VHO's on April 2, 1984. On this date, Wells 505-509, 189, 142, 143, 144, 145 and 146 were also sampled and analyzed. Wells were evacuated before sampling. Samples were collected with a stainless steel bailer which was cleaned after each use. Analyses were conducted by O'Brien and Gere of Syracuse, New York. In addition, analyses were conducted by IBM during the investigation. A summary of groundwater analyses is included in Tables 2 and 3.

TABLE 2

INORGANIC ANALYSIS

Constituent	Well 505	506	508	509	507	189
pH	6.8	6.3	7.4	7.4	7.7	7.7
Cu	<.05	<.05	<.05	<.05	<.05	<.05
Cr	<.05	<.05	<.05	<.05	<.05	<.05
Fe	0.13	0.14	0.48	0.30	0.47	0.40
Ni	0.02	0.03	0.04	0.03	0.04	0.03
Ag	<.05	<.05	<.05	<.05	<.05	<.05
Zn	0.02	0.02	<.01	<.01	0.02	0.09
Pb	<.05	<.05	<.05	<.05	<.05	<.05
Na	90	210	31	28	17	—
Cd	<.05	<.05	<.05	<.05	<.05	<.05
Ca	127	115	39	82	60	80
Mg	42	36	15	23	17	80
NH_3	0.29	<.1	0.24	0.34	0.17	0.24
Cl	710	640	55	48	110	143
SO_4	37	42	28	18	20	25
As	<.1	<.1	<.1	<.1	<.1	<.1

Results in mg/l; pH in pH units.

All analysis by IBM; samples collected January 26-27, 1984.

TABLE 3

ORGANIC ANALYSIS FROM OBSERVATION WELLS*

Well No.	Date	Analysis	Methylene Chloride	Methyl Chloroform	Tri-Chloroethylene	Tetrachloro Ethylene	Notes
505	1/26/84	IBM	<5		<5	<5	
	1/27/84	IBM	<5	<5	25	<5	pH = 6.8
	2/1/84	IBM	<5	<5	15	<5	
	2/3/84	OBG	<1	<1	110	<1	1,2-Dichloroethane-2
	4/12/84	IBM	<1	1	107		
	4/2/84	OBG	<1	<1	130		
506	1/26/84	IBM	<5		<5	<5	
	1/27/84	IBM	<5	<5	55	<5	pH = 6.3
	2/1/84	IBM	<5	<5	60	<5	
	2/3/84	OBG	<1	<1	91	<1	1,2-Dichloroethane<1
	4/2/84	IBM	<1	1	61		
	4/2/84	OBG	<1	2	70		
507	1/26/84	IBM	<5		<5	<5	
	1/27/84	IBM	<5	<5	<5	<5	pH = 7.7
	2/1/84	IBM	<5	<5	<5	<5	
	4/2/84	OBG	<1	<1	<1		
508	1/26/84	IBM	<5		<5	<5	
	1/27/84	IBM	<5	<5	<5	<5	pH = 7.4
	2/1/84	IBM	<5	<5	<5	<5	
	4/2/84	OBG	<1	<1	<1		
509	1/26/84	IBM	<5		<5	<5	
	1/27/84	IBM	<5	<5	<5	<5	pH = 7.4
	2/1/84	IBM	<5	<5	<5	<5	
	4/2/84	OBG	<1	<1	3		

TABLE 3 (Cont'd.)

Well No.	Date	Analysis	Methylene Chloride	Methyl Chloroform	Tri-Chloroethylene	Tetrachloro Ethylene	Notes
510	3/20/84	IBM	<1	<1	110		
	3/20/84	IBM	<1	<1	120		
	3/21/84	OBG	<1	<1	110		
	3/22/84	IBM	<1	<1	130		
	4/2/84	IBM	<1	5	82		
	4/2/84	OBG	<1	<1	100		pH = 6.4, Oil and Grease <1 mg/l
511	3/22/84	IBM	1	3	190		
	3/23/84	OBG	<1	<1	150		
	4/2/84	IBM	4	1	153		
	4/2/84	OBG	<1	<1	180		pH = 6.6, Oil and Grease = 1 mg/l
512	3/23/84*	IBM	<1	<1	<1		
	3/24/84	IBM	<1	3	<1		
	3/24/84	IBM	<1	<1	<1		
	3/26/84	OBG	<1	<1	<1		
	4/2/84	IBM	<1	1	1		
	4/2/84	OBG	<1	<1	<1		pH = 7.1, Oil and Grease = 2 mg/l
513	3/24/84	IBM	<1	<1	6		
	3/26/84	OBG	<1	<1	4		
	4/2/84	IBM	<1	1	<1		
	4/2/84	OBG	<1	<1	2		pH = 7.8, Oil and Grease <1 mg/l
514	3/27/84*	IBM	<1	8	3		
	3/28/84	IBM	<1	<1	<1		
	3/28/84	OBG	<1	<1	<1		
	4/2/84	OBG	<1	<1	<1		pH = 7.1, Oil and Grease = 3 mg/l

*Sample from augers at 27 ft.

*Sample from auger before completion at 40 ft.

TABLE 3 (Cont'd.)

Well No.	Date	Analysis	Methylene Chloride	Methyl Chloroform	Tri-Chloroethylene	Tetrachloro Ethylene	Notes
515	3/28/84	IBM	<1	<1	24		
	3/28/84	IBM	<1	<1	44		
	3/28/84	OBG	<1	<1	53		
	4/2/84	IBM	<1	1	55		
	4/2/84	OBG	<1	<1	52		pH = 6.3, Oil and Grease = 8 mg/l
516	3/30/84	IBM	<1	<1	28		
	3/30/84	OBG	<1	<1	33		
	4/2/84	IBM	<1	<1	19		
	4/2/84	OBG	<1	<1	21		pH = 6.2, Oil and Grease = 1 mg/l
142	4/2/84	IBM	1	3	1		
	4/2/84	OBG	<1	<1	<1		
143	4/2/84	IBM	<1	<1	<1		
	4/2/84	OBG	<1	<1	<1		
144	4/2/84	IBM	<1	<1	<1		
	4/2/84	OBG	<1	<1	<1		
145	4/2/84	IBM	<1	2	<1		
	4/2/84	OBG	<1	<1	<1		
146	4/2/84	IBM	<1	<1	<1		
	4/2/84	OBG	<1	<1	<1		
189	4/2/84	IBM	<1	2	2		
	4/2/84	OBG	<1	2	<1		

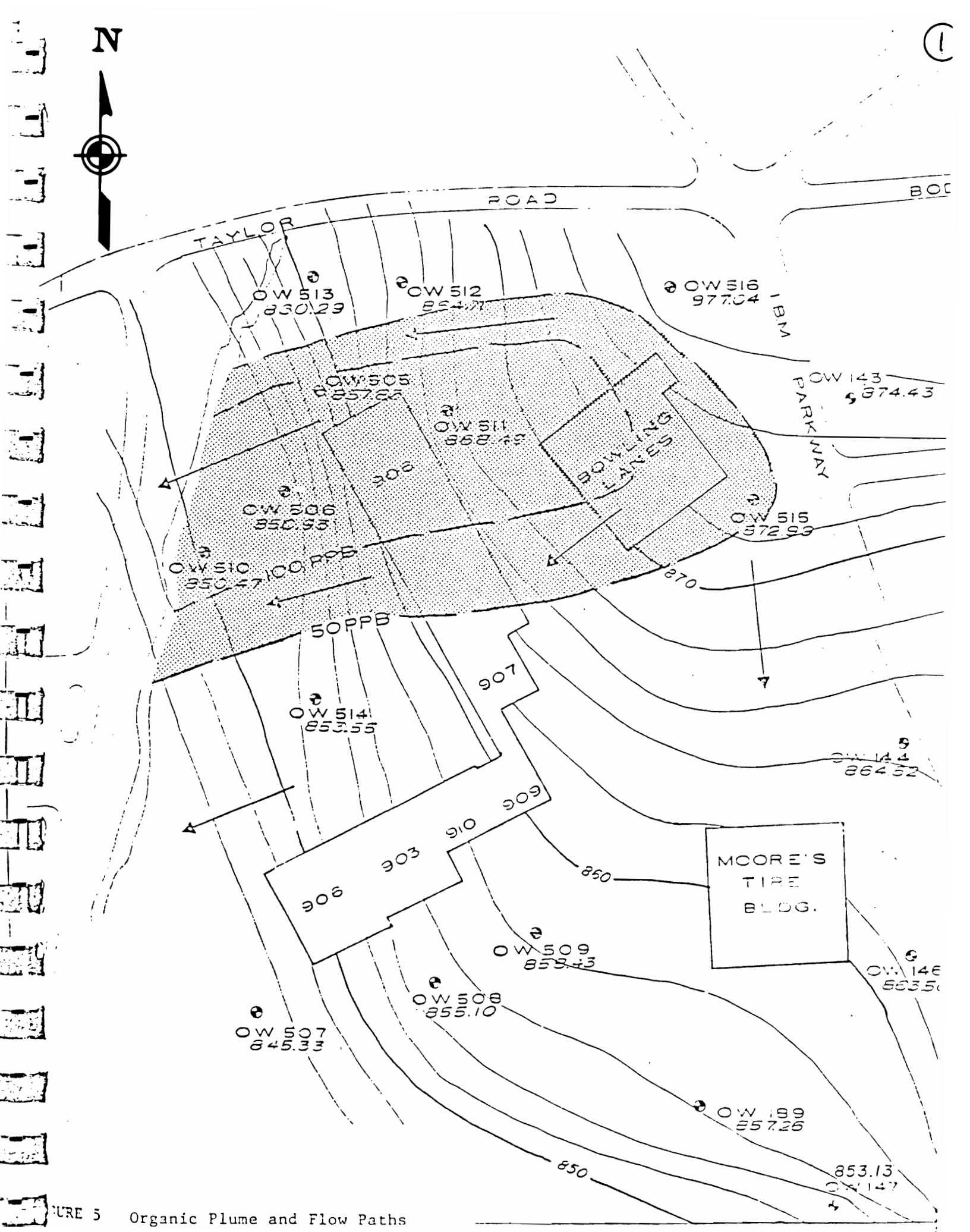
*Organic concentrations in ppb; oil and grease in mg/l (ppm); pH in pH units.

Trichloroethylene (TCE) is the only organic found in significant concentrations in the Victory Plaza area. The TCE concentrations fall into three groupings: concentrations beteen 90-180 parts per billion (ppb) as found in OW 505, 506, 510 and 511; concentrations between 20-60 ppb (OW 515, 516); and concentrations near or below the limits of detection (all remaining wells within the Victory Plaza area). Trichloroethylene concentrations are plotted on Plate 4. The concentrations represent an average of the three highest TCE analyses for each well. These concentrations were used to plot the 50 and 100 ppb contours by linear interpolation.

The trichloroethylene concentrations found in groundwater at the Victory Plaza site exceed the 1977 New York State Department of Health "Interim Guidelines" of 50 ppb for synthetic organic chemicals in drinking water and the New York State Department of Environmental Conservation TCE standard of 10 ppb for Class GA groundwater. The TCE plume is located primarily in the northern portion of the Victory Plaza-Owego Bowl area with the highest concentrations found near the northern portion of Building 908 and to the east. OW 510 which is located adjacent to Barnes Creek along the Victory Plaza property line on the west contains TCE ranging from 80-130 ppb. Because the known groundwater flow paths are towards the west in this area, it is assumed that the TCE plume has migrated beyond the Victory Plaza boundary on the west. Figure 5 shows the plume boundaries in relation to the groundwater equipotential lines.

On the north, OW 512 and 513 exhibit TCE concentrations near or below the detection limits. TCE is found in concentrations ranging from 19 to 55 ppb in Wells OW 515 and 516 which are located to the west of the Owego Bowl at the base of the IBM Parkway embankment. It is assumed that the concentrations in these wells represent the easternmost boundary of a TCE plume that is continuous with the Victory Plaza. Analysis of Wells 142, 143, 144, 145 and 146 on the main IBM site indicate non-detectable concentrations of TCE.

IBM 55



URE 5 Organic Plume and Flow Paths

The plume boundary to the south is not well defined but does not extend beyond OW 514 on the basis of present information. It is not known how far to the south of OW 511 the TCE extends along the access road leading to Moore's Tire.

4.2 Sediment

Split spoon samples of unconsolidated materials from OW 510, 511 and 514 were analyzed for volatile halogenated organic compounds. Analysis were conducted both by O'Brien and Gere and IBM. These analyses are summarized in Table 4.

In OW 510, sediment from 33 feet contained 1,100 ug/kg of TCE. This corresponds to the screened interval. Groundwater from this interval contains 80-130 ug/l (ppb) of TCE. Sediment from 18 feet, the depth at which water was first encountered, contained 53 ug/kg of TCE. The groundwater at this interval can also be expected to contain TCE.

Sediment samples from OW 511 contained non-detectable concentrations of TCE (<10 ppb). Since groundwater from OW 511 contains the highest TCE concentrations at the Victory Plaza, it is assumed that its apparent absence in sediment samples is due to sampling or analytical errors.

Sediment from OW 514 also contained non-detectable concentrations (<1 ppb). This is consistent with groundwater analysis from the well.

TABLE 4

SEDIMENT ANALYSIS FROM OBSERVATION WELLS

Well	Analysis	Interval (Ft. Below Surface)	Trichloroethylene[1]
510	IBM	13	ND
	OBG	18	53
	IBM	23	ND
	OBG	33	1,100
511	OBG	18	<10
	OBG	33	<10
514	OBG	14	<1

[1]Results in ug/kg, wet weight

ROTARY & CONTINENTAL
Box 133, Pierce Creek Rd
Binghamton, N. Y. 13903

ROBERT O. MARTIN SR., Owner

2-3-84

MONITORING WELLS VICTORY PLAZA

Well#1 505
o-14 hardpan
14-18 wet sand and gravel
18-34 mixed sand and gravel and hardpan
34-36 weathered or broken shale, a littlewater
36-41 solid bedrock

Well#2 507
0-12 hardpan
12-14 gravel with water
14-18 gravel with silt quite easy drilling
18-35 mixed hardpan,sand, gravel,silt
35-38 broken rock
38-43 solid bedrock, some water from rock

Well#3 508
0-3 fill
3-10 sand, gravel, silt,clay, dry
10-24 sand, gravel, silt, with some water
24-29 sand and gravel more solid
29-31 broken rock
31-36 solid bedrock water near top of rock

Well#4 509
0-8 sand, gravel, silt
8-12 sand,gravel, silt with water
12-25 sand, gravel,silt, clay. wet
25-28½ sadd,gravel,clay, compact
28½-31 broken rock
31-36 solidrock water from rock

Well#5 506
0-4 could be fill
4-20 hardpan a little moisture, mostly dry
20-28 sand and gravel (dirty)
28-35 hardpan
35-36 broken rock
36-41 solid bedrock. about 1gpm. from rock

Well#6 189
0-25 mushy sand gravel silt with a little water
25-34 sand and gravel with an occasional large rock
34-36 broken rock
36-41 solid rock. Water from just ontop of solid rock and out of bedrock.

(1)

DATE
STARTED 3/19/84
FINISHED 3/20/84
SHEET 1 OF 2

McFARLAND-JOHNSON ENGINEERS, INC.

171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 510
SURF. EL. 857.52
JOB NO. 84-3410
GROUND WATER DEPTH 846

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
0-15'	5'	1	Poorly sorted mixture of gravel, sand and silt. Gravel mostly <1" in diameter, rounded. Sample dry.	
	13'	2	Poorly sorted sand, silt and rounded gravel. Reddish brown. Moist.	
15'-17'			Layer of gravel 2"-3" in diameter.	Water encountered at 17'.
17-28	18'	3	Poorly sorted sand, silt and angular gravel (Till). Water in hole.	
	23	4	Poorly sorted sand, silt and angular gravel (Till).	
28-33	28	5	Med-Coarse sand and fine gravel, mostly < 1/4". Wet.	
33-38	33	6	Brown sand and silt with weathered shale and sandstone.	Zone of weathered till and broken bedrock.

DATE
STARTED 3/19/84
FINISHED 3/20/84
SHEET 2 OF 2

McFARLAND-JOHNSON ENGINEERS, INC.

171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 510
SURF. EL. 857.52
JOB NO. 84-3410
GROUND WATER DEPTH 846

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
	38	7	Grey clay and weathered shale.	
38-42			Grey shale hole completed at 42'.	
			Screened interval 30.5 - 40.5' .040 slot, gravel packed.	
			Water level 11' below TOC after completion. Pumped at ca. 10 gpm for 20 min. with 5 feet of draw down.	
			Potential for 20-30 gpm.	

DATE
STARTED 3/20/84
FINISHED 3/21/84
SHEET 1 OF 2

McFARLAND-JOHNSON ENGINEERS, INC.

171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 511
SURF. EL. 874.66
JOB NO. 84-3410
GROUND WATER DEPTH 866.24

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
0-5			Brown sand, silt and medium gravel. Some large boulders. Could be fill. Dry.	
5-23	13	1	Brown silt and sand, some fine gravel. Dry.	
	18	2	Brown grey silt, sand and gravel. Moist.	
	23	3	Grey silt, sand, gravel. Some rocks 1" diameter in core. Wet.	
24-33	28	4	Grey sand, silt, clay and gravel. Wet.	Static level in auger 15' when auger down 28'.
33-44	33	5	Brownish grey silt, sand and gravel. Some grey shale in core.	Weathered till and broken rock zone.
44-50			Grey shale.	

(1)

DATE
STARTED 3/20/84
FINISHED 3/21/84
SHEET 2 OF 2

McFARLAND-JOHNSON ENGINEERS, INC.

171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 511
SURF. EL. 874.66
JOB NO. 84-3410
GROUND WATER DEPTH 866.24

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
			Screened Interval 40-50' .040 slot, naturally developed Water Level 11' below TOC after completion. Estimated yield 5 gpm.	

(1)

DATE
STARTED 3/22/84
FINISHED 3/22/84
SHEET 1 OF 1

McFARLAND-JOHNSON ENGINEERS, INC.

171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 512
SURF. EL. 874.96
JOB NO. 84-3410
GROUND WATER DEPTH 853.46

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
0-5			Brown sand, silt and gravel. Dry.	Appears to be fill.
5-21			Brown sand, silt, clay and gravel. Poorly sorted. Moist.	Till and sand and gravel.
21-24			Coarser more permeable zone. Water encountered at 23'.	
24-30			Poorly sorted sand, silt, clay and gravel.	Till.
30-34			Grey shale bedrock.	
			Screened Interval 24-34' .040 slot, naturally developed yield < 1 gpm. Water level 21.5' below surface at completion.	

(1)

DATE STARTED 3/23/84
FINISHED 3/23/84
SHEET 1 OF 1

McFARLAND-JOHNSON ENGINEERS, INC.

171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 513
SURF. EL. [illegible]
JOB NO. 84-3410
GROUND WATER DEPTH 852

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
0-19			Poorly sorted sand, silt, clay and gravel.	Mixed till and sand and gravel.
19-21			More permeable zone. Water first encountered at 19'.	
21-30			Poorly sorted sand, silt, clay and gravel.	"Lower" till zone. Denser and more compact than above.
30-34			Weathered rock and till.	
34-40			Grey shale bedrock.	
			Screened Interval 30-40' .040 slot, naturally developed water level 19' below surface after completion.	
			Yield 1 gpm.	

(1)

DATE
STARTED
FINISHED 3/26/84
SHEET 1 OF 1

McFARLAND-JOHNSON ENGINEERS, INC.

171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 514
SURF. EL. 860.22
JOB NO. 84-3410
GROUND WATER
DEPTH 853.5

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
0-13			Brown, poorly sorted sand, silt, clay and gravel.	
13-18			Dirty sand, silt and gravel. Water first encountered at 13'.	
18-36			Poorly sorted sand, silt, clay and gravel.	
36-40			Grey shale bedrock.	
			Well completed at 40' Screened Interval 30-40' .040 slot, naturally developed.	
			Yield ca. 3-5 gpm.	

DATE STARTED
FINISHED 3/27/84
SHEET 1 OF 1

McFARLAND-JOHNSON ENGINEERS, INC.
171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 515
SURF. EL. 875.66
JOB NO. 84-3410
GROUND WATER DEPTH 868.66

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
0-18			Poorly sorted sand, silt, clay and gravel.	Till.
18-20			Weather 1 rock and till. Water encountered at 18'.	
20-25			Grey shale bedrock.	
			Well completed at 25' Screened Interval 15-25' .040 slot, naturally developed.	
			Water Level 7' below surface after completion.	

DATE
STARTED
FINISHED 3/28/84
SHEET 1 OF 1

McFARLAND-JOHNSON ENGINEERS, INC.
171 FRONT STREET
BINGHAMTON, NEW YORK
13905

HOLE NO. 516
SURF. EL. 877.96
JOB NO. 84-3410
GROUND WATER DEPTH 876.46

TEST BORING LOG

PROJECT IBM Victory Plaza LOCATION

DEPTH	SAMPLE DEPTH	SAMPLE NO.	SOIL OR ROCK CLASSIFICATION	NOTES
0-5			Poorly sorted sand, silt, clay and gravel.	
5-12			Grey shale bedrock.	
			Well completed at 12'. Screened Interval 2-12' .040 slot, naturally developed.	
			Water 18" below surface after completion yield 1 gpm.	

Laboratory Report

McFARLAND & JOHNSON ENGINEERS, INC.

2223.001.517

IBM Owego Bore Program

See Below

Bore	Date	Matrix	Lab #	Methylene Chloride	1,1,1-Trichloro-ethane	Trichloroethylene	Tetrachloro-ethylene	Trans-1,2-Dichloro-ethene	pH, Laboratory	Oil & Grease
513	3-26	w	61187	<1.	<1.	4.	<1.	<1.	7.8	<1.
513	4-2	w	73000	<1.	<1.	2.	<1.	<1.	-	-
514		w	61298	<1.	<1.	<1.	<1.	<1.	7.3	3.
514		s	61188	<10.	<10.	<10.	<10.	<10.	-	-
514	4-2	w	73001	<1.	<1.	<1.	<1.	<1.	-	-
515		w	61299	<1.	<1.	53.	<1.	1.	6.3	8.
515	4-2	w	73002	<1.	<1.	52.	<1.	<1.	-	-
516		w	843	<1.	<1.	33.	<1.	<1.	6.2	1.
516	4-2	w	73003	<1.	<1.	21.	<1.	<1.	-	-

Comments:

1) For Matrix designations: w = water, s = soil

2) Volatile organic results are reported in ug/l (ppb) for water samples and ug/kg (ppb) wet weight for soils, oil and grease results are reported in mg/l (ppm).

3) Full priority pollutant purgeables were tested in the water samples. All other values were <1ppb.

Methodology: Federal Register -- 40 CFR, Part 136, December 3, 1979

Comments:

Laboratory Report

MCFARLAND & JOHNSON ENGINEERS, INC. 2223.001.517

IBM Owego Bore Program

See Below - -

Bore	Date	Matrix	Lab #	Methylene Chloride	1,1,1-Trichloro-ethane	Trichloroethylene	Tetrachloro-ethylene	Trans-1,2-Dichloro-ethene	pH, Laboratory	Oil & Grease
142	4-2	w	72986	<1.	<1.	<1.	<1.	<1.	-	-
143	4-2	w	72987	<1.	<1.	<1.	<1.	<1.	-	-
144	4-2	w	72988	<1.	<1.	<1.	<1.	<1.	-	-
145	4-2	w	72989	<1.	<1.	<1.	<1.	<1.	-	-
146	4-2	w	72990	<1.	<1.	<1.	<1.	<1.	-	-
189	4-2	w	72991	<1.	2.	<1.	<1.	<1.	-	-
505	4-2	w	72992	<1.	<1.	130.	<1.	2.	-	-
506	4-2	w	72993	<1.	2.	70.	<1.	<1.	-	-
507	4-2	w	72994	<1.	<1.	<1.	<1.	<1.	-	-
508	4-2	w	72995	<1.	<1.	<1.	<1.	<1.	-	-
509	4-2	w	72996	<1.	3.	<1.	<1.	<1.	-	-
510	3-21	w	61077	<1.	<1.	110.	<1.	<1.	6.4	<1.
510,2+3	3-21	s	61182	<10.	<10.	53.	<10.	<10.	-	-
510,5+6	3-21	s	61183	<10.	<10.	1100.	<10.	<10.	-	-
510	4-2	w	72997	<1.	<1.	100.	<1.	<1.	-	-
511	3-23	w	61158	<1.	<1.	150.	<1.	1.	6.6	1.
511,1+2	3-23	s	61184	<10.	<10.	<10.	<10.	<10.	-	-
511,3+4	3-23	s	61185	<10.	<10.	<10.	<10.	<10.	-	-
511	4-2	w	72998	<1.	<1.	180.	<1.	1.	-	-
512	3-26	w	61186	<1.	<1.	<1.	<1.	<1.	7.1	2.
512	4-2	w	72999	<1.	<1.	<1.	<1.	<1.	-	-

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Comprehensive Hydrogeologic Assessment

IBM Corporation
Owego, New York

July 1987

O'BRIEN & GERE

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REPORT

COMPREHENSIVE HYDROGEOLOGIC ASSESSMENT

IBM CORPORATION

OWEGO, NEW YORK

JULY, 1987

O'BRIEN & GERE ENGINEERS, INC.
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SECTION 1 - INTRODUCTION

1.01 Project Background

The International Business Machines Corporation (IBM), Federal Systems Division Owego facility is located approximately one mile southeast of the Village of Owego, New York. The location of the IBM site is shown on Figure 1.

Previous ground water investigations at the IBM facility have revealed that the ground water in the vicinity of the tank farm, Parking Lot 001, Tower View Drive Area and the Waste Management Area (WMA) contained elevated levels of chlorinated hydrocarbons. The chlorinated hydrocarbons including trichloroethylene, methylene chloride and methyl chloroform were detected within the ground water at each of the areas at levels exceeding the New York State Department of Conservation (NYSDEC) ground water quality standard guidelines. The studies have also defined the extent of the chlorinated hydrocarbon plumes within the ground water at each of the areas described above.

In order to control the migration of the organic plumes and to reduce the concentrations of organic compounds, IBM has installed a ground water collection and treatment facility (GTF) to remove and treat ground water. The GTF consists of a series of thirteen withdrawal wells and a packed column air stripping treatment system. Five of the wells are located within the Tank Farm Area, four are located within the Parking Lot 001 Area and four wells are located downgradient from the WMA. The GTF normally operates 24-hours per day, five days per week and began operation on February 23, 1983.

During the summer of 1986, the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA) reviewed IBM Owego's RCRA Part B Application, which included all sitewide ground water monitoring data. Based on their review the NYSDEC and USEPA requested that additional data be developed in the IBM ground water monitoring program to satisfy specific RCRA requirements. As a result, additional field investigations were conducted during the winter of 1986 and the spring of 1987 to provide a more comprehensive assessment of the hydrogeologic conditions at the IBM site. The hydrogeologic assessment of the WMA was included as part of the RCRA Post Closure Permit Application, which was submitted to the USEPA and NYSDEC in June, 1987. This report provides an overall sitewide hydrogeologic assessment.

1.02 Purpose and Scope

Recent field investigations at the IBM facility have been performed to address the additional information requested by the NYSDEC and USEPA and to evaluate the effectiveness of the existing and proposed corrective actions. These investigations have included the installation of additional ground water monitoring wells to improve the available data base in the vicinity of well 133 or Tower View Drive Area and northern boundary of the WMA. Ground water quality analyses and ground water elevation data were also performed and collected to assess the current status of the chlorinated hydrocarbon plumes and the effectiveness of the ground water withdrawal system. The field investigations are outlined below:

1. Installation of four ground water monitoring wells at the downgradient waste management boundary to serve as compliance wells to monitor the effectiveness of the proposed lagoon closure.
2. Packer testing of seven multiple screened monitoring wells in the vicinity of the WMA. This testing was conducted to assess vertical variations in ground water quality.
3. Installation of four ground water monitoring wells into the bedrock to assess vertical hydraulic gradients between the unconsolidated zone and the bedrock and to examine water quality impacts in the bedrock.
4. Installation of five sand and gravel aquifer monitoring wells adjacent to existing shallower wells to assess vertical gradients within the unconsolidated deposits and evaluate vertical changes in ground water quality.
5. Installation of two additional monitoring wells to monitor ground water quality downgradient from the Parking Lot 001 Area and Tower View Drive Area.
5. Sampling and analysis of the four compliance wells and well 186 for RCRA Appendix IX constituents.
7. Comprehensive ground water sampling and water level monitoring to assess the effectiveness of the withdrawal wells during pumping and non-pumping periods.

8. The installation of two additional ground water monitoring wells, one located between wells 310 and 303, and one at the southwest property boundary. These wells were installed to further quantify ground water quality within the sand and gravel aquifer and to define the area of capture generated by withdrawal well 404.

SECTION 2 - FIELD INVESTIGATIONS

2.01 Compliance Monitor Well Installations

In order to comply with RCRA Post Closure monitoring requirements at the point of compliance, four compliance monitoring wells were installed. The wells, designated as 172, 173, 174 and 175 on Figure 2, are located immediately downgradient of the WMA. Each well is constructed of 4 inch PVC pipe fitted with a 10 foot section of .020 inch slotted PVC well screen. The wells vary in depth from 18 to 33 feet, and have been screened in the sand and gravel aquifer, as determined by split samples collected at 5 foot intervals.

Compliance well construction specifications are presented in Table 1. Borings logs and well construction details are presented in Appendix A.

2.02 Packer Testing

During previous investigations at the IBM facility monitoring wells constructed with multiple screen intervals were installed. The multiple screened wells were originally designed to provide composite ground water samples from separate stratigraphic zones. Seven of these existing multiple screened installations, located downgradient of the WMA, were selected for ground water quality testing. The monitoring wells are designated as 302, 303, 304, 305, 310, 312 and 314, with well locations shown on Figure 2. Packer testing methods were used to effectively seal off the separate screened intervals in each of the seven wells. The packer tests were conducted by inserting a packer system consisting of a perforated pipe with two inflatable rubber packers

spaced 10 feet apart between the screened interval of the well. The water within the packers was evacuated until approximately 3 to 5 times this packer volume were removed. Evacuation water was retained in drums and transported to the GTF. After allowing the wells to recover, water samples were collected and submitted for laboratory analysis. Packer test data is summarized on Table 4.

2.03 Bedrock Monitoring Wells

Four ground water monitoring wells were installed into bedrock adjacent to the WMA. Three of the wells 191, 192 and 193 (Figure 2) were located immediately downgradient of the Waste Management facility.

The fourth bedrock well, 194, was installed upgradient of the facility between existing overburden wells 209 and 182. The purpose of the bedrock monitoring wells is to provide ground water chemistry and elevation data in the bedrock.

The wells were installed by first driving 8 inch steel casing to the bedrock interface, using an air-percussion hammer. An nominal 8-inch diameter hole was then drilled a minimum of 10 feet into the bedrock. A five inch diameter steel casing was then installed through the 8 inch casing into the bedrock borehole, with the annular space around the 5 inch casings filled to ground level with cement/bentonite grout. The eight inch outer casing was then removed from the hole and the grout allowed to set. A nominal 5 inch diameter borehole was then drilled into the bedrock, until sufficient ground water flow was encountered (approximately 1-2 GPM). Ground water was encountered at a depth of 80 to 85 feet with flow rates of approximately 40-50 GPM in wells 191 and 192. Flowing conditions were observed in well 191. The flowing

condition stabilized, but static water levels in well 191 remain above ground level. Ground water was encountered at approximately 65 feet in 193 with an estimated flow rate of 10-20 GPM. Wells 191, 192, and 193 were drilled to a depth of 100 feet including overburden thickness. Well 194, the upgradient installation, was drilled to 110 feet with an estimated flow rate of less than 1 GPM. Bedrock well specifications and installation procedures are included in Table 1 and Appendix B, respectively.

2.04 Additional Monitoring Wells

A total of nine additional overburden monitoring wells were installed. The purpose of these monitoring wells is to provide additional subsurface geologic information, identify and monitor higher permeability aquifer zones (i.e. sand and gravel), and monitor organic plume migration. All the overburden monitoring wells are constructed of 4" diameter PVC well casing, fitted with a 10 foot section of .020 inch slotted PVC well screen. Soil borings were sampled every five feet using split barrel sampling methods (ASTM Method D-1556). Following well completion the wells were developed using a submersible pump, and surveyed to obtain horizontal coordinates, and ground surface, and top of casing (TOC) elevations. Well specifications are included in Table 1. Well installation procedures are outlined in Appendix B. The following is a discussion of the purpose of each of these additional wells.

One of the new overburden wells, designated as 320 was installed between existing wells 154 and 157 (Figure 2). This well is 19 feet in depth with the bottom of the screen section set at the overburden/

bedrock interface. The purpose of this well is to define the extent of the plume emanating from the Parking Lot 001 Area. Another new well designated as 321 has been installed between wells 308 and 119. This well extends down to bedrock (approximately 40 feet), and was installed to define the extent of the organic plume in the Tower View Drive Area.

Five additional sand and gravel aquifer wells were installed downgradient of the WMA. These wells were located adjacent to existing monitor wells 160, 166, 168, 303, and 305, and have been designated as 317, 316, 318, 319, 315, respectively. Additionally, well 322 was installed along the south property boundary and well 323 was completed between existing wells 303 and 310. The locations of these wells are shown in Figure 2. These new wells serve to monitor the organic plume within the sand and gravel aquifer downgradient of the WMA. Boring logs and well construction details are presented in Appendix A.

2.05 Ground Water Sampling and Analyses

Following well installation and development, ground water samples were collected from all the new monitoring wells. Ground water samples were collected on two separate occasions from each new well and analyzed for volatile halogenated organics (VHOs) and benzene, toluene and xylene (BTX), in accordance with EPA methods 601 and 602.

In order to obtain baseline ground water quality data prior to closure of the existing surface impoundments, one additional round of sampling was performed on the four compliance wells, 172, 173, 174, and 175 (Figure 2). Ground water samples collected during this sampling event were analyzed for Appendix IX constituents. Only those

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hazardous constituents identified during this scan will be included in subsequent quarterly ground water analyses of samples drawn from the compliance wells. Four replicates of these analyses will be run on each sample to facilitate statistical determinations. The compliance wells will be sampled once a year for full Appendix IX analysis. Ground water analysis data is presented in Appendix E.

SECTION 3 - HYDROGEOLOGIC CONDITIONS

3.01 Geology

The IBM Owego site lies within the Appalachian Plateau Physiographic Province. Regional subsurface geology is characterized by deposits of glacial, post glacial, and recent fluvial and colluvial origin. The site specific subsurface geologic conditions encompassing the WMA have been defined and unconsolidated stratigraphic deposits correlated using subsurface boring logs.

The consolidated bedrock underlying the site is interbedded shale and siltstone. The subsurface bedrock topography underlying the site is shown in Figure 3. Bedrock surface elevations range from approximately 950 feet (MSL) at Well 109 in the northeastern portion of the site, to 716 (MSL) at Well 303. A buried bedrock valley exists in the central portion of the WMA between wells 178, 188, and 116. This valley was most likely a tributary to the primary Susquehanna River Valley prior to infilling with glacial and post glacial sediments. A second bedrock valley exists in the north central portion of the site beneath Parking Lot 001. This east-west trending bedrock valley, extending from the Tank Farm Area across the northwest property boundary, was probably a tributary to preglacial Barnes Creek.

The sitewide subsurface overburden stratigraphy is depicted by the cross-sections shown in Figures 4 through 10. The cross-sections presented as Figures 7, 8, 9, and 10 define overburden stratigraphy specifically within the WMA.

Immediately overlying bedrock is a layer of dense, gray, glacial till. The till deposit consists of an unsorted mixture of silt, clay, fine

sand, and embedded gravel and rock fragments. This dense gray till is primarily found to the south of the WMA and is overlain by other glacial deposits.

Within and to the north and east of the WMA the till deposits are brown in color, less dense (compacted) and extend from the ground surface to the top of bedrock.

Overlying the gray till to the south of the WMA is a glacio-fluvial sand and gravel, the areal extent and thickness of which are shown on Figure 11. This sand and gravel is the primary aquifer onsite.

As shown on Figure 11, this aquifer thins to the southwest and is not encountered in wells 166, 305, 314, or 303, where it has graded to interbedded (varved) glacio-lacustrine silt, clay and fine sand. The area of greatest thickness (more than 40 feet) is in the vicinity of wells 404 and 186. To the north and east, this unit pinches out against the upland till areas. Presumably correlative sand and gravel deposits were also identified in Well 306 located along the northern edge of Mirror Lake.

Generally, the site is overlain by 10 to 20 feet of alluvial and colluvial silt, clay, and fine sand. These deposits are most likely reworked till. In the vicinity of well nest 160, 161, 317 and Well 305 fine to medium gravels are interspersed with silt, clay and fine sand, and likely originate from recent alluvial processes along Barnes Creek.

3.02 Regional Hydrogeology

Ground water recharge occurs primarily as a result of infiltrating precipitation. The portion of precipitation that does not recharge the ground water is lost through either surface runoff, evapotransporation

or soil moisture storage. Water budget data for the upland and lowland areas of the IBM site indicates that between 27 and 34 percent of the available precipitation recharges the ground water system. Water budget data is presented in Appendix F.

Ground water flow from the IBM site under natural conditions is generally in a south-southwest direction towards the Susquehanna River, which serves as a ground water discharge boundary. Much of the flow of ground water occurs within a sand and gravel aquifer that extends along the Susquehanna river from Binghamton to the Village of Owego. This aquifer is a sole source aquifer and provides water to the local communities.

3.03 Site Hydrogeology

Ground water flow prior to installation of the GTF was characterized by McFarland & Johnson Engineers in December, 1980. The study concluded that generalized ground water flow in the central portion of the site is from the northeast to the southwest. Sitewide ground water elevation maps depicting current non-pumping and pumping conditions are presented on Figures 15 and 16, respectively. As shown on these figures, northeast of the WMA, ground water flow is primarily controlled by the shallow underlying bedrock topography (Figure 3). A portion of the total ground water flow in this area is diverted by the east to west bedrock valley toward the Parking Lot 001 area. The majority of flow proceeds in a south-southwest direction ultimately discharging into the Susquehanna River.

Tank Farm

The geologic conditions in the Tank Farm Area are characterized by 19 to 22 feet of low permeability, dense glacial till overlying shale/siltstone bedrock. Preferential ground water flow occurs primarily at the till/bedrock interface, generally within the bottom five feet of the till.

There are five ground water withdrawal wells in the Tank Farm area, designated as 401, 407, 408, 409 and 410 (Figure 2). Aquifer tests conducted on each of these wells revealed that the glacial till has a transmissivity ranging from 30 to 160 gpd/ft and a hydraulic conductivity ranging from 7 to 33 gpd/ft^2. Ground water flow in the vicinity of the Tank Farm is to the northwest towards Parking Lot 001 under a hydraulic gradient of 0.11 ft/ft during non-pumping conditions. After five days of pumping the ground water flow within close proximity of the Tank Farm is contained. However, the cone of influence only extends approximately 30 feet from the tank farm. In addition, there is a decrease in hydraulic gradient to .036 ft/ft.

Parking Lot 001 Area

The subsurface geologic conditions within the Parking Lot 001 Area are similar to the Tank Farm consisting of glacial till overlying shale/siltstone bedrock. However, the glacial till in this area has a greater thickness, and therefore a higher transmissivity than in the vicinity of the Tank Farm. The overburden thickness averages 30 feet and the transmissivity ranges from 400 to 1700 gpd/ft. Hydraulic conductivities range from 29 to 103 gpd/ft^2.

Ground water in the vicinity of the Parking Lot 001 Area flows radially inward towards pumping wells 402, 411, 412 and 413. The hydraulic gradient during non-pumping conditions is approximately .08 ft/ft toward the withdrawal wells. After five days of pumping the hydraulic gradient, on the upgradient side (between 412 and well 122) is essentially doubled to .16 ft/ft.

Tower View Drive Area

The hydrogeologic conditions within the Tower View Drive Area are similar to those in the Tank Farm and Parking Lot 001 areas. Geologically, the Tower View Drive Area is characterized by glacial till overlying bedrock. Overburden thickness ranges from 26 feet at well location 133 to 39 feet at well 321, with corresponding saturated thicknesses of 4 and 15 feet, respectively.

Waste Management Area

The geologic conditions within the WMA consist of glacial till overlying bedrock in the upper portion of the WMA and a multi-layered sequence of glacial stratigraphic units to the south. Chronologically, from oldest to youngest, the stratigraphic sequence consists of shale/siltstone bedrock, till, fluvial sand and gravel, lacustrine silt and fine sand, and alluvial silt and clay.

The transmissivity of the sand and gravel aquifer materials ranges from 2,500 to 49,000 gpd/ft^2, with hydraulic conductivities ranging from 278 to 654 gpd/ft^2. In the WMA, ground water flows to the southwest under a hydraulic gradient of .05 ft/ft during both non-pumping and pumping conditions. In the vicinity of withdrawal well 404 and 405, however, the hydraulic gradient effectively doubles from .03 ft/ft to .06 ft/ft, following the five

day pumping period, with ground water flow radially inward towards these wells.

3.04 Ground Water Quality

Previous studies at the IBM Facility have identified chlorinated hydrocarbons in ground water samples collected from onsite monitoring wells. Concentrations of methylene chloride, trichloroethylene, and methyl chloroform and assorted inhibitors have been detected.

Due to the low solubilities of these chlorinated hydrocarbons in ground water, they have been transported downgradient from the original source areas. In order to assess the areal extent of the resultant plumes on a sitewide basis, plume maps have been developed for each of the three principal chemical constituents detected. Figures 12, 13, and 14 represent concentration contour maps of trichloroethylene, methyl chloroform, and methylene chloride, respectively. These figures have been prepared using recent 1986 and 1987 data. Ground water quality data from the most recent sampling efforts are summarized in Table 3 and included in Appendix E.

Tank Farm Area

Concentrations of chlorinated hydrocarbons have been detected in the vicinity of the Tank Farm Area. Compounds detected in monitoring wells located around the Tank Farm Area include trichloroethylene, methyl chloroform, and methylene chloride. Trichloroethylene concentrations measured in wells 128 and 137 are in excess of 4000 ppb. To the north of well 127 and to the south of well 311, concentrations decrease to less than 50 ppb. A review of Figure 12, shows that the plume extends to the west

toward the Parking Lot 001 Area. The plume geometry in this area, suggests that the chemical migration parallels the previously defined east to west bedrock valley. Although a portion of the plume extends to the southeast along Powerhouse Road, the majority of the plume extends to the northwest.

A similar relationship is observed in Figure 13, the Methyl Chloroform plume map. In the vicinity of the Tank Farm Area, methyl chloroform concentrations range from 2700 ppb in monitoring well 128 to 11,000 ppb in monitoring well 137. To the south of well 311 which exhibits a value of 4700 ppb, concentrations drop abruptly to less than one ppb in P6. Again the plume geometry tends to parallel the east to west bedrock channel, restricting plume migration to the Parking Lot 001 Area.

Methylene Chloride concentration contours in the vicinity of the Tank Farm Area depict a much smaller plume area when compared with the trichloroethylene and methyl chloroform plumes. Concentrations in excess of 100 ppb tend to be restricted to the immediate vicinity of the Tank Farm Area. In Figure 14, a thin northwest to southeast trending extension of the plume is observed. The slightly elevated lobate plume structure extends from beyond the Tank Farm Area paralleling the direction of Powerhouse Drive. The plume decreases to 7 ppb at well 132. The probable source of this plume is the same as the Tank Farm area. The geometry of the plume in this area may follow a preferred migration path along higher permeability materials used to backfill subsurface utility trenches.

Parking Lot 001 Area

The Parking Lot 001 Area is located in the central portion of the east to west trending bedrock valley. Trichloroethylene and methyl chloroform concentrations have been detected in this area.

Trichloroethylene concentrations measured in well 139 exceed 1000 ppb. Wells 150, 145, and 144 located downgradient from 139 exhibit concentrations of 210 ppb, 23 ppb, and 13 ppb, respectively. In the northwest sector of the Parking Lot 001 Area, trichloroethylene values decrease to 2 ppb in well 151 and less than 1 ppb in well 143. Figure 12, the trichloroethylene plume map, shows that the elevated values measured in wells, within the Parking Lot 001 Area, define the leading edge of the plume migrating from the Tank Farm Area. The concentration values measured in well 153 at the northwest property boundary defines the furthest point of plume migration.

Methyl Chloroform plume geometry, as seen in Figure 13, exhibits the same basic trend as the previously defined trichloroethylene plume. Correlative parametric values of 15 ppb measured at well 153 and 14 ppb value at well 320 suggests that the plume extends offsite and then reenters the site between wells 154 and 157.

Methylene chloride values were detected in well 151 and 412 in the Parking Lot 001 Area, at levels of 5 ppb and 7 ppb, respectively.

Tower View Drive Area

Elevated concentrations of chlorinated hydrocarbons have been detected in the vicinity of Tower View Drive. The source of these compounds is likely to be from migration of the chlorinated

hydrocarbon plume from the tank farm, along the bedding of the industrial lines that extend along Powerhouse Drive.

Trichloroethylene values measured in wells P8 and P10 are less than 100 ppb. A value of 40 ppb measured in adjacent well P8 may provide a representative quantitative value for trichloroethylene concentrations in this area. Immediately downgradient of P10 and P11, values in wells 133 and 308 decrease to 1 ppb. Further downgradient toward Mirror Lake, concentrations in wells 321 and 306 were measured to be less than 1 ppb. Detectable values of 17 and 24 ppb where measured in wells 309 and 313, respectively. The lack of detectable compounds in wells adjacent to Mirror Lake support conclusions derived during previous investigations that a continual source is not present, constituent concentrations would require 12 to 35 years to reach Mirror Lake, and that over this span of time concentrations would be reduced to less than 1 ppb.

A similar scenario exists for methyl chloroform, although concentrations are significantly higher. Methyl Chloroform values of 11,000 ppb, 3,200 ppb, and 1,100 ppb were measured in wells P8, P10, and P11 respectively. Immediately downgradient of P11 a value of 307 ppb was measured in well 308. Other detectable quantities of methyl chloroform were measured in wells 119, 133, 309, 313 and 321, ranging from 12 to 27 ppb. Figure 13 outlines the methyl chloroform plume boundary which appears to extend as far as wells 119 and 321 along Tower View Drive. Concentrations at wells a few hundred feet downgradient to the south of Tower View Drive to the along the edge of Mirror Lake are at or below

the detection limits. The recent monitoring data supports previous projections that the methyl chloroform concentrations would disperse to less than detectable concentrations before reaching Mirror Lake.

Methylene chloride concentrations measured in the Tower View Drive Area are close to or below the detection limits.

Waste Management Area

Ground water analyses have detected elevated concentrations of chlorinated hydrocarbons compounds in samples collected from monitoring wells located within and downgradient from the WMA. Potential sources of these compounds include landfill activities, industrial drain lines, unlined surface impoundments operating prior to the implementation of RCRA, and flow onto the site from the west.

The trichloroethylene plume map in Figure 12 shows that trichloroethylene is the most extensive compound detected within the WMA. The highest trichloroethylene concentrations have been detected in the vicinity of monitoring well 183, suggesting that the industrial drain lines in this location were a significant source of trichloroethylene within the WMA. Recent investigations have identified elevated levels of trichloroethylene at Well 317 along the western property boundary. These data indicate that the elevated level of trichloroethylene is drawn into Well 317 from an off-site upgradient source located to the northwest of this well.

The configuration of the trichloroethylene plume map on Figure 12 shows a direct correlation with the extent of the sand and gravel aquifer shown on Figure 11. The plume does not

extend as far as Wells 314 and 315 to the southwest of the site where the sand and gravel aquifer is absent. The trichloroethylene plume extends within the sand and gravel aquifer as far south as Well 322 where trichloroethylene was detected at a concentration of 2 ppb.

The methyl chloroform plume shown in Figure 13 shows a similar configuration to that of the trichloroethylene plume. However, the methyl chloroform was not as extensive within the sand and gravel aquifer as the trichloroethylene plume. The methyl chloroform concentrations detected at the downgradient property boundary are at or below detection limits.

The methylene chloride plume shown in Figure 14 reveals that downgradient from the WMA, methylene chloride was detected only in the vicinity of withdrawal well 404.

A characterization of the vertical distribution of volatile organics within the WMA has been conducted by installation of well nests and packer testing of multiple screened wells. The well nest data (Table 3) and packer test data (Table 4) indicate there is a significant decrease in volatile organic concentrations between the sand and gravel aquifer and the underlying bedrock. This data suggests that the till serves as a confining layer to restrict vertical flow within the WMA.

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SECTION 4 - GROUND WATER COLLECTION AND TREATMENT SYSTEM

4.01 System Description

In order to prevent off-site migration of the organic plumes and to reduce the concentrations of organic compounds, in accordance with the consent order issued by the NYSDEC (Appendix G), IBM has installed a ground water collection and treatment facility (GTF) to remove and treat the ground water. The GTF facility consists of thirteen withdrawal wells and a packed column air stripping treatment system. Five of the wells are located within the Tank Farm Area, four are located within the Parking Lot 001 area and four wells are located within the WMA. The treated ground water is discharged into the 999 SPDES discharge which in turn discharges to the Susquehanna River. The GTF normally operates 24-hours per day, five days per week and began operation on February 23, 1983.

The purpose of the withdrawal wells is to alter the natural subsurface hydrology in order to restrict the offsite movement of ground water. In order to assess the effects of ground water withdrawal on the local hydrogeologic regime, a comprehensive ground water elevation survey was performed. Sitewide ground water elevation data was collected three days per week (Sunday, Wednesday and Friday) for three consecutive weeks. Representative sitewide ground water elevations reflecting non-pumping and pumping conditions, collected during the three week program are shown in Figures 15 and 16, respectively.

