GEI Consultants, Inc.

December 16, 2002
Project 97598

1021 Main Street
Winchester, MA 01890-1970
781•721•4000
781•721•4073 Fax

Mr. Christopher Pyott
Environmental Analyst
Department of Environmental Protection
Bureau of Waste Site Cleanup
205A Lowell Street
Wilmington, MA 01887

Dear Mr. Pyott:

Re: **North Pond Study Area Investigation: Part I**
Wilmington and Woburn, MA
RTN 3-0471

The purpose of this letter is to present the results of the first part of an investigation of the North Pond Study Area conducted by GEI Consultants, Inc. (GEI), on behalf of Olin Corporation (Olin), and presentation of a scope of work (SOW) for proposed field investigation activities. Part I of the North Pond investigation consists of an assessment of the potential nature and extent of Olin-related contamination in the North Pond area.

This report will be used to support the Comprehensive Site Assessment (CSA) of the Olin Site (Release Tracking Number [RTN] 3-0471). Accordingly, a Comprehensive Response Action (CRA) Transmittal Form (BWSC-108) is attached to this report and a copy is included in Appendix A.

The original interim deadline for the submittal of this report was November 26, 2002. Due to the numerous submittals related to the Olin site that were due in November 2002, Olin contacted you by telephone on November 18, 2002, and requested that the submittal date for this report be extended to December 15, 2002.

1. BACKGROUND

Historical information presented in the GEI report titled "Additional Phase II Investigations of the East Ditch," dated October 12, 2001, indicated that there may have been a potential pathway of contaminant migration between the Olin Property at 51 Eames Street in Wilmington, and the former North Pond in Woburn, as shown in Figure 1. This potential pathway consists primarily of surface water flow from the drainage feature referred to as the "East Ditch," east through a reported former drainage culvert beneath the Massachusetts Bay Transit Authority (MBTA) commuter rail tracks, to an unnamed ditch that flows to North Pond. The culvert beneath the MBTA tacks is not known to currently exist. In a letter to Olin dated February 1, 2002 (Appendix A), Massachusetts Department of Environmental Protection (MADEP) requested that an SOW for additional assessment to delineate the nature, source, and extent of contamination that may have migrated along this pathway, to North Pond be prepared for its review. Accordingly, GEI, in behalf of Olin, submitted an SOW for Phase I of the additional investigations to MADEP

Christine A. Stewart
12/23/02

GEI Consultants, Inc.

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DEC 17 2002

DEP
NORTHEAST REGIONAL OFFICE

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copy delivered to Woburn BOH + ~~Town Mgr~~ Mayor 3/24/03 RCC

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on April 5, 2002 (Appendix A). This letter report and attachments present the results of Part I of this additional assessment.

The North Pond Study Area (herein referred to as the Study Area) and Olin Site boundary is shown in Figure 1. The Study Area is defined by the area encompassing the MBTA culvert, the unnamed ditch that lead to North Pond, and the 1955 aerial extent of North Pond, and is based on a preliminary assessment of adjacent properties and land uses that may have had an impact on surface water or sediment quality in North Pond. Future investigations may alter the size and extent of the Study Area. Historical aerial photographs depicting the Study Area and significant points of interest are shown in Figures 2 through 5.

Olin evaluated groundwater quality in the Study Area as part of the Supplemental Phase II Investigation (Smith, 1997).

2. OBJECTIVES

Six objectives were identified in the SOW, Investigation of the North Pond Area submitted to MADEP by GEI on April 4, 2002:

1. Assess the function of the MBTA culvert and drainage ditches located near the confluence of the East Ditch and South Ditch.
2. Confirm surface water flow direction in what appears to be, on a historical aerial photograph, a drainage ditch possibly connecting the North Pond to the east railway ditch (opposite the confluence of the South Ditch and East Ditch near the Olin property).
3. Conduct an information search and data review for the North Pond area.
4. Assess the source and nature of material used to fill North Pond.
5. Confirm groundwater flow direction and groundwater discharge in the area from the South/East Ditch confluence to North Pond.
6. Issue an Interim report for the Part I investigations, including a SOW for proposed field investigations (Part II).

3. PART I INVESTIGATION RESULTS

3.1 MBTA Culvert and Railway Ditches

Numerous sources were searched for information relevant to the function and nature of the MBTA culvert and adjacent drainage ditches, including: the Boston & Main Railroad Historical Society archives, MADEP files at the Wilmington northeast regional office, US Environmental Protection Agency (USEPA) documents supplied by MADEP, municipal files in Wilmington and Woburn, and site visits to the North Pond and East Ditch area. Copies of significant text and figures are included in Appendix B. The approximate location of the MBTA culvert is indicated in Figure 2.

An assessment of the collected information has led to the following conclusions:

- A culvert (referred to as the MBTA culvert) was installed under the MBTA railroad tracks (Station 705+42), formerly Boston and Maine railroad tracks, that may have provided an historic hydraulic connection between the East Ditch (west side of railroad tracks) and drainage ditches on the east side of the tracks, at approximately the location of the confluence of the South Ditch and East Ditch. The culvert was likely in place (but not necessarily active) from 1955 to 1982.

- Survey information or construction details for the MBTA culvert and immediately adjacent railroad ditches were not available and the function of the culvert could not be ascertained. It is unknown whether the culvert may have functioned continuously or only during periods of high storm water flow in the East Ditch. Information regarding historical surface water elevations in the railroad ditches was not available.
- Land development adjacent to the MBTA right-of-way may have altered the original function of the MBTA culvert, possibly since the late 1960s. It is unknown whether the MBTA culvert currently exists below ground surface. During a site visit on September 13, 2002, the west end of the culvert in the East Ditch channel could not be located. The east end of the culvert was not visible and may have been buried in the late 1960s during development of the E.C. Whitney & Sons property (Fig. 4).

3.2 Historical Surface Water Flow to North Pond

Historical topographic maps and aerial photographs pre-dating the land development north and west of North Pond were reviewed to determine the likely surface water flow direction of the apparent drainage ditch, herein referred to as the Unnamed Ditch, that may have connected the eastside MBTA railway ditch (opposite the Olin property) to North Pond. U.S. Geological Survey (USGS) topographic maps for 1958 and 1968 were assumed to be representative of general ground surface conditions during the period the MBTA culvert may have been active. Pre-development and post-development information were reviewed to evaluate other areas that have contributed runoff to North Pond.

Copies of relevant maps and photographs are presented in Appendix C.

- Prior to development along Woburn Street and construction of Industrial Way, wetlands extended north from North Pond and westward to the Olin property. This wooded, wetland area, including the area of the Unnamed Ditch, contributed runoff to North Pond. Surface water from North Pond discharged south to South Pond and ultimately to the Aberjona River. Prior to 1955, a dike was installed at the south end of North Pond to enable its use as a fire protection water supply.
- The presence of the apparent Unnamed Ditch is first observed in a 1955 aerial photograph (Fig. 2). The Unnamed Ditch may have been partially filled or altered during the development of the E.C. Whitney property, which began about 1966. A 1966 aerial photo (Appendix C) appears to the show the original western and eastern ends of the Unnamed Ditch, while the center section has been filled or obscured by development. The Unnamed Ditch is not visible in a 1971 aerial photo (Fig. 4). It is unknown whether an underground culvert may have been installed in lieu of the open ditch channel. There currently is a headwall/underground culvert (to the east of Woburn Street) that appears to be located approximately where the apparent Unnamed Ditch would have been. Plans indicate that the culvert may be connected to a catch basin on the E.C. Whitney property.
- Topography and drainage plans indicate that many properties located in the pre-development watershed of North Pond (parcels along Woburn Street, Industrial Way, Presidential Way, and abutting North Pond) continue to direct storm water to North Pond through a series of open channels and storm water culverts.

3.3 Information Search and Review

Numerous sources were searched for information related to the Study Area, including MADEP files at the northeast regional office in Wilmington, Massachusetts; USEPA documents supplied to Olin by MADEP; municipal files in Wilmington and Woburn; and reports by the Massachusetts Department of Public Health (MADPH). Copies of significant report text, boring logs, and site plans are included in Appendix D. As of the date of this report, Olin has become aware of, but has not had the opportunity to review, additional information regarding North Pond that may be present in archived files at USEPA and MADEP. This information includes an Environmental Impact Report that was filed with the Massachusetts Executive Office of Environmental Affairs (EOEA) for the Sheehy Industrial Park in 1984, and responses to a USEPA information request for the Property, which was sent to a former owner of North Pond, dated September 13, 1988. Olin intends to make further inquiries regarding this information in the near future.

If contaminants are present in the existing North Pond surface water or sediment, transport could have occurred by various mechanisms, including contaminated surface water or storm water runoff (potentially originating as far west as properties bordering the East Ditch), contaminated groundwater discharge to North Pond or its tributaries, or the use of contaminated soil as fill material in North Pond. Numerous releases or spills at properties near the Study Area, many since 1982, have been documented and may represent potential mechanisms for historical or ongoing impacts to North Pond. Table 1 lists a number of identified spills or releases that may have impacted surface water and/or sediment quality of North Pond via one or more transport mechanisms. The primary contaminants of concern (COCs) for these sites include volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), petroleum products, and numerous metals and inorganic compounds. Most site investigations have focused on determination of VOCs or hydrocarbons in soil or groundwater, and therefore relatively little data has been collected for compounds classified as Olin-related contaminants.

The only existing monitoring wells confirmed to be installed within the former extent of North Pond were installed by Olin in 1993. Wells GW74D and GW74S are located within fill material along Presidential Drive. Screened intervals for these wells lie below the layer of surface fill. Another Olin well cluster within the Study Area is located west of North Pond and consists of wells GW49D, GW80BR, GW80D, and GW80S. Olin well locations within the Study Area are shown in Figure 5. Soil samples were not collected during the installation of these wells, but well installation logs are available (as discussed below). Results of Olin groundwater sampling through 2001, summarized by Geomega, are presented in Appendix D.

The information search revealed only one investigation that had collected surface water or sediment samples directly from North Pond. In 1998, Roy F. Weston, Inc., conducted an evaluation for USEPA regarding the Ritter Trucking Co. site located at 856 Woburn Street, Wilmington, Massachusetts. In addition to other sampling, three surface water samples and four sediment samples were collected from the portion of North Pond bordering Presidential Way. A sampling location plan and table of results is presented in Appendix D. Samples were tested for VOCs, semivolatile organic compounds (SVOCs), pesticides, PCBs, cyanide, and metals. VOCs, Aroclor-1260, and numerous metals were detected in North Pond surface water samples. VOCs, SVOCs, pesticides, PCBs, and numerous metals were detected in North Pond sediment samples. The depth intervals of the sediment samples were not specified.

3.4 North Pond Fill

A comparison of available historical plans and aerial photographs of the area indicate that about one-third of North Pond has been filled since 1955. The boring log for well GW74D indicates the bottom of fill elevation is approximately 69 feet. The source of the material used to fill portions of North Pond is not known. As described in Section 3.3, relatively little soil or sediment data for the within the pre-development extents of North Pond was reported in the data reviewed by GEI to date. Based on a comparison between the pre-development North Pond water line (estimated from the 1955 aerial photograph) and a recent aerial photo from 1995 (Fig. 5), properties identified with filled areas within the 1955 extent of North Pond are listed in Table 2. Municipal records did not contain references to the source of the fill material. The properties identified within the original North Pond footprint are not listed as MADEP disposal sites and the MADEP file information collected as a result of the search and review described in Section 3.3 did not contain data applicable to the chemical characterization of the material used to fill North Pond.

Upon further review of available information, it is unclear if direct contamination from fill and stockpiled materials at the Industri-Plex Site extends beyond the South Pond and as far north as the North Pond. A 1995 Public Health Assessment report by the MADPH summarizes the waste handling activities at the Industri-Plex site. Handling and stockpiling of waste deposits near the "north pond" at the Industri-Plex site appear to refer to what is defined as the South Pond in the Study Area, which is located immediately south of North Pond (Fig. 2). A 1929 Sanborn map for the Industri-Plex Site shows the South Pond situated to the north of a Sludge Pond which may have led to the "north pond" description. However, given the proximity of the Industri-Plex site to North Pond and surrounding wetlands and the chemical manufacturing activity at the site since 1853, historical impact to North Pond remains a possibility. Contaminants at the Industri-Plex site include arsenic, chromium, lead, benzene, and toluene. An area referred to as the "Tabby Dump," located adjacent to North Pond and the west bank of the stream connecting North Pond and South Pond, is identified in one of the documents recently identified by GEI (refer to Appendix E: Department of Environmental Quality Engineering correspondence dated July 24, 1984). The Tabby Dump is reported to contain "miscellaneous fill." Documents recently identified, but not yet reviewed by Olin, for the Study Area, may shed further light on the source of the material that was used to fill North Pond and the contents of the Tabby Dump.

Copies of maps, figures, and text relevant to North Pond fill are contained in Appendix E.

3.5 Groundwater Flow Direction and Discharge

Groundwater elevations measured by Olin at wells GW80S and GW74S during the period from 1993 to 2001 indicated that groundwater flow in this area is to the southeast and towards North Pond (Appendix D). Groundwater flow directions reported for MADEP sites north of North Pond generally indicate groundwater flow to the south or southeast towards North Pond, or localized flow patterns towards wetland or ditch tributaries of North Pond. This is generally consistent with the pre-development surface topography for the Study Area and regional hydrological information.

3.6 Part II Scope of Work

Based on the results of the Part I investigation, the presence or absence of Olin-related contaminants in North Pond cannot be established from results obtained from past investigations performed by Olin and others in the Study Area. The existence of the MBTA culvert and the Unnamed Ditch indicate that a hydraulic connection and contaminant migration pathway between

North Pond and the Olin Property may have existed between 1952 and 1982, and potentially only through the mid-1960s. Additionally, North Pond may receive groundwater discharge from the direction of the East Ditch and the Olin Property. Although there is a potential that surface water flow from the Olin Property did not discharge to North Pond, we conclude that there is a potential that Olin-related contamination may be present in some sediments within the current or former limits of North Pond, and that additional investigation is required to assess the nature and extent of contamination that may be attributable to historical releases at the Olin Property.

Based on the development history of the area, it is our opinion that compounds that are currently present in the Unnamed Ditch location, and potentially present in shallow sediment in remaining portions of North Pond, are likely due to releases since 1982, and cannot be assumed to be due to pre-1982 releases to surface water at the Olin Property.

Olin proposes to conduct the following investigations to determine if Olin-related contaminants are present within the sediments at depth within the historical limits of North Pond.

3.6.1 North Pond

- **Fill/Sediment Sampling.** Fill and buried sediment samples will be collected from up to three locations within the former areas of North Pond, and one location in the remaining portion of North Pond. It is anticipated that borings in filled areas will be advanced with augers and samples collected with slit-spoon samplers. Samples within the existing limits of North Pond will be collected using hand-driven Shelby tubes, or similar methods.

  In filled areas, samples will be collected continuously from the ground surface to the 5 feet below the buried sediment layer, to a maximum depth of 16 feet. Based on the estimated depth of the sediment (less than 10 feet), we expect that up to 10 fill/sediment samples may be collected from each boring. In the remaining area of North Pond, samples will be collected continuously from the ground surface to one foot below the buried sediment layer, to a maximum depth of 4 feet.

- **Soil Classification and Laboratory Analysis**

  All samples will be classified, for the purpose of distinguishing between underlying soils, sediments, and the material used to fill portion of North Pond. If a well-defined layer of sediment is observed in each boring, Olin will evaluate the feasibility of age dating the sediments using radiochemical techniques. Specifically, sediment concentrations of the isotope ^{137}Cs would be measured at approximately 10-centimeter intervals and used as a tracer for sediment dating. ^{137}Cs arises primarily from atmospheric fallout from nuclear weapons tested between 1957 and 1965; it has been found to be an excellent tracer in sediments because it sorbs strongly to clay and organic particles and is essentially non-exchangeable. Examples of the prior usage of ^{137}Cs for sediment age dating at contaminated sediment sites is documented by Davis et. al. (1997) and Stout et. al. (2002) and the references contained therein[1].

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1. References:

Davis, A., P. De Curnou, and L. Edmond Eary. 1997. Discriminating between sources of arsenic in the sediments of a tidal waterway, Tacoma, Washington. *Environmental Science and Technology*, 31, p. 1985-1991.

Stout, S.A., A.D. Uhler, V.S. Magar, K.J. McCarthy, S.J. Emsbo-Mattingly, and E.A. Crecelius. 2002. Sediment geochronology reveals temporal changes in contaminant sources. *Contaminated Soil Sediment and Water*, July/August 2002, p. 104-106.

Up to four samples that are determined to represent, or include "historical" sediments, and one shallow sediment sample from the remaining portions of North Pond, will be analyzed for the following parameters[2]:

- Volatile Organic Compounds (VOCS), including trimethylpentenes (USEPA 8260B)
- Semivolatile Organic Compounds (SVOCs) (USEPA 8270C)
- Polynuclear Aromatic Hydrocarbons (PAHs) (USEPA 8310)
- Pesticides (USEPA 8081A)
- Herbicides (SW-846-8151A)
- Metals (including antimony, arsenic, cyanide, total and hexavalent chromium, lead mercury and thallium [various methods])
- Ammonia (SM4500F/Lachat)
- pH
- Chloride
- Sulfate

At least three samples of the fill that overlies former North Pond sediments will also be tested for metals.

Samples of soil at each boring location, which are judged to be below and in contact with the sediment layer will be extracted and /or preserved, as appropriate, for future analysis.[3]

- **Preparation of Letter Report**

  Olin will prepare a letter report presenting the results of the fill, sediment, and soil sampling described above, and any additional information regarding the source and nature of the material that was used to fill portions of North Pond. If supported by the data, a Licensed Site Professional (LSP) Opinion will be rendered as to the nature and extent of contamination in the former North Pond sediments that may be related to the historical activities at the Olin Property.

3.6.2 Unnamed Ditch

The Unnamed Ditch represents a potential former transport route for Olin-related contaminants from the East Ditch to North Pond. As noted above however, this ditch has been substantially filled since the mid-1960s, and the compounds that are currently present in the remnant unnamed ditch are likely due to releases since at least 1982. Therefore, Olin does not propose to conduct further investigation of the unnamed ditch until it has been established that Olin-related COCs are present in sediment at depth, in North Pond.

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2. These testing parameters are similar to the parameters for which sediments from the East Ditch will be tested.
3. The chemical testing results for sample that are held longer than the method prescribed holding times may be qualified.

3.6.3 East Ditch

Characterization of the East Ditch will be conducted separately from North Pond investigations as presented in the Additional Phase II Investigation of the East Ditch conditionally approved by MADEP on February 1, 2002.

3.6.4 Part II Schedule

Upon written approval from MADEP, Olin will seek permission from property owners to conduct the proposed sampling and obtain approval from the Woburn Conservation Commission for sampling in North Pond. It is anticipated that sampling can be conducted within 30 days of receiving access to the properties. A preliminary report presenting the results of the field investigations will be issued within 90 days of completing the fieldwork.

Sincerely,

GEI CONSULTANTS, INC.

Lawrence J Welch

FOR M. Margret Hanley, LSP
Licensed Site Professional of Record

MMH/LW:lek
Attachment
M:\PROJECT\1997\97598 olin\CORRESP\02\NorthPond P1.doc

GEI Consultants, Inc.
1021 Main Street
Winchester, MA 01890
781-721-4000

LETTER OF TRANSMITTAL

Date 2/26/03	Project No. 975980
Attention Mr. Greg Erikson, Health Director	
Re: North Pond Study Area Investigation: Part I	
Olin Corp. Property	
Wilmington, MA	

TO Wilmington Board of Health **VIA COURIER**
121 Glenn Road, Town Hall
Wilmington, MA 01887

WE ARE SENDING YOU ■ Attached Under separate cover via ________ the following items:
Report Prints Plans Samples Specifications
Copy of letter Change order ________

Copies	Date	No.	Description
1	12/16/02		North Pond Study Area Investigation: Part I, Wilmington and Woburn, MA (report)

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SIGNED: Larry J. Welch
Larry J. Welch, GEI Consultants, Inc.

If enclosures are not as noted, kindly notify us at once.

REMARKS ________

<u>ACKNOWLEDGMENT OF RECEIPT</u>:

Signed ________
Title ________
Date ________

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GEI Consultants, Inc.

1021 Main Street
Winchester, MA 01890
781-721-4000

LETTER OF TRANSMITTAL

Date 2/26/03	Project No. 975980
Attention Mr. Greg Erikson, Health Director	
Re: North Pond Study Area Investigation: Part I	
Olin Corp. Property	
Wilmington, MA	

TO Wilmington Board of Health **VIA COURIER**
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Wilmington, MA 01887

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For review and comment | For review and comment ________
FOR BIDS DUE ________ 19____ | PRINTS RETURNED AFTER LOAN TO US

COPY TO: ________

SIGNED: Larry J. Welch
Larry J. Welch, GEI Consultants, Inc.

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REMARKS ________

ACKNOWLEDGMENT OF RECEIPT:

Signed Toni LaRivi
Title Clerk / BOH
Date 2/26/03

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Sent To Wilmington Conserv. Commission
Street, Apt. No.; or PO Box No. 121 Glenn Rd
City, State, ZIP+ 4 Wilmington, MA ~~01~~ 01887

PS Form 3800, May 2000 See Reverse for Instructions

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1. Article Addressed to:

WILMINGTON CONSERVATION
COMMISSION
121 GLENN ROAD
WILMINGTON, MA
01887

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B. Date of Delivery 2-28-03

C. Signature
X Paul F. Fullerton

☐ Agent
☐ Addressee

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☐ Insured Mail ☐ C.O.D.

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GEI CONSULTANTS, INC.
1021 MAIN STREET
WINCHESTER, MA 01890-1970

Larry Welch

97598

GEI Consultants, Inc.

1021 Main Street
Winchester, MA 01890
781-721-4000

LETTER OF TRANSMITTAL

Date 2/27/03	Project No. 97598-0
Attention	
Re: North Pond Investigation	
Olin Corp. Property	
Wilmington, MA	

TO Wilmington Conservation Commission **Via Certified Mail**
121 Glenn Road
Wilmington, MA 01887

WE ARE SENDING YOU ■ Attached Under separate cover via ________________ the following items:

Report Prints Plans Samples Specifications

Copy of letter *Change order* ________________

Copies	Date	No.	Description
1	12/16/02		North Pond Study Area Investigation: Part I, Olin Corporation, Wilmington and Woburn, MA (copy of report through Appendix A)

THESE ARE TRANSMITTED as checked below:

For approval	Approved as submitted	Resubmit ________ copies for approval
■ For your use	Approved as noted	Submit ________ copies for distribution
As requested	Returned for corrections	Return ________ corrected prints
For review and comment	For review and comment ________________	
FOR BIDS DUE ________ 19____	PRINTS RETURNED AFTER LOAN TO US	

COPY TO________________

SIGNED: L Welch
Larry Welch, GEI Consultants, Inc.

If enclosures are not as noted, kindly notify us at once.

REMARKS________________

ACKNOWLEDGMENT OF RECEIPT:

Signed ________________

Title ________________

Date ________________

Table 1
Study Area Sites with Potential Impact to North Pond
North Pond Study Area Investigation: Part 1
Olin Corporation
51 Eames Street
Wilmington, MA

Site Address	Site Name/Aid	MADEP RTN (if applicable)	Primary Contaminants of Concern
51 Eames St., Wilmington	Olin Corporation	3-0471	Inorganics, including sulfate, chloride, ammonia, chromium
98 Eames St, Wilmington	United Tool and Die	3-0017055, 3-0020785	VOCs, hydrocarbons, metals
100 Eames St, Wilmington	Rafi & Swanson	3-0019519, 3-0020186	VOCs
24 Industrial Way, Wilmington	Pacific Packaging	3-0013805	VOCs
41 Industrial Way, Wilmington	Keene Lighting	3-0000848	TPH, PCBs
844 Woburn St, Wilmington	Tocci Properties	3-0001330	VOCs
856 Woburn St., Wilmington	Ritter Trucking	CERCLIS MAD019717412, RTN 3-0000009	VOCs, SVOCs, hydrocarbons, arsenic, cadmium, lead, mercury
888 Woburn St, Wilmington	E.C. Whitney & Sons	3-0012680, 3-0001787	Lead, Chromium, Nickel, VOCs, SVOCs, PCBs, hydrocarbons.
891 Woburn St, Wilmington	No site name.	3-0014340	VOCs
MBTA Railroad Tracks/ditches, Wilmington	Formerly Boston & Maine RR	N/A	Herbicides, hydrocarbons
LOT 8 Presidential Way, Woburn	Boston Centerless, Inc.	3-0014666	Hydrocarbons
324 New Boston St., Woburn	Smart Ceramics	3-0012666	Hydrocarbons
New Boston St., Woburn	Industri-Plex 128	USEPA National Priority List Site	VOCs, chromium, arsenic, lead
323 New Boston St., Woburn	Tabby Pet Food (Currently New Boston Street Associates)	N/A	Unknown
Woburn	Balkus Piggery	N/A	Unknown
Woburn	Mastromarino Bros. Piggery	N/A	Unknown

<u>**General Notes:**</u>

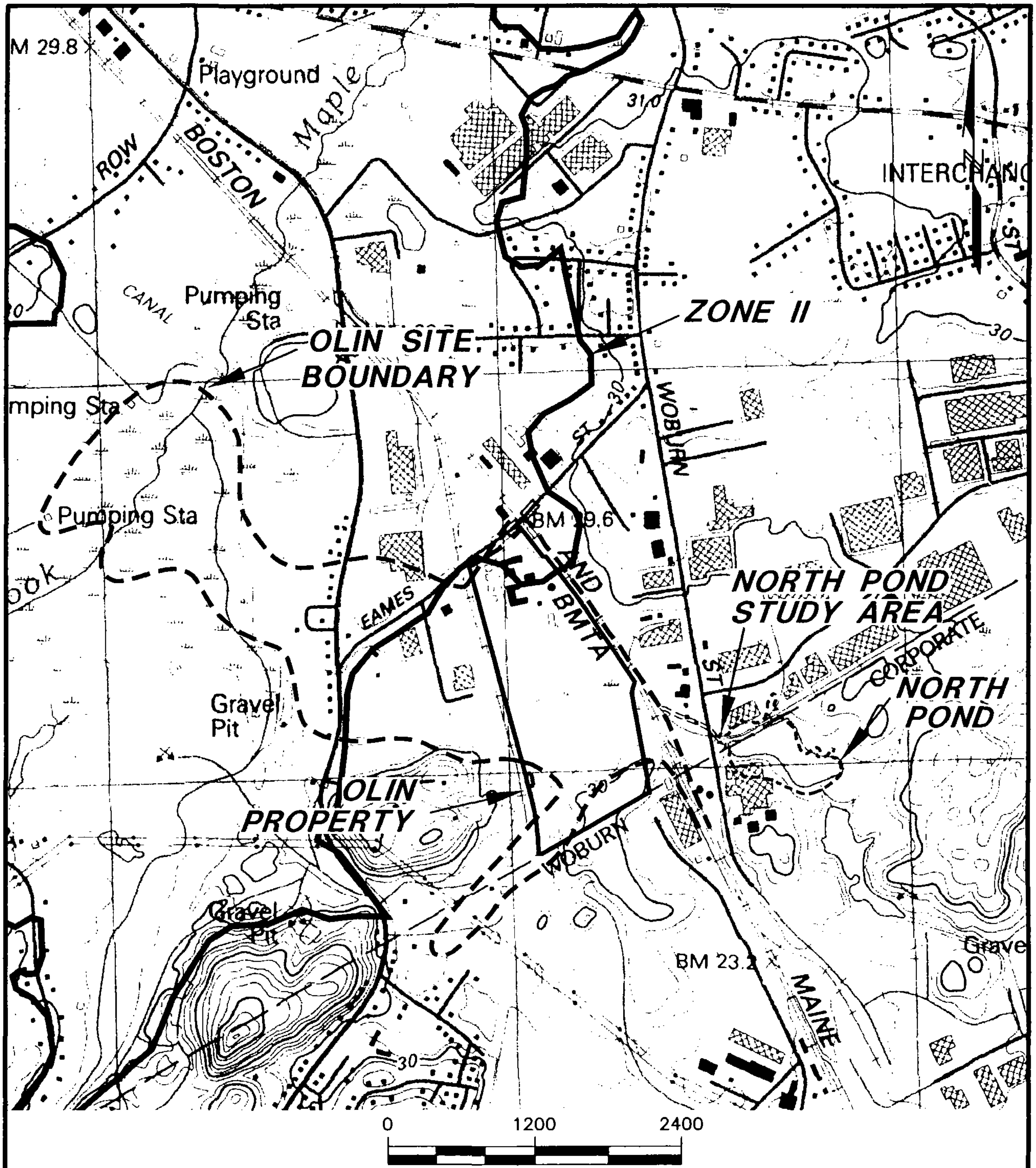
1. MADEP = Massachusetts Department of Environmental Protection
2. RTN = Release Tracking Number
3. VOCs = Volatile Organic Compounds
4. TPH = Total Petroleum Hydrocarbons
5. PCBs = Polychlorinated Biphynols
6. SVOCs = Semivolatile Organic Compounds
7. CERCLIS = Comprehensive Environmental Response, Compensation and Liability Act
8. USEPA = United States Environmental Protection Agency

Table 2
Property Within the 1995 North Pond Extent
Olin Chemical Property
51 Eames Street
Wilmington, MA

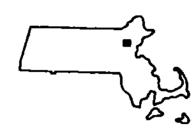
Town	Assessor Map ID	Address	Current Owner	MADEP-Listed Site
Woburn	04/ 07/ 05	331 New Boston Street	Bedoyan Vicken Trust	No
Woburn	04/ 07/ 06	323 New Boston Street	New Boston Street Associates (Formerly Tabby Pet Food)	No
Woburn	04/ 07/ 04	One Presidential Way	Various (Industrial Condos)	No
Wilmington	46/ /101	15 Industrial Way	Jelle LLC	No

General Note:
1. MADEP = Massachusetts Department of Environmental Protection

Figures

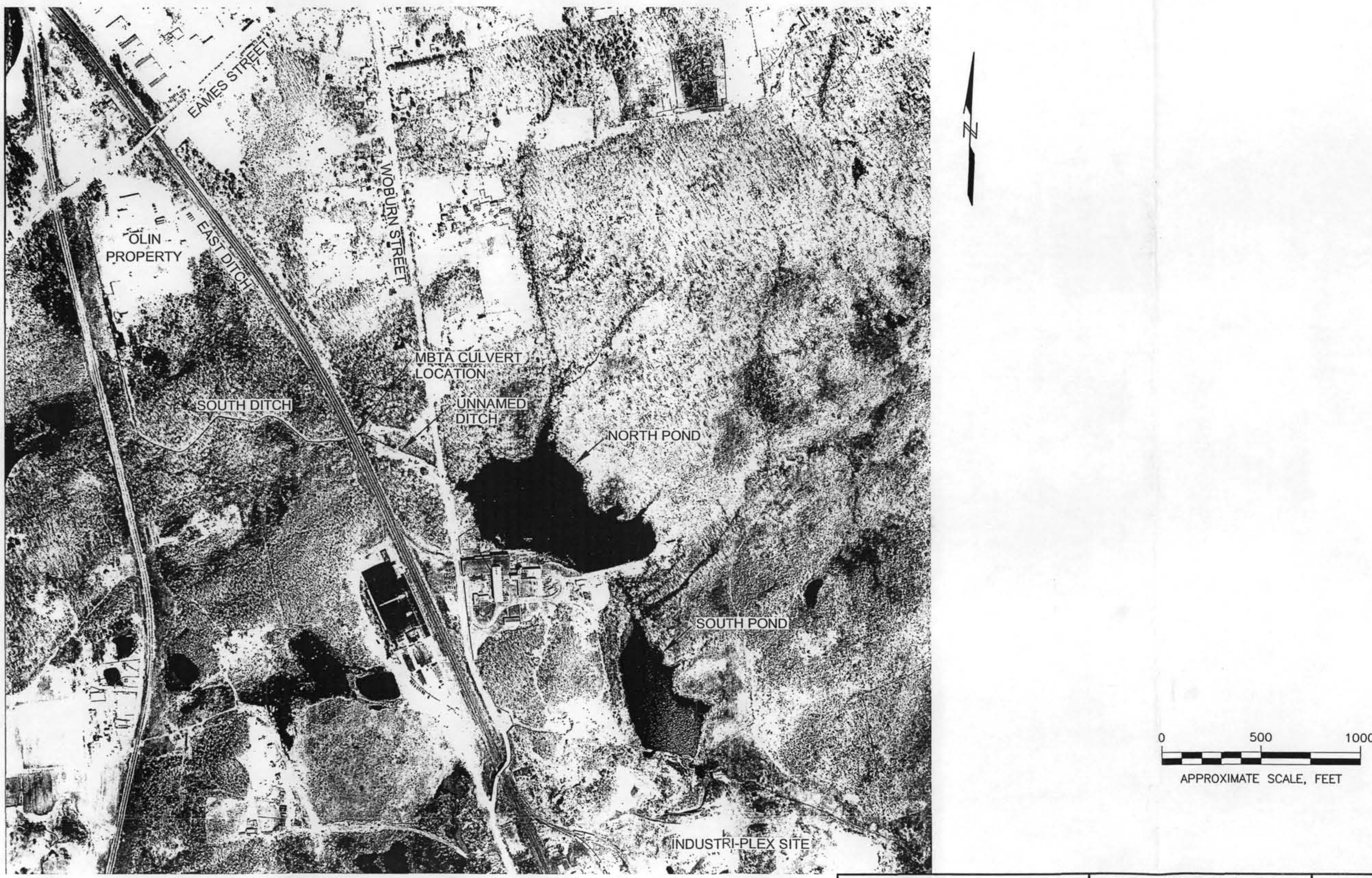


This Map Image provided by MassGIS is taken from U.S.G.S. Topographic 7.5 X 15 Minute Series Reading, MA Quadrangle, 1987.
Datum is National Geodetic Vertical Datum (NGVD).
Contour Interval is 3 Meters.



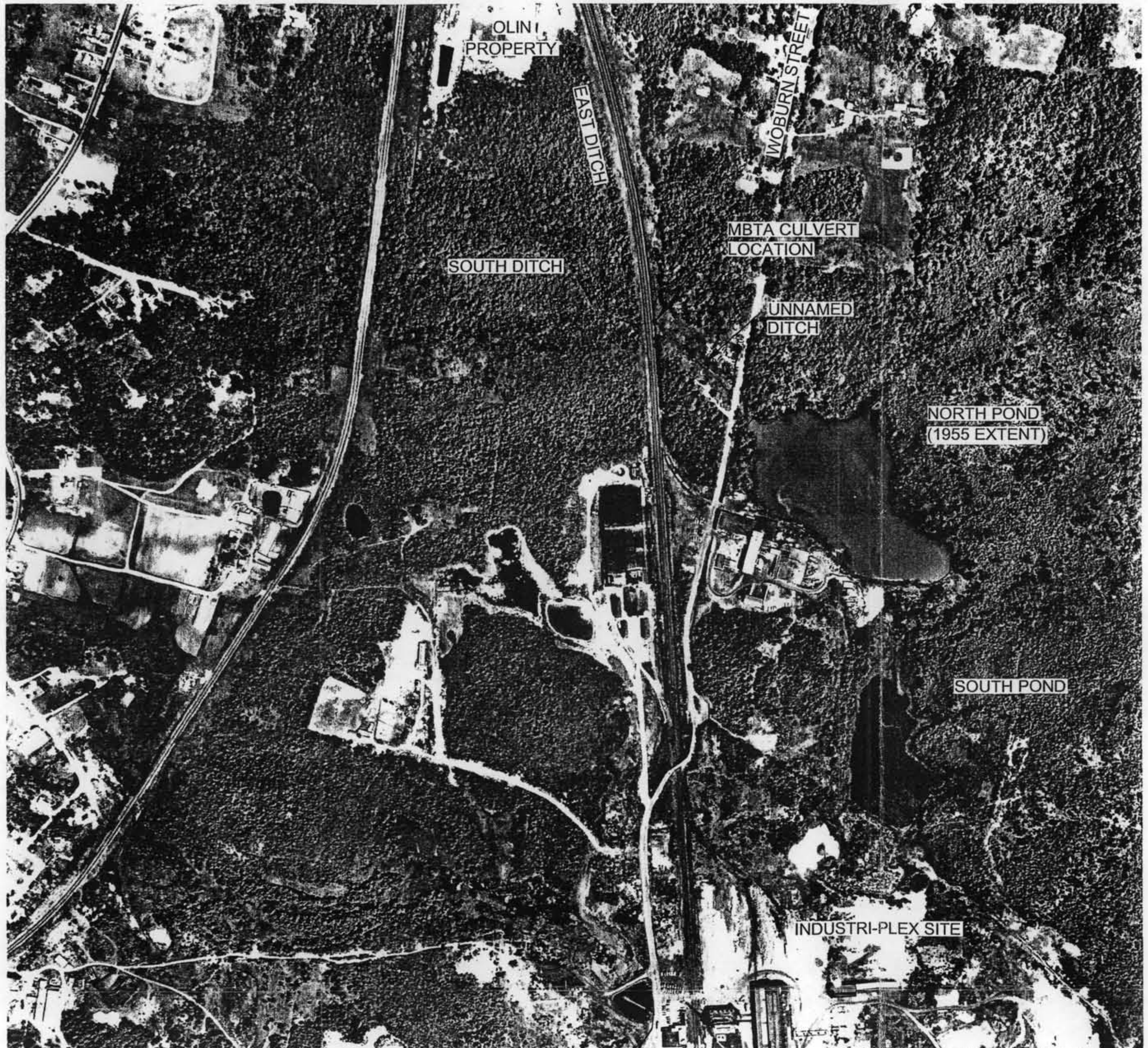
Olin Corporation Charleston, Tennessee	North Pond Study Area Investigation – Part 1 51 Eames Street Wilmington, Massachusetts	SITE LOCATION MAP AND NORTH POND STUDY AREA
GEI Consultants, Inc.	Project 97598	December 2002 Fig. 1

97598-9-506 djm 12/16/02



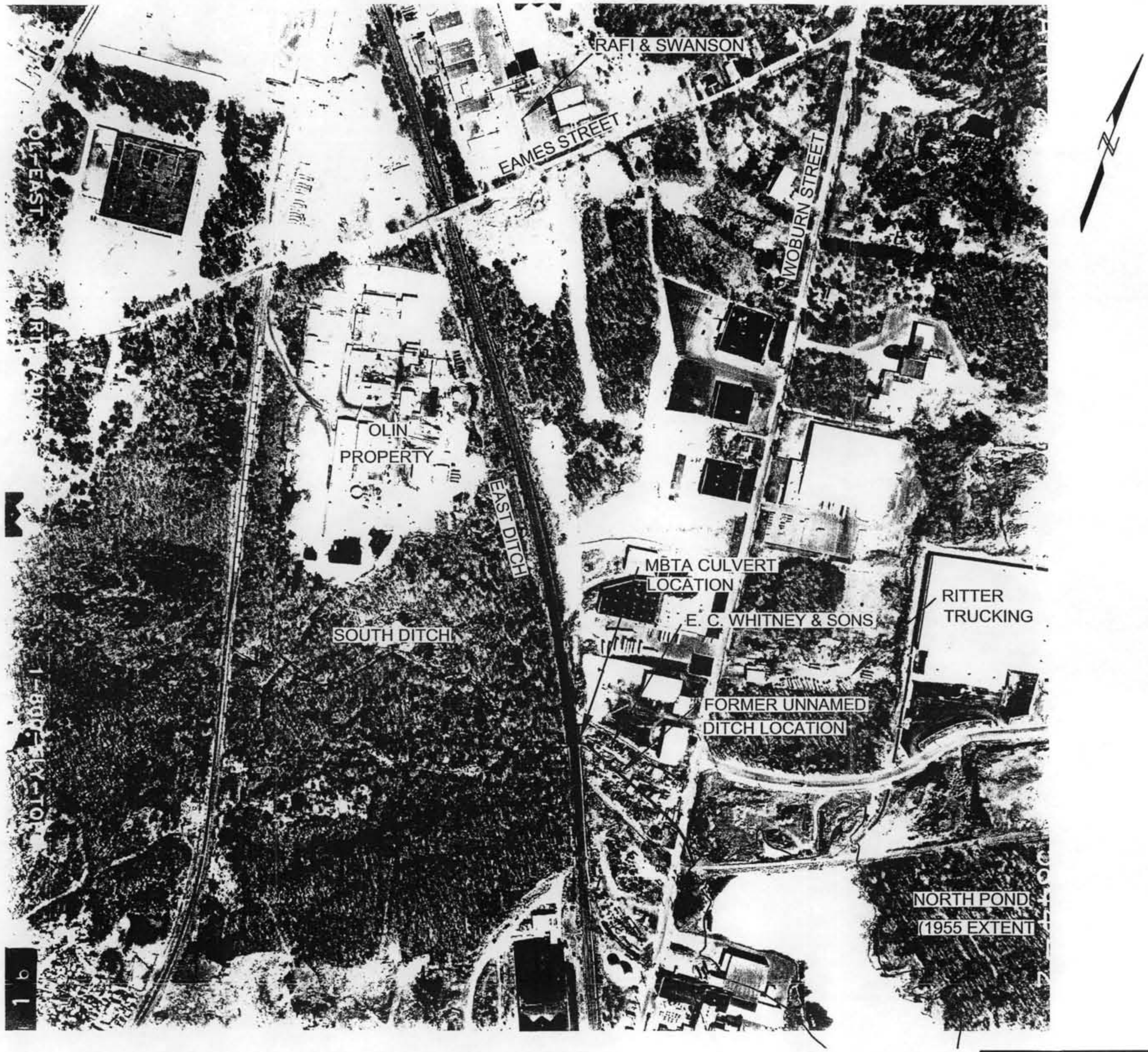
Olin Corporation Charleston, Tennessee	North Pond Study Area Investigation – Part 1 51 Eames Street Wilmington, Massachusetts	AERIAL PHOTOGRAPH APRIL 5, 1955
Φ GEI Consultants, Inc.	Project 97598	December 2002 Fig. 2

97598-9-508 djm 12/11/02



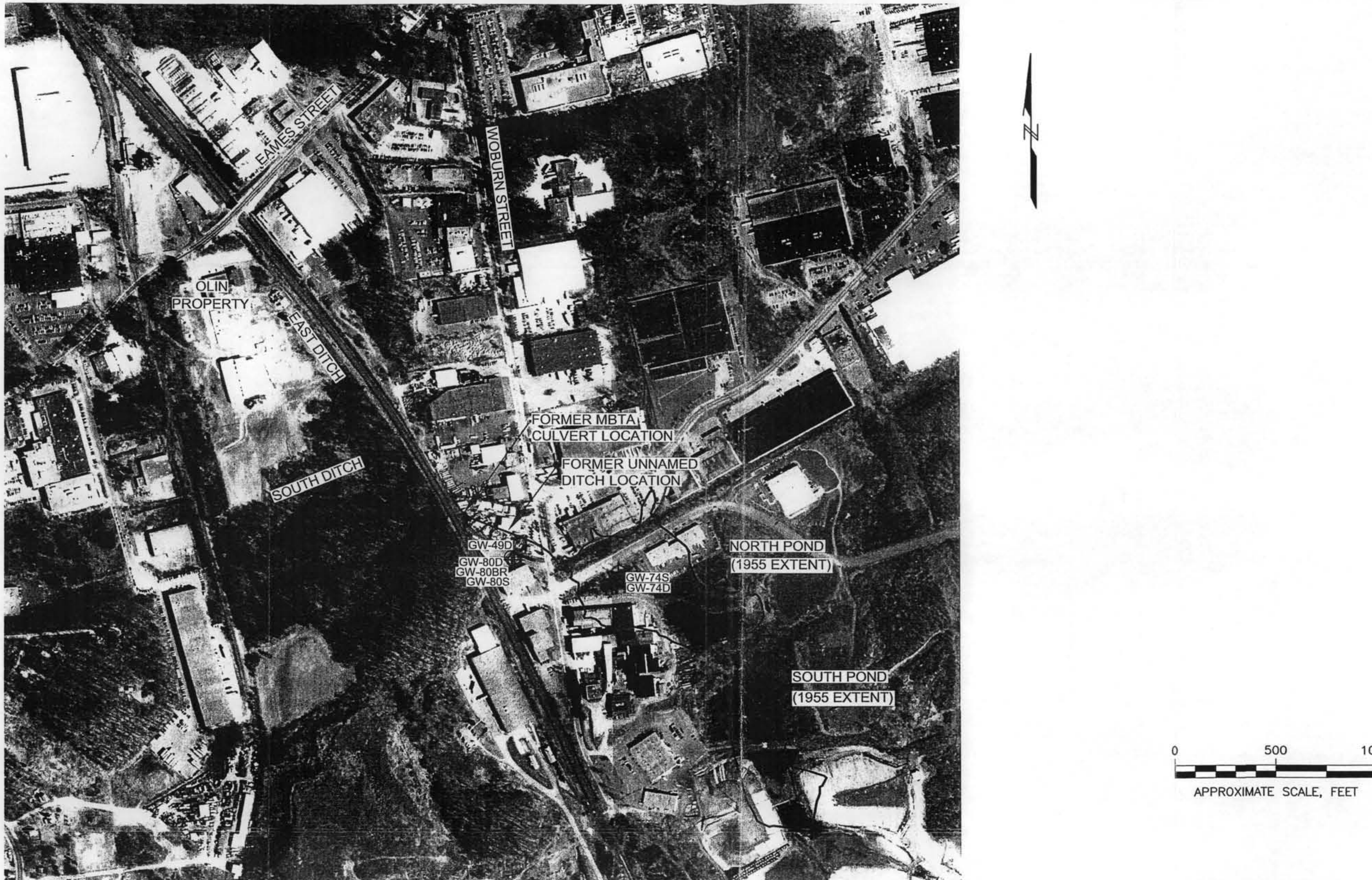
Olin Corporation Charleston, Tennessee	North Pond Study Area Investigation – Part 1 51 Eames Street Wilmington, Massachusetts	AERIAL PHOTOGRAPH JUNE 26, 1956
GEI Consultants, Inc.	Project 97598	December 2002 Fig. 3

97598-9-508 djm 12/11/02



Olin Corporation Charleston, Tennessee	North Pond Study Area Investigation – Part 1 51 Eames Street Wilmington, Massachusetts	AERIAL PHOTOGRAPH APRIL 24, 1971
GEI Consultants, Inc.	Project 97598	December 2002 Fig. 4

97598-9-508 djm 12/11/02



Olin Corporation Charleston, Tennessee	North Pond Study Area Investigation – Part 1 51 Eames Street Wilmington, Massachusetts	AERIAL PHOTOGRAPH 1995
Φ GEI Consultants, Inc.	Project 97598	December 2002 Fig. 5

97598-9-508 djm 12/11/02

Appendix A

Appendix A

Comprehensive Response Action Transmittal Form and MADEP Correspondence

Massachusetts Department of Environmental Protection **BWSC-108**
Bureau of Waste Site Cleanup

COMPREHENSIVE RESPONSE ACTION TRANSMITTAL FORM & PHASE I COMPLETION STATEMENT

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number: 3 - 0471

A. SITE LOCATION:

Site Name: (optional) Olin Corporation

Street: 51 Eames Street   Location Aid:

City/Town: Wilmington   ZIP Code: 01887

Related Release Tracking Numbers that this Form Addresses:

Tier Classification: (check one of the following) [X] Tier IA [ ] Tier IB [ ] Tier IC [ ] Tier II [ ] Not Tier Classified

If a Tier I Permit has been issued, state the Permit Number: 83004

B. THIS FORM IS BEING USED TO: (check all that apply)

- [ ] Submit a **Phase I Completion Statement**, pursuant to 310 CMR 40.0484 (complete Sections A, B, C, G, H, I and J).
- [x] Submit a **Phase II Scope of Work**, pursuant to 310 CMR 40.0834 (complete Sections A, B, C, G, H, I and J). North Pond
- [ ] Submit a final **Phase II Comprehensive Site Report and Completion Statement**, pursuant to 310 CMR 40.0836 (complete Sections A, B, C, D, G, H, I and J).
- [ ] Submit a **Phase III Remedial Action Plan and Completion Statement**, pursuant to 310 CMR 40.0862 (complete Sections A, B, C, G, H, I and J).
- [ ] Submit a **Phase IV Remedy Implementation Plan**, pursuant to 310 CMR 40.0874 (complete Sections A, B, C, G, H, I and J).
- [ ] Submit an **As-Built Construction** Report, pursuant to 310 CMR 40.0875 (complete Sections A, B, C, G, H, I and J).
- [ ] Submit a **Phase IV Final Inspection Report and Completion Statement**, pursuant to 310 CMR 40.0878 and 40.0879 (complete Sections A, B, C, E, G, H, I and J).
- [ ] Submit a periodic **Phase V Inspection & Monitoring Report**, pursuant to 310 CMR 40.0892 (complete Sections A, B, C, G, H, I and J).
- [ ] Submit a final **Phase V Inspection & Monitoring Report and Completion Statement**, pursuant to 310 CMR 40.0893 (complete Sections A, B, C, F, G, H, I and J).

You must attach all supporting documentation required for each use of form indicated, including copies of any Legal Notices and Notices to Public Officials required by 310 CMR 40.1400.

C. RESPONSE ACTIONS:

- [ ] Check here if any response action(s) that serves as the basis for the Phase submittal(s) involves the use of Innovative Technologies. (DEP is interested in using this information to create an Innovative Technologies Clearinghouse.)

Describe Technologies:

D. PHASE II COMPLETION STATEMENT:

Specify the outcome of the Phase II Comprehensive Site Assessment:

- [ ] Additional Comprehensive Response Actions are necessary at this Site, based on the results of the Phase II Comprehensive Site Assessment.
- [ ] The requirements of a Class A Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- [ ] The requirements of a Class B Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- [ ] Rescoring of this Site using the Numerical Ranking System is necessary, based on the results of the final Phase II Report.

E. PHASE IV COMPLETION STATEMENT:

Specify the outcome of Phase IV activities:

- [ ] Phase V operation, maintenance or monitoring of the Comprehensive Response Action is necessary to achieve a Response Action Outcome. (This site will be subject to a Phase V Operation, Maintenance and Monitoring Annual Compliance Fee.)
- [ ] The requirements of a Class A Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- [ ] The requirements of a Class C Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

SECTION E IS CONTINUED ON THE NEXT PAGE

Massachusetts Department of Environmental Protection

Bureau of Waste Site Cleanup

BWSC-108

COMPREHENSIVE RESPONSE ACTION TRANSMITTAL FORM & PHASE I COMPLETION STATEMENT

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number 3 - 0471

E. PHASE IV COMPLETION STATEMENT: (continued)

☐ The requirements of a Class C Response Action Outcome have been met. Further operation, maintenance or monitoring of the remedial action is necessary to ensure that conditions are maintained and that further progress is made toward a Permanent Solution. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

Indicate whether the operation and maintenance will be Active or Passive. (Active Operation and Maintenance is defined at 310 CMR 40.0006.):

○ Active Operation and Maintenance ○ Passive Operation and Maintenance

(Active Operation and Maintenance makes the Site subject to a Post-RAO Class C Active Operation and Maintenance Annual Compliance Fee.)

F. PHASE V COMPLETION STATEMENT:

Specify the outcome of Phase V activities:

☐ The requirements of a Class A Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

☐ The requirements of a Class C Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

☐ The requirements of a Class C Response Action Outcome have been met. Further operation, maintenance or monitoring of the remedial action is necessary to ensure that conditions are maintained and that further progress is made toward a Permanent Solution. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

Indicate whether the operation and maintenance will be Active or Passive. (Active Operation and Maintenance is defined at 310 CMR 40.0006.):

○ Active Operation and Maintenance ○ Passive Operation and Maintenance

(Active Operation and Maintenance makes the Site subject to a Post-RAO Class C Active Operation and Maintenance Annual Compliance Fee.)

G. LSP OPINION:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with the information contained in this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,

> *if Section B indicates that a* ***Phase I, Phase II, Phase III, Phase IV or Phase V Completion Statement*** *is being submitted*, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> *if Section B indicates that a* ***Phase II Scope of Work*** *or a* ***Phase IV Remedy Implementation Plan*** *is being submitted*, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal:

> *if Section B indicates that an* ***As-Built Construction Report*** *or a* ***Phase V Inspection and Monitoring Report*** *is being submitted*, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

☐ Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

LSP Name: M. Margret Hanley LSP #: 8494

Telephone: 781.721.4022 Ext.:

FAX: (optional) 781.721.4073

Signature: M Margret Hanley

Date: December 16, 2002

Stamp: COMMONWEALTH OF MASSACHUSETTS M. MARGRET HANLEY No 8494 REGISTERED LICENSED SITE PROFESSIONAL

Massachusetts Department of Environmental Protection **BWSC-108**

Bureau of Waste Site Cleanup

COMPREHENSIVE RESPONSE ACTION TRANSMITTAL FORM & PHASE I COMPLETION STATEMENT

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number: 3 - 0471

H. PERSON UNDERTAKING RESPONSE ACTION(S):

Name of Organization: Olin Corporation

Name of Contact: Steve G. Morrow Title: Principle Environmental Specialist

Street: 1186 Lower River Road

City/Town: Charleston State: TN ZIP Code: 37310-0248

Telephone: 423.336.4511 Ext.: ______ FAX: (optional) ______

☐ Check here if there has been a change in the person undertaking the Response Action.

I. RELATIONSHIP TO SITE OF PERSON UNDERTAKING RESPONSE ACTION(S): (check one)

☒ RP or PRP Specify: (X) Owner ○ Operator ○ Generator ○ Transporter Other RP or PRP: ______

☐ Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ Any Other Person Undertaking Response Action Specify Relationship: ______

J. CERTIFICATION OF PERSON UNDERTAKING RESPONSE ACTION(S):

I, Steve Morrow, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: Steve Morrow Title: Principle Environmental Specialist
(signature)

For: ______ Date: December 16, 2002
(print name of person or entity recorded in Section H)

Enter address of the person providing certification, if different from address recorded in Section H:

Street: ______

City/Town: ______ State: ______ ZIP Code: ______

Telephone: ______ Ext.: ______ FAX: (optional) ______

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Metropolitan Boston – Northeast Regional Office

JANE SWIFT
Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

FEB 01 2002

Olin Corporation
P.O. Box 248
1186 Lower River Road, NW
Charleston, TN 37310
ATTN: Stephen Morrow

RE: Wilmington
Olin Chemical
51 Eames Street
RTN 3-0471
Additional Phase II Investigations of the East Ditch; Conditional Approval, Additional Investigation Requirements

Dear Mr. Morrow:

On October 12, 2001 the Department of Environmental Protection (DEP) received a Scope of Work entitled "Additional Phase II Investigations of the East Ditch." The Scope of Work (SOW) was prepared on behalf of the Olin Corporation by Harding ESE, Inc. with the assistance of Geomega, Inc., and was reviewed by Margret Hanley, the Licensed Site Professional of Record. The SOW describes additional investigation activities that will be completed to define the nature and extent of contamination in the East Ditch that can be attributed to past activities at the Olin Property.

BACKGROUND

The Olin Property in Wilmington is a former chemical manufacturing facility that has been owned and operated by various companies since the early 1950's. Olin is in the process of investigating the extent of contamination from prior releases at the Property, in accordance with the Phase II Site Characterization requirements in the Massachusetts Contingency Plan. Chemicals of concern that may have entered the East Ditch from the Olin Property include the inorganic chemicals ammonia, chromium, sulfate, chloride and sodium, and the organic compounds n-nitrosodiphenylamine, phthalates, and trimethlypentenes. A chromium-containing floc is also known to migrate into the East Ditch from the Olin Property via surface water flow from the South Ditch.

PHASE II EAST DITCH SCOPE OF WORK

The East Ditch is a narrow and shallow surface water drainage ditch that flows along the east side of the Olin property through a heavily industrialized area. Surface water drainage from the Olin property enters the East Ditch approximately 3/8 mile south of Eames Street. The East Ditch continues to flow to the South and turns into the New Boston Street Drainway, which was addressed as part of cleanup activities for the Industri-Plex Site. The New Boston Street Drainway flows South and discharges into Hall's Brook, than into Hall's Brook Holding Area, and eventually into the Aberjona River.

Olin proposes to complete the following investigative activities in order to assess the extent of their potential contribution to sediment and surface water contamination in the East Ditch:

- Additional assessment of sediment and surface water quality will be performed in the unculverted portions of the East Ditch to the east and south of the Property. Sediment and surface water samples will be collected upstream and downstream of the confluence with the South Ditch, and analyzed for contaminants of concern.

- An ecological characterization will be performed to identify potential ecological receptors that are present in the East Ditch. Aquatic populations will be sampled, evaluated, and compared to background areas in order to determine the degree of impairment.

- The bioavailability of floc, and its potential impact on ecological receptors in the East Ditch and at downstream environments, will be evaluated.

- The information collected as part of this investigation will be used to update both human health and ecological risk characterizations for the East Ditch.

CONDITIONAL APPROVAL

DEP believes that further investigative work is necessary to determine the extent of contamination in the East Ditch from releases from the Olin Property, and the potential for this contamination to impact human health and environmental receptors. DEP approves of the SOW for the Supplemental Phase II Investigation, but the following activities also must be completed:

- In order to define the full extent of contamination in the East Ditch, surface water and sediment samples must be collected in the New Boston Street Drainway (and potentially further downstream) and analyzed for the contaminants of concern. DEP is concerned that the New Boston Street Drainway, which was remediated by 1998 as part of the cleanup of the Industri-Plex Superfund site, may have become recontaminated from releases from the Olin property to the East Ditch.

- The information collected must be used to complete human health and ecological risk characterizations for the additional areas investigated.

- All of the additional data must eventually be included in human health and ecological risk characterizations which address conditions for the entire site.

DEP understands that one year is required in order to evaluate chemical and ecological conditions in the East Ditch during a range of seasonal conditions, so a summary report describing the results of all of the information collected during completion of the Phase II SOW for the East Ditch must be submitted to DEP within one year of the date of this letter. However, parts of the investigation should be completed more quickly. Therefore, a report summarizing the results of the sediment sampling must be submitted to DEP within three months of the date of this letter, and a report summarizing investigations completed to determine the bioavailability of the floc must be submitted to DEP within six months of the date of this letter. Please be advised that these dates are being established as an Interim Deadlines, pursuant to 310 CMR 40.0167.

FORMER DRAINAGE DITCH AND NORTH POND – INVESTIGATION REQUIRED

The 1955 aerial photograph included in the Phase II SOW for the East Ditch shows a surface water drainage ditch, which travels from west to east across the Olin property and discharges into the North Pond. The surface water drainage from the Olin site discharged into the North Pond via this ditch for an unknown period of time, although Olin indicates that this drainage ditch was not evident in a 1963 aerial photograph of the area. The extent to which contamination from the Olin property migrated to the East in these water bodies needs to be investigated. Surface water and sediment quality samples must be collected from the North Pond. In addition, a soil boring and soil sampling program will be necessary to

determine if contamination still exists in areas of the former drainage channel and the North Pond which were filled in the 1970's to make way for the development of Presidential Way and the Bay State Bindery facility.

A supplemental Scope of Work must be submitted to DEP to address the additional activities listed above. The supplemental Scope of Work must be submitted to DEP for review within 90 days of the date of this letter. Please be advised that this date is being established as an Interim Deadline, pursuant to 310 CMR 40.0167.

Your cooperation in this matter is appreciated. If you have any further questions regarding this matter, please contact Christopher Pyott at (978) 661-7739 or at the letterhead address.

Very truly yours,

Christopher Pyott
Environmental Analyst
Site Management

Stephen M. Johnson

Stephen Johnson
Section Chief
Site Management

cc: Wilmington BOH
Wilmington Water Department
Wilmington Conservation Commission
Data Management: SOW
DEP/NERO/Water Supply, Attn: Jim Persky
DEP/NERO/BWSC, Attn: John Fitzgerald, Regional Engineer
Sleeman, Hanley, & DeNitto, 63 St Botolph Street, Boston, MA 02116
Attn: Margret Hanley
Geomega, 2995 Baseline Road, Suite 202, Boulder, CO 80303, Attn: Andy Davis

✓

GEI Consultants, Inc.

April 4, 2002
Project 97598

1021 Main Street
Winchester, MA 01890-1970
781•721•4000
781•721•4073 Fax

Mr. Christopher Pyott
Environmental Analyst
Department of Environmental Protection
Bureau of Waste Site Cleanup
205A Lowell Street
Wilmington, MA 01887

RECEIVED
APR 0 5 2002
DEP
NORTHEAST REGIONAL OFFICE

Dear Mr. Pyott:

Re: Scope of Work
Investigation of North Pond Area
Wilmington and Woburn, MA
RTN 3-0471

The purpose of this letter is to present a Scope of Work (SOW) for the assessment of the extent of Contaminants of Concern (COCs) related to the Olin Property east of the Massachusetts Bay Transportation Authority (MBTA) railroad tracks to North Pond, in Woburn, Massachusetts. For the purposes of this proposal, we refer to this area as the North Pond Study Area (Fig. 1).

The MADEP requested that this SOW be submitted on or before May 1, 2002, as part of its Conditional Approval of the Additional Phase II Investigation of the East Ditch, dated February 1, 2002.

The implementation of this SOW will be used to support the Comprehensive Site Assessment (CSA) of the Olin Property (RTN 3-0471). Accordingly, a Comprehensive Response Action (CRA) Transmittal Form (BWSC-108) is attached to this letter.

Background

MADEP has asked Olin to submit a SOW to assess the extent of Olin-related COCs east of the MBTA railroad tracks to North Pond due potentially to the transport of contamination via surface water from the Olin Property. The presumed pathway of contaminant migration is as follows:

a. Direct discharge of wastewater and the discharge of contaminated groundwater to the South Ditch Surface Water.

b. Discharge to the East Ditch (located on the west side of the MBTA tracks) upstream o at the location of a culvert that connects the ditches to the east and west of the MWR right of way.

c. Flow to the southeast along a drainage ditch that connects the eastern most drainage ditch to North Pond.

The presumed pathway described above is depicted in Figure 1. Historical information reported by Olin indicates that the pathway described above may have existed for a period of time between the late 1950s and the late 1970s[1]. Since the 1970s, a substantial portion of North Pond was filled and developed. Filling may have included soil and debris from the Industri-Plex area. The culvert that may have created a physical pathway between the ditches on the east and west sides of the MBTA right of way is no longer evident.

Olin has installed 6 monitoring wells to the east of the MBTA siding since 1992 (GW-49D, GW-74D, GW-74S, GW-80BR, GW-80D, and GW-80S). These well locations are depicted on Figure 1. Data collected from these wells indicates the following:

a. Groundwater in the study area ranges between approximately 2 to 6 feet below the ground surface (bgs) (Table 1).

b. Groundwater flow at depth in the vicinity of the confluence of the south and east ditch is uncertain, but might be to the southeast, toward North Pond. Shallow groundwater may discharge to the ditch system, under certain conditions.

c. Groundwater south east of the South Ditch/East Ditch confluence exhibits Olin-related COCs (e.g., ammonia in GW-49D) at concentrations that are at or below background levels. Additionally, VOCS that are not associated with Olin (e.g., TCE in GW-74D and GW-80BR) are present. Collectively, the Olin wells east of the MBTA right-of-way have been sampled nine times over the last 10 years, and those samples have been analyzed for more than 1,300 parameters. Of those 1,300 analyses, 345 have resulted in detections above the method limits. A summary of the testing of the Olin wells in the North Pond area is presented on Table 2.

d. The top of the GW-74S well screen is at an elevation of 67.7 feet AMSL, which is about one foot below the likely elevation of the bottom of former North Pond. Sedimentation in the North Pond over the couple of decades (1950s and 60s) prior to its partial filling in the 1970s would have resulted in accumulation of sediment at elevations consistent with the top portion of the GW-74S well screen.

Proposed Scope of Work

Olin proposes to address MADEP's request to assess the potential nature and extent of Olin-related contamination in the vicinity of North Pond in two parts. For Part I, Olin proposes to confirm the hypothesized pathway of migration, and to evaluate a basis for discriminating between Olin-related COCs and contaminants that may be attributable to other sources. Part II will consist of additional subsurface investigations in the Study Area to document Olin's contribution, if any, to the existing conditions in the vicinity of North Pond.

[1] Scope of Work for Additional Phase II Investigation of the East Ditch, dated October 12, 2001.

Part 1 will consist of the following tasks:

1. **Information Search and Data Review.** Olin will seek to obtain information developed by U.S. Environmental Protection Agency (EPA) and others in the Study Area as defined herein. Specifically, Olin will try to obtain soil boring data, monitoring well installation logs, groundwater elevation data, surface and water quality data, and soil and waste profiling data generated for properties located within the study area. Sources of information are expected to include MADEP, EPA, MBTA records, the findings of due diligence reports prepared by private property owners within the study area, if available, and information maintained by municipal departments and historical societies in Woburn and Wilmington.

2. **Confirmation of groundwater flow direction and groundwater discharge in the areas defined by the confluence of the South and East Ditches, extending southeast to North Pond.** Olin proposes to collect seasonal groundwater elevation data in the study area, using existing Olin wells, groundwater elevation data collected during the East Ditch Phase II Investigation, and the data from wells installed by EPA or others in the area, to the extent that access can be obtained.

3. **Confirmation of flow directions in the unnamed drainage ditch that connects the North Pond and the drainage Ditch to the East of the MBTA ROW.** Olin will document surface water flow conditions in the ditches seasonally, and under a variety of hydrological conditions.

4. **Confirmation of the location, invert elevation, and purpose of the culvert that reportedly connected the drainage ditches on either side the MBTA ROW, and confirmation of the base elevation of the drainage ditches on either side of the MBTA drainage ditch during the period of time that the culvert was present.** Although there is historical evidence that a culvert connected the drainage ditches located either side of the MBTA ROW, Olin has been unable to determine if the culver is still present, or when it may have been removed. Moreover, the purpose of the culvert is not clear. If present, the culvert would have created a physical connection between the two drainage ditches. It is not clear if flow discharging to the west side of the ditch from the Olin Property would have flown through the culvert to the east. Flow through the culvert to the west would be determined by the location of the culvert relative to the confluence of the South and East Ditch, the base elevation of the drainage ditches, the invert elevation of the culvert, and elevation of surface water in the ditch. This effort seeks to confirm that period when the culvert existed, and under what conditions, if any, the culvert would have created a hydrological connection between the ditches. We plan to search the historical records of the Towns of Wilmington, Woburn, and the MBTA, and aerial photography for the area as part of this task.

5. **Documentation of the source and nature of material used to fill North Pond.** Historical data suggests that North Pond was filled with material excavated from the

area now known as Industriplex[2]. This material potentially contains Chromium, and other contaminants that are also present at the Olin Property. The presence of these compounds in the vicinity of North Pond, therefore, cannot be considered to be evidence that Olin contributed to the conditions in North Pond. Based on our understanding of the type of material used to fill North Pond, Olin will attempt to develop a criteria for distinguishing between Olin related COCs and COCs attributable to others, for MADEP review and consideration. These criteria will form the basis for further testing by Olin, if determined to be necessary, in and around North Pond.

6. **Interim Report and Part II Scope of Work.** Olin will present the findings of the tasks summarized above, and recommendation for further groundwater, surface water and sediment sampling necessary to establish Olin's contribution, if any, to the existing conditions in the vicinity of North Pond.

Schedule

Olin proposes to start Tasks 1 through 6 within 30 days of MADEP's authorization to proceed. This period of time is required for Olin to arrange for the funding of the work.

We anticipate that the work can be completed within 6 months of Olin's authorization for GEI and other members of the project team to proceed. We note that some information relevant to this assessment will be collected concurrent with the Phase II Investigation of the East Ditch, the scope of work for which was approved by MADEP in February 2002. This schedule is contingent upon Olin obtaining prompt access to publicly available information, including EPA data, and to wells or monitoring locations on private property within the study area. Olin may seek MADEP assistance in obtaining access to monitoring wells located on private property, if these wells are determined to be important to the understanding of environmental conditions in the Study Area.

Please contact Steve Morrow of Olin (423.336.4511) or me (617.742.4447) if you have any questions regarding the SOW presented in this letter.

Very truly yours,

GEI CONSULTANTS, INC.

M. Margret Hanley

M. Margret Hanley, LSP
LSP of Record

MMH:lek
c: Steve Morrow, Olin
M:\PROJECT\1997\97598 olin\CORRESP\02\SOW COCs NorthPond.doc

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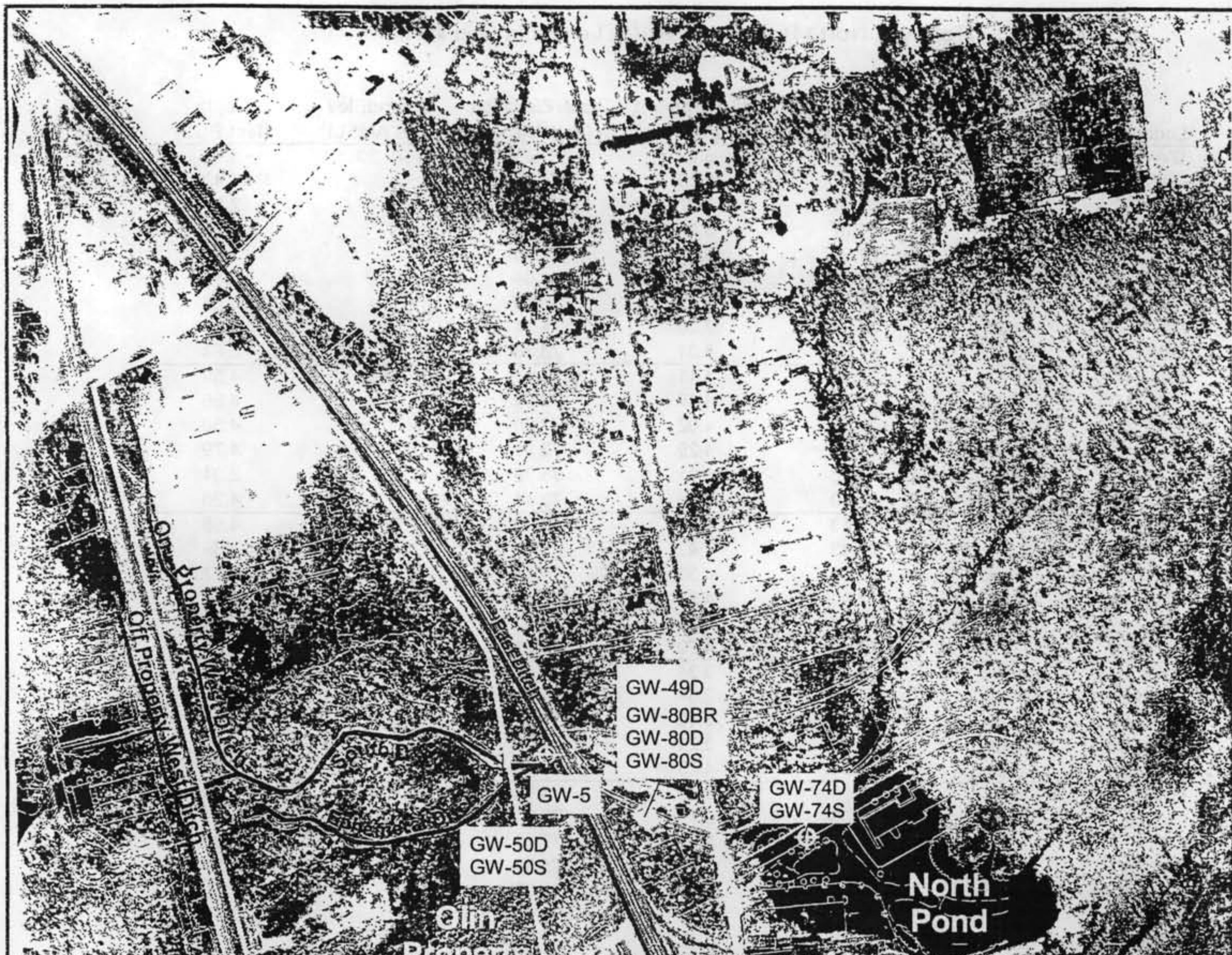
[2] Halliburton NUS. Preliminary Multiple Source Groundwater Response Plan Report; Industri-Plex Site; Woburn, Massachusetts. Prepared for USEPA.



Generation Date; 4/2/02	Figure 1. East Ditch area with 1955 aerial photo	Geomega

I:\Projects\olin\east_ditch.apr layout 4

Table 1. North Pond Area Water Levels in Olin Wells

Location	DateSampled	ReferenceElev (feet AMSL)	Measurement (feet)	WaterElevation (feet AMSL)	GroundElev (feet AMSL)	Depth (feet BGS)
GW-49D	8/14/92	81.37	6.02	75.35	79.20	3.85
GW-49D	9/3/92	81.37	6.59	74.78		4.42
GW-49D	1/7/93	81.37	5.07	76.30		2.90
GW-49D	4/21/93	81.37	5.12	76.25		2.95
GW-49D	10/8/95	81.37	5.92	75.45		3.75
GW-49D	4/30/96	81.37	5.33	76.04		3.16
GW-49D	4/7/98	81.37	5.72	75.65		3.55
GW-49D	5/1/01	81.37	7.23	74.14		5.06
GW-49D	10/30/01	81.37	8.01	73.36		5.84
GW-74D	4/21/93	77.22	4.11	73.11	77.70	4.59
GW-74D	10/8/95	77.22	4.18	73.04		4.66
GW-74D	4/30/96	77.22	4.02	73.20		4.50
GW-74D	4/7/98	77.20	4.29	72.91		4.79
GW-74D	5/1/01	77.20	1.81	75.39		2.31
GW-74D	10/30/01	77.20	3.76	73.44		4.26
GW-74S	4/21/93	77.43	4.31	73.12	77.70	4.58
GW-74S	10/8/95	77.43	4.42	73.01		4.69
GW-74S	4/30/96	77.43	4.30	73.13		4.57
GW-74S	4/7/98	77.41	4.57	72.84		4.86
GW-74S	5/1/01	77.41	2.29	75.12		2.58
GW-74S	10/30/01	77.41	4.20	73.21		4.49
GW-80BR	10/8/95	78.91	3.34	75.57	79.30	3.73
GW-80BR	4/30/96	78.91	2.67	76.24		3.06
GW-80BR	4/7/98	78.91	3.10	75.81		3.49
GW-80BR	5/2/01	78.91	3.21	75.70		3.60
GW-80BR	10/31/01	78.91	4.73	74.18		5.12
GW-80D	10/8/95	79.06	3.46	75.60	79.40	3.80
GW-80D	4/30/96	79.06	2.77	76.29		3.11
GW-80D	3/10/98	79.06	2.01	77.05		2.35
GW-80D	4/7/98	79.06	3.20	75.86		3.54
GW-80D	5/13/98	79.06	2.41	76.65		2.75
GW-80D	6/9/98	79.06	3.11	75.95		3.45
GW-80D	7/8/98	79.06	3.42	75.64		3.76
GW-80D	8/3/99	79.06	4.17	74.89		4.51
GW-80D	11/3/99	79.06	2.88	76.18		3.22
GW-80D	5/5/00	79.06	2.92	76.14		3.26
GW-80D	8/8/00	79.06	3.60	75.46		3.94
GW-80D	11/10/00	79.06	3.33	75.73		3.67
GW-80D	5/2/01	79.06	3.16	75.90		3.50
GW-80D	8/23/01	79.06	2.80	76.26		3.14
GW-80D	10/31/01	79.06	4.77	74.29		5.11
GW-80S	10/8/95	79.17	3.28	75.89	79.60	3.71
GW-80S	4/30/96	79.17	2.87	76.30		3.30
GW-80S	3/10/98	79.17	2.12	77.05		2.55
GW-80S	4/7/98	79.17	3.21	75.96		3.64
GW-80S	5/13/98	79.17	2.22	76.95		2.65
GW-80S	6/9/98	79.17	3.28	75.89		3.71
GW-80S	7/8/98	79.17	3.57	75.60		4.00
GW-80S	8/3/99	79.17	4.43	74.74		4.86
GW-80S	11/3/99	79.17	3.13	76.04		3.56
GW-80S	5/5/00	79.17	2.91	76.26		3.34
GW-80S	8/8/00	79.17	3.70	75.47		4.13
GW-80S	11/10/00	79.17	3.36	75.81		3.79
GW-80S	5/2/01	79.17	3.18	75.99		3.61
GW-80S	8/23/01	79.17	2.81	76.36		3.24

Table 2. Summary of Historical Water Quality Testing of Olin Wells in North Pond Area[1]

Well	Dates Sampled	No. Chemical Analytes[2]	No. Detections
GW-49	8/12/92	147	25
	11/16/92	148	32
GW-74D	4/20/93	148	13
GW-74S	4/20/93	148	12
GW-80BR	10/12/95	65	32
	10/19/95	121	30
	8/24/98	24	20
	12/10/98	11	9
	10/17/00	16	12
	4/25/01	16	13
	10/24/01	16	10
GW-80D	10/12/95	65	31
	10/19/95	121	21
GW-80S	10/12/95	65	40
	10/19/95	121	16

[1] Collectively, these wells have been analyzed for 181 different chemical parameters.

[2] Does not include laboratory spikes.

Appendix B

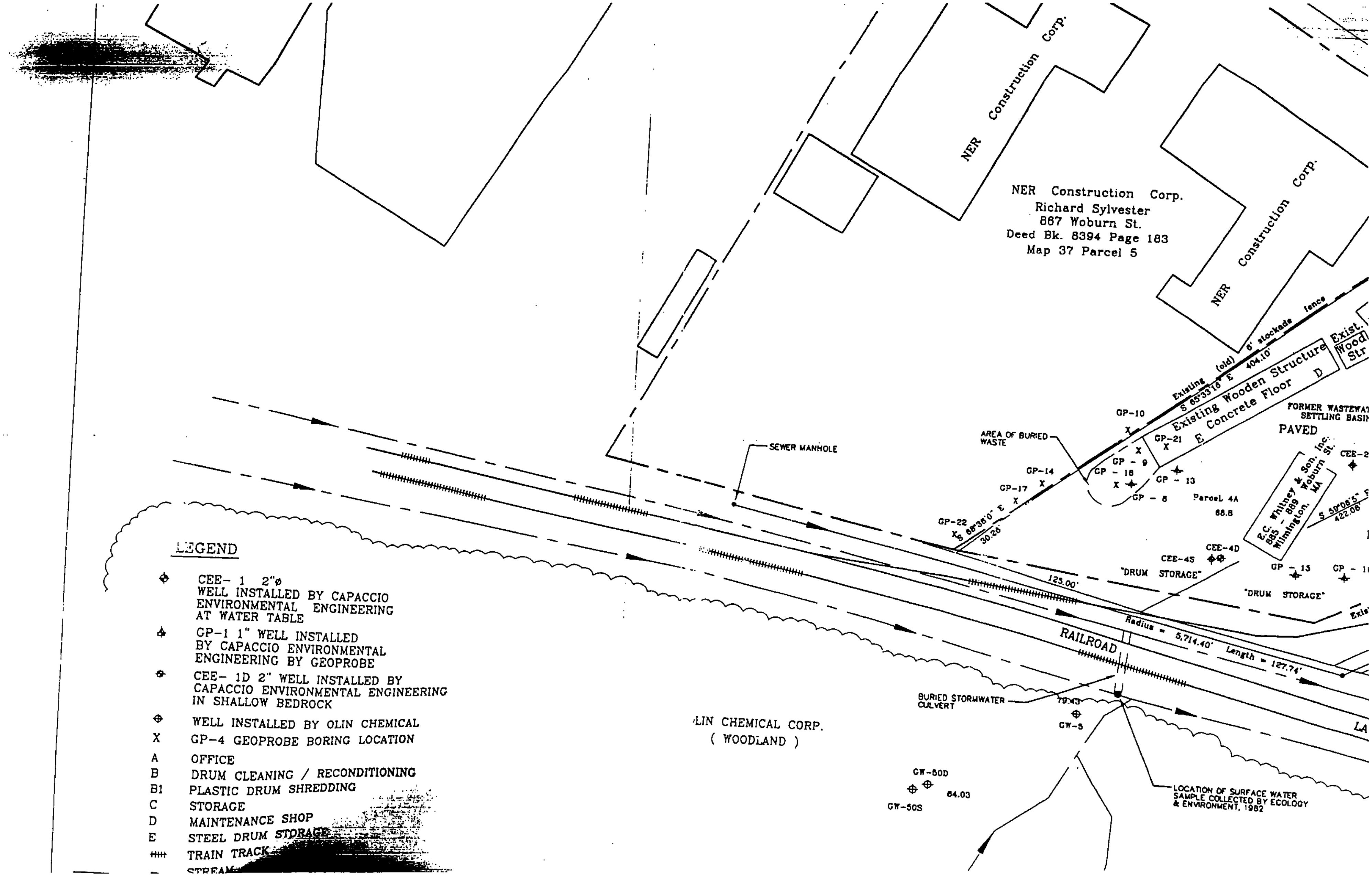
Appendix B

MBTA Culvert Information

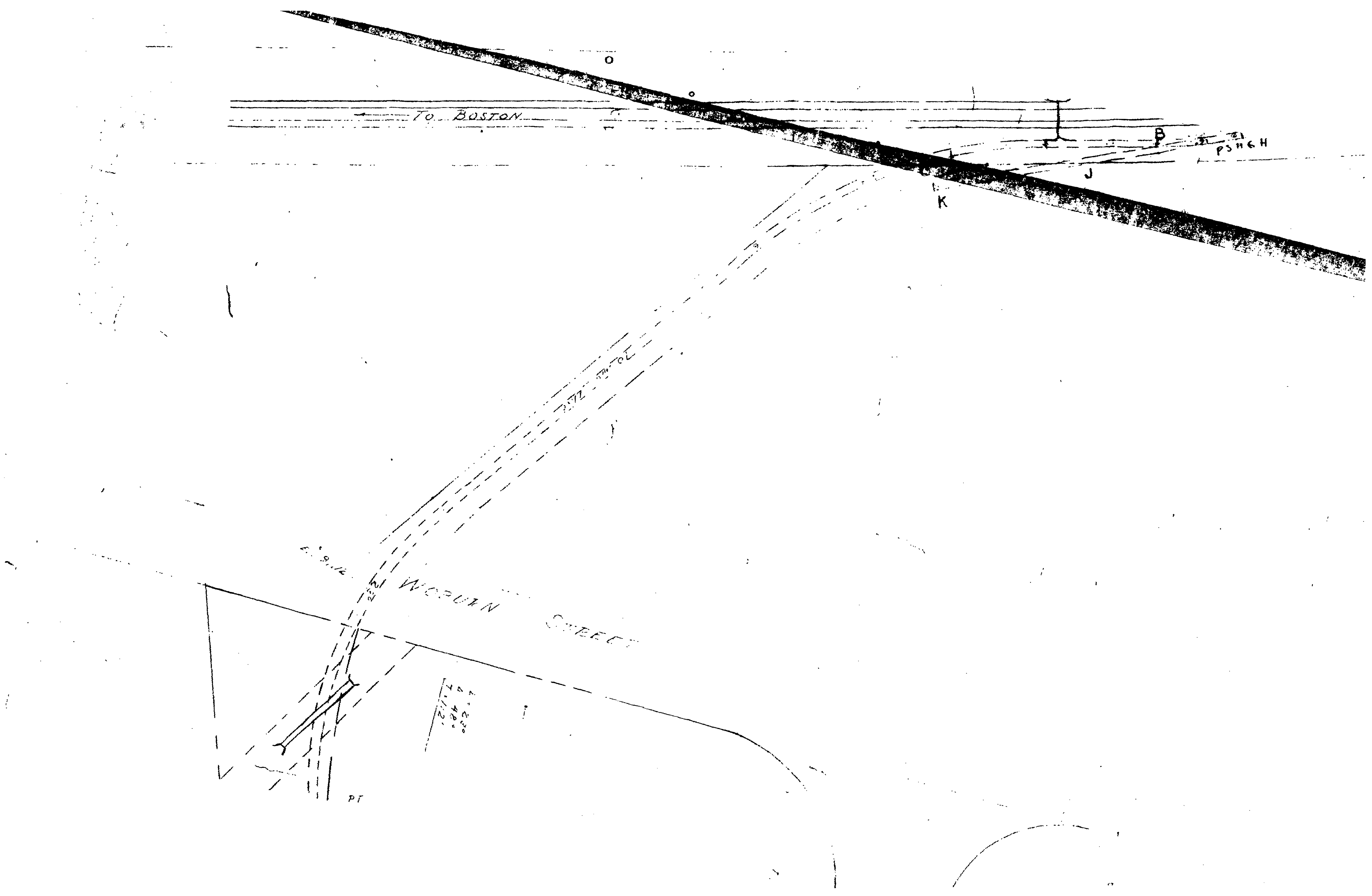
Parcel No.	Custodians	No	Kind of Instrument	Date of Instrument	Grantor	Grantee	Recorded Middlesex County Book	Page	Date	Remarks
10-14	3L	1012	Quit	Aug. 10 1833	Oliver E Richardson et als.	B & L R R Corp	325	320	Aug. 15 1833	
1	"	1569	Location	Nov 1832	Geo. R Baldwin	"	Co Comm		Nov. 19 1832	
2	"	243	F War	May 18 "	Luther Converse	"	313	123	May 19 "	
3	"	1155	" "	" 23 "	Oliver Tay	"	315	57	" 23 "	
4		1054	Quit	Dec 31 1897	B & L R R Corp	Merrimack Chemical Co.	2631	204	Jan. 31 1898	
5		1595	"	June 13 1900	"	" "	2628	261	June 26 1900	
6	3L	105	"	Aug. 31 1839	Geo R. Baldwin, Gdn.	B & L R R Corp	287	175	Sept. 27 1839	
7	CC 5-13-28		C C Decree	May 1 1877	B & L R R Corp.	Town of Wilmington	Co. Comm.		Jan. Term. 1877	Case #102. Straightening Street
"			No filed record found.		"	" " Woburn.				Used for highway purposes
8	8L	107	F War	Feb 13 1834	James F Baldwin	B & L R R Corp.	332	9	Apr 18 1834	
9	"	211	" "	Jan. 26 1833	Daniel Carter, et al.	"	320	522	Mar. 15 1833	
10	"	1301	Quit	Apr 17 1834	B & L R R Corp.	J. F Baldwin	332	11	Apr. 18 1834	
11	"	210	F War	Jan. 26 1833	Dan Carter.	B & L R R Corp	320	521	Mar 15 1833	
12	"	751	" "	Feb 27 "	Jonas Manning	"	321	46	" 1 "	
13	"	1327	Quit	June 19 1841	B & L R R Corp	J F Baldwin	405	186	June 24 1841	
13A	"	"	"	" " "	"	" "	"	"	" " "	
14	"	350	F War	July 16 1833	Jonathan Eames	B & L R R Corp.	325	316	Aug. 5 1833	
14A	"	351	" "	June 2 1838	" "	"	375	559	Oct. 27 1838	
15	"	1011	Quit	Sept 19 1833	Aaron Richardson, et ux	"	325	361	Sept 26 1833	
16	"	1405	"	Apr 8 1853	B & L R R Corp	Stephen Nichols, Jr.	654	13	May 2 1853	
17	"	778-A	Agreement	Sept. 10 1891	Merrimack Chemical Co.	B & L R R Corp.	2070	427	Oct. 6 1891	Right to lay and maintain side tracks.
18	"	"	"	" " "	" "	"	"	"	" " "	" " " " "
19	C.C.B 23-5		C.C. Decree	Jan. 25 1891	Town of Woburn	"	Co. Comm.		June Term. 1891	Case #400. Right to cross Street.
20		6505	Indenture	Oct. 18 1923	Merrimac Chemical Co.	B & M R R				Rights in existing crossing.
21		"	"	" " "	B & M R R	Merrimac Chemical Co.				New private crossing
22		8129	Release	May 21, 1934	"	City of Woburn				Sewer Easement
23		8292	Taking	Nov. 26, 1936	"	"				" "
10-26		11190-A		Apr. 3, 1962	"	John Cupp				
24		10789C		Aug. 21, 1959	"	Comm. of Mass.				Sewer Easement
25		"		" " "	"	" "				" "
26		12460-L	Deed	July, 1975	B & M. Corp.	Comm. of Mass. D.P.W.	12825	563	July 11, 1975	

Date	Changes	
7-2-74	Install Sidings P.S. 666+34.8	SK #191
10-31-75	Ext'n Crusader Paper Trk.	SK #190
8-25-73	Install Sidetracks P.S. 707+65	SK #189
8-13-46	General Revision	
8-10-45	Trks. removed	141
2-6-45	Crossover Relocated	141
12-13-43	Extn to Wil Pack. Trk	137
10-30-41	Wilm. Packing Trk Relocated	126
6-7-38	87' Track Ext. 668+42	116
6-7-38	50' Track Added 675+0	Rev. 9 1938
6-7-38	Track ... 672+04	AFE 15854
1-17-36	Add siding N.E. Chem Ind	131-110
3-7-32	Crossover Removed	EAT

REVISED TO	
PHYSICAL FEATURES	
June 1919	Jan. 1935
	Nov. 1936
	Apr. 1962
	June 1963
	Aug. 1975



Source: Phase IV Remedial Implementation Plan,
E.C. Whitney & Son, Inc., December 1, 2000.
Capaccio Environmental Engineering, Inc.