4.02 Effectiveness of the Collection System

Tank Farm Area

There are five withdrawal wells located within the Tank Farm Area: wells 401, 407, 408, 409, and 410 (Figure 2). The purpose of the withdrawal system is to reduce the high concentration of chlorinated hydrocarbon, migrating from the Tank Farm, which is the suspected source area. Although the data shown on Figure 16 does not delineate the cone of depression, previous ground water elevation data (Appendix H) indicates the cone of influence for the Tank Farm Area is confined to an area within 30 feet of the withdrawal wells.

Ground water elevations observed in monitor well 113, located approximately 60 feet from the Tank Farm withdrawal wells, exhibit a change of less than 0.7 feet over the pumping period from 3/15/87 to 3/20/87. Monitoring well 137 is located approximately 200 feet from the withdrawal wells and shows little change in elevation over the observed pumping period (plus or minus 0.1 feet). A review of Figures 12, 13, and 14 show that although methylene chloride concentrations appear to be restricted to the Tank Farm Area, trichloroethylene and methyl chloroform concentrations detected to the northwest of wells 113 and 114 migrate downgradient along the east to west bedrock valley towards Parking Lot 001. Although the cone of influence within the Tank Farm Area is of limited extent, it appears to have mitigated the source of the chlorinated hydrocarbon plume migrating along Powerhouse Drive.

Parking Lot 001 Area

The purpose of the Parking Lot 001 withdrawal system is to intercept the plume of chlorinated hydrocarbons migrating from the Tank Farm Area, and to prevent it from migrating beyond the northwest property boundary. The system is comprised of four withdrawal wells designated as 402, 411, 412, and 413. The location of the wells are shown in Figure 2. Greater hydraulic conductivity and saturated thickness of till in the Parking Lot 001 Area as opposed to the Tank Farm Area, results in a higher overburden transmissivity. Figures 15 and 16 show that over the five day pumping period the ground water elevation in monitoring well 139, adjacent to withdrawal well 402, exhibits greater than five feet of drawdown. Drawdown is also sufficient in wells 146 and 152 to reverse the hydraulic gradient at the northwest property boundary, suggesting the cone of influence extends beyond this point. The effectiveness of the Parking Lot 001 withdrawal system is apparent with respect to areal concentrations of chlorinated hydrocarbon detected in this area. Figures 12, 13, and 14 show the chlorinated hydrocarbon concentrations, are effectively contained and migration along the bedrock channel is restricted by the reverse flow gradient induced by the withdrawal system.

Waste Management Area

There are four withdrawal wells located downgradient from the WMA: wells 403, 404, 405, and 406 (Figure 2). This withdrawal system was installed to intercept ground water containing chlorinated hydrocarbons released from historic operations upgradient, within and downgradient from the current WMA.

Ground water elevations reflecting non-pumping conditions are depicted on Figure 15. This figure indicates that the smallest radius of inflow, encompassing the withdrawal wells, occurs when the ground water elevations have partially recovered during the weekend shut down period. The data reveal that during weekend shut down ground water elevations do not fully recover to their natural static conditions and a cone of influence is still maintained throughout this plume. Based on this data, the cone of influence extends west of the IBM property beyond Well 317 and as far south as Well 318.

Ground water elevation data depicting the potentiometric surface following five days of pumping is illustrated in Figure 16. These data reveal a similar configuration for the cone of influence as during non-pumping conditions, although the hydraulic gradient doubles from 0.03 to 0.06 following five days of pumping. In spite of this significant increase in hydraulic gradient during pumping, there does not appear to be a significant increase in the areal extent of the cone of influence.

The trichloroethylene plume illustrated in Figure 12 exhibits the most extensive migration of the detected chlorinated compounds. The plume extends southward to well 323. Beyond this point, trichloroethylene values in Wells 318 and 322 drop to 10 ppb or less. Elevated concentrations of methyl chloroform are essentially contained within the area immediately surrounding the WMA. A methylene chloride value of 91 ppb was measured at withdrawal well 404.

As previously noted, the radius of influence following 5 days of pumping extends as far as 318 and 319. To further quantify

and define the area of ground water capture induced by pumping and to further define ground water quality at the southern property boundary, wells 322 and 323 have recently been installed. The new wells have been sampled on one occasion and subsequent results have been incorporated into the plume maps (Figures 12, 13, and 14). To date, a comprehensive set of ground water elevation data has not been collected to better define the extent of the radius of influence pertaining to the area south of the WMA. Subsequent field investigations will include efforts to further define potentiometric conditions in this area. In addition, well 404 will be redeveloped and fitted with a new pump. These efforts should increase the withdrawal capacity of the well and thereby increase the cone of influence.

SECTION 5 - GROUND WATER MONITORING PROGRAM

In order to evaluate the effectiveness of the overall ground water collection and treatment system, a sitewide ground water monitoring program has been established. The objectives of this monitoring program include:

1. Monitor the extent of the plumes;
2. Assess the areal extent of the zone of capture for the withdrawal well system; and
3. Determine if there is a potential for the volatile organic plumes to migrate off-site or into deeper ground water zones.

Description of Wells

To address the objectives described above, a total of 59 monitoring wells will be sampled on a quarterly basis. In addition, ground water elevations will be monitored for 50 monitoring wells as selected by IBM semi-annually on a Friday and the following Sunday to evaluate the configuration ground water flow under pumping and non-pumping periods during wet and dry periods. The wells to be monitored for the corrective action monitoring and the parameters for which they will be tested are described below:

Waste Management Area Wells

- Wells 172, 173, 174, 175, 149, 200, and 205 will be monitored on a quarterly basis for VHOs (EPA 601 and 602), Cu, Pb, Cr, Ba, Hg, Ni to determine upgradient and downgradient ground water quality for the WMA itself.

- Wells 160, 166, 168, 171, 315, 316, 304, 318, and 319 will be monitored on a quarterly basis for VHOs (EPA 601 and 602) to characterize the levels of volatile organics adjacent and downgradient property boundaries and to assess the potential for off-site migration.
- Wells 120, 148, 179, 183, 186, and 185 will be monitored on a quarterly basis for VHOs (EPA 601 and 602) to assess the areas where the highest concentration of volatile organics occur within and downgradient from the WMA.
- Wells 191, 192, 193, and 194 will be monitored on a quarterly basis for VHOs (EPA 601 and 602) to detect any change in water quality in the underlying bedrock.
- Wells 102, 189, 181, 184, 187, 188, 146, and 162 will be monitored on a quarterly basis for VHOs (EPA 601 and 602) to define the eastern, northern and northwestern organic plume boundaries.
- Wells 177, 178, 179, 186, 316, 317, 318, 319 and 322 will be monitored on a quarterly basis for chromium, copper and lead to detect any the downgradient heavy metals migration.

Tank Farm, Parking Lot 001, and Tower View Drive Area Wells

- Wells 128, 137, 136, 124, 105, 139, 145, 144, 152, 153, 311, 133, 308, 321, 122, and 309 will be monitored on a quarterly basis for VHOs (EPA 601 and 602), in order to further assess the effectiveness of the ground water withdrawal systems in the Tank Farm and Parking Lot 001 Areas, and to continue monitoring the concentrations in the previously defined chlorinated hydrocarbon plumes.

- In addition to quarterly water quality monitoring, selected wells will be monitored on a quarterly basis for ground water elevations to evaluate the cone of influence for the withdrawal wells and to assess hydraulic gradients on a sitewide basis.

The monitoring wells installed within the overburden are constructed of 4-inch diameter schedule 40 PVC well casing and a slotted PVC well screen with a maximum length of 10 feet. The bedrock monitoring wells are constructed of a 5-inch diameter steel casing extending ten feet into the bedrock formation with an open borehole to a depth of at least 100 feet. The annular space around the steel casing has been sealed with a cement/bentonite grout. Detailed geologic logs and well specifications for the overburden wells and bedrock wells are included in Appendix A. The well specifications are summarized in Table 1. Well installation procedures are outlined in Appendix B.

Ground Water Sample Collection

Ground water samples are to be collected in accordance with the procedures described in Appendix C and briefly outlined below. Prior to collecting a ground water sample, the standing water within the well and filter pack will be evacuated using either a centrifugal or submersible pump. Before well evacuation, the water level depth within each well will be measured using a portable electric well probe. During well evacuation, the water removed from the well will be field tested for pH, temperature and specific conductivity. Field testing and well evacuation will continue until the field measurements appear to stabilize, the well is pumped to dryness or until a minimum of three well volumes have been removed. Following well evacuation, the well will be allowed to recover until a sufficient volume of water is available for sample

collection. During the initial round of ground water sampling, the water level recovery rate will be measured for each well to assess the duration needed between evacuation and sampling. All well evacuation equipment will be decontaminated after each use to avoid cross-contamination between wells. The decontamination water will be retained for subsequent transport to the GTF.

Once a sufficient volume of water is available within each ground water monitoring well following well evacuation, a sample will be collected for analysis. Prior to sample collection, the water level depth within each well will be measured using a portable electric well probe. The ground water sample will be collected using a Kemmerer sampler. The uncapped sampler will be lowered to the screened interval of the well. Once the sampler reaches the desired depth, capping will be accomplished via a control extending to the surface. Capping will prevent water from mixing within the well. Once the sampler is returned to the surface, the appropriate sample containers will be filled. The Kemmerer sampler and well probe will be cleaned with a control water rinse between each well location. The cleansing water will be retained and transported to the GTF.

Sample Preservation and Shipment

Following sample collection, the ground water samples will be properly preserved in the field and stored in the appropriate containers. Ground water samples collected for volatile organic analysis will be transferred unfiltered immediately to Teflon capped vials. No headspace should exist in these samples to eliminate the potential for volatilization. Ground water samples collected for metal analysis will be filtered in the field through a 0.45 micron filter, transferred to a

bottle, preserved with nitric acid to a pH of less than 2 and analyzed for dissolved metals. Following sample preservation, the samples will be immediately placed in shipping coolers packed with ice.

Analytical Procedures

The ground water samples will be analyzed in accordance with the appropriate EPA-approved methods. During sample collection, field blanks will be collected to verify that the sample collection and handling process has not affected the quality of the samples. These field blanks will be analyzed for the same parameters as the ground water.

The custody of the ground water samples from the time of field collection through laboratory analysis will be documented with a chain of custody program. To provide the documentation needed to trace sample possession, a chain of custody record will be filled out and accompany the samples. The chain of custody record will include the following information: sample number, date and time of collection, sample type, well identification number, parameters requested for analysis, and signature of person(s) involved in the chain of possession.

Statistical Procedure

Based on the analytical results from the compliance wells, it will be determined whether there is a statistically significant increase over the proposed ground water protection standards for any inorganic and non-volatile organic hazardous constituents in the ground water at the point of compliance. This determination will be made by comparing the ground water quality at each compliance well to the concentration limit according to the statistical procedure specified in Appendix D.

The quarterly volatile organic and inorganic analyses of the compliance wells will be compared to the initial baseline water quality data

to evaluate if there are trends showing a significant increase in the concentrations of hazardous constituents monitored. The quarterly monitoring data will be summarized in a tabular format showing statistical parameters including: number of less than detection limit values, total number of values, mean, median, standard deviation, coefficient of variation, minimum value, and maximum value. This summary table will be assessed on a quarterly basis to evaluate spatial and temporal changes in the water quality data.

Results

The data from the quarterly monitoring will be compiled on a quarterly basis and include: tables summarizing ground water elevation data, water quality data, statistical analysis of water quality data, and maps showing ground water elevation contours and organic solvent plumes.

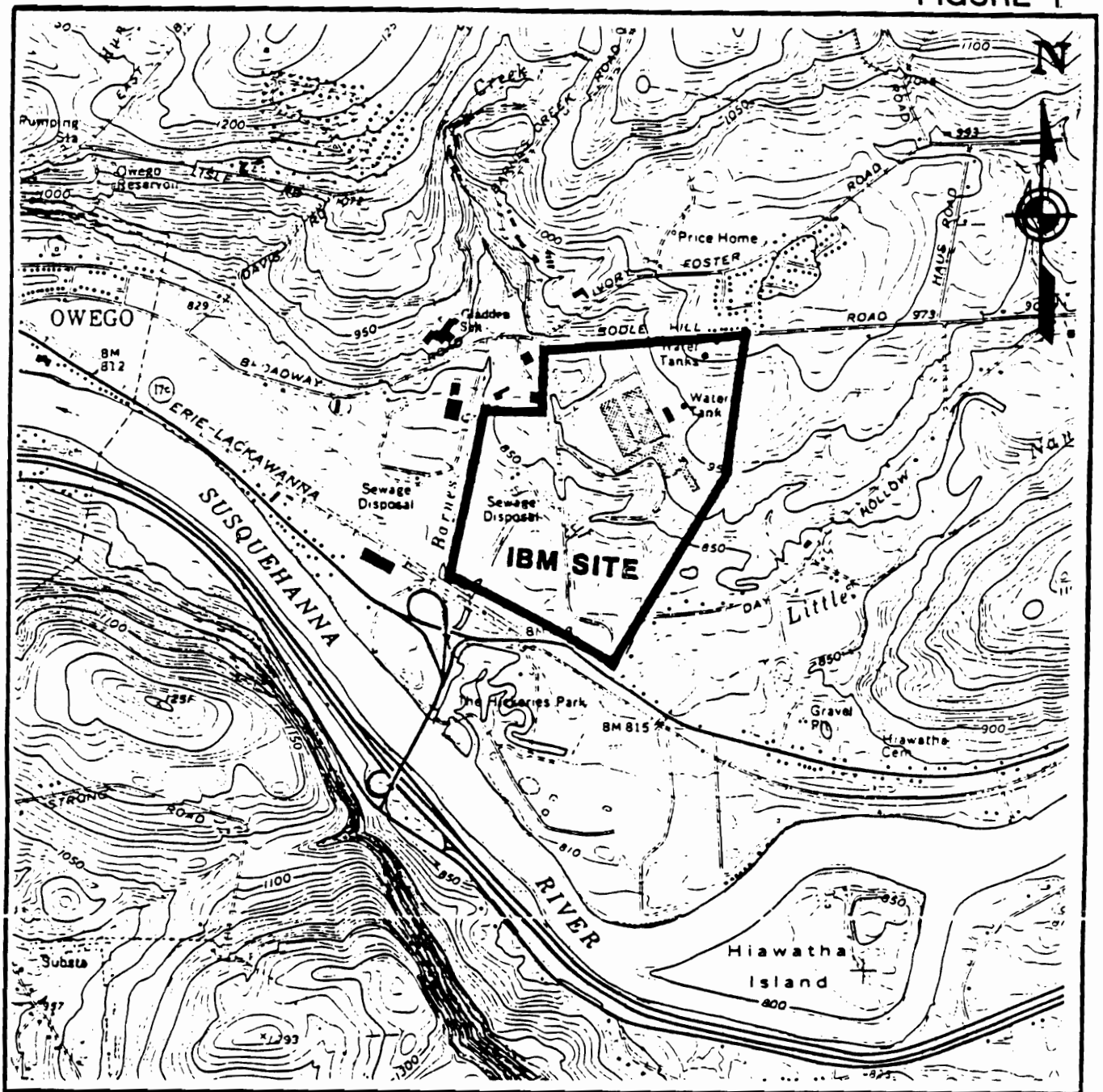
Following the analysis of data from the second and fourth quarter of monitoring, a semi-annual hydrogeologic assessment report will be prepared and submitted to NYSDEC which will include:

- Tables and maps summarizing the data from the quarterly monitoring program.

Figures

O'BRIEN & GERE

FIGURE 1

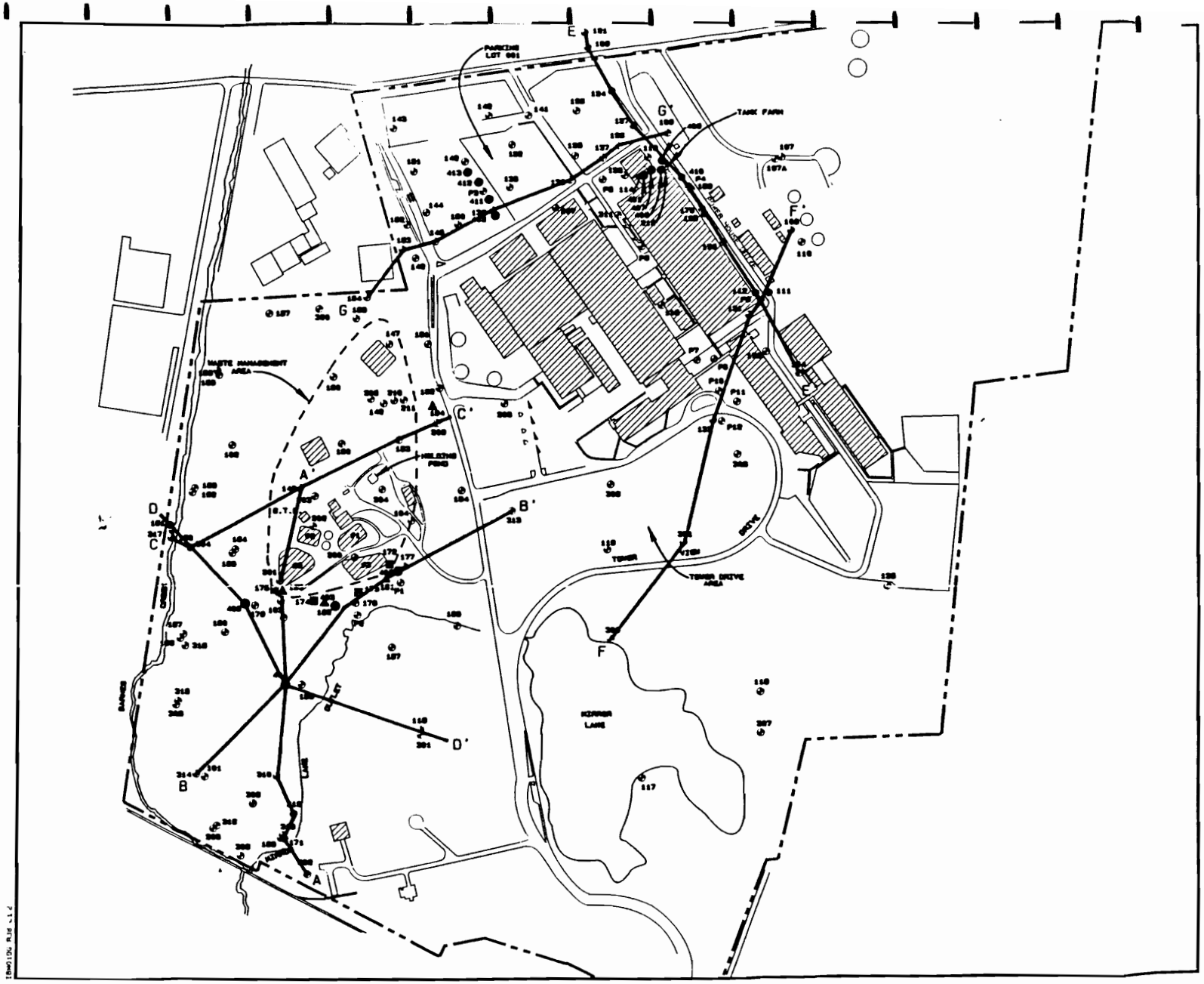


SITE LOCATION MAP

IBM CORPORATION
OWEGO, NEW YORK

Scale: 1" = 2000'

ADAPTED FROM U.S.G.S. APPALACHIA QUAD. (7.5 min.)



IBM. CORP.
OWEGO. NEW YORK

SITE WIDE WELL LOCATION MAP

LEGEND

- ● WITHDRAWAL WELL
- ◒ OVERBURDEN MONITOR WELL
- ▲ BEDROCK MONITORING WELL
- ■ COMPLIANCE MONITORING WELL

A—A' GEOLOGIC CROSS SECTION LINE

0 400 800

SCALE IN FEET

(2)

FIGURE 3

IBM. CORP.
OWEGO. NEW YORK

SITE BEDROCK ELEVATION MAP

LEGEND

- WITHDRAWAL WELL
- OVERBURDEN MONITOR WELL
- BEDROCK MONITORING WELL
- COMPLIANCE MONITORING WELL
- 740 BEDROCK ELEVATION CONTOUR (FEET (AMSL)

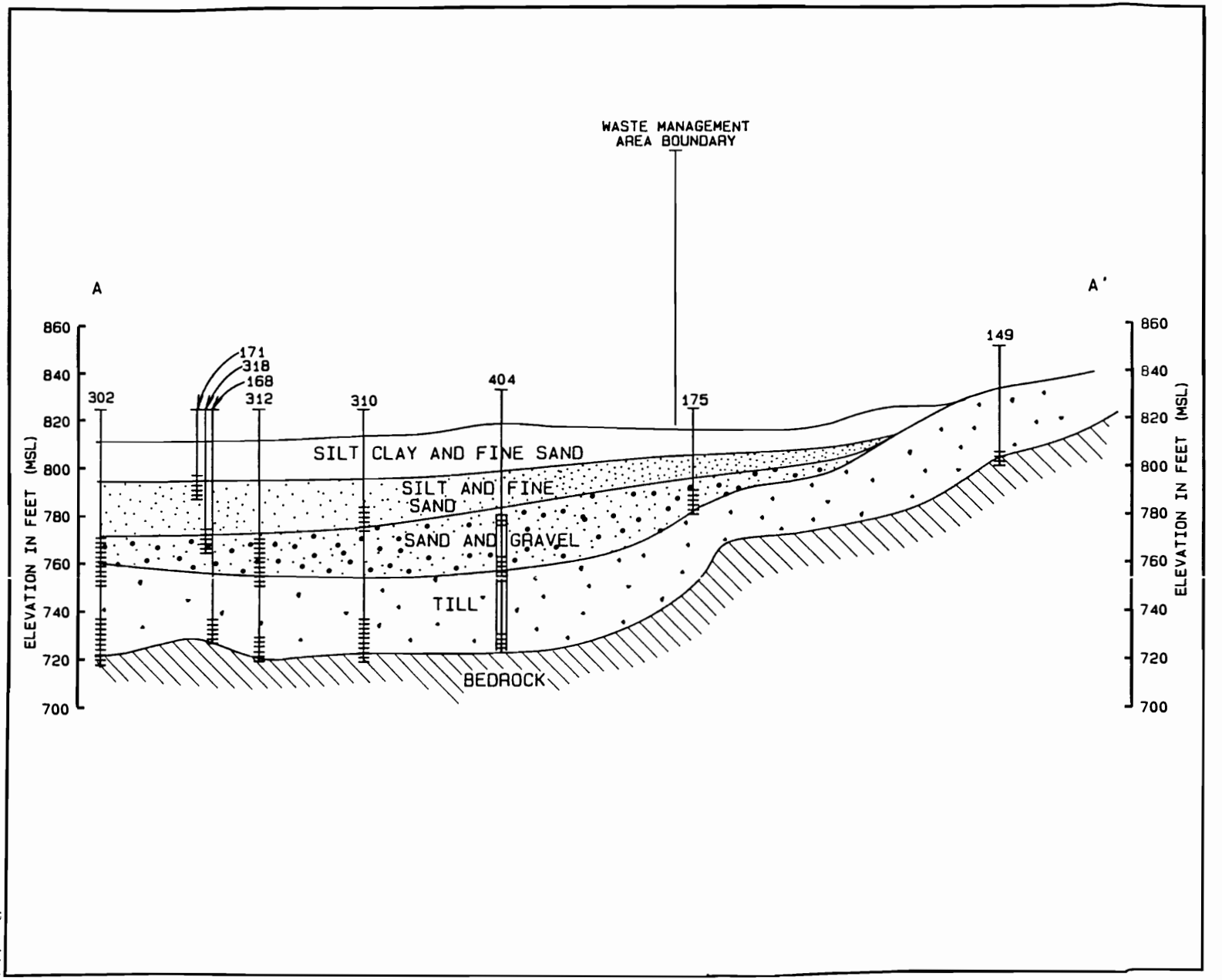
0 400 800
SCALE IN FEET

(2)

FIGURE 4

IBM OWEGO, NY

GEOLOGIC
CROSS SECTION A-A'



LEGEND

MONITOR WELL SCREENED INTERVAL

WITHDRAWAL WELL SCREENED INTERVALS

0 200 400
HORIZONTAL SCALE IN FEET

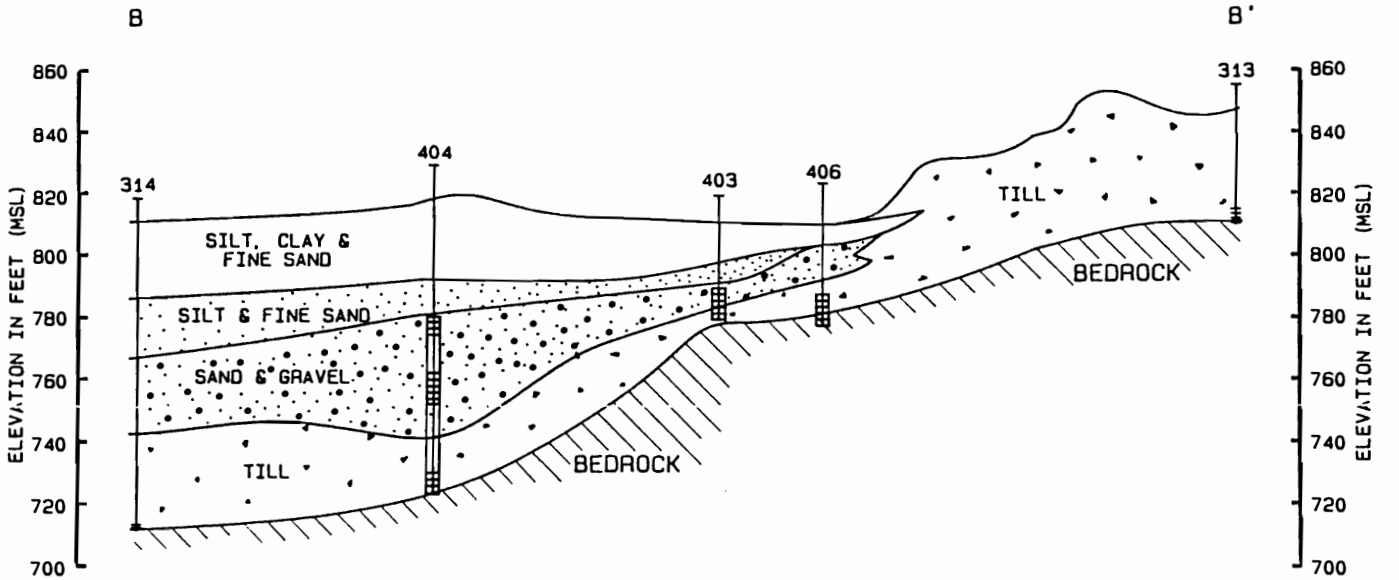
(2)

O'BRIEN & GERE
ENGINEERS, INC

FIGURE 5

IBM OWEGO, NY

GEOLOGIC
CROSS SECTION B-B'



LEGEND

MONITOR WELL
SCREEN INTERVAL
WITHDRAWAL WELL
SCREEN INTERVALS

0 200 400
HORIZONTAL
SCALE IN FEET

2

O'BRIEN & GERE
ENGINEERS, INC

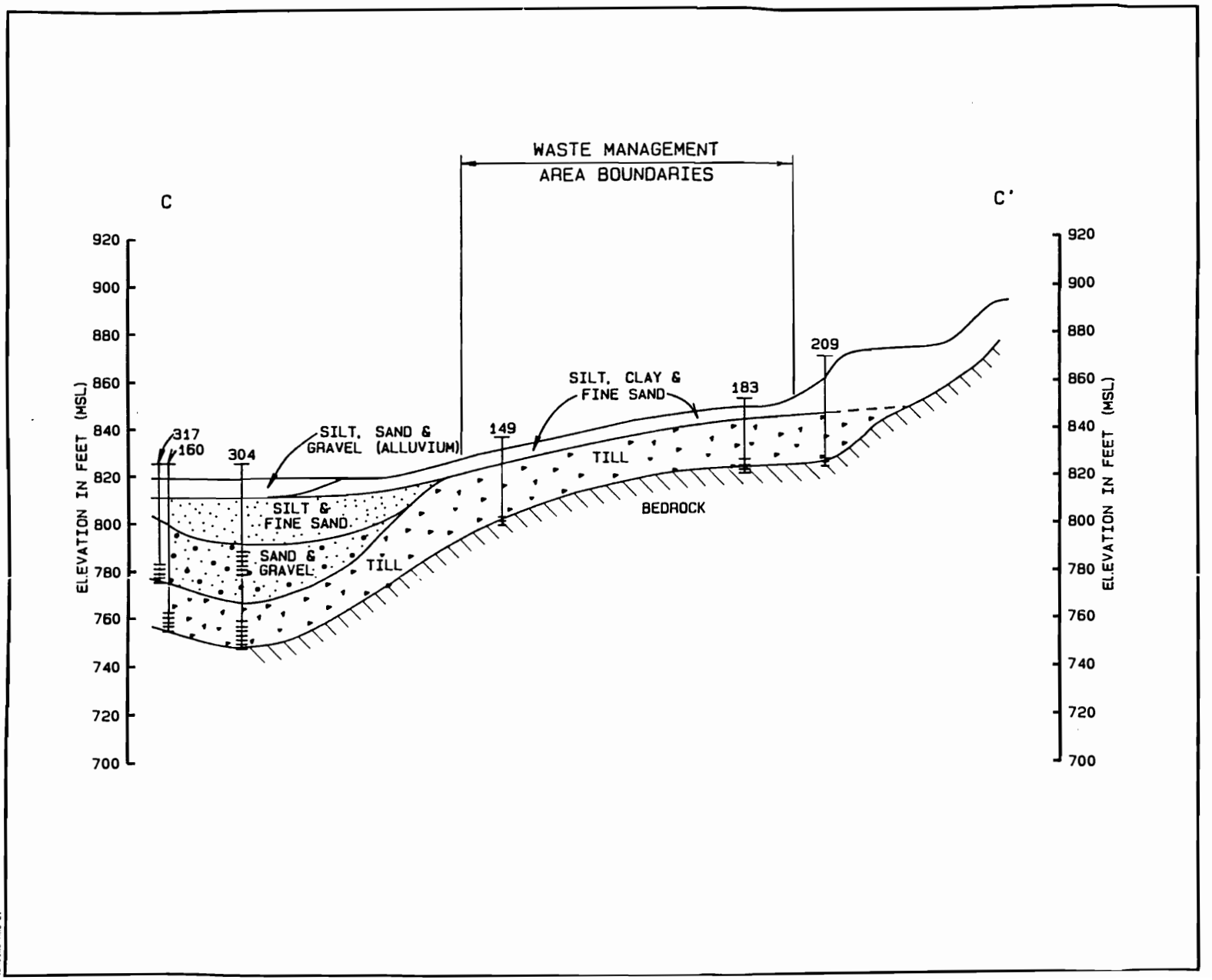


FIGURE 6

IBM OWEGO, NY

GEOLOGIC
CROSS SECTION C-C'

LEGEND

MONITOR WELL
SCREEN INTERVAL

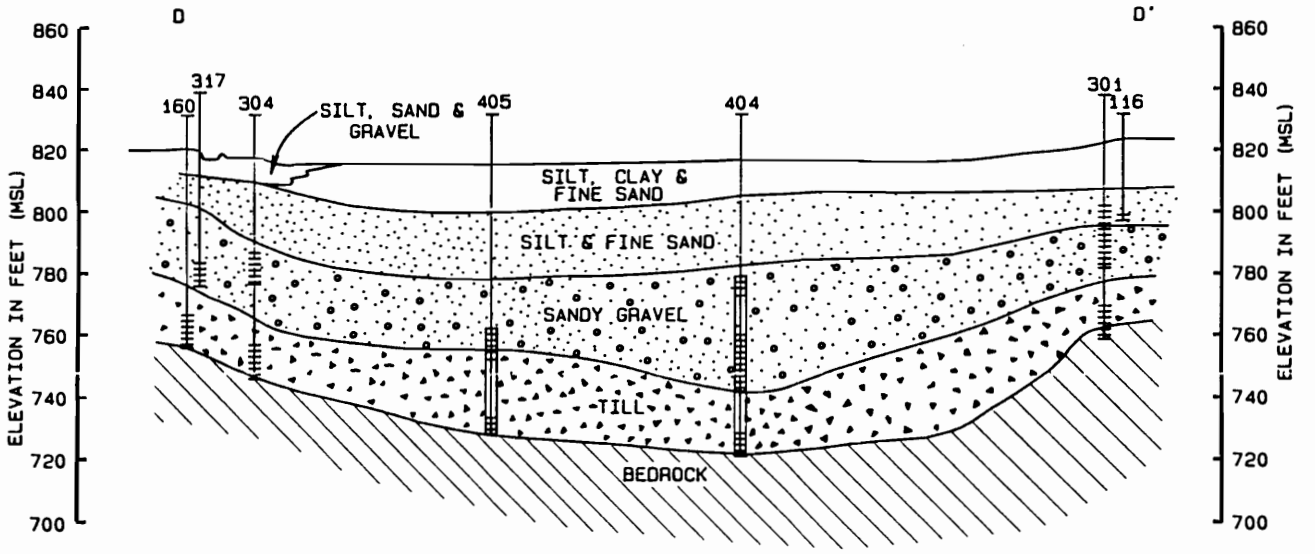
0 200 400
HORIZONTAL
SCALE IN FEET

O'BRIEN & GERE
ENGINEERS, INC

FIGURE 7

IBM OWEGO, NY

GEOLOGIC
CROSS SECTION D-D'



LEGEND

- MONITOR WELL SCREENED INTERVAL
- WITHDRAWAL WELL SCREENED INTERVALS

0 200 400
HORIZONTAL SCALE IN FEET

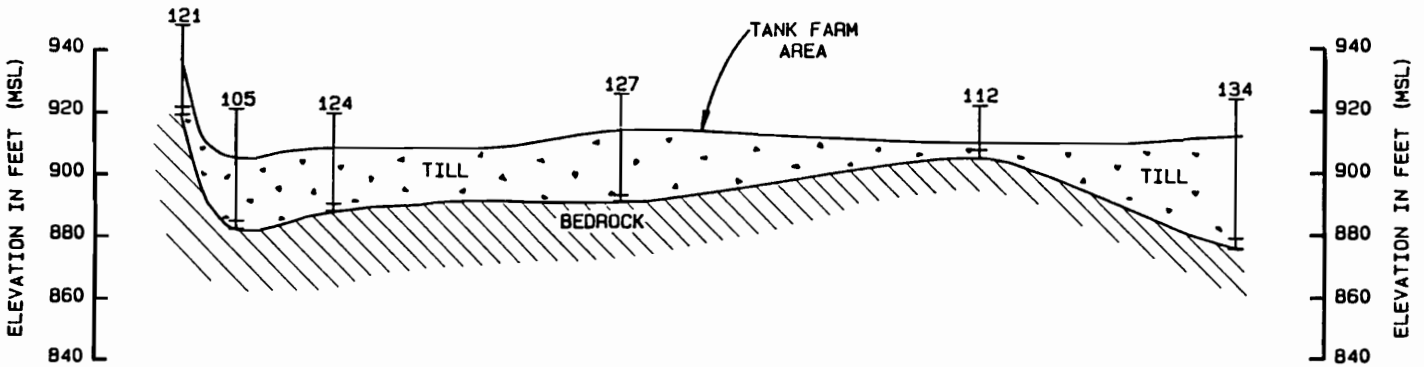
(2)

O'BRIEN & GERE ENGINEERS, INC

FIGURE 8

IBM OWEGO, NY

CROSS SECTION E-E'



LEGEND

MONITOR WELL

SCREENED INTERVAL

0 200 400

HORIZ. SCALE IN FEET

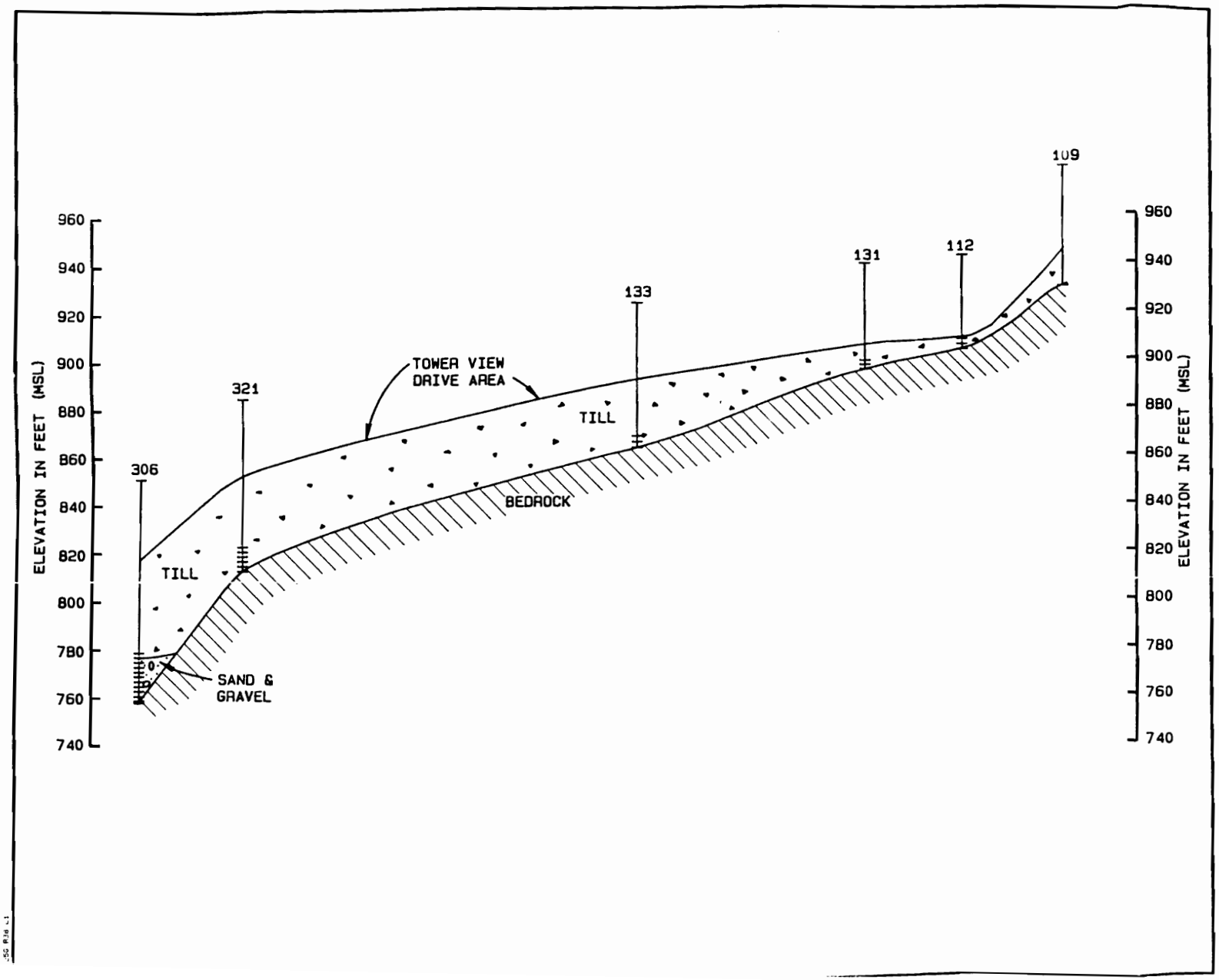
O'BRIEN & GERE ENGINEERS, INC

(2)

FIGURE 9

IBM OWEGO, NY

CROSS SECTION F-F'



LEGEND

MONITOR WELL

SCREENED INTERVAL

0 200 400

HORIZONTAL
SCALE IN FEET

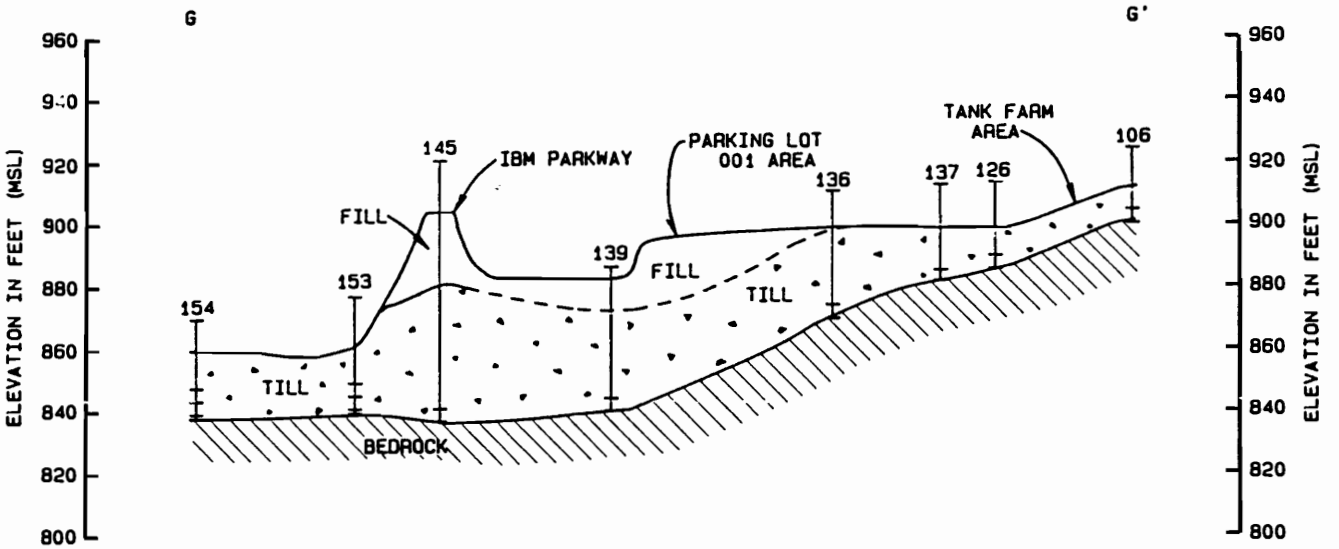
(2)

O'BRIEN & GERE
ENGINEERS, INC

FIGURE 10

IBM OWEGO, NY

GEOLOGIC
CROSS SECTION G-G'



LEGEND

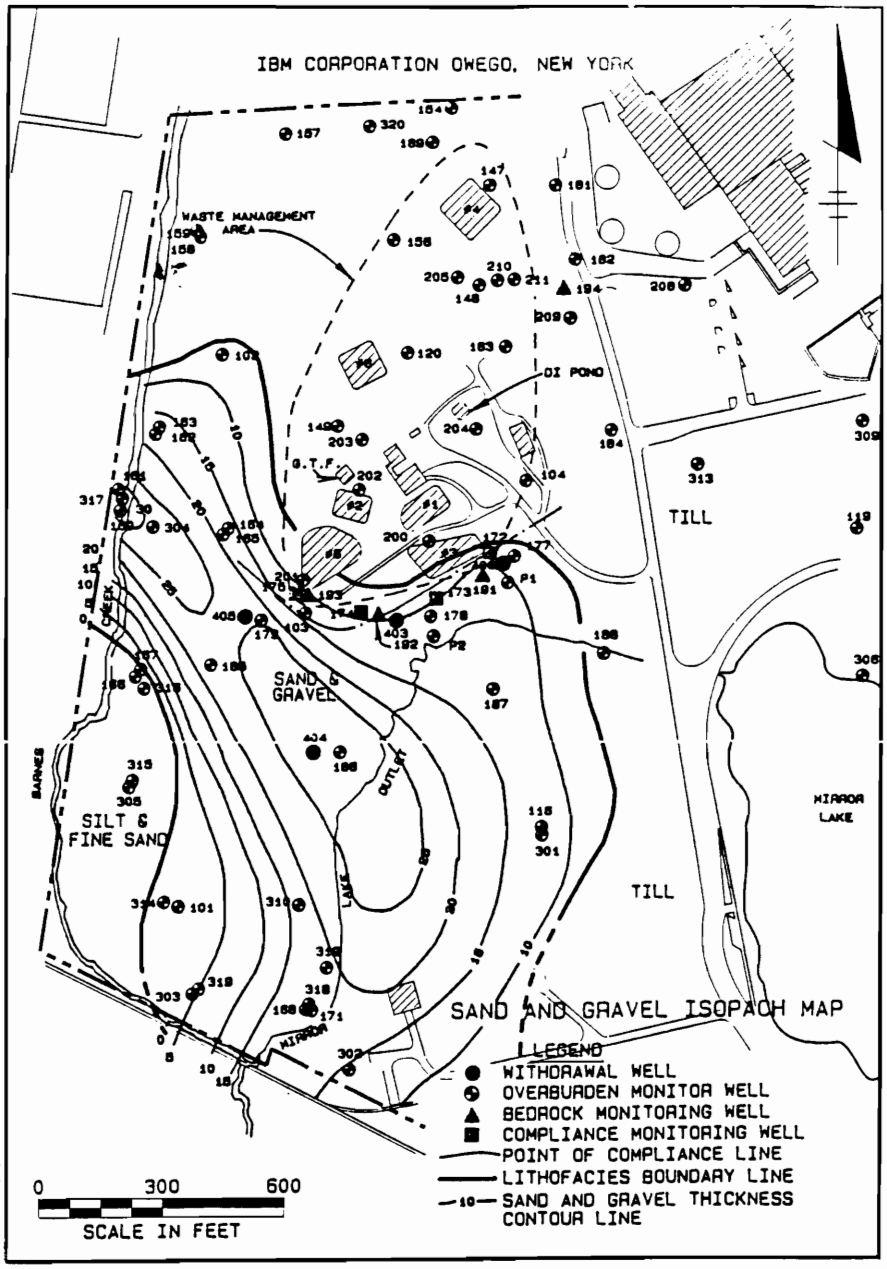
MONITOR WELL SCREENED AREA

0 200 400
HORIZONTAL
SCALE IN FEET

O'BRIEN & GERE
ENGINEERS, INC

2

FIGURE 11


IBM CORPORATION OWEGO, NEW YORK
WASTE MANAGEMENT AREA
OI POND
G.T.F.
SAND & GRAVEL
SILT & FINE SAND
TILL
TILL
BARNES
OUTLET
LAKE
MIRROR LAKE
SAND AND GRAVEL ISOPACH MAP
LEGEND
WITHDRAWAL WELL
OVERBURDEN MONITOR WELL
BEDROCK MONITORING WELL
COMPLIANCE MONITORING WELL
POINT OF COMPLIANCE LINE
LITHOFACIES BOUNDARY LINE
SAND AND GRAVEL THICKNESS CONTOUR LINE
0 300 600
SCALE IN FEET

N
TANK FARM
WASTE MANAGEMENT AREA
HOLDING POND
TOWER DRIVE AREA
TOWER VIEW DRIVE
MIRROR LAKE
LAKE OUTLET
BARNES CREEK

N
WASTE MANAGEMENT AREA
HOLDING POND
TOWER DRIVE
TOWER DRIVE AREA
MIRROR LAKE
OUTLET
BARNES
LAKE

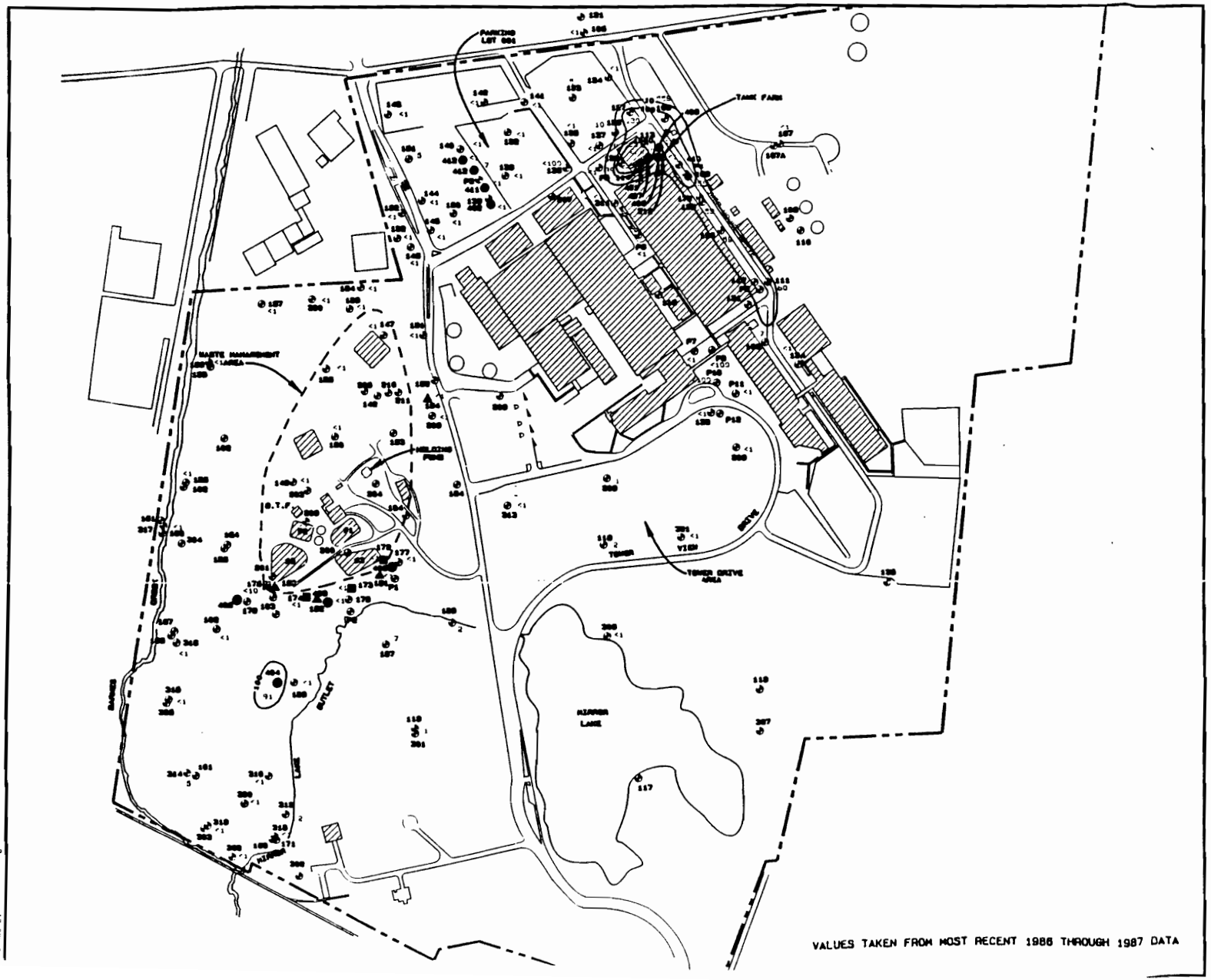


FIGURE 14

IBM. CORP.
OWEGO. NEW YORK

METHYLENE CHLORIDE
PLUME MAP

LEGEND

- WITHDRAWAL WELL
- OVERBURDEN MONITOR WELL
- BEDROCK MONITORING WELL
- COMPLIANCE MONITORING WELL
- —100— METHYLENE CHLORIDE CONCENTRATION CONTOUR (PPB)