TO BOSTON
WOBURN STREET
B
J
K
PT

Note:

All dimensions taken by scaling plan

submitted by: Fred & Carlo B. DiCenso

29 Vaden Rd.

Quincy, Mass.

Drawn by: Robert E. Andersen, Inc

178 Park St.

North Reading Mass. Reg. P.E. & LS

Issue: Nov. 7, 1967

Scale: 1" = 150'

BOSTON AND MAINE CORPORATION

Val Sec. 13.1 Map 11

WILMINGTON, MASS

PROPOSED SIDETRACK FOR

NORTHERN INDUSTRIAL PARK

Office of the Chief Engineer

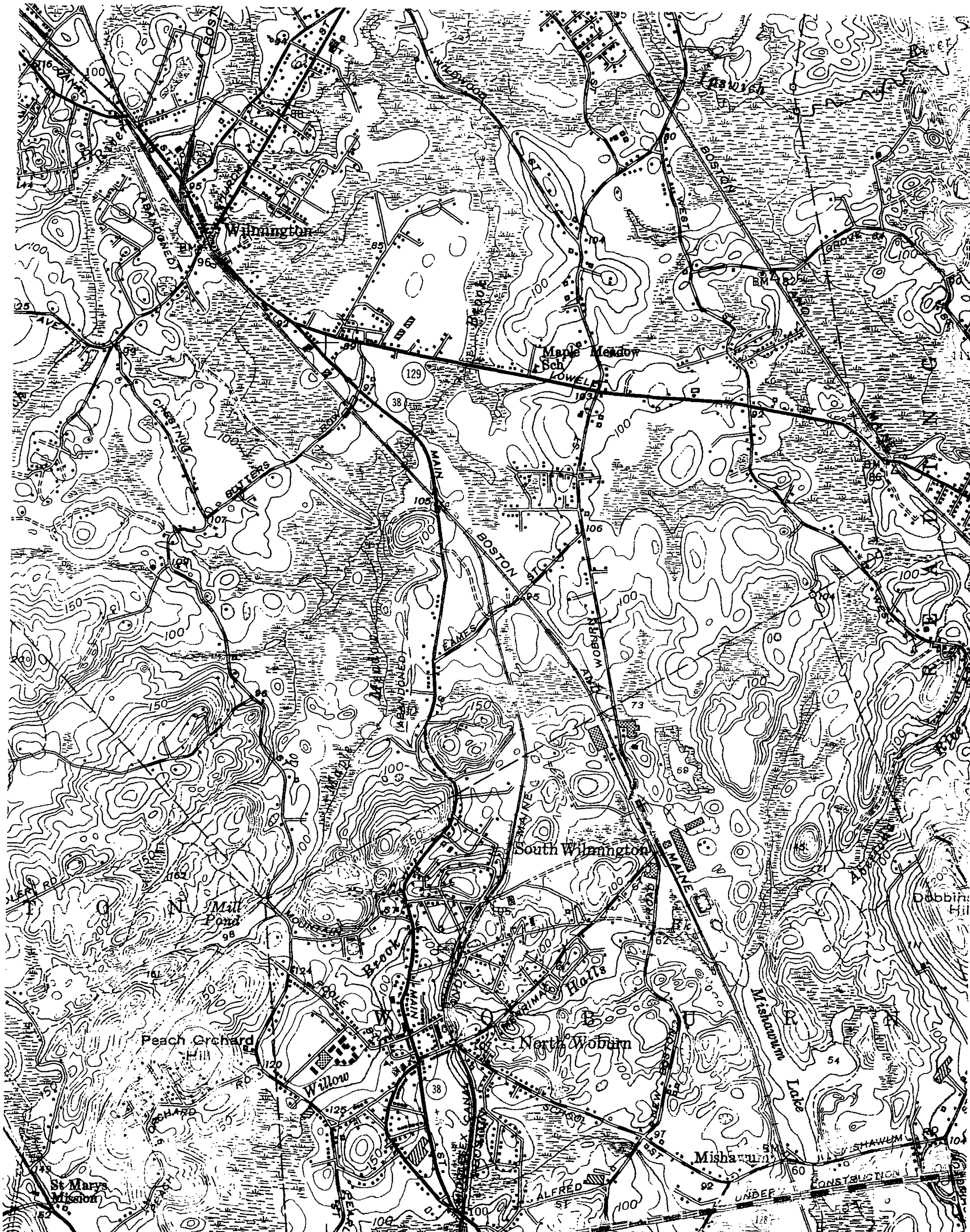
Scale: 1" = 50' Issue: A-8-14-68

B-10-1-68

SIND 449

Appendix C

Topographic Maps and Aerial Photos



(GTON) 10' WOBURN 1.5 MI. BOSTON (CIVIC CENTER) 12 MI 2.1 MI TO U.S. 3

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1958
MR 0276

325000m.E. 7

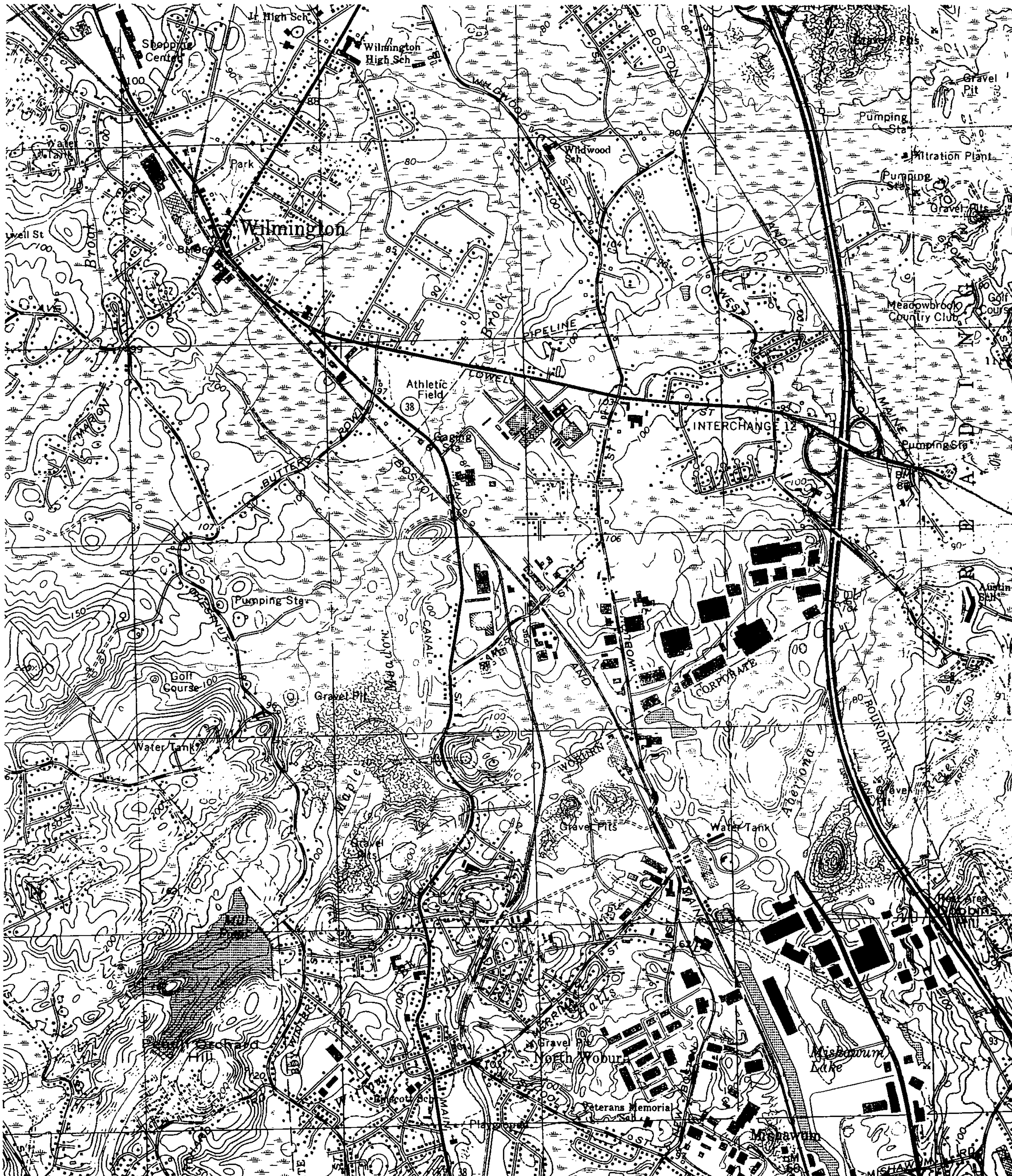
1950

24000

1965

71

1 MILE



(GTON)
NW

321

10' 1.3 MI. TO INTERCHANGE 40
MASS TURNPIKE 18 MI (128) (95)

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1979

325000m E 71°07'3

1:25 000

1 MILE

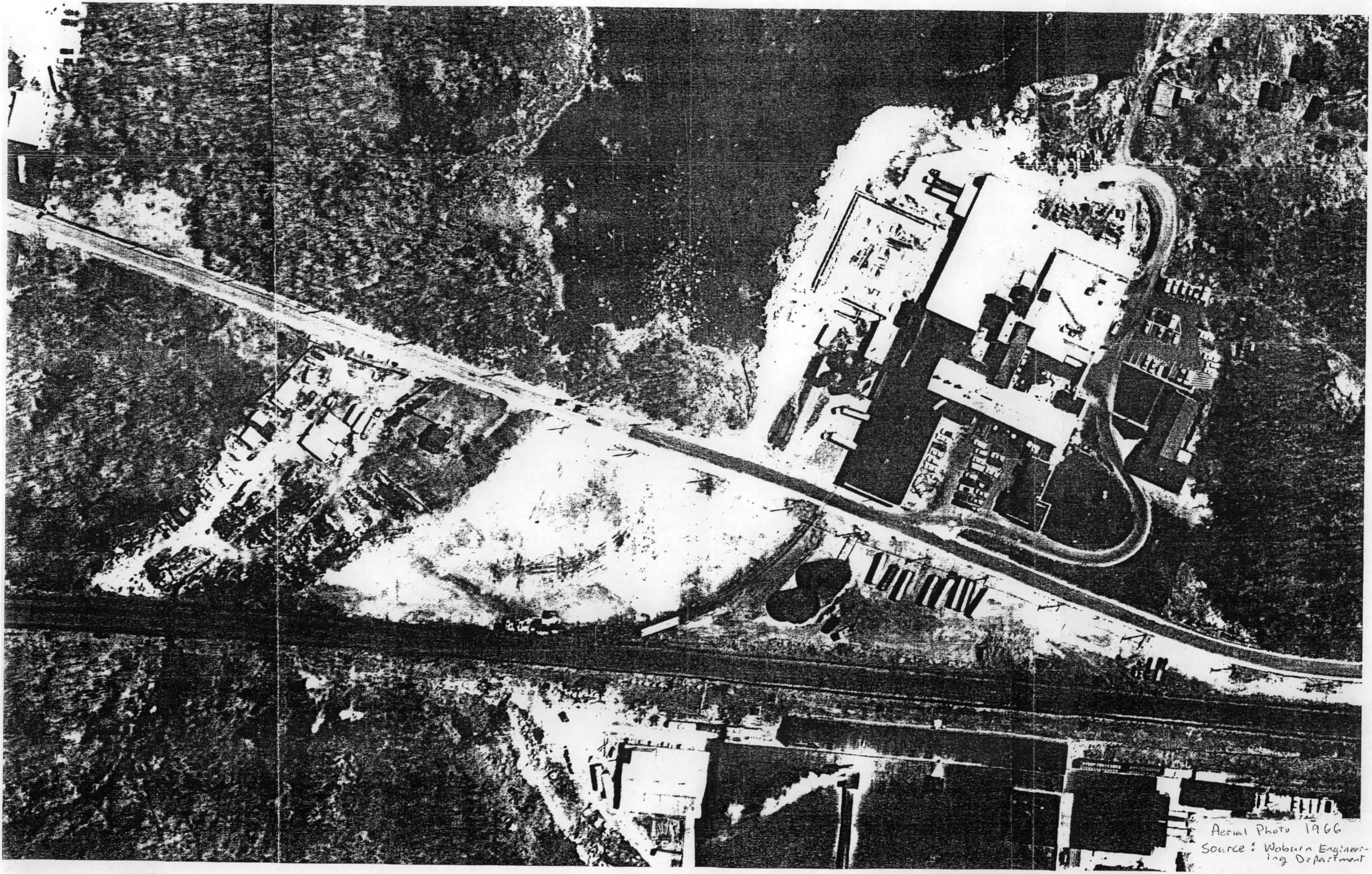
000 4000 5000 6000 7000 FEET

ROAD CLASSIFICATION

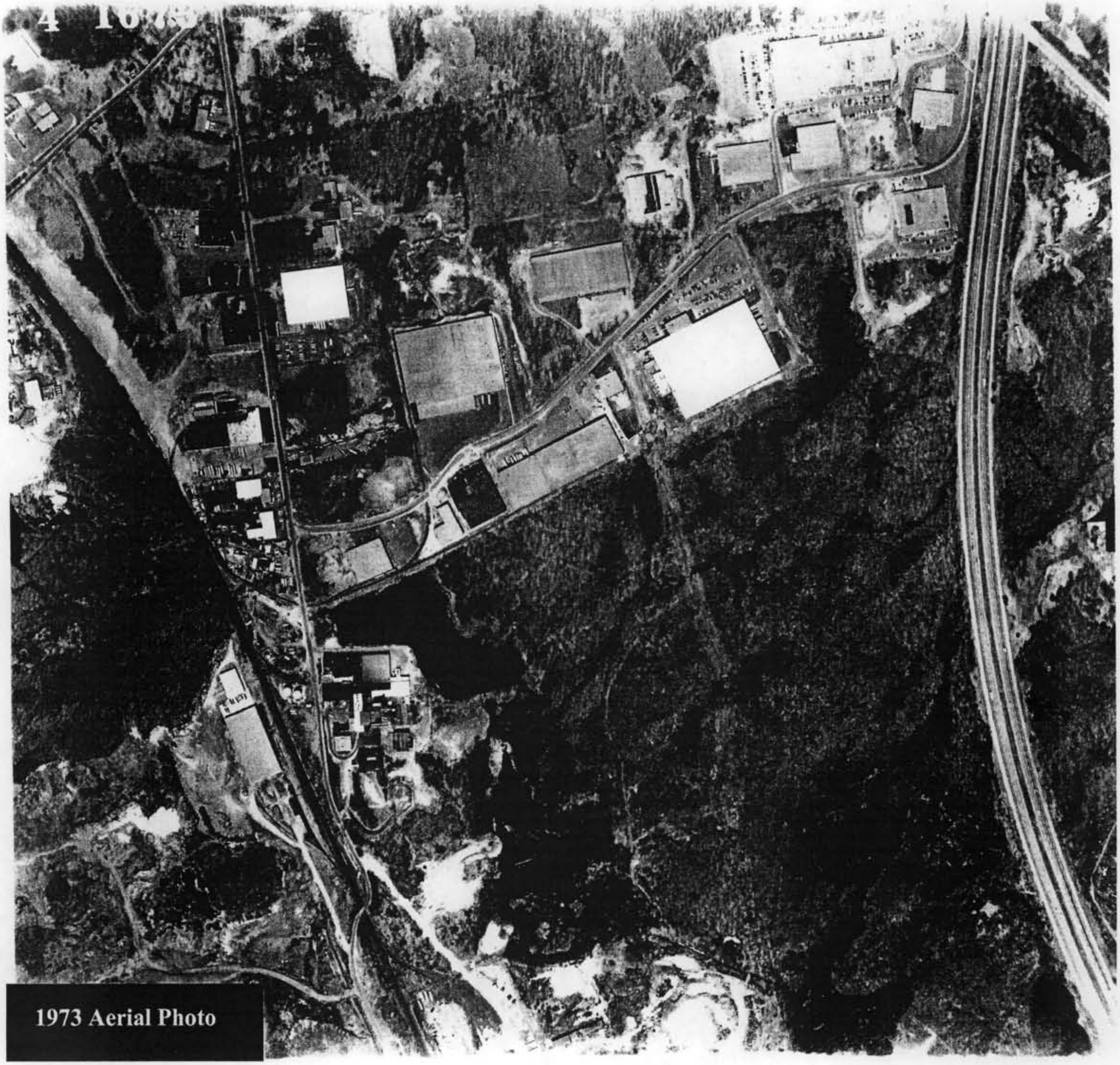
1979

Heavy-duty Light-duty

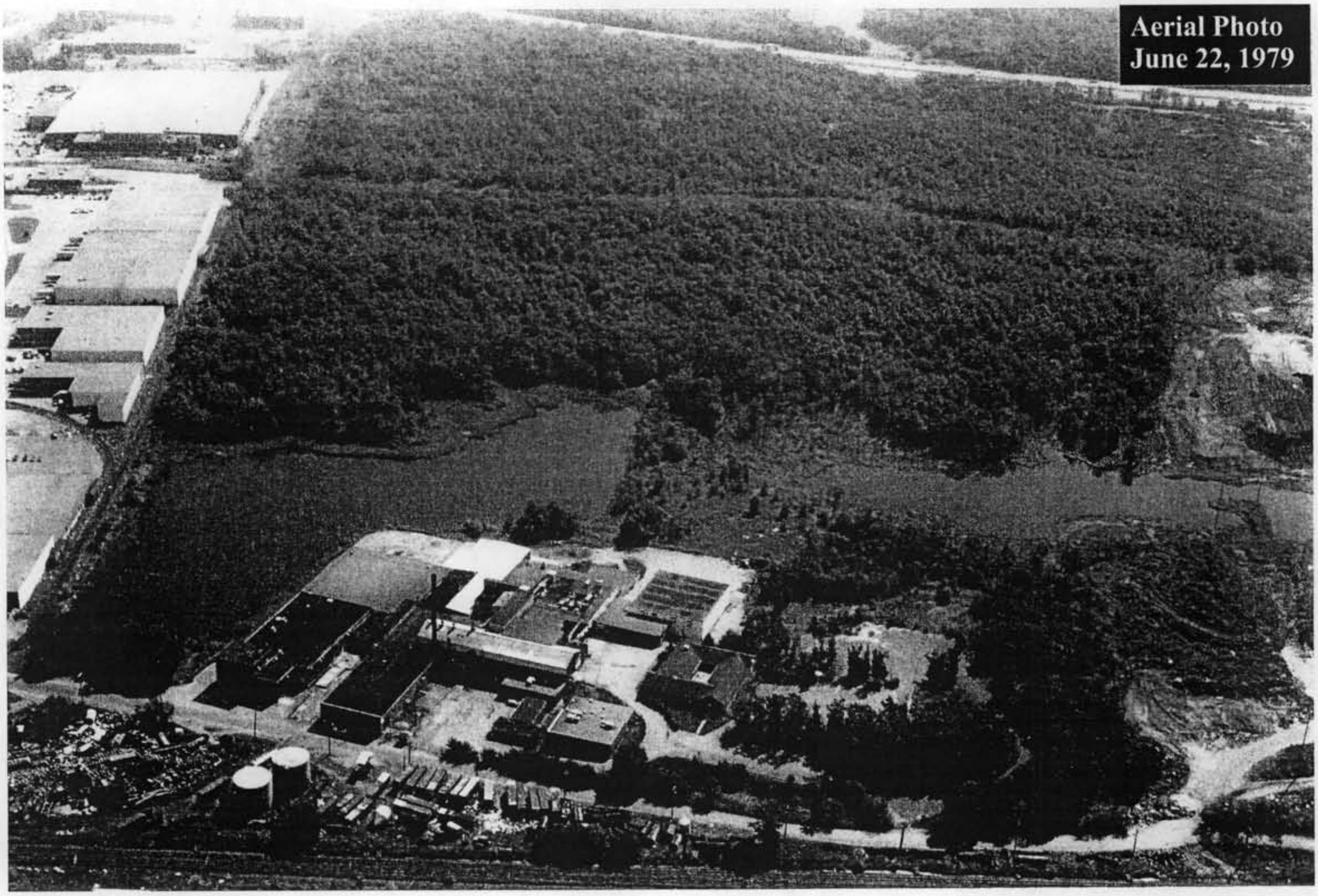

MATCH TO SHEET G-4
Ponding Area
Ponding Area
Ponding Area
INDUSTRIAL
WOBURN
STREET
Industrial Way
MATCH TO SHEET H-3
Mishawum River Drainage Area
Mishawum River Drainage
AREA UNDER CONSTRUCTION
WOBURN
WAY
DATE OF PHOTOGRAPHY MAY 9, 1987
SCALE 1"= 100'
SHEET G-3
Source: Town of Wilmington Engineering Department, Drainage Plan.
N 556,000
E 697,000
F4 G4 H4
F3 G3 H3
F2

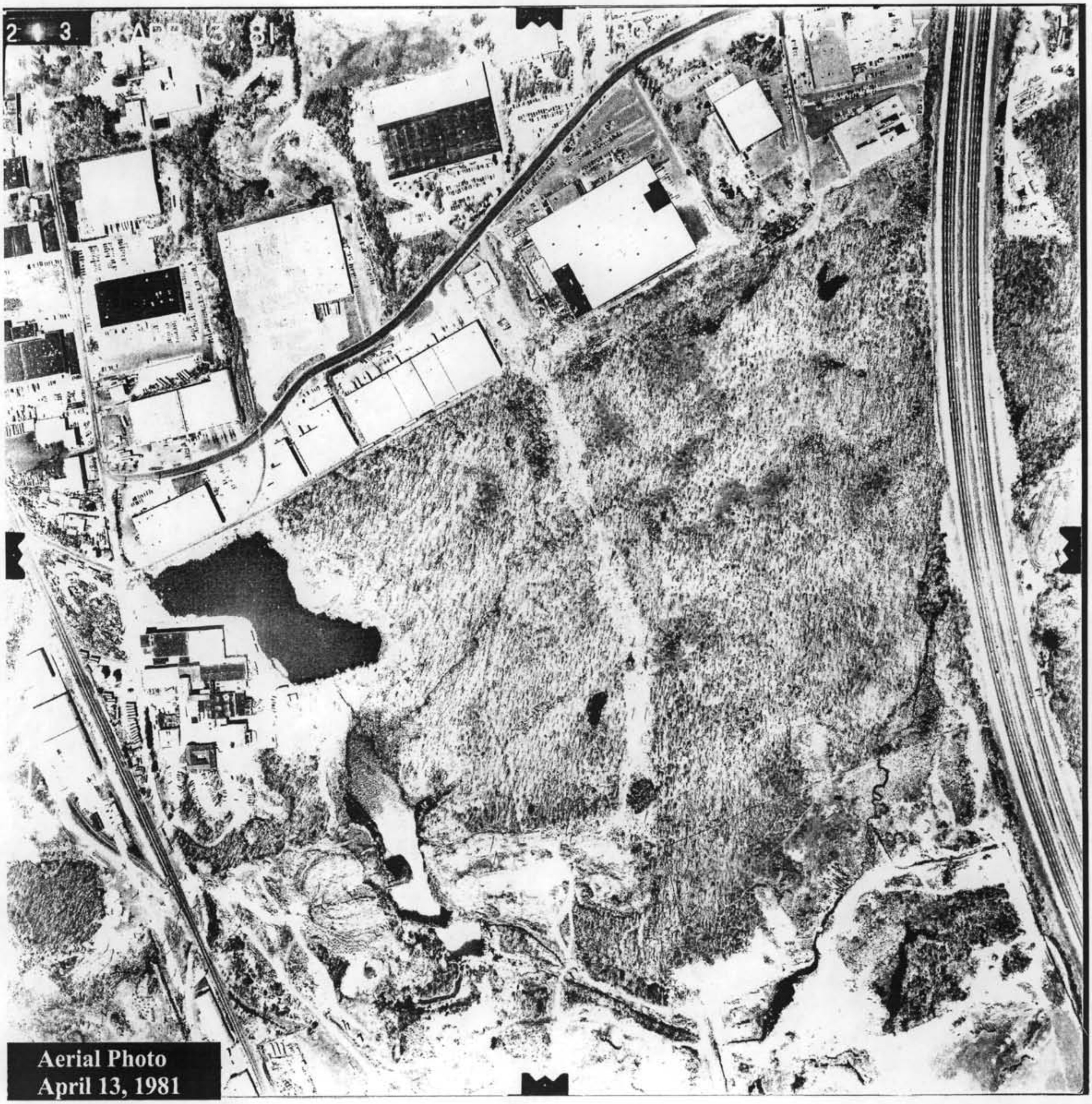


Aerial Photo 1966
Source: Woburn Engineering Department



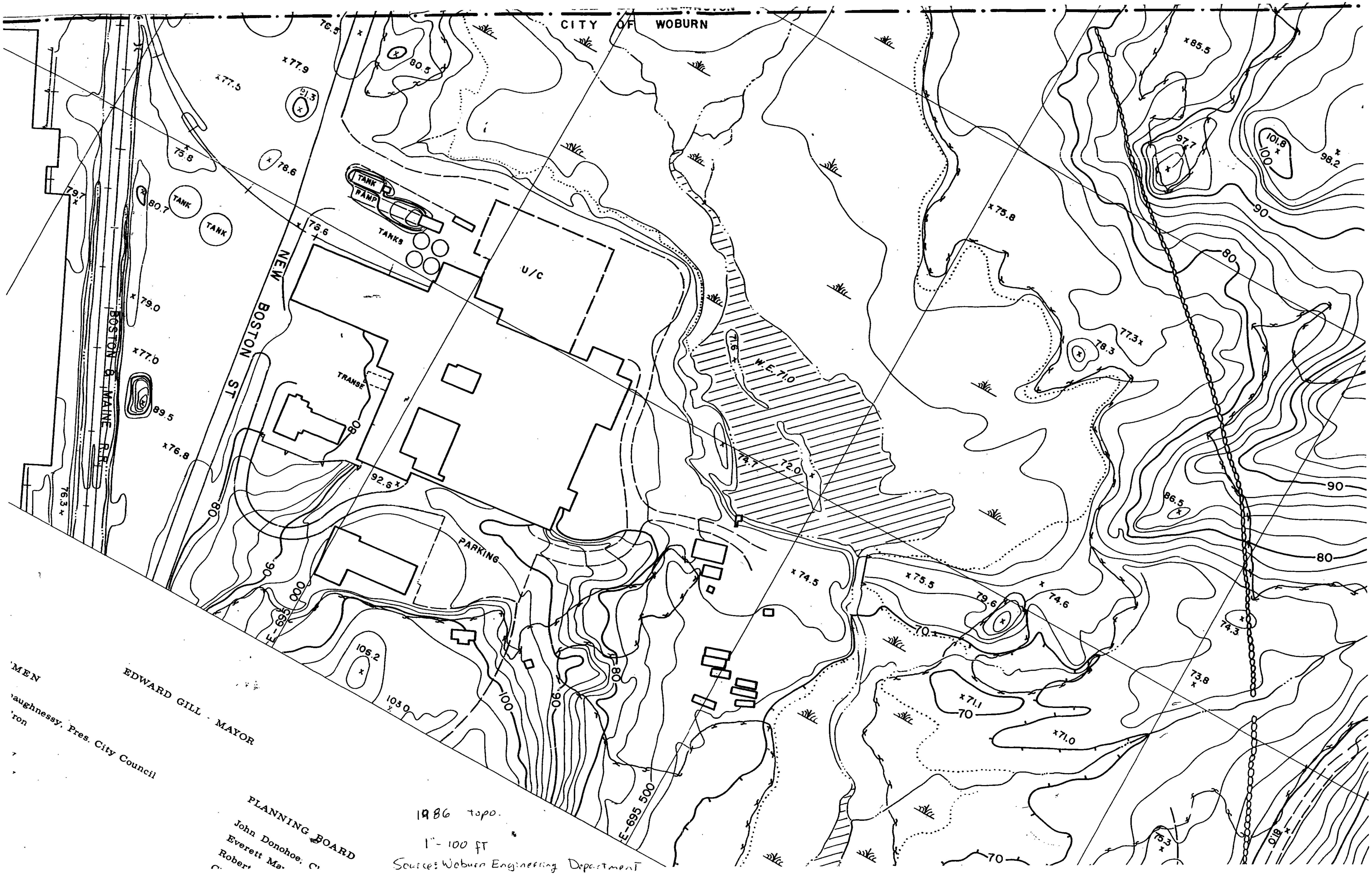
1973 Aerial Photo


Aerial Photo
June 22, 1979



Aerial Photo
April 13, 1981

Aerial Photo
2000
WILMINGTON



CITY OF WOBURN
NEW BOSTON ST
BOSTON & MAINE R.R.
TANK
RAMP
TANKS
U/C
TRANSF
PARKING
W.E. 71.0
E-695 500
EDWARD GILL - MAYOR
PLANNING BOARD
John Donohoe
Everett Ma
1986 topo.
1" - 100 ft
Source: Woburn Engineering Department

Appendix D

MADEP and USEPA File Information

8 presidential Way
Woburn
(3-14666)

REPORT OF

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Lot 8, Presidential Way
Woburn, Massachusetts

Submitted to:

BOSTON CENTERLESS, INC.
Malden, Massachusetts

Prepared by:

Environmental Engineering & Geotechnics, Inc.
Fort Worth, Texas

December 17, 1997

TABLE OF CONTENTS

1.0 INTRODUCTION

Boston Centerless, Inc. (BCI) engaged Environmental Engineering & Geotechnics, Inc. (EE&G) to perform a Phase I Environmental Site Assessment (Phase I ESA) on Lot 8, Presidential Way in Woburn, Middlesex County, Massachusetts (Disposal Site). This Report was requested by Mr. Steven Tamasi of BCI in response to a Massachusetts Department of Environmental Protection (DEP) letter dated November 6, 1997 requiring submittal to the DEP of one of the following milestones:

- Remedial Action Outcome (RAO) Statement and supporting documentation;
- Down-Gradient Property Status Transmittal Form and supporting documentation; or,
- Tier Classification Transmittal Form and supporting documentation.

This Report was developed as supporting documentation for the purpose of Tier Classification Transmittal Form submittal. A list of documents reviewed and persons interviewed during the development of this Report is included as Attachment I.

2.0 GENERAL DISPOSAL SITE INFORMATION

The Disposal Site was purchased by BCI in September of 1997 and is located at Lot 8, Presidential Way in Woburn, Massachusetts (Figures 1 and 2). The Disposal Site is zoned for industrial purposes, is currently undeveloped and is approximately 6.64 acres in size with approximately 780 feet of frontage along and to the north of Presidential Way. A wetland area is located along the eastern portion of the Disposal Site and is estimated to cover approximately 15 to 20 percent of the total acreage (Figure 3). The Disposal Site was filled and graded between 1985 and 1987 on what had previously been undeveloped land and wetlands (Figures 4 and 5). Based on review of a Flood Insurance rate Map, dated July 2, 1980, for the general area, the Disposal Site is located in Zone C and is not generally susceptible to flooding. Photographs of the Disposal Site are located in Attachment II.

On August 16 and 17, 1996 a Limited Site Assessment (LSA) was performed by EE&G for the purpose of assessing the potential on-site presence of subsurface constituents of concern (COCs) within the soils and ground water underlying the Disposal Site prior to the potential acquisition of the property by BCI. EE&G provided oversight for the advancement of five soil borings (MW-1, MW-1A, MW-2, MW-3 and MW-4) to a maximum depth of 17.0 feet below ground surface (BGS) and the installation of three monitoring wells (MW-2, MW-3 and MW-4) to a maximum depth of 15.0 feet BGS. In addition, EE&G collected one surface water sample from the on-site wetland. Soil, ground-water and surface water samples were submitted for laboratory analysis of volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPH). Soil laboratory results indicated several COCs to be above the anticipated reportable concentrations for soil [i.e., Massachusetts Contingency Plan Oil and Hazardous Material Reporting Category for Soil (MCP OHM RCS-2)]. Ground-water and surface water laboratory analytical results indicated no COCs detected above the anticipated reportable concentrations for ground water [i.e., Massachusetts Contingency Plan Oil and Hazardous Material Reporting Category for ground water (MCP OHM RCGW-2)]. In addition, one ground-water sample was collected and submitted for laboratory analysis of total dissolved solids (TDS). Subsurface assessment results are discussed in further detail in Section 5.0 and a copy of the LSA Report is included in Attachment IV.

Subsequent soil borings (S-1, S-2, S-3, S-4 and S-5) and test pits (WS-6, WS-7, WS-8, WS-9, WS-10, WS-11, WS-12 and WS-13) were conducted by Weston & Sampson Engineers, Inc. (WSE) for the previous property owner in November and December 1996, respectively. WSE collected additional soil samples for PAH and TPH analyses. Subsurface assessment results are presented as Table 2. Due to the poor copy quality of the WSE Letter dated January 24, 1996 that was provided to EE&G, this document was not included in this Phase I ESA. However, EE&G is currently attempting to obtain a hard copy of the WSE Letter and will submit it to the MA DEP upon receipt under a separate cover.

General Site information required by the MA DEP is listed below.

DEP Release Tracking Number (RTN)	3-0014666	
Disposal Site Address	Lot 8 Presidential Way Woburn, Massachusetts 01801	
Latitude/Longitude	42.5259 / 71.1422	
Universal Transverse Mercator (UTM) coordinates (meters)	4,710,800 North / 3,239,400 East	
Disposal Site Locus Map	(See Figure 1)	
Estimated number of on-site workers at the Disposal Site	0	
Estimated residential population within 500 feet of the Disposal Site	0	
Land use to the north	Industrial	(see Figure 2)
Land use to the south	Industrial, Undeveloped	(see Figure 2)
Land use to the east	Industrial	(see Figure 2)
Land use to the west	Industrial, Undeveloped	(see Figure 2)
Estimated Number of Institutions within 500 feet of the Disposal Site	0	
Natural Resource Areas located within 500 feet of the Disposal Site	Wetlands - Two wetlands are located on or near the Disposal Site (Figure 3): (1) along the eastern portion of the Disposal Site; and, (2) approximately 250 feet to the south and west of the Disposal Site.	

3.0 DISPOSAL SITE MAP

A *Disposal Site Map* is presented as Figure 3 and where applicable, includes the elements listed below.

Disposal Site Boundaries	YES
Boundaries of Properties located within the Disposal Site	YES (Shown on Figure 2)
On-Site Buildings	NONE IDENTIFIED
Floor and Storm Drains	NONE IDENTIFIED
Utilities transecting or serving the Disposal Site	NONE IDENTIFIED
Oil and/or hazardous material storage and disposal structures and/or areas	NONE IDENTIFIED
Location of any known oil and/or hazardous material releases and/or threats of release	YES (Shown by Soil Borings, Monitoring Wells and Test Pits)[1]

Monitoring Wells	YES
Soil Borings	YES
Test Pits[1]	NOT IDENTIFIED
Surface Water Sampling Location	SW-1 on Figure 3

Note: [1]EE&G is currently trying to obtain a hard copy of the WSE Site Plan showing soil boring and test pit locations conducted by WSE between November and December 1996.

4.0 DISPOSAL SITE HISTORY

Owner/Operator and Operations History

Based on information obtained from the City of Woburn Assessors Office and review of aerial photographs, the Disposal Site appeared to be unimproved prior to ownership by Mr. Walter Jamitkowski of the James Bond Realty Trust (i.e., March of 1986). Previous ownership of the Disposal Site was identified as far back as 1967 and the ownership history is as follows:

- September 1997 to Present — Boston Centerless, Inc.
- March 1986 to September 1997 — Mr. Walter Jamitkowski, James Bond Realty Trust
- August 1979 to March 1986 — Augustine P. Sheehy
- September 1977 to August 1979 — Lipton Industries Inc.
- June 1967 to September 1977 — Usen Canning Co.
- Before June 1967 — Woburn Process Co. Inc.

The Disposal Site is undeveloped as of the date of this Report (December 17, 1997). Therefore, no operator or operations history exists.

Release History

Based on review of historical records, field inspection and previous subsurface assessment data contained within the *Limited Site Assessment Report* (LSA) developed by EE&G and dated August 30, 1996, it appears that the petroleum hydrocarbon and PAH impacted fill identified at the Disposal Site was relocated from another site during filling and grading operations between 1986 and 1987. A 1966 aerial photograph (Figure 4 shows the Site as undeveloped prior to construction of Presidential Way. The 1986 aerial photograph (Figure 5) shows Presidential Way under construction with evidence of recent fill placement on the Site.

Oil and/or Hazardous Material Use and Storage History

Based on the Disposal Site being currently undeveloped, review of the EDR Radius Search Report (Attachment III), document review and conversation with Mr. William E. Sweeney, Jr. of the Woburn Fire Department, there has been no indication that oil and/or hazardous material has been used or stored at the site.

Waste Management History

The Disposal Site is currently undeveloped, therefore, no waste has been generated and no waste management procedures have been implemented.

Environmental Permits and Compliance History

During a Woburn Conservation Commission file review EE&G identified a *Wetlands Permit, Woburn Wetlands Ordinance and Order of Conditions* (Permit) which was granted by the City of Woburn Conservation Commission to Mr. Jamitkowski, Jr. on October 3, 1986 for Presidential Way (Dundee Road and listed on the Permit as Dundee Park II). No specific Lot number was listed on the Permit. However, a *Certificate of Compliance* was issued by the Woburn Conservation Commission to Mr. Jamitkowski, Jr. on February 1, 1989 listing Lot 6 as the Permitted Site. Therefore, it is EE&G's opinion that the Permit was issued for Lot 6 only. No additional permits or compliance issues were identified during research activities. Copies of the Wetlands Permit and Certificate of Compliance are included as Attachment V.

5.0 SITE HYDROGEOLOGICAL CHARACTERISTICS

Site Drainage

Based on review of Topographic Maps [1943 (revised in 1969) and 1987], aerial photographs (1966 and 1986) and field observations, the on-site surface water drainage appears to flow towards the southeast towards the on-site wetland (Figures 2 and 3) which runs north and south across the east-central portion of the Disposal Site.

Site Geology

Based on subsurface assessment activities performed on August 16, 1997, the natural on-site soil consist of sands (SP) and silty sands (SM) as classified using the Unified Soils Classification System and were generally overlain by 3 to 5 feet of blast rock fragments, silty sand (fill) material. Bedrock at the Disposal Site (Ordovician volcanic rock based on EDR Report in Attachment III) ranged from several feet above ground surface (AGS) to greater than 17 feet BGS. See Attachment IV for more detailed geologic information.

Site Hydrogeology

Based on subsurface assessment activities performed on August 16 and 17, 1997, groundwater was encountered at the Disposal Site in monitoring wells MW-2, MW-3 and MW-4 ranging between 9.52 feet and 11.49 feet below the top of well casing [(BTOC) top of casing (TOC) elevations approximately 2.5 to 3.0 feet AGS giving an approximate estimated depth to groundwater of between 6 and 8 feet BGS] and the interpolated groundwater flow direction was southwest (Attachment IV).

6.0 NATURE AND EXTENT OF CONTAMINATION

Soil

During LSA field activities on August 16, 1996, soil samples were collected from soil borings MW-1, MW-2, MW-3 and MW-4 and submitted for laboratory analysis of VOCs, PAHs and TPH (i.e., (COCs). Soil analytical data sheets are provided in Appendix D of Attachment IV. Results are summarized in Table 1. Soil laboratory analytical results indicated that Benzo (a) Anthracene, Benzo (a) pyrene and Benzo (b) fluoranthene [1,000 micrograms per kilogram (μg/kg), 890 μg/kg and 1,100 μg/kg respectively] in soil boring MW-1 (sample depth 1.5 - 3.0 feet BGS) were above the MCP MA OHM RCS-2 for those COCs. Table 1 presents a summary of soil laboratory analytical results. Soil laboratory analytical results from soil borings MW-3 and MW-4 (sample depths 3.0 -4.0 feet BGS and 2.0 - 3.0 feet

BGS respectively) indicated concentrations of TPH and several VOCs and PAHs above laboratory detection limits but below the MCP MA OHM RCS-2 for those COCs. Soil laboratory analytical results from soil boring MW-2 (sample depth 10.0 - 12.0 feet BGS) were below laboratory method detection limits (BDL).

WSE soil data from November and December 1996 are summarized in Table 2. The WSE data are generally consistent with the August 1996 data.

Based on the estimated depth of the fill material (0.5 - 5 feet BGS based on the LSA), the depth of soil samples for the four soil borings and the COC concentrations, it appears that the fill material is the COC source location. Review of aerial photographs (Figures 4 and 5) indicate that the aforementioned fill material identified at the Disposal Site was relocated from another site and used during filling and grading operations between 1985 and 1987. More detailed information regarding the nature and extent of soil contamination is discussed in Attachment IV.

Groundwater

During LSA field activities on August 17, 1996 groundwater samples were collected from monitoring wells MW-2, MW-3 and MW-4 and the on-site wetlands (SW-1) and submitted for laboratory analysis of VOCs, PAHs and TPH. One additional groundwater sample collected from monitoring well MW-2 and submitted for laboratory analysis of TDS. Groundwater laboratory analytical results indicated a TDS concentration of 176 milligrams per liter (mg/l). Table 3 presents a summary of groundwater laboratory analytical results. Groundwater laboratory analytical results indicated that monitoring wells MW-2 and MW-4 and wetlands sample SW-1 were BDL and below the MCP MA OHM RCGW-2 for those COCs. Groundwater laboratory analytical results from monitoring well MW-3 indicated detectable concentrations of cis-1,2-Dichloroethene [i.e., 15 micrograms per liter (µg/l)] but were below the MCP MA OHM RCGW-2 for that COC.

Based on the aforementioned laboratory analytical data, ground water at the Disposal Site has not been significantly impacted from the COCs present in the soil. Additional information regarding the nature and extent of groundwater contamination is discussed in Attachment IV.

7.0 MIGRATION PATHWAYS AND EXPOSURE POTENTIAL

Air

Based on the minor concentrations of VOCs in the soil, air is not anticipated to be a migration pathway and there is minimal or no exposure potential.

Soil

Based on the COCs present in the soil being above the MCP OHM RCS-2, soil is anticipated to be a migration pathway. It is anticipated that COC concentrations may decrease over time through potential natural attenuation and biodegradation, thereby lowering the exposure classification. In the Disposal Site's current undeveloped state the exposure potential is low. There is a potential low exposure pathway; the fill containing PAHs is present at the ground surface. Human exposure is possible through dermal contact and ingestion due to the shallow depth of potentially COC impacted soil. However, this pathway is mitigated by the undeveloped nature of the Site and its setting is in an industrial park. In addition, excavation activities associated with possible future construction may increase the risk of exposure and precautions may need to *be implemented to limit exposure and/or migration of the COCs.*

Groundwater

The groundwater on the Disposal Site is not anticipated to be a significant migration pathway and that there is minimal or no exposure potential based on the following:

- One COC (cis-1,2-Dichloroethene) is present in the groundwater in minor concentrations. However, the COC is not present at detectable concentrations in the source material (i.e., soil);
- Groundwater beneath the Disposal Site is not in a Zone II area, interim wellhead protection area, Zone A area, potentially productive aquifer area or within 500 feet of a private well; and,
- Groundwater beneath the Disposal Site is not a sole source aquifer.

Surface Water

Based on the COCs identified in the soil and ground water and the laboratory analytical results for SW-1 (surface water sample collected within the on-site wetlands), surface water is not anticipated to be a migration pathway of concern.

Sensitive Receptors

The wetland located on site is the only identified sensitive receptor within 500 feet of the Disposal Site. However, based on the information contained within the aforementioned *Surface Water* Section, it is anticipated that the risk to the on-site wetlands is low. However, future evaluation for the presence of COCs in wetland sediment will need to be performed.

Evaluation for Immediate Response Actions

The Disposal Site has been evaluated for the need to conduct immediate response actions and EE&G does not believe that an immediate response action is warranted for the following reasons:

310 CMR 40.0412 (1)

The nature of the release does not require notification to the Department under the "Two Hour" notification provisions of 310 CMR 0311 or 310 CMR 40.0312.

310 CMR 40.0412 (2)

The nature of the release does not require notification to the Department under the "72 Hour" notification provisions of 310 CMR 0313 or 310 CMR 40.0314.

310 CMR 40.0412 (3)

Based on the low mobility of PAHs and limited presence of hazardous materials in Site groundwater, migration of the COCs in the on-site soil and groundwater appears to be low.

310 CMR 40.0412 (4)

Based on information contained herein, the potential for an imminent hazard to health, safety, public welfare or the environment is minimal.

Federal Regulatory Database Review

Review of the federal regulatory databases disclosed the following:

- One (1) National Priority List [NPL (Superfund)] site (1.0 mile radius);
- Two (2) Comprehensive Environmental Response Compensation and Liability Act (CERCLA) sites (0.5 mile radius);
- Two (2) Resource Conservation and Recovery Act (RCRA) small quantity generator sites (0.25 mile radius);
- One (1) Resource Conservation and Recovery Act (RCRA) large quantity generator sites (0.25 mile radius);
- One (1) Record of Decision (ROD) site (1.0 mile radius);
- One (1) Superfund consent decree (CONSENT) site (1.0 mile radius);
- 32 State Hazardous Waste sites (SHWS) (1.0 mile radius); and,
- 11 Orphan Sites (inadequate address):

  - Eight (8) SHWS;
  - Two (2) Solid Waste Facilities/Landfill Sites (SWF/LF); and,
  - One (1) Emergency Response Notification System (ERNS) site.

Conclusions

Based on the information contained herein, it appears that a large portion of the Disposal Site has been previously graded and filled between 1986 and 1987 and the fill present is the likely source of the potentially impacted COCs in the on-site subsurface soil. No environmental permits, compliance directives or notifications regarding environmental impairment were identified during the development of this Report. The EDR radius Search Report indicated that there are numerous environmental notifications and determinations regarding subsurface contamination at several of these sites. It is possible that former activities in the vicinity of the Disposal Site may have contributed to the relocation of COC impacted soils and subsequent use of these soils as fill on the Disposal Site. Future use of the Disposal Site will potentially be the construction of a manufacturing facility including 75 to 100 % pavement or structure coverage.

Based on information contained herein, the Disposal Site currently does not represent an imminent hazard to health, safety, public welfare or the environment. As such, immediate response actions are not warranted at this time.

TABLES

Table 1: Summary of Soil Laboratory Analytical Results[1] (August 16, 1996)

Sample Identification	Sample Depth (Feet BGS)	Results (µg/kg) Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Chrysene	Dibenzo (a,h) anthracene	Fluoranthene	Indeno (1,2,3-cd) pyrene	Phenanthrene	Pyrene	Butyl Benzene (Total)	Trimethylbenzenes (Total)	Results (mg/kg) TPH
MW-1	1.5 -3.0	600	**1,000**	**890**	**1,100**	690	890	190	1,800	600	1,500	1,200	<10	<10	90
MW-2	10.0 - 12.0	<330	<330	<50	<330	<330	<330	<50	<330	<330	<330	<330	<10	<10	<10
MW-3	3.0 - 4.0	<330	<330	230	<330	<330	<330	<50	660	<330	450	400	<10	<10	370
MW-4	2.0 - 3.0	<330	<330	110	<330	<330	<330	<50	340	<330	<330	<330	56	37	1,100
MCP OHM RCS-2[2]		1,000,000	1,000	700	1,000	2,500,000	1,000	700	1,000,000	1,000	100,000	2,000,000	1,000	100,000[3]	2,000

Notes:

MW: Monitoring Well
BGS: Below Ground Surface
COC: Constituent of Concern
<: Less than - indicates COC concentration below laboratory method detection limits
µg/kg: micrograms per kilogram
mg/kg: milligrams per kilogram
RCS-2: Reporting Category - Soil Class 2
OHM: Oil and Hazardous Material List
MCP: Massachusetts Contingency Plan
Bold: COC concentration above the MCP OHM RCS-2
[1]: Chemical analyses were performed on soil samples for; (1) Polynuclear Aromatic Hydrocarbons (PAH) using EPA Method 8270; (2) Volatile Organic Compounds (VOCs) using EPA Method 8260; and, (3) Total Petroleum Hydrocarbons (TPH) using EPA Method 418.1. Table 1 lists only those COCs which were detected above laboratory method detection limits. Soil samples were collected by EE&G on August 16, 1996.
[2]: From the Massachusetts Oil and Hazardous Material List, 310 CMR 40.1600, Table 1, RCS-2.
[3]: Standard for 1,3,5 Trimethylbenzene

Prepared By/Date: PCO / 12-17-97
Checked By/Date: MAO / 12-23-97

Table 2: Summary of Soil Laboratory Analytical Results[1] (November and December 1996)

Sample Ident-ification	Sample Depth (Feet BGS)	Results (µg/kg) Anthra-cene	Acenap-thene	Acenap-thylene	Benzo (a) anthra-cene	Benzo (a) pyrene	Benzo (b) fluor-anthene	Benzo (k) fluor-anthene	Benzo (g,h,i) perylene	Chrysene	Dibenzo (a,h) anthra-cene	Fluor-anthene	Fluorene	Indeno (1,2,3-cd) pyrene	Phen-anthrene	Pyrene	2-Methyl-nap-thalene	Nap-thalene[5/6]	Results (mg/kg) TPH
S-1[2]	0.5 - 1.5	990	310	300	310	**3,400**	**2,700**	2,700	2,700	3,100	590	6,000	290	**1,900**	3,600	5,500	ND	ND/ND	53
S-2[2]	1.0 - 2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND/ND	ND
S-3[2]	1.0 - 2.0	3,200	1,500	800	**5,450**	**11,000**	**8,500**	8,300	6,490	9,600	**2,100**	20,000	1,400	**5,900**	14,000	18,000	370	950/96	610
S-4[2]	1.0 - 2.0	5,000	2,300	860	**12,000**	**13,000**	**1,500**	**17,000**	6,800	**12,000**	**2,500**	27,000	2,100	**6,500**	20,000	23,000	510	1,200/76	421
S-5[2]	1.0 - 2.0	450	ND	ND	**1,300**	**1,400**	**11,000**	1,200	550	1,400	ND	2,400	ND	540	1,400	2,480	ND	ND/ND	170
WS-6[3]	1.0 - 2.0	960	78	41	450	440	360	410	220	440	95	930	83	230	760	810	ND	46/NA	ND
WS-7[3]	1.0 - 2.0	910	310	ND	**2,300**	**2,300**	**1,900**	1,900	1,300	2,200	500	5,100	310	**1,300**	3,300	4,100	ND	ND/NA	560
WS-8[3]	1.0 - 2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND/NA	ND
WS-9[3]	1.0 - 2.0	600	150	390	**1,800**	**1,300**	**1,500**	1,600	1,100	1,100	410	3,400	220	**1,000**	2,100	3,100	72	160/NA	ND
WS-10[3]	1.0 - 2.0	1,100	ND	1,000	**2,700**	**2,900**	**2,100**	2,500	1,800	2,900	680	5,300	ND	**1,700**	2,800	5,000	ND	ND/NA	50
WS-11[3]	1.0 - 2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND/NA	ND
WS-12[3]	1.0 - 2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND/NA	ND
WS-13[3]	1.0 - 2.0	880	290	ND	**1,900**	**1,900**	**1,500**	1,500	1,300	1,800	460	4,200	370	**1,200**	2,900	3,600	ND	320/NA	1,300
MCP OHM RCS-2[4]		1,000,000	2,500,000	1,000,000	1,000	700	1,000	10,000	2,500,000	10,000	700	1,000,000	2,000,000	1,000	100,000	2,000,000	1,000,000	1,000,000	2,000

Table 2: Summary of Soil Laboratory Analytical Results (Continued)[1] (November and December 1996)

Notes:

S:	Soil Boring
WS:	Weston & Sampson Test Pit
COC:	Constituent of Concern
ND:	Not Detected
NA:	Not Analyzed for
µg/kg:	micrograms per kilogram
mg/kg:	milligrams per kilogram
RCS-2:	Reporting Category - Soil Class 2
OHM:	Oil and Hazardous Material List
MCP:	Massachusetts Contingency Plan
Bold:	COC concentration above the MCP OHM RCS-2
1:	Chemical analyses were performed on soil samples for; (1) Polynuclear Aromatic Hydrocarbons (PAH) using EPA Method 8100; (2) Volatile Organic Compounds (VOCs) using EPA Method 8260; and, (3) Total Petroleum Hydrocarbons (TPH) using a GC/FID. Table 2 lists only those COCs which were detected above laboratory method detection limits.
2:	Soil samples were collected by Weston & Sampson in November 1996.
3:	Soil samples were collected by Weston & Sampson on December 23, 1996
4:	From the Massachusetts Oil and Hazardous Material List, 310 CMR 40.1600, Table 1, RCS-2.
5:	Chemical analysis performed for Napthalene by EPA Method 8100.
6:	Chemical analysis performed for Napthalene by EPA Method 8260.

Prepared By/Date: PCO / 12-17-97
Checked By/Date: MAO / 12-23-97

Table 3: Summary of Ground-Water Laboratory Analytical Results[1] (August 17, 1996)

Sample Identification	TDS[2]	Cis-1,2-Dichloroethene[3]
SW-1	NA	<10
MW-2	176	<10
MW-3	NA	15
MW-4	NA	<10
MA OHM RCGW-2[4]	NL	30,000

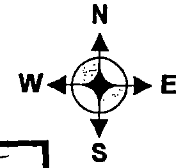
Notes:

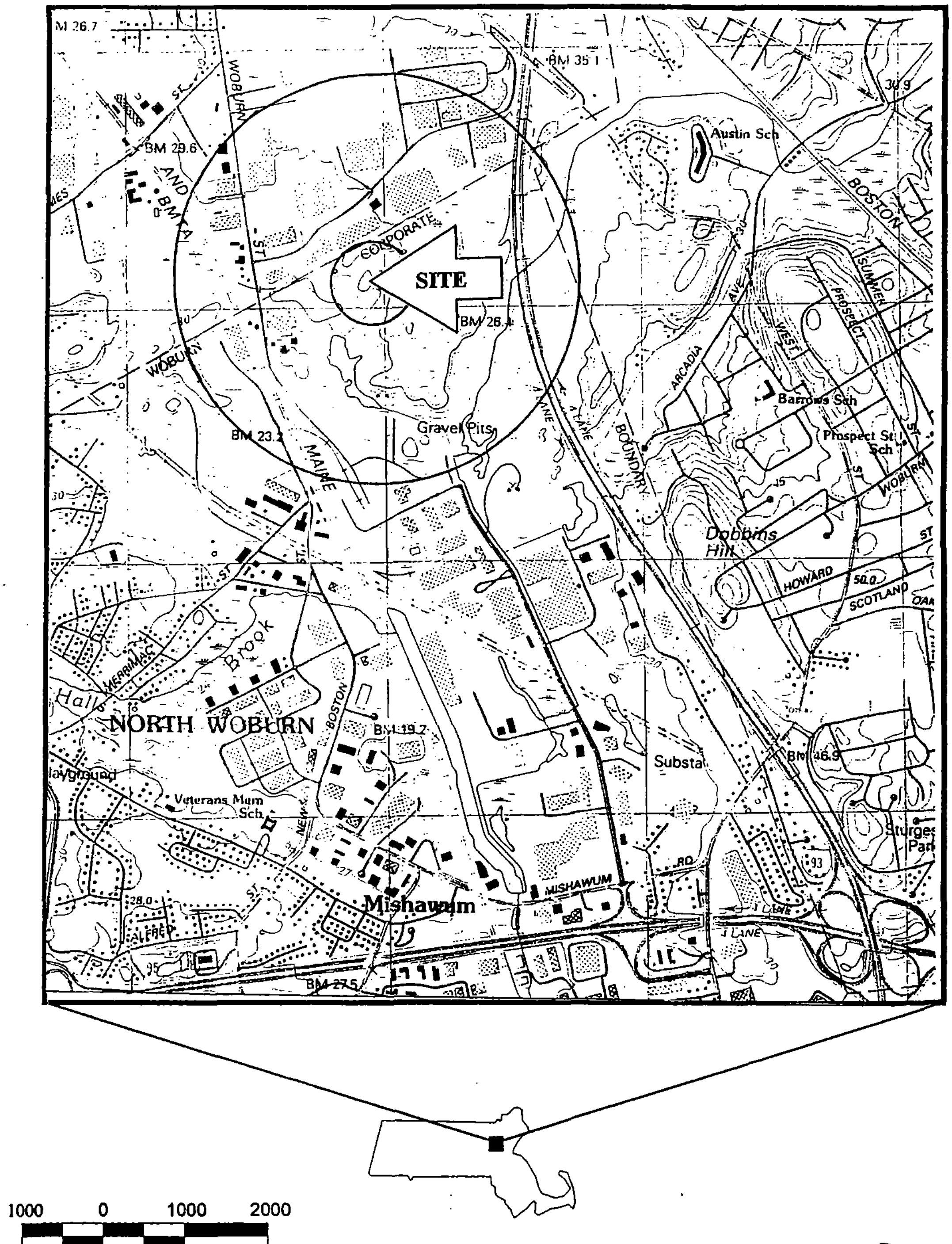
NA: Not Analyzed
NL: Not Listed; no reportable concentration listed within the MCP
MW: Monitoring Well
COC: Constituent of Concern
<: Less than - indicates COC concentration below laboratory method detection limits
µg/l: micrograms per liter
mg/l: milligrams per liter
RCGW-2: Reporting Category - Ground Water Class 2
OHM: Oil and Hazardous Material List
MCP: Massachusetts Contingency Plan dated May 30, 1997
1: Chemical analyses were performed on ground-water samples for; (1) Polynuclear Aromatic Hydrocarbons (PAH) using EPA Method 8270; (2) Volatile Organic Compounds (VOCs) using EPA Method 8260; (3) Total Petroleum Hydrocarbons (TPH) using EPA Method 418.1. Monitoring well MW-2 was also sampled for Total Dissolved Solids (TDS) using EPA Method 160.1. Table 2 lists only those COCs which were detected above laboratory method detection limits. Ground-water samples were collected by EE&G on August 17, 1996.
2: Concentrations in mg/L
3: COC Concentrations in µg/L
4: From the Massachusetts Oil and Hazardous Material List, 310 CMR 40.1600, Table 1, RCGW-2.

Prepared By/Date: PCO / 12-17-97
Checked By/Date: MAO / 12-23-97

FIGURES

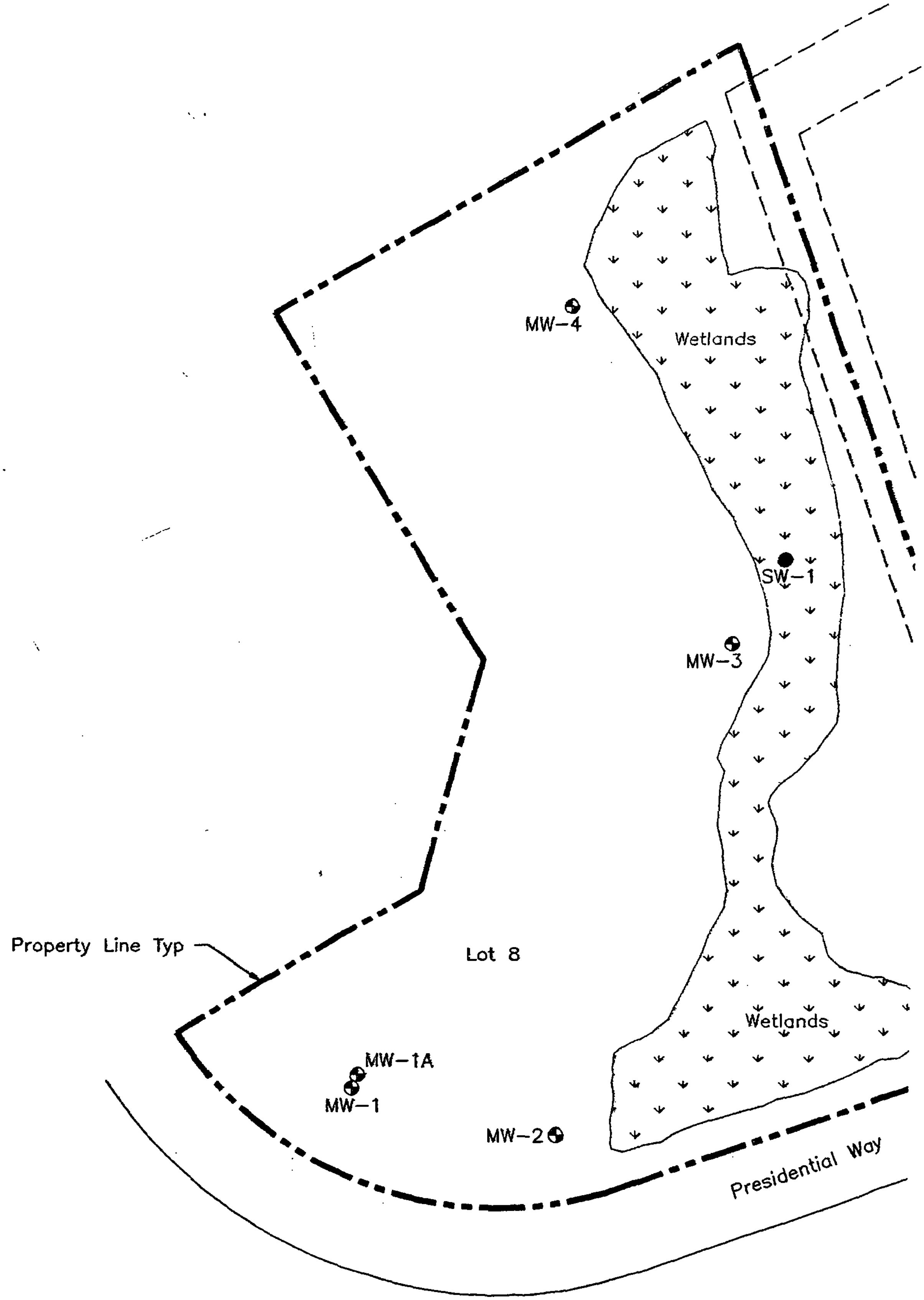
Source: U.S. Geological Survey Middlesex Co., Reading, Massachusetts
Quadrangle 7.5 Minute Series (Topographic), Dated 1987

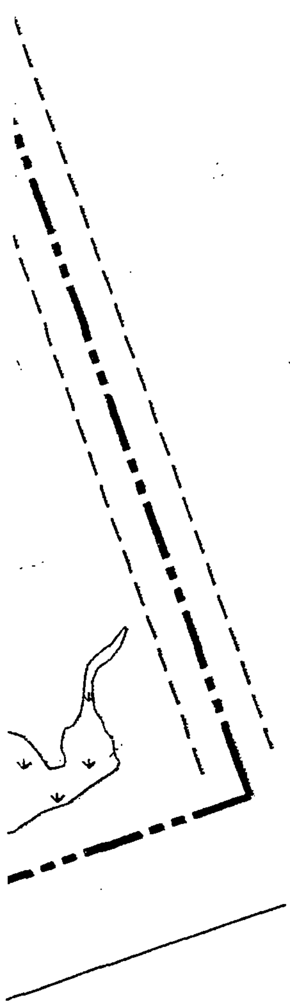




Prepared By/Date: PCO / 12-17-97
Checked By/Date: MAO / 12-23-97

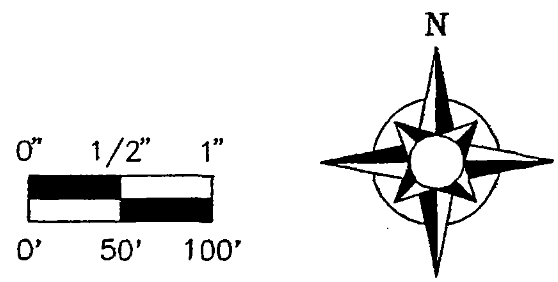
Boston Centerless **Phase I ESA** **Lot 8 Presidential Way** **Woburn, Massachusetts**	**Environmental Engineering** **& Geotechnics, Inc.** 1612 North Sylvania Avenue Phone (817) 838-0330; Fax (817) 838-7722	**DISPOSAL SITE LOCUS MAP** **Figure 1**


MW-4
Wetlands
SW-1
MW-3
Property Line Typ
Lot 8
Wetlands
MW-1A
MW-1
MW-2
Presidential Way



LEGEND

- Monitor Well Locations
- Surface Water Sample Location



EE&G *ENVIRONMENTAL ENGINEERING & GEOTECHNICS, INC.*

Boston Centerless

REMEDIAL TREATMENT PROGRAM

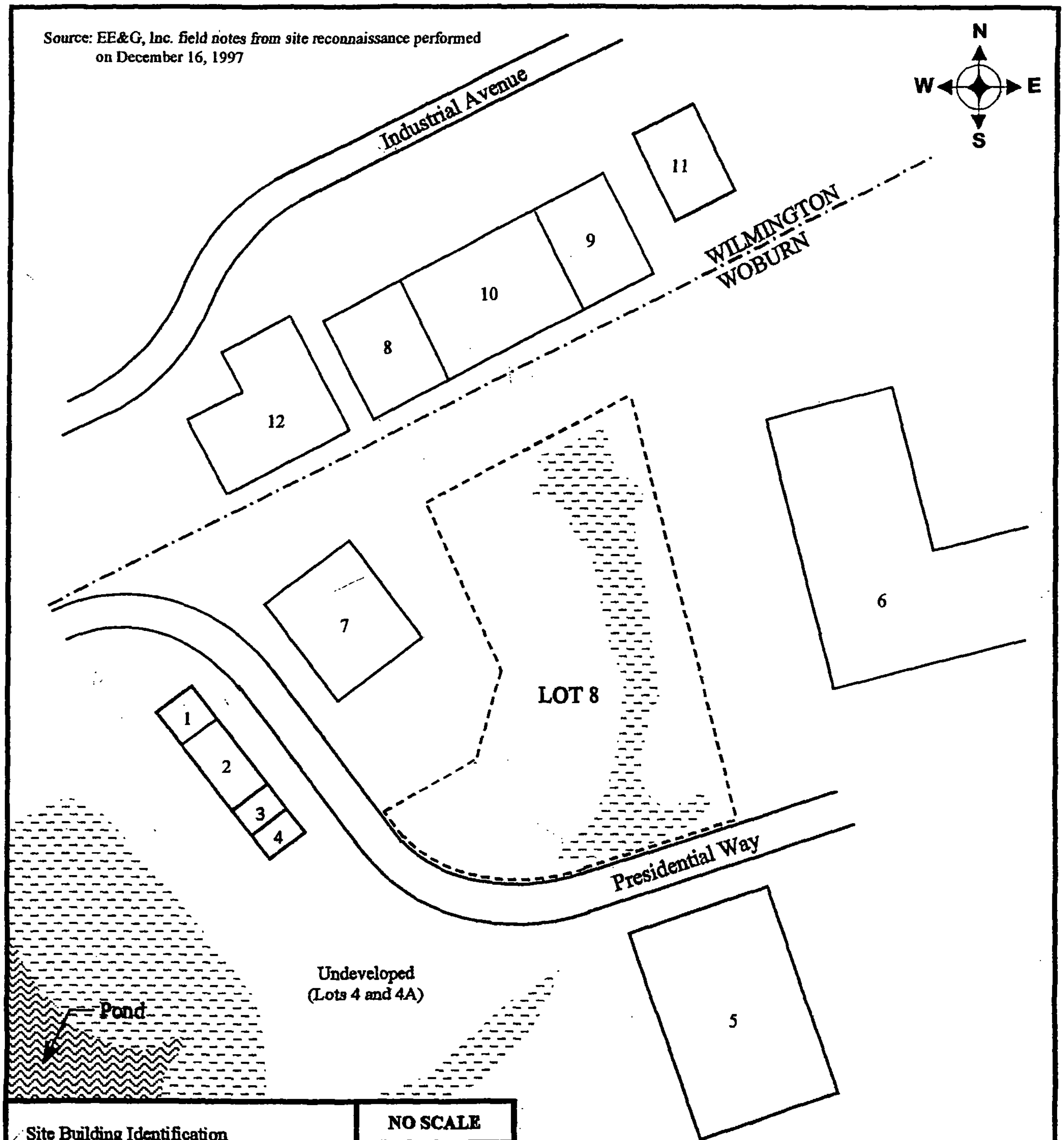
Lot 8 Presidential Way
Woburn, Massachusetts

Project No. 96.1025FT	Date: 12/17/97

Figure 3

DISPOSAL SITE MAP

Scale: 1" = 100'



NO SCALE

Site Building Identification

1) Market Grinding
2) Industrial Plastics
3) Ellsworth Adhesives
4) Terminix
5) KMS Printing
6) Altron Circuit Boards
7) Crown Lift Trucks
8) Smith & Nephew, Inc.
9) Pierce Leahy
10) Crystal Warehouse Corporation
11) Solectra Electric Automobiles
12) 3M Corporation

- - - - Disposal Site Property Line
—·— City Property Line
Wetlands

Prepared By/Date: PCO / 12-17-97
Checked By/Date: MAO / 12-23-97

Boston Centerless Phase I ESA Lot 8 Presidential Way Woburn, Massachusetts	Environmental Engineering & Geotechnics, Inc. 1612 North Sylvania Avenue Phone (817) 838-0330; Fax (817) 838-7722	SITE AND VICINITY PLAN Figure 2

844 Woburn St
3-001330

TGG
ENVIRONMENTAL INC.
A Subsidiary of
The Geotechnical Group Inc.

May 3, 1988
File No. HP2125

Mr. Lawrence Tocci
One Atherton Drive
Ayre, MA 01432

Re: Environmental Studies
844 & 856 Woburn Street
Wilmington, Massachusetts

Dear Mr. Tocci:

We are pleased to submit this report which summarizes the results of environmental studies conducted at 844 and 856 Woburn Street in Wilmington, Massachusetts. The objective of this work has been to assess the current quality of groundwater underlying the two parcels. In conjunction with recommendations made by Ms. Pat Donoghue at the northeastern regional office of the DEQE, TGG Environmental compared the current levels of volatile organic compounds to those found during previous sampling rounds. Work was conducted pursuant to verbal authorization and in accordance with the attached Limitations and Conditions of Engagement.

Recent analytical testing of samples from existing groundwater monitoring wells at both sites suggests that total levels of volatile organic compounds are attenuating at all the wells sampled on the two properties. Attached Tables 1 and 2 reflect the results of groundwater testing at both sites during November, 1987 (Groundwater Technology, consultant) and March, 1988, respectively. These tables document the total and individual levels of volatiles detected at each well location.

The apparent trend towards decreased levels of total volatile organic compounds in groundwater at both parcels over a five month period was discussed as part of a conversation with Ms. Donoghue during the week of April 25, 1988. Based on the observed attenuation, the option of no further work at 844 Woburn Street was thought to be acceptable. Further short term monitoring may be prudent at 856 Woburn Street, where operations at Ritter Trucking appear to have been the source of contamination.

BACKGROUND

In August, 1985, an environmental site assessment was conducted at 856 Woburn Street (Ritter Trucking) by Toxic Systems Management, Inc. During these investigations a floating petroleum product layer was noted on groundwater at the site.

Groundwater Technology, Inc. was retained by the owner of the site, Mr. Larry Tocci, to evaluate the detected petroleum contamination and supervise remedial actions at the site. Investigations by Groundwater Technology, summarized in their 'Hydrogeologic Investigation Report' of May 7, 1986, indicated the presence of petroleum constituents and several solvents in groundwater at 856 Woburn Street. The petroleum products were associated with a former underground storage tank and the solvents tentatively associated with a waste water settling tank on the site. Local groundwater flow was assessed for this report as being in a westerly direction.

During June, 1986, petroleum contaminated soil was excavated from the area surrounding the former underground tank, as reported in Groundwater Technology's 'Hydrological Investigation Report' of November 24, 1986.

In July, 1987, TGG Environmental, Inc. conducted a site assessment at the property abutting 856 Woburn Street to the north, including the installation and sampling of three monitoring wells, B-1 through B-3. The results of this assessment are summarized in our report of September 9, 1987, titled 'Environmental Site Assessment, 844 Woburn Street, Wilmington, MA'. Analysis of groundwater during this site assessment showed the presence of volatile organic compounds largely corresponding to those found at 856 Woburn Street. Detected compounds were reported in higher concentrations in monitoring well B-1, located closest to 856 Woburn Street.

Studies were subsequently conducted at 844 and 856 Woburn Street by Groundwater Technology in August through November, 1987, as summarized in their letter of November 17, 1987. These studies included the removal of additional petroleum contaminated soils, a groundwater survey including wells at 844 and sampling and analysis of wells on both properties. Results of the groundwater elevation survey and monitoring well locations are presented in their Figure 2 which is attached for reference.

During Groundwater Technology's most recent studies, in October, 1987, groundwater samples from seven monitoring wells as well as a sample from a brook running east of the site were submitted to a laboratory for priority pollutant volatile organic compounds analysis. Volatile organic compounds including petroleum constituents and solvents were found in all of the groundwater samples at levels ranging from 17. to 1159. parts per billion (ppb). A summary of results of groundwater testing during October, 1987 is presented in Table 1. Results are dicussed further below.

GROUNDWATER SAMPLING AND ANALYSIS

Selected monitoring wells, including those tested during the October, 1987 sampling round were re-sampled for analysis in March, 1988 by TGG Environmental. At the request of the DEQE, the samples were submitted to Eastern Analytical Laboratories (EAL) of Billerica, Massachusetts, a state certified laboratory for priority pollutant volatile organic compounds analysis in accordance with EPA Method 624.

Volatile organic compounds were found at levels above the detection limits of the instrumentation used in five of the eight samples tested. None of the compounds tested for were detected in groundwater from the remaining three wells, B-2, B-3 and GT-3. Total concentrations of petroleum related compounds, including benzene, toluene, ethylbenzene and xylenes were generally higher in wells on the Ritter trucking site. The highest total concentration of the chlorinated compounds was found in monitoring well B-1, on the 844 property located adjacent to the Ritter parking area. Concentrations of individual compounds ranged up to 375. ppb while the total content of the priority pollutant volatile organic compounds was up to 585 ppb (in B-1). A summary of the most recent results is presented in Table 2, and formal results from both the October, 1987 and March, 1988 sampling rounds are attached.

As noted in recent conversations with the DEQE, the total levels of volatile organic compounds at both properties have markedly decreased over a period of five months. In light of the reported removal of contaminated soils at Ritter Trucking, the established trend is judged to be representative of a long term trend at the site.

CONCLUSIONS

Groundwater from monitoring wells at 844 and 856 Woburn Street was sampled by TGG Environmental and analyzed in March, 1988. The results were compared to those provided by Groundwater Technology in December, 1987. Based on the comparison, total levels of petroleum related compounds and chlorinated solvents appear to be attenuating in groundwater from each of the wells tested. Levels of priority pollutant volatile organic compounds detected in groundwater samples were in all cases less than available Suggested No Adverse Reaction Levels (SNARLS) provided by the US EPA.

Health Advisories

The property at 856 Woburn Street, which is occupied by Ritter Trucking, has been identified by the DEQE as the source of detected petroleum and solvent contamination. A soil removal program has been completed at Ritter to remove the suspected sources and mitigate further groundwater contamination.

Ongoing conversations with the DEQE have revealed that based on the significant attenuation at both properties, further testing at 844 Woburn Street will not likely be required. Based on a review of the enclosed results, and in light of our recent conversations, the DEQE may require a supplementary, final round of testing at Ritter Trucking.

LIMITATIONS

This report was prepared in accordance with generally accepted geotechnical engineering practice and in accordance with the Conditions of Engagement attached. No other warranty, expressed or implied, is made.

If you have any questions concerning the contents of this letter please call. TGG Environmental has apreciated this opportunity to work for you.

Very Truly Yours,

TGG ENVIRONMENTAL, INC.

Stacy P Clark

Stacy Pancoast Clark
Vice President

SPC/ld

cc; Ms. Pat Donahue, DEQE

Attachments: Figure
Tables
Results of Quantitative Analysis
Conditions of Engagement

TGG
ENVIRONMENTAL INC.
A Subsidiary of
The Geotechnical Group Inc.

September 9, 1987
File No. HW2026

Mr. Larry Tocci
6 Ocean Front Street
Box Q
Humarock, Massachusetts 02047

Re: Environmental Site Assessment
844 Woburn Street
Wilmington, MA

Dear Mr. Tocci:

We are pleased to submit this report which summarizes the results of an environmental site assessment conducted at the above-referenced site in Wilmington, Massachusetts. The objective of the work has been to evaluate the presence of oil or hazardous material in the environment of the site, in accordance with Massachusetts General Laws, Chapter 21E. This work was conducted in accordance with our proposal dated June 23, 1987.

SUMMARY

Studies conducted for this assessment include site visits, a review of the site history, a limited subsurface exploration program, preliminary screening of soil, groundwater, and surface water samples, and limited analytical testing of selected groundwater samples.

Based on the studies conducted and reported herein, it is our opinion that low levels of volatile organic compounds (VOCs) are locally present in the environment of the referenced site on the northeast and southern portions of the property, as represented by borings B-2 and B-1. It is our further opinion, given the nature of the site's use and documentation of environmental incidents in the immediate vicinity of the site, that the low levels may be as a result of an off-site source.

While no available history was found to suggest that a past or on-going incident has occurred at the referenced site, DEQE documentation of an on-going incident at Ritter Trucking, located immediately south of the site, was found.

BACKGROUND AND SITE HISTORY

The referenced site consists of approximately 5 acres of land situated in the southeast portion of Wilmington, Massachusetts, which is characterized predominantly by industrial development. The Wilmington Assessor's office locates the industrially zoned property on Map 46 as Parcel 1B.

The referenced property is relatively low in elevation with respect to properties located north, east, and west of the site. It is our opinion, as based on visual observations of topographical features and USGS Survey Maps, that local groundwater generally flows in a southeasterly direction toward a wetland area which apparently discharges to the Aberjona River, located approximately 3/4 of a mile south and east of the referenced site. Field measurements of groundwater head elevations would be required; however, to verify actual groundwater flow patterns in the area of the referenced site. Based on this interpretation, businesses to the north and west of the site along Woburn Street are located potentially upgradient of the subject property while businesses south of the site, including the abutting Ritter Trucking facility, would appear to be located downgradient or cross-gradient with respect to the referenced site.

Mr. Lawrence Tocci is the current owner of the site property, which is presently occupied by a single-story, rectangular shaped, brick-faced warehouse building. The building itself is currently owned by Trustees of the I. Fred DiCenso Estate who lease the site warehouse to Jarvinen Company, a cross country ski manufacturer and Penzoil Corporation, an oil refining company both of whom use the building exclusively for storage. Computax, processors of tax forms, occupy business offices on the easternmost portion of the facility.

As part of this assessment, the Wilmington Assessor's Office, Engineering Department, and Water Department were contacted with regard to the site history. In addition, contact was made and files were reviewed at the Wilmington Board of Health, Wilmington Fire Department, and the Northeast Regional Office of the Department of Environmental Quality Engineering (DEQE) in an effort to gather information concerning past or ongoing environment incidents at or in the neighborhood of the referenced site.

The Wilmington Engineering Department and Water Department indicated that Woburn Street and the neighborhood in the vicinity of the site is serviced by public sewer and water systems. No information was available at the Wilmington Engineering Department and Water Department to suggest that private water wells and/or septic systems exist in the neighborhood of the referenced site.

Hazardous Waste Coordinator Gregory Erickson of the Wilmington Board of Health reported in a July 13, 1987 letter to TGG Environmental, Inc. that he has no record of an incident on file to suggest the potential presence of oil or hazardous material in the environment of the referenced site. Deputy Chief Daniel Stewart of the Wilmington Fire Department did not have information on file regarding an incident of oil or hazardous material at the referenced site; however he did have indirect knowledge of an environmental incident occurring at Ritter Trucking, which abuts the site to the south, at 856 ~~829~~ Woburn Street. Deputy Chief Stewart referenced the Northeast Regional Office of the Department of Environmental Quality Engineering (DEQE) for information.

Files and records at the Northeast Regional Office of the Department of Environmental Quality Engineering (DEQE) were reviewed by TGG Environmental, Inc. in an effort to gather information concerning past or ongoing environmental incidents at or near the referenced site. While no record was found to indicate a past or ongoing environmental incident had occurred at the referenced site, documented information indicated that an oil spill resulting in contaminated soils occurred at 829 Woburn Street. According to available records, on July 24, 1985, a presence of diesel fuel and "latex type fluid" was detected at Ritter Trucking Company located at 829 Woburn Street in Wilmington. Ritter Trucking which abuts the south side of the referenced site employed Jet Line Services, Inc., a licensed cleanup contractor, to remove the contaminated soil. Monitoring wells were installed under the supervision of Groundwater Technology, Inc. and soil and groundwater samples were collected for analytical laboratory testing. Results of analytical testing revealed elevated levels of oil and grease in selected soil and groundwater samples. Groundwater at the site is reportedly monitored on a periodic basis however no indication as to the parameters of the testing, or whether the DEQE reviews the laboratory results was found. As discussed in the following section of this report, visual observation of the Ritter Trucking property revealed surficial oil staining less than twenty feet from the referenced site. Consequently, regardless of the groundwater flow direction in the area of the site, the close proximity of the Ritter Trucking property to the referenced site represents a potential source of contamination by hazardous materials or oil.

Industriplex-128, which is located approximately 1 mile south of the referenced site is listed by the Environmental Protection Agency as a Superfund hazardous waste site according to the DEQE file research. Several priority pollutant metals and volatile organic compounds were detected at the site during excavation for new construction. Based on the local direction of the groundwater flow outlined in that report, it would appear that Industriplex 128 is not hydrologically upgradient of the referenced site, and therefore would not be expected to represent an environmental threat to the referenced site with respect the Massachusetts General Laws, Chapter 21E.

VISUAL ASSESSMENT

A visual assessment was conducted at the referenced site on July 14, 1987, by TGG Environmental, Inc. in order to view surficial site conditions for visual evidence of a possible presence of oil or hazardous material in the environment of the referenced site.

The referenced site consists of approximately 5 acres of industrially zoned land in the southeast section of Wilmington, Massachusetts. The neighborhood of the referenced site is characterized by industrial development, much of which occurred during the mid-1960's. A single-story, brick-faced warehouse and office building and its associated paved parking areas presently occupy the property which slopes gently downward in a southerly direction.

Jarvinen Company, a cross county ski distributor, stores skis and other associated cross country ski equipment in the western portion of the building. A portion of the warehouse area on the southwest section of building is occupied by Jarvinen office and showroom areas. No floor drains or staining were observed in this area.

concentration of dissolved ions in the sample. Results of these screenings are attached for reference. The pH values of groundwater and surface water samples collected from the site ranged from 6.6 to 5.9. These levels, in our opinion, appear consistent with levels commonly observed in urban New England groundwater and surface water.

The conductivity values for both collected groundwater and surface water samples ranged from 227 to 552 umhos, with the exception of groundwater from boring B-2 which had a reading of 1287 umhos/cm on the conductivity meter. The presence of organic peat at the ten to twelve foot depth at B-2 and the absence of organics at B-1 and B-3 suggests that the 1287 pmhos value is reflective of the peaty soils at B-2.

ANALYTICAL TESTING

Due to the elevated levels of VOCs detected in the groundwater from borings B-1 and B-2 using the gas chromatograph, selected groundwater samples from borings B-1 and B-2 were submitted to a state certified laboratory for a test for priority pollutant volatile organic compounds in accordance with EPA Method 624.

Priority pollutant VOCs were detected at varying concentrations in both groundwater samples B-1 and B-2. Results obtained for groundwater sample B-1 revealed that concentrations of 1,1 dichloroethene and 1,1,1 trichloroethane exceed proposed MCLs and RMCLs set by the EPA. Other priority pollutants detected in groundwater from boring B-2 were below MCLs and RMCLs or were not evaluated due to unreported data. Refer to the attached Table 1 for a tabulated list of results.

Acetone, benzene and ethylbenzene were detected in groundwater collected from boring B-2 at varying concentrations; however, benzene exceeds the proposed RMCL set by the EPA with a concentration of 0.0012 ppm. The proposed RMCL set by the EPA for benzene is zero.

Analytical results as reported by Stevens Water Analysis are attached for reference.

CONCLUSIONS

The following conclusions are subject to the following Limitations and the attached Conditions of Engagement.

An environmental site assessment was conducted at the referenced site at 844 Woburn Street in Wilmington, Massachusetts in accordance with our proposal dated June 23, 1987. This assessment included a site visit, a review of the site history, a limited subsurface exploration program, preliminary screening of soils, surface water and groundwater samples and limited analytical testing of selected groundwater samples.

Based on the studies conducted and the observations made, it is our opinion that volatile organic compounds (VOCs) are present in the environment of the referenced site. Although an assessment of groundwater flow patters at the site has not been performed, available information on the nature of the site's use, and documented evidence of past and ongoing environmental incidents in the immediate neighborhood of the referenced site suggests that the levels of VOCs ~~VOC~~s exist as a result of an off-site source. Given that no exact source of the contamination can be made at the present time, and given that the results of analytical testing indicated levels of VOCs in groundwater exceeding drinking water standards, TGG Environmental recommends field survey of groundwater head elevations at the site to assess groundwater flow patterns. Based on the results, additional groundwater sampling and associated laboratory testing will likely be required.

LIMITATIONS

The work reported herein was conducted to assess the physical characteristics of the referenced site with respect to the presence of oil or hazardous material in the environment at the site as defined in MGL Chapter 21E. Past or present owners of the site were not contacted regarding their compliance with federal, state and local laws and regulations.

The conclusions summarized herein were made based on the specific observations and limited explorations stated in this report at the time these services were conducted. Future events could change these findings. Limited qualitative screening and quantitative analysis were conducted as part of this study. As discussed above, should future work encounter differing conditions, or additional information regarding the site become available, sections of this report and our conclusions may require modification.

This report was prepared for the exclusive use of the named addressee solely for use in an environmental evaluation of the site. The report was prepared in accordance with generally accepted geohydrological and geotechnical engineering practice and in accordance with the attached Conditions of Engagement. No other warranty, expressed or implied, is made.

We trust this report meets your requirements. If you have any questions, or comments regarding this project, please do not hesitate to call.

Very truly yours,

TGG ENVIRONMENTAL, INC.

Jeffrey M Hardin SP

Jeffrey M. Hardin
Vice President

Stacy Pancoast

Stacy Pancoast
Vice President

SP/lp

Attachments: Exploration Location Plan
Tables
Test Boring Logs
Preliminary Screening Results
Analytical Results
Conditions of Engagement

TABLE 1

ANALYTICAL DATA AS COMPARED TO PROPOSED EPA REGULATORY DATA

	SAMPLE B-1 GW (ppm)	SAMPLE B-2 GW (ppm)	RMCL (ppm)	MCL (ppm)
Methylene Chloride	0.920	BDL	*	*
Acetone	0.033	0.024	*	*
Benzene	BDL	0.0012	**0	0.005
Ethylbenzene	BDL	0.0063	0.68	*
1,1,dichloroethene	0.030	BDL	**0.007	**0.007
1,1,dichloroethane	0.480	BDL	*	*
1,1,1,trichloroethane	0.800	BDL	**0.20	**0.20
trichloroethene	0.035	BDL	0	0.005
tetrachloroethene	0.014	BDL	*	0

* Data not available.

**Exceeds values reported for proposed RMCLs and on MCLs (one or both).

GW = Groundwater

BDL = Below Detectable Limits

PPM = Parts Per Million

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
5 Commonwealth Avenue
Woburn, Massachusetts 01801

S. RUSSELL SYLVA
Commissioner

July 6, 1988

Mr. Lawrence Tocci
One Atherton Drive
Ayer, MA 01432

RE: WILMINGTON-844 Woburn St.
DEQE Case No.# 03-1330

Dear Mr. Tocci:

The Department of Environmental Quality Engineering is in receipt of a groundwater monitoring report for properties located at 844 and 856 Woburn St., Wilmington, MA dated May 3, 1988. The report was prepared by TGG Environmental, Inc. in response to requirements outlined in a Notice of Responsibility letter dated January 29, 1988.

The Department has reviewed the submitted groundwater quality data from three monitoring wells on-site. Only monitoring location B-1 has shown significant levels of volatile organic compounds (VOCs). Data collected during July 1987, October 1987 and March 1988 from B-1 contained total VOC concentrations of 2312 ug/l, 765 ug/l and 586 ug/l, respectively.

The contaminants detected at B-1 appear to be the result of migration from the adjacent property (Ritter Transportation) and have attenuated over the past 9 months. Based upon existing information, the Department has determined that conditions on your property do not pose a significant risk to public health, safety, welfare or the environment in its present condition. Since contaminant levels are decreasing and there is no significant risk the Department does not anticipate further remedial response actions on your property.

Should further action become necessary, the Department would initially require responsible parties at the Ritter Transportation site to take appropriate action. The Department will continue to monitor the Ritter site and will notify you should conditions worsen. The Department does require notification in the event that significant land use changes occur on your property which could alter existing site conditions and result in potential exposure scenarios.

The Department's determination on this matter shall not limit the response or action we might take with respect to other sites in the area of the response or action we might take regarding this property in the event that further information comes to the attention of the Department.