0 400 800
SCALE IN FEET

(2)

FIGURE 15

IBM. CORP.
OWEGO, NEW YORK

POTENTIOMETRIC MAP
UPPERMOST AQUIFER
(NON PUMPING) CONDITIONS

LEGEND

- WITHDRAWAL WELL
- OVERBURDEN MONITOR WELL
- BEDROCK MONITORING WELL
- COMPLIANCE MONITORING WELL
- 804.5 GROUND WATER ELEVATION 3/8/87
- —800— GROUND WATER POTENTIOMETRIC CONTOUR

0 400 800
SCALE IN FEET

(2)

FIGURE 16

IBM, CORP.
OWEGO, NEW YORK

POTENTIOMETRIC MAP
(PUMPING 5 DAYS)

LEGEND

- WITHDRAWAL WELL
- OVERBURDEN MONITOR WELL
- BEDROCK MONITORING WELL
- COMPLIANCE MONITORING WELL
- —820 GROUND WATER ELEVATION 3/13/87

0 400 800
SCALE IN FEET

(2)

REF. (3)

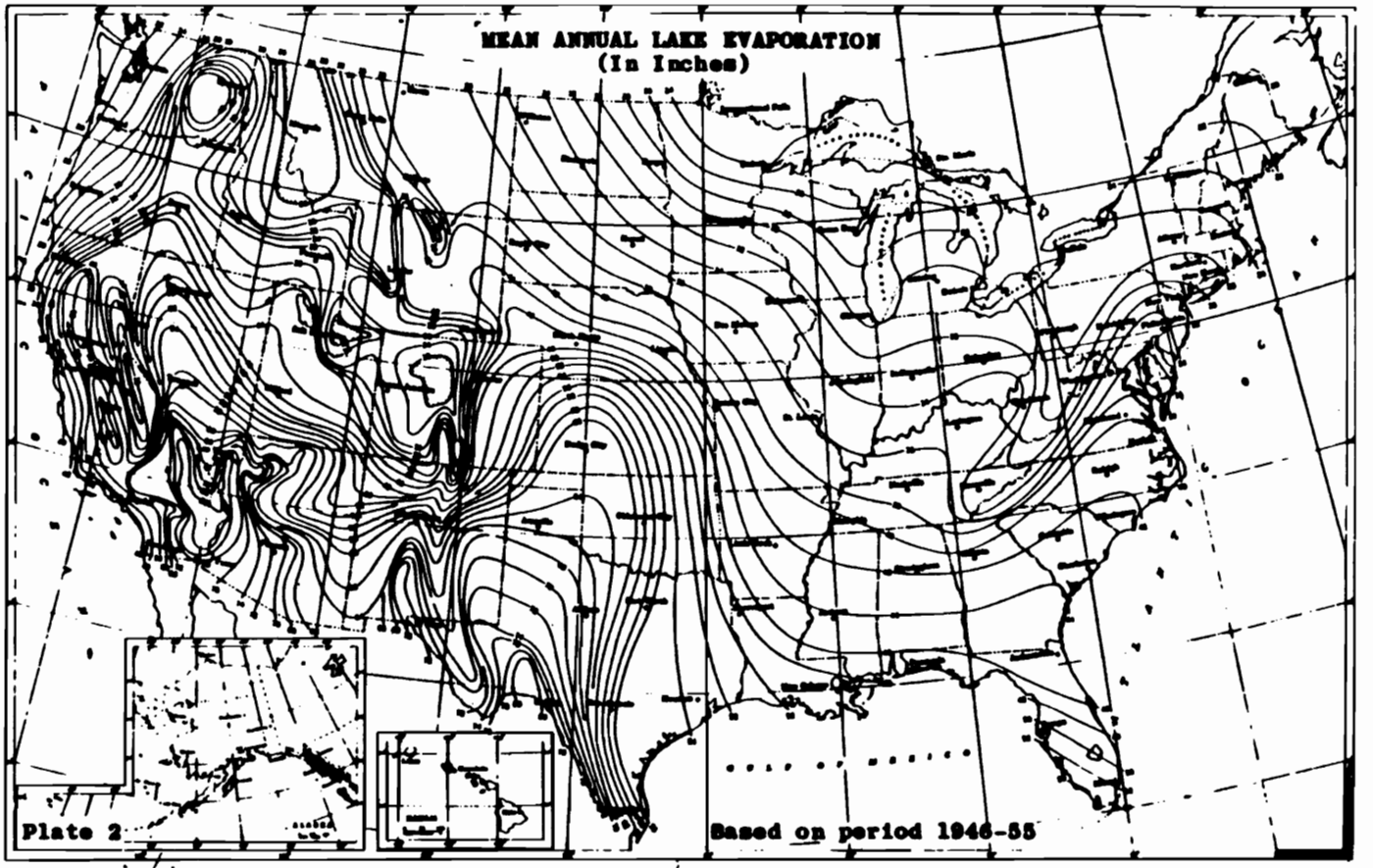
Uncontrolled Hazardous Waste Site Ranking System

A Users Manual
(HW-10)

Originally Published in
the July 16, 1982, *Federal Register*

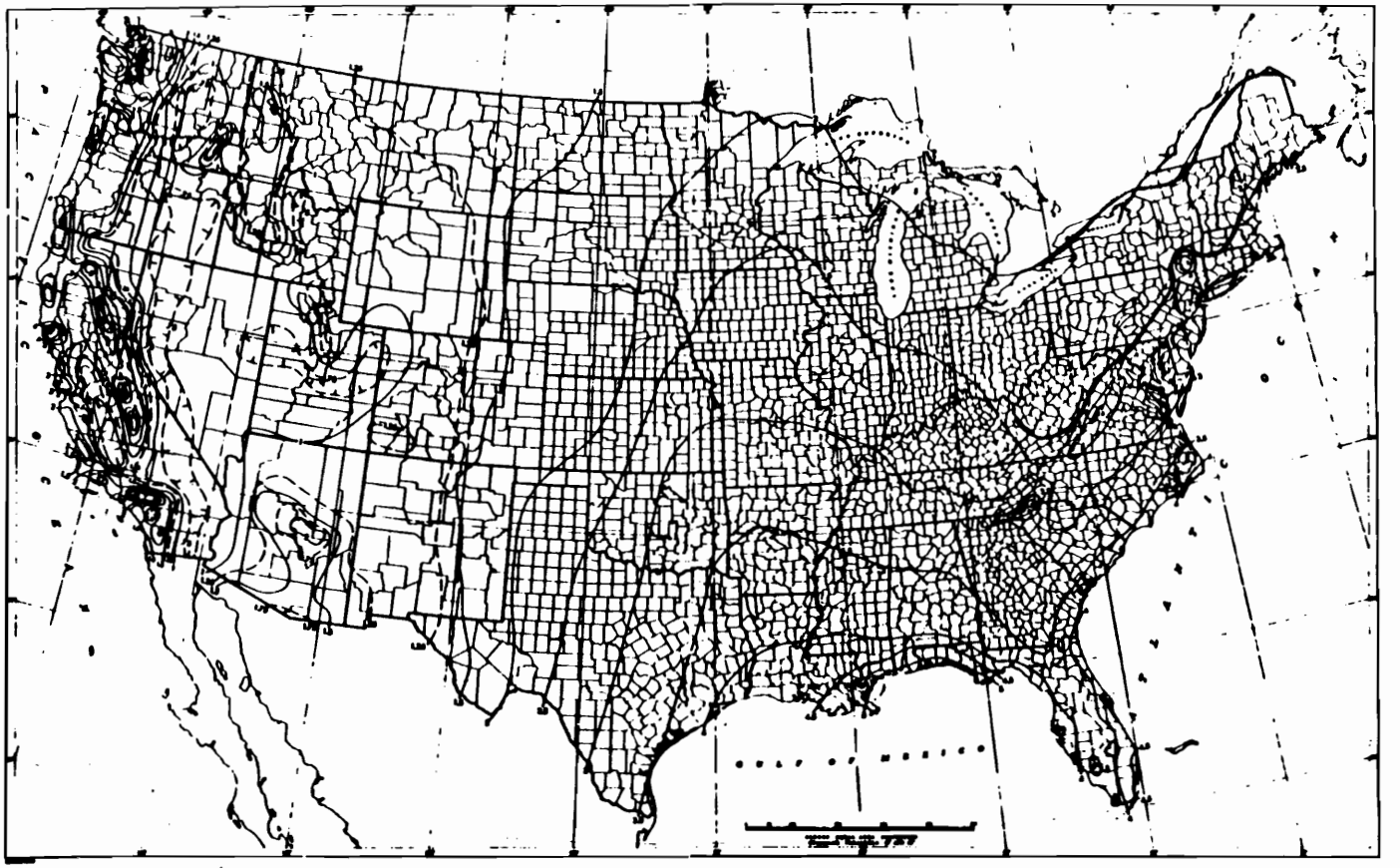
United States
Environmental Protection
Agency

1984



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)



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)

3.0 GROUND WATER MIGRATION ROUTE

3.1 Observed Release

If there is direct evidence of release of a substance of concern from a facility to ground water, enter a score of 45 on line 1 of the work sheet for the ground water route (Figure 2); then you need not evaluate route characteristics and containment factors (lines 2 and 3). Direct evidence of release must be analytical. If a contaminant is measured (regardless of frequency) in ground water or in a well in the vicinity of the facility at a significantly (in terms of demonstrating that a release has occurred, not in terms of potential effects) higher level than the background level, then quantitative evidence exists, and a release has been observed. Qualitative evidence of release (e.g., an oily or otherwise objectionable taste or smell in well water) constitutes direct evidence only if it can be confirmed that it results from a release at the facility in question. If a release has been observed, proceed to "3.4 Waste Characteristics" to continue scoring. If direct evidence is lacking, enter a value of 0 on line 1 and continue the scoring procedure by evaluating Route Characteristics.

3.2 Route Characteristics

Depth to aquifer of concern is measured vertically from the lowest point of the hazardous substances to the highest seasonal level of the saturated zone of the aquifer of concern (Figure 3). This factor is one indicator of the ease with which a pollutant from the facility could migrate to ground water. Assign a value as follows:

REF. (4)

URS Company, Inc.
CONSULTING ENGINEERS
NEW YORK NEW JERSEY

JOB NO. 35154

JOB TITLE NYS SUPERFUND

MEMO OF TELECON

DATE 10-21-87 / 10-27-87 TELEPHONE #(607) 687-1201

PERSON CALLING K. HARTNETT PERSON CALLED DANIEL CRONK FIRE CHIEF

REPRESENTING URS CORP. REPRESENTING TOWN OF OWEGO

PURPOSE OF TELECON AND/OR EQUIPMENT INVOLVED: FIRE & EXPLOSION THREAT INFO. FOR VICTORY PLAZA

TEXT OF TELECON

HE CONFIRMED THAT THE SITE "DOES NOT POSE A FIRE OR EXPLOSION THREAT ON THE PUBLIC".

CC:

EPA 2070-13

Site Inspection Report

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

EPA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	NYSDEC #754005

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Victory Plaza	Taylor Road

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Owego	NY		Tioga		

09 COORDINATES LATITUDE	LONGITUDE
42° 06' 16"._	76° 13' 33"._

10 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL _____ ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER _____ ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
07 / 28 / 87 (MONTH DAY YEAR)	☐ ACTIVE ☑ INACTIVE	NA (BEGINNING YEAR) (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR _____ (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR _____ (Name of firm)
☐ E. STATE ☒ F. STATE CONTRACTOR URS Corporation (Name of firm) ☐ G. OTHER _____ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Linda J. Clark	Project Geologist	URS Corp.	(716)883-5525
09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Frank Trent	Geologist	NYSDEC Region 7	(607) 773-7763
Gary Rice		Tioga Co. Health Dept.	(607) 687-4535
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
Donald Cronk	Owners rep.		(607) 687-5169
John Stelmak	IBM representative		(800)426-3333
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	9:00 A.M.	Sunny, 70°F

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Daniel W. Rothman	URS Corporation	(716) 883-5525

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Kevin H. Siepel		URS Corp.	(716) 883-5525	10 / 13 / 87 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	NYSDEC #754005

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

☐ A. SOLID ☐ E. SLURRY
☐ B. POWDER, FINES ☐ F. LIQUID
☐ C. SLUDGE ☐ G. GAS
☐ D. OTHER NA (Specify)

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

TONS
CUBIC YARDS NA
NO. OF DRUMS

03 WASTE CHARACTERISTICS (Check all that apply)

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

III. WASTE TYPE

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

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

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	NA				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

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

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

No sources of information allege hazardous waste disposal at this site.

EPA FORM 2070-13(7-81)

EPA

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

I. IDENTIFICATION	
01 STATE: NY	02 SITE NUMBER: NYSDEC #754005

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 [X] OBSERVED (DATE: 3-22-84) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

Groundwater contamination (190 ppb TCE) not attributable to this site, on basis of upgradient background levels.

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

None reported

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

None reported

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

None Reported

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

None reported

01 [X] F. CONTAMINATION OF SOIL — 02 [X] OBSERVED (DATE: 3-84) — [ ] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: unknown (Acres)
04 NARRATIVE DESCRIPTION

Deep soil contamination (1,100 ppb TCE) not attributable to this site on basis of upgradient background levels.

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

None reported

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

None reported

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

None reported

EPA

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

I. IDENTIFICATION

01 STATE: NY | 02 SITE NUMBER: NYSDEC #754005

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

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

None reported

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

None reported

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

None reported

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

None reported

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

None reported

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

None reported

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

None reported

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

None reported

III. TOTAL POPULATION POTENTIALLY AFFECTED: approx. 7,895 people within a 3-mile radius

IV. COMMENTS

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

No sources of information allege waste disposal on this property

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	NYSDEC #754005

II. PERMIT INFORMATION

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

III. SITE DESCRIPTION

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

04 TREATMENT (Check all that apply)

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

05 OTHER

- ☒ A. BUILDINGS ON SITE

06 AREA OF SITE

15.02 (Acres)

07 COMMENTS

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

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

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

NA

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☐ NO

02 COMMENTS

NA

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

NYSDEC Region 7

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

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: NYSDEC #754005

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)	SURFACE	WELL	02 STATUS: ENDANGERED	AFFECTED	MONITORED	03 DISTANCE TO SITE
COMMUNITY	A. ☒	B. ☒	A. ☒	B. ☐	C. ☐	A. 1.25 (mi)
NON-COMMUNITY	C. ☐	D. ☒	D. ☒	E. ☐	F. ☐	B. 0.5 (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

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

02 POPULATION SERVED BY GROUND WATER	03 DISTANCE TO NEAREST DRINKING WATER WELL
7,895	0.5 (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
1-17 (ft)	southwest	1 (ft)	1,440-7,200 (gpd)	☒ YES ☐ NO

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

unknown

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

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
Barnes Creek	☐	.04 (mi)
Susquehanna River	☐	1.25 (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. 1,326 NO. OF PERSONS	B. 4,145 NO. OF PERSONS	C. 7,895 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION: .11 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE	04 DISTANCE TO NEAREST OFF-SITE BUILDING
1,120	.11 (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)

7,895 people within 3-mile radius of site. Rural.

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	NYSDEC #754005

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

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

02 PERMEABILITY OF BEDROCK (Check one)

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

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
5-44 (ft)	soil Contam. first noted at 18 ft. increase (ft) with depth	unknown	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
8.4 (in)	2.3 (in)	3 %	south-west	4.5 %

09 FLOOD POTENTIAL

SITE IS IN _____ YEAR FLOODPLAIN

10

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

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE	OTHER
A. _____ (mi)	B. 0.5 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

no critical habitat within 1 mile (mi)

ENDANGERED SPECIES: _____

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. .11 (mi)	B. .25 (mi)	C. .11 (mi)	D. _____ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Site is at higher elevation than Hadco property, to west. It is at lower elevation than IBM property, to east. Most westerly portion of IBM property (south of site) at approximately same elevation as site. Barnes Creek runs along western edge of site. Entire area drains to Susquehanna River, about one mile to south.

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

USGS Topographic Quadrangle Map
IBM Analytical Report, 1984
Letter from Tom Lasater to Muffett Mauche, Aug. 5, 1987

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	NYSDEC #754005

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	69/8	IBM & O'Brien & Gere/Lancy Inc. & Hadco	1984
SURFACE WATER		Corp./1985	
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL	7	IBM & O'Brien & Gere	1984
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☐ AERIAL

02 IN CUSTODY OF URS Corporation (Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS URS Corporation - 570 Delaware Avenue - Buffalo, New York 14202

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

Boring Logs

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

NYSDEC Region 7 -

1984 IBM Analytical Report

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: NYSDEC #754005

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER
Owego Plaza Associates	

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

05 CITY	06 STATE	07 ZIP CODE
Mineola	NY	11502

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	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

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	02 D+B NUMBER
Joseph Gerrity	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
60 East 42nd Street	

05 CITY	06 STATE	07 ZIP CODE
New York	NY	10165

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

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

06 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

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

06 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

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

06 CITY	06 STATE	07 ZIP CODE

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

Owego Plaza Associates, Steven Israel (212) 382-3600

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	NYSDEC # 754005

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

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

OPERATOR'S PARENT COMPANY *(If applicable)*

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

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

01 NAME	02 D+B NUMBER

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

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

PREVIOUS OPERATORS' PARENT COMPANIES *(If applicable)*

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER

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

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER

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

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

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

NYSDEC - Region 7

EPA

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

I. IDENTIFICATION	
01 STATE: NY	02 SITE NUMBER: NYSDEC # 754005

II. ON-SITE GENERATOR

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

III. OFF-SITE GENERATOR(S)

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

IV. TRANSPORTER(S)

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

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

NYSDEC - Region 7

EPA

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

I. IDENTIFICATION

01 STATE: NY | 02 SITE NUMBER: NYSDEC #754005

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

EPA FORM 2070-13(7-81)

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	NYSDEC #754005

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

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

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

NYSDEC Region 7

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	NYSDEC #754005

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)

NYSDEC Region 7

EPA FORM 2070-13 (7-81)

6.0 ASSESSMENT OF DATA ADEQUACY AND RECOMMENDATIONS

Data collected during this Phase I investigation of the Victory Plaza site, used to develop the Hazard Ranking System (HRS) scores, are considered inadequate in the following areas:

- o Site Definition
  - In order to evaluate the site more accurately, consideration should be given to redefining site boundaries to include the properties of IBM and Hadco.
- o Route Characteristics
  - Consideration should be given to constructing new monitoring wells to trace the IBM plume across the Victory Plaza site, so as to make a determination whether the subsurface contamination at Victory Plaza and Hadco is in fact coming from the IBM property.
  - Some control wells should be constructed upgradient of the IBM property.

6.1 APPENDIX A - DATA SOURCES AND REFERENCES

DATA SOURCES AND REFERENCES

1. Victory Plaza Analytical Report, MacFarland-Johnson Engineers, Inc., January 1984.

2. Comprehensive Hydrogeologic Assessment Report, IBM Corporation - Owego, New York, O'Brien and Gere Engineers, Inc., July 1987.

3. Uncontrolled Hazardous Waste Site Ranking System, A Users Manual (HW-10), United States Environmental Protection Agency, 1984.

4. Karen A. Hartnett - URS Corporation, telecon to Daniel Cronk, Fire Chief - Town of Owego, October 21, 1987.

5. Tax Map - Town of Owego, Tioga County, New York, Section Map No. 129.07- 1-7.1, 7.2, 6, December 17, 1976.

6. Steven Israel, President - SMI Capital Corp., G.P. of Owego Plaza Associates, letter to Kevin Siepel, Scientist - URS Corporation, October 9, 1987.

7. Victory Plaza - Site Inspection Notes, signed by Donald Cronk, Owner Representative - Owego Plaza Associates, July 28, 1987.

8. Linda J. Clark, Project Geologist - URS Corporation, letter to Byron Moore - Moore Tires, August 5, 1987.

9. Hazardous Waste Disposal Sites Report - Victory Plaza Site, L.T. Lepak - NYSDEC, June 27, 1984.

10. USGS Topographic Maps 7.5 Series; Apalachin, New York Quadrangle, 1969; Owego, New York Quadrangle, 1969; Candor, New York Quadrangle, 1969.

11. A.A. Coburn, Regional Permit Administrator - NYSDEC, letter and map to Linda J. Clark, Project Geologist - URS Corporation, October 2, 1987.

12. Geology of South-Central New York, Guidebook for New York State Geological Association - 35th Annual Meeting, May 1963.

13. New York State Geological Association, Guidebook for Field Trips in South Central New York - 53rd Annual Meeting, State University of New York at Binghamton, September 18-20, 1981.

14. Geologic Map of New York (Finger Lakes Sheet), Lawrence V. Rickard and Donald W. Fisher, 1970.

15. Report on Ground Water Dependence - New York State, by New York State Department of Health, Division of Environmental Health - Bureau of Public Water Supply, 1981.

16. Surficial Geologic Map of New York (Figure Lakes Sheet), Ernest H. Muller and Donald H. Cadwell, 1986.

17. Richard Ottens, Jr., Area Manager - Owego Water Works, letter to Muffett A. Mauche, Staff Engineer - LeRoy Callender, PC, October 22, 1987.

18. **NYSDEC** - Attachment to Consent Order, International Business **Machines** Corporation (IBM), File No. 7-0528, June 7, 1983.

19. L. Lepak - NYSDEC Region 7, memo to W. Demick - NYSDEC, June 26, 1984.

20. Phase II Hydrogeologic Investigation - Hadco Corporation, Owego, New York, by Lancy Laboratories.

21. Subsurface Investigations - Hadco Corporation, Owego, New York, Richard A. Hixon, Project Geologist and Cliff Harper, Managing Hydrogeologist - Groundwater Technology, Inc., August 1986.

22. William M. Gilday, Public Health Sanitarian - New York State Department of Health, Bureau of Toxic Substance Assessment, Analytical Examination Results of the IBM-Hadco Sites in Owego to Mario Nirchi - NYSDEC, February 23, 1987.

23. Gary E. Rice, R.S., Director Environmental Health Services, letter and map to Mario Nirchi - NYSDEC, November 12, 1985.

24. Muffett A. Mauche, Staff Engineer - LeRoy Callender, PC, letter to Barry Wilkins - Town of Owego Utilities, September 28, 1987.

25. Climates of the States - New York, Climatography of the United States No. 60-30, United States Department of Commerce Weather Bureau, February 1960.

26. New York State Atlas of Community Water System Sources, New York State Department of Health, Division of Environmental Protection - Bureau of Public Water Supply Protection, 1982.

27. Tom Lasater, District Conservationist - NYSDEC, letter and map to Muffett A. Mauche, Staff Engineer - LeRoy Callender, PC, August 5, 1987.

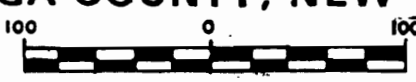
28. Muffett A. Mauche, Staff Engineer - LeRoy Callender, PC, letter to Gary Rice, Director of Environmental Health - Tioga County Health Department, September 28, 1987.

29. 1980 Census of Population, Number of Inhabitants - New York, United States Department of Commerce - Bureau of the Census.

30. Visual Encyclopedia, Map of Genesee and Northern Finger Lakes Region of New York State.

REF. (5)

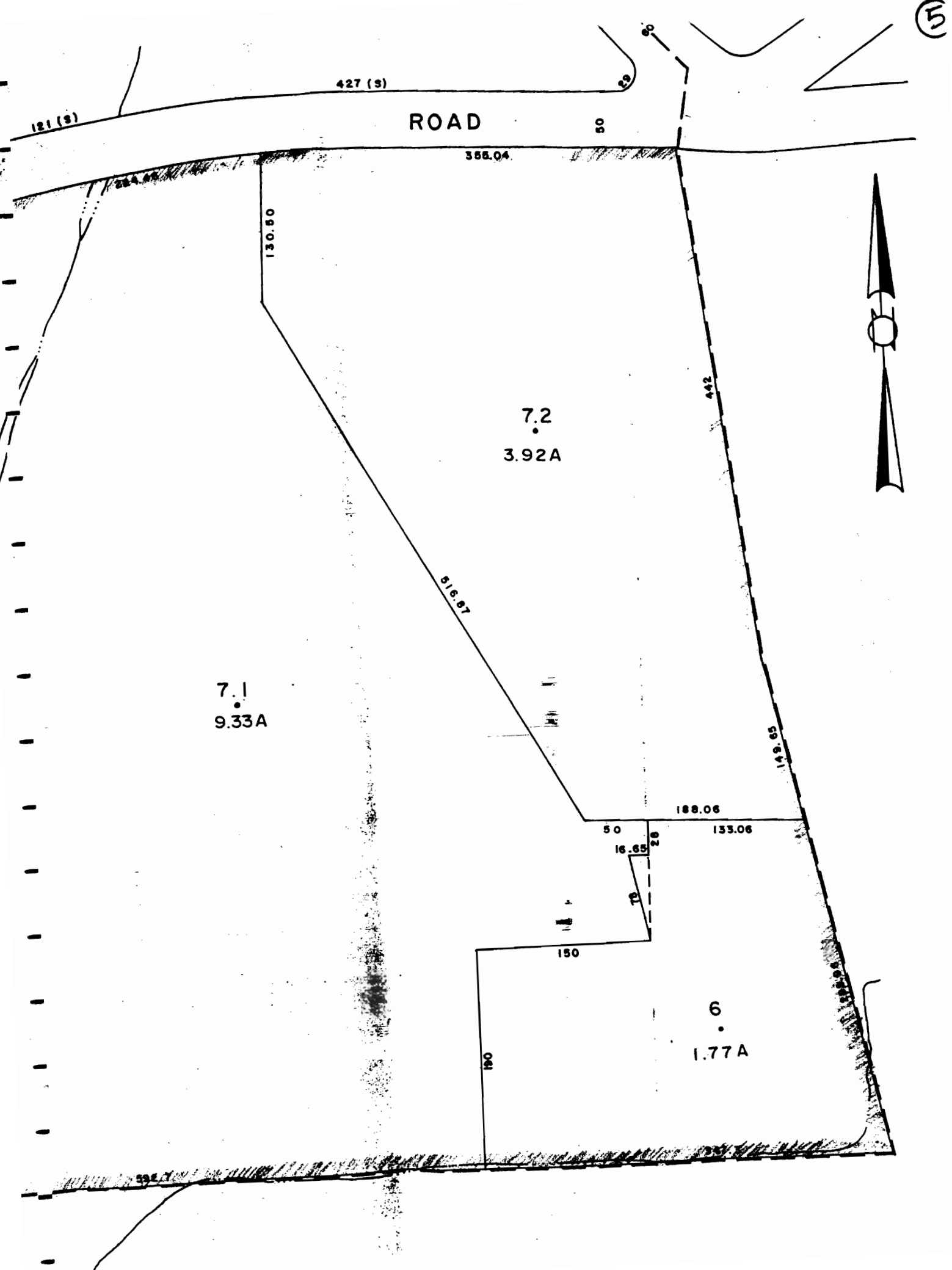
TAX MAP
TOWN OF OWEGO
TIOGA COUNTY, NEW YORK



GRAPHIC SCALE
1" = 100'

MAP DATE 12-17-76

129.07



5
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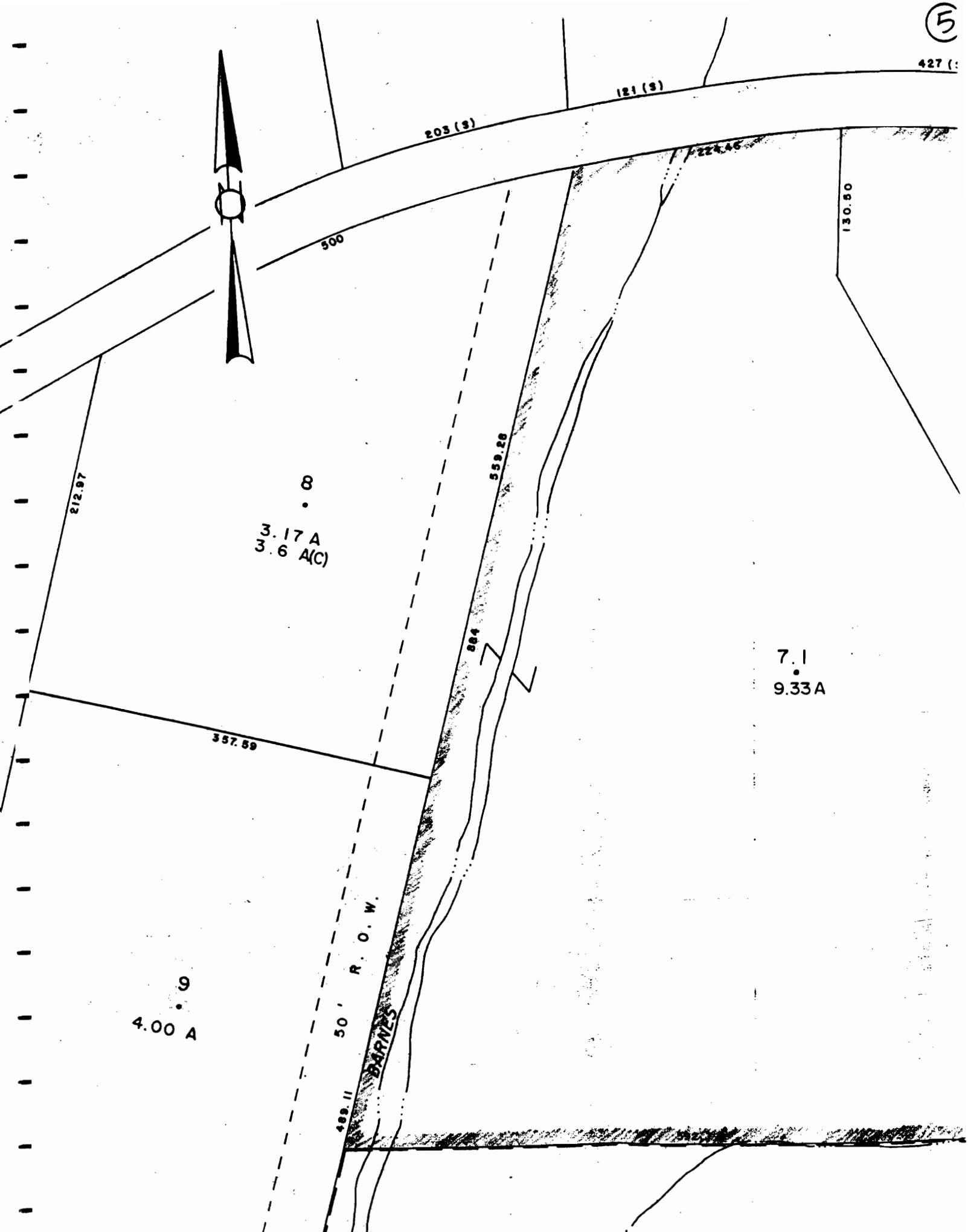
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50' R.O.W.
BARNES
489.11

REF. (6)

SMI CAPITAL CORPORATION
ONE TIMES SQUARE
22 Floor
New York, New York 10036

(212) 382-3600

RECEIVED
URS COMPANY
OCT 14 1987
JOB #

Kevin Siepel
URS Corporation
570 Delaware Avenue
Buffalo, N.Y. 14202-1207

October 9, 1987

Dear Mr. Siepel:

Regarding your request last week for specific information pertaining to the former Victory Plaza site in Owego, New York, the following facts are, to the best of our knowledge, true.

1). In October of 1984, Owego Plaza Associates purchased the subject property from Joseph Gerrity and Arrowhead Estates (owned by Joseph Gerrity). Owego Plaza Associates is a limited partnership, the general partner of which is SMI Capital Corp. (Note: At the time of the sale, the name of Owego Plaza Associates was IBM Associates. The name was later changed to Owego Plaza Associates at the request of IBM.) The property is still owned by Owego Plaza Associates.

2). The site gradually ceased operations as a shopping center over a period of time beginning in the early 70's and running through the early 80's, as IBM continued to lease more and more space. IBM is now the sole tenant on the site, although a small portion of it is still being sub-leased to them by Victory Markets.

3). The underground gas tanks were removed from the site sometime in 1985 by Victory Markets. We have no specific information regarding either the dates or the ownership of any gas station which may or may not have existed on the site, although such information might possibly be obtained from Victory Markets, 54 East Main Street, Norwich, N.Y. 13815

4). At one time there was a car wash adjacent to the Owego Bowl bowling alley. Neither the bowling alley nor the car wash was ever owned by us, and we have no further information on it.

I hope that the above facts will be of help to you in your analysis of the property's history. If we can be of further assistance, please do not hesitate to contact us. Thank you very much.

Sincerely,

Steven Israel
President, SMI Capital Corp.,
G.P. of Owego Plaza Associates

REF. (7)

VICTORY PLAZA Site

7-28-87, 9:00 a.m. ~70°F, sunny

FRANK TRENT (DEC)
GARY RICE (Tioga Co. Health Dept.)
DON CRONK (owner)
JOHN STELMAK (IBM rep)

contact: Jim Ryan - IBM

MRS. Joe Gerraghty Jr, Albany - previous owner
She sold property to Stephen Bordel (NY)
approx. 3 yrs ago.

Victory Plaza was closed ~15 yrs ago

gas station that was previously on-site was abandoned ~17 yrs. ago.; 3 - 10,000 gal. tanks (approx)
located just north of end of plaza
- all below ground tanks removed ~2 yrs ago

Don Cronk

REF. (2

URS

AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATION

URS COMPANY, INC.
CONSULTING ENGINEERS
570 DELAWARE AVENUE
BUFFALO, NEW YORK 14202
TEL: (716) 883-5525

NEW YORK
MONTVALE, NJ
BUFFALO
ATLANTA
TAMPA
HATO REY, PR
WASHINGTON, DC
BOSTON
CLEVELAND
DENVER
DALLAS
SEATTLE
SAN FRANCISCO
SAN MATEO, CA

August 5, 1987

Mr. Byron Moore
c/o Moore Tires
P.O. Box 449
Taylor Road
Owego, New York 13827

Dear Mr. Moore:

As discussed during our meeting on July 28, 1987, URS Company, Inc. is currently conducting a Phase I investigation of the "Victory Plaza" site located on Taylor Road, Town of Owego, Tioga County, New York.

We are performing this investigation for the New York State Department of Environmental Conservation pursuant to the requirements of the New York State Superfund Law (Chapter 857 of the Laws of 1982).

The following information was provided during the site inspection:

- The property to the southeast of the previous Victory Plaza, which includes the Moore Tire building as well as a small parcel to the west of this building, is owned by Mr. Byron Moore and Mr. James Moore of Owego, New York.
- The Moore property was purchased approximately 15 years ago from Mrs. Joseph Gerrahty, Jr. of Albany, New York. Prior to this, the property was leased by IBM Corporation - Owego, New York for light manufacturing and shipping purposes.
- During the years of ownership by the Moores, you have no knowledge of the disposal of hazardous substances on the property.
- Approximately 7-8 years ago (about 1980), the Town of Owego, New York disposed of a small quantity of soil (from ditch cleaning operations) on the property adjacent to the Moore Tire building (to the west).

We would appreciate if you would review this information, note any necessary corrections, and return a signed and dated copy to indicate your concurrence.

Sincerely,

URS COMPANY, INC.

Linda J. Clark

Linda J. Clark
Project Geologist

LJC/bc
8/5/87L2
35154

I agree with the information as it is presented.

REF. (9)

47-15-11(2/80)

HAZARDOUS WASTE DISPOSAL SITES REPORT
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Code: _____

Site Code: 7a

Name of Site: Victory Plaza Site Region: 7

County: Tioga Town/~~City~~ Owego

Street Address ~~[illegible]~~ Taylor Rd & IBM Parkway

Status of Site Narrative:

In 1984, IBM Corporation hired a consultant to conduct a hydrogeologic investigation of the Victory Plaza property to ascertain water quality. IBM was considering purchasing the property. McFarland Johnson Engineers, Inc. completed a partial Phase II type investigation of the site. This study found trichloroethylene contamination in the groundwater with a maximum concentration of 190 ppb. The report provided an isoconcentration plume map of the trichloroethylene contamination, together with three wells identified. IBM did not acquire the property.

Type of Site: Open Dump ☒ Treatment Pond(s) ☐ Number of Ponds _____
Landfill ☐ Lagoon(s) ☐ Number of Lagoons _____
Structure ☐

Estimated Size 5 to 10 Acres

Hazardous Wastes Disposed? Confirmed ☐ Suspected ☒

*Type and Quantity of Hazardous Wastes:

TYPE	QUANTITY (Pounds, drums, tons, gallons)

* Use additional sheets if more space is needed.

Name of Current Owner of Site: Joseph Garrity

Address of Current Owner of Site: 60 East 42nd St.
New York, N.Y. 10165 Ph. 212-697-2995

Time Period Site Was Used for Hazardous Waste Disposal:

_____, 19 To _____, 19

Is site Active ☐ Inactive ☐ Unknown
(Site is inactive if hazardous wastes were disposed of at this site and site was closed prior to August 25, 1979)

Types of Samples: Air ☐ Groundwater ☒ None ☐
Surface Water ☐ Soil ☐ Sediment ☒

Remedial Action: Proposed ☐ Under Design ☐
In Progress ☐ Completed ☐
Nature of Action:

Status of Legal Action: _____ State ☐ Federal ☐

Permits Issued: Federal ☐ Local Government ☐ SPDES ☐
Solid Waste ☐ Mined Land ☐ Wetlands ☐ Other ☐

Assessment of Environmental Problems:

A groundwater contamination plume has been identified on the Victory Plaza property, originating from an unknown source.

Assessment of Health Problems:

Trichloroethylene levels in the groundwater in the plume area exceed Class GA groundwater limits for the substance (10ppb).

Persons Completing this Form:

L. T. Lepak

New York State Department of Environmental Conservation

New York State Department of Health

Date 6/27/84

6/3/81
RPM:cl

SCALE 1:24000

REF. (10)

APALACHIN, N. Y.

SW/4 ENDICOTT 15' QUADRANGLE

N4200—W7607.5/7.5

1969

AMS 5768 II SW—SERIES V821

SCALE 1:24000

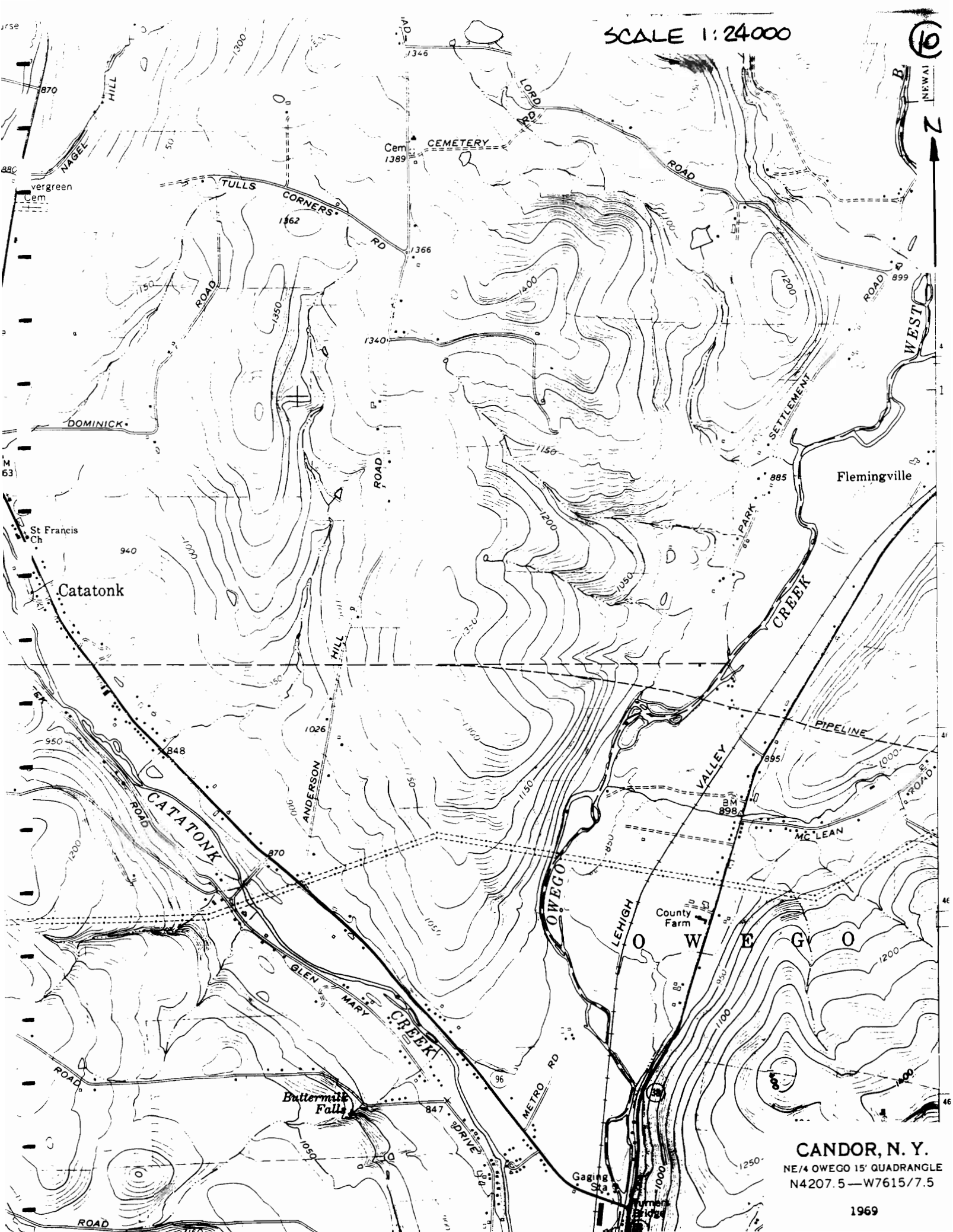
10

OWEGO, N. Y.

SE/4 OWEGO 15' QUADRANGLE

N4200—W7615/7.5

1969



CANDOR, N. Y.

NE/4 OWEGO 15' QUADRANGLE

N4207.5—W7615/7.5

1969

REF. (11)

New York State Department of Environmental Conservation
Region 7
Division of Regulatory Affairs
PO Box 5170
Cortland, NY 13045-5170
(607) 753-3095

Thomas C. Jorling
Commissioner

RECEIVED
URS COMPANY

OCT 05 1987

JOB # _____

October 2, 1987

URS Corporation
570 Delaware Avenue
Buffalo, New York 14202

Attention: Linda J. Clark, Project Geologist

Dear Ms. Clark,

I am returning your maps with the State regulated wetlands and protected streams so designated.

I do not have at my disposal all of the information you requested so my statement of no other concerns speaks only to my knowledge and concerns that I am aware of at this time.

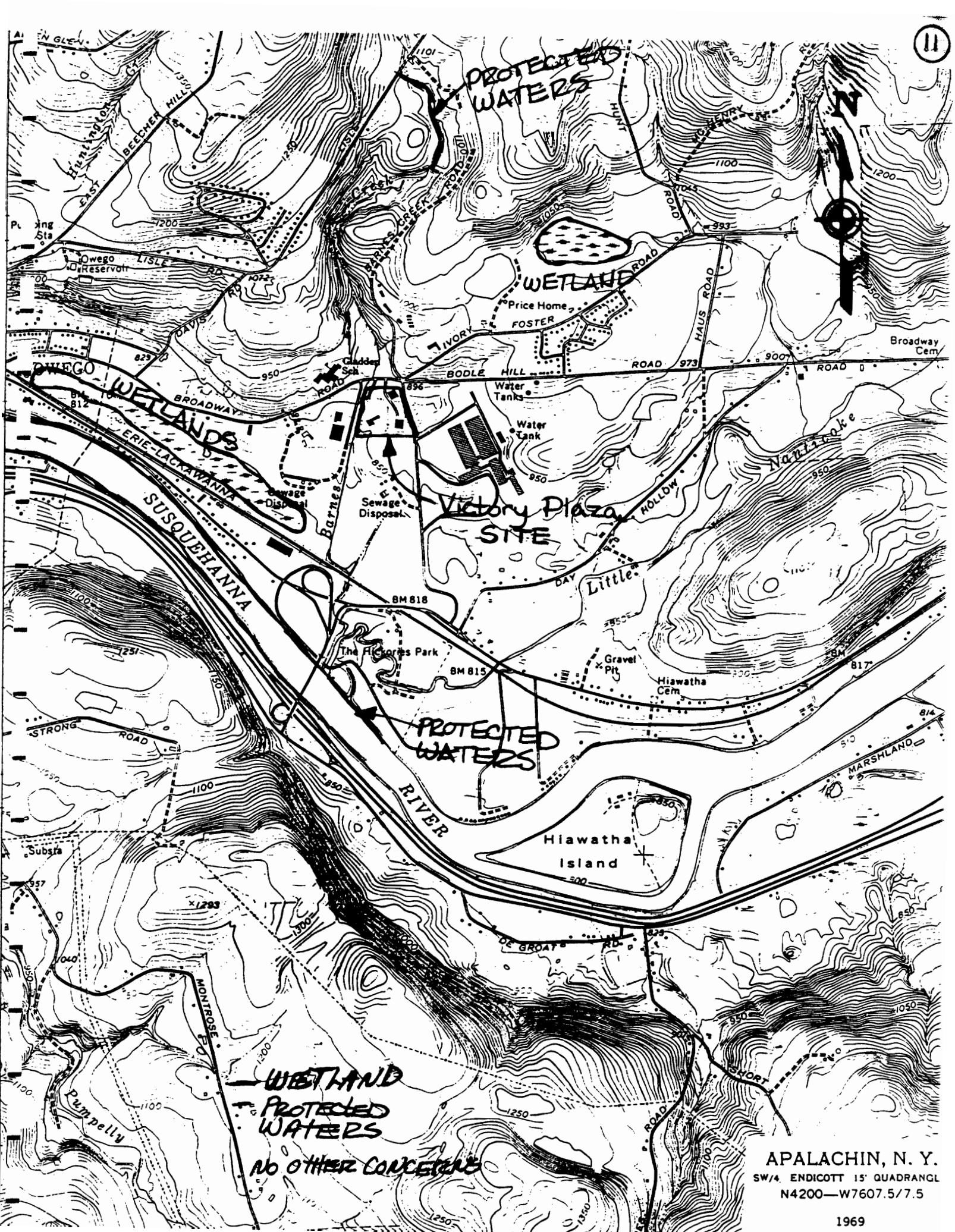
If a site qualified for further action, a more detailed investigation should be undertaken.

I hope my information is helpful. If I can assist further, please advise.

Sincerely yours,

A. A. Coburn
Regional Permit Administrator

Enclosures



APALACHIN, N. Y.
SW/4 ENDICOTT 15' QUADRANGL
N4200—W7607.5/7.5

1969

QE
145
.N56
1963

REF. (12)

GEOLOGY

of

SOUTH-CENTRAL NEW YORK

GUIDEBOOK FOR
NEW YORK STATE GEOLOGICAL ASSOCIATION
35th Annual Meeting — May 1963

(12)

sandstone and some siltstone and shale comprise the non-marine facies. There is a significant absence of limestone with the exception of a few thin coquinite horizons. Conglomerates are rare in the part of the Catskills traversed on the field-trip route. Although some literature offers the impression that the Catskill beds are largely "red beds", less than 10 percent of the beds in this area are "red". The reader is referred to the Explanation in Figure 4 for current nomenclature of the various rock-time units.

The rocks that will be seen on the field trip are mostly fine to medium-grained subgraywackes that range in color from brown and red to gray and blue. The volume of sandstone-type units when compared to finer-grained clastics is about 9 to one for rocks east of Windsor, whereas the sandstones comprise only about 20 percent of the sedimentary volume west of the village.

The mineral composition and fabric of the non-marine sandstones make them particularly valuable in the quarrying and milling of dimension stone. The slightly angular sand grains are tightly bonded by an indurated matrix of materials that include sericite, chlorite, mica, and feldspars. This combination of features make the rock hard and of desirable color. Joints and "reed planes" facilitate commercial operations. The rock is sold under a variety of names as: Hudson River Stone, North River Stone, Railroad Stone, Catskill Stone, Bluestone, and Genesee Standard Dark. The thinner units, generally less than 2", are referred to as "flagstone" and are used for sidewalks, patio walls, floor treads etc. Thicker units have a wide range of uses in buildings, construction, and decoration in the architectural arts. Figure 6a and 6b illustrate the natural setting and commercial production of good quality "bluestone".

STRUCTURAL GEOLOGY

The primary or sedimentary structures of the Upper Devonian strata cover a wide range of small-scale features. Ripple marks, rill marks, and flute grooves and casts are common in most south-central New York rocks. Some sequences of the marine facies contain graded bedding, and the sandier horizons show cross lamination. The flow rolls are restricted to marine rocks. Cross bedding is the most important primary structure of the non-marine sandstones. It should be understood that the sedimentary rocks occur in layers with some variation in texture, composition and color. The angularity of bedding planes is so common as to make this a general feature of sediments that formed on a huge system of coalescing alluvial fans and deltaic distributaries. Other features of the non-marine rocks include rain-drop impressions, plant rootlet casts, mud cracks, and occasional fresh-water molluscs.