Penzoil Corporation, utilizes the central portion of the building as warehouse space for drums and containers of motor oil, antifreeze, lubricating oils, and other petroleum products. Office areas are located along the east side of Penzoil's area. While minor staining was observed on the surface of the cement concrete floor in various limited areas, general housekeeping practices appeared to be satisfactory. Minor amounts of a speedi-dry product used to absorb oil, was noted on the concrete slab floor of the Penzoil Warehouse. No floor drains were noted.

Computax, an income tax processing company, utilizes the eastern side of the building exclusively as office space. No floor drains or staining were observed in this area.

Paved parking areas are located on the south, east and west sides of the building, while overgrown vegetation occupies property north of the building. The parking areas along the south and east boundaries are bordered by gravel and grass covered surfaces. Property on the eastern border of the site slopes downward toward a wetland area characterized by weeds and wetland vegetation. An unnamed brook runs southerly in the wetland area parallel with the sites eastern boundary line.

The site is bounded by ADAP Auto Parts to the North, Ritter Trucking to the south, a wetland area to the east and Woburn Street to the west. The unpaved ground surface of the Ritter Trucking property was noted to be oil stained in various areas, many of which were less then twenty feet from the site.

SUBSURFACE EXPLORATIONS AND CONDITIONS

A series of four soil test borings (B-1 through B-4) were conducted at the site to assess subsurface conditions and collect soil and groundwater samples for preliminary screening and analytical testing. The approximate locations of the borings are shown on the attached Figure 1 for reference. The test borings were conducted on July 14, 1987, by Carr-Dee Corporation of Medford, Massachusetts and observed by TGG Environmental, Inc. Logs of the boreholes prepared by TGG Environmental are attached for reference. The borings were advanced using hollow stem augers without the use of drilling water. Standard Penetration Tests were performed at approximately 5-foot intervals, yielding split spoon samples. Soil samples, which were visually classified on-site by TGG Environmental, were sealed in 8 ounce drillers jars, and placed on ice pending subsequent field and in-house screening for volatile organic compounds, and analytical testing.

Soil conditions on the southern side of the site, as represented in boring B-1, consist of 4 feet of fill underlain by glacial till to the depth of refusal at 13.5 feet. Boring B-1 was sited on the southern boundary line near the abutting Ritter Trucking Company. A slight petroleum odor was noted on soil sample S-1, which was collected at depth of 0.25 to 2.25 feet.

Soil conditions on the eastern side of the site as represented in boring B-2 consist of 7 feet of fill underlain by a 2-foot layer of peat, which in-turn is underlain by gravely sand to the depth explored at 12 feet. No petroleum odors or staining were noted in soil samples collected from boring B-2.

Soil conditions on the northwest portion of the site as represented in boring B-3 consisted of 4.5 feet of fill underlain by sand to the depth explored at 12 feet. Given topographic characteristics of the site and the assumption that groundwater generally follows surficial topographic features, test boring B-3 was sited on the northwest portion of the site in an area assumed to be on the upgradient end of the property. Based on this assumption, boring B-3 serves as an indication of the water quality from off site.

Time allowing, a soil probe, B-4 was conducted on the southeast portion of the site adjacent to the wetland area. Refusal on apparent bedrock prohibited advancement of B-4 beyond a depth of 4 feet. Groundwater was not encountered above 4 feet and given the time limitations imposed by the drillers, no soil samples were collected.

Groundwater was encountered in borings B-1 through B-3 at depths ranging from 6 to 9 feet. Water levels were observed in the wells at the times and under the conditions stated in the attached boring logs. However, it must be stated that the level of groundwater may fluctuate due to the variations in rainfall, temperature, and other factors different than those prevailing at the time the measurements were made.

As discussed above, groundwater in the immediate area of the site would appear to flow in a southeasterly direction toward wetlands and the Aberjona River which is located approximately 3/4 mile south of the referenced site. This, however, is our opinion and has not been verified by field survey of groundwater head elevations.

OBSERVATION WELL INSTALLATION AND GROUNDWATER SAMPLING

Groundwater observation wells which were installed in borings B-1, B-2, and B-3 consisted of 2-inch PVC pipe with slotted well screen for the lower section, so as to intercept the groundwater. Clean silica sand was placed as a filter in the annular space around the wellscreen. A bentonite surface seal was placed above the sand filler and a protective metal roadway box was installed flush with the ground surface to complete each observation well.

The three observation wells were sampled July 14, 1987, for in-house screening. Sampling was accomplished with bailers consisting of 5-foot lengths of stainless steel tubing fitted with a teflon ball check valve. A separate precleaned bailer was used for each well to reduce the possibility of cross contamination. Approximately three to five times the initial volume of groundwater in the well was removed prior to sample collection. Water quality samples for subsequent screening were recovered in precleaned triplicate 40 ml glass septum vials and 8 ounce drillers jars.

SURFACE SOIL AND WATER SAMPLING

Surface soil and water samples were collected at the referenced site on July 14, 1987, by TGG Environmental for preliminary screening for volatile organic compounds (VOCs). Surface water samples were additionally screened for pH and conductivity.

Two surface soil samples (SS-1 and SS-2) were collected from an unpaved area along the southern boundary of the site, approximately ten feet from the abutting Ritter Trucking property. Surficial sample SS-1 was collected less than 100 feet Woburn Street, while surface soils SS-2 was collected toward the east side of the site's southern boundary as shown on Figure 1. Collected samples were sealed in 8 ounce drillers jars and chilled on ice until they were screened for (VOCs) by TGG Environmental, Inc.

As shown on attached Figure 1, surface water SW-2 was collected from the brook near the southeast corner of the site, while surface water SW-1 was collected approximately 100 feet upstream of surface water SW-2. Surface water samples SW-1 and SW-2 were collected in 40 ml septum vials for preliminary in-house screening of volatile organic compounds, and in 8 ounce drillers jars for field screening for pH and conductivity.

RESULTS OF SCREENING ANALYSES

The soil samples collected during the explorations and the surface soil samples were initially screened for total organic compounds (VOCs) using the AID Model 580 portable organic vapor detector. Results are reported simply as "units" to reflect variations in instrument response to compounds other than butadiene results are attached for review.

Field screening of collected soil samples for VOCs using the portable organic vapor detector indicated elevated levels of total VOCs in soil sample S-1 from boring B-1 (13.7 units) and soil sample S-1 from boring B-2 (11.7 units). Readings for all other soil samples were 1.5 units or less, which do not in our opinion indicate a significant presence of VOCs.

In addition to the screening for VOCs using the AID Model 580 portable organic vapor detector, selected soil, groundwater and surface water samples were screened in-house by TGG Environmental, Inc. for volatile organic compounds (VOCs) using a Hewlett Packard Model 5890A gas chromatograph (GC) equipped with a flame ionization detector (FID) and a capillary column and a Hewlett Packard Model 3392 integrator.

Results of GC screening for soil samples designated as S-1 from both borings B-1 and B-2 using the GC indicated elevated levels of VOCs which appear to concur with the results obtained using the portable organic vapor detector.

Results of the GC screening of the surface water sample, SW-2 collected from the brook along the eastern boundary line did not reveal significant levels of VOCs, while surface water sample SW-1 revealed detectable levels of volatile organic compounds (VOCs).

Results of the GC screening of groundwater from boring B-3 suggested that no VOCs were detected. While groundwater samples from borings B-1 and B-2 revealed elevated levels of volatile organic compounds which similarly correspond to the elevated levels detected in the soil samples S-1 from both borings, B-1 and B-2.

Groundwater and surface water samples were additionally screened for pH and conductivity using a Lakewood Model PCD pH and conductivity meter. The pH data is a measure of the relative alkalinity or acidity of the water. The specific conductance value represents an indirect measure of the

Mr Lawrence Tocci
Page 2

Should you have further questions regarding this matter, please contact Patricia Donahue at the letterhead address or 935-2160.

Very truly yours,

Richard J. Chalpin

Richard J. Chalpin
Deputy Regional
Environmental Engineer

RJC/PD/ram

JF

cc: DEQE/DHW, 1 Winter St., Boston, MA 02108, Attn: Madeline Snow
Board of Health, c/o Greg Erickson, 121 Glen Rd., Wilmington, MA 01887

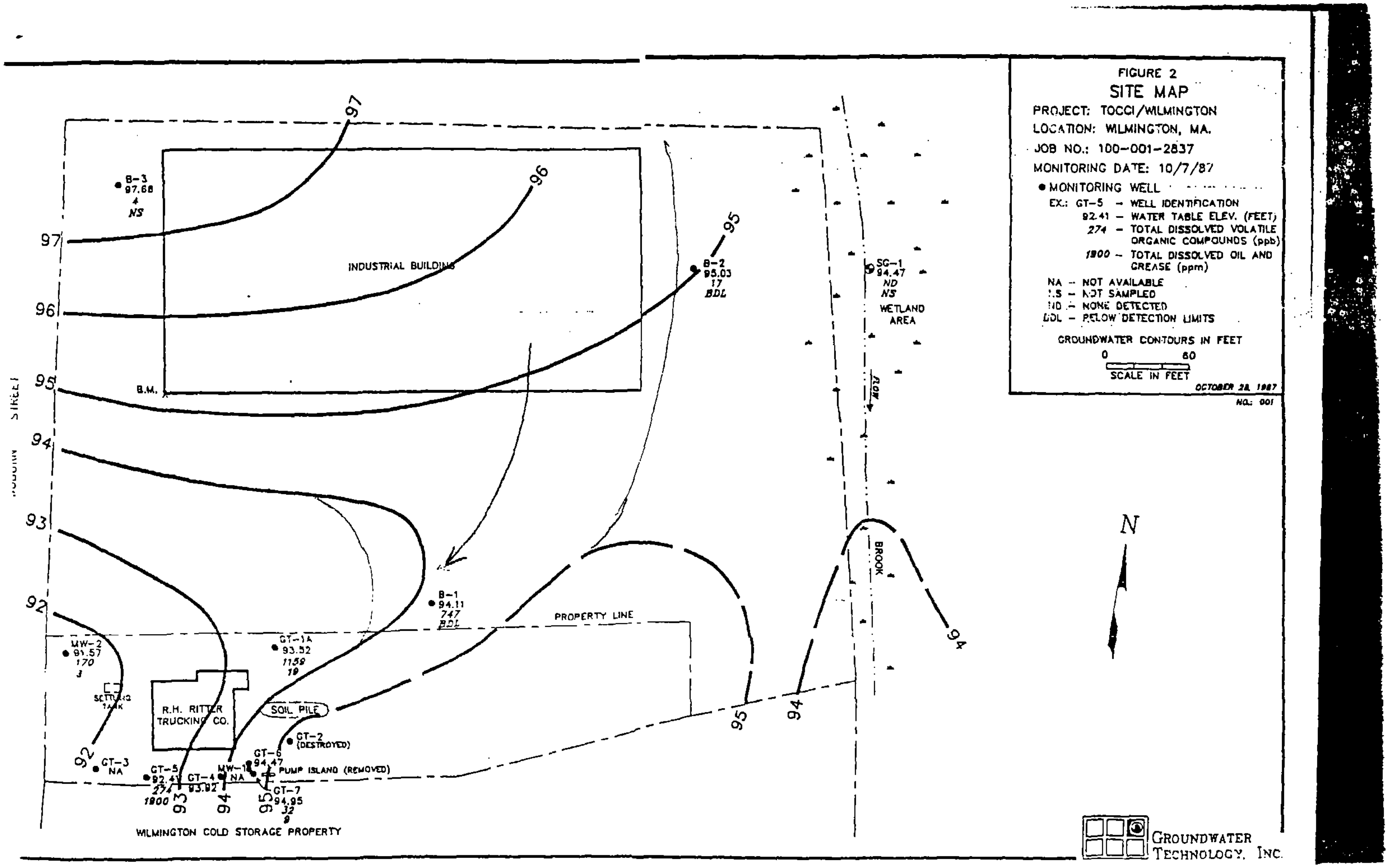


FIGURE 2
SITE MAP
PROJECT: TOCCI/WILMINGTON
LOCATION: WILMINGTON, MA.
JOB NO.: 100-001-2837
MONITORING DATE: 10/7/87
● MONITORING WELL
EX.: GT-5 – WELL IDENTIFICATION
92.41 – WATER TABLE ELEV. (FEET)
274 – TOTAL DISSOLVED VOLATILE ORGANIC COMPOUNDS (ppb)
1900 – TOTAL DISSOLVED OIL AND GREASE (ppm)
NA – NOT AVAILABLE
NS – NOT SAMPLED
ND – NONE DETECTED
BDL – BELOW DETECTION LIMITS
GROUNDWATER CONTOURS IN FEET
0
60
SCALE IN FEET
OCTOBER 28, 1987
NO.: 001
INDUSTRIAL BUILDING
B-3 97.68 4 NS
B-2 95.03 17 BDL
B-1 94.11 747 BDL
SG-1 94.47 ND NS
WETLAND AREA
FLOW
BROOK
PROPERTY LINE
MW-2 91.57 170 3
GT-1A 93.52 1159 19
SETTLING TANK
R.H. RITTER TRUCKING CO.
SOIL PILE
GT-2 (DESTROYED)
GT-3 NA
GT-5 92.41 274 1900
GT-4 93.82
MW-1 NA
GT-6 94.47
PUMP ISLAND (REMOVED)
GT-7 94.95 32 9
B.M.
WILMINGTON COLD STORAGE PROPERTY
N
GROUNDWATER TECHNOLOGY, INC.

GROUNDWATER
TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

220 Norwood Park South, Norwood, MA 02062 U.S.A. (617) 769-7600
Telex: 92-8420 Fax: (617) 769-7785

November 17, 1987

Refer: 100-001-2837

Mr. Lawrence Tocci
6 Ocean Front Street
Box Q
Humarock, Massachusetts 02047

Subject: Groundwater Monitoring and Sampling
Tocci Properties
844 and 856 Woburn Street
Wilmington, Massachusetts
August through November, 1987

Dear Larry:

The purpose of this letter is to report the methods and results of recent groundwater monitoring and sampling activities of Groundwater Technology, Inc. at two lots owned by Mr. Lawrence Tocci.

Groundwater Technology previously completed a hydrogeologic site assessment at the 856 Woburn Street property in May 1986. Between May and October 1986, Groundwater Technology conducted further investigation of this location, the results of which were reported in November 1986.

TGG Environmental, Inc. prepared an environmental site assessment of the 844 Woburn Street property in September 1987.

The following report pertains to Groundwater Technology's activities at both the 844 and 856 Woburn Street properties between August and November, 1987.

Scope of Work

Groundwater Technology performed the following tasks during the period August 26 to October 30, 1987:

1) Supervision of soil removal in the immediate vicinity of MW-1.

2) Gauging of monitoring wells.

3) Top-of-casing survey of monitoring wells.

4) Water quality sampling and sample analysis.

5) Report preparation.

Samples from MW-2, GT-1A, GT-5, GT-7, B-1, B-2, B-3, and the brook were collected and prepared in accordance with EPA Method 624. Each of the monitoring wells, with the exception of B-3 was also sampled in accordance with EPA Method 413.2.

All samples were preserved, packed and transported in accordance with Groundwater Technology Environmental Laboratories standard quality assurance guidelines. On October 12, 1987 Groundwater Technology Environmental Laboratories analyzed samples in accordance with EPA Method 624 for 33 volatile organic compounds. On October 21, 1987, samples were analyzed in accordance with EPA Method 413.2 for oil and grease.

RESULTS

Soil Removal

On August 26, 1987 approximately fifteen cubic yards of soil were excavated from the area surrounding MW-1. Portable photoionizer readings indicated total VOC levels of 35 to 60 parts per million in the headspaces of soil samples excavated from depths of five to seven feet in the vicinity of MW-1. These soils were removed to the contaminated soil stockpile east of the Ritter building (Figure 1).

Gauging Results

Well monitoring forms containing the well gauging data for August 26 and October 7, 1987 are attached to this report. The gauging data indicate that only one monitoring well, MW-1, contained free-floating petroleum on August 26, 1987. A thickness of 0.15 feet of petroleum was detected in MW-1 on this date. No monitoring wells contained detectable thickness of free-floating petroleum on October 7, 1987.

Groundwater Technology prepared water table elevation contours (Figure 1) with the top-of-casing elevation and well gauging data obtained on October 7, 1987. The water table contours indicate a complex pattern of local groundwater flow which is influenced by recharge areas and bedrock topography in the vicinity of the site.

Groundwater flow across the 856 Woburn Street property is generally to the west, towards Woburn Street. The data indicate that, at the 844 Woburn Street site, groundwater flow is largely to the south towards 856 Woburn Street.

The results of water sample laboratory analyses are summarized in the following table:

Table II
Laboratory Analyses Results
October 7, 1987 Sampling

Sample Source	Total VOC Concentration (ppb)	Total Oil and Grease (ppm)
MW-2	170	2.6
GT-1A	1159	19
GT-5	274	1900
GT-7	32	9.2
B-1	747	BDL
B-2	17	BDL
B-3	4	NS
Brook	ND	NS

Notes: NS = Not Sampled
ND = Not Detected

The complete laboratory analysis reports for both the EPA Method 624 and EPA Method 413.2 analyses are appended to this report.

Figure 1 indicates the levels of dissolved VOCs and oil and grease detected in samples from each sampling location.

Groundwater Technology, Inc. is pleased to provide technical services. If you have questions or comments concerning the contents of this report, please call us.

Sincerely,

GROUNDWATER TECHNOLOGY, INC.

Dan Lanier Cohen
Environmental Scientist

John A. Thompson
Hydrogeologist
Project Manager

DLC/JAT/paw
SMJ5:31

THE GEOTECHNICAL GROUP, INC.

TEST BORING LOGS	- PROJECT - 844 Woburn St. Wilmington, MA	BORING NO. B-1 SHEET 1 OF 1 DATE 7/14/87 FILE HW2026

BORING CO. Carr-Dee Corp. BORING LOCATION See plan
FOREMAN R. Long, Sr. GROUND ELEV. NA
ENGINEER S. Fleming DATE START 7/14/87 DATE END 7/14/87

CASING
SIZE: HSA
HAMMER: lb.
FALL:

SAMPLER
TYPE: SS
HAMMER 140 lb.
FALL: 30

OTHER:

GROUNDWATER READINGS

DATE	DEPTH	CASING AT	STABILIZATION TIME
7/14	8'	10'	0
7/14	9'	OW	0

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS/6"	STRATA CHANGE/ DESC.	SAMPLE DESCRIPTION	NOTE
		S-1	Auger	0.25-2.25	Sample	0.25	Bituminous concrete pavement.	
			13.7 units			Fill	Brown, medium fine SAND, little coarse to fiene Gravel, trace Silt, trace organics.	1
						4.0		
5		S-2	24/14	5-7'	41-51-60-53	Glacial till	Very dense, bown , coarse to fine SAND, little (+) coarse to fine Gravel, little Silt.	
10		S-3	24/12	10-12'	71-50-51-60		Very dense grey, coarse to fine SAND, some coarse to fine Gravel, little Silt.	
						13.5	Refusal	2 3

REMARKS:

1. Soil sample S-1 had a slight petroleum odor.
2. Auger refusal at 13.5 feet.
3. Installed observation well to a depth of 13 feet. Ten feet of 2" slotted screen, three feet solid PVC pipe as riser.

THE GEOTECHNICAL GROUP, INC.

TEST BORING LOGS

- PROJECT -	
844 Woburn Street	BORING NO. B-2
Wilmington, MA	SHEET 1 OF 1
	DATE 7/14/87 FILE HW2026

BORING CO. Carr-Dee Corp. BORING LOCATION See plan
FOREMAN R. Long GROUND ELEV. NA
ENGINEER S. Fleming DATE START 7/14/87 DATE END 7/14/87

CASING
SIZE: HSA
HAMMER: lb.
FALL:

SAMPLER
TYPE: SS
HAMMER 140 lb.
FALL: 30
OTHER:

GROUNDWATER READINGS

DATE	DEPTH	CASING AT	STABILIZATION TIME
7/14	6'	10'	0

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS/6"	STRATA CHANGE/ DESC.	SAMPLE DESCRIPTION	NOTE
		S-1	24/14 11.7	1-3	5-6-7-6	Fill	Medium dense brown medium SAND, trace fine Gravel, trace (+) Silt, little(-) Wood.	
5		S-2	24/6	5-7	2-3-2-3	7.0	Loose brown coarse to fine SAND, little coarse to fine Gravel, trace Silt, little Wood.	
		S-3	Auger	7-9	Sample	Peat 9.0	Black medium to fine (+) SAND, some Silt, trace Peat fibers.	1
10		S-4	24/6	10-12	6-8-9-6	Gravelly Sand 12.0	Medium dense tan coarse to fine SAND, little coarse to fine Gravel, little (-) Silt.	2
							Bottom of Borehole	

REMARKS:

1. Auger sample collected; driller notes that sample S-3 was collected from 7 to 9 feet.
2. Installed observation well to a depth of 10 feet. Five feet of 2" PVC slotted screen, 5 feet PVC pipe as a riser.

THE GEOTECHNICAL GROUP, INC.

TEST BORING LOGS

- PROJECT -
844 Woburn Street
Wilmington, MA

BORING NO. B-3
SHEET 1 OF 1
DATE 7/14/87 FILE HW2026

BORING CO. Carr Dee Corporation
FOREMAN R. Long
ENGINEER S. Fleming

BORING LOCATION See Plan
GROUND ELEV. NA
DATE START 7/14/87 DATE END 7/14/87

CASING
SIZE: HSA
HAMMER: lb.
FALL:

SAMPLER
TYPE: SS
HAMMER 140 lb.
FALL: 30"

OTHER:

GROUNDWATER READINGS

DATE	DEPTH	CASING AT	STABILIZATION TIME
7/14	6'	10'	0

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS/6"	STRATA CHANGE/ DESC.	SAMPLE DESCRIPTION	NOTE
						0.25	Bituminous Pavement Concrete	
		S-1	Auger	0.25-2.25	Sample	Fill	Brown medium to fine SAND, some coarse to fine Gravel, trace Silt, few Cobbles.	1
						4.5		
5		S-2	24/20	5-7	7-16-22-28	SAND	Dense, tan medium to fine SAND, trace (+) Silt, trace (-) fine Gravel.	
10		S-3	24/16	10-12	13-18-23-29		Dense tan coarse to fine SAND.	
						12.0		
							Bottom of boring	2
15								

REMARKS:

1. Auger sample was collected because of the difficulty the driller encountered try to penetrate the top 2.5 feet.
2. Installed observation well to a depth of 9.75 feet. Five feet 2 inch PVC slotted screen, 4.75 feet solid PVC pipe as a riser.

THE GEOTECHNICAL GROUP, INC.

TEST BORING LOGS	- PROJECT - 844 Woburn Street, Wilmington, MA	BORING NO. B-4 SHEET 1 OF 1 DATE 7/14/87 FILE HW2026

BORING CO. Carr Dee Corporation
FOREMAN R. Long
ENGINEER S. Fleming
BORING LOCATION See Plan
GROUND ELEV. NA
DATE START 7/14/87 DATE END 7/14/87

CASING
SIZE: HSA
HAMMER: lb.
FALL:

SAMPLER
TYPE: SS
HAMMER 140 lb.
FALL: 30"
OTHER:

GROUNDWATER READINGS

DATE	DEPTH	CASING AT	STABILIZATION	TIME
7/14	Dry	4'	0	

DEPTH	CAS. BL. /FT.	SAMPLE NO.	PEN./REC.	DEPTH	BLOWS/6"	STRATA CHANGE/ DESC.	SAMPLE DESCRIPTION	NOTE
						0.25	Bituminous Concrete Pavement	
						4.0		
5							Refusal	1 2

REMARKS:

1. Refusal on apparent bedrock. Moved hole 20 feet north to 4A and obtained another refusal at 4 feet.
2. No samples collected; an effort was made to install the observation well. Groundwater, however was not attained.

PORTABLE ORGANIC VAPOR ANALYZER RESULTS

(A.I.D. Model 580, Unit No. 1 , 10.0 eV lamp)

Project Name: 844 Woburn Street Location: Wilmingotn, MA

File No. HW2026 Sample Volume: 30cc Sample Temperature: Ambient

Operator: S. Fleming Date Collected: 7/14/87 Date Tested: 7/14/87

Exploration Number	Sample(1) Number	Total Volatiles Reading	Comment
B-1	S-1	13.7	Slight petroleum odor. *
	S-2	0.9	
	S-3	0.7	
B-2	S-1	11.7	*
	S-2	4.9	
	S-3	0.7	
	S-4	1.3	
B-3	S-1	0.9	
	S-2	1.5	
	S-3	1.5	
	SS-1	0.5	
	SS-2	0.7	

Sensitivity Check: ____________

NOTES: (1) Soil Samples recovered in 250 cc plastic bottles unless otherwise noted.

* Screened [illegible]

pH AND CONDUCTIVITY TEST RESULTS

(Lakewood Inst. pH and conductivity meter, model PCD)

Project Name: 844 Woburn Street Location: Wilmington, MA

File No. HW2026 Sample Volume: 30cc Sample Temperature: Ambient

Operator: S. Fleming Date Collected: 7/14/87 Date Tested: 7/14/87

Number	Sample Number	pH	Conductivity (µmhos/cm)	Comment
B-1	GW	6.4	552	*
B-2	GW	5.9	1287	*
B-3	GW	6.0	520	*
	SW-1	6.59	227	*
	SW-2	5.9	290	*

* Screened using the gas chromatograph.

provisional for VOCs

Stevens Water Analysis

38 Montvale Avenue • Stoneham, MA 02180 • Mass. (617) 438-6114 • Salem, N.H. (603) 893-3106

LABORATORY NUMBER: 3773

SAMPLE DATE: 7/14/87
Method 624

SUBMITTED BY: T.G.G. Environmental
100 Crescent Road
Needham, MA 02194

SAMPLE SOURCE: (2) Samples Received
844 Woburn Street, Wilmington, MA
Job # HW2026 Sample ID# B1-B2 Ground Water

COMPOUND	GW B-1	GW B-2	ug/L DETECTION LIMIT
Chloromethane	ND	ND	10
Bromomethane	ND	ND	10
Chloroethane	ND	ND	10
Methylene Chloride	920 ug/L	ND	5.0
Acetone	33 ug/L	24 ug/L	10
1,1 Dichloroethene	30 ug/L	ND	1.0
1,1 Dichloroethane	480 ug/L	ND	1.0
Trans-1,2 Dichloroethene	ND	ND	1.0
Chloroform	ND	ND	1.0
1,2 Dichloroethane	ND	ND	1.0
1,1,1 Trichloroethane	800 ug/L	ND	2.0
Carbon Tetrachloride	ND	ND	5.0
Bromodichloromethane	ND	ND	5.0
1,1,2,2 Tetrachloroethane	ND	ND	5.0
1,2 Dichloropropane	ND	ND	1.0
Trans-1,3 Dichloropropene	ND	ND	1.0
Trichloroethene	35 ug/L	ND	1.0
Dibromochloromethane	ND	ND	5.0
1,1,2 Trichloroethane	ND	ND	1.0
Benzene	ND	1.2 ug/L	1.0
Cis-1,3 Dichloropropene	ND	ND	1.0
Bromoform	ND	ND	5.0
Tetrachloroethene	14 ug/L	ND	5.0
Toluene	ND	ND	2.0
Chlorobenzene	ND	ND	1.0
Ethylbenzene	ND	6.3 ug/L	1.0
1,3 Dichlorobenzene	ND	ND	5.0
1,2 Dichlorobenzene	ND	ND	5.0
1,4 Dichlorobenzene	ND	ND	5.0
2-Chloroethyl vinyl ether	ND	ND	5.0
Dichlorofluoromethane	ND	ND	10
Trichlorofluoromethane	ND	ND	10
Vinyl Chloride	ND	ND	5.0

Alan Stevens
Chemist/Microbiologist

ND - None Detected

TABLE 3

SUMMARY OF GROUNDWATER ELEVATIONS MARCH, 1988 Date 3/ /88

Well	Well Elevation	Depth to Groundwater	Groundwater Elevation
B-1	~~NA~~ 99.22	4.2	~~NA~~ 95.02
B-2	~~NA~~ 99.98	4.9	~~NA~~ 95.08
B-3	~~NA~~ 101.46	2.6	~~NA~~ 98.86
MW-1	100.10	3.4	96.7 ✓
MW-2	100.10	4.2	95.9 ✓
GT-1A	99.70	4.9	94.8 ✓
GT-3	96.99	5.2	91.8 ✓
GT-4	99.10	3.8	95.3
GT-5	98.50	4.9	93.6 ✓
GT-7	100.60	3.5	97.1 ✓

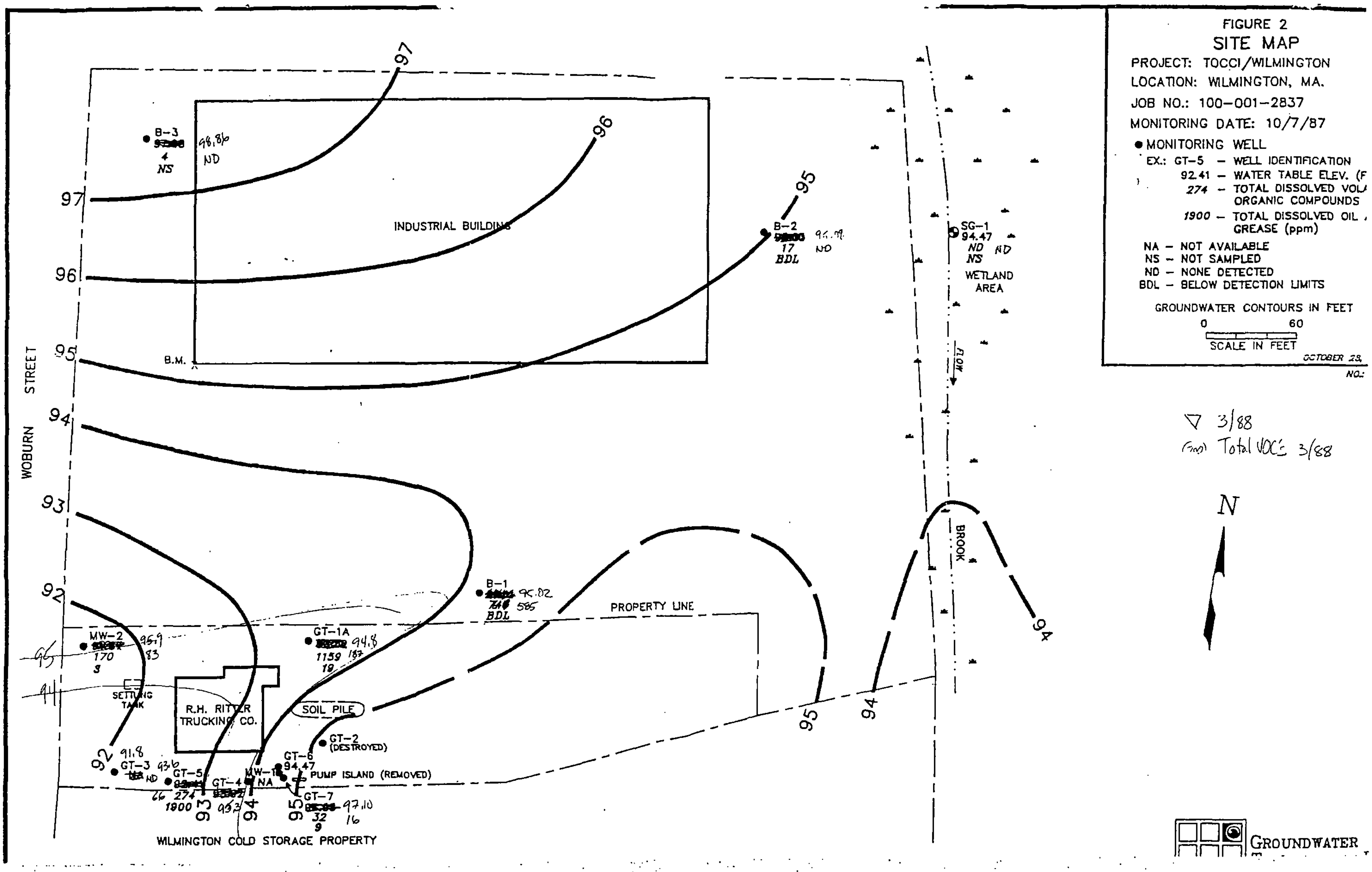


FIGURE 2
SITE MAP
PROJECT: TOCCI/WILMINGTON
LOCATION: WILMINGTON, MA.
JOB NO.: 100-001-2837
MONITORING DATE: 10/7/87
MONITORING WELL
EX.: GT-5 – WELL IDENTIFICATION
92.41 – WATER TABLE ELEV. (F
274 – TOTAL DISSOLVED VOL
ORGANIC COMPOUNDS
1900 – TOTAL DISSOLVED OIL
GREASE (ppm)
NA – NOT AVAILABLE
NS – NOT SAMPLED
ND – NONE DETECTED
BDL – BELOW DETECTION LIMITS
GROUNDWATER CONTOURS IN FEET
0
60
SCALE IN FEET
OCTOBER 23,
NO.:
▽ 3/88
Total VOC's 3/88
N
INDUSTRIAL BUILDING
B.M.
WOBURN STREET
B-3
98.86
4
NS
ND
B-2
94.47
17
BDL
ND
SG-1
94.47
ND
NS
ND
WETLAND AREA
FLOW
BROOK
B-1
95.02
585
BDL
PROPERTY LINE
MW-2
95.9
170
83
3
GT-1A
94.8
1159
187
19
SETTLING TANK
R.H. RITTER TRUCKING CO.
SOIL PILE
GT-2 (DESTROYED)
GT-6
94.47
PUMP ISLAND (REMOVED)
GT-3
91.8
ND
GT-5
93.6
26
274
1900
GT-4
93.3
MW-1
NA
GT-7
97.10
32
16
9
WILMINGTON COLD STORAGE PROPERTY
97
96
95
94
93
92
GROUNDWATER

TABLE 1

SUMMARY OF
QUANTITATIVE LABORATORY ANALYSIS
OF GROUNDWATER

ANALYSIS FOR PRIORITY POLLUTANT VOLATILE ORGANIC COMPOUNDS (1)
Sampling Round ~~November~~, 1987 10/1/87

Compound Detected	Observation Well B-1	B-2	B-3	MW-2	GT-1A	GT-5	GT-7	Brook
Vinyl Chloride	4.9	ND	ND	35.	ND	ND	ND	ND
1,1 Dichloroethene	28.	ND	ND	ND	ND	ND	ND	ND
1,1 Dichloroethane	260.	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	15.	15.	BDL	BDL	ND	ND	17.	ND
t-1,2 Dichloroethene	18.	ND	ND	8.4	ND	ND	2.2	ND
1,2 Dichloroethane	2.7	2.0	3.6	ND	60.	ND	ND	ND
1,1,1 Trichloroethene	400.	ND	ND	ND	ND	ND	BDL	ND
Trichloroethene	30.	ND	ND	BDL	ND	ND	3.9	ND
Benzene	6.0	ND	ND	2.8	69.	ND	ND	ND
Tetrachloroethene	BDL	ND	ND	BDL	ND	ND	ND	ND
O & P Xylene	BDL	BDL	ND	30.	120.	94.	4.7	ND
M Xylene	ND	BDL	ND	ND	BDL	ND	BDL	ND
Toluene	ND	BDL	ND	3.4	ND	BDL	4.3	ND
Ethylbenzene	ND	BDL	ND	90.	910.	180.	BDL	ND
TOTAL LEVELS	764.6	17.0	3.6	169.6	1159.	274.	32.1	ND

ND -- Not detected above method detction limit
BDL -- Compound dtected but at levels below quantifiable detection limits

1. Testing conducted in accordance with EPA Method 624. Results are reported in parts per billion (ppb). Only those compounds detected above the detection limits of the method used are reported here. All 624 tests conducted at GT Environmental Laboratories of Greenville, New Hampshire.

TABLE 2

SUMMARY OF
QUANTITATIVE LABORATORY ANALYSIS
OF GROUNDWATER

ANALYSIS FOR PRIORITY POLLUTANT VOLATILE ORGANIC COMPOUNDS (1) 3-30-88
Sampling Round March, 1988

Compound	Observation Well								MCL
Detected	B-1	B-2	B-3	MW-2	GT-1A	GT-3	GT-5	GT-7	ug/l
Vinyl Chloride	ND	ND	ND	46.7	ND	ND	ND	ND	2
1,1 Dichloroethene	18.5	ND	ND	ND	ND	ND	ND	ND	7
1,1 Dichloroethane	151.4	ND	ND	ND	22.9	ND	ND	ND	
Methylene Chloride	21.3	ND	ND	ND	ND	ND	ND	ND	
t-1,2 Dichloroethene	ND	ND	ND	36.5	ND	ND	ND	ND	
1,2 Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	5
1,1,1 Trichloroethane	375.	ND	ND	ND	ND	ND	ND	ND	200
Trichloroethene	19.6	ND	ND	ND	ND	ND	ND	ND	5
Benzene	ND	ND	ND	ND	10.5	ND	ND	ND	5
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	20
Total Xylenes	ND	ND	ND	ND	14.5	ND	66.1	16.5	620
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	340
Ethylbenzene	ND	ND	ND	42.2	139.	ND	ND	ND	
TOTAL LEVELS	585.8	ND	ND	83.4	186.9	ND	66.1	16.5	

ND -- Not detected above method detction limit
BDL -- Compound dtected but at levels below quantifiable detection limits

1. Testing conducted in accordance with EPA Method 624. Results are reported in parts per billion (ppb). Only those compounds detected above the detection limits of the method used are reported here. All 624 tests conducted at Eastern Analytical Laboratories of Billerica, Massachusetts.

41 Industrial Way.

GZA

RESPONSE ACTION OUTCOME
LIGHTOLIER
WILMINGTON, MASSACHUSETTS

PREPARED FOR:
Lightolier
Wilmington, Massachusetts

PREPARED BY:
GZA GeoEnvironmental, Inc.
Providence, Rhode Island

File No. 31439.1
March 1995

1.00 INTRODUCTION

GZA GeoEnvironmental has prepared this report in response to an April 27, 1994 Notice of Responsibility and Interim Deadlines (NOR) issued by the Massachusetts Department of Environmental Protection (MADEP) to Keene Lighting Products, 41 Industrial Way, Wilmington, Massachusetts. A copy of MADEP's NOR is included in Appendix A. Please note that the name of the facility has been changed to Lightolier and the correct mailing address is 45 Industrial Way. Our work was performed in accordance with our January 12, 1995 proposal to Lightolier.

Our report reviews the release and subsequent response actions completed at the site in 1987; presents information on additional investigations; and includes a Response Action Outcome Statement for the site concluding that no significant risk exists in the release areas of concern. This report is subject to the Limitations and Terms and Conditions set forth in Appendix B.

2.00 BACKGROUND/SITE HISTORY

Lightolier a manufacturer of fluorescent lighting fixtures, is located in a predominantly industrial area in the southeastern portion of Wilmington. The location of the site is shown on Figure 1. The site was undeveloped land until 1969 when the manufacturing plant building was constructed. The manufacturing plant consists of one main building which houses offices, manufacturing areas, and shipping and receiving areas. Manufacturing consists of press forming aluminum and steel into lighting fixture housings, welding, spray painting, and assembly of completed lighting fixtures. Lighting product manufacturing commenced in 1969 and continues to this date.

The portion of the site subject to the MADEP NOR involves two small areas where oil and low-level polychlorinated biphenyl (PCB) contaminated soils were previously detected, located on the southwest portion of the site. It is these areas that are specifically addressed by this report and the attached Response Action Outcome (RAO) Statement. On July 8, 1987, Lightolier reported in writing to the MADEP's (then the MADEQE) Northeast Regional Office the discovery of the two areas of oil stained soil subject to this report. A copy of the 1987 notification is provided in Appendix C. The oil contamination reportedly resulted from the release of residual lubricating oil, over a period of time, from the surface of scrap metal (primarily aluminum) which was stored in these two areas. Once this situation was discovered, scrap metal storage was immediately relocated to inside the manufacturing building thereby,eliminating the source of a future release to the soil. Levels of contamination noted in surficial soil samples (prior to soil removal) ranged from 300 mg/kg to 205,000 mg/kg oil and grease; 1.51 mg/kg to 29 mg/kg polychlorinated biphenyls (PCBs) (Arochlor 1254); and no detectable volatile organic compounds (VOCs).

Contaminated soil in the two areas of concern was excavated and removed during July 1987 as described in a report dated September 10, 1987, submitted to MADEP (see Appendix D). Excavated area #1 measured approximately 50 feet in length by 5 feet wide by 3 feet deep. Excavated area #2 measured approximately 15 feet in length by 7 feet wide by 4 feet deep. The bottoms and sidewalls of each excavated area appeared visually clean and exhibited less than 0.6 ppm (background) when subjected to jar vapor-space field scanning using a HNU photoionization detector (PID) equipped with an 11.7 ev lamp. Confirmatory, soil samples collected from the bottoms and sidewalls of each excavated area revealed concentrations of oil and grease ranging from non-detectable levels (<10 mg/kg) to 18,290 mg/kg, and polychlorinated biphenyls ranging from non-detectable levels (<0.25 mg/kg) to 1.75 mg/kg. All oil and grease analyses were by the gravimetric method (Standard Method 503 A & D)

3.00 RECENT SITE INVESTIGATION

Subsequent to the receipt of the NOR, Lightolier retained GZA to assess the two areas of concern. On July 11, 1994, GZA conducted a series of soil test borings in the two areas of concern to assess subsurface conditions and collect soil and groundwater samples for preliminary screening and analytical testing. Based on surficial observations, the two areas which had been excavated and backfilled in 1987, appeared clean with no obvious signs of surficial soil staining. The locations of the two areas were determined using the site plan included in the 1987 reports (discussed in Section 2.00 of this report.)

3.10 SOIL BORINGS

The July 11, 1994 soil borings were conducted by GZA Drilling, Inc. of Brockton, Massachusetts and observed by GZA. Logs of the boreholes are enclosed in Appendix E and the locations are shown on Figure 2. The borings were advanced using hollow stem augers without the use of drilling water or mud. Continuous split spoon samples were collected from each boring and placed in two sets of sealed 8 ounce clean bottles and in 40 milliliter glass septum vials. The samples were immediately placed on ice for transport to GZA's laboratory in Upper Newton Falls, Massachusetts, a MADEP certified laboratory. Chain of custody forms were used to document sample possession and transfer. One set of samples collected in 8-ounce bottles was screened using an HNU PID equipped with a 10.2 ev lamp. The results of this field screening is presented on the boring logs in Appendix E.

Soil conditions in each of the two areas of concern were similar. Boring depths extended to auger refusal (4 to 12 feet). All soil samples appeared visually clean, except for one sample from boring GZ-C (4'-6') which had a slightly darker appearance than the rest of the samples. However, analytical testing on this sample did not reveal significant concentrations of contaminants of concern. In addition, none of the samples exhibited a discernable chemical or petroleum odor except for two samples (GZ-C 8'-10' and GZ-D 4'-6') which appeared to exhibit a very slight odor. Subsequent analytical testing identified no significant concentrations of contaminants of concern. The analytical testing results are discussed in detail in Section 3.30 of this report.

Groundwater monitoring wells were installed in three of the recent soil borings; GZ-C, GZ-E, and GZ-F. Groundwater was encountered at an approximate depth of 10 feet in these locations during July 1994. During January 1995, the depth to groundwater rose to about 7 feet (see Table 2).

3.20 GROUNDWATER MONITORING WELL INSTALLATION AND GROUNDWATER MONITORING

As mentioned in Section 3.10 of this report, monitoring wells were installed at boring locations GZ-C, GZ-E and GZ-F as shown on Figure 2. The wells consisted of 2-inch diameter PVC pipe with slotted well screen at the lower section (below approximately 5 feet). Clean silica sand was placed in the annular space between the well screen and the borehole. A bentonite clay seal was placed above the silica sand and a protective roadway box was installed flush with the ground surface to complete each monitoring well.

Because there was an inadequate depth of water to sample the wells during the summer of 1994, Lightolier decided to wait until the "wet season" to collect groundwater samples. On January 20, 1995, GZA personnel collected groundwater samples from each of the three wells. Sampling was accomplished using aluminum bailers fitted with teflon ball check valves. A separate, precleaned bailer was used to sample each well to prevent cross contamination. Each well was purged of at least three times the initial volume of groundwater in the well prior to sample collection. Groundwater samples were then collected and placed in 1-liter amber glass bottles (one for petroleum hydrocarbon (PHC) and one for PCB analytical testing), and 8-ounce clear bottles and for visual observation. The one liter bottles were immediately placed on ice for transport to GZA's laboratory. Chain of custody forms were used to document sample possession and transfer. Each of the collected samples appeared visually clear and exhibited no odor. No sheens or separate phases (floater) were observed in the purge water or samples.