Certain aspects of the structural history of south-central New York and its relation to other regions in eastern North America are discussed in the Meyerhoff and Woodrow and Nugent articles in this volume. The main properties of the regional structure consist of a slightly flexured south to southwest dipping homocline. Wedel (1932) shows the wave length to be about 10 miles for the gentle east and northeast trending fold axes. More recent work by the University of Rochester group indicates that such structures might more accurately be interpreted as several series of aligned domes. The dip of the rocks is rarely more than 1-2 degrees, but the southern limbs are steeper than their northern counterparts. Wedel uses the following terms from west to east to describe the flexures: Watkins Anticline, Enfield Syncline, Alpine Anticline, Cayuta Syncline, Van Etten Anticline, Horseheads Syncline, Elmira Anticline, Nichols syncline, and Union Center Dome. Table 1 presents data for selected deep wells in south-central New York. An unsuccessful oil test hole was drilled on the Union Center Dome. The regional dip in Broome County is about 11 ft. per mi. in a direction S 30° W.

The main architecture of the Catskill Mountains is a large synclinorium with upturned nose to the east and plunging gently S 25° W. The eastern rim of this region as it rises majestically over the Hudson-Mohawk region is the classic example of a retreat-

common with range up to 2,000 gpm. Other wells in the valley fill many encounter clay beds and morainic materials that deteriorate ground-water properties. Bedrock wells commonly are more than 100 feet deep. Such depths are necessary in order to incise sufficient numbers of rock fractures that slowly permit recharge in the well bore. The yield of bedrock wells average 5-10 gpm and rarely exceed 30 gpm. The quality of water has a wide range, but would average about 200 parts per million as $CaCO_3$ hardness, about 180 ppm alkalinity, 15 ppm chlorine, and 0.1 ppm iron.

GLACIAL GEOLOGY

Although Illinoian and Wisconsin ice sheets are known to have travelled at least 40 miles south of the region under discussion in this report, all glacial features and deposits in south-central New York have been given a Wisconsin date in the literature. The youngest ice sheet of Wisconsin time stopped north of the south-central New York region and has been given the name "Valley Heads". This glacier was responsible for many of the features in the Finger Lakes district. The important and debatable question is, however, were there one or two ice sheets that covered southern New York during the Wisconsin prior to Valley Heads time? Although some work has been done on the problem, the writer is unaware of glacial mapping studies that have been done in the area traversed by the field route.

Rich (1935) using topographic and weathering criteria states the case for two separate ice advances in the region of the central Catskills.

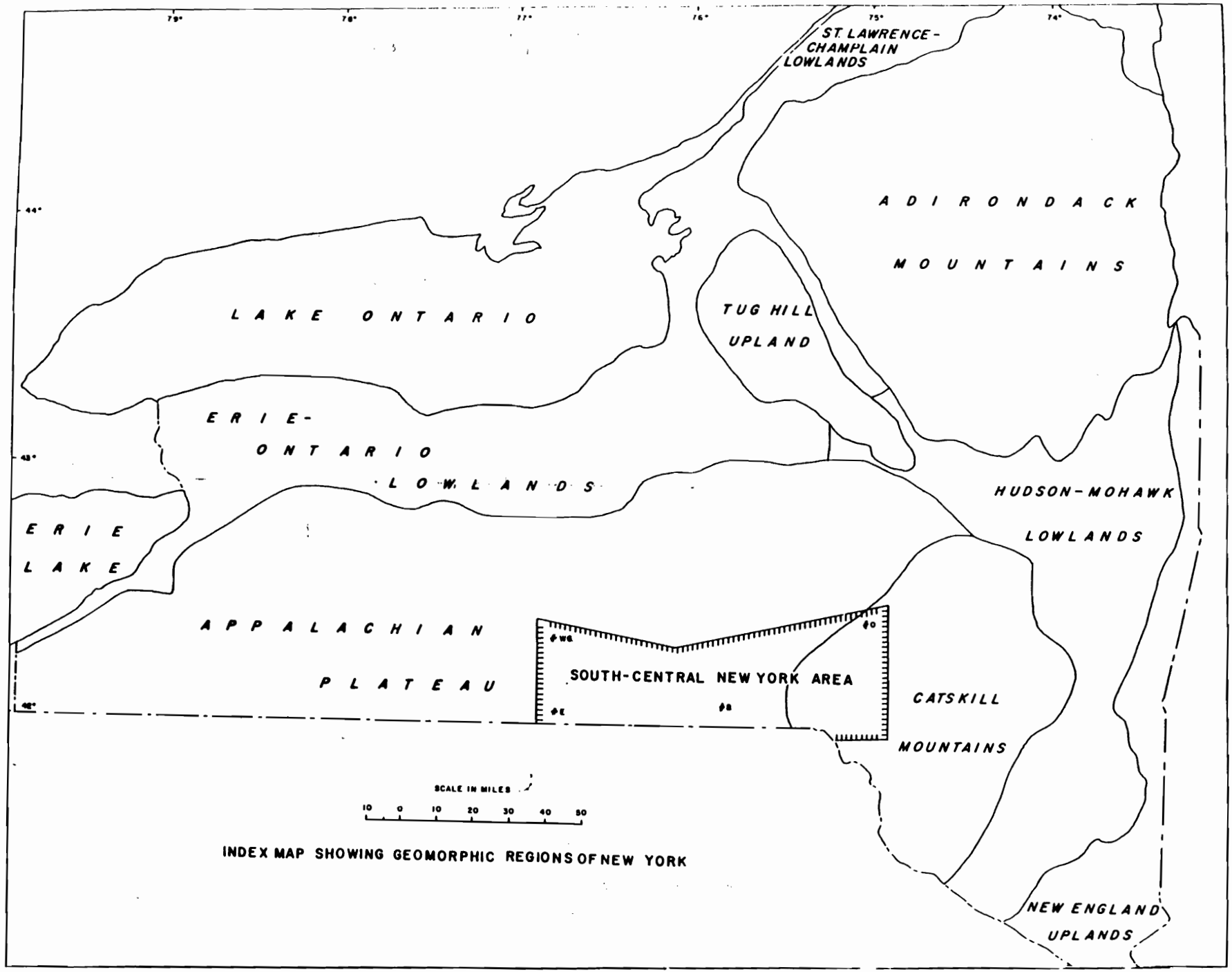
> "....an outer belt of moraines...seems to separate two unlike areas - one to the north and east, in which moraine loops are abundant, sharp and fresh; and the other to the south and west where few moraines are found, where smooth, thick drift is the prevailing form of glacial deposit, where evidences of the erosive action of the ice are few, and where the topography and the weathering of boulders suggest noticeably greater age of the drift" (Rich, 1935, p. 130).

MacClintock and Apfel (1944) by the use of pebble counts, outwash, and moraine relations in the area west of Binghamton also state there were two ice sheets. The older one is called "Olean" and the younger is termed the "Binghamton".

Flint (1953, p. 904-5) correlated New York and New England till sheets and concluded that Olean drift is of the Tazewell Substage and that Binghamton drift is the same as Rich's younger moraine and is of the Cary Substage.

Denny (1956) working in the Elmira area doubted the presence of the "Binghamton" for that locality and believed it must occur north of the Valley Heads border. Moss and Ritter (1962) using heavy-mineral-suite characteristics and sand-silt-clay ratios deny a separate advance of the "Binghamton". On the basis of previous studies and work done by the author in the preparation of this report, Table 7 is presented as a summation of till characteristics for this region.

Thus, the author believes that a single ice sheet created the morainic materials in this region, and recommends retention of the names "Olean" and "Binghamton" as lithologic facies. The Olean is the upland facies and the Binghamton is the valley facies. In deep excavations the Binghamton grades vertically into the overlying Olean without an intervening soil profile. Along valley walls the Binghamton also grades laterally into the higher Olean lithology. The circumstances that caused facies development is discussed below.

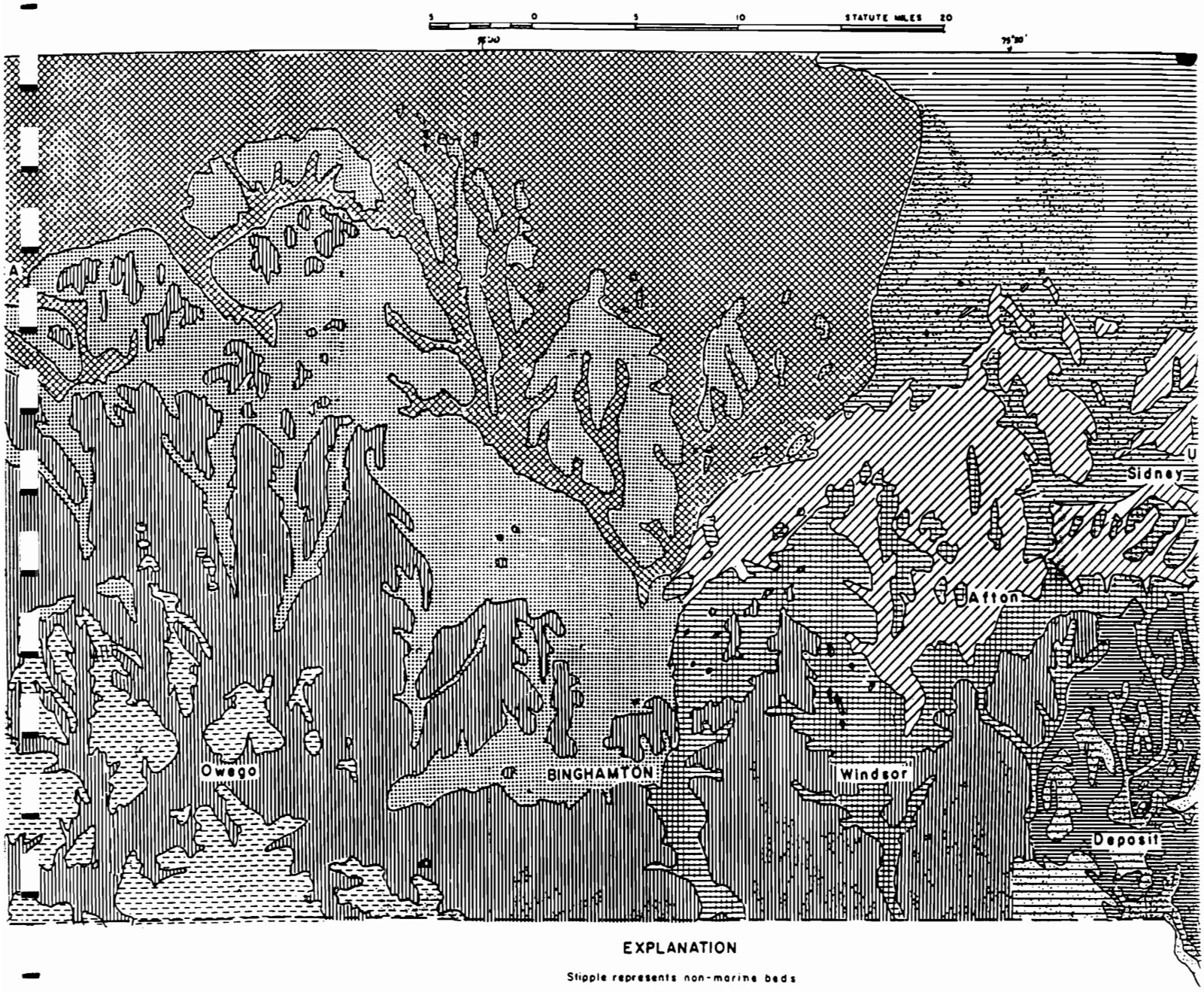


INDEX MAP SHOWING GEOMORPHIC REGIONS OF NEW YORK

Figure 1.

REDRAWN FROM GEOLOGICAL MAP OF NEW YORK 1961

GEOLOGIC MAP OF SOUTHERN NEW YORK



EXPLANATION

Stipple represents non-marine beds

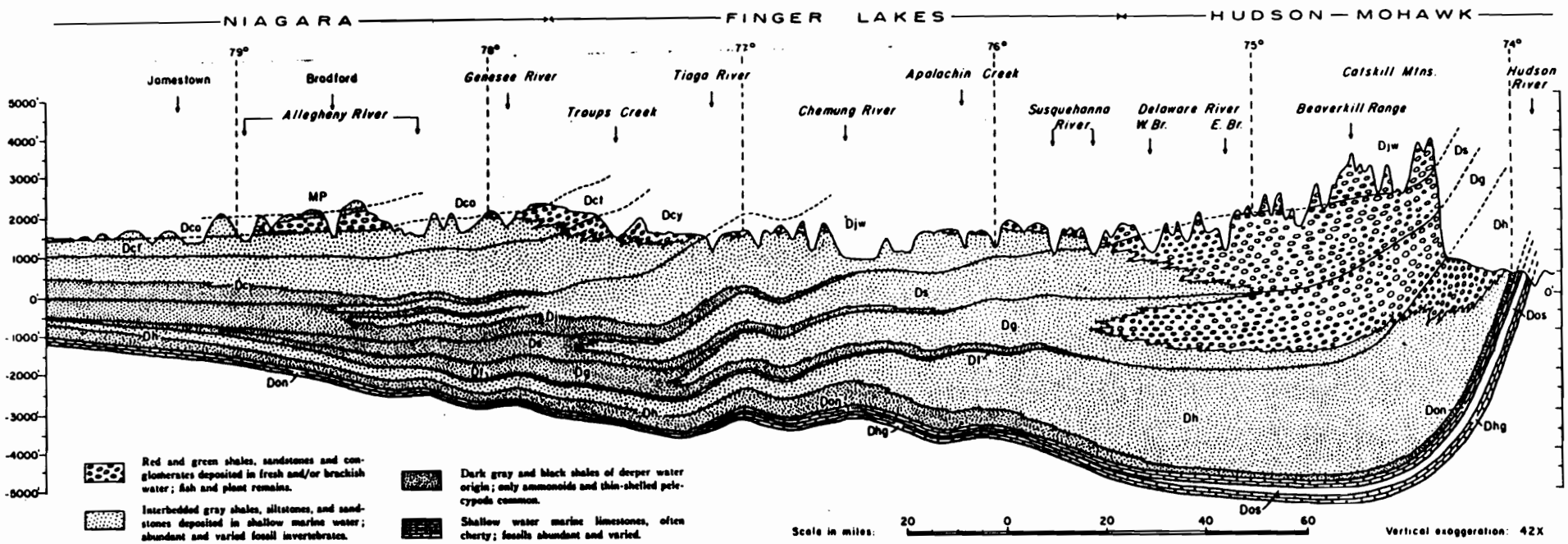
Upper Devonian

Western Beds

Djwm / Djwl / Djwn	Java and West Falls Group	-MIDDLE WEST FALLS GROUP - SHALE, SILTSTONE, SANDSTONE (WELLSBURG?) -LOWER WEST FALLS GROUP - SHALE, SILTSTONE, SANDSTONE (CAYUTA?) -WISCOY FORMATION - SANDSTONE, SHALE; PIPE CREEK SHALE, HUNDA FORMATION - SANDSTONE, SHALE
Ds	Sonyea Group	-CASHAQUA SHALE REPLACED EASTWARDLY BY ENFIELD FORMATION SHALE, SILTSTONE, SANDSTONE; MIDDLESEX SHALE.
Dg	Genesee Group	-WEST RIVER SHALE; GUNUNDEWA LIMESTONE; PENN YAN AND GENESEO SHALES; ALL EXCEPT GENESEO REPLACED EASTWARDLY BY ITHACA FORMATION SHALE, SILTSTONE AND SHERBURNE SANDSTONE

Eastern Beds

Djws / Djwh	-SLIDE MOUNTAIN FORMATION; RED SHALE, SANDSTONE, CONGLOMERATE -UPPER KATSBERG FORMATION; R. SHALE, SANDSTONE, CONGLOMER
Dsu / Dsd / Dsk / Dss	-DSU - UPPER SONYEA GROUP, SHA. SILTSTONE, SANDSTONE -DSK - KATTEL FORMATION - SHALE SILTSTONE, SANDSTONE -DSD - LOWER KATSBERG FORMATION SANDSTONE, RED SHALE, SILTSTONE -DSS - STONY CLOVE FORMATION SANDSTONE CONGLOMERATE, SHALE
Dgou	-ONEONTA AND UNADILLA FORMAT RED SHALE, SILTSTONE, SANDSTONE



Reproduced from THE GEOLOGY OF NEW YORK STATE (1962) by permission of N.Y. State Museum and Science Service and Geological Survey

CROSS SECTION OF DEVONIAN ALONG NEW YORK-PENNSYLVANIA BORDER

Figure 5.

APPENDIX A

STRATIGRAPHY IN THE APALACHIN AND BINGHAMTON QUADRANGLES

Robert G. Sutton[1]

Reconnaissance studies provide the following generalized stratigraphic section:

"New Milford"	lower 100 feet only
West Falls Group	
West Hill-Nunda	130-0 feet
Gardeau	400-620 feet
Rhinestreet	600-800 feet
Naples Group	
Sonyea	800 feet
Middlesex	250 feet
Genesee Group	1200 feet (subsurface only)

Given below is a summary of post-Rhinestreet strata. More detailed information will be presented in papers being prepared for publication (Sutton, 1963 and Woodrow, 1963). The Rhinestreet and pre-Rhinestreet formations and members have been discussed elsewhere (Sutton and others, 1962).

The Gardeau Formation as described by Twigg (1961) is comprised of all the strata between the top of the Roricks Glen Member of the Rhinestreet and the base of the overlying West Hill Formation. Recognized at the top of the Gardeau and included in it is the Corning Member, a sequence of very dark gray shales and thin-bedded gray siltstones approximately forty feet thick. The type section of the Corning is the cliff, south of New York 17 at the west edge of Corning, New York (elevation 975 feet) where 17 bridges the railroad.

Strata above the Gardeau and below the oldest red-beds in the area are recognized as occupying a stratigraphic position correlative with the West Hill and Nunda Formations west of the field trip area. Strata of this interval decrease in thickness between Elmira and Binghamton as the red-beds are encountered lower in the sequence, until, at the Corbisello Quarry on Ingraham Hill south of Binghamton, sandstones of the "New Milford" Formation are found directly above the dark gray shales of the Corning.

Assignment of the youngest units to the "New Milford" is tentative and is based on the appearance in the section of red-beds. "Mansfield" is used in the same manner west of the Waverly quadrangle.

Within the Apalachin and Binghamton quadrangles strata dip S 60° W at approximately 90 feet per mile. Middlesex outcrops are confined to the Chenango valley. The Sonyea and Rhinestreet may be found in the Susquehanna valley and on the hills to the north. The Gardeau-"New Milford" strata are restricted to the hills south of the Susquehanna.

The Moreland Member of the Rhinestreet occurs at Union Center, at Dickenson and in Acre Creek; the Dunn Hill on New York 17 southwest of Twin Orchard and in Doubleday Glen; the Roricks Glen on Pennsylvania (1500 feet); the Corning Member of the Gardeau at Ingraham Hill.

The Portage lithofacies occurs in the Middlesex and in portions of the Sonyea.

---

[1]University of Rochester (Temporary Address: Lamont Geological Observatory, Palisades, New York).

GEOMORPHOLOGY OF THE BINGHAMTON AREA

Donald R. Coates
Department of Geology
Harpur College

The Binghamton area, also known as "The Triple Cities", is located in Broome County, immediately north of the Pennsylvania State line. The 200,000 population of the metropolitan area is largely confined to the flood plain-terrace area, often two miles wide, of the Chenango and Susquehanna Rivers. Until recent years the Endicott-Johnson Corporation was the only important large industry of the area. Attracted by excellent water recources, and other factors, however, there are now more than 100 industries in the area the largest being: International Business Machines, Inc., Ansco-Ozalid, Link Division of General Precision, Inc., and General Electric Co. Such a setting provides an ideal environment for Harpur College and Broome Technical Community College.

The purpose of this report is to focus attention on the specific topographic, hydrologic, and glacial features that typify the area. The general geologic setting is discussed in other articles of this volume. Additional information may be found in the text of the Description for Field Trip B. The route of the trip (Fig. 1) was designed to cover the maximum area in the time provided. The trip stops are at convenient and accessible localities but are representative of the geomorphology of the Triple Cities.

TOPOGRAPHY

The flavor of any topography is largely the result of the intensity and nature of the interaction of internal earth foces and the external degradational processes. The Binghamton landscape has been sculptured from shale and siltstone of Upper Devonian age by the action of running water and gravity. These processes continued for millions of years until molested and interrupted by the challenge of Pleistocene glaciation.

The topography of the area ranges from 810' in the Susquehanna River to 1877' south of Ingraham Hill (Fig. 2). The total relief is less today than it was during pre-glacial time, owing to aggradation of till on upland and valley sides and deposition of outwash and alluvial materials in river channels. The valley bedrock floors of the major drainages were 200' deeper and hill summits were probably 10'-20' higher. Glacial ice was not an important erosional factor in the area.

Three important slope elements compose the topography, namely those slopes produced by, (1) Sheet wash and gravity - "equilibrium-type slopes", (2) direct river incisement and oversteepening by lateral corrasion, and (3) aggradational processes. Some of the quantitative slope and drainage relations are presented in Tables 1 and 2. Slopes of the first category usually range from 13-15 percent grade, whereas second category slopes may be vertical and third category slopes horizontal. Less than one-fourth of the slopes are more than 15 percent. The wide flood plain-terrace areas reduce the overall ruggedness of the region.

At least three interesting aspects of slopes and drainage are worthy of special mention: (1) With the exception of direct stream corrasion the, steepest topography occurs on north-facing slopes; (2) Many stream junctions in the southern part of the

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Acknowledgments: W. Bothner and W. Cook aided in drafting the illustrations. W. Cook, J. Conners, and R. Teifke aided in assembling some of the statistical data.

area are "barbed", and; (3) The presence of youthful-type valleys superimposed upon the "maturely-dissected" land forms.

The author believes that by use of such data as found in Tables 1 and 2 important deductions can be made and theories for erosional history can be tested. For example some geologists believe the area south of the Susquehanna has had a somewhat different history than the area to the north. An interpretation of the data shows, however, that in general the erosion is of similar magnitude. The statistical level of significant differences are attributed to the slightly higher sandstone ratio and circularity index of the southern basins.

HYDROLOGY

Drainage Considerations

The major streams in the area are the Susquehanna, Chenargo, and Tioughnioga Rivers. As the combined discharge of these rivers entering the Binghamton area is 6,106 cfs. and is 6,451 cfs. when it leaves the area, the 228 square miles of the region have added 345 cfs., a yield of 1.51 cfs/sq/mi.

There are many unusual drainage relations in this area, such as the Susquehanna River entering the area from the south and then making a right angle bend and flowing west out of the area. The relic channels and erosional history of these rivers is discussed elsewhere in this volume.

Water Resources

Water is a basic ingredient of the economy of the Binghamton area. Table 3 itemizes water use for the year 1962. The reader should study the publication by Brown and Ferris (1946) for a complete analysis of ground-water characteristics in the area. In 25 years, ground water use has increased 170 percent, from 5.3 billion gallons in 1937, to 7.6 bg. in 1944, to 8.9 bg in 1962. Brown and Ferris (p. 40) gave this note of caution:

> "Thus, under the present localization of ground-water development in the southwestern part of Broome County, it is possible that appreciably more than 50 percent of the total available supply is being utilized".

Some water users, such as Ansco, have major programs of water reversal in which they have developed some wells that are periodically used as recharge wells.

Rock wells in the area are generally more than 100' deep and yield only small amounts of water that is of poor quality owing to hardness and occasional chlorine, iron, sulfur etc. All public and industrial wells are developed in the outwash sand and gravel. The water is of excellent quality and may produce yields considerably more than 1,000 gpm with transmissibility of 70,000 gallons per day per foot of drawdown. Several wells and test borings have encountered large thicknesses of lacustrine clays, one reported as much as 200'.

GLACIAL GEOLOGY

The Wisconsin ice sheet covered the Binghamton area and spread 40 miles south into Pennsylvania. As it covered hills in Pennsylvania as high as 2,800' and by an interpretation of modern ice sheet slopes, it is probable that the total thickness of ice over Binghamton may have approached 3,000'. The part of the sheet confined to the major

REF. (13)

"N.Y. STATE GEOLOGICAL ASS'N"

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NEW YORK STATE GEOLOGICAL ASSOCIATION

53RD ANNUAL MEETING 18-20 SEPTEMBER 1981

BINGHAMTON, NEW YORK

GUIDEBOOK FOR FIELD TRIPS IN SOUTH-CENTRAL, N.Y./ NEW YORK

PAUL ENOS, EDITOR

S-003885807

STATE UNIVERSITY OF NEW YORK AT BINGHAMTON

Published by the New York State Geological Association. Guidebook available from the executive secretary: Manfred P. Wolff, Department of Geology, Hofstra University, Hempstead, New York, 11550.

HYDROLOGY IN RELATION TO GLACIAL GEOLOGY ALONG THE SUSQUEHANNA RIVER VALLEY, BINGHAMTON TO OWEGO, NEW YORK

by

ALLAN D. RANDALL
U.S. Geological Survey

INTRODUCTION

Over the past 20 years, several regional and localized studies have increased our knowledge of aquifers in the Susquehanna River basin of New York. This article extracts and summarizes some results of these studies that pertain to sites visited on this field trip along the Susquehanna valley from Binghamton downstream to Owego.

DISTRIBUTION OF AQUIFERS WITHIN THE GLACIAL DRIFT

About 85 percent of the Susquehanna River basin of New York is an upland in which shale, siltstone, and fine sandstone of Devonian age is dissected by narrow valleys and mantled by till. Stratified drift is confined largely to broad valleys, 1,000 to 8,000 feet wide, which occupy the remaining 15 percent of the basin.

During the waning stages of glaciation, tongues of ice extended southward along the broad valleys beyond the main ice sheet. Lakes formed near the ends of the shrinking ice tongues, temporarily filling any space vacated by melting of the ice that lay below the level of stratified drift previously deposited downstream. Many of these lakes were extensive, particularly in the deeper valleys, and trapped much clay, silt, and very fine sand. Elsewhere, particularly in relatively shallow valleys such as the Susquehanna River valley from Binghamton to Owego, smaller lakes and stream channels formed atop and against ice tongues that became too thin to flow. As each small lake filled with sediment, others formed nearby, and water velocities were often great enough to keep fine-grained sediment in suspension. The resulting stratified drift is heterogeneous but predominantly coarse grained, like the idealized sketch in Figure 1 and the actual cross sections in Figures 2 and 3.

Only the coarser sands and gravels within the stratified drift yield enough water to be considered aquifers. Several generalizations may be made as to their distribution within the broad valleys of the Susquehanna River basin:

1. As a rule, the greater the depth to bedrock, the greater the thickness of non-water-yielding clay, silt, and very fine sand. In broad valleys northeast of Binghamton, depth to bedrock generally ranges from 250 to 500 feet. Near and west of Binghamton, depths of 70 to 200 feet are typical, although bedrock is deeper than 250 feet locally. Total thickness of gravel and coarse sand rarely exceeds 150 feet in any of these valleys and can be as little as 10 feet.

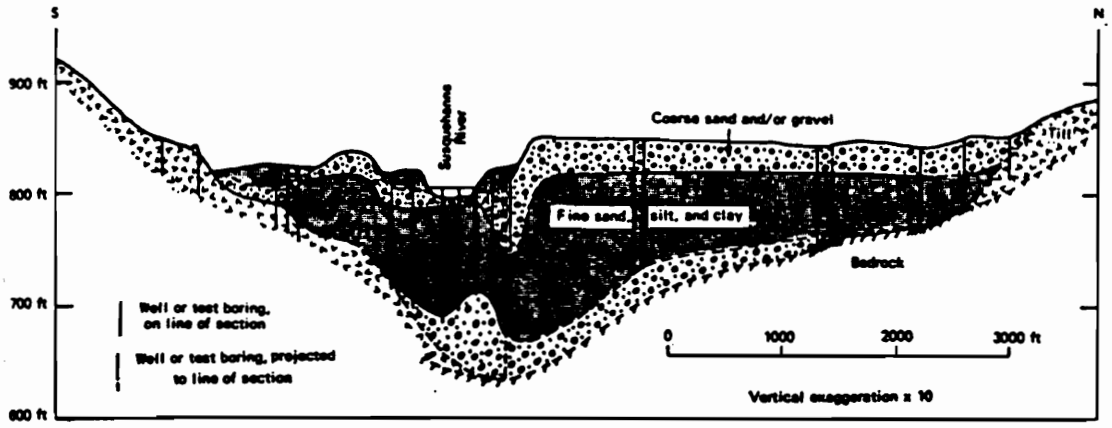


Figure 2. Geologic cross section beneath Route 26 in Vestal and McKinley Avenue in Endicott (Modified from Randall, 1970). Approximate location is shown in figure 7.

2. Sands and gravels are present at or near land surface in all broad valleys. In some places, the near-surface sands and gravels are thin or largely above the water table, but elsewhere they form the most productive aquifers in the basin because they are moderately to highly permeable and generally in hydraulic contact with streams from which water can infiltrate to sustain well yields.

3. Some of the broad valleys also contain basal sand-and-gravel aquifers beneath extensive silts and clays. The basal aquifers tend to be thin or less permeable than the near-surface aquifers and generally yield only moderate quantities of water. The water is commonly of inferior chemical quality, widely characterized by high iron and, in a few places, by high chloride.

4. Locally, the entire thickness of stratified drift is sand and gravel. In the deeper valleys, the condition is generally limited to the sides of the valleys.

LITHOLOGY AS A CLUE TO DEGLACIAL HISTORY AND AQUIFER DISTRIBUTION

MacClintock and Apfel (1944) were the first to call attention to a marked contrast in drift lithology within the Appalachian Plateau of south-central New York. They recognized a "Binghamton" drift whose bright, colorful appearance is caused by numerous pebbles of limestone, chert, quartzite, and other rock types foreign to the plateau, and a contrasting drab "Olean" drift in which limestones generally constitute less than 3 percent of the pebbles, and sandstone or shale of local origin constitute more than 85 percent. They inferred that the two drifts represent successive ice advances from different directions. Later writers

Induced infiltration from large streams

Whenever water levels in surficial aquifers are drawn below stream stage by pumping, infiltration is induced from stream reaches that do not lose water ordinarily. The rate of induced infiltration depends on many factors, including the distribution of wells, pumping rates, hydraulic conductivity of the streambed and nearby parts of the aquifer (which together may be termed "effective streambed permeability"), and changes in stage, bottom area, and water temperature of the stream. Potential induced infiltration from the Chenango River to the Clinton Street-Ballpark aquifer in Binghamton was estimated by Randall (1977, Appendix F), and induced infiltration from the Susquehanna River to the South Street well field in Endicott was estimated by Ground Water Associates (1978). In 1981, water-level distribution around several municipal well fields on the banks of the Susquehanna River will be measured under steady-state pumping conditions and under the transient conditions caused by starting or stopping of pumping. Results are expected to be useful in calibrating a digital model of the stratified-drift aquifers, which should lead to a better understanding of potential induced infiltration and aquifer yield.

GROUND-WATER PROBLEMS AND TRADEOFFS

In most urban areas, numerous competing demands are placed on the local earth resources and landscape. The use or modification of the land to meet human needs generally has some impact, negative or positive, on the quantity or quality of ground water. Several examples from the Susquehanna River valley are mentioned briefly below.

Excavation of river channels

A village of Endicott municipal well 180 feet from the north bank of the Susquehanna River continuously delivered more than 1 million gallons per day of bacteria-free water for 19 years until December 1964, when coliform bacteria were detected in routine weekly water samples. Since then, coliforms have never been absent for more than a few weeks, despite greatly reduced pumping. Randall (1970) demonstrated that the bacteria came from the river and argued that the most likely explanation was repeated excavation of the river bed within 200 feet upstream and downstream of the well for pipeline and bridge construction in the early 1960's. The backfill that replaced the naturally stratified streambed sediments may have been more permeable, permitting greater induced infiltration but also greater movement of bacteria.

Riverbeds have been excavated for many reasons. The Chenango River between the Erie Railroad and DeForest Street in Binghamton has been relocated and deepened at least twice to accomodate dike and highway construction (Randall, 1977). According to a local contractor and dealer in earth materials (R. Murphy, oral commun., 1981) large volumes of gravel were removed before 1970 from four reaches of the Susquehanna River channel between Johnson City and Endicott by draglines that may have dug as deep as 40 feet locally. Each reach was at least 1,000 feet long.

Presumably silt settled in the resulting abnormally deep pools, but its thickness and the net effect of excavation and siltation on infiltration have not been studied.

Lining of stream channels

Several reaches of tributary streams crossing the Susquehanna River valley within the Triple Cities (Endicott, Johnson City, and Binghamton) have been encased in culvert pipe or routed in open channels having a concrete floor and sides. This was done to eliminate the meandering and bank erosion that are characteristic of natural channels but costly in areas of urban development. Randall (1977, p. 31) noted that continuation of this process would eliminate recharge from such streams and suggested that recharge could be increased if needed by digging multiple parallel channels or by replacing the oily and silty streambed sediment in other reaches by clean gravel.

Paving of recharge areas

Pavement and buildings covered a substantial part of the Clinton Street-Ballpark Aquifer in 1967, and Randall (1977, appendix E) estimated that, as a result, about 2 inches of recharge that would have occurred annually under natural conditions was lost as storm runoff. However, he also estimated that evapotranspiration had been reduced by at least 4 inches because of lowered water tables due to intensive ground-water development and through the replacement of soil and plants by buildings and paved surfaces. If so, the amount of water available for pumping under the degree of development prevailing in 1967 exceeded that which would have discharged naturally to streams had the city not been there.

Landfills

Innumerable studies have shown that leaching of municipal refuse by infiltrating precipitation or rising ground water produces a strong chemical solution characterized by a large oxygen demand, an offensive odor, and several thousand milligrams per liter of dissolved solids (Zanoni, 1971). Traces of leachate have been recognized at distances of several thousand feet from landfills in permeable glacial outwash (Kimmel and Braids, 1974).

In the 1950's and earlier, some industrial wastes reportedly were dumped east of Charles Street in Binghamton, above part of the Clinton Street-Ballpark aquifer. In 1958, traces of chemicals ascribed to the wastes reportedly were detected in nearby GAF wells 2 and 4 and led to the abandonment of these wells, although no problems were reported at other nearby wells (Randall, 1972; A. Schmidt and others, GAF Corp., oral commun. 1965).

In the late 1960's, the Broome County Board of Supervisors considered establishing a regional municipal landfill in a large gravel pit on Prentice Road in Vestal, which offered advantages in location and capacity.

However, the edge of the pit was only a few hundred feet east of Vestal municipal wells 4-2, 4-3, and 4-4, and the likelihood of adverse impact on ground-water quality was a major factor leading to a decision to look for a site elsewhere (R. J. Martin, consulting engineer, written commun. 1969).

In the 1970's the Village of Endicott operated a large landfill immediately west of their sewage-treatment plant near the north bank of the Susquehanna River. No problems due to ground-water contamination have been reported (R. Austin, Broome County Health Dept, oral commun. 1981). Note, however, that during construction of the Endicott sewage-treatment plant, dewatering pumps withdrew about 5,000 gallons per minute to lower the water table 25 feet (Randall, 1972), which demonstrates presence of a highly productive aquifer; the dedication of this area for a sewage-treatment plant and landfill may have precluded for the time being any use of that aquifer.

Organic fluids

In urban areas such as the Triple Cities, hydrocarbon fuels (including gasoline, kerosene, and fuel oil) and liquid organic chemicals (including solvents and cleaning fluids) are widely used, transported, and stored. Although most of these liquids have slight solubility in water, the minute quantities that can dissolve cause objectionable tastes and odors in drinking water and (or) have been shown to be toxic. Some are volatile to the extent that vapors evolved from films floating on the water table can be explosive or toxic in basements. Over the years, several instances of leaks, spills, or disposal of these liquids have been reported, and the geologic setting of each has influenced the outcome.

In 1965, a petroleum pipeline crossing the State University of New York campus in Vestal was ruptured by a backhoe excavating for new buildings; 29,000 gallons of gasoline erupted and flowed downslope toward the Susquehanna River. About half of it was recovered within hours by pumping from the initial excavation and from ditches and sumps dug downslope (Binghamton Press, Sept. 1965; C. J. Yablonski, Sun Pipeline Co., oral commun., 1981). No ground-water contamination was reported, probably because the rupture and runoff of gasoline was confined to an area underlain by impermeable till in which most buildings were served by public water systems.

In 1979, a leak was discovered in a large tank used to store solvents at a factory in Endicott. Investigation disclosed more than 12,000 gallons of chlorinated hydrocarbons (chiefly methyl chloroform and trichloroethylene) in the subsurface (Dames & Moore, 1980). More than 100 observation wells were drilled to define the extent of the contamination and help devise a method of recovery (Dames & Moore, 1980). Efforts to recover the solvents have been simplified by the stratigraphy in the immediate locality, which consisted of a surficial gravel generally 15 to 35 feet thick having a saturated thickness of 3 to 15 feet, resting upon a few tens of feet of silt and clay (Dames & Moore, 1980; Randall, 1970, fig. 5). The silt and clay must have greatly retarded downward migration of the solvents, which are heavier than water and sank to the bottom of

the surficial aquifer (Dames & Moore, 1980). The surficial aquifer is not tapped as a source of water locally but seems to be continuous laterally with thicker aquifers elsewhere along the valley.

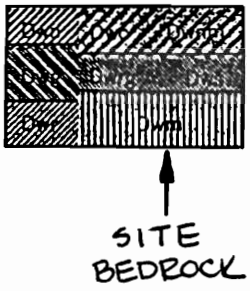
In 1980, water samples collected from public-supply wells and numerous points in the water-distribution systems of the Triple Cities were analyzed for several organic chemicals (New York State Department of Health, written commun. 1981). Samples from Vestal municipal well 4-2 on Prentice Road consistently contained 1,1,1-trichloroethane, trichloroethylene, and tetrachloroethylene, in concentrations as high as 217, 92, and 14.8 micrograms per liter, respectively (New York State Department of Health, written commun, 1981). The New York State Department of Environmental Conservation has set a limit of 10 micrograms per liter for discharges of trichloroethylene to potable ground water; no standards have been set for the others (New York State Department of Environmental Conservation, 1980). The New York State Department of Environmental Conservation (1980) and Parratt-Wolff, Inc. (1980) have investigated the contamination, and both report that one possible source is a chemical plant 200 feet west of well 4-2 that repackages chemicals including 1,1,1-trichloroethane, trichloroethylene, and other chlorinated solvents, and has discharged water from rinsing empty containers to a leach pit. In this locality, the glacial drift consists almost entirely of sand and gravel of variable silt content (Parratt-Wolff, 1980; Randall, 1972), which may have favored migration of the organic solvents to the depth of the well screen.

A LIMITED ALTERNATIVE: THE BEDROCK AQUIFER

Most studies of ground water in the Susquehanna River basin in New York have emphasized the stratified-drift aquifers because of their potential for high-yield wells, even though these aquifers underlie no more than 15 percent of the basin. Bedrock, chiefly siltstone and shale of Devonian age, underlies 100 percent of the basin and has been tapped by many wells to meet domestic and other small yields. A well drilled at any point in the basin stands a very good chance of obtaining enough water for a single-family home, although "dry holes" yielding almost no water are occasionally reported (Wetterhall, 1959; Soren, 1963; Randall, 1972). Wetterhall (1959) reports the average yield of wells tapping bedrock in Chemung County to be 8 gallons per minute. This average may be somewhat misleading, however, for two reasons: First, it is based on mostly domestic wells in which drilling was stopped as soon as the owner's needs were met, without attempting to determine the maximum yield of fresh water obtainable from the bedrock. Second, no one has studied the yield of the bedrock aquifer to clusters of wells, as distinguished from the yields of individual wells. One might ask: if 200 homes were built on contiguous half-acre lots and were supplied by individual wells, would the yield of all these wells average close to 8 gallons per minute? It seems reasonable to expect the cone of depression to be deep enough that wells near the center would have smaller yields than wells near the perimeter, but how much smaller cannot be easily predicted at present.

Near the Triple Cities, residents of some planned or unplanned concentrations of homes that were initially supplied by private wells later

REF. (14)



WEST FALLS GROUP
1100-1600 ft. (340-490 m.)

Dwn	Nunda Formation—sandstone, shale.
Dwg	West Hill and Gardeau Formations—shale, siltstone; Roricks Glen Shale; upper Beers Hill Shale; Grimes Siltstone.
Dwr	lower Beers Hill Shale; Dunn Hill, Millport, and Moreland Shales.
Dwc	Nunda Formation—sandstone, shale; West Hill Formation—shale, siltstone; Corning Shale.
Dwnm	"New Milford" Formation—sandstone, shale.
Dwrg	Gardeau Formation—shale,. siltstone; Roricks Glen Shale.
Dws	Slide Mountain Formation—sandstone, shale, conglomerate.
Dwm	Beers Hill Shale; Grimes Siltstone; Dunn Hill, Millport, and Moreland Shales

GEOLOGIC MAP OF NEW YORK

1970

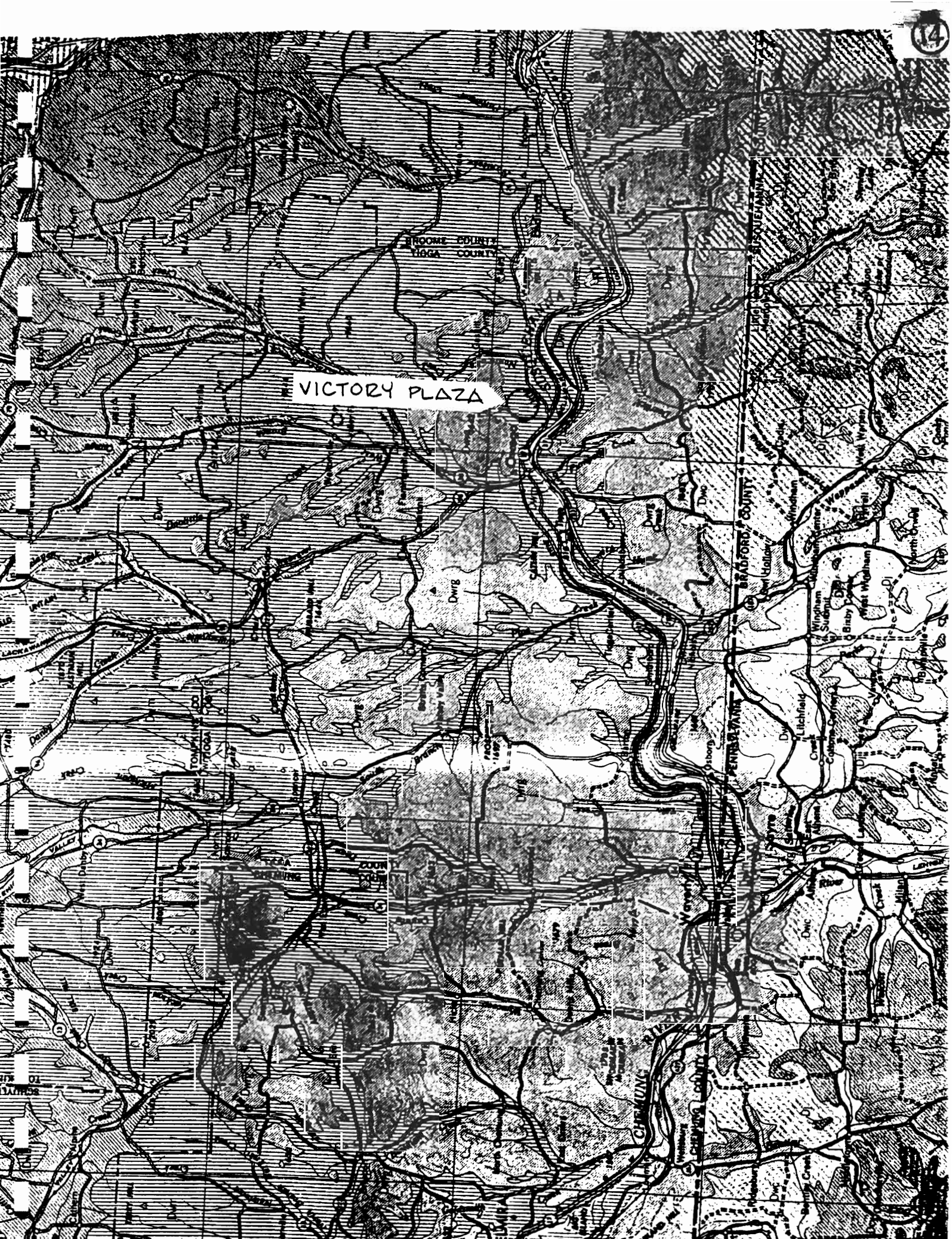
Finger Lakes Sheet

Scale 1:250,000

5 0 5 10 15 Statute Miles 20

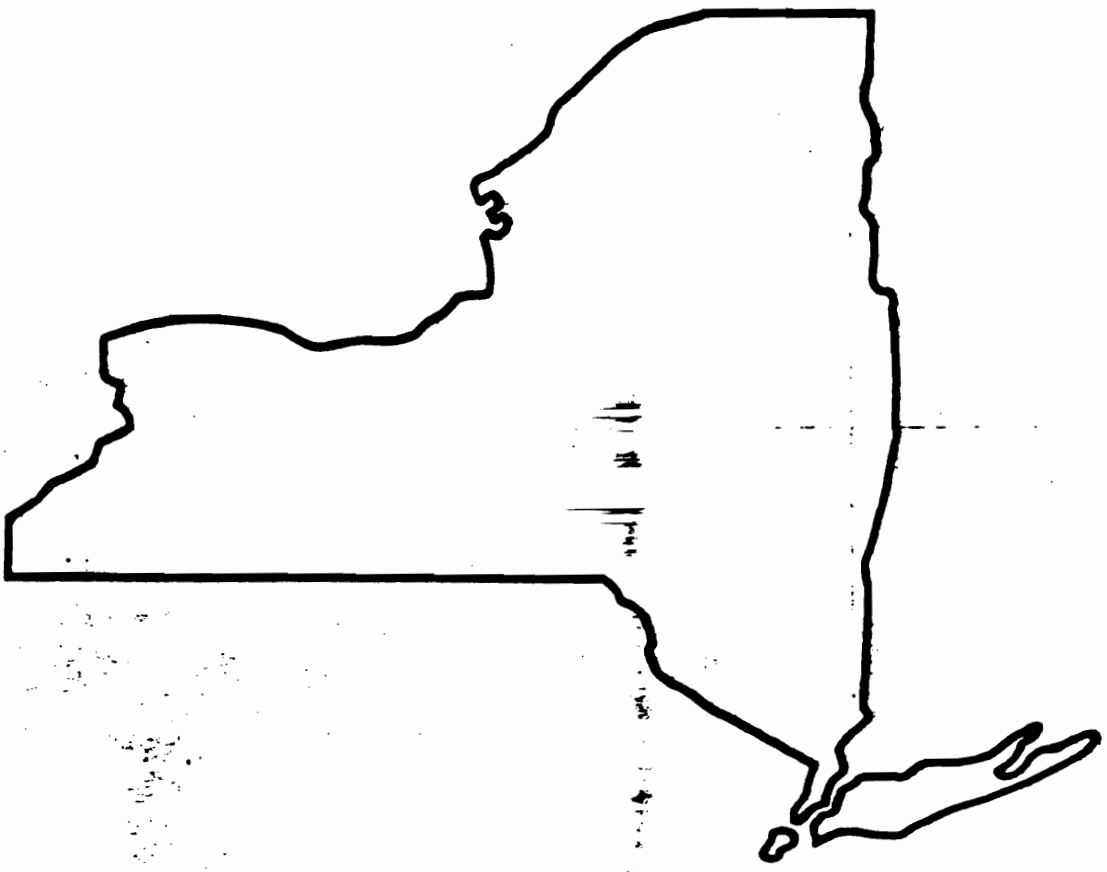
5 0 5 10 15 20 25 Kilometers 30

CONTOUR INTERVAL 100 FEET


VICTORY PLAZA
BROOME COUNTY
TIOGA COUNTY
BRADFORD COUNTY
CHEMUNG COUNTY

REF. (15)

REPORT ON GROUND WATER DEPENDENCE IN NEW YORK STATE



BY
NEW YORK STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
BUREAU OF PUBLIC WATER SUPPLY
1981

OWEGO - WAVERLY AQUIFER

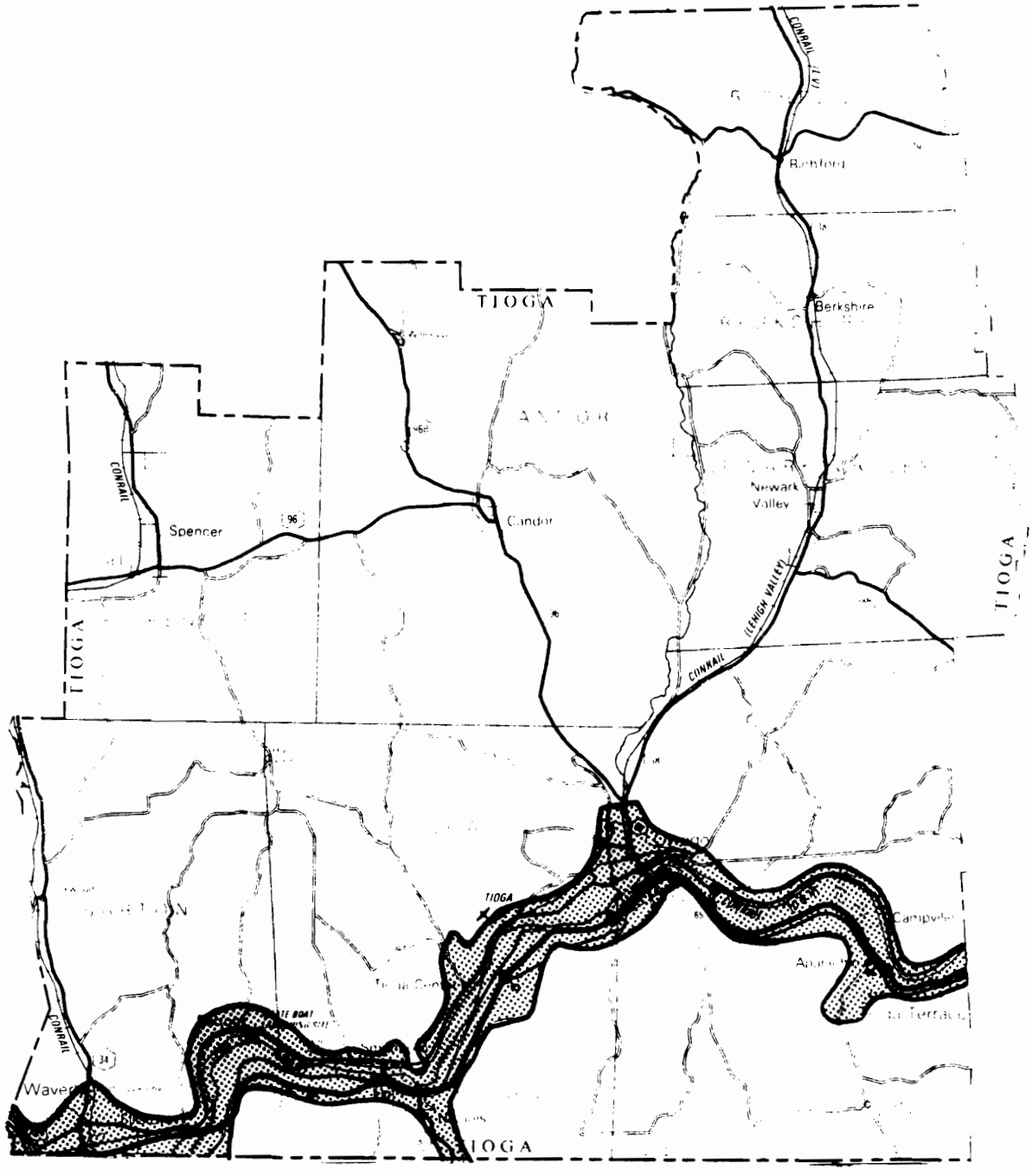
Owego Water District #2	2,000
Owego Water District #3	1,400
Owego Water District #4	1,800
Owego Water Works	5,000
Nichols Water Company	500
Waverly (V)	5,255
Owego Water District #1 - Pur. from Owego WW	580
Owego Water District #5 - Pur. from Owego WW	Unknown
Total*	16,535

*PC 100's - See Page 10 for definition.

The Owego-Waverly aquifer is located in the Susquehanna River valley along the entire length of the river in Tioga County. The aquifer is adjacent to the Endicott-Johnson City aquifer to the east and consists of unconsolidated sand and gravel deposits.

(15)

OWEGO-WAVERLY AQUIFER



SCALE 1:250,000

5 0 5 MILES

NORTH

SITE OVERBURDEN →

og

og - **Outwash sand and gravel**
Coarse to fine gravel with sand,
proglacial fluvial deposition,
well-rounded and stratified,
generally finer texture away from ice border,
thickness variable (2-20 meters).

al - **Recent deposits**
Generally confined to floodplains within a valley,
oxidized, non-calcareous, fine sand to gravel,
in larger valleys may be overlain by silt,
subject to frequent flooding, thickness 1-10 meters.

alf - **alluvial fan**

SURFICIAL GEOLOGIC MAP OF NEW YORK

FINGER LAKES SHEET

Compiled and Edited by: Ernest H. Muller, Donald H. Cadwell

Reconnaissance field review (1985) by: G. Gordon Connally, Richard A. Young

1986

Prepared under contract with the New York State Electric and Gas Corporation

Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

5 0 5 10 15 Nautical Miles

CONTOUR INTERVAL 100 FEET

THE ISOGANIC LINES VARY FROM APPROXIMATELY 10° WEST TO 13° 30' WEST, RUNNING IN A NORTHWEST TO SOUTHEAST DIRECTION.

REF. (16)

VICTORY PLAZA
STATE FOREST
TOMPKINS CO
CORTLAND COUNTY
TIOGA CO
BROOME CO
BRADFORD COUNTY
PENNSYLVANIA
Jacksonville
Kinney
Cayuga Heights
Etna
Fall Creek
Speedsville
Newark Valley
Weltonville
Van Etten
Spencer
Waverly
Chemung
Blue Swan
Wirawana
Chemung Valley
Windham
Cadis
Lake of Meadows
Stanley Lake
Carmault Lake

REF. (17)

OWEGO WATER WORKS
173 MAIN STREET • OWEGO, NY 13827 • (607) 687-1491

October 22, 1987

Muffett A. Mauche
Staff Engineer LeRoy Callender PC
For Linda J. Clark, Project Geologist, URS Company, Inc.
570 Delaware Avenue
Buffalo, New York 14202-1207

Dear Ms. Mauche,

Regarding your report concerning the telephone conversation you had with Mrs. Ruth Ace of this office, a number of changes are required to fully validate your findings. It is under this light that the following information will be presented.

1.) The Owego Water Works a privately owned utility has a franchise area which encompasses the Village of Owego. Therefore because we are a private company, water service from our system is not mandatory resulting in approximately 25 private home wells. (A list of which can be supplied from the Village of Owego office)

2.) The Owego Water Works draws its supply source from 3 wells located within the Village of Owego:

1.) Well #1 @ George St. - 60 feet deep
2.) Well #3 @ George St. - 80 feet deep
3.) Well #4 @ William St. - 75 feet deep

All of the wells located within our system are found to have unconsolidated sediments. The two wells within our George Street well field are approximately 250 LF apart with all having a water source found in the Susquehanna Valley Basin Aquifer.

3.) Once again there are private wells located within the franchise area of the Owego Water Works for which, this is their sole source of water.

4.) The Owego Water Works supplies water through a private water main, some residents of Glenmary Drive in the Town of Tioga which as you note is within 3 miles of the site. Additionally it is my understanding that water service is provided through this private water main to 8 to 10 homes located south of Beecher Hill Road, the remaining homes are served by their own private wells.

5.) The residents to the best of our knowledge located in the Town of Tioga on Route 17C between the Village line and the Zion Church are served by the private wells.

6.) The Owego Water Works provided two metered take off points for the Town of Owego. This is in addition to their own well source.

Attached please find the distribution maps of the Owego Water Works highlighting the take off points for the Town of Owego. I must add that these are master metered, thus for the number of customers on the town distribution system. I can only advise you to contact the Town of Owego.

The Owego Water Works presently serves 1475 customers within its franchise area.

If we can be of further assistance please feel free to advise.

Very truly yours,

Owego Water Works

Richard Ottens, Jr.
Area Manager

RO/sdr
enc.

REF. (18)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONSENT ORDER 7-0528 DEC v. IBM, JUNE 1983, IS ON FILE AT THE FOLLOWING ADDRESS:

NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ROUTE 11 RD 1
KIRKWOOD, NEW YORK 13795

15 (12/75)

REF. (19)

New York State Department of Environmental Conservation

MEMORANDUM

TO: W. Demick, Albany, Room 223
FROM: L. Lepak, Region 7 Albany
SUBJECT: Inclusion of Victory Plaza property (Owego) on State Superfund Listing

DATE: 6/26/84

On May 11, 1984, Mr. Nirchi and I met with Al Simons (607-751-3107) and Hank Peters of IBM-Owego. These gentlemen notified us that McFarland-Johnson Engineers, Inc., as consultant to IBM-Owego, conducted a groundwater investigation on a parcel of land, located adjacent to the IBM Owego property. IBM was considering purchasing the property.

Mr. Simons explained to us that IBM has a general policy to conduct groundwater investigations on any properties they are considering purchasing, if they suspect any problem at the site. Mr. Simons said that IBM was aware that a gasoline station was formerly located at the Victory Plaza site. Thus, they felt the need for the groundwater investigation.

McFarland-Johnson Engineers, Inc. did find groundwater contamination at the Victory Plaza site of trichloroethylene levels exceeding Class GA groundwater limits. A source of the material was not identified, but isoconcentration lines were plotted, based on monitoring well data.

Mr. Peters stated that their consultant has carefully reviewed the groundwater situation at IBM Owego and determined the groundwater problem at the Victory Plaza property was not originating from the IBM Owego facility. IBM Owego does have an active groundwater contamination treatment program occurring on site. A brief review of the IBM groundwater situation by this office indicates that it is highly unlikely that the Victory Plaza problem originates from IBM. Mr. Simons said the IBM legal counsel instructed him to notify our Department of their consultant's findings and present us with the consultant's findings.

IBM also requested that the present property owner speak with us, but to date, there has been no contact from anyone, except IBM on this site. IBM notified the property owner about their consultant's findings.

I have reviewed this matter with Steve Lackey. He has requested that I request to you that this site be placed on the State Superfund list. I have also prepared a rating form for the site.

For your information, I have included the following McFarland-Johnson Engineers, Inc. information about the site:

1. Investigative report, including well details, geological cross-sections, analytical results and boring logs.

2. Topographic map, showing Victory Plaza property in relation to IBM Owego.

3. Bedrock elevation map.

4. Groundwater potentiometric map.

5. Trichloroethylene isoconcentration map.

Since we received only one copy of items #2-5, we are sending you the only copy of these items.

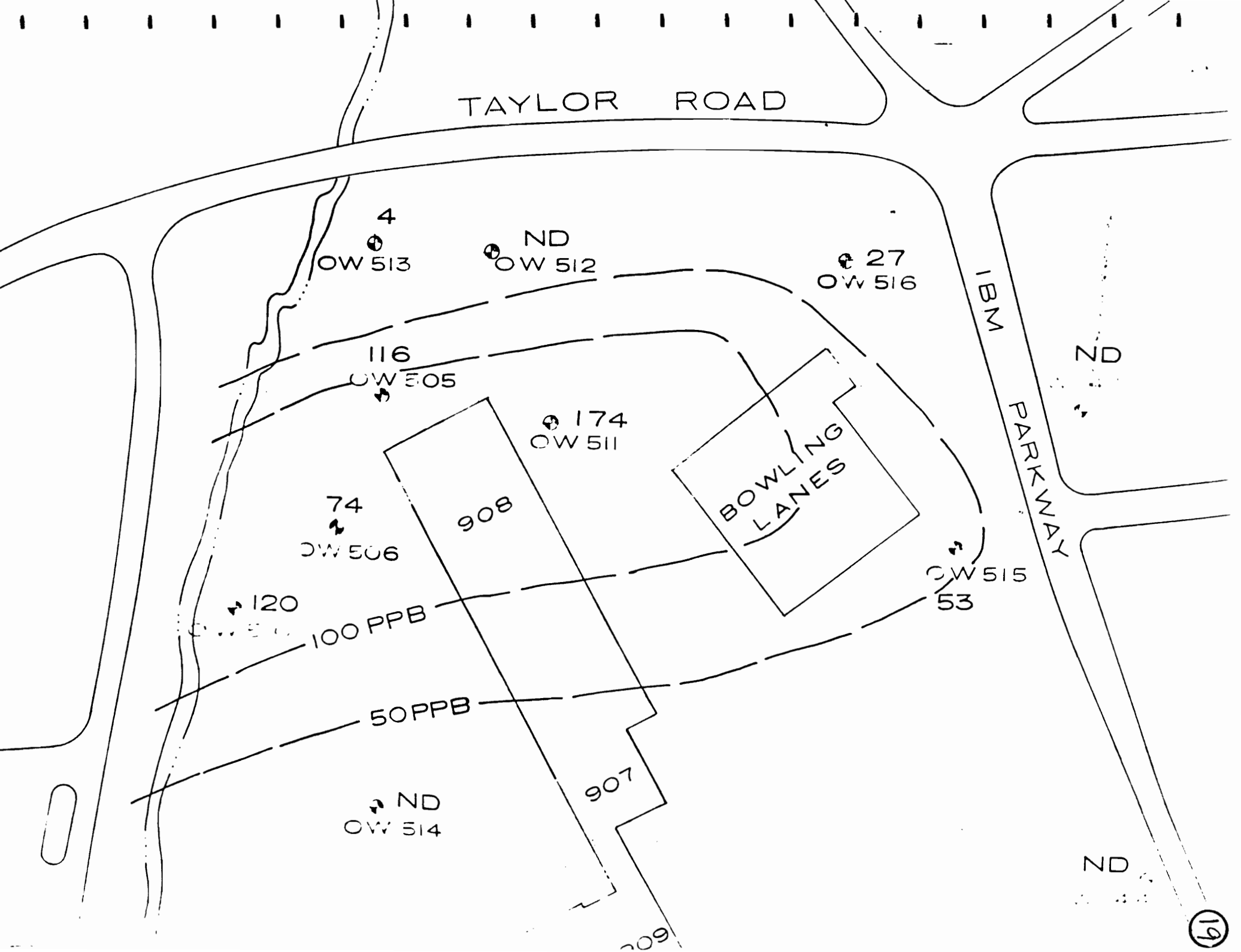
The rating form information is quite sketchy on the site, since no known hazardous waste disposal has occurred on the site. However, the McFarland-Johnson Engineers, Inc. report adequately defines the problem and pinpoints the area of potential source.

I do not have any further information on this site. If you have any questions on my memo, contact me.

L. Zepak

LTL:kr

cc: S. Lackey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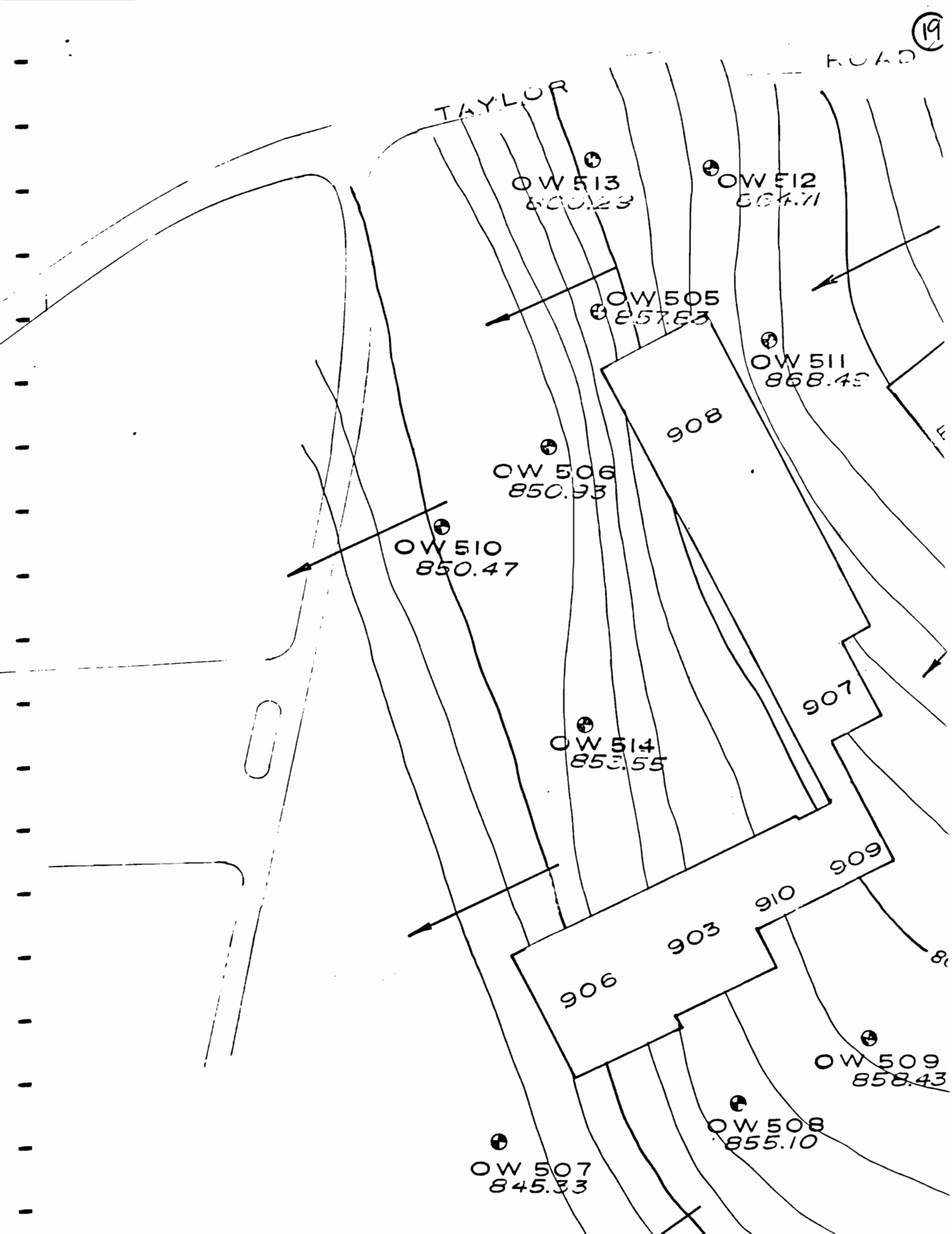
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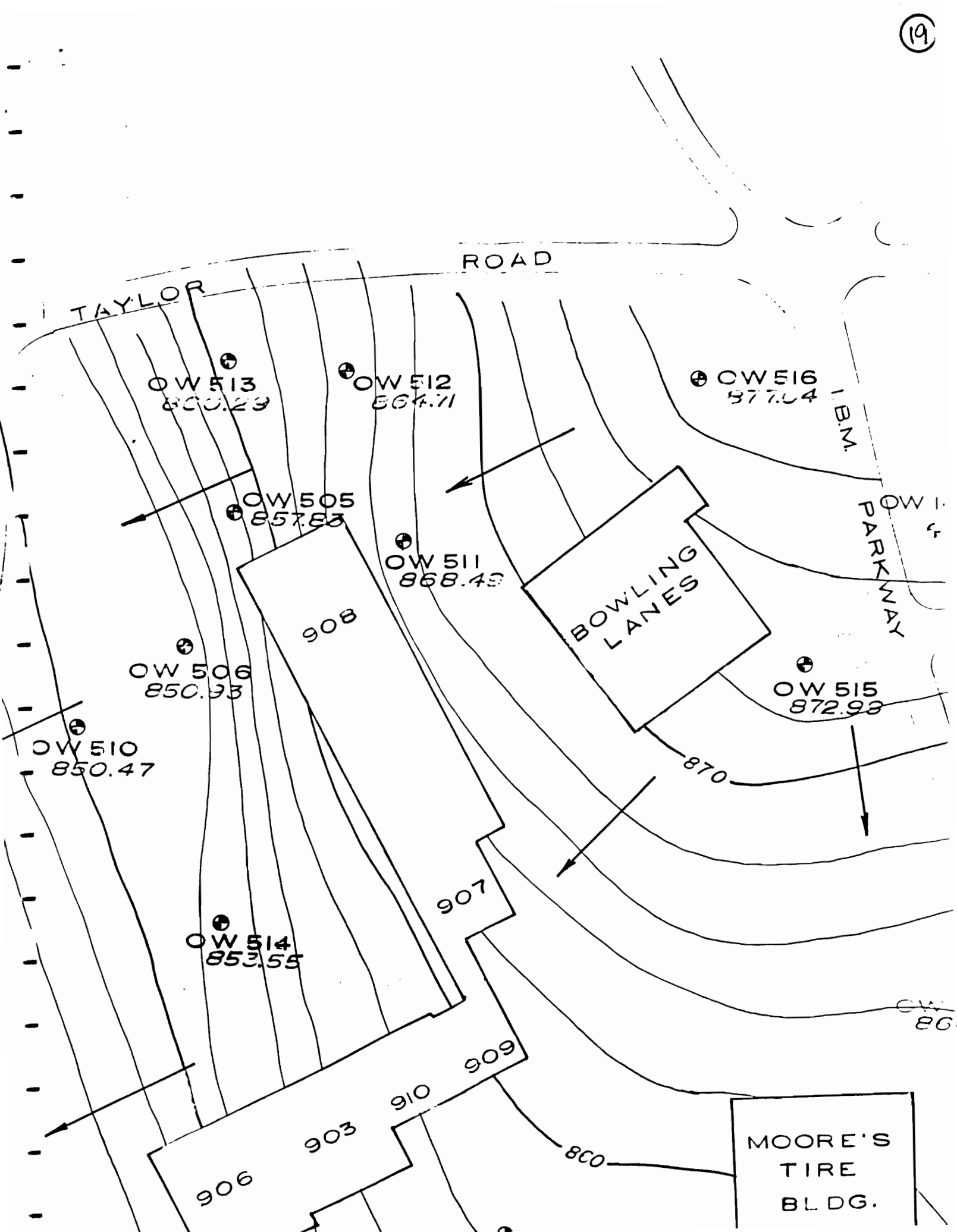
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MOORE'S TIRE BLDG.

REF. (20)

HADCO

October 10, 1985

N.Y.S. Dept. of Environmental Conservation
Region 7 Binghamton Sub Office
c/o Flood Control Maintenance Center
Route 11 RD#1
Kirkwood, New York 13795

ATTN: Mario Mirchi - Senior Sanitary Engineer

Dear Mario;

Enclosed are two copies of the Hydrogeological Investigation prepared by Lancy International for your review.

Please call myself or Ken Ogle if you have any questions.

Sincerely,

Steven S. Paufve
Plant Engineering Manager

SP/bw
Enc:

(20)

PHASE II HYDROGEOLOGIC INVESTIGATION

HADCO CORPORATION
OWEGO, NEW YORK

July, 1985

Prepared by
Lancy Laboratories, Division
Lancy International, Inc.

PHASE II HYDROGEOLOGIC INVESTIGATION

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ATTACHMENT A - Raw Materials Inventory
ATTACHMENT B - Boring Logs
ATTACHMENT C - Analytical Data

1.0 INTRODUCTION

1.1 Background

Hadco Corporation is a printed circuit board manufacturing firm with a facility located in Owego Township of Tioga County, New York. (Figure 1-1) The manufacturing process at this facility incorporates operations such as plating and degreasing, which include the use of hazardous and/or toxic substances. The facility is classified as a hazardous waste generator. This is no on-site treatment, storage, or disposal of hazardous wastes.

In March, 1983, Tioga County passed a law requiring all facilities storing more than 550 gallons of any hazardous material to install and operate a groundwater monitoring system. In compliance with this regulation, Hadco Corporation installed two monitoring wells along the southern boundary of their property at locations specified by the county. At that time there was no official request or statement by the county specifying sampling frequency, analytical parameters or reporting requirements. However, under their own initiative, Hadco performed sampling and general analysis on these wells in July, 1984. These analyses indicated the presence of low concentrations of organic solvents and certain metals in both wells.

In October, 1984, Lancy Laboratories performed a preliminary investigation of both the existing groundwater monitoring and solvent management programs at Hadco. This investigation concluded that there were no probable sources of contamination in the current manufacturing

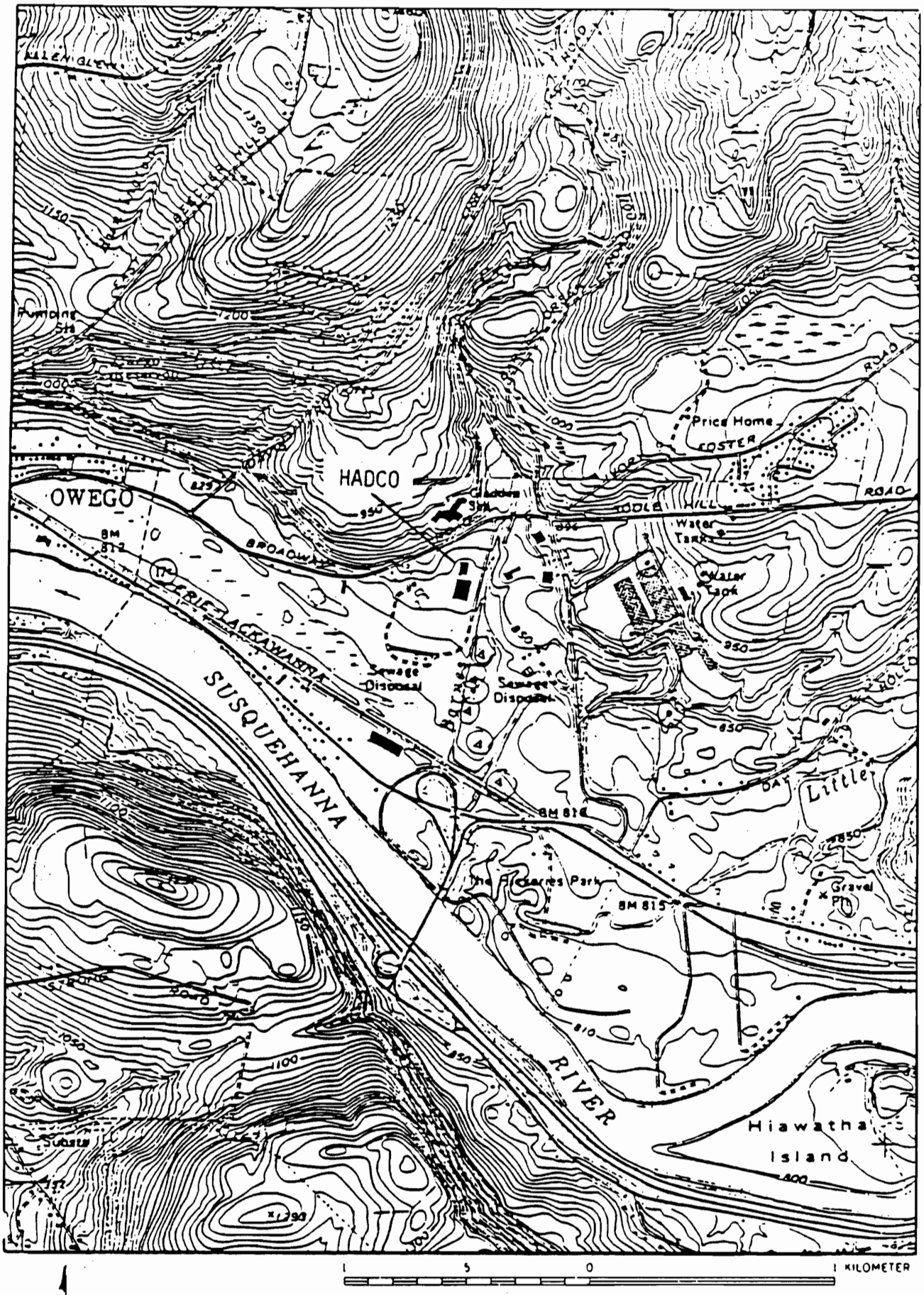

HADCO
OWEGO
Price Home
FOSTER
ROAD
Water Tank
Water Tank
BROADWAY
ERIE LACKAWANNA
SUSQUEHANNA
RIVER
Sewage Disposal
Sewage Disposal
Little
BM 816
BM 815
The Pleasures Park
Gravel Pit
Hiawatha Island
Substa
1 5 0 1 KILOMETER

Figure 1-1

operations and that it would be necessary to determine if the indicated groundwater contamination was representative of the general groundwater conditions in the plant vicinity. Recommended actions included:

- o Redevelopment and survey of existing wells
- o Installation and survey of upgradient wells
- o Pump testing of all wells for flow rate determinations

There were also several recommendations dealing with in-plant operations and monitoring well maintenance.

Actions recommended in this preliminary investigations were implemented as a program referred to as the Phase I Hydrogeologic Investigation. Field studies were initiated in December, 1984. There were three primary goals to this investigation:

- o Determine the general groundwater flow pattern underlying Hadco's property.
- o Determine if earlier analytical data was representative of groundwater throughout the entire property.
- o Determine which constituents are naturally occurring or coming from off-site sources.

In pursuing these goals, two additional wells (Wells #3 and #4) were installed. Upon completion of installation, on-site testing was performed on each well. These two new wells and the two original wells were sampled and routine monitoring of water levels was initiated.

Data acquired during this investigation established general groundwater flow patterns and confirmed the presence of organic contamination in the southern portions of the property. However, the investigation was not able to adequately define the source(s) of contamination. Analytical data indicated that some solvent was entering the property from an off-site to the northeast, but in insufficient quantities to account for the concentrations detected in downgradient locations.

In order to establish a more refined picture of the site hydrology and more adequately define the scope of the groundwater contamination, it was determined that additional investigational work was needed. Consequently a second program, referred to as the Phase II Hydrogeologic Investigation, was developed and implemented. This report incorporates the findings of both the Phase I and Phase II investigations to present an overall picture of the Hadco property hydrogeology and groundwater quality.

1.2 Project Description

The Phase I investigation resulted in several recommendations for further studies necessary to better define possible sources and the extend of the indicated contamination. These recommendations were incorporated into a plan of investigation with the following goals:

- Refine the basic groundwater flow patterns so as to allow better projections of contaminant movement.
- Determine if historical chemical management practices could be responsible for the indicated contamination.

- o Determine if there are any known sources of contamination in the vicinity of Hadco which may be responsible for some or all of the indicated contamination.
- o Determine the area of highest groundwater contamination.

These goals were accomplished through the following activities:

- o Installation and survey of monitoring wells at four additional locations.
- o Pump testing of new wells.
- o Analysis of samples from all wells.
- o Interview of Hadco personnel on past chemical management activities at Hadco or former facility owners.
- o Review county records on property ownership.
- o Inquire various sources as to potential groundwater contamination sources in the site vicinity.

This report summarizes the results and findings of these activities and the results of earlier site studies.

2.0 SITE HISTORY

2.1 Ownership

County records indicate that the eastern portion of the property currently occupied by Hadco's facility was owned by the Taylor Family from 1929 to 1956. This property was once part of the Taylor farm immediately west of the Hadco facility and can be assumed to have been part of that farm during those years. In 1956 this 3.6 acre parcel was sold to Mr. George Warneke. Mr. Warneke held the land for only six months before selling to the Owego Development Company. Owego Development soon developed this and nearby properties for industrial use. The property was leased to Mutual Design which operated the first manufacturing operation on this site. This firm produced electrical and electronic components until 1970. At that time the property, including the manufacturing facility, was purchased by Robintech, Inc. This firm produced printed curcuit boards using many of the same basic production methods and procedures utilized today by Hadco. There were several expansions under Robintech (Figure 2-1) which more than doubled the size of the facility. It should be noted that the 1978 expansion was built over a sanitary leachfield and the site of a dirt floor chemical storage shed.

In 1979, Hadco purchased the property from Robintech and began manufacturing printed circuit boards utilizing much of the existing equipment. Although there have been many modernizations and technological improvements, most of the processes used when Hadco first began operation are still in use today. Shortly after occupying the facility Hadco began

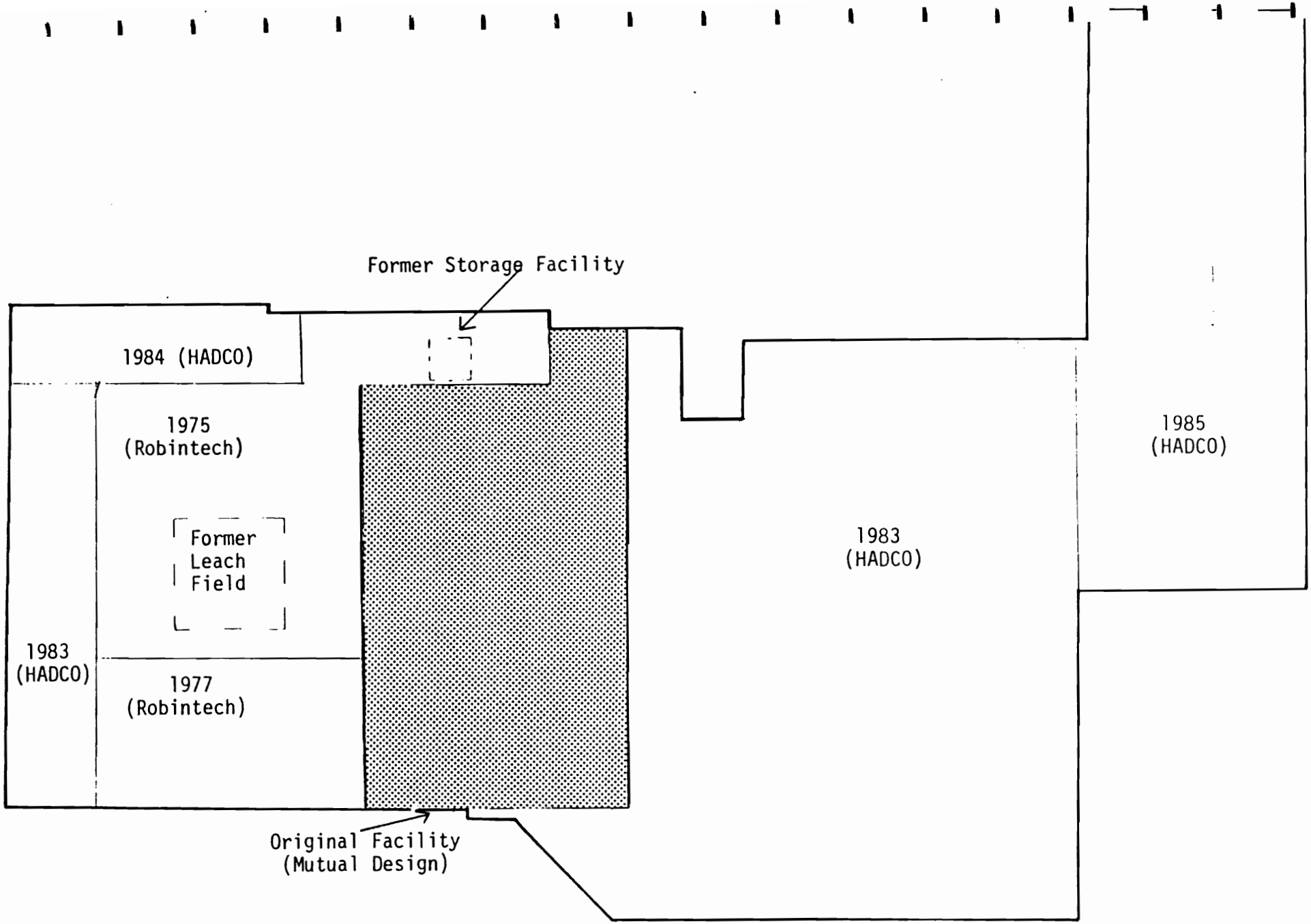


Figure 2-1

Facility Expansions

its own expansion program. A 4.5 acre parcel immediately west of the original property was purchased in 1981. This allowed construction of an addition completed in 1983 which approximately doubled the floor space of the facility. Part of the 1983 expansion was built over the site of Robintech's wastewater treatment facility. No other additions are believed to cover former industrial operations sites. In 1984 Hadco acquired an additional 9.2 acres to the south of their existing property to allow room for future growth.

2.2 Chemical Usage and Management

There is virtually no information readily available that describes the chemical usage and management by Mutual Design. However, based upon chemical usage in manufacturing procedures common to that type of industry during these years and the lack of environmental regulations, there is a high probability that some chemicals (solvents, plating solutions, etc.) may have been spilled or discharged to the sanitary leachfield and/or surrounding property.

There is considerably more information regarding operations at Robintech. Several solvents were used by this facility, including methyl ethyl ketone, acetone, trichloroethylene, 1,1,1-trichloroethane, and methanol. However, discussions with former Robintech employees did not indicate the usage of other organics such as 1,1-dichloroethane which were detected by Hadco's groundwater monitoring network. Most solvents used by Robintech were stored in the chemical storage shed indicated in Figure 2-1. This dirt floor building was apparently the site of occasional spillage. It has also

been indicated that, many spent solvents and plating baths were disposed of by discharge to stream, sewer or on the surrounding property. This was a common an acceptable practice at that time.

Within a year after Hadco acquired the property, RCRA was enacted and modern chemical management practices were initiated. At this time an effort was also made to limit or eliminate the usage of certain chemicals. Most notable was the elimination of trichloroethylene. Current chemical usage is indicated by the inventory presented in Attachment A. During the first year after RCRA enactment solvent recycling programs were developed and arrangements were made for off-site disposal of plating baths. In addition to developing an approved waste management plan, Hadco constructed a modern chemical storage facility as part of the 1983 expansion. Thus, current chemical management procedures allow for the isolation of all hazardous raw and waste materials from the environment.

2.3 Potential External Sources of Contamination

Much of the land usage within a 1 km radius of Hadco is dedicated to manufacturing operations in the electronics industry. The facilities are primarily owned and operated by IBM. There are other industrial concerns in the county, such as Stackmore and Monarch Chemical, that utilize many of the materials of interest but are too far from Hadco to be of concern. Thus only the nearby IBM facilities and any unauthorized disposal or accidential spills in the immediate vicinity of Hadco can be considered for potential off-site sources.

In 1982, leaks were found at several organic solvent storage tanks at the IBM facility approximately 0.5 km east of the Hadco facility. It was determined that these tanks were discharging 1,1,1-trichloroethane, trichloroethylene and methylene chloride to the local groundwaters. This problem has been addressed and clean-up operations are currently underway. The exact location of the leakage and local groundwater flow patterns make it highly unlikely that this incident has impacted the quality of groundwater underlying the Hadco property. There are no public records of any other groundwater contamination incidents at any of the IBM facilities near Hadco.

Discussions with NYDEC personnel in April, 1985 have determined that NYDEC is currently investigating a possible source of groundwater contamination approximately 0.2 km northeast of Hadco. Very little data is currently available on this potential off-site source. However, the site is situated such that contamination could easily be transported via natural groundwater flow patterns from that location to the Hadco property. This NYDEC investigation should be followed closely to determine if this source is actually responsible for a portion of the detected contamination, primarily that noted in the vicinity of Well #4.

There are no other known potential off-site sources.

3.0 FIELD INVESTIGATION METHODOLOGY

3.1 Well Placement and Installation

There are several factors which influence the placement of monitoring wells. The locations chosen for the four additional wells were designed to obtain additional background water quality data and improve our knowledge of the site hydrology as well as further define the extent, nature and concentration of indicated contamination. The plan originally called for the installation of five wells. However, site soil configuration voided the need for this fifth well.

It was determined that a well (Well #5) was required along the eastern property boundary close to Barns Creek (Figure 3-1). This serves to further define the contamination indicated in Well #1, define possible contamination entering the property from the stream or sewer line located along the stream, and aid in further definition of interactions between the stream and surface aquifer. Original plans called for the installation of two wells at this location, one to monitor the upper portions of the aquifer and the other to monitor the lower. The purpose of this would be to determine the presence or absence of groundwater movement into the site from beneath the stream. However, borings for these wells at this site indicated that the aquifer is very shallow and underlain by a thick layer of clay. Consequently installation of a deeper well at this location would serve no purpose.

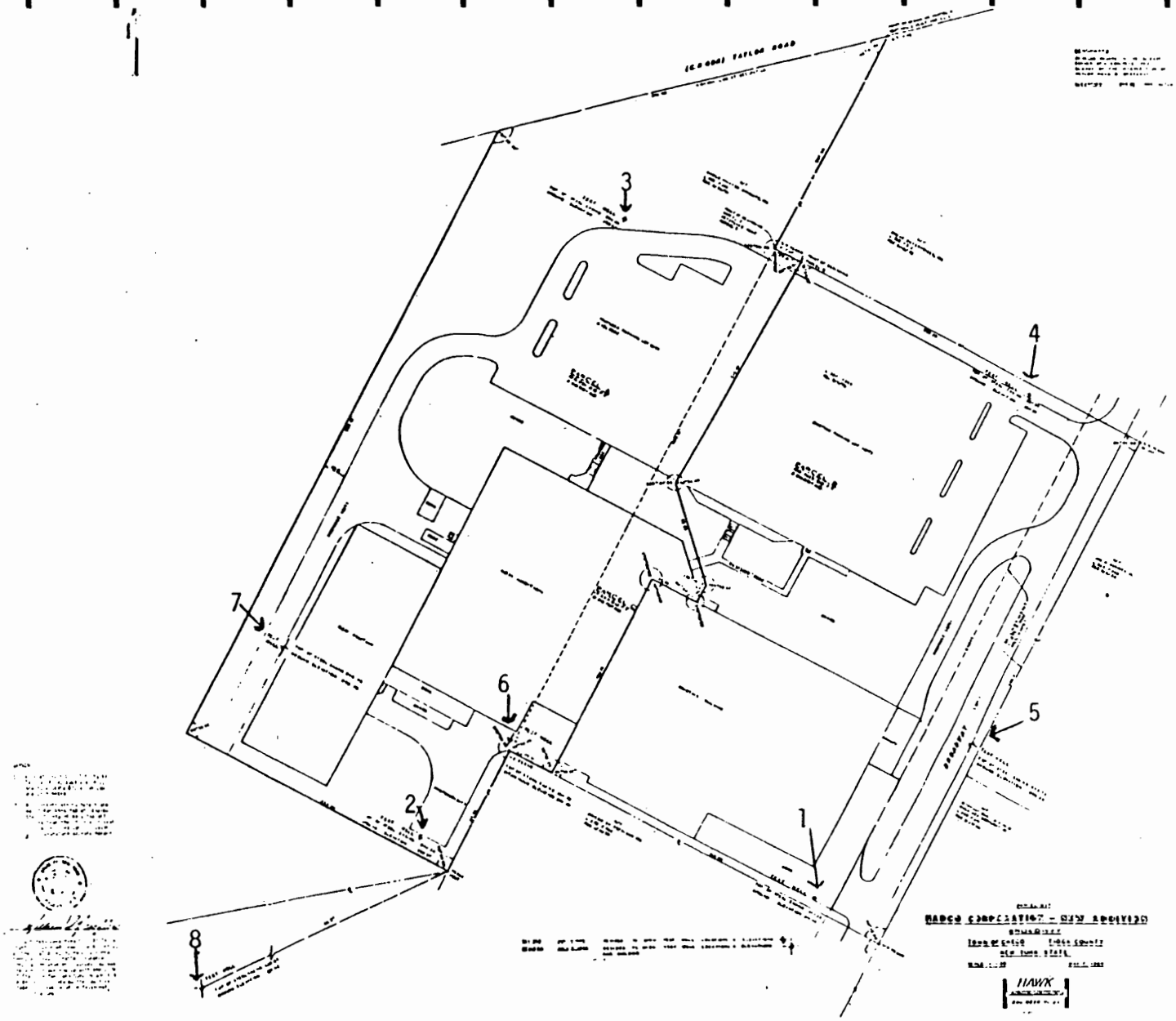


Figure 3-1

Monitoring Well Locations

Well #6 was placed north of Well #2 in the area between the original building and the 1983 addition. Its primary purpose was to further investigate the relatively high concentration of contamination indicated by Well #2. The exact placement of this well was severely limited by underground utilities and plant equipment in the area. This well also provides additional information on the site hydrology.

Wells #7 and #8 serve to define the western and southern extent of contamination and provide hydrologic and stratographic data for those portions of the property.

Borings for the above mentioned wells were made with a six inch hollow stem auger with split spoon samples collected at five foot intervals during the boring process. During the Phase I investigation, continuous soil samples were taken to insure accurate soil descriptions since only minimal on-site soil data were available. However, sufficient data were collected during Phase I to reduce sampling to five foot intervals for confirmation. This procedure allowed for on-site inspection and accurate identification of representative soil to augment soil data collected in the Phase I study while minimizing costs. Logs of these and the Phase I borings are presented in Attachment B.

Upon completion of each bore hole, the auger was removed and four inch diameter type 304 stainless steel screening and risers were installed. The screens are a wire would type with a 0.015 slot size with an end cap welded

TABLE 3-1

Monitoring Well Specifications

Well #	Depth (from TOC[1]) (ft)	Screening length/type (ft)	Casing Diameter/type (in)	TOC[1] Elevation (ft MSL)[2]	Ground Elevation (ft MSL)[2]
1	27	10/SS Wound	4/carbon steel	842.22	841.62
2	27	10/SS Wound	4/carbon steel	842.20	839.97
3	28	10/SS Wound	4/stainless	853.80	850.64
4	44	30/SS Wound	4/stainless	857.93	854.87
5[3]	18.5	5/SS Wound	4/stainless	845.75	846.28
6[3]	30.5	20/SS Wound	4/stainless	841.25	841.49
7	37	20/SS Wound	4/stainless	843.43	840.70
8	22	10/SS Wound	4/stainless	830.07	827.42

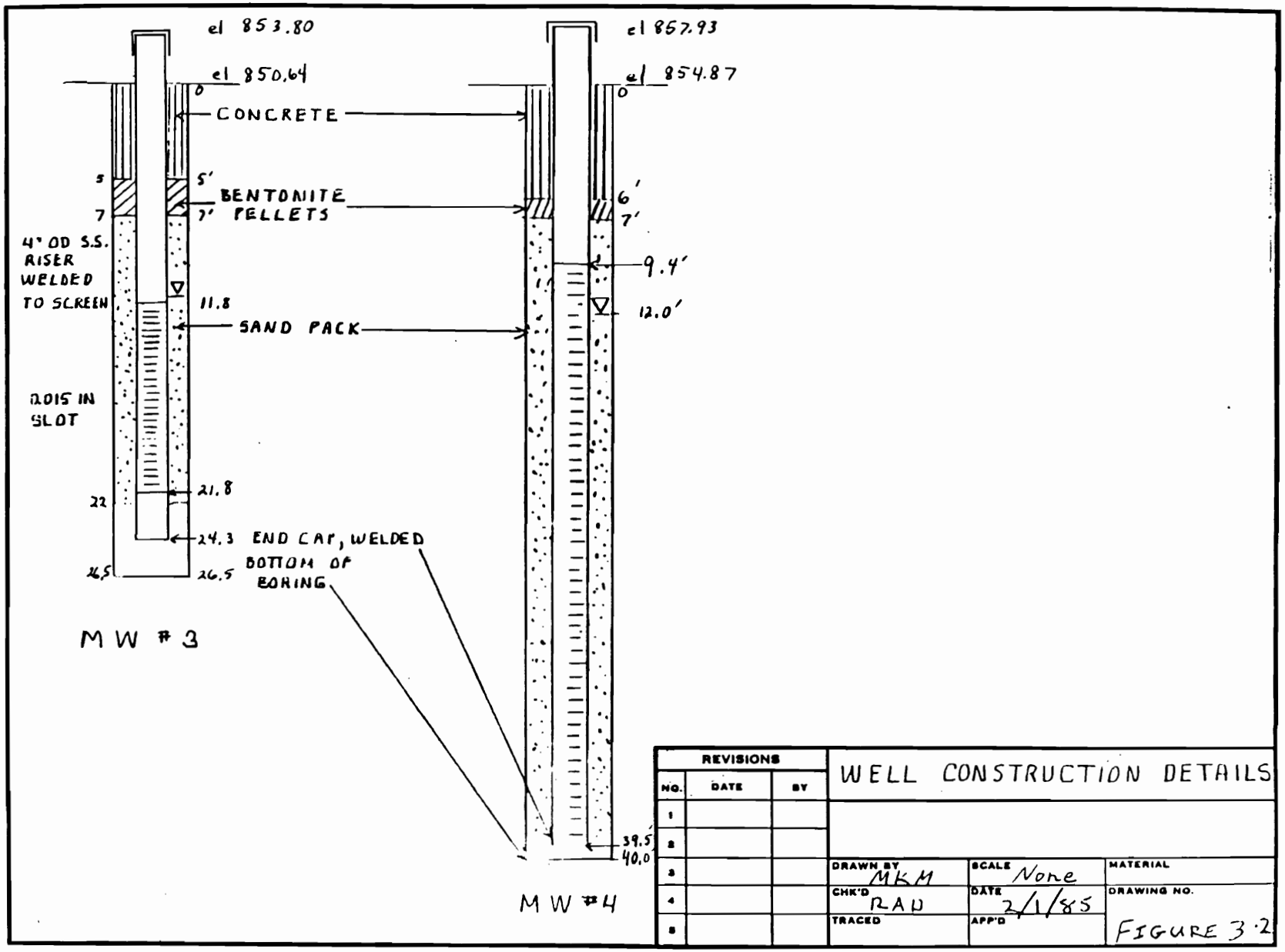
1 TOC - Top of Casing
2 MSL - Mean Sea Level
3 Finished below grade

to the bottom. In all four wells, screen sections were welded to the riser. Once the screen/riser combination was installed in a bore hole, a silica sand pack was placed in the annular space between the bore hole wall and the screen. A one foot layer of bentonite pellets was placed above this, followed by cement grout. Upon completion of well installation, each well was pumped until the discharge flowed clear. Finally each well was surveyed for location and elevation and fitted with a lockable cap. Pertinent data on these wells is presented in Table 3-1 while Figures 3-2 and 3-3 depict the construction of the wells installed by Lancy.

3.2 Field Testing

In order to determine the flow rate of groundwater through the property, it is necessary to know the gradient of the water table, the thickness of the aquifer and the permeability of the aquifer. The first two parameters can be determined from the boring logs and water level readings. However, accurate permeability data must be determined through on-site testing, such as the pump tests utilized at this site. The following paragraphs describe the test procedures used in this particular case.

Pump tests were conducted by withdrawing water from each well at a constant rate while monitoring the elevation of the groundwater surface in the pumped well. A gasoline powered suction pump was used for water withdrawal. When the groundwater surface level was lowered to the point where the pump could no longer operate effectively, the pump was shut down and the rate of recovery monitored and recorded.