3.30 RESULTS OF TESTING

Analytical testing results for both soil samples and groundwater samples are summarized in Tables 1 and 2. Copies of the laboratory certificates are provided in Appendix F.

Soil Samples

As described in Section 3.10, all soil samples collected were screened with a PID. Decisions were made to submit samples for laboratory testing based on a combination of PID results, apparent visual staining and apparent odor exhibited by the samples. At least one sample was selected from each boring for PHC testing even where no unusual PID readings or visual observations were recorded. Three samples were selected for VOC testing even though no VOCs were suspected to be present (lubricating oil release) and no VOCs were detected in surficial soil testing conducted in 1987. The laboratory results revealed no VOCs or PCBs detected in the selected soil samples above method detection limits (see laboratory certificates for method detection limits). PHC concentrations ranged from non-detectable levels (< 10 mg/kg) to 220 mg/kg at location GZ-B 2'-4'.

The PHC analytical method used was EPA Method 8100, which is considered one of the more precise and accurate methods of analytically determining the petroleum hydrocarbon content of soil and groundwater samples. The methodology used to determine oil and grease content of soil samples collected in 1987 was the gravimetric method (Standard Method 503 A & D), which since has been demonstrated to yield results of low accuracy for most categories of petroleum products. Further, the gravimetric method is subject to various interferences (sulfur compounds, animal fats and humics) and often yields false positive results. MADEP's "Interim Final Petroleum Report: Development of Health-Based Alternative to the Total Petroleum Hydrocarbon (TPH) Parameter" dated August 1994 states in Section 4.2.1, "This procedure (gravimetric) represents the most basic level of analysis and is not recommended for health risk assessment purposes." For the above reasons and because residual petroleum compounds may have biodegraded over the years, the 1987 Oil and Grease testing data was not used to complete the risk characterization for this site.

Testing for all polycyclic aromatic hydrocarbons (PAHs) or other semivolatile compounds (SVs) was not conducted because the majority of metal working press lubricants previously and currently used at Lightolier are refined, light to middle distillates which do not typically contain significant concentrations of these compounds. These press lubricating oils are not used in combustion processes (i.e. crankcase oil) and are therefore, are not subject to contamination with combustion byproducts; high temperature degradation; nor the formation or concentration of high boiling constituents (PAHs or SVs). Rather, the oils at Lightolier are used to lightly lubricate the surface of aluminum sheet prior to press forming and remain a residue on the metal. The above is substantiated by the fact that naphthalene (a PAH commonly found in some oils) was tested for and not detected (<5 ug/kg) in three soil samples (GZ-C 4'-6', GZ-C 8'-10' or GZ-E 2'-4').

Groundwater Samples

Collected groundwater samples from each of the three installed monitoring wells were analyzed for PHCs and PCBs. The laboratory results, summarized in Table 2, revealed non-detectable levels of PCBs (<0.2 ug/l) and PHCs (<0.25 mg/l) in all but the sample from well GZ-F which contained 0.40 mg/l PHC. As shown on Figure 2, these wells are located either in or very close to the disposal areas and therefore, should represent worst case groundwater conditions affected by the release.

4.00 HUMAN HEALTH AND ENVIRONMENTAL RISK CHARACTERIZATION

As required by the Massachusetts Contingency Plan (MCP), 310 CMR 40.0900, GZA completed a characterization of the risk of harm to health, safety, public welfare, and the environment associated with potential exposures to oil and/or hazardous material (OHM) present in soil and groundwater at the Lightolier site in Wilmington, Massachusetts. The risk characterization included evaluation of all OHM detected above background levels (310 CMR 40.0902). As described in Section 3.00 of this report, low levels of PHCs were detected in the soil and groundwater at the site. These concentrations are associated with a release of oil from scrap metal stored in the area prior to 1987. This release is the focus of this risk characterization.

This evaluation characterized risks for current and reasonably foreseeable future site activities and uses. The results of the risk characterization indicate that a level of no significant risk exists at the site.

4.10 METHODOLOGY

The December 1994 MCP describes two basic approaches (a chemical-specific approach and a cumulative risk approach) and three methods (Method 1, Method 2, and Method 3) for performance of risk characterizations. The Method 1 Risk Characterization entails comparison of soil and groundwater exposure point concentrations to applicable Method 1 Standards (derived by DEP), as well as characterizing risk of harm to safety. The Method 2 Risk Characterization supplements and modifies the MCP Method 1 Standards with site and chemical-specific information. Method 2 can be used to modify existing Method 1 Standards and/or to derive additional standards for those compounds for which Method 1 Standards have not been promulgated by DEP. The Method 3 Risk Characterization is a cumulative risk approach which includes assessment of the impacts to identified human and ecological receptors; as well as characterizing the risk of harm to safety and public welfare. Subpart I of the MCP (310 CMR 40.0900) describes the procedures, criteria, and standards for the characterization of the risk of harm to health, safety, public welfare, and the environment.

File No. 13439
03/23/95:ck

TABLE 2

SUMMARY OF GROUNDWATER SAMPLE ANALYSES
Lightolier
Wilmington, Massachusetts

Parameter	Area 1	Area 2	
	GZ-C	GZ-E	GZ-F
Field Parameters:			
Total Depth of Well	10'	9.9'	10.5'
Elevation Top PVC	97.58'	98.33'	97.79'
Depth to Water	7.55'	7.78'	6.92'
Water Table Elevation	90.03'	90.55'	90.87'
Total Petroleum Hydrocarbons	<0.25 mg/l	<0.25 mg/l	0.40 mg/l
PCBs	<0.2 μg/l	<0.2 μg/l	<0.2 μg/l

Notes:

1. See Certificates of Analyses for a complete list of compounds, analytical methods and limits of detection.
2. Well locations are indicated on Figure 2.
3. Field measurements completed on January 20, 1995. The wells were surveyed to an arbitrary benchmark, elevation 100', established at the site.

TABLE 1

SUMMARY OF SOIL SAMPLE ANALYSES
Lightolier
Wilmington, Massachusetts

Parameter	Area 1					Area 2						
	GZ-A 2-4'	GZ-B 2-4'	GZ-C 4-6'	GZ-C 8-10'	GZ-H 6-8'	GZ-D 4-6'	GZ-D 6-8'	GZ-E 2-4'	GZ-E 8-10'	GZ-F 6-8'	GZ-G 6-8'	GZ-H 6-8'
Total Petroleum Hydrocarbons	83 mg/kg	220 mg/kg	12 mg/kg	110 mg/kg	<10 mg/kg	170 mg/kg	15 mg/kg	NT	<10 mg/kg	<10 mg/kg	<10 mg/kg	<10 mg/kg
PCBs	NT	NT	NT	<50 µg/kg	NT	<50 µg/kg	NT	NT	NT	NT	NT	NT
Volatile Organic Compounds	NT	NT	ND	ND	NT	NT	NT	ND	NT	NT	NT	NT

Notes:

1. See Certificates of Analyses for a complete list of compounds, analytical methods and limits of detection.
2. Sample locations are indicated on Figure 2.
3. NT equals not tested.
4. ND equals not detected. Analyses for multiple compounds with different limits of detection.

24 Ind, WAY

SIMMONS Environmental Services, Inc.

DOCUMENTATION IN SUPPORT OF A CLASS B-1 RESPONSE ACTION OUTCOME STATEMENT

For Property At:

24 Industrial Way
Wilmington, Massachusetts

SIMMONS ENVIRONMENTAL SERVICES, INC.
375 ELM STREET
SALISBURY, MASSACHUSETTS 01952
508-463-6669

APRIL 1996

PROJECT NUMBER
9601973

1.0 BACKGROUND

The subject property is a 14.7± acre parcel situated on the northerly side of Industrial Way in Wilmington, Massachusetts. Figure 1 provides a Site Locus. The property is developed with a 200,000± square foot slab-on-grade, concrete block building. The building is heated by roof mounted natural gas fired units and has all common public utilities available and in use (i.e., municipal water supply and sewerage). All utilities, including electric service are underground at this location.

TWENTY FOUR INDUSTRIAL WAY ASSOCIATES LIMITED PARTNERSHIP purchased this property in 1992 from BAKER'S BOSTON SHOE STORE, INC. Prior use of the property after its development by the prior owner had been warehousing shoes. Since its purchase by TWENTY FOUR INDUSTRIAL WAY ASSOCIATES LIMITED PARTNERSHIP, use of the property has been changed to warehousing operation for various packaging products. The current tenant is PACIFIC PACKAGING. It is noted that current use of the property involves printing on paper and plastic substrates using solvent based inks. As such, PACIFIC PACKAGING is a very small quantity generator for hazardous waste associated with printing. Its waste codes consist of F005 (i.e., spent solvent waste) with regulated hazardous constituents and D001 (i.e., high total organic carbon ignitable characteristic waste). The facility maintains a current and valid EPA Waste Generator number. Regulated waste streams are removed, as needed, by a licensed hazardous waste transporter. Inspection of the printing area indicated that it occupies approximately 200 square feet of area and appears to be well run. No floor drains were noted within the specific area where printing is conducted nor were there any overt signs of prior spillage. Flammable solvents, including ethyl acetate, alcohols and naphtha were observed to be stored in properly labeled containers within a fire and explosion proof room. Copies of *Waste Characterization* and a *Hazardous Waste Manifest* are attached as part of the APPENDICES to this report.

2.0 SUBSURFACE INVESTIGATION ACTIVITIES

A previous subsurface investigation was prepared by **SIMMONS** in 1991 prior to the purchase of this property by TWENTY FOUR INDUSTRIAL WAY ASSOCIATES LIMITED PARTNERSHIP. The scope of the 1991 assessment involved placement of six geotechnical borings which were subsequently developed as monitoring wells as well as installation of test pits and collection and analyses of both soil and groundwater samples. Results obtained in this initial assessment indicated that no detectable concentrations of volatile organic compounds (VOCs) were noted in groundwater and that analytical data for soil showed no detectable concentrations above the test method's limit of detection for petroleum hydrocarbons (TPH). Eight characteristic heavy metals were within naturally occurring concentrations based upon the levels established by the recommendation of the Superfund Advisory Committee in 1990. **SIMMONS** concluded, on the basis of research and subsurface investigation conducted in 1991, that the subject property posed minimal risk with respect to environmental risk liability and that no further investigation was warranted at that time. Locations of monitoring wells are shown on Figure 2.

In order to update to conditions in 1996, the observation wells previously installed were relocated. Five of the wells designated MW1, MW2, MW3, MW4, and MW6 were relocated, redeveloped by purging, and sampled. MW5 could not be located and is presumed to have been destroyed. Groundwater samples from the above wells were analyzed for VOCs, TPH, and thirteen dissolved priority pollutant metals. All sample collection and handling was conducted in accordance with standard protocol published by EPA and the Massachusetts Department of Environmental Protection (MDEP) (e.g., *Standard References for Monitoring Wells,* published by the MDEP, Publication No. WSC-310-91). The following table shows the analytical results compared to Reportable

SIMMONS

24 Industrial Way
Wilmington, Massachusetts

GROUND WATER RESULTS for
Pacific Packaging
Wilmington, Massachusetts

COMPOUND	MW-1	MW-2	MW-3	MW-4	MW-6	RCGW2
Volatile Organic Compounds (ug/L)						
Acetone	ND	20	ND	520	ND	50,000
1,1-Dichloroethylene	***2.8***	ND	ND	ND	ND	1
1,1-Dichloroethane	2.7	ND	ND	ND	ND	20
1,1,1-Trichloroethane	6.5	ND	ND	ND	ND	4,000
Total Petroleum Hydrocarbons (mg/L)						
TPH	ND	ND	ND	ND	ND	50
Metals (mg/L)						
Antimony	ND	NA	ND	ND	NA	0.300
Arsenic	ND	NA	ND	ND	NA	0.400
Beryllium	ND	NA	ND	ND	NA	5.000
Cadmium	ND	NA	ND	ND	NA	0.010
Chromium (total)	0.04	NA	ND	ND	NA	2.000
Copper	ND	NA	ND	ND	NA	100.000
Lead	ND	NA	ND	0.004	NA	0.030
Mercury	ND	NA	ND	ND	NA	0.001
Nickel	0.01	NA	ND	ND	NA	0.080
Selenium	ND	NA	ND	ND	NA	0.080
Silver	ND	NA	ND	ND	NA	0.007
Thallium	ND	NA	ND	ND	NA	0.040
Zinc	0.05	NA	0.05	0.07	NA	0.900

Notes:
ND - Below the limit of detection
NA - Not Analyzed

As noted from the above table, there was one exceedance of a RC for VOCs. This exceedance was noted in MW1 for 1,1-Dichloroethylene (1,1-DCE). All of the other analytes were significantly below the applicable groundwater reporting category.

As a result of this confirmed exceedance, three additional borings were advanced on the site on February 22, 1996, using a direct push hydraulic sampling technique (i.e., a GeoProbe®). These were advanced under the supervision of an experienced hydrogeologist from **SIMMONS.** The location of these three borings triangulates MW1 where the 1,1-DCE exceedance was observed. Their location is shown on Figure 2A.

During advancement of these borings, soil samples that had been collected in acetate sleeves were screened for headspace concentrations. No concentrations above background at 0.5-1.00 parts per million by volume (relative to an isobutylene standard) were observed. As a result of the absence of headspace concentrations, no laboratory analsyes for VOCs were made. That decision is based upon experience relating to headspace concentrations to applicable Reportable Concentrations (RCs) and Method 1 soil exposure standards for TCE 111 TCA and 1,1-DCE. In instances where headspace concentrations are negligible, the probability of exceeding a Method 1 exposure standard is nil. Therefore, screening results did not warrant off site laboratory analyses of soil based upon professional judgment.

Following completion of the boring, one inch microwells were installed. The entire boring interval was screened. *Details of the boring and well construction* activities are provided in the *Subsurface Exploration Appendix.*

The microwells designated MW-10, MW-11 and MW-12 were developed by bailing 3-5 boring volumes and then were allowed to recharge to static elevations. Thereafter, groundwater samples were collected and analyzed by EPA Method 8010 with a detection limit of 1.0 μg/L. In addition to the groundwater samples, a surface water sample was also collected from a nearby seasonal stream. These results of these analyses are shown below for those analytes above the detection limit of 1 μg/L:

	MW-10	MW-11	MW-12	Stream	RCGW-2
1,1 Dichloroethane	3.2	3.1	ND	ND	1
1,1,1 Trichloroethane	3.6	1.9	ND	ND	4000

These data imply that a limited area of groundwater has been affected. The most probable source is vehicle washing activities and use of commercial cleaning products with trace components of chlorinated degreasers. This practice has been stopped and vehicles will now be washed off site at a commercial facility according to Robert Goldstein, President of PACIFIC PACKAGING, the operator of this facility.

3.0 DISCUSSION OF RESULTS

As noted above, there was one exceedance of a RC for groundwater in category 2. The observed concentration for 1,1-DCE was reported as 2.8 μg/L or parts per billion (ppb). The applicable RC for this groundwater category is 1 μg/L. In order to determine the validity of this sample, a duplicate vial collected at the same time was analyzed by the same subcontract laboratory. This result indicated the presence of 1,1-DCE at the concentration of 2.1 μg/L. An additional sample of groundwater was collected from this monitoring well and analyzed by a separate subcontract laboratory on February 7, 1996. The data reported on February 8, 1996 also indicated the presence of 1,1-DCE at a concentration of 2 μg/L. Therefore, it is clear that the presence of this compound is an actual occurrence and not as a result of laboratory error or carryover from other samples. It is noted that in addition to 1,1-DCE, two other chlorinated VOCs were reported in the original data set, but at concentrations significantly below their Reportable Concentrations.

Exposure categories for groundwater are divided into three groups: GW1, GW2 and GW3. The GW1 category covers water used for potable supply purposes where there is a direct potential for exposure to humans through ingestion. GW3 is groundwater that is not used for domestic supply purposes but which ultimately discharges to surface water (e.g., a lake, river, ocean, etc.). GW2 is a unique category applicable only for a class of contaminants called volatile organic compounds (VOCs). A characteristic of these compounds is that they all have significant vapor pressure, meaning that they can partition (change physical state) from being dissolved in groundwater and become gaseous vapors. The health concern regarding partitioning of VOCs is the potential for these compounds to change to a gas, migrate through soil and result in a inhalation exposure, particularly in a basement.

MDEP derived its Method 1 GW-2 Risk Based or Exposure Standards by relating the *"safe"* concentration of volatiles in air within a building to the corresponding concentration in groundwater, from a mathematical transport model that predicts vapor entrainment.

Based upon the results of a wellhead survey, a Method 2 Risk Characterization was used at this disposal site. This involved review of literature entitled *"A Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings*[1]. This model provides a method for estimating vapor transport into buildings and was used by MDEP to develop a transport equation for calculating GW2 Standards which are based upon acceptable indoor air quality concentrations. Site specific data from boring logs and results of air quality measurements taken from the air space in 3 wells. The *"headspace"* air quality concentration in monitoring wells closest to the building (i.e., MW-10, OW-1 and MW-12) were measured on March 25, 1996 using a Photovac 10SPlus mobile gas chromatograph. Each well was fitted with a pre-fabricated stopper to prevent dilution by ambient air. Samples of the gases above the static groundwater were then collected in a Tedlar® bag and analyzed on site. The following results were reported.

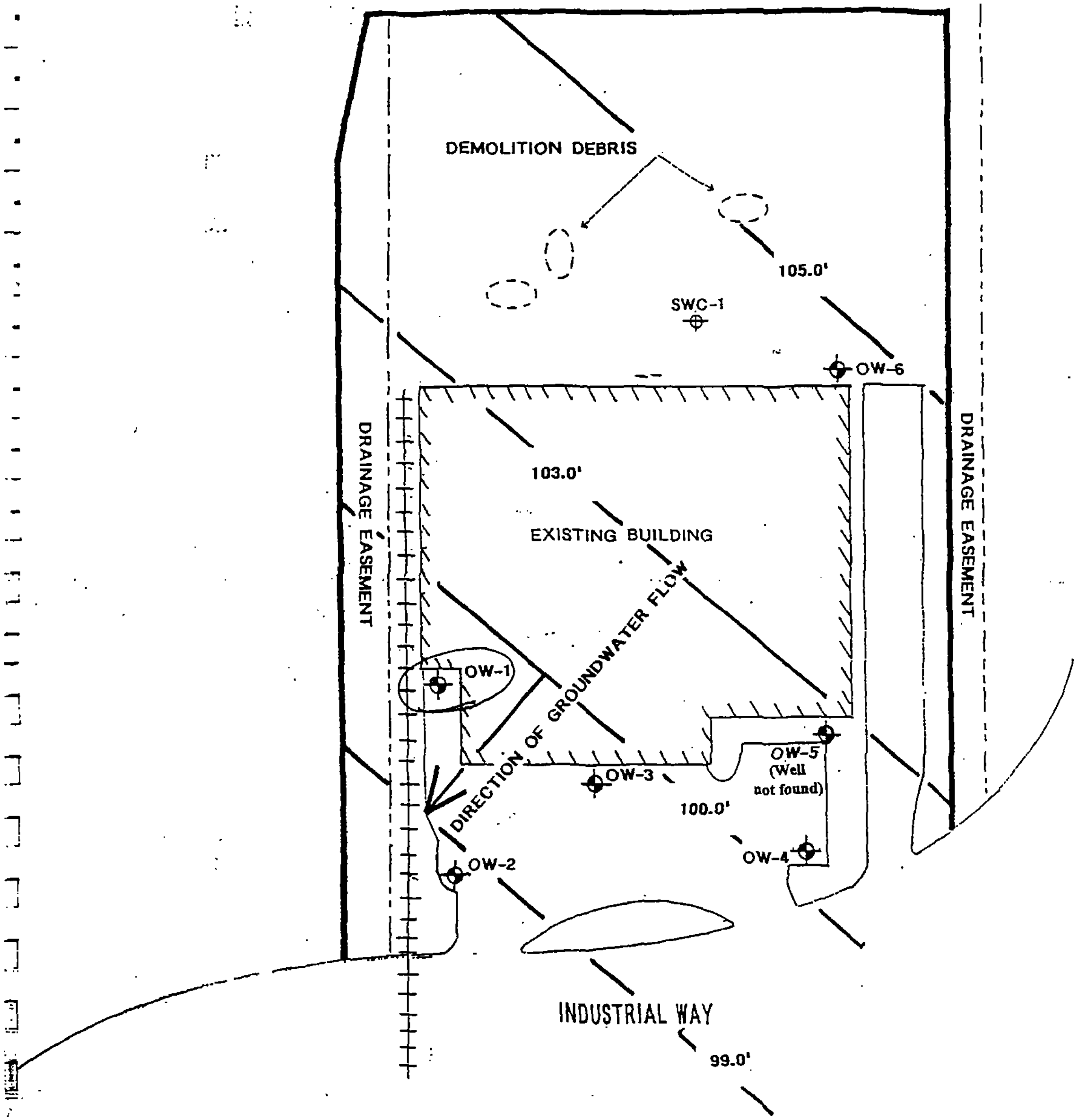
not soil gas

well in equil'y atmos. (stagnant H_2O?)

PHOTOVAC 10SPLUS GC ANALYSIS OF SOIL VAPOR
MARCH 26, 1996
CONCENTRATIONS IN PPB

Location Designation	1,1-DCE	1,1-DCA	1,1,1-TCA
B-10	ND	ND	ND
B-12	2.76	ND	ND
OW-1	ND	ND	ND
Quantitation Limit	1.00	1.00	5.00

[1] Johnson, Paul C. and Ettinger, Robert A. *Environmental Science Technology*, 1991, 25, 1445-1452.



WELL	WELL ELEV.	DEPTH TO G.W.	G.W. ELEV.	DISTANCE TO B.M.
OW-1	99.2'	3.41'	95.79'	313'
OW-2	98.23'	4.46'	93.77'	262'
OW-3	99.05'	3.5'	95.55'	174'
OW-4	100.58'	4.38'	96.20'	147'
OW-5	102.85'	5.17'	97.68'	201'
OW-6	103.93'	0.5'	103.43'	536'

LEGEND

OBSERVATION WELL
SURFACE WATER COMPOSITE
R.R. TRACKS

N

FIGURE 2
SITE PLAN

FOR PROPERTY AT:
PACIFIC PACKAGING, INC.
24 INDUSTRIAL WAY
WILMINGTON, MA

PREPARED BY:
SIMMONS ENVIRONMENTAL SERVICES, INC.
375 ELM STREET
SALISBURY, MA 01952
(508) 463-6669

DATE: FEBRUARY, 1996 **PROJECT #: 9601973**
DRAFTED: SHL/AK

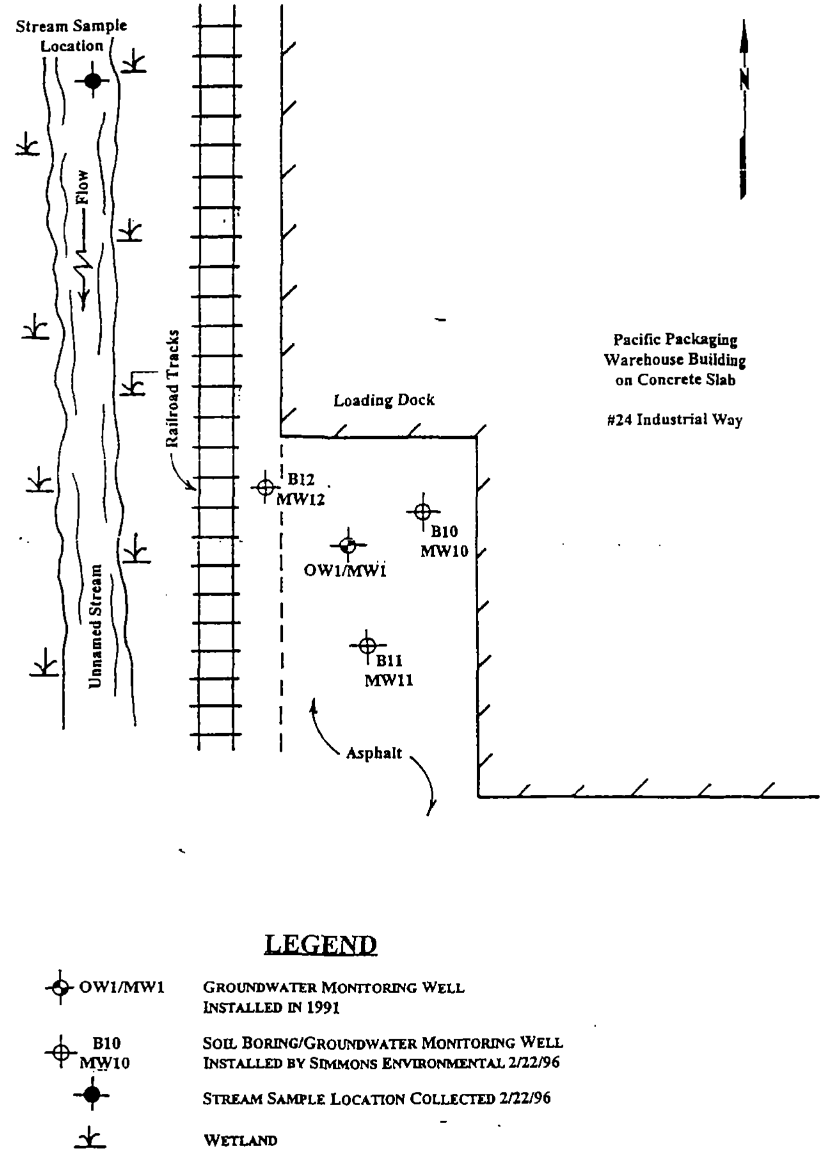


FIGURE 2A

ADDITIONAL SUBSURFACE INVESTIGATION PLAN
ADJACENT TO
MONITORING WELL OW1/MW1

FOR PROPERTY AT:

PACIFIC PACKAGING, INC.
24 INDUSTRIAL WAY
WILMINGTON, MA

PREPARED BY:

SIMMONS ENVIRONMENTAL SERVICES, INC.
375 ELM STREET
SALISBURY, MA 01952
(508) 463-6669

DATE: FEBRUARY 22, 1996 **PROJECT #: 9601973**
SCALE: 1" = 20' **DRAFTED: SHL/AK**

0' 10' 20' 40'

ROBERT W. PEASE, JR.
LICENSED SITE PROFESSIONAL/ENVIRONMENTAL CONSULTANT

23 Hitchinpost Rd., Chelmsford, Massachusetts 01824
Phone/fax: (978) 244-5625

RELEASE ABATEMENT MEASURE STATUS REPORT

United Tool & Die Co., Inc.
98 Eames Street
Wilmington, Massachusetts

RTN 3-4168, 3-15773, and 3-17055

August 24, 1998

)BERT W. PEASE, JR.
:ENSED SITE PROFESSIONAL/ENVIRONMENTAL CONSULTANT

Hitchinpost Rd., Chelmsford, Massachusetts 01824
one/fax: (978) 244-5625

ıgust 24, 1998

assachusetts Department of Environmental Protection
ortheast Region
ureau of Waste Site Cleanup
)5A Lowell Street
/ilmington, Massachusetts 01887

.e: Release Abatement Measure Status Report
United Tool & Die Co., Inc.
98 Eames Street
Wilmington, Massachusetts
RTN 3-4168, 3-15773, and 3-17055

)ear Sir or Madam:

)n behalf of United Tool & Die Co., Inc. (United Tool & Die), I am pleased to submit to the Massachusetts Department of Environmental Protection (DEP) the enclosed Release Abatement Measure (RAM) Status Report for the above-referenced property. Enclosed with this report is a copy of a DEP Bill of Lading, with original signatures, for the off-site recycling of a portion of the site's soil excavated during the RAM. An earlier Bill of Lading was submitted to the DEP under separate cover. Please contact me at (978) 244-5625 if you have any questions in regard to this document.

Very truly yours,

Robert Pease

Robert W. Pease, Jr.
Licensed Site Professional

cc: United Tool & Die

1.0 PERSON ASSUMING RESPONSIBILITY FOR RAM

United Tool & Die Co., Inc.
98 Eames Street
Wilmington, Massachusetts 01887

Contact: Mr. Arthur Marsilia, President
(978) 658-5500, phone; (978) 658-5728, fax.

2.0 LICENSED SITE PROFESSIONAL

Robert W. Pease, Jr.
Licensed Site Professional/Environmental Consultant
23 Hitchinpost Road
Chelmsford, Massachusetts 01824

Phone/fax: (978) 244-5625

3.0 INTRODUCTION

Three releases of oil and hazardous materials have been detected in regard to the subject property. The releases and their Release Tracking Numbers (RTNs) are as follows:

- **RTN 3-4168:** chlorinated hydrocarbons detected in groundwater on certain portions of the property, as described in a Phase I Initial Site Investigation submitted August 5, 1997 and in a Tier Classification and Tier IC Permit Application submitted December 23, 1997;

- **RTN 3-15773:** petroleum-contaminated soil whose source was a fuel oil underground storage tank (UST), as described in the Phase I Initial Site Investigation, in the Tier Classification and Tier IC Permit Application, and in a Release Notification Form (RNF), with accompanying letter, submitted to the DEP on November 25, 1997; and

- **RTN 3-17055:** copper detected in solid material of a floor drain in the tumbler room of the building, whose structure was unknown and was presumed to consist of soil walls and base, as described in an RNF with accompanying letter submitted to the DEP on July 15, 1998.

A RAM Plan was submitted to the DEP on March 25, 1998 in regard to the subject property, and a RAM Plan Modification was submitted on July 15, 1998. The activities that were proposed under the RAM Plan and its modification are presented below.

Drywell

A drywell located on the eastern side of the property, behind the United Tool & Die building, was suspected to be a source of the chlorinated organic compounds (RTN 3-4168) detected in the property's groundwater, because of its proximity to the monitoring well exhibiting the highest contaminant concentrations. The following activities were planned in regard to the drywell:

- Removal of the contents of the drywell and disposal of the materials removed off-site at a licensed facility; and

- Removal of the concrete block and stone structure of the drywell, removal of soil surrounding the drywell, disposal of the materials removed off-site at a licensed facility, collection and analysis of samples of soil from the walls and base of the excavation, and backfilling the excavation with clean soils.

Each of the above activities has been conducted as of the date of this report.

Petroleum Contaminated Soil and Fuel Oil UST

A 1000 gallon fuel oil UST was located in front of the United Tool & Die building, which represented the source of the detected petroleum-contaminated soil (RTN 3-15773). The following activities were planned in regard to the UST and impacted soil:

- Removal of the residual contents of the UST, removal of the UST, removal of fuel oil impacted soil adjacent to the UST, and disposal of all removed materials off-site at licensed facilities.

Each of the above activities has been conducted as of the date of this report.

Floor Drain

The RAM Plan was modified by the July submittal to address the conditions detected in the floor drain solids (RTN 3-17055). The following activities were planned in regard to the floor drain:

- Removal of the solid contents of the floor drain, disposal of the removed materials off-site at a licensed facility, and, if the walls and base of the drain were found to be composed of soil (rather than concrete or other solid structure), collection of samples of the soil walls and base for laboratory analysis; and

- Backfilling the floor drain chamber with clean soil and decommissioning the floor drain with concrete.

As of the date of this report, each of the above activities has been completed with the exception of disposing of the removed materials off-site and backfilling and decommissioning the floor drain.

4.0 DRY WELL REMOVAL (RTN 3-4168)

The contents of the drywell, consisting of a gray sludge and water, were removed on April 20, 1998. The materials were removed by vacuum and by hand into DOT 1A2 steel drums. A total of 6 drums were generated, which were shipped on May 13, 1998 to Chem-Met Services, Inc. of Brownsville, Michigan. The manifest for disposal is presented in **Attachment 1.** As is seen in the attachment, the manifest covers 8 drums, 2 of which are residual petroleum solids from the UST removal.

Analysis of the sludge was conducted during following the Phase I Initial Site Investigation and is reported in the Tier Classification submittal. The sludge was found to contain elevated levels of petroleum (predominately lubricating or cutting oils, with a minor amount of mineral spirits) and several metals, specifically copper, nickel, and chromium. Toxic Characteristic Leaching Procedure (TCLP) analysis was conducted on the sample and none of the metals was found to exceed its TCLP threshold concentrations (which, if exceeded, would classify the material as a hazardous waste).

The drywell itself was removed on April 24, 1998 with a backhoe. The upper portion of the excavation was conducted to approximately 10 feet in diameter because of sloughing of the top 3 feet of soil and stone. The excavation extended to an approximate depth of 10 feet and an approximate width of 6 to 8 feet at a depth between 3 and 10 feet. The blocks and stone were segregated from the soil generated during the excavation, both of which were placed on and covered by 6 mil polyethylene sheeting.

The remaining soil appeared as a tan to brown fine sand with some loamy soil and appeared homogeneous to a depth of 10 feet below ground surface. No stains or apparent contamination was observed along the walls and base. Soil samples were collected from various depths at 8 side wall and 4 base locations. The total headspace volatile organic compound (VOC) concentrations of the soil samples were measured using a Photovac Microtip HL-2000 photoionization detector (PID) calibrated to the benzene response factor, and using the jar headspace method. The locations of the soil samples are presented in **Figure 1** and their PID readings are presented in **Table 1.**

As is seen from the PID readings presented in the table, none of the samples exhibited headspace concentrations greater than 10 parts per million (ppm), thereby indicating a lack of significant impact of petroleum or VOC constituents. Five samples were collected for laboratory analysis from locations of the highest PID readings along 4 sidewalls and the base, as shown in the figure and table. A sixth sample was collected at the location which exhibited the highest PID response of all samples collected.

TABLE 1
Headspace VOC Concentrations in Soil Samples
Following RAM Soil Excavation
Chlorinated Release
(RTN 3-4168)
April 24, 1998

Sample Location	Depth Below Ground Surface, Feet	Headspace VOC Concentration, ppm
S1	4-6	1.9
S2	4-6	10
S2	7-9	0.3
S3	3-5	8.6
S4	3-5	4.1
S5	4-6	2.1
S5	7-9	0.6
S6	3-5	0.7
S7	3-5	4.9
S8	3-5	0.7
S8	7-9	1.1
S9	10	3.8
S10	10	3.8
S11	10	4.9
S12	10	8.2

Notes: 1.) ppm = parts per million.
2.) Sample locations presented in Figure 1.

Four of the samples were analyzed for chlorinated VOCs by EPA Method 8021B, and two of the samples, DW4 and DW5, were analyzed for total VOCs by EPA Method 8260. Samples DW4 and DW5 were located near the outlet of the pipe leading to the drywell and so more comprehensive VOC analysis was conducted there. All of the samples were analyzed for total petroleum hydrocarbons (TPH) by EPA Method 8100M, and for total chromium, copper, and nickel. DW4 and DW5 were also analyzed for extractable petroleum hydrocarbons (EPH) by the DEP method for the reasons mentioned above. EPH analysis was also conducted on sample DW3 following receipt of its TPH results. The analysis was conducted by Spectrum Analytical, Inc. (Spectrum) of Agawam, Massachusetts and the laboratory reports for analysis are presented in **Attachment 2.**

The results of analysis are presented in **Table 2,** compared with Massachusetts Contingency Plan (MCP) Reportable Concentrations (RCs) for S-1 categorized soil, the appropriate categorization for the property. As is seen in the table, none of the analytes detected exceeded their respective RCs, except for the TPH concentration of sample DW3. However, the low EPH concentrations exhibited by the sample indicate that Method 1 Risk Characterization Standards are not exceeded by DW3 and that a condition of No Significant Risk exists there.

Based on these findings, the excavation was backfilled with clean soils. However, United Tool & Die understands that, because the TPH RC was exceeded for sample DW3, an additional RNF is required to be submitted to the DEP, since this condition is not associated with any other previously-occurring release. The deadline for submission is September 16, 1998.

A total of 17.86 tons of soil from the drywell excavation were transported to Bardon Trimount, Inc. in Salem, Massachusetts on July 28, 1998. A copy of the Bill of Lading for the shipment, with original signatures, is presented in **Attachment 1.**

A total of 5.41 tons of concrete block and stone from the drywell structure were shipped to Waste Management of New Hampshire , Inc. in Gonic, New Hampshire on July 28, 1998. A copy of the shipment manifest and weight receipt is presented in Attachment 1 as well.

5.0 UNDERGROUND STORAGE TANK AND SOIL REMOVAL (RTN 3-15773)

The UST was cleaned and pumped out by New England Disposal Technologies, Inc. (NEDT) of Shrewsbury, Massachusetts on April 20, 1998. The UST was removed and placed on polyethylene sheeting and allowed to dry so soil encrusted on the bottom of the tank could be removed and examined for the potential presence of holes or cracks in the tank seams.

No holes or structurally impaired seams were observed and no "pinholes" of light were observed from the interior of the tank. The tank was found to have been lined with what appeared to be a plastic interior coating. The tank was known to have been relined at some point before the property was purchased by United Tool & Die, likely as a result of the leakage which impacted

TABLE 2
Results of Analysis of Side Wall and Base Soil Samples
Following RAM Soil Excavation
Chlorinated Release
(RTN 3-4168)
Samples Collected April 24, 1998
(All Concentrations in ppm)

Analyte Detected	DB1	DW1	DW2	DW3	DW4	DW5	Reportable Concentration, ppm S-1 Soil
TPH	120, as other petroleum	ND	ND	**440, as other petroleum**	ND	ND	200
EPH: C9-C18 Aliphatics	--	--	--	ND	ND	ND	1000
EPH: C19-C36 Aliphatics	--	--	--	300	ND	ND	2500
EPH: C19-C36 Aromatics	--	--	--	83	ND	ND	200
Total Chromium	19.1	14.9	61.0	24.7	33.1	28.4	1000
Total Copper	300	46.8	171	73.3	108	282	1000
Total Nickel	16.5	14.8	22.2	38.2	42.2	58.0	300

Notes: 1.) ppm = parts per million; ND = not detected above detection limit of analysis.
2.) Dashed lines indicate that listed analysis not conducted for identified sample.
3.) Bold type indicates Reportable Concentration exceeded.

the subject soils.

The tank was transported to Tombarello & Sons, Inc. disposal yard on April 21, 1998. A disposal receipt is not currently available, but will be provided upon submission of the RAM closure report.

Excavated soils were screened with a Photovac Microtip HL-2000 PID calibrated to the benzene response factor using the jar headspace technique. Soil from above the UST exhibited PID readings from 0.0 to 1.7 parts per million (ppm) total headspace volatile organic compounds (VOCs). This soil was segregated for use as backfill following the removal of the UST.

Petroleum-contaminated soil was identified approximately 5 to 6 feet below ground surface. Groundwater was observed entering the excavation at an approximately 8 feet depth and, at the termination of activities, a sheen was observed on the surface of the water table.

The extent of the excavation was approximately 15 feet wide by 22 feet long by 10 feet deep. The soils included a brown fine sand with gravel and small cobbles to a depth of approximately 2 feet, tan to orange fine sand to approximately 3 feet, and tan fine sandy material to approximately 7 feet. The soils encountered from 7 to 10 feet were identified as a mixture of brown and gray medium and fine sand with cobbles and small boulders.

The excavation was terminated at the dimensions cited above, based on the discovery that the apparent area of highest impact was along the building front, thereby indicating that contamination existed underneath the building slab. Soil samples from the walls and base of the excavation were collected and were screened with a PID. The sampling locations are presented on **Figure 1** and the PID results are presented in **Table 3.**

As is seen from the table, elevated PID readings were exhibited in all samples, except for sample S16 (7 to 9 foot depth) collected in a corner of the excavation away from the building. The samples collected from the front of the building exhibited significantly higher headspace VOC concentrations than elsewhere in the excavation.

The samples from each wall and base exhibiting the highest PID concentrations, except for sample Wall#1, were submitted to Spectrum for volatile petroleum hydrocarbon (VPH) analysis by the DEP method and for EPH analysis. Wall#1 was selected because of its central location and because its PID response was essentially equivalent to the highest response detected. The results of analysis are presented in **Table 4** and are compared to MCP Method 1 Risk Characterization Standards for S-3 soil (soil in an inaccessible location where only adults are present and land uses are not of an intensity that would cause intimate exposure) and for GW-1/GW-2/GW-3 categorized groundwater, whichever is most stringent (GW-1 is protective of potable water, GW-2 is protective of indoor air, and GW-3 is protective of surface waters). The laboratory reports for the analysis are presented in **Attachment 2.**

TABLE 3
Headspace VOC Concentrations in
Soil Samples Following RAM Soil Excavation
UST Release
(RTN 3-15773)
April 20, 1998

Sample Location	Depth Below Ground Surface, feet	Headspace Concentration, ppm
S1	10	410
S2	10	311
S3	10	175
S4	10	235
S5	10	507
S6	10	193
S7	10	102
S8	10	97
S9	7-9	2500
S10	7-9	2089
S11	7-9	910
S12	7-9	71.7
S13	7-9	66.3
S14	7-9	101
S15	7-9	78.7
S16	7-9	2
S17	7-9	218
S18	7-9	360

Note: ppm = parts per million.

TABLE 4
Results of Analysis of Soil Samples Following RAM Excavation
UST Release
(RTN 3-15773)
April 20, 1998
(All Concentrations in ppm)

Analyte Detected	Base#1	Wall#1	Wall#2	Wall#3	Wall#4	Method 1 Risk Characterization Standards S-3 Soil (1)
VPH: C5-C8 Aliphatics	ND	ND	ND	ND	120	500
VPH: C9-C12 Aliphatics	1000	600	1100	780	760	5000
VPH: C9-C10 Aromatics	**420**	**320**	**390**	**350**	**560**	100
Ethylbenzene	1.9	0.95	1.1	1.4	4.4	80
Xylenes	16.5	4.3	6.2	9.9	17.6	500
EPH: C9-C18 Alphatics	3900	840	2100	1400	3900	5000
EPH: C19-C36 Alphatics	1100	220	530	350	970	5000
EPH: C11-C22 Aromatics	**2000**	**430**	**1100**	**640**	**1900**	200
Acenaphthene	1.1	0.2	0.3	0.3	1	20
Acenaphthylene	0.43	ND	ND	ND	0.38	100
Anthracene	0.63	ND	ND	ND	0.47	5000
Fluroene	1.8	0.43	0.57	0.56	1.5	400

Analyte Detected	Base#1	Wall#1	Wall#2	Wall#3	Wall#4	Method 1 Risk Characterization Standards S-3 Soil (1)
2-Methyl Naphthalene	**13.1**	3.8	2.1	**5.4**	**11**	4
Naphthalene (2)	4	0.49	ND	0.93	2.3	4
Phenanthrene	4.7	1	1.3	1.3	3.8	100
Pyrene	0.41	ND	ND	0.27	0.43	1000

Notes: 1.) **Risk Characterization Standards for GW-1/GW-2/GW-3 categorized groundwater, whichever is most stringent.**
2.) **Reported Naphthalene concentrations based on Method 8270 analysis reported in the EPH analytical reports.**
3.) **ppm = parts per million; ND = not detected above analytical detection limits.**
4.) **Values in bold text indicate that Risk Characterization Standard exceeded for listed analyte.**

As is seen in the table, Risk Characterization Standards were exceeded in all samples for the aromatic VPH and EPH fractions and in 3 of the samples for 2-methyl naphthalene, thereby signifying that a condition of No Significant Risk was not attained. In anticipation of these findings, a 4 inch slotted polyvinyl chloride pipe was installed in the excavation for potential future use as a bio-venting application or nutrient injection program. The pipe was installed to take advantage of the open excavation, however United Tool & Die understands that the pipe cannot be utilized for remedial activities without an approved RAM or a modification to its Tier IC permit.

The pipe was installed at a depth of 6 feet on the base of the excavation along the sidewall closest to the building and along the opposite sidewall, approximately 20 feet long and 15 feet apart. The pipe was laid on and covered by approximately 12 inches of 3/8 inch peastone and a header was directed vertically to a point a few inches under the ground surface by the edge of the building. The excavation was backfilled and compacted with clean sandy fill.

A total of 95.34 tons of petroleum-impacted soil were shipped from the property on April 24, 1998 to Bardon Trimount, Inc. for asphalt batching. (The volume of soil approved under the RAM for off-site recycling was 200 cubic yards or approximately 300 tons.) The Bill of Lading, with original signatures, and other documentation for theses soils were submitted to the DEP previously on May 19, 1998. However, the submission was inadvertently made under RTN 3-4168 rather than RTN 3-15773 and so a copy of the submission is presented here in **Attachment 1.** Also included in the attachment, under a manifest for the disposal of 8 drums of sludge, are 2 drums of residual sludge from the UST, the remainder being sludge from the drywell.

6.0 REMOVAL OF SOLIDS FROM FLOOR DRAIN (RTN 3-17055)

The floor drain in the tumbler room was cleaned out on July 29, 1998 by the use of a "drum vac," which is a vacuum motor attached to a lid of an open-topped DOT 1A2 steel drum and an approximate two inch diameter hose leading from the motor. The floor drain was accessed by an approximate 10 inch diameter hole which was covered by an approximate 12 inch diameter cover.

Six inches of water were encountered below the rim of the floor drain overlying gray, tan and white stratified layers of ceramic solid material, from the former tumbling operations which used ceramic chips for polishing. The floor and sidewall material was removed until a majority of the sidewalls appeared to contain a medium to coarse sand. The base of the floor drain was removed until the sidewalls began to loosen at a depth of 4.5 feet below the concrete tumbler room floor. Hard cinder block or concrete walls or bottom were not encountered and it is assumed that the walls are constructed of the medium to coarse sand.

A total of 7 sidewall samples and 3 base samples were collected and were screened with a Photovac Microtip HL-2000 PID calibrated to the benzene response factor. The headspace VOC concentrations of the samples are presented in **Table 5** and the locations of the samples are presented in **Figure 1.** As is seen from the table, none of the headspace VOC concentrations exceeded 10 ppm. The samples with the highest headspace readings along a sidewall were selected for analysis.

The samples were analyzed by Amro Environmental Laboratories Corporation (Amro) of Merrimack New Hampshire for total copper. The results of analysis are presented in **Table 6** and the laboratory reports are presented in **Attachment 2.** The samples are identified as W-1 through W-4 and B-1, as shown in the figure and table.

The RC for copper is 1000 ppm, however there is no Method 1 Risk Characterization Standard provided by the MCP. A Method 2 or Method 3 standard will need to be developed in order to determine whether a condition of No Significant Risk exists for the release, however this will be conducted at a later date. On the other hand, all of the copper concentrations presented in Table 6 are below the copper RC, thereby indicating that a condition of No Significant Risk is the likely result.

The floor drain has not as yet been backfilled, pending the results of the analysis cited above, and the material removed from the floor drain has not as yet been disposed. The drain has been blocked with plastic sheeting to maintain wall and base quality conditions. Approximately 1.5 cubic yards of solids were removed and were stored in two steel drums pending shipment. A RAM Completion Report will be submitted at the time of shipment of the solids and closure of the floor drain.

7.0 LSP OPINION REGARDING CONFORMANCE WITH RAM PLAN

It is the opinion of Robert W. Pease, Jr. that the RAM has been conducted in conformance with the RAM Plan of April 27, 1998 and the RAM Plan Modification of July 15, 1998, with the following exception: the suitability of site soil for backfilling the excavation at the UST location was based on PID screening results and not on the results of a TPH sample, as stated in the April RAM Plan.

TABLE 5
Headspace VOC Concentrations of Soil Samples
Following Floor Drain Cleanout
Copper Release
(RTN 3-17055)
July 29, 1998

Sample Location	Depth Below Floor Surface, feet	Headspace VOC Concentration, ppm
S1	2-3	2.1
S2	2-3	3.7
S3	2-3	0.3
S4	2-3	0.9
S7	2-3	5.1
S8	4	2.9
S9	4	4.2
S10	4	1.7

Note: **ppm = parts per million**

TABLE 6
Results of Copper Analysis of Soil Samples
Following RAM Floor Drain Cleanout
Copper Release
(RTN 3-10755)
July 29, 1998

Sample	Copper Concentration, ppm
W-1	140
W-2	26
W-3	540
W-4	810
B-1	540

Note: ppm = parts per million.

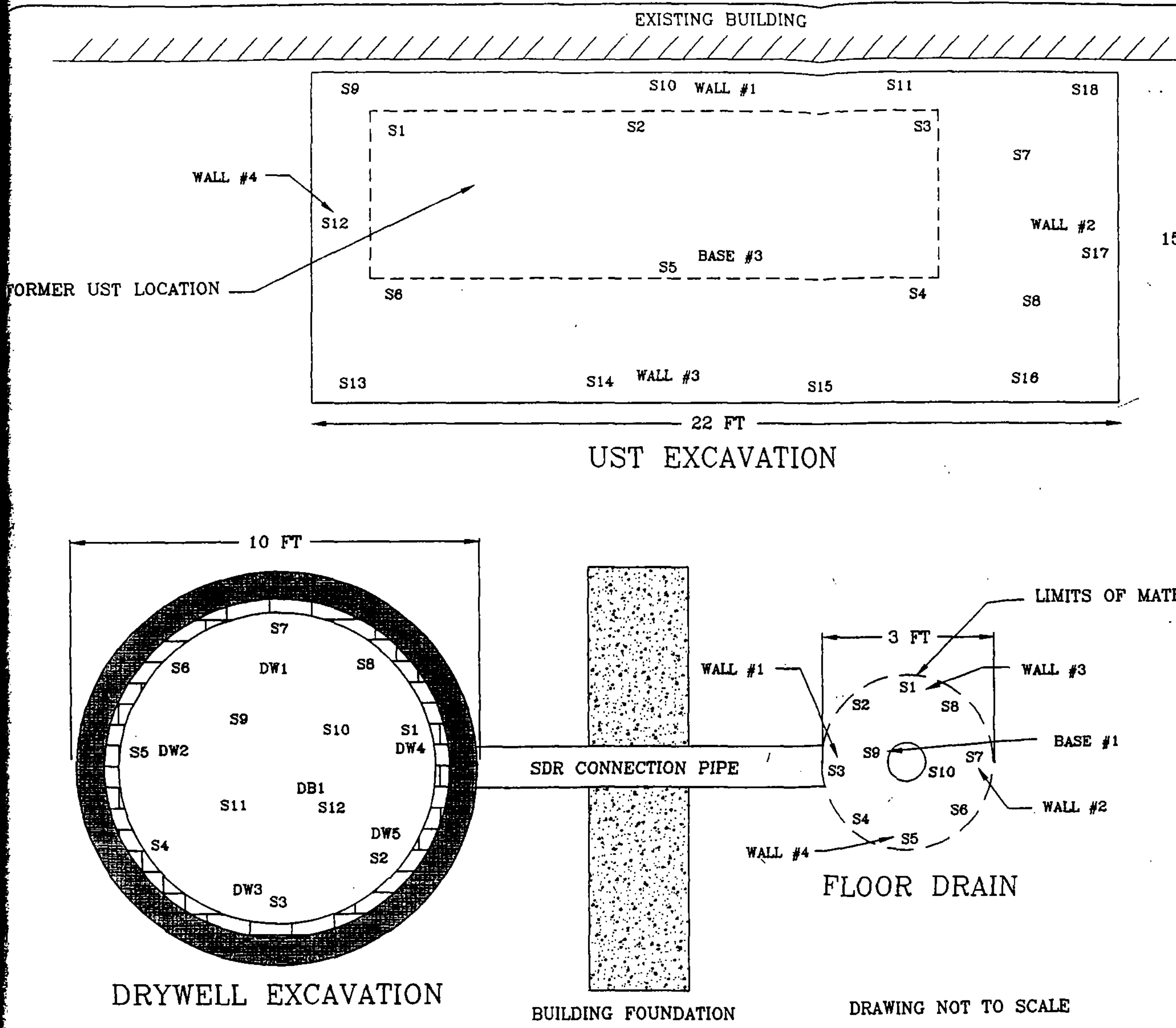


FIGURE 1

Robert W. Pease, Jr.
Licensed Site Professional/Environmental Consultant
23 Hitchinpost Road, Chelmsford, MA

RELEASE ABATEMENT MEASURE
UNITED TOOL & DIE

EXCAVATION SAMPLE LOCATIONS

98 EAMES STREET, WILMINGTON, MASSACHUSETTS

DATE: AUGUST 1998

BPE009.01

WILMINGTON
98 EAMES ST
3-4168

ROBERT W. PEASE, JR.
LICENSED SITE PROFESSIONAL/ENVIRONMENTAL CONSULTANT

23 Hitchinpost Rd., Chelmsford, Massachusetts 01824
Phone/fax: (978) 244-5625

TIER CLASSIFICATION

United Tool & Die Co., Inc.
Eames Street
Wilmington, Massachusetts
RTN 3-4168

December 23, 1997

1.0 INTRODUCTION

The United Tool & Die Co. Inc. (United Tool & Die) property was listed as a Location to be Investigated (LTBI) by the Massachusetts Department of Environmental Protection (DEP) on January 15, 1993. The property was identified as an LTBI as a result of a soil gas survey conducted there by the DEP in 1991, which detected the presence of trichloroethylene (TCE) in soil on a portion of the property.

United Tool & Die occupies a 1.2 acre parcel in an industrial-zoned portion of Wilmington. The company manufactures stamped and machined metal parts within a one-story 18,000 square foot steel panel building constructed on a slab on-grade. The exterior portions of the property include a paved parking lot in the front and northern side of the building and vegetated areas to the rear and southern side. The property is abutted by a rail line and other industrial facilities. A site locus map and property layout map are presented in the **Figures** section of this report.

The property was investigated in July, 1997 by Marin Environmental, Inc. (Marin), which is documented in a report titled "Phase I Environmental Site Assessment", August 1997 (Phase I Report). Pursuant to this investigation, a Licensed Site Professional (LSP) Evaluation Opinion and a Phase I Completion Statement were filed by Marin with the DEP on August 5, 1997.

The LSP Evaluation Opinion concluded that releases of oil and hazardous materials had occurred on the property that required notification to the DEP. The following two releases of oil and hazardous materials were identified by the Marin investigation:

- The presence of TCE, tetrachloroethylene, 1,1,1-trichloroethane, 1,4-dichlorobenzene, and 1,1-dichloroethane in the property's groundwater in concentrations above their respective Reportable Concentrations (for GW-1 classified groundwater); and

- The presence of petroleum constituents in soil in the vicinity of an underground 1000 gallon fuel oil storage tank, as measured by total petroleum hydrocarbons (TPH) in a concentration above the TPH Reportable Concentration (for S-1 classified soil).

The presence of TPH in soil represents a new release condition, for which a Release Notification Form was submitted to the DEP on November 26, 1997. The fuel oil tank has been taken out of service and its contents have been pumped out. Mr. Arthur Marsilia, President of United Tool & Die, has reported that the tank was relined prior to his purchase of the property and he now suspects that the relining was the result of an identified loss of product by the former owner.

The source of the chlorinated organic compounds is suspected to be a drywell located on the property, which received washwater from an aqueous metal parts cleaner and polisher. However, a chlorinated compound above its Reportable Concentration has been found in a monitoring well upgradient from the drywell and its source is unknown.

The purpose of this report is to provide a Numerical Ranking System (NRS) score and Tier Classification of the site pursuant to the requirements of 310 CMR 40.0500 of the Massachusetts Contingency Plan (MCP). The Tier Classification is based on the findings of the Phase I Report and on certain additional investigations conducted after the submission of the Phase I Report, the results of which are reported herein. A copy of the Phase I Report is presented in **Attachment 1.**

As is described in the body of this report, the NRS score for the property is 336 and the property is classified as a Tier IC site, pursuant to the inclusionary criteria described in 310 CMR 40.0520 (2) (a) (1). The property is classified as a Tier IC site because it is located in a mapped Zone II of a public water supply well field, which categorize the property's groundwater as GW-1, and because compounds were detected in the property's groundwater which exceed the GW-1 Reportable Concentrations (RCs). Because of its classification as a Tier IC site, a Tier IC permit application has been prepared and is being submitted to the DEP simultaneous with this report.

2.0 SUMMARY OF PHASE I REPORT

The location of the property is presented in a **Site Location Classification Map** prepared by Marin, which is found in the **Figures Section** of this report. Eight soil borings were installed by Marin as part of its Phase I investigation and four of these borings were converted to 2-inch monitoring wells. The locations of the borings and monitoring wells are presented in Marin's **Ground Water Elevation and Ground Water Quality Data Site Plan** *also found in the* Figures Section of this report.

Soil samples were collected from five of the borings and submitted for laboratory analysis. All of the samples from the four borings that were converted to monitoring wells (MW-1 through MW-4) were submitted, as well as a sample from one (B-1) of four borings installed in the vicinity of the underground fuel oil storage tank. The soil samples from the monitoring well locations were collected at the water table interface 5 to 9 feet below ground surface). The sample from B-1 was the sample that exhibited the highest response on a photoionization detector (PID) during headspace analysis, which was found at 7 to 7.5 feet below ground surface.

The soil samples from MW-1 through MW-4 were analyzed for volatile organic compounds (VOCs) by EPA Method 8240. The sample from B-1 was analyzed for TPH by EPA Method 8100 and for extractable petroleum hydrocarbons (EPH) by the DEP method. The results of the analysis are presented below and are compared with their respective RCs for S-1 soil.

Results of Analysis of Soil Samples
Marin Phase I Report

Parameter	MW-1	MW-2	MW-3	MW-4	B-1	RCS-1
VOCs	ND	ND	ND	ND	--	
TPH, ppm	--	--	--	--	**4500**	500
C9-C18 Aliphatics, ppm	--	--	--	--	**2200**	1000
C19-C36 Aliphatics, ppm	--	--	--	--	600	2500
C10-C22 Aromatics, ppm	--	--	--	--	**1700**	200
Fluorene, ppm	--	--	--	--	1.6	400
2-Methyl-naphthalene, ppm	--	--	--	--	**20.0**	4
Naphthalene, ppm	--	--	--	--	1.0	4
Phenanthrene ppm	--	--	--	--	1.3	100
Pyrene, ppm	--	--	--	--	1.0	700

Notes: ND = not detected; dashed lines indicate parameter not tested for identified sample location; bold text indicates that sample concentration exceeds Reportable Concentration for identified parameter.
ppm = parts per million
RCS-1 = Reportable Concentration for S-1 categorized soil.

As is seen from the above table, none of the soil samples collected from the locations of the monitoring wells exhibited detectable concentrations of VOCs. On the other hand, sample B-1, collected from the vicinity of a 1000 gallon fuel oil underground storage tank exhibited TPH, EPH, and polyaromatic hydrocarbon (PAH) concentrations exceeding RCs, likely associated with the fuel oil tank. Mr. Arthur Marsilia, president of United Tool & Die, has reported that the tank was relined before he purchased the property, and that he now suspects that it might have been relined in response to a known or suspected release.

Groundwater samples were collected from the monitoring wells and were analyzed for VOCs by EPA Method 624/8240. All of the monitoring wells were sampled on July 15, 1997 and two monitoring wells, MW-1 and MW-2, were resampled on July 29, 1997. The results of the analysis are presented below and are compared with RCs for GW-1 categorized groundwater.

Results of Groundwater Analysis
Marin Phase I Report

Analyte Detected	MW-1 7/15/97	MW-1 7/29/97	MW-2 7/15/97	MW-2 7/29/97	MW-3 7/15/97	MW-4 7/15/97	RCGW-1
1,4 Dichlorobenzene, ppb	**16**	4.5	ND	ND	ND	ND	5
1,1 Dichloroethane, ppb	ND	ND	43	**130**	ND	ND	70
Tetrachloroethene, ppb	ND	ND	**17**	40	ND	ND	5
1,1,1-Trichloroethane, ppb	ND	ND	**240**	**250**	ND	ND	200
Trichloroethene, ppb	ND	ND	2.7	**6.5**	3.6	ND	5

Notes: ND = not detected; ppb = parts per billion.
RCGW-1 = Reportable Concentration for GW-1 categorized groundwater.

3.0 RECENT SITE INVESTIGATIONS

3.1 Geoprobe Investigation

Ten soil probes were conducted at the property using the geoprobe direct push technique on October 3, 1997. Probes GP-1 and GP-2 were conducted in the northeastern portion of the site, on two sides of a drywell located there. The purpose of the probes was to collect a soil sample next to the drywell and submit it to laboratory for disposal parameters analysis. The subject analysis was conducted in anticipation of closure of the drywell. A sample collected from GP-1 at 6 to 7 feet below ground surface was submitted to Amro Environmental Laboratories Corporation (Amro) of Merrimack New Hampshire for analysis.

Probes GP-3 through GP-10 were conducted to the west and southwest of the fuel oil underground storage tank. The purpose of the sampling in this area was to delineate the areal extent of the petroleum-impacted soil and to collect a soil sample for submission to laboratory for disposal parameter analysis. The impacted area was found to extend approximately 50 feet to the southwest underneath the parking lot in the front of the building in a conical shape ranging from an estimated 40 feet wide in the area of the building to an estimated 15 feet wide at its maximum extent southwest away from the building. It is not currently known whether the impacted soil extends underneath the building. The depth to impacted soil was approximately 6 feet below ground surface. A soil sample collected from probe GP-3 at a depth of 5 to 6 feet was submitted to Amro for analysis. Probe GP-3 was installed approximately 5 feet toward the building from Marin boring B-1-3.

The samples were analyzed for the following parameters: pH, flashpoint, free liquids, reactive cyanide and sulfide, total organic carbon, total solids, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, TPH by EPA Method 8100, VOCs by EPA Method 8260A, and polychlorinated biphenyls by EPA Method 8081. The results of the laboratory analysis are presented in the table below and the laboratory reports are presented in **Attachment 2.**

Results of Analyses of Soil Samples for Disposal Parameters

Analytes Detected	**GP-1**	**GP-3**	**RCS-1**
Total Barium, ppm	25	ND	1000
Total Chromium, ppm	15	7.2	1000
Total Lead, ppm	53	ND	300
Total Mercury, ppm	0.032	ND	20
Tetrachloroethene, ppb	ND	44	500
Ethylbenzene, ppb	ND	36	80,000
Isopropylbenzene, ppb	ND	110	1,000,000
n-Propylbenzene, ppb	ND	250	100,000
Total Xylene, ppb	ND	170	500,000
sec-Butylbenzene, ppb	ND	630	NS
4-Isopropyltoluene, ppb	ND	730	NS
Naphthalene, ppb	ND	210	4000
1,2,4-Trimethylbenzene, ppb	ND	1,300	1,000,000
1,3,5-Trimethylbenzene	ND	680	10,000
TPH, ppm	ND	**3800, as No. 2 Fuel Oil**	500
Total Organic Carbon, ppm	5000	9200	NS
pH	8.0	7.6	NS

Notes: ppm = parts per million, ppb = parts per billion, ND = not detected, NS = no standard
RCS-1 = Reportable Concentration for S-1 soils
Text in bold type indicates that measured concentration exceeds Reportable Concentration.

As is seen from the above table, Sample GP-1, collected from the rear of the building in the area of the drywell is free of impacts, similar to the soil sample collected from MW-2 by Marin, which is reported in the Phase I Report. Similarly, GP-3, the soil sample collected in the front of the building in the vicinity of the fuel oil tank, exhibits a TPH concentration generally similar to that detected in boring B-1 of the Phase I Report (4500 ppm). The compounds detected in GP-3 are associated with petroleum, except for chromium, whose concentration is low relative to its respective RC, and tetrachoroethylene, which may be from historic site operations.

3.2 Monitoring Well Sampling and Analysis for TPH

Groundwater samples were collected from the four monitoring wells installed by Marin on November 5, 1997 and were submitted to Amro for TPH analysis. These samples were collected in support of this Tier Classification, to determine whether groundwater impacts were present as a result of the discovery of the TPH-impacted soil in the front of the property.

The samples were collected with dedicated disposable bailers after purging of the wells by a minimum of three well volumes. None of the samples was found to have detectable TPH concentrations. The laboratory report for the groundwater analysis is presented in **Attachment 2.**

Based on the groundwater elevation contours depicted in the site plan, it appears that none of the monitoring wells are positioned in a downgradient location to the fuel oil tank and that additional monitoring wells will be necessary for final determination as to whether the groundwater has been impacted by the fuel oil release.

3.3 Analysis of Contents of Drywell

The contents of the drywell were sampled and analyzed by Marin on August 12, 1997. United Tool & Die reports that between 1 to 2 inches of material were present in the drywell at the time of sampling.

The drywell received water from a tumbler washer, which washed fabricated parts with detergent and water and provided agitation with an abrasive for surface smoothing. The tumbler washer was used only for selected parts and was not in constant use. The tumbler washer has not been used since the time of the Phase I Report, and parts smoothing and washing are now conducted off-site by a vendor.

Marin sampled a water layer and a sludge layer found in the drywell. The water layer was analyzed for VOCs by EPA Method 624/8240 and the sludge was analyzed for disposal parameters including VOCs by EPA Method 624/8240, PAHs by EPA Method 8270, Organochlorine Pesticides by EPA Method 8080, PCBs by EPA Method 8080, TPH by EPA Method 8100, pH, flash point, reactivity, conductance, priority pollutant metals, aluminum, and TCLP chromium, copper, lead, nickel, and zinc. The laboratory reports for these analyses are presented in **Attachment 3.**

The results of the VOC analysis of the water sample are presented below and compared with applicable RCs for GW-1 classified groundwater. The RCs for groundwater are presented for reference purposes only, and are not applicable to the subject material because the water in the drywell does not represent groundwater.

Results of VOC Analysis of Water in Drywell
Collected by Marin, August 12, 1997

Detected Compounds	Concentration	RCGW-1
1,1-Dichloroethane, ppb	8.8	70
Ethylbenzene, ppb	2.1	700
1,1,1-Trichloroethane, ppb	3.8	200
Total Xylenes, ppb	10.0	6000

Notes: ppb = parts per billion
RCGW-1 = Reportable Concentrations for groundwater; subject material does not represent site groundwater and RCs are presented for reference only.

As is seen from the above table, two of the four compounds detected in MW-2 in concentrations above their respective RCs (the others being tetrachloroethene and trichloroethene) were found in the water layer of the drywell, but at concentrations below RCs. Moreover, petroleum constituents ethylbenzene and xylenes were detected there, likely from the cutting and lubricating oils used in the machining and metal fabrication process.

The results of the analysis of the sludge layer are presented below. There are no applicable RCs for sludges.

Results of Analysis of Drywell Sludge Sample
Collected by Marin, August 12, 1997

Compounds Detected	Concentration
Ethylbenzene, ppb	1800
Toluene, ppb	440
Total Xylenes, ppb	2600
TPH, ppm	370, as Mineral Spirits 16,000 as lubricating and cutting oil
pH	7.46
Flash Point, °F.	>200

Compounds Detected	Concentration
Conductance, umhos/cm	530
Copper, ppm	2620
Lead, ppm	32.0
Nickel, ppm	1350
Zinc, ppm	323
Chromium, ppm	2570
Aluminum, ppm	12,000
TCLP Chromium, ppm	0.040
TCLP Lead, ppm	0.025
TCLP Nickel, ppm	0.530
TCLP Zinc, ppm	1.19
TCLP Copper, ppm	ND

The above results indicate that the sludge is free of chlorinated VOCs and other chlorinated compounds, such as PCBs and pesticides, but contains elevated levels of metals and oils. The presence of metals and oils is an expected result of the metal cleaning and smoothing process conducted in the tumbler washer. As reported earlier, MW-2, the monitoring well adjacent to the drywell was sampled and analyzed for TPH and none was detected. On the other hand, follow-on analysis for the presence of metals, in particular copper, nickel, and chromium, is required for complete site characterization.

4.0 NUMERICAL RANKING SYSTEM SCORE

An NRS Scoresheet was prepared as part of the Tier classification for the property and is presented later in this section. The following describes the development of the scores for each section of the score sheet.

4.1 Sections IIA through IID, Exposure Pathways

Soil. Contaminated soil was found in excess of reportable concentrations (RCs) in the Marin Phase I Report, and in geoprobe soil samples collected on October 3, 1997. The sample with the highest contaminate concentration was collected within 6.0 feet of the ground surface. However, the contaminated soil is under pavement and is therefore inaccessible. For this reason, the soil exposure pathway is scored as "Evidence of Contamination".

Groundwater. Groundwater is scored as "Potential Exposure Pathway" because groundwater samples collected as part of Marin investigations were found to have exceeded RC's for several compounds, and the site is located within a Zone II wellhead maximum recharge area. As is reported in the Phase I Report, contamination has been found in the public supply wells that draw from the Zone II area. Because the United Tool & Die property is on the edge of the Zone II, and because there is a low reported historic usage of chlorinated compounds there (as described in the Phase I Report), there is a low likelihood that the subject site is the source of the impacts to the public wells. It is for this reason that "Likely or Confirmed Exposure Pathway" was not selected for scoring the site.

Surface Water and Air. No surface waters are present in the site vicinity and therefore surface water does not represent an exposure pathway. The concentrations of VOCs detected in groundwater are presented below and compared with their respective GW-2 MCP Method 1 Risk Characterization Standards. The GW-2 standards are protective of indoor air from the volatilization of compounds from shallow groundwater close to occupied buildings.

Comparison of Maximum VOC Concentrations in Groundwater With MCP GW-2 Risk Characterization Standards

VOC	Maximum Groundwater Concentration	MCP GW-2 Risk Characterization Standard
1,4 Dichlorobenzene, ppb	16	30,000
1,1 Dichloroethane, ppb	130	9000
Tetrachloroethene, ppb	40	3000
1,1,1-Trichloroethane, ppb	250	4000
Trichloroethene, ppb	6.5	300

Note: ppb = parts per billion

As is seen in the table, none of the VOC concentrations detected exceed the MCP GW-2 Risk Characterization Standards, thereby indicating that the indoor air pathway is not applicable to site conditions.

Based on the above the score for these Sections is 115.

4.2 Section IIE, Oil and Hazardous Material (OHM) Sources

There are indications that more than two sources of OHM are present for the property. One is the 1000-gallon fuel oil underground storage tank, where an historic release has occurred. Another is the drywell adjacent to MW-2, where a majority of the chlorinated VOCs were detected in the property's groundwater. However, chlorinated VOCs have also been detected in MW-1 and MW-3, thereby indicating that other sources may have been present as well. The score for this Section is therefore 50, in accordance with the score sheet.

4.3 Section IIIA, OHM Toxicity Score

The OHM Toxicity Score is based on the maximum concentrations of VOCs, metals, and fuel oil constituents detected during analysis conducted as part of previous Marin phase I investigation, and the recent geoprobe investigation and monitoring well sampling. These maximum concentrations are presented in the table below. The water layer of the drywell is represented in the determination of maximum concentrations, however the sludge layer is not. The reason for the exclusion of the sludge layer is that it is considered herein to be contained by the drywell structure, whereas the water layer is mobile. Soil sample GP-1, which was collected external to and below the depth of the drywell, is considered to be representative of the environmental condition of soil related to the presence of the drywell.

Maximum Concentrations of Detected Compounds

Parameter Detected	Maximum Soil Concentration	Location of Maximum	Maximum Groundwater Concentration	Location of Maximum
TPH	4500 ppm	B-1	ND	--
1,4 Dichlorobenzene	ND	--	16 ppb	MW-1
1,1 Dichloroethane	ND	--	130 ppb	MW-2
Tetrachloroethene	44 ppb	GP-3	40 ppb	MW-2
1,1,1-Trichloroethane	ND	--	250 ppb	MW-2
Trichloroethene	ND	--	6.5 ppb	MW-2
Fluorene	1.6 ppm	B-1	--	--
2-Methylnaphthalene	20 ppm	B-1	--	--
Naphthalene	1.0 ppm	B-1	--	--
Phenanthrene	1.3 ppm	B-1	--	--

Parameter Detected	Maximum Soil Concentration	Location of Maximum	Maximum Groundwater Concentration	Location of Maximum
Pyrene	1.0 ppm	B-1	--	--
Total Mercury	0.032 ppm	GP-1	--	--
Total Lead	53 ppm	GP-1	--	--
Total Barium	25 ppm	GP-1	--	--
Total Chromium	15 ppm	GP-1	--	--
Ethylbenzene	36 ppb	GP-3	2.1 ppb	Drywell
Isopropylbenzene	110 ppb	GP-3	--	--
n-Propylbenzene	250 ppb	GP-3	--	--
Xylene	170 ppb	GP-3	10 ppb	Drywell
sec-Butylbenzene	630 ppb	GP-3	--	--
1,2,4-Trimethylbenzene	1,300 ppb	GP-3	--	--
1,3,5-Trimethylbenzene	680 ppb	GP-3	--	--
4-Isopropyltoluene	730 ppb	GP-3	--	--
C9-C18 Aliphatics	2200 ppm	B-1	--	--
C19-C36 Aliphatics	600 ppm	B-1	--	--
C10-C22 Aromatics	1700 ppm	B-1	--	--

Notes: ND=not detected, dashed lines indicate not tested or not applicable, ppb = parts per billion, ppm = parts per million.

The above maximum concentrations are used to develop the scores for the individual compounds presented in Table III.A of the scoresheet and in Worksheet III.A.1. Isopropylbenzene, n-propylbenzene, sec-butylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-isopropyltoluene, C9-C18 aliphatics, C19-C36 aliphatics, and C10-C22 aromatics are all assumed to be components of the TPH concentration, which is counted as fuel oil.

As can be seen from the table and worksheet, the maximum score is derived from the TPH concentration in soil, which is 25.

4.4 Section IIIB, Multiple OHMs

As seen in the Scoresheet, no OHM had scores equal or greater than 30. The score for this category is therefore 0.

4.5 Section IIIC, OHM Mobility and Persistence

The compounds with OHM Toxicity Scores greater than 20 and their mobility and persistence scores are as follows:

OHM	Toxicity Score	Mobility and Persistence Score
1,2 Dichloroethane	20	45
#2 Fuel Oil	25	20
Lead	20	25
Mercury	20	15

Based on the above table, the score for this Section is 45.

4.6 Section IIID, Disposal Site Hydrogeology

The depth to groundwater at the site is between 7.0 and 9.0 feet below the ground surface. Soils at the site have been classified as medium to fine sand; however, information concerning the silt content of the soil was not available. To be conservative, high soil permeability has been used to score this site. The score for this category is 16.

4.7 Section IVA, Human Population

The human population within a one-half mile radius of the site is estimated to be less than 1,000 persons, based on a review of 1990 census data by block area provided by the U.S. EPA Envirofacts Site Information database. Population in the database is reported in population density per square mile.

According to the owners of United Tool & Die Co., Inc., there are twenty employees at the facility.

There are no institutions within 500 feet of the site.

The score for this section is 15, based on the scoresheet.

4.8 Section IVB, Aquifers

The property is not located over a sole source aquifer and or a potentially productive aquifer, based on a review of the DEP Priority Resources GIS map, a copy of which is included in the Figures section of this report. The score for this Section is 0.

4.9 Section IVC, Water Use

The property is located within a mapped Zone II wellhead maximum recharge area. According to information obtained from the Wilmington Water Department, there are 6,500 listed water connections in the Town. The Wilmington Board of Health indicated that there are no water wells of any kind within 500 feet of the site and alternative public water supplies are available in the community from well and surface water sources elsewhere. The score for this section is 85.

4.10 Section VA, Ecological Resources

No ecological resources were identified within the identified distances on the scoresheet. The nearest wetland is approximately 600 feet away; the nearest fish habitat is approximately 2300 feet from the site, and the nearest protected open space is approximately 840 feet distant. There are no areas of critical concern or endangered species in the vicinity of the site.

The score for this section is 0.

4.11 Section VB, Environmental Toxicity Score

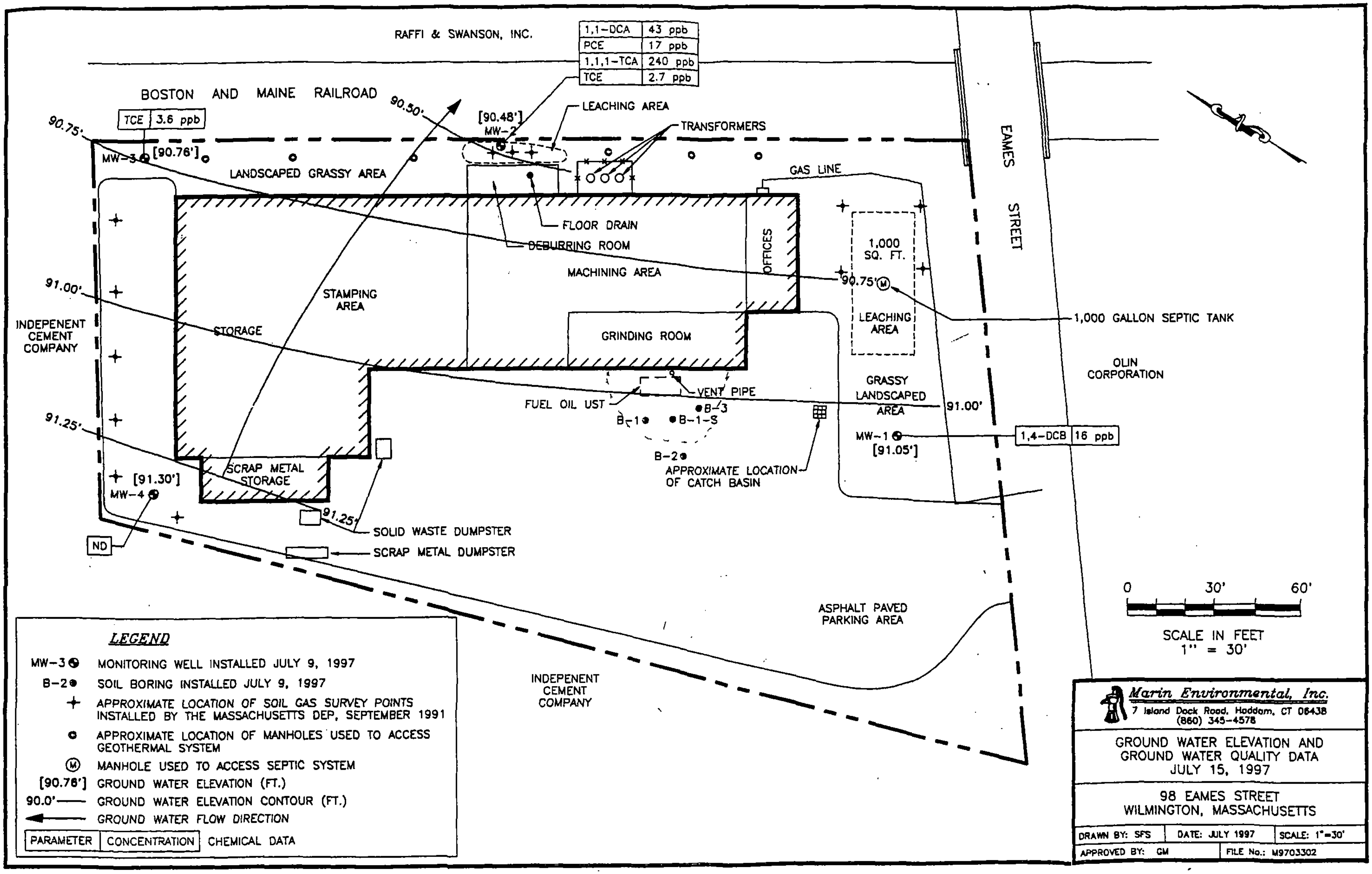
The score of Section VA does not exceed 30 and therefore this section is not applicable.

4.12 Mitigating Conditions

There are no mitigating conditions currently identified and the score for this Section is 0.

5.0 PUBLIC NOTIFICATION

Pursuant to the requirements of the MCP, notification of this submittal has been made to the Chairman of the Board of Selectmen and the Director of the Board of Public Health for the Town of Wilmington. Copies of their notifications are included in **Attachment 4.** A legal notice in the form required by the DEP will appear in the Wilmington Town Crier within seven days of submission. A copy of the legal notice is also included in Attachment 4.


RAFFI & SWANSON, INC.
1,1-DCA 43 ppb
PCE 17 ppb
1,1,1-TCA 240 ppb
TCE 2.7 ppb
BOSTON AND MAINE RAILROAD
TCE 3.6 ppb
90.75'
90.50'
[90.48']
MW-2
LEACHING AREA
TRANSFORMERS
MW-3
[90.76']
LANDSCAPED GRASSY AREA
GAS LINE
EAMES STREET
FLOOR DRAIN
DEBURRING ROOM
MACHINING AREA
OFFICES
1,000 SQ. FT.
90.75'
LEACHING AREA
1,000 GALLON SEPTIC TANK
91.00'
STAMPING AREA
INDEPENENT CEMENT COMPANY
STORAGE
GRINDING ROOM
OLIN CORPORATION
GRASSY LANDSCAPED AREA
VENT PIPE
FUEL OIL UST
B-3
B-1
B-1-S
91.00'
MW-1
[91.05']
1,4-DCB 16 ppb
91.25'
B-2
APPROXIMATE LOCATION OF CATCH BASIN
SCRAP METAL STORAGE
[91.30']
MW-4
91.25'
SOLID WASTE DUMPSTER
SCRAP METAL DUMPSTER
ND
ASPHALT PAVED PARKING AREA
0 30' 60'
SCALE IN FEET
1" = 30'
INDEPENENT CEMENT COMPANY
LEGEND
MW-3 MONITORING WELL INSTALLED JULY 9, 1997
B-2 SOIL BORING INSTALLED JULY 9, 1997
APPROXIMATE LOCATION OF SOIL GAS SURVEY POINTS INSTALLED BY THE MASSACHUSETTS DEP, SEPTEMBER 1991
APPROXIMATE LOCATION OF MANHOLES USED TO ACCESS GEOTHERMAL SYSTEM
MANHOLE USED TO ACCESS SEPTIC SYSTEM
[90.76'] GROUND WATER ELEVATION (FT.)
90.0' GROUND WATER ELEVATION CONTOUR (FT.)
GROUND WATER FLOW DIRECTION
PARAMETER CONCENTRATION CHEMICAL DATA
Marin Environmental, Inc.
7 Island Dock Road, Haddam, CT 06438
(860) 345-4578
GROUND WATER ELEVATION AND GROUND WATER QUALITY DATA
JULY 15, 1997
98 EAMES STREET
WILMINGTON, MASSACHUSETTS
DRAWN BY: SFS
DATE: JULY 1997
SCALE: 1"=30'
APPROVED BY: GM
FILE No.: M9703302

**IMMEDIATE RESPONSE ACTION
COMPLETION REPORT
RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MASSACHUSETTS
DEP RTN 3-19519** N/A-C

PREPARED FOR:
Raffi & Swanson, Inc.
Wilmington, Massachusetts

PREPARED BY:
GZA GeoEnvironmental, Inc.
Norwood, Massachusetts

April 2001
File No. *11268.79*

GZA
GeoEnvironmental, Inc.

Engineers and
Scientists

April 13, 2001
File No. 11268.79-C,PC

Bureau of Waste Site Cleanup
Massachusetts Department of Environmental Protection
205A Lowell Street
Wilmington, Massachusetts 01887

Re: Immediate Response Action Completion Report
Separate Phase Product – Tank Farm Area
Raffi & Swanson/Surface Coatings, Inc.
100 Eames Street
Wilmington, Massachusetts
DEP Release Tracking Number 3-19519

...dgewater Drive
...ood
...chusetts
...78-3700
...781-278-5701
...www.gza.net

To Whom It May Concern:

On behalf of Raffi & Swanson/Surface Coatings, Inc., GZA GeoEnvironmental, Inc. (GZA) has prepared the following Immediate Response Action (IRA) Completion Report to document response activities related to the discovery of floating (separate phase) toluene adjacent to an aboveground storage tank (AST) area at Raffi & Swanson/Surface Coatings' property at 100 Eames Street in Wilmington, Massachusetts. A locus plan is attached as Figure 1, and a site plan is shown on Figure 2. An original IRA Transmittal Form (Massachusetts Department of Environmental Protection [DEP] Form BWSC-105) is enclosed with this report; for convenience, a copy of this form is attached in Appendix A. GZA's work is subject to the limitations in Appendix B.

Raffi & Swanson is submitting DEP Form BWSC-107A under separate cover to link Release Tracking Number (RTN) 3-19519 to the main RTN for the property (3-0470) upon submittal of this IRA Completion Report. A copy of this form is included in Appendix C.

COMPLETION REPORT INFORMATION

The following information is presented to address the requirements of the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000) for IRA Completion Reports, as described in 310 CMR 40.0427(4)(a) through (f).

(a) a description of the release or threat of release, site conditions and surrounding receptors

The Raffi & Swanson/Surface Coatings site is located in the southern portion of Wilmington. The facility manufactures various coating materials using both solvent-based and water-based processes. Solvents are stored in a tank farm to the north of most of the Site buildings. A number of tanks have been removed from this area; however, some tanks remain, and the concrete "cradles" for the former tanks remain in place. The tank farm area is surrounded by a concrete wall and soil berm. Industrial property is located to the west and south of the Site, and residential property to the north and east. Railroad tracks abut the Site to the west; drainage ditches to either side of the tracks flow in a southerly direction.

In late April 2000, during the excavation of holes for footings for a new aboveground tank, a solvent odor was noted. On May 2, 2000, GZA and Raffi & Swanson personnel completed 22 hand-augered borings, designated GZ-100 through GZ-121, at the site; boring locations are shown on Figure 2. One or two soil samples were collected from each boring and screened in the field for volatile organic compounds (VOCs) using a photoionization detector (PID) equipped with a 10.6-eV lamp; results are presented in Table 1. When groundwater was encountered, separate phase toluene (light non-aqueous phase liquid or LNAPL) was detected in some of the borings, at a maximum thickness of approximately 2 inches. The LNAPL was discovered at approximately noon on May 2, 2000.

At Raffi & Swanson's request, on May 5, 2000, GZA notified DEP of the discovery of the LNAPL. Mr. Brad Stewart of DEP's Northeast Regional Office assigned RTN 3-19519 to the incident and gave oral permission to conduct an IRA consisting of additional assessment and manual recovery of floating product. DEP subsequently issued a Notice of Responsibility (NOR) requiring the submission of an IRA Plan within 60 days of the notification date. A Release Notification Form and an IRA Plan were submitted to DEP on June 30, 2000.

(b) a description of the work completed, including work undertaken in response to any conditions of approval imposed by the Department, and any work undertaken at the site that was not included in the scope of the Immediate Response Action Plan, where submitted

As indicated in the IRA Plan, the objective of the IRA was to evaluate the source and extent of the separate phase product, and to conduct initial product recovery activities. Immediate Response Actions have consisted of assessment and product recovery activities including:

- installation of 22 hand-augered borings in and downgradient of the AST area and two hollow-stem auger borings adjacent to/downgradient of the AST area;
- collection and chemical screening and analysis of soil and groundwater samples from the new borings and of groundwater samples from selected existing wells in the vicinity;
- installation of ten stainless steel wellpoints in selected hand-augered borings and two PVC monitoring wells in the hollow stem auger borings;
- measurement of depth to groundwater and depth to product, and calculation of the thickness of product in the monitoring wells;
- survey of wellhead elevations; and
- manual recovery of floating product.

In summary, information collected to date indicates that separate phase toluene occurs only in a relatively limited area at the eastern edge of the tank farm. Elevated concentrations of dissolved toluene have been detected in groundwater from monitoring wells to the west and southwest of the tank farm, but floating product has not been detected in this area. The following paragraphs provide additional information on the activities conducted to date.

On May 2, 2000, GZA and Raffi & Swanson personnel completed 22 hand-augered borings, designated GZ-100 through GZ-121, at the site; boring locations are shown on Figure 2. One or two soil samples were collected from each boring. The soil samples were screened in the field for volatile organic compounds (VOCs) using a photoionization detector (PID) equipped with a 10.6-eV lamp. The PID screening provides a relative quantification of the concentrations of VOCs present in the samples. PID screening results ranged from 40 to over 2,500 parts per million by volume (ppmv) in the 24 samples collected, as summarized on Table 1. When groundwater was encountered, samples were collected unless LNAPL was present. LNAPL was detected in some of the borings, at a maximum measured thickness of approximately 2 inches; product thickness measurements are presented on Table 2.

Sixteen of the soil samples collected from the borings on May 2, 2000, were analyzed at GZA's Environmental Chemistry Laboratory (ECL) in Newton, Massachusetts for VOCs using EPA Method 8021. GZA also collected groundwater samples from the thirteen borings that encountered groundwater but not floating product. The groundwater samples were screened for VOCs using gas chromatography. The laboratory report is attached in Appendix D.

Results of the analyses of soil samples indicate that toluene was detected in each sample analyzed, at concentrations ranging from 0.110 to 55,000 parts per million (ppm), as summarized in Table 1 and shown on Figure 2. No other compounds were detected; however, note that in samples with high concentrations of toluene, the detection limits for other compounds were higher than is typical for Method 8021.