REVISIONS		
NO.	DATE	BY
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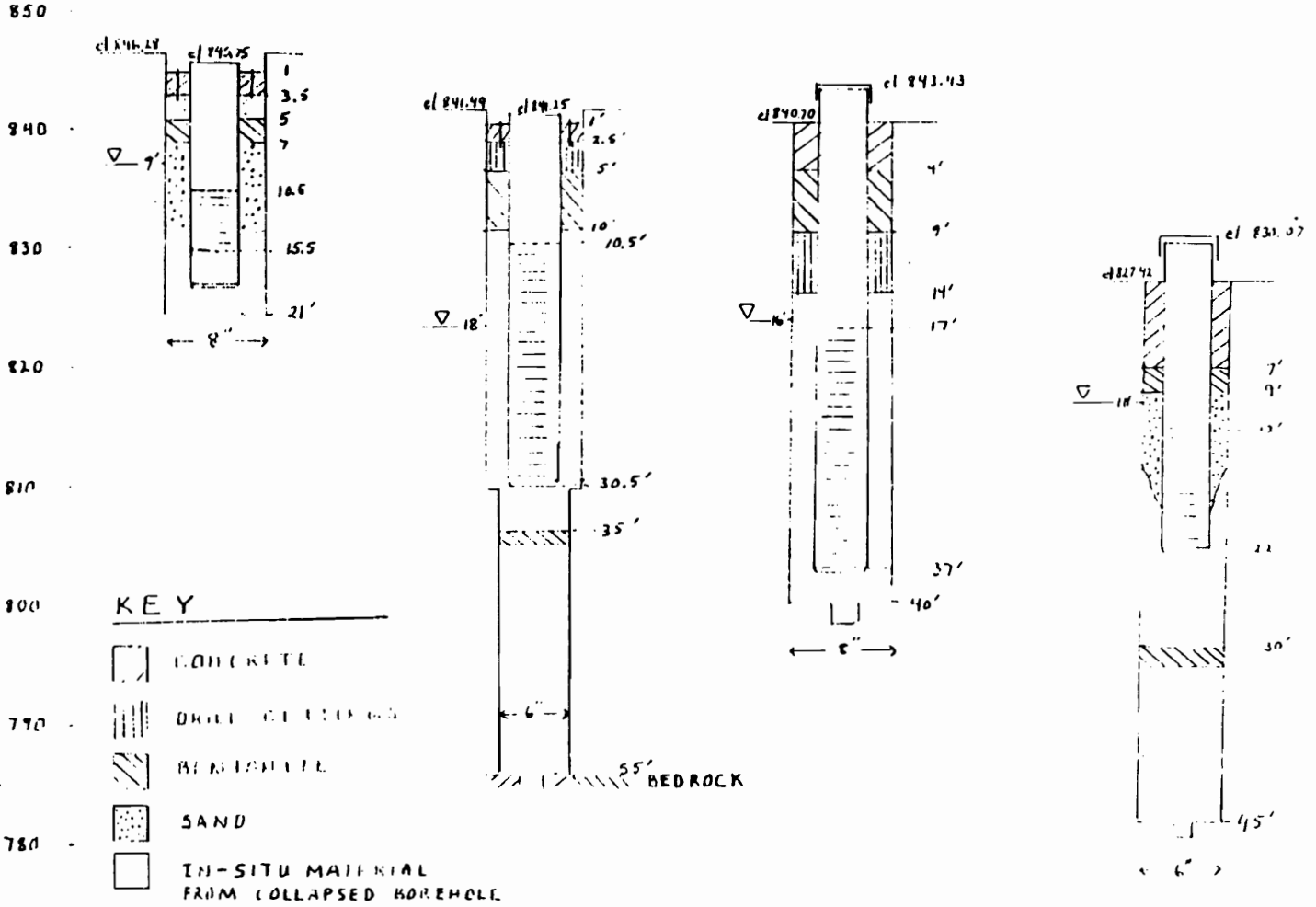
WELL CONSTRUCTION DETAILS

DRAWN BY MKM	SCALE None	MATERIAL
CHK'D RAD	DATE 2/1/85	DRAWING NO. FIGURE 3-2
TRACED	APP'D	



TITLE
WELL CONSTRUCTION DETAILS #5 & 8

CLIENT
HADCO, OWEGO, NEW YORK

FIGURE 3-3

LANCY International, Inc.

The recorded drawdown was plotted against the ratio (t/t') where t is time (in minutes) pumping began and t' is the time (in minutes) pumping ceased. The slope of this line, ($\Delta s'$) is then inserted into the equation for transmissivity, $T=264\ (Q)/\Delta s'$. This equation is set up for English units where Q is the pump discharge rate in gallons per minute and T is transmissivity in gallons per day per foot.

Each well was subjected to the above testing during field activities. Productivity of Monitoring Well #4 was, however, so great that the pump was not able to sufficiently lower the water surface. Consequently it is possible to only give a minimum transmissivity for this well. It should be noted that for the current purposes of this investigation, a more accurate determination is not critical.

3.3 Sampling and Analysis

Sampling

Sampling of monitoring wells is conducted by a qualified field technician experienced in obtaining samples for water testing and analysis. Water level measurements are taken prior to sampling monitoring wells. This number is then used to evaluate the volume standing in each well. Samples are then collected only after a minimum of three well volumes have been removed and discarded. Samples were collected with a stainless steel and teflon bailer and transferred directly to laboratory sample bottles. The wells were sampled in order of lowest to highest level of anticipated contamination and rinsed with distilled water between samples.

Sample Preservation and Handling

Specifications for sample containers, chemical and physical stabilization, and sample holding times employed conform to required practices outlined in "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020). Samples were packed in insulated shipping cartons which include appropriate sample bottles and preservatives for each set of analyses, as well as "ice" packs to maintain sample refrigeration during transport to the laboratory.

Holding times for these samples are controlled within USEPA recommended holding times, not to exceed those suggested by mark J. Carter (NEIC, Chemistry Branch) in his memo of August 25, 1978, entitled "Summary of Sample Preservation and Holding Time data". As a means of tracking samples

and establishing chain-of-custody, sampling record sheets are provided to record on-site data and descriptive notes on sampling conditions. Space is provided for the entry of the sampler's signature, a witness, the sampling date, time, and location. Sampling record sheets accompany samples in sample handling kits.

Analysis

Analytical parameters were selected to identify the extent and concentration of contamination in the shallow aquifer underlying this site. The chosen parameters reflect chemicals used by Hadco and its predecessors which are of regulatory importance. These parameters have been evaluated using those methods listed in Table 3-2 and approved by the United States EPA. Measurements of pH were made on-site.

Analytical plans for the October, 1984, and the January, 1985, sampling sessions included several additional parameters. More specifically, analysis for tin, cobalt, sulfate, and fluoride were performed. These parameters did not provide any useful data and were subsequently deleted from the Phase II program. It should be noted that specific conductance was also deleted. This was done to the high probability that salting of nearby roads and parking lots during winter months would impact this parameter in certain wells.

TABLE 3-2

Analytical Procedures

Parameter	Ref #	Method Number	Detection Limit (mg/L)	Notes
pH	1	9040	0.05	Standard Units
Organic Carbon, Total	2	415.1	0.5	
Copper	1	7210	0.01	
Nickel	1	7520	0.01	
Lead	1	7420	0.1	
Oil and Grease	2	413.1	0.01	
Volatile Organics	1	8010 8020	Variable	

Ref #

1 SW 846 (2nd Edition) - Methods for Evaluating Solid Wastes.

2 EPA-600/4-79-020 - Methods for Chemical Analysis of Water and Wastes.

3 Standard Methods for the Examination of Water and Wastewater, 15th Edition.

4.0 SITE HYDROGEOLOGY

4.1 Geology

The published well log (NYDEC, Bulletin #69, 1984) of a test boring for the Owego Water Works indicates that the unconsolidated sediments in the site vicinity are approximately 42 feet thick. This boring was made about 700 feet south of Hadco's manufacturing facility. Borings made during the installation of the monitoring wells confirm this.

The bedrock beneath these consolidated deposits are grey shales and sandstones of the Devenian Age lying in relatively flat layers. Water movement through this zone is expected to be minimal. Consequently, the role of the bedrock is of minor importance with it acting only as a lower confining zone for water and contaminant movement.

4.2 Soils

There are three main soil types found within the plant property. These soils and their locations are as follows:

A - Recent alluvial deposits along Barnes Creek.

Cga - A gravelly loam located further from the creek known as Chanango gravelly loam, hilly phase (16-25 percent slope).

Cgr - The northeastern portion of the property contains a more compacted gravelly loam mapped as the Chenango gravelly loam, steep phase (26 to 45 percent slope).

The actual depth of these soils (unconsolidated materials) ranges from approximately thirty (30) feet in the northwest portion of the property (MW3) to fifty five (55) feet in the southern reaches (Well #6).

It appears that various construction activities on the property, and the site vicinity in general, have resulted in distortion of the natural soil regimes. This includes the burial of portions of the Barnes Creek flood plain with soil cut from the northwest section resulting in a narrowing of the natural Barnes Creek flood plain.

4.3 Hydrology

Boring logs and soil permeabilities (Table 4-1) indicate the presence of two distinct surface aquifers on the northern portion of the property. The boundry between these two aquifers lies between Monitoring Wells #2 and #4 and is probably along the topographic relief change in the vicinity of the underground telephone cable.

All wells except Well #3 are in the sand and gravel outwash aquifer associated with Barnes Creek. This aquifer has widely varying contents of fine sand, silt and clay. This surface aquifer extends from approximately ten (10) to fifty five (55) feet below ground surface. There appears to be direct communication between this aquifer and Barnes Creek, with the creek acting as a recharge source for the aquifer. The transmissivity of this aquifer ranges from 9 to over 300 gpd/ft. Table 4-1 lists the thickness and measured transmissivity at the monitoring wells. The base of the aquifer is either bedrock or a blue, very compacted till.

TABLE 4-1

Hydraulic Properties

Well #	M Aquifer Thickness (ft)	T Transmissivity (gpd/ft)	K = T/M Est. Permeability (gpd/ft^2)
1	30	163	5.3
2	30	59	2.0
3	17	9	0.5
4	28	>300	>7
5	7	31	4.4
6	45	Not Tested	-
7	30	235	7.8
8	36	11	0.3

Soils in the area of Monitoring Well #3 are primarily glacial tills and are poor water producers. Groundwater flows unevenly and slowly through this formation. For example, visual inspection of the open borehole noted discrete seeps rather than a uniform flow on the northside (uphill) of the hole. No influx of water was detected on the southern side of the hole. This aquifer is limited by a blue clay encountered at approximately twenty-six (26) feet below grade.

Using water elevation data collected from these eight wells, (Table 4-2) a general picture of groundwater flow through the property was developed. Figure 4-1 depicts the flow patter on January 24, 1984. In this pattern, Wells #1 and #4 are receiving water from Barnes Creek, Well #3 is receiving water from the slope to the northwest and Wells #2 and #6 are intercepting water that passes beneath the Hadco facility. The gradient varies somewhat over the property but is generally on the order of 0.025 ft/ft. measured January 24, 1984 to 0.017 measured June 27, 1985. Water level data collected by Hadco personnel from January through July followed this same general flow pattern. The gradient also appears to increase to the south. For example, on 6/27/85 the hydraulic gradient was 0.017 at the plant site, increasing to 0.025 south of the plant toward Well #8. The overall flow direction is to the southwest, towards downgradient Well #8.

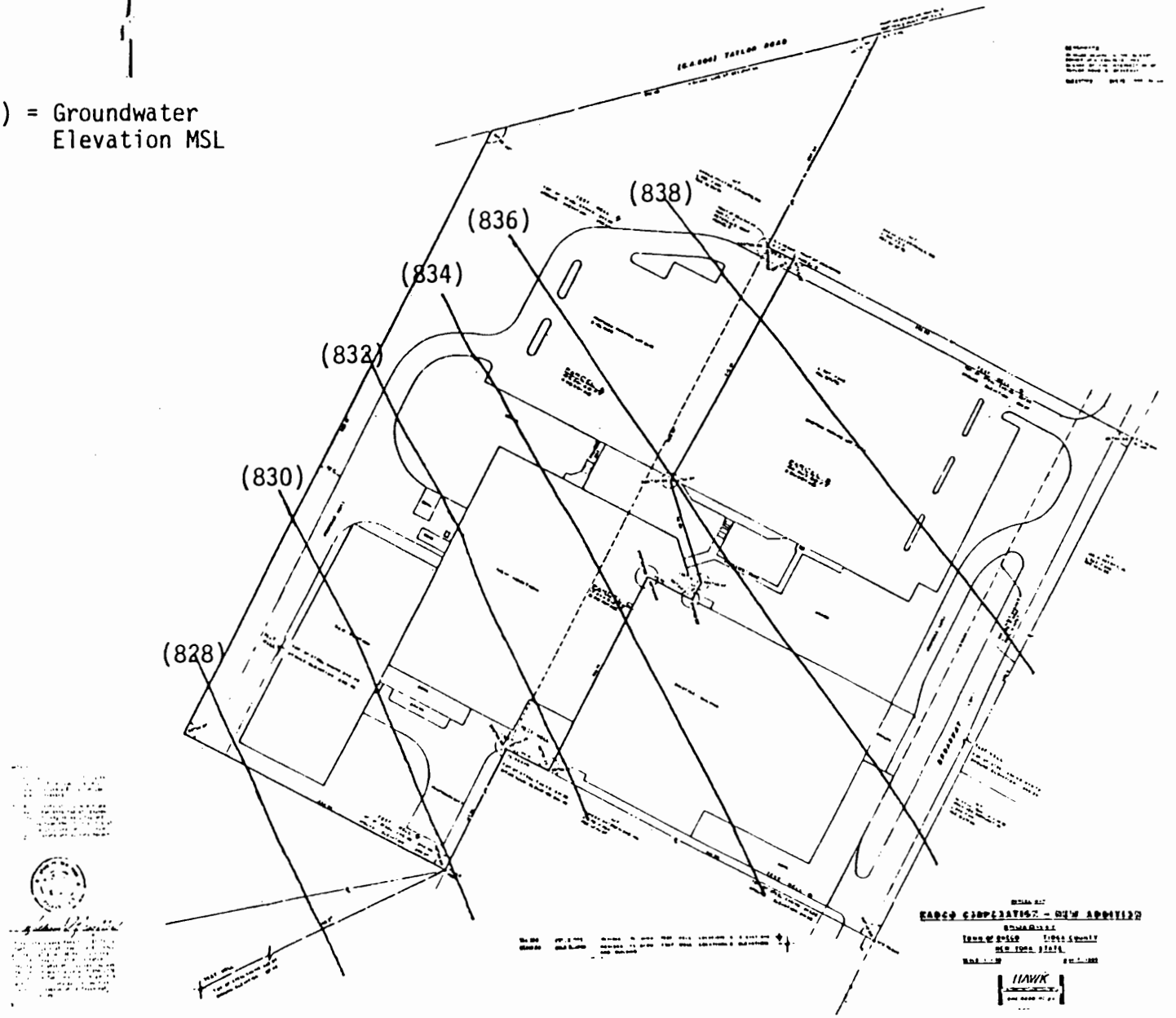


Figure 4-1

Hydraulic Flow Pattern on June 27, 1985

TABLE 4-2

GROUNDWATER ELEVATIONS

Well	6/27/85 Depth to Water	TOC	6/27 Water Elev.	7/17 Water Elev.
1	7.96	842.22	834.26	833.9
2	12.50	842.20	829.70	829.7
3	16.08	853.80	837.72	837.1
4	18.75	857.93	839.18	837.9
5	9.25	845.75	836.50	835.8
6	9.55	841.25	831.70	831.8
7	14.54	843.43	828.89	828.9
8	12.63	830.07	817.44	817.74

Calculations based upon data gathered during on-site studies indicate flow rates ranging from approximately 2.5 feet per year in the vicinity of Monitoring Well #3 to greater than 50 feet per year in the vicinity of Well #4. These flow rates will, of course, vary from season to season with changes in hydraulic gradients. At the site of Well #6, where the highest concentrations are found, the average velocity is measured as 20 ft/yr on 6/27/85 and increases toward Well #8 to 30 ft/yr. On 1/24/85, the average velocity was calculated at 30 ft/yr across the plant site. This calculation was based on a permeability of 4.8 gpd/ft^2 and a gradient of 0.025 ft/ft.

It should be noted that these rates do not necessarily reflect the rate of movement of contaminants through the soil. Contaminant movement must also consider factors such as specific gravity, sorption/desorption characteristics, reactivity, and biodegradability.

References:

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Wetterhall, W.S., 1959. The Groundwater Resources of Chemung Co., New York, New York State Department of Conservation Bulletin GW-40.

USDA, Soil Map, Tioga County, New York, 1939.

4.4 Groundwater Quality

The report of analytical results obtained from samples collected from the eight (8) wells on June 27, 1985 are presented in Attachment C. The results associated with the January, 1985, sampling of Wells #1 through #4 and the October, 1984, sampling of Wells #1 and #2 have also been included for comparative purposes.

Organics

These data indicate that the primary organic contaminant is trichloroethylene (TCE) with Well #6 being closest to the primary source. In correlation with the site hydrology, analytical data indicates Well #2 is the next closest downgradient location to this source. Repeated detection of TCE in upgradient Well #4 strongly indicates that groundwater contaminated with approximately 60 ppb of TCE is moving onto the site from the northeast. There also appears to be a secondary point or area source of TCE in the vicinity of Well #1.

The source of TCE in the vicinity of Well #6 is also a source of 1,1,1-trichloroethane, 1,2-trans-dichloroethylene, 1,2-dichloroethane and methylene chloride. The lack of detection of these latter two compounds in the next downgradient well (Well #2) can be attributed to one or more of the following:

- Variations in the relative mobility of each compound
- Possible variations in the date of entrance of each compound into the groundwater system
- Dilution to levels below detection limits
- Possible variation in the location of the source(s) for each compound

These variables are also responsible for the lack of consistancy in the ratio of concentrations of each contaminant from well to well. The presence of 1,1,-dichloroethane in Wells #1 and #2 but not Well #6 is also a strong indication that there may be more than one source.

Inorganics

Analysis of the sample taken from Well #2 indicates a continued trend of increasing concentrations of copper at this location. The concentration itself is still not high enough to be of concern, but the rapid increases in concentration is evidence that there is movement of copper in the immediate vicinity of this well. The relatively high concentration of copper in Well #6 also indicates that the increasing concentrations found in Well #2 is probably emanating from a source in the vicinity of Well #6.

Lead and nickel concentrations indicate general background concentrations on the order of 0.1 to 0.3 mg/l and 0.2 to 0.6 mg/l respectively. The data do not indicate the presence of any contamination by either of these parameters.

The data also show strong evidence that Well #3 is in a completely different soil type than the other wells. The pH at this location is almost a full point lower and the metal concentrations significantly less. This correlates well the hydrogeologic data gathered at each monitoring location.

5.0 ENVIRONMENTAL IMPACT AND REMEDIAL ACTION ALTERNATIVES

5.1 Environmental Impact

Analytical results obtained from samples collected from five of the monitoring wells have shown the presence of several constituents in concentrations higher than the New York Groundwater Quality Limitations (Table 5-1). In addition, although there are no specific criteria, several constituents (such as TCE) are present in concentrations much higher than what is considered acceptable for drinking water.

Extent of the affected groundwater has been roughly defined, and is believed to be similar to the pattern indicated in Figure 5-1. The plume of affected groundwater currently does not intercept any known water wells. Consequently the environmental impact to date has been minimal. This plume is expected to continue its movement southward where it will eventually intercept the Susquehanna River. As the plume discharges into the river there will be such dilution that no detectable impact is anticipated. There are no known water wells between the facility and the anticipated point of interception by the Susquehanna River.

A significant impact could arise only if a water well is installed in or near the plume. The water is not suitable for many uses, including human consumption, and could possibly cause an adverse impact if improperly utilized.

Table 5-1

New York Groundwater Quality Limitations

Parameter	Maximum Concentration
(1) Arsenic (As)	(1) 0.025 mg/l
(2) Barium (Ba)	(2) 1.0 mg/l
(3) Cadmium (Cd)	(3) 0.01 mg/l
(4) Chloride (Cl)	(4) 250 mg/l
(5) Chromium (Cr) Hexavalent	(5) 0.05 mg/l
(6) Copper (Cu)	(6) 1.0 mg/l
(7) Cyanide (CN)	(7) 0.2 mg/l
(8) Fluoride (F)	(8) 1.5 mg/l
(9) Foaming Agents[1]	(9) 0.5 mg/l
(10) Iron (Fe)[2]	(10) 0.3 mg/l
(11) Lead (Pb)	(11) 0.025 mg/l
(12) Manganese (Mn)[2]	(12) 0.3 mg/l
(13) Mercury (Hg)	(13) 0.002 mg/l
(14) Nitrate (as N)	(14) 10.0 mg/l
(15) Phenols	(15) 0.001 mg/l
(16) Selenium (Se)	(16) 0.02 mg/l
(17) Silver (Ag)	(17) 0.05 mg/l
(18) Sulfate (SO_4)	(18) 250 mg/l
(19) Zinc (Zn)	(19) 5 mg/l
(20) pH Range	(20) 6.5-8.5
(21) Aldrin, or 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-*endo*-1 4-exo-5, 8-dimethanonaphthalene.	(21) not detectable[3]
(22) Chlordane, or 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene.	(22) 0.1 ug/l
(23) DDT, or 2,2-bis-(*p*-chlorophenyl)-1,1,1-trichloroethane and metabolites.	(23) not detectable[3]
(24) Dieldrin, or 6,7-epoxy aldrin.	(24) not detectable[3]
(25) Endrin, or 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-*endo*-1,4-*endo*-5,8-dimethanonaphthalene.	(25) not detectable[3]
(26) Heptachlor, or 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene and metabolites.	(26) not detectable[3]
(27) Lindane and other Hexachlorocyclohexanes or mixed isomers of 1,2,3,4,5,6-hexachlorocyclohexane.	(27) not detectable[3]
(28) Methoxychlor, or 2,2-bis-(*p*-methoxyphenyl)-1,1,1-trichloroethane.	(28) 35.0 ug/l
(29) Toxaphene (a mixture of at least 175 chlorinated camphene derivatives).	(29) not detectable[3]
(30) 2,4-Dichlorophenoxyacetic acid (2,4-D)	(30) 4.4 ug/l
(31) 2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex)	(31) 0.26 ug/l
(32) Vinyl chloride (chloroethene)	(32) 5.0 µg/l
(33) Benzene	(33) not detectable [3]
(34) Benzo(a) pyrene	(34) not detectable [3]
(35) Kepone or decachlorooctahydro-1,3,4-metheno-2H - cyclobuta (*cd*) pentalen - 2 - one (chlordeone).	(35) not detectable [3]
(36) Polychlorinated biphenyls (PCB) (Aroclor)	(36) 0.1 µg/l
(37) Ethylene thiourea (ETU)	(37) not detectable [3]
(38) Chloroform	(38) 100 µg/l
(39) Carbon tetrachloride (tetrachloromethane)	(39) 5 µg/l
(40) Pentachloronitrobenzene (PCNB)	(40) not detectable [3]
(41) Trichloroethylene	(41) 10 µg/l
(42) Diphenylhydrazine	(42) not detectable [3]
(43) bis (2 - chloroethyl) ether	(43) 1.0 µg/l
(44) 2,4,5 - Trichlorophenoxyacetic acid (2,4,5-T)	(44) 35 µg/l
(45) 2,3,7,8 - Tetrachlorodibenzo - *p* - dioxin (TCDD)	(45) 3.5×10^{-5} µg/l
(46) 2 - Methyl - 4 - chlorophenoxyacetic acid (MCPA)	(46) 0.44 µg/l
(47) Amiben, or 3 - amino - 2,5 - dichlorobenzoic acid (chloramben)	(47) 87.5 µg/l
(48) Dicamba, or 2 - methoxy - 3, 6 - dichlorobenzoic acid	(48) 0.44 µg/l
(49) Alachlor, or 2 - chloro - 2', 6' - diethyl - *N* - (methoxymethyl) - acetanilide (Lasso)	(49) 35.0 µg/l
(50) Butachlor, or 2 - chloro - 2', 6' - diethyl - N - (butoxymethyl) - acetanilide (Machete)	(50) 3.5 µg/l
(51) Propachlor, or 2 - chlor - N - isopropyl - N - acetanilide (Ramrod)	(51) 35.0 µg/l

Parameter	Maximum Concentration
(52) Propanil, or 3', 4' - dichloropropionanilide	(52) 7.0 µg/l
(53) Aldicarb, [2 - methyl - 2 - (methylthio) propionaldehyde O - (methyl carbamoyl) oxime] and methomyl [1 - methylthioacetaldhyde O - (methyl - carbamoyl) oxime]	(53) 0.35 µg/l
(54) Bromacil or 5 - bromo - 3 - *sec* - butyl - 6 - methluracil	(54) 4.4 µg/l
(55) Paraquat, or 1,1' dimethyl - 4,4' - dipyridylium	(55) 2.98 µg/l
(56) Trifluralin, or *a, a, a* trifluoro - 2, 6 - dinitro - N - dipropyl - *p* - toluidine (Treflan)	(56) 35.0 µg/l
(57) Nitralin, or 4 - (methylsulfonyl) — 2, 6 - dinitro - N, N - dipropylaniline (Planavin)	(57) 35.0 µg/l
(58) Benefin, or N - butyl — N - ethyl - *a, a, a* - trifluoro - 2,6 - dinitro - *p* - toluidene (Balan)	(58) 35.0 µg/l
(59) Azinphosmethyl, or O, O - dimethyl - *S* - 4 - oxo - 1,2,3 - benzotriazin - 3(4H) - ylmethylphosphoro - dithioate (Guthion)	(59) 4.4 µg/l
(60) Diazinon, or O, O-diethyl O-(2-isopropyl-4-methyl - 6 - pyrimidinyl) - phosphorothioate.	(60) 0.7 µg/l
(61) Phorate (also for Disulfoton), or O, O - diethyl - *S* - [(ethylthio)methyl] - phosphoro - dithioate (Thimet R), and disulfoton, or O, O-diethyl-S-[(2-ethylthio)ethyl] phosphorodithioate (Di-System R)	(61) not detectable [3]
(62) Carbaryl, or 1 - naphthyl - N - methylcarbamate	(62) 28.7 µg/l
(63) Ziram, or zinc salts of dimethyl - dithiocarbamic acid.	(63) 4.18 µg/l
(64) Ferbam, or iron salts of dimethyl - dithiocarbamic acid.	(64) 4.18 µg/l
(65) Captan, or *N* - trichloromethylthio - 4 - cyclohexene - 1, 2 - dicarboxmide.	(65) 17.5 µg/l
(66) Folpet, or N - trichloromethylthiophthalimide.	(66) 56.0 µg/l
(67) Hexachlorobenzene (HCB)	(67) 0.35 µg/l
(68) Paradichlorobenzene (PDB) (also orthodichlorobenzene)	(68) 4.7 µg/l
(69) Parathion (and Methyl parathion), or (O, - O - diethyl O *p* - nitrophenylphosphorothioate, and methyl parathion, or O, O - dimethyl - O - *p* - nitrophenylphosphorothioate.	(69) 1.5 µg/l
(70) Malathion, or *S* - 1, 2 - *bis* (ethoxycarbonyl) ethyl O, O - dimethylphosphorodithioate.	(70) 7.0 µg/l
(71) Maneb, or - manganese salt of ethylene - bis - dithiocarbamic acid.	(71) 1.75 µg/l
(72) Zineb, or zinc salt of ethylene - bis - dithiocarbamic acid.	(72) 1.75 µg/l
(73) Dithane, or zincate of manganese ethylene - bis - dithiocarbamate.	(73) 1.75 µg/l
(74) Thiram, or tetramethylthiuramdisulfide	(74) 1.75 µg/l
(75) Atrazine, or 2 - chloro - 4 - ethylamino - 6 - isopropylamino - S - triazine.	(75) 7.5 µg/l
(76) Propazine, or 2 - chloro - 4, 6 - diisopropyl - amino - S - triazine.	(76) 16.0 µg/l
(77) Simazine, or 2 - chloro - 4, 6 - diethylamino - S - triazine.	(77) 75.25 µg/l
(78) di - n - butylphthalate	(78) 770 µg/l
(79) Di (2 - ethylhexyl) phthalate (DEHP)	(79) 4.2 mg/l
(80) Hexachlorophene, or 2,2' - methylene - bis (3,4,6 - trichlorophenol)	(80) 7 µg/l
(81) Methyl methacrylate	(81) 0.7 mg/l
(82) Pentachlorophenol (PCP)	(82) 21 µg/l
(83) Styrene	(83) 931 µg/l

Notes:

1. Foaming agents determined as methylene blue active substances (MBAS) or other tests as specified by the Commissioner.

2. Combined concentration of iron and manganese shall not exceed 0.5 mg/l.

3. "*Not detectable*" means by tests or analytical determinations referenced in Section 703.4.

The soil removal method would involve the location and removal of those soils with the highest concentration of contamination. This would eliminate the contaminant source and allow the plume to dissipate naturally. In that most of the contaminated soils are expected to lie under the facility, this method would prove to be extremely expensive and disruptive to Hadco's operations. Since other acceptable methods are available, this method cannot be considered a viable alternative.

The method involving soil removal in conjunction with groundwater removal and treatment program would provide the most rapid solution to the issue, but as with the straight soil removal method, the cost and disruption to Hadco greatly outweigh this advantage. For this reason, this method also cannot be considered a viable alternative.

Based upon the data presented in the above discussion, it appears that the monitoring alternative is the most cost effective resolution to this issue. This assumes there are no current or future demands for groundwater in the vicinity of the projected plume pathway.

The final approach to remedial action will also be influenced by requirements of the New York Department of Environment Conservation (NYDEC). Groundwater contamination situations such as this are addressed by NYDEC on a case-by-case basis. It is therefore not possible to accurately project which approach to remedial action will be considered acceptable by this agency. This must be resolved through negotiations between Hadco and NYDEC.

ATTACHMENT A

RAW MATERIALS INVENTORY

TRADEN[illegible]	MSDS/#		[illegible]KA	C[illegible]ITU[illegible]S	FIRE [illegible]GHT[illegible]	[illegible]E	CO[illegible] SI[illegible]	[illegible] USED
CU 405A	Y	1A	Ethone 700A Cu or EP Copper 405	Copper Salts, e.g. $CuSO_4$ - $CuCl_2$ Formaldehyde, ethylene diamene derivative (decomposer to formic acid in fire) complexer		660 gal/mo	55 gal.	
CU 405B	Y	1B	Ethane 700B Cu or EP Copper 405B	Ethylene diamene derivative decomposes to nitrogen oxides in fire NaOh		440 gal/mo	55 gal.	Tank 9,10 11
Cu405C	Y	1C	Ethane 700C Cu or EP Copper 405C	Sodium hydroxide, potassium cyanides - complexers (Reacts with acid to form Hydrogen Cyanide)		880 gal/mo.	55 gal.	
AF Solution	Y	1D	Ethane Reducer 700Cu	Formaldehyde		275 gal/mo.	55 gal.	
102 Cleaner	Y	1E	Ethane 453	NaOH, Sodium formate		10 gal/mo.	5 gal.	
301 Accelerator	Y	1F	Ethane PA491	Chelator, fluoroboric acid, aliphatic acid, decomposition of HF in fire.		60 gal/mo.	5 gal.	Tank 12
302 Preactivator	Y	1G	Ethane 11236	HcL (5%), SnCL2, NaCL		660 gal/mo.	55 gal.	Tank 17
212 Activator	Y	1H	Ethane 443 Activator	Stannous chloride, hydrochloric acid, methanol, .15 g/liter palladium chloride		45 gal/mo	5 gal.	Tank 16
Hydrochloric Acid		1I		HCL		500 lb/mo	500 lb/dr	
Metex G5B		1J	MacDermid G5B	H_2O_2 (hydrogen peroxide) Sulfuric Acid, chlator		3 dr/mo	50 gal.	

TRADE	[illegible]S/#	[illegible]KA	[illegible]TIT[illegible]S	[illegible]	FIR[illegible]GHT	[illegible]E	C[illegible]SI	[illegible]US
Metex G5S	1K	MacDermid G5S	Sodium salt of Salicylic acid, Sulfuric acid, Chelator			3 dr/mo	55 gal	
Sulfuric Acid 25%	1L		Sulfuric Acid				750 lb/dr	
Inland 640D	1M		Chelator					Ultrason cleaner

TRADE NAME	MSDS/#	AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE USED
Metex 3108	2A	MacDermid 3108	Acid, microetch, H_2SO_4, H_2O_2, Persulfates			800 lb/mo	400 lb/dr.	
Metex 9268	2B		Acid electrocleaner, H_2SO_4 & chelator, phosphoric acid, glycols			1 dr/mo	55 gal/dr	
Copper Sulfate	2C					110 gal/mo	55 gal/dr	
Sulfuric Acid (25%)	2D						750 lb/dr	
CX-BN Y	2E	Harshaw CX-BN	Organic grain refiner			200 gal/mo	15 gal/dr	
Fluoroboric Acid Y	2F		Fluoroboric Acid			2 dr/mo	625 lb/dr	
Lead Fluoroborate Y	2G		Lead Fluoroborate			40 gal/mo	70 lb/pail	
Stannous Fluoroborate Y	2H		Stannous Fluoroborate			30 gal/mo	165 lb/pail	
Harshaw FGR Y	2I		Organic grain refiner, peptone			40 gal/mo	4 gal/cs	

TRADENAME	MSDS/#	AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE US
Liq. Nickel Sulfate	3A		Nickel sulfate			20 gal/mo	5 gal/pail	
Liq. Nickel Chloride	3B		Nickel chloride			20 gal/mo	5 gal/pail	
Etcho Strip Concentrate Y	3C		HCL, inhibitor, glycol			20 gal/mo	5 gal/pail	
C29 SB Brightener	3D						1 gal/pail	
C29 SMB Brightener	3E		Organic				1 gal/pail	
C29S Conditioning Salts Y	3F		Acid salt (e.g. citric acid)				50 lb/box	
Sulfuric Acid 50% (1606)	3I		Sulfuric Acid				750 lb/dr	
Reclaim Resin	3J						cu.ft.	
Nickel Sulfamate	3K		Nickel Sulfamate					
Technic GBX MOD C Gold Bath	3L		Citric Acid, KOH, gold potassium cyanide					
Acid Adjusting salts	3M		Citric Acid					
Sulfamic acid (lowers PH)	3N		Sulfamic acid					
Nickel carbonate (raises PH)	3O		Nickel carbonate					
Cobalt citrate (brightener)	3P		Cobalt citrate					

TRADE	E	LOS/#	AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE USE
Dynachem Anti-foam 50%		4A						5 gal/pail	
Sod., Carb. Monohydrate		4B					1000 lb/mo	100 lb/bag	
Butyl Carbitol 50%	Y	4C		Diethylene glycol Monobutyl ether			600 gal/mo	440 lb/dr	
Monoethanolamine		4D		Monoethanolamine					

TRADENAME	MSDS/#	AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE USED
Butyl Carbitol (50%)		5A				600 gal/mo	440 lb/dr	Stripper
Hunt Ac-CU guard etch	Y	5B	NH_4OH-$CuSO_4$, NH_4Cl (never put Hg or Ag near solution, don't use mercury thermometerP			7000 gal/mo	Bulk 5000 gal. tank	Etcher
Hunt Finishing Sol.		5C	HCL, on decomposition 6 drs. per mon. get Hydrogen Sulfide HBG4			6 dr./mo	55 gal/dr	Etcher
Caustic Potash		5D	NaoH & Kolt			3 dr/mo	660 lb/dr	Etcher
Monoethanolamine		5E	Monoethanolamine			½ dr/mo	470 lb/dr	

TRADE NAME	MSDS/#	AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE USED
Alpha 4144 flux	Y 6A					300 gal/mo	5 gal/pail	Reflow
Halltin	6B		SNCL, HCL			30 lb/mo	300 lb/dr	Reflow
Trichloro-ethane	Y 6C		1,1,1, Trichloro-ethane, Methyl-chloroform			450 gal/mo	54 gal/dr	CP Proce
Monoethanol-amine	6D		Monoethanolamine			½ dr/mo	470 lb/dr	
Dynachem Anti-foam 50%	6E	Dynachem 50				25 gal/mo	5 gal/pail	
Hydrochloric Acid - Reagent grade	6F		12m HCL			500 lb/mo	40 lb/cs	
Sulfuric Acid 1600	6G		18M H_2SO_4			6 dr/mo		
Algin 331 Preclean	6H							

TRADE	MSDS/#	[illegible]A	CO ITU	[illegible]	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE USED
Legend Inks (black, white yellow)	7A						Gallons	
Masking Inks (404, 501)	Y 7B						Gallons	
Ulano Photo Coat	Y 7C						Gallons	
'l Clene S	7D		(95%) Methylene Chloride			4 dr/mo	570 lb/dr	
MBO Reclaim	7E	Hubbard Hall C. C. Hub Strip S.					6x40 oz/cs	
Cello Solve Acetate	7F					1 dr/mo	445 lb/dr	
AP727 (Inland)	7G							
Thorlener	7H		Aromatic Amines (mixed w/7B)					

TRADENAME	MSDS/#		AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE USED
CF4	Y	8A						300 cu.ft.	
O_2 U.P.C.	Y	8B						300 cu.ft.	
Dry Nitrogen		8C						25 cu.ft.	

TRADENAME	MSDS/#	AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	WHERE USED
Antifoam FG-10	Y		Siliconemulsion			1 dr/mo	55 gal/dr	T-20
Calcium Cl Chloride	Y		Calcium Chloride			1 ton/wk	100 lb/bag	
Caustic Soda	Y		($CaCl_2$) 50% Sodium Hydroxide (NaOH)			12x55/wk	55 gal/dr	
Ferrous Sulfate	Y		Ferrous Sulfate ($FeSO_4$)			15x50 lb/wk	50 lb/bag	
Sodium Hydrosulfite	Y		Sodium Hydrosulfite			1-2x250 lb/wk	250 lb/dr	
Sodium Hypochlorite	Y		Sodium Hydrochlorite (a bleach, oxidizer)			4x55 gal/wk	55 gal/dr	
Sulfuric Acid #66	Y		Sulfuric Acid			3x55 gal/wk	55 gal/dr	
Muriatic Acid (HCL)	Y		20% HCL Solution			2x15 gal/wk	15 gal/dr	
Soda Ash	Y		Sodium Carbonate (neutralizer for acid spills)					

TRADE	MSDS/#	AKA	CONSTITUENTS	HAZARD	FIRE FIGHTING	USAGE	CONT. SIZE	MFRS USED
Bugman Roach, Ant & Fly Spray			Pesticide					
Crown Bleach								
Taski P44 Emulsion			Flammable $MeCl_2$					
Franklin Blu-Lite Germicidal Acid Cleaner			Phosphoric, Sulfuric Acid					
Comet Cleanser			Chlorine Problem					
Silicone Polish			Flammable					
Vasco Furniture Polish			Flammable					
Vasco Disinfectant Spray			Flammable					
Stainless Steel Polish			Flammable					
Vindex Glass Cleaner								
Perfect High Carpet Care								
Airwick A-33 Dry								
Airwick A-33 Liquid								
Anderol Synthetic Lubricant 500 (Compressor Oil)								

ATTACHMENT B

BORING LOGS

( ) = Concentration of
Total Volatile Organics
Detected

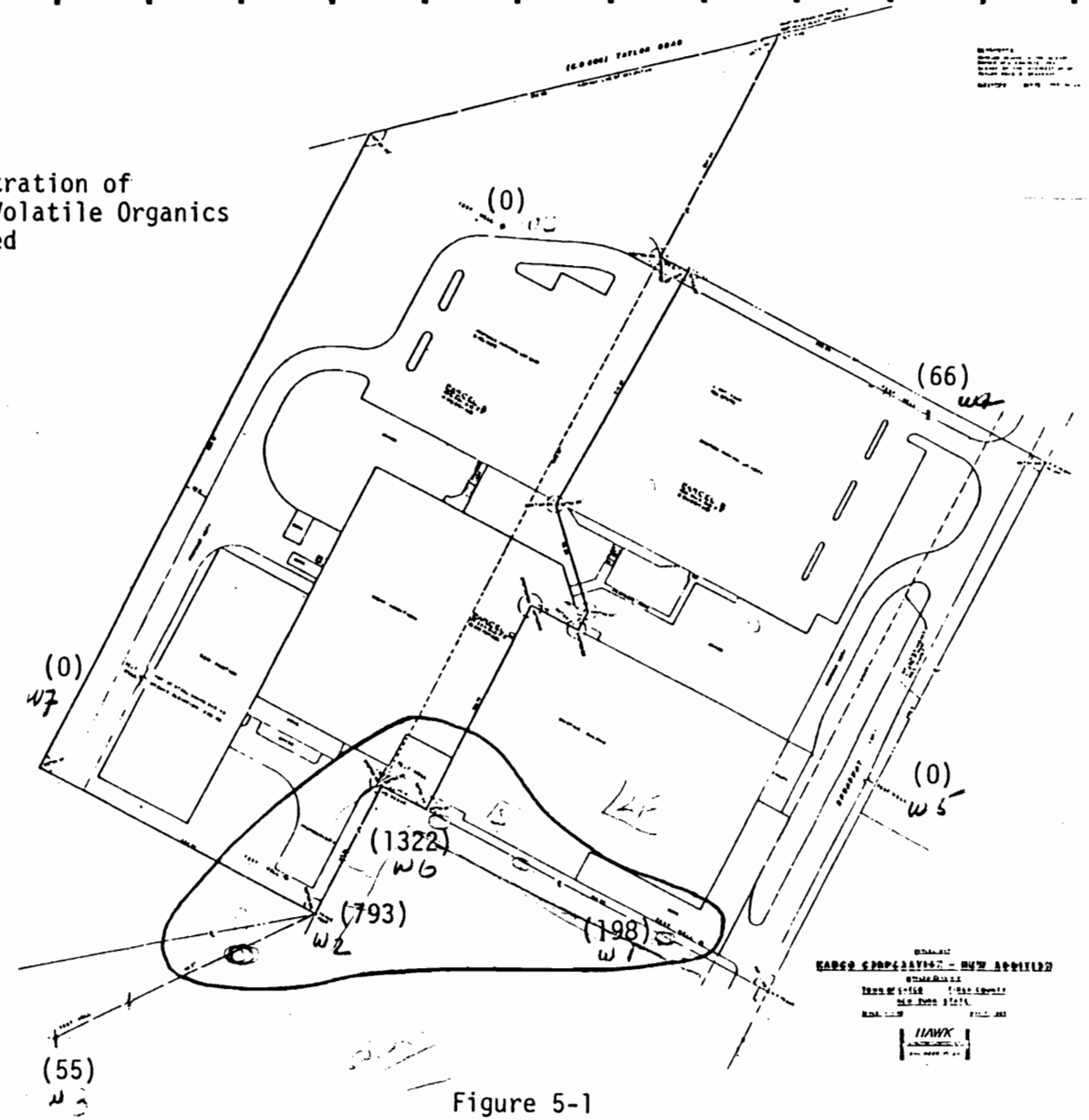


Figure 5-1
Projected Zone of Contamination
(>100 ppb TVOC)

5.2 Remedial Action Alternatives

The area of contamination depicted in Figure 5-1 represents an estimated four (4) million gallons of water with total volatile organics greater than 100 ppb. The 100 ppb level is commonly used as an acceptability criteria for public drinking water supplies and can therefore be considered a reasonable criteria for any remedial actions. The following discussion on remedial action alternatives is based upon this criteria.

There are three basic alternatives available as approaches to remedial action. They are as follows:

- o Tracking
- o Containment
- o Corrective Action

Due to the large area involved in this issue (estimated 1-2 acres), the cost of containment is estimated to be on the order of 1 to 3 million dollars and would produce the least environmentally acceptable results. For that reason this alternative is not considered viable.

The tracking alternative would call for the contamination plume to be monitored as it is be gradually transported from the Hadco property into the Susquehanna River. No other activity would take place unless future circumstances, such as a sharp increase in the noted contamination, make this alternative environmentally unsound. It is expected that the river's

flow would quickly dilute the contaminants to concentrations well below detection limits. A portion of the organic constituants would then slowly breakdown into harmless by-products, another portion would be accumulated in the river's ecosystem, while the remainder would volatilize and degrade in the atmosphere. Inorganic contaminants would become diluted to the point of being indistinguishable from natural background levels. This alternative would require restrictions on groundwater usage in the area of the projected plume pathway. It is the least expensive approach incurring only the cost of routine monitoring of existing wells at an estimated annual cost of $2500. At this stage of investigation, this alternative also appears to be environmentally acceptable as there is currently no known usage of this water prior to discharge into the Susquehanna River. Disadvantages include long term restriction on groundwater usage in the projected plume pathway and the discharge of low concentrations of hazardous constituants into a more sensitive portion of the environment.

The corrective action alternative can be addressed with a wide variety of methods. The most feasible, in terms of effectiveness and acceptability include the following:

- Groundwater removal with discharge to sewer
- Groundwater removal, treatment, and discharge to stream
- Soil removal
- Soil removal in conjunction with a groundwater removal program

Groundwater removal and discharge to sewer would involve the installation of one or more recovery wells in the areas of highest groundwater contamination and possibly certain downgradient locations. The water removed from these wells would then be discharged directly to the sewer system for treatment and subsequent discharge to the Susquehanna River. The advantages of this method is a relatively low cost and a more immediate clean-up of the aquifer than provided by the "monitoring" approach. In addition, the treatment facility is adjacent to Hadco's property, thereby, minimizing the problems associated with the transport of contaminated waters through a sewer line system. It is estimated that this method could be initiated for $20-40,000 with an annual cost of $4-6000. The cost is highly dependent on the number of recovery wells installed. There are, however, several disadvantages to this method:

- o Volatile contaminants would be transferred to the air during treatment and therefore provides no significant advantage over the the air stripping method.
- o Certain constituants may reach concentrations unacceptable to the sewage treatment facility, resulting in the need for some form of pretreatment. This would defeat the purpose of this method.
- o The productivity of the contaminated aquifer is low. Therefore, it would be necessary to install several recovery wells in order to make a significant impact on the plume movement.

It should be noted that the hydraulic capacity of the adjacent treatment plant is currently under strain. The availability of other

methods combined with this situation places serious doubt on the viability of this approach.

Groundwater removal and treatment followed by discharge to stream would be similar to the method described above, but would not depend upon the Owego sewage facility for treatment of the contaminated water. There are two main treatment methods available for removal of volatile organics: carbon adsorption and air stripping. The overall water flow diagram would be similar for both. Water would be pumped from one or more wells to a central collection point, pass through a treatment module, and be discharged to Barnes Creek under an SPDES permit. The difference, of course, lies in the actual treatment.

In the carbon adsorption method, contaminated water is passed through a pre-filter to remove excess suspended solids and then through a cartridge type carbon cannister. The activated carbon, which adsorbs volatile organics, is replaced with a new cartridge when the adsorption capacity is exhausted. The spent cartridge is manifested and shipped to an incineration facility or returned to the vendor for regeneration. In either case, the captured organics are destroyed. Routine sampling of influent and effluent water would determine when a given cartridge is exhausted and must be replaced. A second cartridge could be placed in the flow scheme in order to insure treatment of the water prior to discharge should there be a "break through" in the primary cartridge. The actual design and cost of such a system is highly dependent upon the flow rate desired. It is estimated,

however, that such a system, including installtion of recovery wells could be brought into operation for $25-75,000. Annual maintenance, which would include routine laboratory testing, replacement of activated carbon cannisters, pump maintenance, and reporting, could be accomplished at an annual cost of $6-12,000. The advantages of this method would be complete destruction of the contaminant, better clean-up of the aquifer than provided by the monitoring approach, and removal of organics to very low concentrations. The major disadvantage would be the relatively high annual cost. Although it is difficult to accurately project, it is estimated that such a system with a 15 gpm flow rate would a minimum require 2-3 years of operation to remove and treat contaminated water.

In the air stripping method the water would simply pass through a packed tower with a counter current air flow. This turbulent contact with air would volatize the organics and remove them with the waste air stream. This method has a cost advantage over carbon adsorption since there is no routine replacement of cannisters or a parallel activity. Space requiements and initial capital expenditures would, however, be similar. In addition to the lower annual expense, air stripping would be less prone to fouling problems than carbon absorption. The main disadvantages include a high potential for icing problems during winter months and the lack of assured destruction of the contaminants provided by the carbon adsorption methods. Time required for removal and treatment of the contaminated groundwater would be similar to that for carbon adsorption.

BORING LOGS

Project Hadco Monitoring Wells — Project No. 003075
Elevation 851ft.MSL — GWL 0 HRS 11.5 ft — Boring No. 3B
24 HRS 11.5 ft
Date 12-19-85 — Field Engineer Mary K. McGuire — Page 1 of 1
Drilling Method Hollow-stem auger/ split spoon sampling (140 # hammer)

Depth feet	Blow Count	Sample Recovery	Color	Description	Remarks
0-2.0	na	na	brown	soil and subsoil	
2.0-5.0			grey-brown	gravel, silt & clay (auger chattering)	till
5.0-7.0	100/0"	0"		probably till, no sample recovery	
7.0-10.0				not sampled	
10.0-12.0	40,40	6"	grey-brown	sandy clay and gravel	till
12.0-15.0				not sampled	
15.0-16.0	80/6"	6"	grey-brown	sandy clay and gravel	till
16.0-18.0				not sampled	
18.0-18.5	50/6"	4"	blue	clay with a gravel size limestone (auger runs smooth)	
18.5-20.0				probably till (auger chattering)	
20.0-22.0				probably till (auger chattering)	
22.0-25.0				probably clay (auger runs smooth)	
25.0-26.5	50/2"*	2"	blue	clay and gravel rock chips	
26.5				Auger refusal	

Remarks: Abandoned borehole at 12:00. Rain fell over lunch. At 1:30 the borehole had filled with water to 11.5 feet below ground. After bailing out 10 gallons I could see incoming ground water on the north side of the borehole. It was difficult to lower the water level past 12.5 feet, therefore the well made an adequate amount of water for a well. The well screen extends from 12 to 22 ft, sand pack from 22 to 7, bentonite pellet seal 7 to 5 and Portland Type I cement grout from 5 to 0 ft below ground.

*: Sampling attempted with 300 lb. hammer.

na: Sampling not attempted.

BORING LOGS
HADCO
OWEGO, NEW YORK

Project Hadco Monitoring Wells — Project No. 003075
Elevation 854ft.MSL — GWL 0 HRS 12.0 ft — Boring No. MW 4
48 HRS 9.0 ft
Date 12-19-85 — Field Engineer Mary K. McGuire — Page 1 of 1
Drilling Method Hollow stem auger/ split spoon sampling (140 # hammer)

Depth Feet	Blow Count	Sample Recovery	Color	Description	Remarks
0-1.0	na	na	brown	soi	
1.0-5.0	na	na	lt brown	gravel, large	dry
5.0-5.5	40/6"	6"	brown	gravel and silt, stiff	dry to moist
5.5-10.0				not sampled	
10.0-12.0	12,9,11	1.5'	brown	gravel and silt	water in tip
12.0-14.0	17,11,7,7	1.5'	brown	gravel	wet
14.0-15.0				not sampled	
15.0-17.0	17,13,10,11	1.5'	brown	cs. sand and gravel	wet
17.0-19.0	10,10,8,10	1.5'	brown	cs. sand & gravel, clay & sand in tip	wet
19.0-20.0				not sampled	
20.0-22.0	15,4,8,8	1.5'	brown	clayey sand, some gravel	wet
22.0-24.0	8,16,16,13	2"	brown	gravel and sand	wet
24.0-25.0				not sampled	
25.0-27.0	5,5,6,4	1.5'	brown	clayey sand, angular grains	wet
27.0-29.0	3,6,6,7	2'	brown	sand, some clay, 6" layer of fine gravel in middle of sample	wet
29.0-30.0				not sampled	

30.0-32.0	13,13,15,12	2′	brown	clayey sand over gravel & sand, wet	
32.0-34.0	9,12,13,12	2′	brown	clayey gravel with some sand,stiff,wet	
34.0-35.0				not sampled	
35.0-37.0	30,18,25,40	1.5′	brown	gravel with some sand	wet
37.0-40.0				gravel (auger chattering)	
40.0-42.0	65/6"	0.7′	brown-grey	clay, silt and fine gravel	till
42.0-45.0				not sampled, probably till(auger chattering)	
45.0-45.5	100/6"	6"	blue	clay and gravel, stiff	till

45.5 Bottom of Borehole

Remarks: Type 304 stainless steel well screen extends from 39.5 to 9.5 ft, sand pack from 40 to 7, bentonite pellet seal 7 to 6 and Portland Type I cement grout from 6 to 0 ft below ground.

na: Sampling not attempted.

Project #004325 Client: HADCO Corporation Well No. 5 Date: May 31, 1985

Depth/Ft	Blows Per 6 Inches	Recovery	Color	Material Classification	Remarks
0-5'			Grey-Brown	Grey gravel, fine gravel , brown silt, some sand, trace of clay	Dry
5-6'	57,69	6"/12"	Grey-Brown	Grey gravel and brown silt, some sand, trace of clay, some cobbles	
6-10'				Not sampled	
10-11'	20,17	8"/12"	Grey-Brown	Grey gravel and brown silt, some sand, trace of clay, some cobbles	Wet in tip
11-15'				Not sampled	
15-16'	35,60	8"/12"	Grey-Brown	Grey gravel and brown silt, some sand, trace of clay, some cobbles	
17-20'				Smoother drilling, but still slow, not sampled	
20-21'	50	6"/6"	Grey	Shale under grey clay and silt	
				End of Boring	

Note: Boring located east of pavement. Stream level is 9 feet below ground in Barnes Creek.

Grey gravel was tested with acid but did not effervesce. Gravel consisted of fine grain sandstone. The brown clay and silt found with the gravel did react with acid.

Project J04325 Client: HADCO Corporation Well No. 6 Date: May 29, 1985

Depth/Ft	Blows Per 6 Inches	Recovery	Color	Material Classification	Remarks
0-4"			Black	Asphalt (thickness varies from 1"-4")	
4"-2'			Brown	Gravel, silt, some sand and clay	Dry
2-3'				Not sampled	
5-6.5'	18,14,12	16"/18"	Brown	Grey gravel and brown silt, some sand and trace of clay	Dry
6.5-10'				Not sampled	
10-11.5'	30,35,40		Brown	Grey gravel, brown sand and silt, trace of clay	Dry
11.5-15'				Not sampled	
15-16.5'	6,15,15	16"/18"	Brown	Grey gravel, brown sand and silt, trace of clay; 3" of silt is reddish brown, fewer gravel pieces	Moist
16.5-20'				Not sampled	
20-21.5'	7,13,16	12"/18"	Brown	Grey gravel, brown sand, silt, trace of clay	Wet
21.5-25'				Not sampled	
25-26.5'	10,15,15	12"/18"	Brown	Grey gravel, sand, red-brown silt and clay	Wet
26.5-30'				Not sampled	
30-31.5'	11,19,17	12"/18"	Greyish Brown	Grey gravel, sand, silt, trace of clay	Wet
31.5-35				Not sampled	
35-36.5'	13,15,18	12"/18"	Greyish Brown	Grey gravel, reddish brown silt matrix with sand and clay	
36.5-40'				Not sampled	
40-41.5'	7,3,4	12"/18"	Greyish Brown	Grey gravel and sand with silt, 3" reddish brown silt layer	Soft
41.5-45				Not sampled	
45-46.5'	15,10,10	10"/18"	Greyish Brown	Small grey gravel and sand with silt, trace of clay, slower drilling at 49 feet	
46.5-50'				Not sampled, slower drilling at 49 feet	
50-51'	35,35	12"/12"	Grey and Brown	Gravel and sand with silt, limestone gravel caused high blow count	
55-56'	50,65	12"/12"	Grey and Black	Weathered shale bedrock	Bedrock at 55' with sand and gravel on top of bedrock in spoon

Note: 6" O.D. hollow stem auger, 2" diameter 24" long split spoons. Reamed hole to 31 feet with 8" I.D. auger prior to installing casing.

Project #004325 Client: HADCO Corporation Well No. 7 Date: May 28, 1985

Depth/Ft	Blows Per 6 Inches	Recovery	Color	Material Classification	Remarks
0-5'			Brown	Gravel, some sand and silt	Top 6" wet from recent rain
5-6.5'	21,11,12	14"/18"	Brown	Round pea-sized gravel, sand and silt	Dry
6.5-10'				Round pea-sized gravel, sand and silt	Material brought up
10-11.5'	14,11,8	12"/18"	Brown	Angular and round gravel with sand and silt; trace of clay	Dry
11.5-15'				Not sampled	
15-16.5'	7,7,9	12"/18"	Brown	Round gravel, silt, sand	6" thick layer of reddish-brown clay and gravel, wet in tip
16.5-20'				Not sampled	
20-21.5'	18,14,16	4"/18"	Brown	Angular gravel, sand, silt, trace of clay	Wet
21.5-25'				Not sampled	
25-26.5'	6,10,10	6"/18"	Brown	Coarse sand, some silt and clay, reddish brown clay, silt, and gravel in tip; gravel clogged tip of spoon; wet coarse sand, moist clay seam	
26.5-30'				Not sampled	
30-31.5'	5,7,10	12"/18"	Brown	Coarse sand and gravel, with silt and clay	
31.5-35'				Not sampled	
35-36.5'	12,9,7	6"/18"	Brown	Gravel, sand, clay and silt	
36.5-40'					
40-41.5'	13,40,70	12"/18"	Brown/Blue Grey	Gravel, sand, clay and silt; blue and grey silt only in middle of spoon	

Note: Drilled with 6" I/D. hollow stem auger, split spoon sampled at 5 foot intervals. Advanced boring to 40 feet. Then reamed hole with 8" hollow stem auger. Casing came up in auger when removing auger because of sand installed around screen. Therefore, no further sand placed around screen and the borehole was allowed to collapse around screen and riser.

Project #U04325 Client: HADCO Corporation Well No. 8 Date: May 30, 1985

Depth/Ft	Blows Per 6 Inches	Recovery	Color	Material Classification	Remarks
0-3'			Brown	Cobbles, gravel, silt, some sand, trace of clay: cornfield	Dry
3-5'			Brown	Silt, some clay	
5-6.5'	5,17,29	12"/18"	Brown & Grey	Clayey silt, no gravel	
6.5-10'				Not sampled	
10-11.5'	13,12,10	4"/18"	Greyish Brown	Gravel and silt, trace of clay	
15-16.5'	5,5,6	12"/18"	Brown	Upper 4" gravel and sand; lower 8" silt, some clay	Wet
16.5-20'				Not sampled	
20-21.5'	3,3,4	14"/18"	Brown	Silt, some clay (no gravel or sand)	Moist
21.5-25'				Not sampled	
25-26.5'	5,6,7	12"/18"	Brown	Silt; 1 piece grey gravel	Moist
26.5-30'				Not sampled	
30-31.5'	1,1,3	3"/18"	Brown	Silt; trace of very fine sand	Wet
31.5-35'				Not sampled	
35-36.5'	7,10,17	6"/18"	Brown	Silt; trace of fine sand; ~3 pieces of red shale gravel	Wet
36.5-40'				Not sampled	
40-41.5'	7,10,10	6"/18"	Brown	Silt, sand in tip	Wet
41.5-45'				Not sampled	
45-46.5'	20,35	12"/12"	Dark Grey/ Medium Grey	Upper 6" dark grey, medium sand; Lower 6" rounded gravel, stiff silt, rust and black staining (till); high blow count due to a piece of gravel stuck in tip of spoon	

Note: Withdrew auger to 30 feet - installed bentonite pellet plug at 35-33 feet (6 cans - 13 oounces each). Then withdrew to 15 feet to allow water table to stabilize to determine if well can be finished.

Drilling Method: 6" diameter hollow stem auger with split spoon samples taken at 5 foot intervals. The split spoon is driven by a 140 lb. weight falling 30 inches.

ATTACHMENT C

ANALYTICAL DATA

LANCY
LABORATORIES
Division, Lancy International, Inc.
525 W. New Castle St., P.O. Box 490
Zelienople, Pennsylvania 16063

ANALYSIS REPORT

Report Date 7/12/85

HADCO Corporation
Bodel Hill Road
Owego, New York 13827

Attention: Kenneth Ogle

Collected 6/27/85 by JK
Received 6/28/85 by LS
Analyzed 6/28 - 7/12/85 by Staff
No. of Samples 8
P.O. # H07915

Phase II Groundwater Investigation

Well #	1	2	3	4
Lab Reference #	13601	13602	13603	13604
Parameter	(mg/L)	(mg/L)	(mg/L)	(mg/L)
pH (SU)	6.7	7.3	6.0	7.4
Oil and Grease	-	-	-	<0.1
Organic Carbon, Total	20	9.9	3.6	5.2
Copper	0.40	1.40	0.06	0.22
Lead	0.10	0.25	<0.05	0.10
Nickel	0.55	0.25	0.20	0.50

Well #	5	6	7	8
Lab Reference #	13605	13606	13607	13608
Parameter	(mg/L)	(mg/L)	(mg/L)	(mg/L)
pH (SU)	7.0	7.2	7.1	7.1
Oil and Grease	-	<0.1	-	-
Organic Carbon, Total	5.0	51	3.3	6.3
Copper	0.24	3.1	0.28	0.72
Lead	0.15	0.15	0.10	0.20
Nickel	0.35	0.40	0.25	0.30

C. John Ritzert, Manager-Technical Services

ANALYSIS REPORT

LANCY LABORATORIES
Division, Lancy International, Inc.

Company: HADCO Corporation
Report Date: 7/12/85
Description: Volatile Organics
PO#/Chg.#: H07915

Well #	1	2	3	4
Lab Reference #	13601	13602	13603	13604
Parameter	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Benzene	<2	<2	<2	<2
Bromoform	<50	<50	<50	<50
Carbon tetrachloride	<50	<50	<50	<50
Chlorobenzene	<2	<2	<2	<2
Chlorodibromomethane	<50	<50	<50	<50
Chloroform	<10	<10	<10	<10
Dichlorobromomethane	<25	<25	<25	<25
1,1-Dichloroethane	115	47	<10	<10
1,2-Dichloroethane	<10	<10	<10	<10
1,1-Dichloroethylene	<25	<25	<25	<25
1,2-Dichloropropane	<10	<10	<10	<10
Ethylbenzene	<2	<2	<2	<2
Methylene chloride	<25	<25	<25	<25
Trans-1,3-Dichloropropylene	<25	<25	<25	<25
Tetrachloroethylene	<25	<25	<25	<25
Toluene	<2	<2	<2	<2
1,2-trans-Dichloroethylene	<10	350	<10	<10
1,1,1-Trichloroethane	39	76	<10	<10
1,1,2-Trichloroethane	<10	<10	<10	<10
Trichloroethylene	44	320	<10	66

C. John Ritzert, Manager-Technical Services

ANALYSIS REPORT

LANCY LABORATORIES
Division, Lancy International, Inc.

Company: HADCO Corporation
Report Date: 7/12/85
Description: Volatile Organics
PO#/Chg.#: H07915

Parameter	Well # 5 Lab Reference # 13605 (ug/L)	6 13606 (ug/L)	7 13607 (ug/L)	8 13608 (ug/L)
Benzene	<2	<2	<2	<2
Bromoform	<50	<50	<50	<50
Carbon tetrachloride	<50	<50	<50	<50
Chlorobenzene	<2	<2	<2	<2
Chlorodibromomethane	<50	<50	<50	<50
Chloroform	<10	<10	<10	<10
Dichlorobromomethane	<25	<25	<25	<25
1,1-Dichloroethane	<10	<10	<10	<10
1,2-Dichloroethane	<10	120	<10	<10
1,1-Dichloroethylene	<25	<25	<25	<25
1,2-Dichloropropane	<10	<10	<10	<10
Ethylbenzene	<2	<2	<2	<2
Methylene chloride	<25	92	<25	<25
Trans-1,3-Dichloropropylene	<25	<25	<25	<25
Tetrachloroethylene	<25	<25	<25	<25
Toluene	<2	<2	<2	<2
1,2-trans-Dichloroethylene	<10	390	<10	24
1,1,1-Trichloroethane	<10	70	<10	1.0
1,1,2-Trichloroethane	<10	<10	<10	<10
Trichloroethylene	<10	650	<10	31

C. John Ritzert, Manager-Technical Services

LANCY
LABORATORIES
Division, Lancy International, Inc.
525 W. New Castle St., P.O. Box 490
Zelienople, Pennsylvania 16063

ANALYSIS REPORT

HADCO Corporation
Bodle Hill Road
Owego, New York 13827

Attention: Kenneth Ogle

Report Date 2/6/85

Collected 1/24/85 by MM
Received 1/25/85 by LS
Analyzed 1/25 - 2/1/85 by Staff
No. of Samples 4
P.O. # H05397

Sample	Well #1	Well #2	Well #3	Well #4
Lab Reference #	10663	10664	10665	10666
	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Parameter				
pH (SU)	5.7	6.6	6.9	8.5
Specific Conductance (umhos/cm)	1550	600	300	770
Fluoride	0.7	0.6	<0.1	<0.1
Sulfate	140	58	26	24
Copper	0.07	0.29	0.14	0.07
Nickel	0.32	0.06	0.10	0.01
Lead	0.10	0.10	0.15	0.10
	(ug/L)	(ug/L)	(ug/L)	(ug/L)
1,1-Dichloroethylene	<10	18	<10	<10
1,1-Dichloroethane	79	46	<10	<10
Trans-1,2,-Dichloroethylene	<10	249	<10	<10
1,1,1-Trichloroethane	60	73	<10	<10
Trichloroethylene	43	335	<10	63

C. John Ritzert, Manager-Technical Services

(20)

ANALYSIS REPORT

LANCY LABORATORIES
Division, Lancy International, Inc.
525 W. New Castle St., P.O. Box 490
Zellenople, Pennsylvania 16063

Report Date 10/31/84

HADCO Corporation
Bodle Hill Road
Owego, New York 13827

Attention: Kenneth Ogle

Collected 10/8/84 by MM
Received 10/9/84 by LS
Analyzed 10/9 - 10/30/84 by Staff
No. of Samples 3
P.O. # H04203

Sample	Well #1	Well #2	Stream
Lab Reference #	09721	09722	09723
	(mg/L)	(mg/L)	(mg/L)
Parameter			
pH (SU)	7.6	6.8	7.4
Specific Conductance (umhos/cm)	880	520	230
Organic Carbon, Total	6.9	5.6	4.1
Fluoride	0.7	0.8	0.1
Sulfate	140	85	30
Cobalt	<0.1	<0.1	<0.1
Copper	0.21	0.11	0.01
Lead	0.15	<0.05	<0.05
Nickel	0.30	0.06	0.01
Tin	<0.1	<0.1	<0.1
	(ug/L)	(ug/L)	(ug/L)
1,1 Dichloroethane	<10	46	<10
trans 1,2 Dichloroethylene	<10	275	<10
1,1,1 Trichloroethane	25	70	<10
Trichloroethylene	46	310	<10

Lana L. Grow, Laboratory Supervisor for C. John Ritzert

C. John Ritzert, Manager-Analytical Services

REF. (21)

SUBSURFACE INVESTIGATION
HADCO CORPORATION
OWEGO, NEW YORK
AUGUST 1986

Prepared for:

Perry Walter
Hadco Corporation
Bodle Hill Road
Owego, NY 13827

Submitted by:

GROUNDWATER TECHNOLOGY INC.
1641 Central Avenue
Albany, NY 12205

Richard A. Hixon
Project Geologist

Cliff Harper
Managing Hydrogeologist

INTRODUCTION

The facility presently owned by Hadco in Owego, New York, has been in operation since the mid 60's as a manufacturing site for electronic components. The south side of the facility was at one time the "back door" of the facility, and a dirt-floored drum storage area was located there. It is likely that, over the past decade, chemicals may have been lost to the soil in this vicinity.

A monitoring well (MW-6), installed by Lancy Laboratories in May, 1985, is located at the south edge of the building. This well has shown the highest concentration levels of various chemicals in groundwater , including trichloroethylene (TCE), 1,2-Dichloroethane, and 1,2 trans-Dichlorethylene. Groundwater Technology Inc. completed two soil borings hydraulically downgradient from MW-6. Samples were collected at five foot intervals using a split-spoon sampler driven by a standard 140 lb. weight hammer, and analyzed by a portable gas-chromatograph (GC) instrument.

The purpose of the analysis was two-fold:

To determine the vertical distribution of volatile organic compounds (VOC's).

To determine the design specifications for a pumping well for contaminant removal.

PORTABLE GAS CHROMATOGRAPH

A portable gas chromatograph instrument manufactured by Photovac was used in the field and in the laboratory to analyze samples from various depths. The instrument is calibrated by injecting a volume of air containing concentrations of substances volatilized from standard solutions of known concentration. A measured weight of the sample is then mixed with a small volume of water to extract the chemicals of interest. A volume of air from the headspace in the sample vial is then injected into the machine. The peaks which are produced by the presence of compounds in the soil are compared to those produced by injection of the standard solution. The GC also reports the area under each peak which is mathematically analyzed to measure the chemical concentrations.

At times, different compounds are present that produce a peak at the same elapsed time in the sample run (called coelusion). It is not possible to distinguish these compounds using the portable instrument. At Hadco, some samples produced fourteen or more peaks that were superimposed or displaced slightly and could not be distinguished from each other. Because of the number of compounds present, it was decided to report the results as the total concentration of

ionizable compounds. Our on-site chemist noted the persistent occurrence of a peak corresponding to the retention time of TCE. This suggested that TCE was the most prevalent and highly concentrated organic compound present.

The analytical technique utilized in the field relies on the solubility of the chemicals in water, when water is used as the solvent. Water is a fairly effective solvent for the desorbtion of volatile organic compounds from the soil, with a range of extraction efficiency from 18 to 70%. The use of water as the extraction solvent does not produce a detection peak that would obscure the presence of compounds of interest, such as would occur if a solvent such as methanol was used for the extraction. An overall extraction efficiency factor of 50% is probable with water due to some loss of VOC's during the sampling process. This factor should be kept in mind when reviewing the reported VOC concentrations, which are not adjusted for extraction efficiency.

VERTICAL DISTRIBUTION OF ORGANIC COMPOUNDS

The first soil boring, SB-1, was completed by Groundwater Technology on July 7, 1986. The water table was encountered at approximately 12 feet in this boring. Low levels of VOC concentrations were found in the sample recovered from the 13 foot depth. The VOC concentration increased to a maximum in the 30 foot sample, and decreased with increasing depth thereafter. Low concentrations of VOC's were found in the 50 foot sample.

The second soil boring installed by Groundwater Technology was located proximate to the area suspected to contain the highest VOC concentration. The water table was encountered at approximately 10.5 feet in this boring. Low level VOC concentrations were found at the 10 foot sample depth, and increased to a maximum of 180 ppb (raw data) at the 20 to 30 foot interval. Levels decreased thereafter with increasing depth to 6 ppb at 50 feet.

In both borings, the highest level of contamination was found between 20 and 35 feet. This depth is well below the water table, indicating the denser-than-water nature of the contaminants. Presently, decreasing level of VOC concentration below this zone suggest that no significant contamination of the bedrock has occurred in this area.

PUMPING WELL INSTALLATION:

A four inch well was installed at the location of the second soil boring drilled by Groundwater Technology. The well was screened from 24 to 34 feet, using a Johnson Stainless Steel Screen. This depth was chosen as the optimum location to extract groundwater from the zone of highest VOC concentration, and to provide sufficient drawdown to establish a cone of depression during pumping activities. Setting the well deeper than the interval chosen would cause groundwater from the most contaminated zone to move vertically downward to the well screen. This would draw it down through a less contaminated soil zone and closer to the bedrock.

RECOMMENDED WORK STEPS:

A. WELL DEVELOPMENT

The nature of the vertical VOC distribution is indicated by the soil borings and GC data. The lateral distribution of VOC's must also be verified prior to the design and commencement of a treatment program.

Crucial to the delineation of the VOC plume is the ability of the monitor wells to reliably represent the groundwater in the surrounding formation. Following our review of Lancy Laboratory's data concerning construction of these wells, a program of redevelopment must occur to assure continuity of the wells with the strata. This would involve surging and pumping with air, water, or a mechanical device to remove silts and other fine particles from the well screen. Without this step, water samples taken from these wells will not reliably reflect the groundwater in the vicinity of the well. Without reliable water quality data to indicate the areal extent of the VOC plume, the ability to evaluate the treatment system may be hampered.

Following development of the new pumping well, PW-1, a pump test is recommended to verify aquifer characteristics. This will allow treatment system design and calculation of the zone of influence from this well. An alternative would be to design the system based on composite data from the Lancy report, and to allow for system modification.

B. WATER SAMPLING

An additional round of water sampling is necessary to indicate the current VOC concentrations in the groundwater. Analysis of these samples will define the areal extent and degree of groundwater treatment necessary. Sampling and analysis is recommended before meeting with DEC. This will offer a current and factual assessment of the groundwater situation in support of the proposed remediation plan.

C. HEALTH AND SAFETY PLAN

A plan describing protection measures for the safety of our personnel will be provided. Continuous monitoring of organic vapor levels in air around the work site will be performed, and protective apparel and breathing apparatus will be used appropriate to the levels encountered.

D. CONFERENCE WITH HADCO AND DEC

Following your review of these results and recommendations, we suggest a meeting between your engineering personnel and our project staff. The scope of the meeting would include your response and comments to our findings, and the content of a subsequent report to be presented to DEC. The proposed outline of the report would include:

- Lithology of the site, from review of our soil boring data.
- Vertical limit of VOC contamination.
- Vertical profile of VOC concentrations in soil.

- Dissolved gradient map/areal extent.
- Aquifer characteristics in the area of the pumping well.
- Predicted aquifer response to pumping, and calculation of radius of influence of pumping well.
- Comprehensive design of groundwater treatment system.
- Treatment levels provided by the system.

GROUNDWATER TECHNOLOGY

Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number SB-1

Project HADCO Owner

Location Owego, NY Project Number 11-8022

Date Drilled 7/7/86 Total Depth of Hole 51' Diameter 6¼"

Surface Elevation Water Level, Initial 24-hrs.

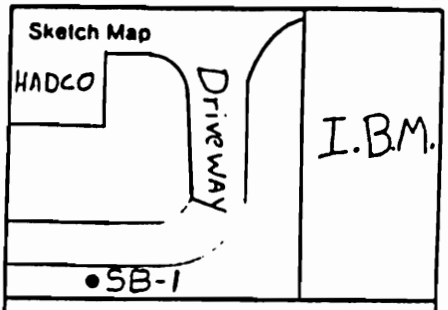
Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company GT Drilling Drilling Method Hollow-stem auger

Driller R.A. Hixon/S. Meier Log by R.A. Hixon

Sketch Map



Notes

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0					Brown, dry, coarse GRAVEL; some SILT.
2					
4			9/8/1[illegible]		Brown, dry, coarse GRAVEL; some fine gravel; some SILT.
6			7/11/	16	Brown, dry, medium GRAVEL, some SILT.
8					
10			38/40	/34	Coarse, dry, GRAVEL (too coarse to sample) little SILT.
12					▼ Water table at 12 feet
14					
16			18/19	/18	Medium coarse to fine, wet GRAVEL; some SILT. 10% retention.
18					
20			3/11/	18	Medium to fine GRAVEL and SILT; some coarse sand.
22					
24					
26			6/18	/19	Wet, fine GRAVEL; some silt; some clay. Brown clay layer 3 inches thick.
28					
30			6/11	/13	Gray, wet, fine GRAVEL; some clay and silt (brown); some silt (gray).
32					
34					
36			13/14	/13	Gray, wet, fine GRAVEL and coarse SAND; some gray silt; some brown silt.
38					
40			29/39	/59	Gray medium to fine GRAVEL; some silt.
42					
44					
46			18/14	/19	Gray, wet, medium to fine GRAVEL; some silt (brown); little clay.
48					
50			13/19	/18	Coarse SAND, bottom half gravel and clay.

GROUNDWATER TECHNOLCY LABORATORY

ANALYTICAL & CONSULTING SERVICES
Division Oil Recovery Systems, Inc.
Lisbon St., Greenville, NH 03048
Tel: (603) 878-2500

PROJECT HADCO SB-1
JOB # 11-8022
DATE 7/86
PAGE

METHOD HEADSPACE
ANALYST MIKE MONROE

FIELD DATA SHEET: SB-1

Sample no./ID	Matrix	Inj. Vol.		Dilution						TOTAL CONCEN. ORGANIC CMPD. PRESENT (PPB.)
01/ SB 1 3.0'	SOIL			10 ml.						< 2.0
02/ SB1 5.0'	SOIL			10 ml.						< 2.0
03/ SB1 13.0'	SOIL			10 ml.						3.5
04/ SB1 15.0'	SOIL			10 ml.						3.9
05/ SB1 20.0'	SOIL			10 ml.						4.3
06/ SB1 25.0'	SOIL			10ml.						7.3
07/ SB1 30.0'	SOIL			10 ml.						93
08/ SB1 35.0'	SOIL			10ml.						11.2
09/ SB1 40.0'	SOIL			10ml.						5.4
10/ SB1 45.0'	SOIL			10ml.						5.0
11/ SB1 50.0'	SOIL			10ml.						4.1

GROUNDWATER TECHNOLOGY

Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number PW-1

Project HADCO Owner

Location Owego Project Number 11-8022

Date Drilled 7/15/86 Total Depth of Hole 50' Diameter 6.5"

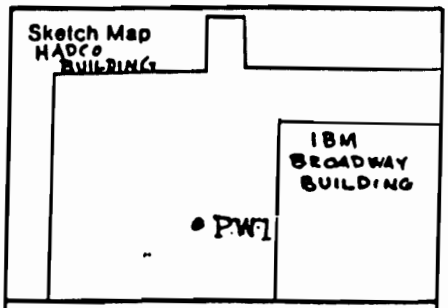
Surface Elevation Water Level, Initial 10.5' 24-hrs.

Screen: Dia. 4" Length 10' Slot Size .020

Casing: Dia. 4" Length 27' Type Carbon Steel

Drilling Company GT Drilling Drilling Method Hollow Stem Auger

Driller Maier/Hixon Log by Hixon



Notes

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0	Native Fill; Bentonite	Blow Counts			Coarse gravel and silt
		17/8/13			Coarse gravel (outwash), little silt pea gravel (1/4" size), little silt change at 9'
10	Native Fill	12/6/8			Medium to coarse gravel and silt Water table at 10 feet
	4" Carbon Steel Riser Pipe	18/19/18			Wet, medium to coarse gravel and silt
20		6/6/4			Grey, wet sand and silt (some gravel encountered at 23.5')
	Gravel Pack	12/14/18			Medium gravel and silt
30	4" Johnson Stainless Screen .020 slot	19/19/35			Medium gravel and silt (layer of medium gravel about 4" thick with very little silt; rest of sample 50% gravel, 50% silt)
		12/7/8			Wet medium gravel and silt
40	6" O.D. Hole (caved)	12/13/14			Wet brown and grey silt and gravel
		19/22/25			Wet medium gravel and silt some coarse gravel encountered at 27'
50		6/19/19			Wet, medium gravel and silt

PROJECT HADCO PW-1
JOB # 11-8022
DATE 7/86
PAGE

GROUNDWATER TECHNOLOGY LABORATORY

ANALYTICAL & CONSULTING SERVICES
Division of Oil Recovery Systems, Inc.
Mill St., Greenville, NH 03048
Tel: (603) 878-2500

METHOD HEADSPACE
ANALYST MIKE MONROE

FIELD DATA SHEET: PW-1

Sample no./ID	Matrix	Inj. Vol.	Wt. (gms.)	Dilution						TOTAL CONC. ORGANIC CMPDS. PRESENT (PPB.)
STD.		50 µl.								
BLANK										
01/ PW1 5.0'	SOIL	200 µl	12.0	10 ml.						< 1.0
02/ PW1 10.0'	SOIL	250 µl	21.0	10 ml.						30
03/ PW1 15.0'	SOIL	50 µl	21.0	10 ml.						61
04/ PW1 20.0'	SOIL	50 µl	19.0	10 ml.						170
05/ PW1 25.0'	SOIL	25 µl	24.0	10 ml.						45
06/ PW1 30.0'	SOIL	50 µl	22.0	10 ml.						162
07/ PW1 35.0'	SOIL	50 µl	41.0	10 ml.						44
08/ PW1 40.0'	SOIL	50 µl	15.0	10 ml.						29
08/ PW1 40.0'	SOIL	100 µl	15.0	10 ml						31
09/ PW1 45.0'	SOIL	50 µl	25.0	10 ml.						29
10/ PW1 50.0'	SOIL	50 µl	35.0	10 ml.						6

REF. (22)

STATE OF NEW YORK DEPARTMENT OF HEALTH

CORNING TOWER • THE GOVERNOR NELSON A. ROCKEFELLER EMPIRE STATE PLAZA • ALBANY, N.Y. 12237

DAVID AXELROD, M.D.
Commissioner

February 23, 1987

Mr. Mario Nirchi
NYS Department of Environmental Conservation
Region 7 Sub-office
Route 11, R.D. #1
Kirkwood, New York 13795

Dear Mr. Nirchi:

Enclosed please find analytical results from several well samples in the vicinity of the IBM-Hadco sites in Owego. These private wells are approximately one half of a mile from the contaminant plumes (to the Southeast and Southwest near the Susquehanna River), and, from the results, are apparently not impacted by groundwater contamination at present. Hopefully IBM's purge wells have contained their solvent plume.

I thought you would appreciate these. If you have any questions, feel free to contact me at (518) 473-8427.

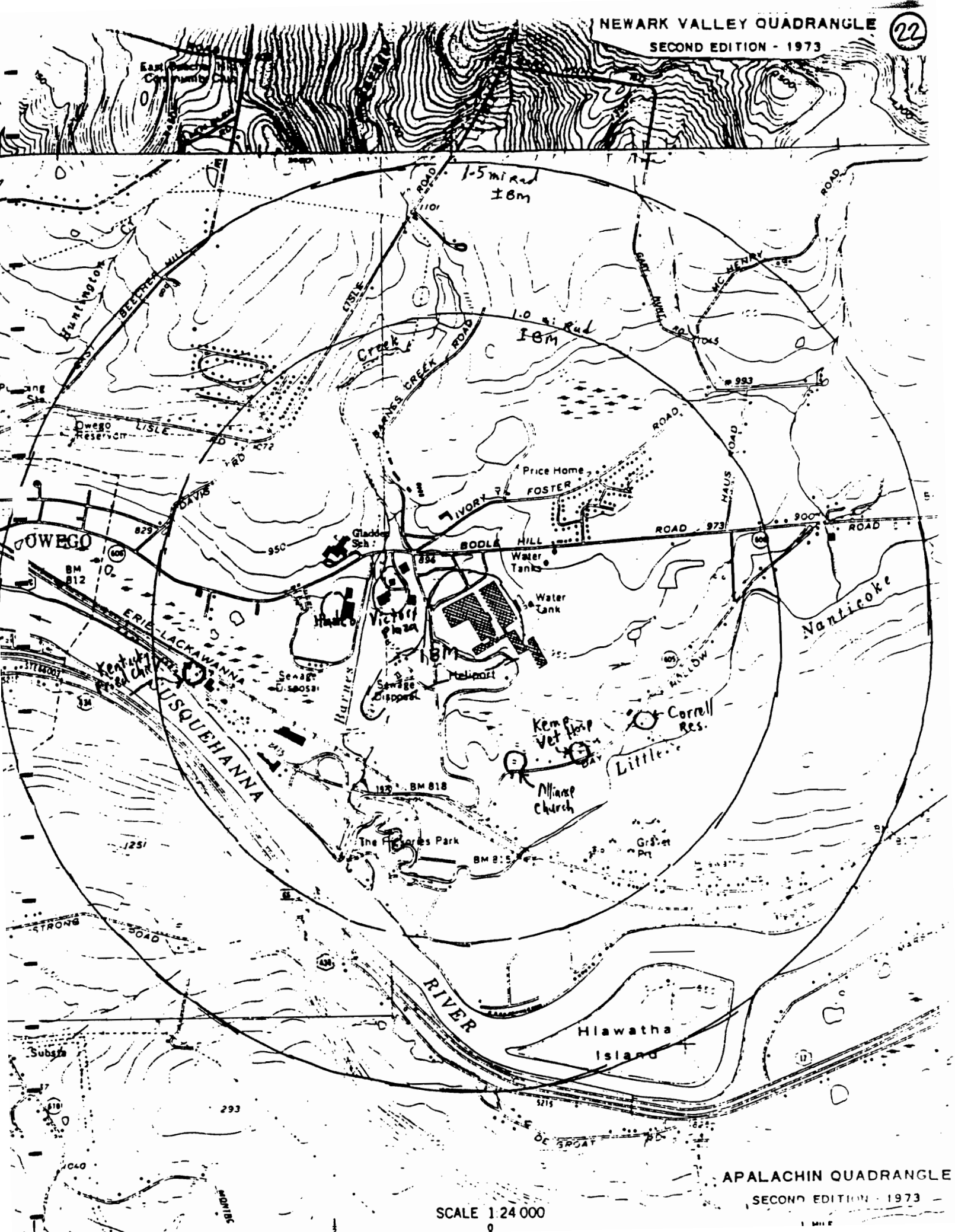
Sincerely,

William Gilday

William M. Gilday
Public Health Sanitarian
Bureau of Toxic Substance Assessment

cc: Mr. Tramontano/Mr. Bates
Mr. Heerkens
Mr. Rice, Tioga Co. H.D.

3/3/87
Copy to Frank Trent
Mike


NEWARK VALLEY QUADRANGLE
SECOND EDITION - 1973
22
1.5 mi Rad
IBM
1.0 mi Rad
IBM
Huntington
BEECHER HILL
LISLE
Creek
BARNES CREEK ROAD
MC HENRY
ROAD
Owego Reservoir
LISLE RD
DAVIS
Price Home
IVORY
FOSTER
ROAD
HAUS ROAD
OWEGO
BM 812
Gladden Sch
BODLE HILL
ROAD
973
900
Water Tanks
Water Tank
Victory Plaza
IBM
Heliport
Sewage Disposal
Barnes
ERIE-LACKAWANNA
Kentucky Fried Chk
SUSQUEHANNA
Nanticoke
HOLLOW
Kemp Vet Hosp
Correll Res.
Little
Alliance Church
BM 818
The Fisheries Park
BM 815
Gravel Pit
STRONG ROAD
RIVER
Hiawatha Island
Substa
DE GROAT RD
APALACHIN QUADRANGLE
SECOND EDITION - 1973
SCALE 1:24 000

SAMPLE ID: 870280 SAMPLE RECEIVED:87/01/22/ CHARGE: 14.00
PROGRAM: 106:BUREAU OF TOXIC SUBSTANCES ASSESSMENT
SOURCE ID: DRAINAGE BASIN:06 GAZETTEER CODE:5355
POLITICAL SUBDIVISION:OWEGO COUNTY:TIOGA
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: KENTUCKY FRIED CHICKEN RT 17C OWEGO NY
DESCRIPTION:AT PRESSURE TANK
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL2:PURGEABLE HALOCARBONS AND AROMATIC PURGEABLES
SAMPLE TYPE: 160:PRIVATE WATER SUPPLY - MISCELLANEOUS
TIME OF SAMPLING: 87/01/20 13:30 DATE PRINTED:87/02/03

ANALYSIS: 601 PURGEABLE HALOCARBONS, FR METHOD 601 (DES 310-18)
DATE REPORTED: 87/01/30 REPORT MAILED OUT

	PARAMETER	RESULT
T62009	CHLOROMETHANE	< 1. MCG/L
T61809	BROMOMETHANE	< 1. MCG/L
T41009	VINYL CHLORIDE	< 1. MCG/L
T70209	DICHLORODIFLUOROMETHANE	< 1. MCG/L
T61909	CHLOROETHANE	< 1. MCG/L
T61709	TRICHLOROFLUOROMETHANE	< 1. MCG/L
T23809	METHYLENE CHLORIDE (DICHLOROMETHANE)	< 1. MCG/L
T50909	1,1-DICHLOROETHENE	< 1. MCG/L
T51909	1,1-DICHLOROETHANE	< 1. MCG/L
T61209	TRANS-1,2-DICHLOROETHENE	< 1. MCG/L
T39009	CHLOROFORM	< 1. MCG/L
T50809	1,2-DICHLOROETHANE	< 1. MCG/L
T23609	1,1,1-TRICHLOROETHANE	< 1. MCG/L
T36609	CARBON TETRACHLORIDE	< 1. MCG/L
T38909	BROMODICHLOROMETHANE	< 1. MCG/L
T61309	1,2-DICHLOROPROPANE	< 1. MCG/L
T61509	TRANS-1,3-DICHLOROPROPENE	< 1. MCG/L
T41109	TRICHLOROETHENE	< 1. MCG/L
T44909	DIBROMOCHLOROMETHANE	< 1. MCG/L
T61409	CIS-1,3-DICHLOROPROPENE	< 1. MCG/L
T51709	1,1,2-TRICHLOROETHANE	< 1. MCG/L
T61109	2-CHLOROETHYLVINYL ETHER	< 1. MCG/L
T42109	BROMOFORM	< 1. MCG/L
T51809	1,1,2,2-TETRACHLOROETHANE	< 1. MCG/L
T41209	TETRACHLOROETHENE	< 1. MCG/L
T40909	CHLOROBENZENE	< 1. MCG/L
T49709	1,3-DICHLOROBENZENE	< 1. MCG/L
T44109	1,2-DICHLOROBENZENE	< 1. MCG/L
T44209	1,4-DICHLOROBENZENE	< 1. MCG/L

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RON TRAMONTANO
BUREAU OF TOXIC SUBSTANCES ASSESSMENT
NY STATE DEP'T OF HEALTH SUBMITTED BY:RICE
TOWER BUILDING ROOM 359
ALBANY NY 12201

SAMPLE ID: 870280 SAMPLE RECEIVED:87/01/27/ CHARGE: 14.00
POLITICAL SUBDIVISION:OWEGO COUNTY:TIOGA
LOCATION: KENTUCKY FRIED CHICKEN RT 17C OWEGO NY
TIME OF SAMPLING: 87/01/20 13:30 DATE PRINTED:87/02/03

ANALYSIS: 5031P AROMATIC PURGEABLES-EPA METHOD 503.1 (DES 310-22)

	PARAMETER	RESULT
T34409	BENZENE	< 1. MCG/L
T39209	TOLUENE	< 1. MCG/L
T51009	ETHYLBENZENE	< 1. MCG/L
T85209	1-CHLOROCYCLOHEXENE-1	< 1. MCG/L
T70409	PARA-XYLENE	< 1. MCG/L
T70309	META-XYLENE	< 1. MCG/L
T51409	ORTHO-XYLENE	< 1. MCG/L
T85309	CUMENE	< 1. MCG/L
T85409	STYRENE	< 1. MCG/L
T85509	P-BROMOFLUOROBENZENE	< 1. MCG/L
T51109	N-PROPYLBENZENE	< 1. MCG/L
T85609	TERT-BUTYLBENZENE	< 1. MCG/L
T85709	O/P-CHLOROTOLUENE	< 1. MCG/L
T51209	BROMOBENZENE	< 1. MCG/L
T50509	META-CHLOROTOLUENE	< 1. MCG/L
T85809	1,3,5-TRIMETHYLBENZENE	< 1. MCG/L
T85909	1,2,4-TRIMETHYLBENZENE	< 1. MCG/L
T86009	P-CYMENE	< 1. MCG/L
T86109	CYCLOPROPYLBENZENE	< 1. MCG/L
T86209	SEC-BUTYLBENZENE	< 1. MCG/L
T86309	N-BUTYLBENZENE	< 1. MCG/L
T86409	2,3-BENZOFURAN	< 1. MCG/L
T52509	HEXACHLOROBUTADIENE (C-46)	< 5. MCG/L
T44009	1,2,4-TRICHLOROBENZENE	< 5. MCG/L
T65609	NAPHTHALENE	< 5. MCG/L
T43909	1,2,3-TRICHLOROBENZENE	< 5. MCG/L

**** END OF REPORT ****

STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 870281 SAMPLE RECEIVED:87/01/22/ CHARGE: 14.00
PROGRAM: 106:BUREAU OF TOXIC SUBSTANCES ASSESSMENT
SOURCE ID: DRAINAGE BASIN:06 GAZETTEER CODE:5355
POLITICAL SUBDIVISION:OWEGO COUNTY:TIOGA
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: BURT CORBELL RD #1 BOX 156 OWEGO NY
DESCRIPTION:KCWT
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL2:PURGEABLE HALOCARBONS AND AROMATIC PURGEABLES
SAMPLE TYPE: 160:PRIVATE WATER SUPPLY - MISCELLANEOUS
TIME OF SAMPLING: 87/01/20 15:00 DATE PRINTED:87/02/03

ANALYSIS: 601 PURGEABLE HALOCARBONS, FR METHOD 601 (DES 310-18)
DATE REPORTED: 87/01/30 REPORT MAILED OUT

	PARAMETER	RESULT
T62009	CHLOROMETHANE	< 1. MCG/L
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T51709	1,1,2-TRICHLOROETHANE	< 1. MCG/L
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T44109	1,2-DICHLOROBENZENE	< 1. MCG/L
T44209	1,4-DICHLOROBENZENE	< 1. MCG/L

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

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BUREAU OF TOXIC SUBSTANCES ASSESSMENT
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ALBANY NY 12201

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T70309	META-XYLENE	< 1. MCG/L
T51409	ORTHO-XYLENE	< 1. MCG/L
T85309	CUMENE	< 1. MCG/L
T85409	STYRENE	< 1. MCG/L
T85509	P-BROMOFLUOROBENZENE	< 1. MCG/L
T51109	N-PROPYLBENZENE	< 1. MCG/L
T85609	TERT-BUTYLBENZENE	< 1. MCG/L
T85709	O/P-CHLOROTOLUENE	< 1. MCG/L
T51209	BROMOBENZENE	< 1. MCG/L
T50509	META-CHLOROTOLUENE	< 1. MCG/L
T85809	1,3,5-TRIMETHYLBENZENE	< 1. MCG/L
T85909	1,2,4-TRIMETHYLBENZENE	< 1. MCG/L
T86009	P-CYMENE	< 1. MCG/L
T86109	CYCLOPROPYLBENZENE	< 1. MCG/L
T86209	SEC-BUTYLBENZENE	< 1. MCG/L
T86309	N-BUTYLBENZENE	< 1. MCG/L
T86409	2,3-BENZOFURAN	< 1. MCG/L
T52509	HEXACHLOROBUTADIENE (C-46)	< 5. MCG/L
T44009	1,2,4-TRICHLOROBENZENE	< 5. MCG/L
T65609	NAPHTHALENE	< 5. MCG/L
T43909	1,2,3-TRICHLOROBENZENE	< 5. MCG/L

**** END OF REPORT ****

WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

(22)

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 870283 SAMPLE RECEIVED:87/01/22/ CHARGE: 14.00
PROGRAM: 106:BUREAU OF TOXIC SUBSTANCES ASSESSMENT
SOURCE ID: DRAINAGE BASIN:06 GAZETTEER CODE:5355
POLITICAL SUBDIVISION:OWEGO COUNTY:TIOGA
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: CHRISTIAN AND MISSIONARY ALLIANCE CHURCH DAY H.
DESCRIPTION:RECTORY KCWT
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL2:PURGEABLE HALOCARBONS AND AROMATIC PURGEABLES
SAMPLE TYPE: 160:PRIVATE WATER SUPPLY -MISCELLANEOUS
TIME OF SAMPLING: 87/01/20 15:00 DATE PRINTED:87/02/03

ANALYSIS: 601 PURGEABLE HALOCARBONS, FR METHOD 601 (DES 310-18)
DATE REPORTED: 87/01/30 REPORT MAILED OUT

	PARAMETER	RESULT
T62009	CHLOROMETHANE	< 1. MCG/L
T61809	BROMOMETHANE	< 1. MCG/L
T41009	VINYL CHLORIDE	< 1. MCG/L
T70209	DICHLORODIFLUOROMETHANE	< 1. MCG/L
T61909	CHLOROETHANE	< 1. MCG/L
T61709	TRICHLOROFLUOROMETHANE	< 1. MCG/L
T23809	METHYLENE CHLORIDE (DICHLOROMETHANE)	< 1. MCG/L
T50909	1,1-DICHLOROETHENE	< 1. MCG/L
T51909	1,1-DICHLOROETHANE	< 1. MCG/L
T61209	TRANS-1,2-DICHLOROETHENE	< 1. MCG/L
T39009	CHLOROFORM	< 1. MCG/L
T50809	1,2-DICHLOROETHANE	< 1. MCG/L
T23609	1,1,1-TRICHLOROETHANE	< 1. MCG/L
T36609	CARBON TETRACHLORIDE	< 1. MCG/L
T38909	BROMODICHLOROMETHANE	< 1. MCG/L
T61309	1,2-DICHLOROPROPANE	< 1. MCG/L
T61509	TRANS-1,3-DICHLOROPROPENE	< 1. MCG/L
T41109	TRICHLOROETHENE	< 1. MCG/L
T44909	DIBROMOCHLOROMETHANE	< 1. MCG/L
T61409	CIS-1,3-DICHLOROPROPENE	< 1. MCG/L
T51709	1,1,2-TRICHLOROETHANE	< 1. MCG/L
T61109	2-CHLOROETHYLVINYL ETHER	< 1. MCG/L
T42109	BROMOFORM	< 1. MCG/L
T51809	1,1,2,2-TETRACHLOROETHANE	< 1. MCG/L
T41209	TETRACHLOROETHENE	< 1. MCG/L
T40909	CHLOROBENZENE	< 1. MCG/L
T49709	1,3-DICHLOROBENZENE	< 1. MCG/L
T44109	1,2-DICHLOROBENZENE	< 1. MCG/L
T44209	1,4-DICHLOROBENZENE	< 1. MCG/L

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

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

RON TRAMONTANO
BUREAU OF TOXIC SUBSTANCES ASSESSMENT
N.Y STATE DEP'T OF HEALTH SUBMITTED BY:RICE
TOWER BUILDING ROOM 359
ALBANY NY 12201

RESULTS OF EXAMINATION

FINAL REPORT

AMPLE ID: 870283 SAMPLE RECEIVED:87/01/22/ CHARGE: 14.00
POLITICAL SUBDIVISION:OWEGO COUNTY:TIOGA
OCATION: CHRISTIAN AND MISSIONARY ALLIANCE CHURCH DAY H.
IME OF SAMPLING: 87/01/20 15:00 DATE PRINTED:87/02/03

ANALYSIS: 5031P AROMATIC PURGEABLES-EPA METHOD 503.1 (DES 310-22)

	PARAMETER	RESULT
T34409	BENZENE	< 1. MCG/L
T39209	TOLUENE	< 1. MCG/L
T51009	ETHYLBENZENE	< 1. MCG/L
T85209	1-CHLOROCYCLOHEXENE-1	< 1. MCG/L
T70409	PARA-XYLENE	< 1. MCG/L
T70309	META-XYLENE	< 1. MCG/L
T51409	ORTHO-XYLENE	< 1. MCG/L
T85309	CUMENE	< 1. MCG/L
T85409	STYRENE	< 1. MCG/L
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T51109	N-PROPYLBENZENE	< 1. MCG/L
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T85709	O/P-CHLOROTOLUENE	< 1. MCG/L
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T86209	SEC-BUTYLBENZENE	< 1. MCG/L
T86309	N-BUTYLBENZENE	< 1. MCG/L
T86409	2,3-BENZOFURAN	< 1. MCG/L
T52509	HEXACHLOROBUTADIENE (C-46)	< 5. MCG/L
T44009	1,2,4-TRICHLOROBENZENE	< 5. MCG/L
T65609	NAPHTHALENE	< 5. MCG/L
T43909	1,2,3-TRICHLOROBENZENE	< 5. MCG/L

**** END OF REPORT ****

WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

(22)

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 870282 SAMPLE RECEIVED:87/01/22/ CHARGE: 14.00
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SOURCE ID: DRAINAGE BASIN:06 GAZETTEER CODE:5355
POLITICAL SUBDIVISION:OWEGO COUNTY:TIOGA
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: DR EUGENE KEMP VETERNARY SERVICE DAY HOLLOW RD OWEGO
DESCRIPTION:KCWT
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL2:PURGEABLE HALOCARBONS AND AROMATIC PURGEABLES
SAMPLE TYPE: 160:PRIVATE WATER SUPPLY - MISCELLANEOUS
TIME OF SAMPLING: 87/01/20 14:30 DATE PRINTED:87/02/03

ANALYSIS: 601 PURGEABLE HALOCARBONS, FR METHOD 601 (DES 310-18)
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	PARAMETER	RESULT
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T61809	BROMOMETHANE	< 1. MCG/L
T41009	VINYL CHLORIDE	< 1. MCG/L
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T61909	CHLOROETHANE	< 1. MCG/L
T61709	TRICHLOROFLUOROMETHANE	< 1. MCG/L
T23809	METHYLENE CHLORIDE (DICHLOROMETHANE)	< 1. MCG/L
T50909	1,1-DICHLOROETHENE	< 1. MCG/L
T51909	1,1-DICHLOROETHANE	< 1. MCG/L
T61209	TRANS-1,2-DICHLOROETHENE	< 1. MCG/L
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T61409	CIS-1,3-DICHLOROPROPENE	< 1. MCG/L
T51709	1,1,2-TRICHLOROETHANE	< 1. MCG/L
T61109	2-CHLOROETHYLVINYL ETHER	< 1. MCG/L
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T41209	TETRACHLOROETHENE	< 1. MCG/L
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T49709	1,3-DICHLOROBENZENE	< 1. MCG/L
T44109	1,2-DICHLOROBENZENE	< 1. MCG/L
T44209	1,4-DICHLOROBENZENE	< 1. MCG/L

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

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

RON TRAMONTANO
BUREAU OF TOXIC SUBSTANCES ASSESSMENT
NY STATE DEP'T OF HEALTH SUBMITTED BY:RICE
TOWER BUILDING ROOM 359
ALBANY NY 12201

SAMPLE ID: 870282 SAMPLE RECEIVED:87/01/22/ CHARGE: 14.00
POLITICAL SUBDIVISION:OWEGO COUNTY:TIOGA
LOCATION: DR EUGENE KEMP VETERNARY SERVICE DAY HOLLOW RD OWEGO
TIME OF SAMPLING: 87/01/20 14:30 DATE PRINTED:87/02/03

ANALYSIS: 5031P AROMATIC PURGEABLES-EPA METHOD 503.1 (DES 310-22)

	PARAMETER	RESULT
T34409	BENZENE	< 1. MCG/L
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T70309	META-XYLENE	< 1. MCG/L
T51409	ORTHO-XYLENE	< 1. MCG/L
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T51109	N-PROPYLBENZENE	< 1. MCG/L
T85609	TERT-BUTYLBENZENE	< 1. MCG/L
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T86409	2,3-BENZOFURAN	< 1. MCG/L
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T44009	1,2,4-TRICHLOROBENZENE	< 5. MCG/L
T65609	NAPHTHALENE	< 5. MCG/L
T43909	1,2,3-TRICHLOROBENZENE	< 5. MCG/L

**** END OF REPORT ****

REF. (23)

TIOGA COUNTY
ENVIRONMENTAL HEALTH SERVICES
231 Main Street, Owego, NY 13827
Telephone 607-687-4535

November 12, 1985

Mr. Mario Nurchi
New York State
Department of Environmental Conservation
Route 11
Kirkwood, New York 13795

Subject: Phase II Hydrogeologic Investigation Hadco Corporation, dated July 1985

Dear Mike:

I have reviewed the above-mentioned document and have the following comments at this time:

1. I believe that the extent of contamination should be better defined around well #8;

2. the direction of groundwater flow was stated as southwesterly. (see attached map of area) Southwest of the Hadco facility at/or around 2500 feet there are 15 private residential wells, 11 commercial wells and 1 non-community public water supply;

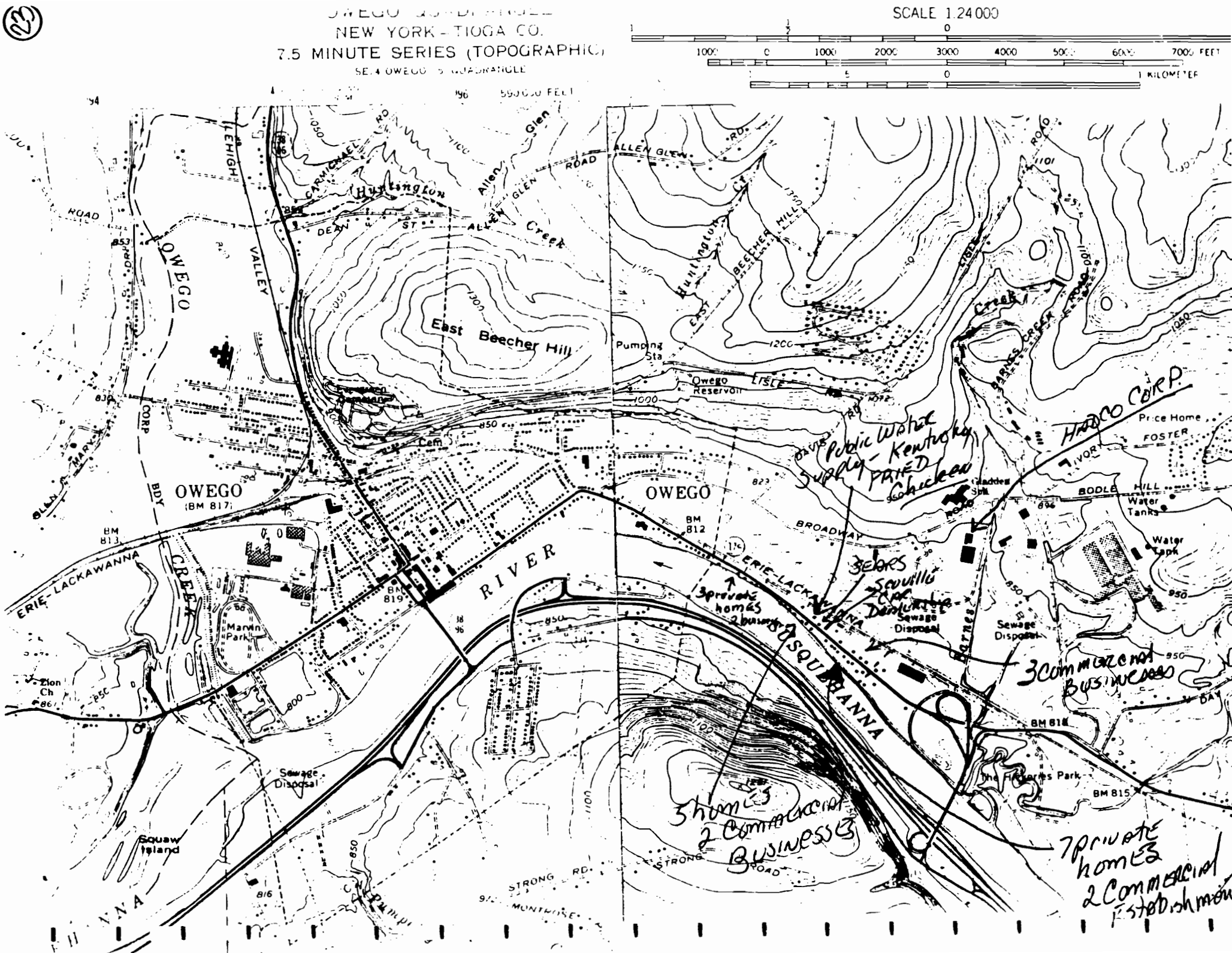
3. the organic chemicals found in some test wells are not stored on-site by Hadco, according to my records. (since March of 1983 when we first began to regulate the Hadco Corporation)

If you have any questions, please call me. Also, please update me on any new developments in this situation.

Sincerely,

Gary E. Rice, R.S.
Director Environmental Health Service

GER/jm



NEW YORK - TIOGA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SCALE 1:24 000
7000 FEET
1 KILOMETER
OWEGO
(BM 817)
OWEGO
East Beecher Hill
Pumping Sta
Owego Reservoir
Huntington Creek
Allen Glen
ALLEN GLEN ROAD
CARMICHAEL RD
DEAN ST
LEHIGH VALLEY
ERIE-LACKAWANNA
RIVER
SUSQUEHANNA
BROADWAY
Marvin Park
Sewage Disposal
Squaw Island
Zion Ch
STRONG RD
MONTROSE
BM 813
BM 819
BM 812
BM 818
BM 815
Price Home
FOSTER
BODLE HILL
Water Tanks
Water Tank
The Hickories Park
Public Water Supply - Kentucky FRIED Chicken
3 private homes 2 business
3 Commercial Businesses
5 homes 2 Commercial Businesses
7 private homes 2 Commercial Establishments

REF. (24)

URS

AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATI

URS CORPORATION
570 DELAWARE AVENUE
BUFFALO, NEW YORK 14202-1207
716/856-5525

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SAN MATEO
SEATTLE
WASHINGTON, D C

RECEIVED
URS COMPANY
OCT 09 1987

September 28, 1987

Mr. Barry Wilkins
Town of Owego Utilities
Apalachin, New York 13732

JOB # _____

Dear Mr. Wilkins:

As I mentioned during a telephone conversation on September 24, 1987, URS Company, Inc. is currently conducting a Phase I investigation of the Victory Plaza Site in the Town of Owego.

We are performing this investigation for the New York State Department of Environmental Conservation pursuant to the requirements of the New York State Superfund Law (Chapter 857 of the Laws of 1982.)

This is to confirm the telephone conversation wherein you provided the following information regarding water supply for the Town of Owego:

- The Town of Owego has its own community water system. Its sources are seven (7) wells which lie outside of a three mile radius of the site.
- Owego Water Works supplies water to a portion of the Town of Owego near the site.
- Outside of the areas served by these water systems, the residences rely on private wells.

We would appreciate if you would review this information, note any necessary corrections and return a signed and dated copy to indicate your concurrence.

In addition, would you send a map showing any Town water districts within 3 miles of the site. This will help us to determine the number of units within 3 miles of the site in the Town of Owego which are not served by a public supply.

Your assistance would be appreciated as the information is necessary to complete our evaluation of the site.

Sincerely,

Muffett A. Mauche

Muffett A. Mauche, Staff Engineer, Le Roy Callender PC
for Linda J. Clark, Project Geologist, URS Company, Inc.

I agree with the information as it is presented.

Barry Wilkins _____ 10/8/87
Barry Wilkins Date

MAM/mb
35154L3

REF. (25)

U. S. DEPARTMENT OF COMMERCE
WEATHER BUREAU

CLIMATOGRAPHY OF THE UNITED STATES NO. 60 – 30

CLIMATES OF THE STATES

NEW YORK

WASHINGTON, D. C.

FEBRUARY 1960

Climate of New York

Ernest C. Johnson, Weather Bureau State Climatologist

The climate of New York State is broadly representative of the moist continental type area which blankets the northeastern United States, but its diversity is not usually encountered within such a small area. Differences in latitude, character of topography, and bodies of water have pronounced effects on the climate of local areas. The geographical position of the State and the usual course of air masses governed by the atmospheric circulation of the region provide the general climatic controls.

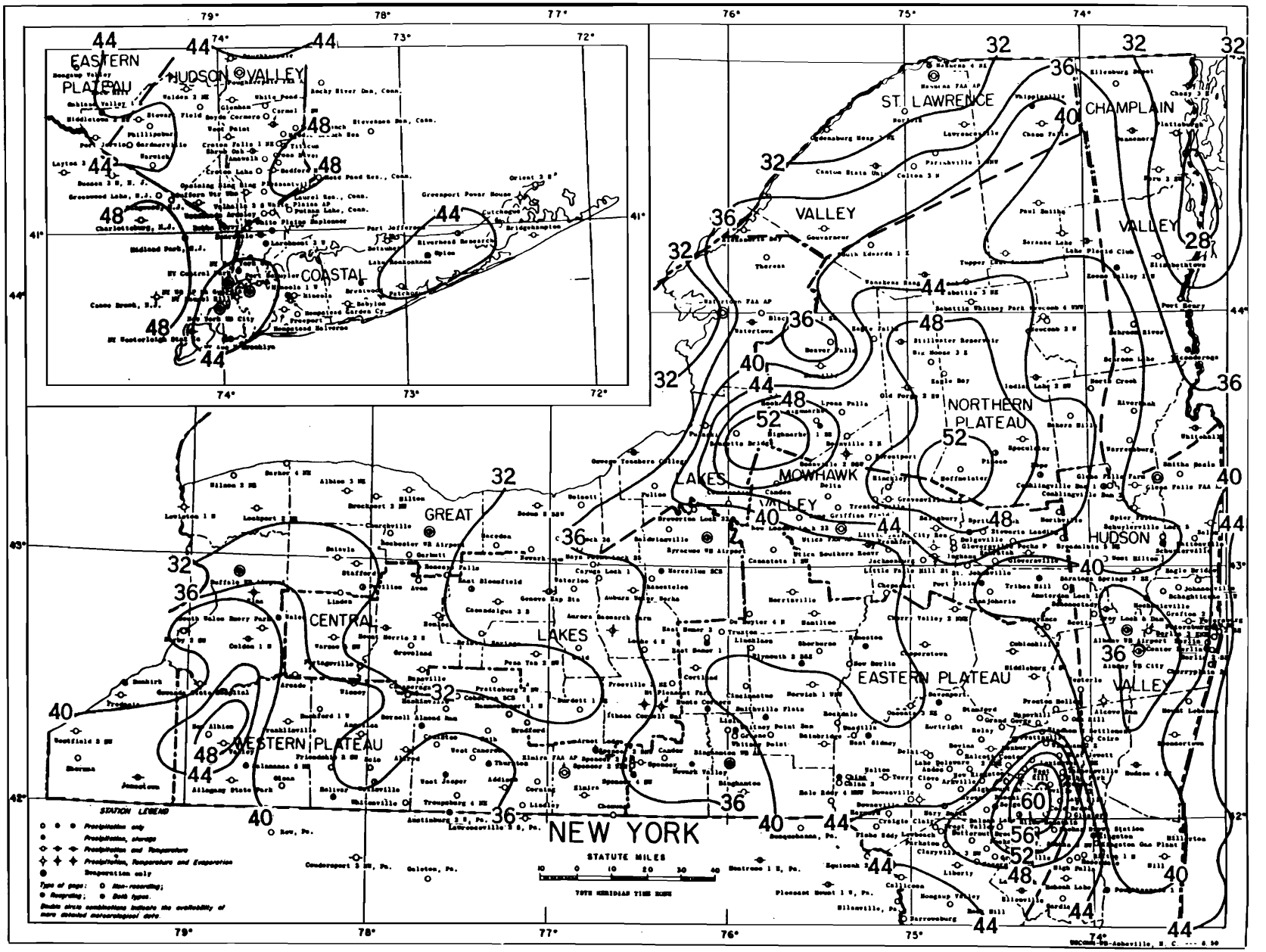
New York State contains 49,576 square miles exclusive of the boundary water areas of Long Island Sound, New York Harbor, Lake Ontario, and Lake Erie. The major portion of its area lies approximately between latitudes 42°N. and 45°N.; longitudes 73°30'W. and 79°45'W. However, in the extreme southeast a triangular portion extends southward to latitude 41°N., while Long Island lies eastward between latitudes 41°00'N. and 40°35'N. and longitudes 72°W. and 74°W.

The principal highlands of the State may be divided into two general regions, namely, the Adirondack section in the northeast and the Appalachian plateau in the southern portion west of the Hudson Valley. A subdivision of the Appalachian highlands is produced by the deep channel of Seneca Lake, extending from the plains bordering Lake Ontario southward to the Susquehanna Valley. Thus are formed the areas commonly called the Eastern and Western Plateaus; the former extending from the central lakes to the Hudson Valley and the latter westward from the central lakes to the depression of Lake Erie. The Eastern Plateau includes the Catskill Mountains, which are the northeastern New York terminus of the Allegheny Range of the Appalachian Mountain system. In southeastern New York is a minor highland region cut through by the Hudson River. This includes the Highlands, the Palisades, and the Taconic Mountains. Another minor highland known as Tug Hill lies just west of the Adirondacks and the Black River, and includes a large part of Lewis County.

Along the eastern border of the State is a long, narrow lowland, which is occupied by Lake Champlain, Lake George, and the middle and lower portions of the Hudson Valley. The St. Lawrence River, Lake Ontario, and Lake Erie lie in another lowland region on the north and western boundaries. This region is widest south of the eastern end of Lake Ontario, narrowing to a width of only 4 or 5 miles in the western end of the State. Connecting the Hudson-Champlain Valley with the lake plains is a third lowland. This is a deep transversal cut which forms the valley of the Mohawk River and Lake Oneida, and thus divides the main plateau area into the distinct masses of the Appalachian and Adirondack systems. A fourth lowland region is Long Island which is a part of the Atlantic

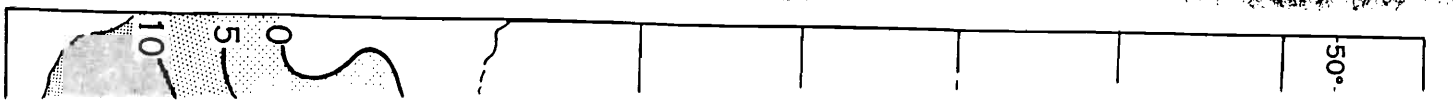
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. - Price 15 cents

Mean Annual Precipitation, Inches



Based on period 1931-55

Isolines are drawn through points of approximately equal value. Caution should be used in interpolating on these maps, particulary in mountainous areas.



New York State Atlas of Community Water System Sources 1982

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

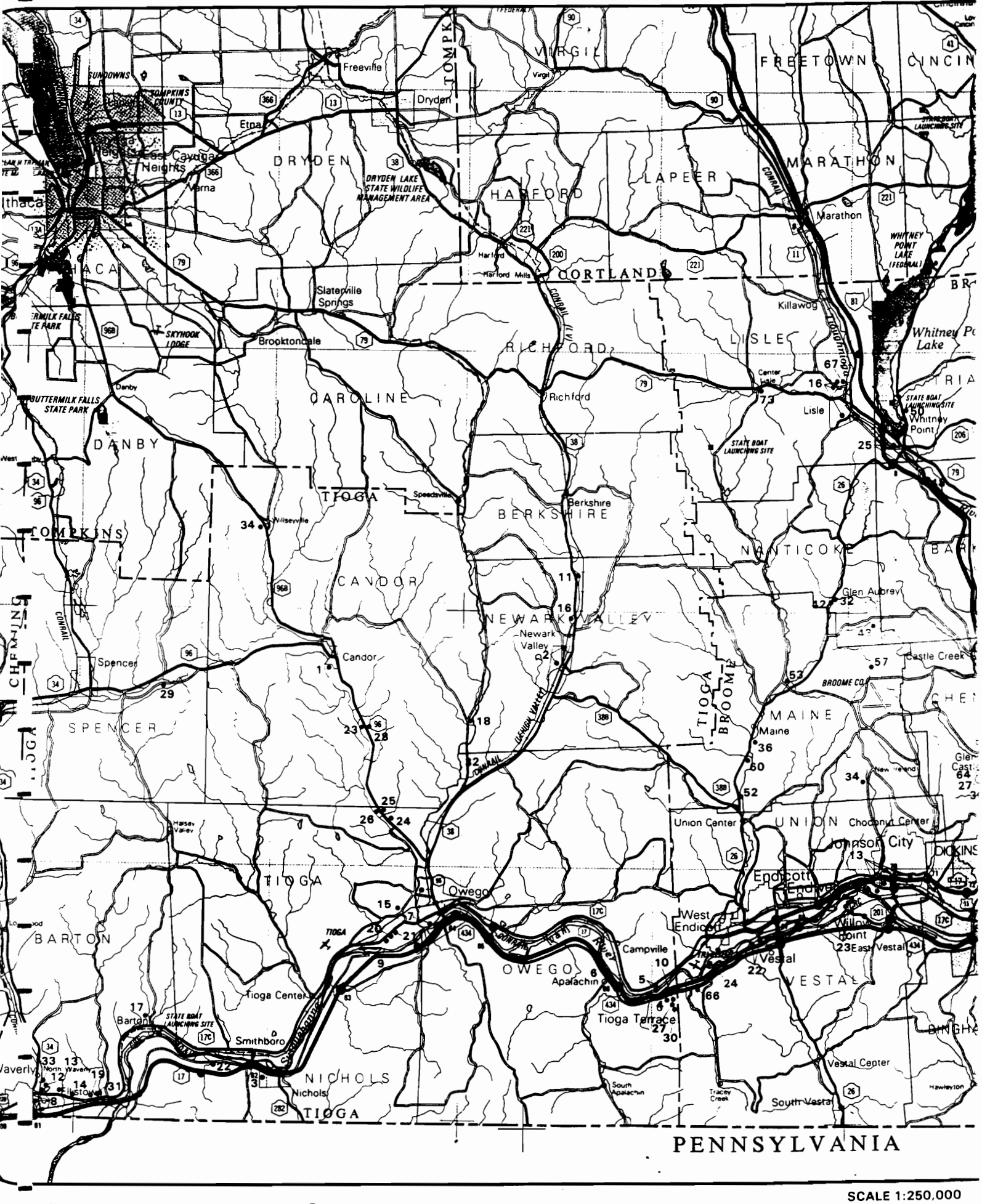
REF. (24)

TIOGA COUNTY

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
Municipal Community			
1	Candor Village	1000	Wells
2	Newark Valley Village	1400	Wells
3	Nichols Water Company	500	Wells
4	Owego Water District #2	2000	Wells
5	Owego Water District #3	1400	Wells
6	Owego Water District #4	1800	Wells
7	Owego Water Works	5000	Wells
8	Waverly Village	5255	Dry Brook Reservoirs, Wells
Non-Municipal Community			
9	Airways Inn Trailer Park	60	Wells
10	Bouton's Trailer Park	40	Wells
11	Brookside Court	30	Wells
12	Cedar Terrace Trailer Park	70	Wells
13	El-Ba Trailer Park #1	100	Wells
14	El-Ba Trailer Park #2	200	Wells
15	Glenmary Estates	50	Wells
16	Green Valley Mobile Home Park	120	Wells
17	Hoffman Trailer Park	12	Wells
18	Jolly J Mobile Home Park	150	Wells
19	Maple Lane Trailer Court	200	Wells
20	Maple Shade Trailer Park #1	45	Wells
21	Maple Shade Trailer Park #2	40	Wells
22	Nichols Carriage Manor	200	Wells
23	Owego Contracting Company Inc	30	Wells
24	Owego Heights Mobile Home Park	200	Wells
25	Pebble Hill Mobile Home Park	100	Wells
26	Pine Tree Trailer Court	30	Wells
27	Post Mobile Homes	300	Wells
28	Route 96 Residential Park	99	Wells
29	Saunders Mobile Home Park	30	Wells
30	Stephens Trailer Park	120	Wells
31	Sunset Trailer Park	126	Wells
32	Valley Park Inc	200	Wells
33	Wagon Wheel Trailer Park	60	Wells
34	Willseyville Mountainside Estates	100	Wells

OCATION OF COMMUNITY WATER SYSTEM SOURCES-1982

NEW YORK STATE DEPAR
DIVISION OF ENVIRONM
BUREAU OF PUBLIC WATEF



ADAPTED FROM THE FOUR-SHEET, 1:250,000 SCALE NEW YORK STATE MAP, © 1980 BY THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION.

SCALE 1:250,000

0 5

REF. (27)

United States Department of Agriculture
Soil Conservation Service
56 Main Street
Owego, NY 13827

Subject: Victory Plaza
Tioga County
Phase I Investigation

Date: August 5, 1987

To: Muffet A. Mauche
Staff Engineer
URS Company, Inc.
570 Deleware Avenue
Buffalo, NY 14202

File Code:

Dear Ms. Mauche:

As requested the following information is provided concerning the above subject:

1.) There are no groundwater irrigated acres within 3 miles of the site.

2.) There are approximately 90 acres of truck crops irrigated by streams within 3 miles of the site. Intakes are marked with a red X on the attached map.

3.) It is only 600 feet to the closest crop field (presently in corn) and the soils are mapped as Chenango, gravelly loam and classified as prime farmland (also shown on attached map).

If I can be of further assistance feel free to call on me.

Sincerely,

Tom Lasater

Tom Lasater
District Conservationist

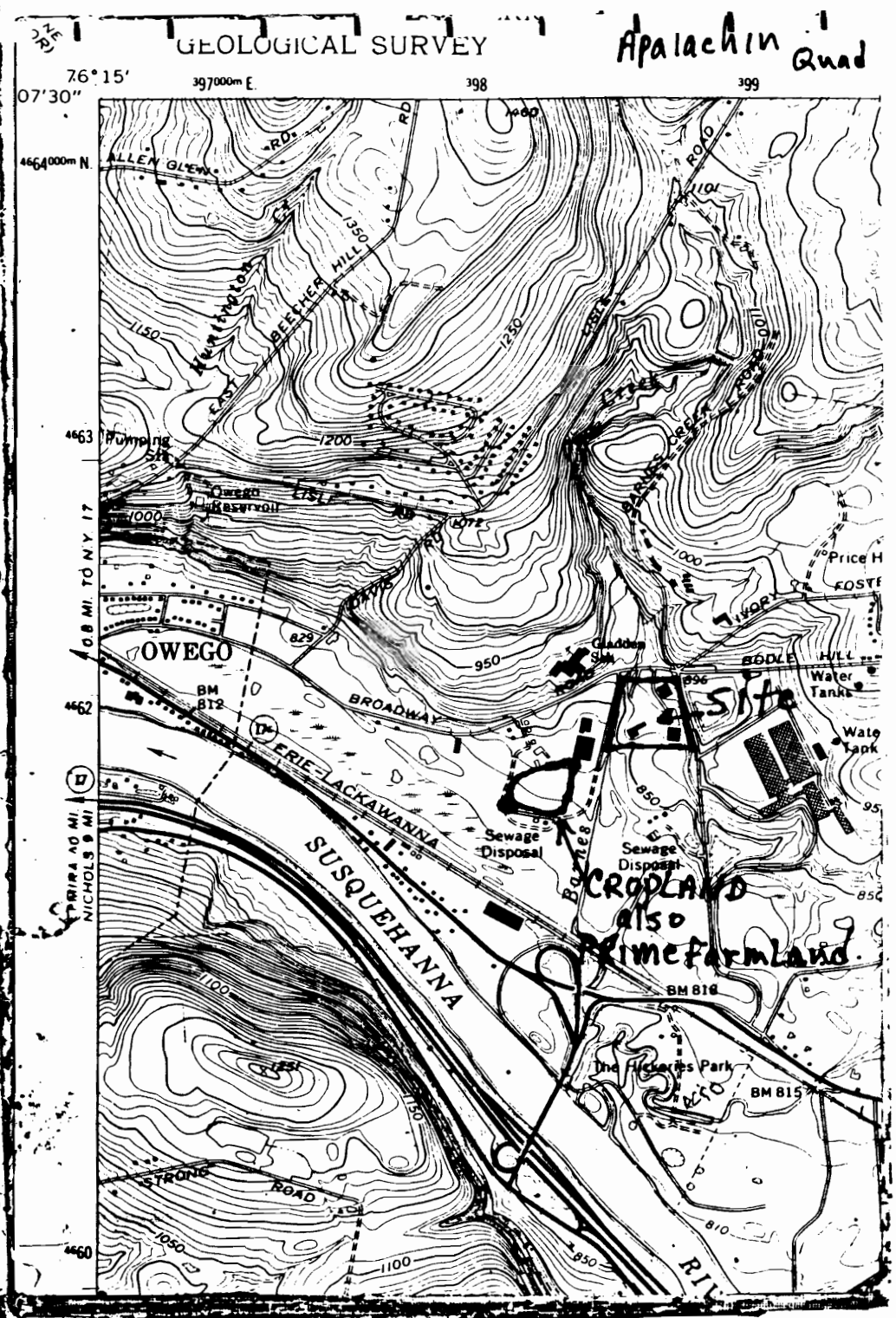
Enc.

RECEIVED
URS COMPANY
AUG 7 1987

JOB #_____

Owego quad

Apalachin Quad



X - irrigation intakes free flowing

(2)

REF. (28)

URS

AN INTERNATIONAL PROFESSIONAL SERVICES FIRM

URS CORPORATION
570 DELAWARE AVENUE
BUFFALO, NEW YORK 14202-1207
(716) 883-5525

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COLUMBUS
NEW YORK
PARAMUS, NJ
SAN ANTONIO
SAN FRANCISCO
SAN MATEO
SEATTLE
WASHINGTON, D.C.

September 28, 1987

Mr. Gary Rice
Director of Environmental Health
Tioga County Health Department
231 Main Street
Owego, New York 13827

Dear Mr. Rice:

As I mentioned during a telephone conversation on September 24, 1987, URS Company, Inc. is currently conducting a Phase I investigation of the Victory Plaza Site in the Town of Owego.

We are performing this investigation for the New York State Department of Environmental Conservation pursuant to the requirements of the New York State Superfund Law (Chapter 857 of the Laws of 1982.)

This is to confirm the telephone conversation wherein you provided the following information regarding surface water use downstream of the site:

- The Susquehanna River is used for irrigation, fishing, boating and swimming.
- Barnes Creek empties into the Susquehanna River at Hickories Park and is used for fishing.

We would appreciate if you would review this information, note any necessary corrections and return a signed and dated copy to indicate your concurrence. Your prompt attention to this would be appreciated as the information is necessary to complete our evaluation of the site. Thank you for your cooperation.

Sincerely,

Muffett A. Mauche

Muffett A. Mauche, Staff Engineer, Le Roy Callender PC
for Linda J. Clark, Project Geologist, URS Company, Inc.

I agree with the information as it is presented.

Gary Rice _____ Date 10/2/87

MAM/mb
35154L2

C 3.223/5:980/ REF. (29)

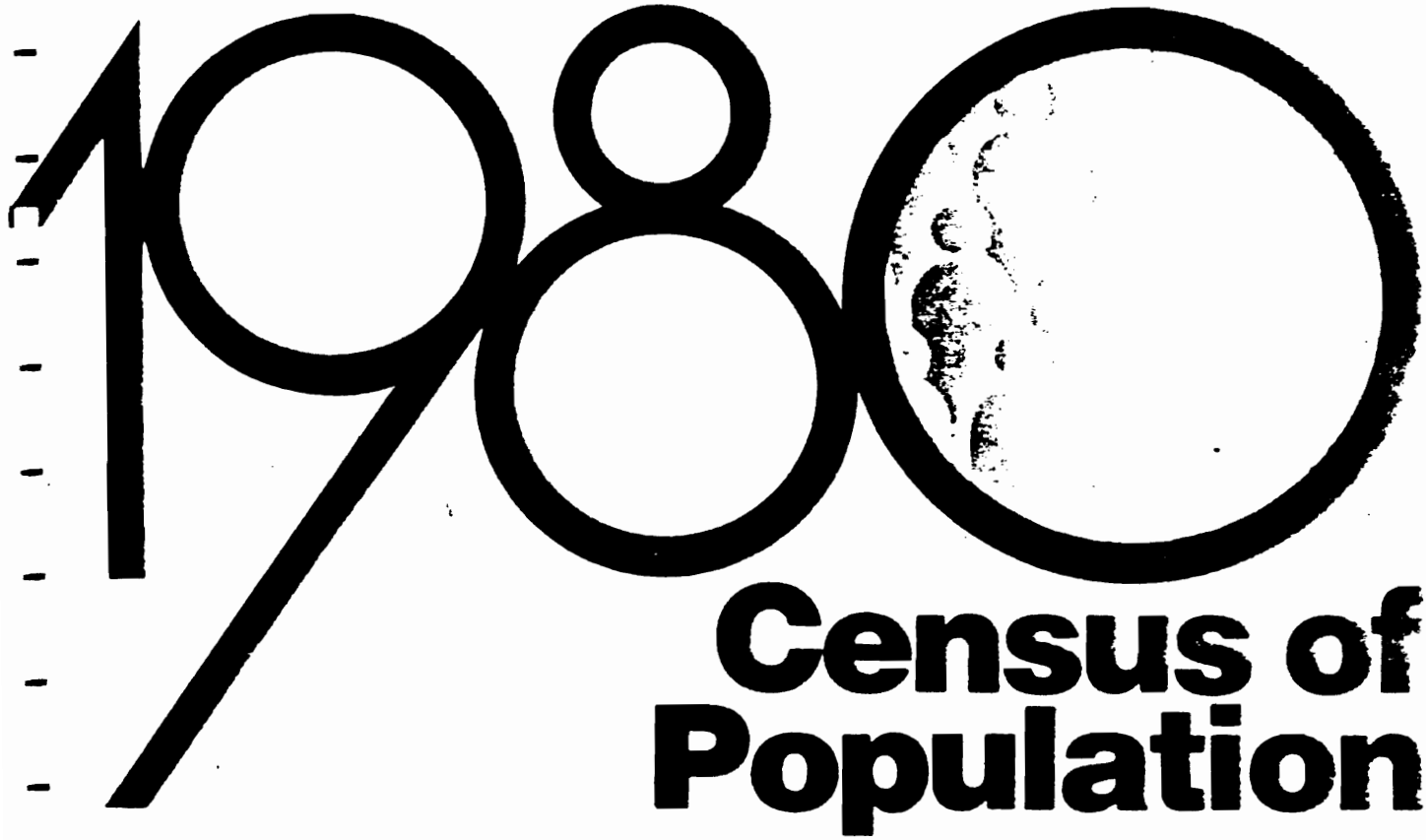
MAR 1 1

C80-1-A34

CHARACTERISTICS OF THE POPULATION

Number of Inhabitants

NEW YORK



U.S. Department of Commerce
BUREAU OF THE CENSUS

Table 5. Population of Places: 1960 to 1980—Con.

(For changes in boundaries of incorporated places since 1970, see table 4. For meaning of symbols, see introduction)

Incorporated Places Census Designated Places	Counties	1980	1970	1960
...ore Lake (CDP)	Rensselaer	1 304	...	...
...ston village	Montgomery	691	716	729
...tonville village	Putnam	567	583	555
...sconset (CDP)	Suffolk	10 706	10 048	1 964
Newark village	Wayne	10 017	11 644	12 868
...rk Valley village	Tioga	1 190	1 286	1 234
... Berlin village	Chenango	1 392	1 369	1 262
...burgh city	Orange	23 438	26 219	30 979
...burgh West (CDP)	Orange	1 381	...	...
New Cassel (CDP)	Nassau	9 635	8 721	...
New City (CDP)	Rockland	35 859	27 344	...
...ara (CDP)	Niagara	3 120	2 588	1 423
... Hackensack (CDP)	Dutchess	1 532	1 111	...
... Hampton-Denton (CDP)	Orange	1 385	...	...
New Hartford village	Oneida	2 313	2 433	2 468
New Hyde Park village	Nassau	9 801	10 116	10 808
New Paltz village	Ulster	4 938	6 058	3 041
...port village	Herkimer	746	908	827
... Rochelle city	Westchester	70 794	75 385	76 812
... Square village	Rockland	1 750	1 156	...
New Windsor (CDP)	Orange	7 812	8 803	4 041
New Windsor West (CDP)	Orange	2 120	...	...
York city	Total	7 071 639	7895563	7 781 984
	Bronx (pt. in)	1 168 972	1 471 701	1 424 815
	Kings (pt. in)	2 230 936	2 602 012	2 627 319
	New York (pt. in)	1 428 285	1 539 233	1 698 281
	Queens (pt. in)	1 891 325	1987174	1 809 578
	Richmond (pt. in)	352 121	295 443	221 991
New York Mills village	Oneida	3 569	3 805	3 788
...ara Falls city	Niagara	71 384	85 615	102 394
...ara Town (CDP)	Niagara	9 648	...	...
...da village	Tioga	613	638	663
...dayara (CDP)	Schenectady	5 223	6 186	...
Nissequogue village	Suffolk	1 462	1 120	332
Niverville (CDP)	Columbia	1 856	...	...
...ville (CDP)	St. Lawrence	1 599	1 379	1 353
... Amityville (CDP)	Suffolk	13 140	11 936	...
... Babylon (CDP)	Suffolk	19 019	39 526	...
North Ballston Spa (CDP)	Saratoga	1 350	1 296	...
North Bay Shore (CDP)	Suffolk	35 020	...	...
North Bellmore (CDP)	Nassau	20 630	22 893	19 639
... Bellport (CDP)	Suffolk	7 432	5 903	...
... Boston (CDP)	Erie	2 743	1 635	...
... Collins village	Erie	1 496	1 675	1 574
...mont Great River (CDP)	Suffolk	11 416	12 080	...
North Haven village	Suffolk	738	694	450
North Hills village	Nassau	1 587	295	359
... Hornell village	Steuben	813	919	917
... Hudson Falls (CDP)	Washington	2 309	...	...
... Lindenhurst (CDP)	Suffolk	11 511	11 117	...
North Massapequa (CDP)	Nassau	21 385	23 123	...
North Merrick (CDP)	Nassau	12 848	13 650	12 976
North New Hyde Park (CDP)	Nassau	15 114	18 154	17 929
North Patchogue (CDP)	Suffolk	7 126	5 232	...
...port village	Suffolk	7 651	7 494	5 972
... Sea (CDP)	Suffolk	1 171	...	...
... Syracuse village	Onondaga	7 970	8 687	7 412
North Terrytown village	Westchester	7 994	8 334	8 818
North Tonawanda city	Niagara	35 760	36 012	34 757
... Valley Stream (CDP)	Nassau	14 530	14 881	17 239
...ville village	Fulton	1 304	1 192	1 156
...ville (CDP)	Suffolk	2 588	...	...
... Wantagh (CDP)	Nassau	12 677	15 053	...
Northwest Harbor (CDP)	Suffolk	2 459	...	...
Norwich city	Chenango	8 082	8 843	9 175
Norwood village	St. Lawrence	1 902	2 098	2 200
...k (CDP)	Suffolk	2 657	...	...
... village	Livingston	1 169	1 254	1 224
... village	Rockland	6 428	6 659	6 062
Oakdale (CDP)	Suffolk	8 090	7 334	...
Oakfield village	Genesee	1 791	1 964	2 070
Ocean Beach village	Suffolk	155	109	111
...side (CDP)	Nassau	33 639	35 372	30 488
...a village	Schuyler	613	606	573
...ebury city	St. Lawrence	12 375	14 554	16 122
...ara (CDP)	Niagara	1 571	1 592	1 215
Old Bethpage (CDP)	Nassau	6 215	7 084	...
...eadville village	Nassau	1 574	1 785	1 126
...eld village	Suffolk	829	812	373
...ega (CDP)	Herkimer	1 061	...	...
...ebury village	Nassau	3 277	2 667	2 044
...ego city	Cattaraugus	18 207	19 169	21 868
Oneida city	Madison	10 810	11 658	11 677
Oneida Castle village	Oneida	751	788	754
...ta city	Otsego	14 933	16 030	13 412
...a Lake (CDP)	Orange	5 120	4 348	...
...d Park village	Erie	3 671	3 732	3 278
...ary village	Oneida	1 680	1 627	1 580
Oriskany Falls village	Oneida	802	927	972
...ning village	Westchester	20 196	21 659	18 662
...a city	Otsego	19 793	20 913	22 155
...a village	Orange	1 089	956	875
...a village	Orange	953	933	896
...ville village	Seneca	666	779	789
...ville village	Tioga	4 364	5 152	5 417
...ville village	Chenango	1 765	1 944	1 871
...ster Bay (CDP)	Nassau	6 497	6 822	...

Incorporated Places Census Designated Places	Counties	1980	1970	1960
Oyster Bay Cove village	Nassau	1 799	1 320	988
Painted Post village	Steuben	2 196	2 496	2 570
Palatine Bridge village	Montgomery	604	601	578
Palmyra village	Wayne	3 729	3 776	3 476
Panama village	Chautauqua	511	489	450
Parish village	Oswego	535	634	567
Patchogue village	Suffolk	11 291	11 582	8 838
Pawling village	Dutchess	1 996	1 914	1 734
Peach Lake (CDP)	Total	1 464	...	...
	Putnam (pt. in)	998	...	...
	Westchester (pt. in)	466	...	...
Pearl River (CDP)	Rockland	15 893	17 146	...
Peconic (CDP)	Suffolk	1 056	...	...
Peekskill city	Westchester	18 236	19 283	18 737
Pelham village	Westchester	6 848	2 076	1 964
Pelham Manor village	Westchester	6 130	6 673	6 114
Penn Yan village	Yates	5 242	5 293	5 770
Perry village	Wyoming	4 198	4 538	4 629
Perrysburg village	Cattaraugus	405	433	434
Peru (CDP)	Clinton	1 716	1 261	...
Phelps village	Ontario	2 004	1 989	1 887
Philadelphia village	Jefferson	855	858	868
Piermont village	Columbia	1 539	1 674	1 750
Phoenix village	Oswego	2 357	2 617	2 408
Piermont village	Rockland	2 269	2 386	1 906
Pike village	Wyoming	367	373	345
Pine Bush (CDP)	Orange	1 255	1 183	1 016
Pine Hill village	Ulster	216	247	180
Pine Plains (CDP)	Dutchess	1 303	...	...
Pitcher Hill (CDP)	Onondaga	6 063	...	...
Pittsford village	Monroe	1 568	1 755	1 749
Plainedge (CDP)	Nassau	9 629	10 759	21 973
Plainview (CDP)	Nassau	28 037	31 695	27 710
Plandome village	Nassau	1 503	1 593	1 379
Plandome Heights village	Nassau	963	1 032	1 025
Plandome Manor village	Nassau	883	835	705
Plattsburgh city	Clinton	21 057	18 715	20 172
Plattsburgh AFB (CDP)	Clinton	5 905	7 078	...
Plattsburgh West (CDP)	Clinton	1 210	...	...
Pleasant Valley (CDP)	Dutchess	1 255	1 372	...
Pleasantville village	Westchester	6 749	7 110	5 877
Poestenkill (CDP)	Rensselaer	1 031	...	...
Poland village	Herkimer	553	629	564
Pomona village	Rockland	2 421	1 792	...
Poquott village	Suffolk	588	427	295
Port Byron village	Cayuga	1 400	1 330	1 201
Port Chester village	Westchester	23 565	25 803	24 960
Port Dickinson village	Broome	1 974	2 132	2 295
Port Ewen (CDP)	Ulster	2 813	2 882	2 622
Port Henry village	Essex	1 450	1 532	1 767
Port Jefferson village	Suffolk	6 731	5 515	...
Port Jefferson Station (CDP)	Suffolk	17 009	7 403	1 041
Port Jervis city	Orange	8 699	8 852	9 268
Port Leyden village	Lewis	740	862	898
Portville village	Cattaraugus	1 136	1 304	1 336
Port Washington (CDP)	Nassau	14 521	15 923	15 657
Port Washington North village	Nassau	3 147	2 883	722
Potsdam village	St. Lawrence	10 635	10 303	7 765
Poughkeepsie city	Dutchess	29 757	32 029	38 330
Prospect village	Oneida	368	392	348
Pulaski village	Oswego	2 415	2 480	2 256
Quogue village	Suffolk	966	865	692
Randolph village	Cattaraugus	1 398	1 498	1 414
Ransomville (CDP)	Niagara	1 401	1 034	...
Ravena village	Albany	3 091	2 797	2 410
Red Creek village	Wayne	645	626	689
Red Hook village	Dutchess	1 692	1 680	1 719
Red Oaks Mill (CDP)	Dutchess	5 236	3 919	...
Remsen village	Oneida	621	602	567
Remsenburg-Speonk (CDP)	Suffolk	1 868	...	...
Rensselaer city	Rensselaer	9 047	10 136	10 506
Rensselaer Falls village	St. Lawrence	360	332	375
Rhinebeck village	Dutchess	2 542	2 336	2 093
Richburg village	Allegany	494	482	493
Richfield Springs village	Otsego	1 561	1 540	1 630
Richmondville village	Schoharie	792	826	743
Richville village	St. Lawrence	336	334	292
Ridge (CDP)	Suffolk	8 977	...	...
Ripley (CDP)	Chautauqua	1 205	1 173	1 247
Riverhead (CDP)	Suffolk	6 339	7 585	5 830
Riverside village	Steuben	684	911	1 038
Riverside-Flanders (CDP)	Suffolk	5 400	...	...
Rochdale (CDP)	Dutchess	1 825	1 849	1 800
Rochester city	Monroe	241 741	295 011	318 611
Rockville Centre village	Nassau	25 412	27 444	26 355
Rocky Point (CDP)	Suffolk	7 012	...	...
Rensselaerville (CDP)	Albany	11 685	5 351	...
Rome city	Oneida	43 826	50 148	51 646
Urban part		42 205	47 655	...
Roosevelt (CDP)	Nassau	14 109	15 008	12 883
Rosendale Village (CDP)	Ulster	1 134	...	...
Roslyn village	Nassau	2 134	2 607	2 681
Roslyn Estates village	Nassau	1 292	1 420	1 289
Roslyn Harbor village	Nassau	1 129	1 125	925
Roslyn Heights (CDP)	Nassau	6 546	7 242	...
Rotterdam (CDP)	Schenectady	22 933	25 214	16 871
Rotterdam Junction (CDP)	Schenectady	1 010	...	...

REF.
TOMPKINS
TIOGA
ITHACA
Ithaca
Dryden
Freeville
Virgil
Willow Glen
Franks Corners
Dryden Lake
Harford
Hunts Corners
East Branch Owego Creek
Lapeer
Caroline
Caroline Center
Richford
Speedsville
Berkshire
East Berkshire
Ketchumville
Jenksville
Newark Valley
Candor
Spencer
Van Etten
Owego
Tioga Center
Nichols
Waverly
Barton
Chemung
Reniff
Halsey Valley
Strait Corners
Catatonk
Gaskill
Foster
Owego Tioga County Airfield
Danby
West Danby
South Danby
Wilseyville
North Spencer
Kennedy Corners
Starrs Corners
Enfield Center
Enfield
Newfield
Skyhook Lodge Inc
Cayuga Inlet
Cayuga Lake
Taughannock Falls State Park
Buttermilk Falls State Park
Robert H. Treman State Park
Watkins Glen State Park
Finger Lakes National Forest
Owego Creek
Danby Creek
Michigan Creek
Newark Valley Golf Course
Tioga Golf Course
Tioga County Hill
Tioga Downs Harness Track
Tioga Downs Thoroughbred Track
Tioga Downs Airfield
Tioga Downs Exit
Southern Tier Expressway
Interstate 81
Interstate 86
Interstate 88
Interstate 99
Interstate 390
Interstate 481
Interstate 690
Interstate 790
Interstate 990
Interstate 1190
Interstate 1290
Interstate 1390
Interstate 1490
Interstate 1590
Interstate 1690
Interstate 1790
Interstate 1890
Interstate 1990
Interstate 2090
Interstate 2190
Interstate 2290
Interstate 2390
Interstate 2490
Interstate 2590
Interstate 2690
Interstate 2790
Interstate 2890
Interstate 2990
Interstate 3090
Interstate

6.2 APPENDIX B - REVISED NYSDEC INACTIVE HAZARDOUS WASTE DISPOSAL SITE REPORT

(47-15-11 (10/83)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF SOLID AND HAZARDOUS WASTE

INACTIVE HAZARDOUS WASTE DISPOSAL SITE REPORT

PRIORITY CODE: _____ SITE CODE: 754005

NAME OF SITE: Victory Plaza REGION: 7

STREET ADDRESS: Taylor Road

TOWN/CITY: Owego COUNTY: Tioga

NAME OF CURRENT OWNER OF SITE: Owego Plaza Associates

ADDRESS OF CURRENT OWNER OF SITE: 210 Old County Road-Mineola, New York 11502

TYPE OF SITE: OPEN DUMP ☐ STRUCTURE ☐ LAGOON ☐
NA
LANDFILL ☐ TREATMENT POND ☐

ESTIMATED SIZE: 15.02 ACRES

SITE DESCRIPTION:

The Victory Plaza site comprises a bowling alley, a tire store, and a former food mart and gasoline filling station. It lies down gradient of IBM, which has a well documented case of subsurface contamination, and upgradient of Hadco Corporation, with a second well documented case of subsurface contamination. Both IBM and Hadco use or have used the materials found beneath their respective properties. These substances, specifically TCE, are also found beneath Victory Plaza site in deep soil and in groundwater. No known or alleged source of such contamination at Victory Plaza. Contaminant levels here significantly lower than levels measured-upgradient in 1987.

The Phase I investigation was completed in October, 1987.

HAZARDOUS WASTE DISPOSED: CONFIRMED ☐ SUSPECTED ☐ None Reported

TYPE AND QUANTITY OF HAZARDOUS WASTES DISPOSED:

TYPE	QUANTITY (POUNDS, DRUMS, TONS, GALLONS)
None Reported	

TIME PERIOD SITE WAS USED FOR HAZARDOUS WASTE DISPOSAL:

_____, 19 ___ TO NA , 19 ___

OWNER(S) DURING PERIOD OF USE: NA

SITE OPERATOR DURING PERIOD OF USE: NA

ADDRESS OF SITE OPERATOR: _____

ANALYTICAL DATA AVAILABLE: AIR ☐ SURFACE WATER ☐ GROUNDWATER [X]
SOIL [XX] SEDIMENT ☐ NONE ☐

CONTRAVENTION OF STANDARDS: GROUNDWATER ☐ DRINKING WATER ☐
SURFACE WATER ☐ AIR ☐

SOIL TYPE: glacial till, sand, gravel

DEPTH TO GROUNDWATER TABLE: 1-17 feet

LEGAL ACTION: TYPE: None STATE ☐ FEDERAL ☐
STATUS: IN PROGRESS ☐ COMPLETED ☐
REMEDIAL ACTION: PROPOSED ☐ UNDER DESIGN ☐
IN PROGRESS ☐ COMPLETED ☐

NATURE OF ACTION: _____

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

A strong source of organics contamination exists in this area. It presents a long term threat to groundwater supply. On present evidence, the contamination is not attributable to Victory Plaza site.

ASSESSMENT OF HEALTH PROBLEMS:

None reported or, at the moment, threatened. Downgradient wells (0.5 mi from site) showed no organics contamination in January 1987 sampling by NYSDOH.

PERSON(S) COMPLETING THIS FORM:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

NAME Kevin H. Siepel
TITLE Scientist, URS Corp.
NAME Buffalo, N.Y.
TITLE _____
DATE: _____

NEW YORK STATE DEPARTMENT OF HEALTH

NAME _____
TITLE _____
NAME _____
TITLE _____
DATE: _____