Results of the analyses of groundwater samples, MCP Method 1 standards, and the Method 3 UCLs are summarized in Table 3. Toluene concentrations in groundwater samples collected in May 2000 are also shown on Figure 2. Toluene was detected in each sample analyzed. At ten of the locations, the toluene concentrations were beyond the linear range of calibration of the instrument; concentrations reported are approximate and indicate order of magnitude only. Most of the toluene concentrations exceeded MCP Method 1 GW-1 and GW-2 standards, and one is equal to the GW-3 standard. None of the concentrations exceeded the UCL for toluene. Other compounds detected included the aromatic VOCs benzene, ethylbenzene, and xylenes, and the chlorinated VOCs 1,1-dichloroethane and 1,1,1-trichloroethane. Each of these compounds was detected at a concentration one to three orders of magnitude lower than the concentration of toluene at the same boring, and each has been detected at the Raffi & Swanson site in the past.

On May 12, 2000, GZA installed nine 5-foot, stainless steel wellpoints in selected hand-augered holes at the site. These borings were used to delineate the boundaries of the existing LNAPL plume. Stainless steel was used for the wells because of the incompatibility of the more traditional PVC well materials with separate-phase toluene. A sand filter was installed around the screen of the wellpoint and each wellpoint was completed with a roadbox set flush with the ground surface. LNAPL thicknesses were measured with an interface probe and are summarized in Table 2. LNAPL was encountered in five of the nine wellpoints, at thicknesses ranging from 0.40 to 0.99 foot, as shown on Figure 2 and summarized in Table 2.

On May 18, 2000, GZA measured depths to product and depth to groundwater in the wellpoints at the site. LNAPL was encountered in five of the nine wellpoints at thicknesses ranging from 0.16 to 0.56 foot. GZA purged a total of approximately 61 ounces of product from the wellpoints using a peristaltic pump. The product was pumped into a 5-gallon steel pail and left on site.

On June 8, 2000, GZA surveyed the elevations of the new monitoring wells to the datum used for previous surveys at the site, and measured groundwater elevations and product thickness. Product thickness measurements are summarized in Table 2 and groundwater elevation data are summarized in Table 4. Information developed during this study and during GZA's previous work at the Raffi & Swanson site indicates that a groundwater divide is located in the vicinity of the tank farm. Groundwater to the east of this divide flows in an easterly or northeasterly direction toward a wet area to the north of the site buildings, while groundwater to the west of the divide flows toward the unnamed drainage ditches to the west of the site. Floating product was detected in several wells at the eastern side of the tank farm, at thicknesses ranging from 0.07 to 0.94 feet.

During recent groundwater sampling rounds at the Raffi & Swanson site, GZA has periodically observed elevated concentrations of toluene in monitoring wells GZ-6 and GZ-11; these wells are located to the west and southwest of the tank farm area. Although floating product appears to be confined to the eastern portion of the tank farm area, the apparent presence of a groundwater divide beneath the tank farm area suggested that groundwater from beneath a portion of the tank farm could flow in a generally westerly direction. However, GZA was unable to install wells in the hand-augered borings to the west of the tank farm because the depth to groundwater in this area was too great.

To further evaluate groundwater quality between the tank farm and wells GZ-6 and GZ-11, on September 7, 2000, GZA Drilling, Inc. of Brockton, Massachusetts installed two additional monitoring wells, GZ-200 and GZ-201, in this area. The wells were installed using hollow stem auger techniques and no drilling fluids were used. Split-spoon soil samples were collected at 5-foot intervals during the drilling process and screened for VOCs using a MiniRAE Model PGM-75 PID equipped with a 10.6-eV bulb. Elevated concentrations of VOCs were not detected in samples from boring GZ-201 or from the upper sample (0-2 feet below ground surface) at boring GZ-200, but elevated VOC levels were encountered in the deeper samples from GZ-200. A strong toluene-like odor was noted in sample S-2 from boring GZ-200, collected at a depth of 5 to 7 feet below ground surface. PID screening results for borings GZ-200 and GZ-201 are presented on the boring logs in Appendix E.

On September 13, 2000, GZA surveyed the elevations of newly installed monitoring wells GZ-200 and GZ-201, measured groundwater elevations and product thicknesses, and collected groundwater samples from the new monitoring wells. Product thickness measurements are summarized on Table 2 and groundwater elevation data are summarized on Table 4. No floating product was encountered in either of the new monitoring wells; however, product thicknesses had increased in some of the monitoring wells on the east side of the tank farm since GZA's previous monitoring round.

Groundwater samples from the new monitoring wells were analyzed for VOCs using EPA Method 8260. Results are summarized on Table 3; laboratory data reports are attached in Appendix D. An elevated concentration of toluene (200 ppm) was encountered in sample GZ-200, but only low concentrations of VOCs (less than 0.15 ppm total VOCs) were detected in the sample from GZ-201. Results of the groundwater elevation measurements and chemical analyses of groundwater samples indicates that the tank farm area may be the source of the elevated concentrations of VOCs recently observed in groundwater samples from GZ-6 and GZ-11.

In January 2001, GZA collected groundwater samples from the tank farm area as part of a site-wide sampling round; results of analyses of these samples for VOCs are summarized in Table 3. Elevated concentrations of toluene were detected in several samples; at GZ-114 and GZ-117 the toluene concentration exceeded the UCL for toluene in groundwater. The concentration of toluene in the sample from GZ-200 decreased from September 2000 to January 2001. A low concentration of toluene (1.7 ppb) was measured in the sample collected from GZ-201 in January 2001; this concentration is similar to that measured in September 2000.

Raffi & Swanson personnel have periodically measured floating product thicknesses and bailed free product from the wells, as summarized in Table 2. Product thickness has been observed to increase substantially after significant precipitation, and to decrease to generally less than one inch within a few days; the most significant volumes of product have been collected immediately following heavy rain.

(c) all investigatory and monitoring data obtained during the implementation of the Immediate Response Action

All relevant investigatory and monitoring data are summarized in the attached tables and discussed in this IRA Completion Report.

(d) a succinct statement on the findings and conclusions of the Immediate Response Action

Work conducted as part of the IRA has indicated that separate-phase toluene is present in and to the east of the tank farm area. The probable source of the release was one or more spills or leaks from a former AST in the tank farm. Based on measurements made since the discovery of the LNAPL in the spring of 2000, it does not appear that the LNAPL has migrated a significant distance since its discovery.

Groundwater gradients are relatively flat in the area of the tank farm; however, measurements GZA has collected to date, and our interpretation of regional groundwater flow, suggest the tank farm is located on or near a groundwater divide. Although dissolved toluene has been detected to the southwest of the tank farm, separate phase product has not been encountered in this area.

The thickness of floating product in the monitoring wells has been observed to be greatest following heavy rain, when a foot or more of product has been observed. The most significant recovery of floating product has occurred during these times. Between rain events, product thickness generally decreases to less than one inch.

(e) details and documentation on the management of any Remediation Waste, Remedial Wastewater, and/or Remedial Additives managed at the Site as part of the Immediate Response Action

LNAPL recovered from the monitoring wells, and groundwater incidentally recovered with the LNAPL, has been accumulated in a 55-gallon drum at the site. Approximately 18 gallons of product had been recovered as of March 21, 2001. Significant additional product was recovered following the unusually heavy rain of March 22, 2001. The waste will be managed by Raffi & Swanson/Surface Coatings as part of its routine handling of waste solvent.

No Remedial Additives have been used at the site.

(f) a description of any on-going activities related to the Immediate Response Action that will be conducted at the site, including monitoring activities, security measures, and the maintenance of fences, caps and other passive systems

Periodic product gauging and recovery will be performed in association with the ongoing Phase II investigations at the Site. In addition, GZA and Raffi & Swanson plan to install additional monitoring wells to the east and northeast of the tank farm area to evaluate the extent of dissolved toluene in groundwater in that portion of the site, because elevated concentrations of dissolved toluene have been detected in monitoring wells GZ-100 and GZ-114 to the north and east of the area of floating product. Proposed boring locations are shown on the sketch in Appendix F.

The IRA is considered complete pursuant to 310 CMR 40.0427(1) because it appears that conditions at the site are stabilized; significant migration of the separate-phase product has not been observed. The toluene release has not resulted in any identified Imminent Hazard or Critical Exposure Pathway. Response actions at the remainder of the site are ongoing; additional response actions related to the toluene release will be undertaken as part of the ongoing work.

TABLE 1
RESULTS OF ANALYSES OF SOIL SAMPLES

File No. 11268.77
04/13/2001

Sample Number	PID Field Screening Result (ppmv)	Toluene Concentration (ppm)
GZ-100, S-1	1,241	**1,200**
GZ-100, S-2	>2,500	NA
GZ-101, S-1	612	**16,000**
GZ-101, S-2	1,894	NA
GZ-102	>2,500	NA
GZ-103	>2,500	**12,000**
GZ-104	1,638	**12,000**
GZ-105	211	NA
GZ-106	77	**280**
GZ-107	99	40
GZ-108	>2,500	NA
GZ-109	143	0.110
GZ-110	71	0.380
GZ-111	40	NA
GZ-112	1,883	NA
GZ-113	>2,500	NA
GZ-114	1,724	**910**
GZ-115	2,097	**55,000**
GZ-116	1,240	**28,000**
GZ-117	2,103	**43,000**
GZ-118	86	**6,700**
GZ-119	154	**2,500**
GZ-120	1,840	**5,500**
GZ-121	1,651	**1,200**
MCP Method 1 Standards		
S-1/GW-1	NS	90
S-1/GW-2	NS	500
S-1/GW-3	NS	500
S-2/GW-1	NS	90
S-2/GW-2	NS	500
S-2/GW-3	NS	1,000
S-3/GW-1	NS	90
S-3/GW-2	NS	500
S-3/GW-3	NS	2,500
Upper Concentration Limit	NS	10,000

:es:
Samples collected May 2, 2000 by GZA personnel. Samples analyzed by GZA's Environmental Chemistry Laboratory in Newton, Massachusetts using EPA Method 8021.
Only detected compounds are listed. NA indicates not analyzed. Refer to laboratory report for a complete list list of compounds analyzed and individual detection limits.
MCP Method 1 Standards from the Massachusetts Contingency Plan, 310 CMR 40.0975(6)(c) Tables 2, 3, and 4.
Numbers in boldface type exceed at least one MCP Method 1 standard. NS indicates no standard available.
1268.ZRA\11268-77.SRH\[ZRA77T03.XLS]Sheet1

FIGURES

Table 2
Product Thickness and Product Recovery Data

ate	Measured By	Thickness of Product (feet)								Volume Recovered (ounces)	Notes
		GZ-108	GZ-110	GZ-112	GZ-113	GZ-114	GZ-115	GZ-116	GZ-117		
2/2000	GZA	0.66	0	0.07	0.81	0	0.99	0	0.4	0	
3/2000	GZA	0.24	0	0.16	0.54	0	0.56	0	0.54	61	
5/2000	R&S									12	
1/2000	R&S									6	
9/2000	R&S									34	
8/2000	R&S									16	
5/2000	R&S									12	
9/2000	R&S									64	
5/2000	R&S									64	
8/2000	R&S									96	
1/2000	R&S									64	
3/2000	GZA	2.22	0	1.52	1.33	0	0	0.12	0.87	0	
9/2000	R&S									32	
2/2000	R&S									16	
5/2000	R&S									64	
)3/2000	R&S									96	
23/2000	R&S					0	0.17	0.21		2	
27/2000	R&S					0	*	0.21		10	
)1/2000	R&S					0	*	*		96	
)6/2000	R&S					0	*	*		96	
13/2000	R&S	*		*	*		0			132	1
20/2000	R&S	0		0	0		0			0	
22/2000	R&S	0		0	0		0			0	
28/2000	R&S	*		0	0		0			64	
29/2000	R&S	*		*	0.17		*			128	
30/2000	R&S	*		*	*		*			64	
01/2000	R&S	*		*	0.33		*			36	
04/2000	R&S	0.25		0.17	0.0		0.33			8	
06/2000	R&S	0		0.17	0		0.17			4	
07/2000	R&S	0		*	0		0			4	
13/2000	R&S	0.17		0.17	0		0			4	
15/2000	R&S	0.25		0.17	0		0			5	
18/2000	R&S	*		0	0		0			160	2
19/2000	R&S	*		*	0.0		0.0			256	
/27/2000	R&S	0.17		*	0		0			24	
/29/2000	R&S	0		0	0		0.5			8	
/03/2001	R&S	0		0	0		0			0	
/03/2001	GZA	0.05	0	0.06	0.04	0	0	0.01	0	0	
/08/2001	R&S	0		0.17	0		0			2	
/16/2001	R&S	0		0	0		0			0	
/03/2001	R&S	0.33		0	0		0.17			6	
/20/2001	R&S	*		*	0		0			363	
/21/2001	R&S	*		0.42	1.33		0			217	
)TAL PRODUCT RECOVERED											
(ounces)										**2326**	
(gallons)										**18.2**	

APPENDIX A

APPENDIX B

APPENDIX C

FIGURES

Table 2
Product Thickness and Product Recovery Data

ıtes: 1. Well dry (damaged?).
2. After 2" rain.
3. Blank space indicates no product thickness measurement made.
4. Asterisk (*) indicates cumulative thickness of product was measured during bailing of well but initial thickness was not recorded.

11268.ZRA\11268-77.SRH\CORRESPZRA77T0A.XLS

FIGURES

TABLE 3
RESULTS OF ANALYSES OF GROUNDWATER SAMPLES
(results in parts per billion, ppb)

	Sample Number																	
	GZ-100	GZ-101	GZ-102	GZ-103	GZ-104	GZ-105	GZ-106	GZ-107	GZ-109	GZ-110	GZ-110	GZ-111	GZ-114	GZ-116	GZ-117	GZ-120	GZ-200	
	5/2/00	5/2/00	5/2/00	5/2/00	5/2/00	5/2/00	5/2/00	5/2/00	5/2/00	5/2/00	1/5/01	5/2/00	1/4/01	5/2/00	1/5/01	5/2/00	9/13/00	1/4/01
Compound	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	8260	GC	8260	GC	8260	GC	8260	8260
1,1-DCA	-	**15**	-	-	-	-	-	-	-	-	-	-	-	-	-	130	-	-
1,1,1-TCA	-	48	-	-	**280**	10	-	-	-	-	-	-	-	29	-	29	-	-
Benzene	**19**	**33**	***69***	**48**	***170***	-	-	-	-	-	-	-	-	**130**	-	***130***	-	-
Toluene	**50,000***	**40,000***	**40,000***	**32,000***	**35,000***	**18,000***	**20,000***	**3,200**	980	**1,100**	**20,000**	670	**230,000**	**32,000***	**630,000**	**32,000***	**200,000**	**52,000**
PCE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	7.2	22	180	33	**1,100**	**1,100**	160	6.5	-	10	**1,700**	-	350	310	**1,400**	310	-	-
m&p-Xylene	10	28	570	75	2,800	2,700	410	22	7.6	40	**8,500**	-	900	740	**5,600**	740	-	450
o-Xylene	-	-	130	16	650	630	110	-	-	9.9	**1,800**	-	-	180	**1,500**	180	-	-

Notes:

1. Samples listed as "GC" were screened by GZA's Environmental Chemistry Laboratory, Newton, Massachusetts, using gas chromatography. Samples listed as "8260" were analyzed by GZA's ECL using EPA Method 8260.
2. 1,1-DCA indicates 1,1-dichloroethane; 1,1,1-TCA indicates 1,1,1-trichloroethane; PCE indicates tetrachloroethene.
3. Only detected compounds are listed. Dashes (-) indicate none detected. Refer to laboratory report for a complete list of compounds analyzed and individual detection limits.
4. Reported results in excess of 10,000 ppb (as indicated by *) are beyond the linear range of calibration of the instrument and indicate order of magnitude only.
5. MCP Method 1 Standards from the Massachusetts Contingency Plan, 310 CMR 40.0974(2) (Table 1). Numbers in bold exceed at least one Method 1 standard.
5. UCLs indicate MCP Upper Concentration Limits, from 310 CMR 40.0996(7), Table 6.

C:\WINDOWS\Personal\[Zraairt]Sheet1

100 Eames.

RESULTS OF SAMPLING AND ANALYSIS
RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MASSACHUSETTS

3-20186

PREPARED FOR:
Raffi & Swanson, Inc.
Wilmington, Massachusetts

PREPARED BY:
GZA GeoEnvironmental, Inc.
Newton, Massachusetts

March 2001
File No. 11268.80

1.00 INTRODUCTION

In accordance with our proposal dated December 1, 2000, on January 3-8, 2001, GZA GeoEnvironmental, Inc. (GZA) completed another groundwater and surface water sampling round at Raffi & Swanson's Wilmington property (Figure 1). The objectives of the sampling round were:

- to monitor fluctuations in the concentrations of volatile organic compounds (VOCs) in groundwater and surface water at the Site;
- to gather preliminary information on groundwater quality across the drainage ditches to the west of the site; and
- to provide additional information on groundwater flow directions and on the extent and possible sources of the VOCs which have been detected in groundwater at the site.

GZA's work is subject to the limitations in Appendix A.

2.00 BACKGROUND

Raffi & Swanson is a manufacturer of industrial inks and other coating materials. The property is located in the southern portion of Wilmington, to the north of Eames Street and to the east of Boston and Maine railroad tracks and a sewer easement. Drainage ditches which flow to the south and ultimately join and flow into Halls Brook, a tributary of the Aberjona River, are located on either side of the railroad tracks. A locus plan is provided on Figure 1, and a site plan is attached as Figure 2. Commercial and industrial properties are to the west of the railroad tracks and to the south across Eames Street; residential property is to the north and east.

The Raffi & Swanson property occupies approximately 25 acres of land, of which approximately 10 acres are developed. Manufacturing operations that involve the use of solvents, primarily toluene, are conducted in the western portion of the property. Manufacturing operations involving the use of water-based materials are conducted to the east of the solvent-based manufacturing areas. A tank farm for the storage of raw materials is located within each of the two manufacturing areas. The facility is served by municipal water and sewer services. The buildings were formerly heated by fuel oil stored in underground storage tanks (USTs) but are now heated by natural gas.

In the early 1980s, the United States Environmental Protection Agency (EPA) identified the Raffi & Swanson property as a source of VOCs detected in the drainage ditches to the west of the site; other identified sources included the former Stepan Chemical (Olin) property to the southwest of Raffi & Swanson, and the Whitney Barrel property located to the south of Raffi & Swanson near the Woburn/Wilmington town line. EPA initially provided regulatory oversight of the Raffi & Swanson site. The Massachusetts Department of Environmental Quality Engineering (DEQE, now the Massachusetts Department of Environmental Protection or DEP), subsequently assumed the primary oversight role at the site, and work at the site is subject to the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000).

GZA has been monitoring groundwater quality at the Raffi & Swanson site for a number of years as part of ongoing response actions related to the presence of VOCs, primarily toluene, in groundwater, soil, and surface water at the site. Areas of VOC contamination of soil and/or groundwater on the Raffi & Swanson property identified during GZA's initial studies at the site included the area downgradient of Buildings 5 and 6, and the area around a former still to the north of Building 10. In both of these areas, toluene was the primary compound detected; other significant constituents included xylenes and ketones. The source of the VOCs in the former still area was identified as "poor housekeeping," most likely spillage during container-handling operations in this area. Former underground solvent transfer pipes, a sewer line, an area between the buildings where drums had been stored, and a loading dock area upgradient of the buildings were evaluated as possible sources, but the source of the VOCs in the area of Buildings 5 and 6 was not positively identified.

In 1986, a release of toluene occurred in Building 8. Although recovery efforts were initiated immediately after the spill, separate-phase toluene was subsequently detected downgradient of Building 8. A recovery system was installed and operated until recoverable product was no longer present. In 2000, separate-phase toluene was detected at a tank farm to the north of Building 9. Chlorinated VOCs detected upgradient of Raffi & Swanson's buildings and operating areas are believed to be from an off-site source.

In October 2000, the DEP issued a Notice of Audit Findings (NOAF) for the site. The NOAF required the completion of additional field work including: measurement of groundwater and surface water elevations; the collection and analysis of groundwater samples from monitoring wells which have not been sampled recently and from locations across the drainage ditch; and sampling and analysis of surface water from additional locations in the ditches. On November 17, 2000, Raffi & Swanson, GZA, and DEP personnel met to discuss the scope of additional work in more detail. Following this meeting, GZA prepared a list of proposed sampling locations at the Raffi & Swanson site, which was provided to DEP for review. DEP personnel requested some additions to the proposed sampling; Raffi & Swanson and GZA agreed to these changes. A list of groundwater monitoring wells at the Raffi & Swanson site, showing whether they were proposed for sampling and the rationale for including or not including them in the sampling round, is presented on Table 1.

One of DEP's requirements for additional study was to gather information concerning groundwater quality on western side of the drainage ditch located to the west of the Raffi &

Swanson site, and to further evaluate groundwater flow patterns in this area. Two properties are located across the ditch from Raffi & Swanson: United Tool & Die, Inc. occupies the area to the west of the southern portion of the Raffi & Swanson site; and Glen Falls Cement Company (Glen Falls) occupies property to the west of the northern portion of the Raffi & Swanson site, to the north and west of United Tool & Die.

Raffi & Swanson is negotiating with Glen Falls for permission to install monitoring wells on the Glen Falls property, and has provided information requested by Glen Falls. However, to date, an agreement has not been finalized, and no sampling points on the Glen Falls property were included in the January 2001 sampling round.

United Tool & Die has installed several monitoring wells on its property as part of environmental evaluations of that site. United Tool & Die agreed to allow Raffi & Swanson access to its monitoring wells in return for Raffi & Swanson's engaging a surveyor to measure wellhead elevations to a common datum on the two sites so that a groundwater contour plan of both properties can be prepared. The January 2001 sampling round included the collection of groundwater samples from two monitoring wells on the United Tool & Die property.

In summary, areas identified for evaluation during the January 2001 sampling round included:

- the upgradient portion of the Raffi & Swanson site, which has apparently been affected by an off-site release of chlorinated VOCs;
- the area downgradient of Buildings 5 and 6, where toluene and other VOCs have been detected in groundwater but not in unsaturated soil, and where chlorinated VOCs, apparently related to the off-site source noted above, have been detected at depth in the overburden;
- the area downgradient of Building 8, which was the site of a toluene release in 1986;
- the area around a former still in the northwestern portion of the Raffi & Swanson property;
- the area around a tank farm where a release of toluene was discovered in 2000;
- the drainage ditches; and
- the United Tool & Die property.

3.00 FIELD ACTIVITIES

Field activities included the surveying of wellhead elevations, the measurement of groundwater levels and product thickness, and the collection and analysis of groundwater and surface water samples.

3.10 ELEVATION SURVEY AND DEPTH TO GROUNDWATER MEASUREMENTS

Depth to groundwater measurements were obtained on January 3, 2001, and the well elevations and depth to water measurements were used to derive groundwater elevations and groundwater flow direction. GZA attempted to locate and measure the depth to groundwater at each monitoring well that had been installed at the two sites. However, due to extensive snow and ice at the Raffi & Swanson and United Tool & Die properties, a number of monitoring wells could not be located. On subsequent days of the sampling round, GZA returned with a metal detector to search for wells which could not be found but was still unable to gain access to all of the wells originally proposed for sampling and water level measurement. An additional round of groundwater elevation measurements will be conducted when the snow and ice have melted.

GZA installed stakes at three locations in each drainage ditch and measured the elevation of the surface water in the ditch relative to the stakes.

At several of the monitoring wells recently installed in the tank farm area to the north of Building 9, floating (separate phase) product, previously identified as toluene, was encountered. The depth to product and the depth to water were measured using an oil/water interface probe. Product thickness ranged from 0.01 to 0.06 foot; the measured thickness of product has decreased significantly since the previous sampling round in September and is consistent with recent measurements by Raffi & Swanson personnel. Groundwater elevations and product thickness measurements are summarized in Table 2.

On January 31, 2001, Marchionda & Associates (Marchionda) of Stoneham, Massachusetts, surveyed the elevations of accessible monitoring wells at the United Tool & Die site relative to the same datum (NGVD) used at the Raffi & Swanson site. Marchionda also surveyed the elevations of the stakes in the drainage ditches. Results of the survey have not been received to date from Marchionda; when the new data are received, a groundwater elevation plan showing both sites will be prepared.

3.20 GROUNDWATER AND SURFACE WATER SAMPLE COLLECTION AND ANALYSIS

On January 4-8, 2001, GZA personnel collected water samples from 17 groundwater monitoring wells (GZ-1, GZ-2, GZ-5, GZ-6, GZ-7, GZ-8R, GZ-11, GZ-13, GZ-26, GZ-29, GZ-30, GZ-31, GZ-110, GZ-114, GZ-117, GZ-200, and GZ-201) on the Raffi & Swanson property and from two monitoring wells (MW-3 and MW-3D) located in the northeastern portion of the United Tool & Die property. The two wells sampled at United Tool & Die are those closest to the identified sources of VOCs on the Raffi & Swanson property. GZA also collected surface water samples from four locations along the drainage ditches that flow in a southerly direction near Raffi & Swanson's western property line. Sampling locations on the Raffi & Swanson property are shown on Figure 2, and well locations on the United Tool & Die property are shown on the plan in Appendix B.

Groundwater samples were obtained from monitoring wells on the Raffi & Swanson site using dedicated tubing and a Waterra® foot-valve. Three times the initial standing volume of groundwater in each well was evacuated to remove stagnant water, and the well was allowed to recharge prior to sample collection. At the request of United Tool & Die, low-flow sampling techniques were used to sample the wells at that site. No evidence of measurable floating (separate phase) product was observed in any of the wells from which samples were collected. Floating product was detected only in four monitoring wells (GZ-108, GZ-112, GZ-113, and GZ-116) adjacent to the tank farm.

Surface water samples were collected from the east and west drainage ditches upstream of the Raffi & Swanson facility (DD-3 and DD-3W) and from adjacent to Eames Street (DD-1 and DD-1W). The sampling location designated DD-1 in the January 2001 sampling round corresponds to the location identified as SW-1E in earlier sampling rounds. GZA attempted to collect surface water samples from the area adjacent to Building 10, believed likely to contain the highest concentration of VOCs (due to its proximity to identified source areas at the Raffi & Swanson site); however, the water was frozen.

The samples were collected in 40-ml septum-capped vials preserved with hydrochloric acid. The sample containers were chilled and transported to GZA's Environmental Chemistry Laboratory in Hopkinton, Massachusetts, for analysis for VOCs by EPA Method 8260.

4.00 RESULTS OF VOC ANALYSES

The results of GZA's analyses of groundwater and surface water samples are attached as Appendix C and summarized in Table 3. Summary tables showing the results of VOC analyses conducted at stations GZ-1, GZ-2, GZ-5, GZ-8R, GZ-31, GZ-32, and SW-1E since the start of GZA's monitoring program at the site are attached as Appendix D for purposes of comparison. In addition, plots showing the concentrations of individual compounds over time at selected wells are included in Appendix E.

4.10 BUILDINGS 5 AND 6

VOCs were present in all of the groundwater samples collected from the vicinity of Buildings 5 and 6 (shallow monitoring wells GZ-1, GZ-2, GZ-13, GZ-29, and GZ-30; deep monitoring well GZ-32 could not be located due to ice and snow cover). Toluene was the predominant component in the samples from wells GZ-1, GZ-2, and GZ-13 (at concentrations of 210, 8,500, and 710 parts per billion [ppb], respectively). The drinking water standard for toluene (1,000 ppb) was exceeded in the shallow groundwater sample from GZ-2. The drinking water standard for ethylbenzene (700 ppb) was also exceeded at GZ-2 (1,300 ppb). Xylenes were a significant component of the VOCs detected in the shallow wells, but xylene concentrations did not exceed drinking water standards. Other detected compounds included chloroethane (detected in sample GZ-13 at a concentration of 89 ppb), 1,1,1-trichloroethane (detected in samples GZ-1, GZ-29 and GZ-30 at concentrations ranging from 2.9 to 10 ppb), and 1,2,4-trimethylbenzene, detected in sample GZ-1 at a concentration of 2.7 ppb. Plots of toluene, xylene, methyl ethyl ketone, methyl isobutyl ketone, and 1,1,1-trichloroethane (TCA) concentrations over time at monitoring well GZ-1 are included in Appendix E.

Monitoring well GZ-32 was under ice and snow and could not be located. In recent sampling rounds, only chlorinated VOCs, predominantly TCA, were detected in the sample from GZ-32. Other chlorinated VOCs which have been detected in samples from GZ-32 include 1,1-dichloroethene, DCA, and trichloroethene (TCE). Plots of toluene, TCA, and DCA concentrations over time at monitoring well GZ-32 are included in Appendix E.

The source of the toluene in shallow wells near Buildings 5 and 6 has not been positively identified, although several potential sources including former underground solvent transfer lines, a sewer line, an area between the buildings which was formerly used for drum storage, and the loading dock area upgradient of the buildings have been identified and evaluated. Elevated concentrations of VOCs have not been detected in soil samples from above the water table in this area. The source of the chlorinated VOCs, which have been detected at greater concentrations at depth (GZ-32) than in shallow monitoring wells in previous sampling rounds, appears to be from off site, as discussed further in the following section.

4.20 UPGRADIENT AREA

As described in more detail in GZA's February 2000 report (GZA File Number 11268.76), monitoring wells GZ-18R/19R, GZ-22R, and GZ-23R were installed in January 2000 to further evaluate the possibility that the chlorinated VOCs detected at GZ-32 were from an off-site source. Chlorinated VOCs had historically been detected in samples from monitoring wells GZ-18 and GZ-19, both of which were located upgradient of Raffi & Swanson's office building (Building 11) and upgradient of storage and production areas at the site. Monitoring wells GZ-18 and GZ-19 had not been located for several years, and apparently had been destroyed. Monitoring well GZ-18R/19R was installed between these two well locations, and GZ-22R and GZ-23R were installed between GZ-18R/19R and GZ-32. All of the borings were advanced to refusal and the monitoring wells were screened in the lower portion of the overburden. Chlorinated VOCs were detected in samples from these wells, and groundwater elevation measurements indicated that they were upgradient of GZ-32; this information indicated to GZA that the source of the chlorinated VOCs at GZ-32 was from an upgradient, off-site location.

In the January 2001 sampling round, wells GZ-18R/19R, GZ-22R, and GZ-32 could not be located due to extensive snow and ice. Monitoring well GZ-23R was located and sampled; TCA was the predominant VOC detected, at a concentration of 99 ppb. Other chlorinated VOCs detected included 1,1-dichloroethene, 1,1-dichloroethane, and TCE, at individual concentrations ranging from 1.2 to 7.3 ppb. Methyl-tert-butyl ether (MTBE) was also detected at a concentration of 2.0 ppb; no other VOCs were detected. The VOCs detected in 2001 are the same as those detected in 2000, and the concentrations measured in the January 2001 sampling round are similar to those measured in January 2000. Although most of the wells relevant to the evaluation of an off-site source of chlorinated VOCs could not be sampled in January 2001, the available information is consistent with GZA's earlier interpretation of the source of these compounds.

4.30 BUILDING 8 (LOCATION OF 1986 SOLVENT RELEASE)

As part of the current monitoring round, groundwater samples were collected from well GZ-8R, a shallow monitoring well located downgradient of Building 8 where a solvent release had occurred in 1986, and from monitoring wells GZ-6 and GZ-11, which are located generally downgradient of GZ-8R on the west side of Building 10. Because significant fluctuations in toluene concentrations have been observed in groundwater samples from monitoring wells GZ-6 and GZ-11 during recent sampling rounds, it is GZA's opinion that in recent years these wells may have been more affected by the toluene release at the tank farm than by the 1986 release.

The total concentration of VOCs detected in groundwater from monitoring well GZ-8R was 42.5 ppb, with toluene the most significant constituent at a concentration of 30 ppb. Other VOCs detected in this sample include TCA, m&p-xylene, and o-xylene. The VOC concentrations measured in January 2001 are significantly lower than the VOC concentration of 4,086 ppb, including 3,000 ppb of toluene detected in a sample collected from well GZ-8R in June 2000.

In GZ-6, toluene was detected at a concentration of 1,700 ppb. This is a marked increase from the June 2000 sampling round, when toluene was detected at a concentration of 86 ppb, but is still significantly lower than the concentration of 18,000 ppb measured in January 2000 sampling round. The concentration of toluene in groundwater from GZ-6 has fluctuated significantly during the last three years, ranging from a high of 42,000 ppb in February 1998 to the low value of 4.2 ppb measured in October 1999. Well GZ-6 was sampled only infrequently prior to 1998, but had not shown elevated concentrations of VOCs in early sampling rounds. A plot of toluene concentrations over time in well GZ-6 is included in Appendix E. No other VOCs were detected in GZ-6, and only low concentrations of VOCs (1.4 ppb toluene and 1.1 ppb m & p-xylenes) were detected in the sample from GZ-11.

4.40 TANK FARM AREA

Groundwater samples were collected from monitoring wells GZ-110, GZ-114, and GZ-117 located to the east of the tank farm area, and from wells GZ-200 and GZ-201 located to the southwest and south, respectively, of the tank farm. As previously noted, floating product was encountered in samples GZ-108, GZ-12, GZ-113, and GZ-116; groundwater samples were not collected from these wells.

The concentrations of toluene in samples GZ-110, GZ-114, and GZ-117 ranged from 20,000 to 620,000 ppb. Ethylbenzene and xylenes were detected at concentrations ranging from 350 to 1,700 ppb (ethylbenzene) and 900 to 10,300 ppb (total xylenes). Toluene and m&p xylenes were detected in the sample from GZ-200 at concentrations of 52,000 and 450 ppb,

TABLES

respectively; no other VOCs were detected in this sample. Toluene, tetrachloroethene (PCE), and TCA were detected in the sample from GZ-201 at individual concentrations ranging from 1.7 to 2.4 ppb.

The available groundwater elevation and toluene distribution data suggest that the tank farm is located on a groundwater divide, and that the toluene contamination has migrated to both the southwest and east of the tank farm.

4.50 FORMER STILL AREA

Shallow wells GZ-5, GZ-7, and GZ-26, and monitoring well GZ-31, which is screened in the lower portion of the overburden, were sampled in the former still area. Well GZ-12 was dry; apparently, the well has been damaged. Wells GZ-24, GZ-25, GZ-27, and GZ-28 could not be located; not all of these wells had been proposed for sampling.

Toluene was detected in the sample from GZ-7 at a concentration of 1.3 ppb; no other VOCs were detected in this sample. Similar concentrations of toluene and several chlorinated VOCs were detected in the samples from GZ-5 and GZ-26. The VOCs detected in the sample from GZ-5 were at concentrations below the drinking water standards for those compounds, as has been the case at this location for the past several years. The concentrations of TCE (9.4 ppb) and PCE (43 ppb) in the sample from GZ-26 exceeded the drinking water standard of 5 ppb for each of these compounds.

The source of the chlorinated compounds detected in the former still area and in the tank farm area is not known; it is GZA's opinion that it may be a separate source from the one impacting the southern portion of the Raffi & Swanson property. Given that higher concentrations were detected in GZ-26 than in GZ-5, and that chlorinated VOCs were detected at higher concentrations in GZA's earlier sampling round at the tank farm, it is GZA's opinion that the source of the chlorinated VOCs is closer to the tank farm than to the former still area.

4.60 MONITORING WELLS AT UNITED TOOL & DIE

Chlorinated VOCs (1,1-dichloroethane, TCA, and TCE) were detected in groundwater from both of the monitoring wells on the United Tool & Die property, at individual concentrations ranging from 1.3 to 2.9 ppb. In addition, MTBE was detected in both samples; the MTBE concentration was higher in the shallow sample than in the deep sample. No toluene, ethylbenzene, or xylenes were detected in either sample. The compounds detected in the monitoring wells at United Tool & Die are the same compounds detected in the monitoring wells upgradient of Raffi & Swanson's production facilities; however, until wellhead elevation data for the United Tool & Die wells are received, the possible hydrogeologic connection between these two areas cannot be reliably evaluated.

4.70 SURFACE WATER

No VOCs were detected in either of the upstream samples (DD-3 and DD-3W). VOCs were detected in both of the downstream samples, with a higher total concentration of VOCs detected in the eastern ditch (242 ppb) than in the western ditch (48.1 ppb). The total VOC concentration at location DD-1/SW-1E was slightly lower than the 296 ppb detected at this location in June 2000. The highest individual VOC concentration was 110 ppb of toluene; this concentration is lower than the 200 ppb detected in June 2000 and the 290 ppb detected in January 2000. Other detected compounds include chloroethane, 1,1-dichloroethene, TCA, ethylbenzene, m&p-xylenes, and o-xylene. No PCE or TCE, which had been detected in some of the groundwater samples, was found in the surface water samples. VOCs in the surface water are typically similar to those detected in groundwater at the Site; however, as would be expected, the surface water exhibits greater seasonal fluctuations in VOC concentrations.

5.00 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

GZA has measured groundwater and surface water elevations and collected groundwater and surface water samples from accessible locations on the Raffi & Swanson and United Tool & Die properties. Groundwater samples were analyzed for volatile organic compounds (VOCs) using EPA Method 8260. Monitoring results were generally consistent with previous findings at the site, as summarized below:

- VOCs are not present in the surface water in the drainage ditches at locations upgradient/upstream of the Raffi & Swanson property, but are present in surface water from the ditches downgradient/downstream of the Raffi & Swanson property. The VOCs detected in the drainage ditches are generally consistent with those found in groundwater on the Raffi & Swanson site, indicating discharge of groundwater from Raffi & Swanson to the ditches.

- There appears to be an upgradient, off-site source of the chlorinated VOCs detected at depth in the overburden in the vicinity of Buildings 5 and 6. The potential relationship between the chlorinated VOCs on the Raffi & Swanson site near Buildings 5 and 6 and those detected on the United Tool & Die property will be further evaluated upon receipt of groundwater elevation data (wellhead elevation survey data) for the United Tool & Die site. There appears to have been a separate source of chlorinated VOCs in the vicinity of the tank farm; chlorinated VOCs have been present as minor constituents of the total concentration of VOCs in this area for a number of years.

- VOC concentrations in the immediate vicinity of the former still are within drinking water standards. Two chlorinated VOCs exceeded drinking water standards in a sample from monitoring well GZ-26, located between the former still and the tank farm. VOCs were not present in the sample from the deep overburden well in this area; this is consistent with past results.

- The tank farm to the north of Building 9 appears to be located on a groundwater divide. Although separate-phase toluene released from this tank farm has been detected only within and to the east of the tank farm, elevated concentrations of dissolved toluene are present both to the east and the southwest of the tank farm.

- The measured thickness of separate-phase toluene has decreased since GZA's last sampling round in September 2000; this is consistent with a number of measurements made by Raffi & Swanson personnel during manual gauging and bailing of wells in the release area.

GZA recommends an additional round of water level measurements in the spring, when the ice and snow have melted, to allow better delineation of groundwater flow directions in the vicinity of the Raffi & Swanson site. Those locations that were planned for sampling in January but were inaccessible due to snow or ice should be sampled during the next sampling round. In addition, key monitoring wells indicative of conditions in each source area should be sampled during the next monitoring round; GZA will prepare more specific recommendations concerning wells to be sampled following receipt of groundwater elevation information.

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TABLES

TABLE 3

RESULTS OF ANALYSES OF GROUNDWATER AND SURFACE WATER SAMPLES

(results in parts per billion, ppb)

File No. 11268.76
3/15/01

	Groundwater													
	Up-gradient	Buildings 5 and 6					Building 8			Tank Farm Area				
Compound	GZ-23R	GZ-1	GZ-2	GZ-13	GZ-29	GZ-30	GZ-6	GZ-11	GZ-8R	GZ-110	GZ-114	GZ-117	GZ-200	GZ-201
Chloroethane	-	-	-	89	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl-t-Butyl-Ether	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	99	7.8	-	-	2.9	10	-	-	6.8	-	-	-	-	2.4
Trichloroethene	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	-	210	8,500	710	-	-	1,700	1.4	30	20,000	230,000	630,000	52,000	1.7
Tetrachloroethene	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0
Ethylbenzene	-	2.2	1,300	61	-	-	-	-	-	1,700	350	1,400	-	-
m&p-Xylene	-	19	4,300	250	-	-	-	1.1	3.9	8,500	900	5,600	450	-
o-Xylene	-	9.1	1,400	91	-	-	-	-	1.8	1,800	-	1,500	-	-
1,2,4-Trimethylbenzene	-	2.7	-	-	-	-	-	-	-	-	-	-	-	-

G:\11268.ZRA\11268-80.SRH\CORRESP\[ZRA80T02.XLS]Sheet1

RESULTS OF ANALYSES OF GROUNDWATER AND SURFACE ...

(results in parts per billion, ppb)

Compound	Groundwater						Surface Water			
	Former Still Area				United Tool & Die					
	GZ-5	GZ-7	GZ-26	GZ-31	MW-3	MW-3D	DD-1/ SW-1E	DD-1W	DD-3	DD-3W
Chloroethane	-	-	-	-	-	-	13	2.4	-	-
1,1-Dichloroethene	-	-	-	-	-	-	3.0	1.3	-	-
Methyl-t-Butyl-Ether	-	-	-	-	16	3.8	-	-	-	-
1,1-Dichloroethane	3.8	-	1.1	-	-	2.9	-	-	-	-
cis-1,2-Dichloroethene	7.1	-	-	-	-	-	-	-	-	-
Chloroform	-	-	3.4	-	-	-	-	-	-	-
1,1,1-Trichloroethane	1.2	-	76	-	1.3	1.6	60	28	-	-
Trichloroethene	1.1	-	9.4	-	-	1.6	-	-	-	-
Toluene	-	1.3	1.9	-	-	-	110	15	-	-
Tetrachloroethene	-	-	43	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	4.0	-	-	-
m&p-Xylene	-	-	-	-	-	-	37	1.4	-	-
o-Xylene	-	-	-	-	-	-	15	-	-	-
1,2,4-Trimethylbenzene	-	-	-	-	-	-	-	-	-	-

Notes:

1. Samples collected January 3-8, 2001 by GZA personnel. Analyses by GZA's Environmental Chemistry Laboratory, Hopkinton, MA, using EPA Method 8260.
2. Only detected compounds are listed. Dashes (-) indicate none detected. Refer to laboratory report for a complete list of compounds analyzed and individual detection limits.

G:\11268.ZRA\11268-80.SR1

Table I

Groundwater and Surface Water Sampling Outcome, January 2001, Raffi Swanson

Sampling Location	To Be Sampled? (Y/N)	Rationale	Sampling Outcome, January 2001
Groundwater			
GZ-1	Y	Long-term monitoring point, Bldgs. 5 & 6	Found; sampled
GZ-2	Y	Near Buildings 5 and 6	Found; sampled
GZ-3	N	Upgradient of Bldgs 5 and 6; generally no VOCs	Not found; sampling not planned
GZ-4	N	Well damaged/destroyed	Not found; destroyed; sampling not planned
GZ-5	Y	Long-term monitoring point, former still area	Found; sampled
GZ-6	Y	VOCs detected during recent rounds	Found; sampled
GZ-7	Y	Near still area; has not been sampled recently	Found; sampled
GZ-8	N	Well damaged/destroyed; replaced by GZ-8R	Found; sampled
GZ-8R	Y	VOCs have been detected; adjacent to 1986 spill area	Found; sampled
GZ-9	N	Well damaged/destroyed; GZ-8R nearby for coverage	Not found; destroyed; sampling not planned
GZ-10	N	Well damaged/destroyed; GZ-8R nearby for coverage	Not found; destroyed; sampling not planned
GZ-11	Y	VOCs detected during recent rounds	Found; sampled
GZ-12	Y	In former still area	Found; damaged/dry
GZ-13	Y	Near Buildings 5 and 6	Found; sampled
GZ-14	Y	Near Buildings 5 and 6	Not found (under ice/snow)
GZ-15	N	Upgradient of Bldgs 5 and 6, generally no VOCs	Not found; sampling not planned
GZ-16	N	Well damaged/destroyed; previously clean	Found; measured water level; sampling not planned
GZ-17	N	Well damaged/destroyed; previously clean	Found; could not open; sampling not planned
GZ-18	N	Well damaged/destroyed; replaced by GZ-18/19R	Not found; destroyed; sampling not planned
GZ-19	N	Well damaged/destroyed; replaced by GZ-18/19R	Not found; destroyed; sampling not planned
GZ-18/19R	Y	upgradient well; has contained chlorinated VOCs	Not found (under ice/snow)
GZ-20	N	Well damaged/destroyed; previously clean	Not found; sampling not planned
GZ-21	N	Well damaged/destroyed; previously clean	Not found; sampling not planned
GZ-22	N	Well damaged/destroyed. Shallow well; was clean.	Not found; sampling not planned
GZ-22R	Y	Chlorinated VOCs detected.	Not found (under ice/snow)
GZ-23	N	Well damaged/destroyed. Shallow well; was clean.	Not found; sampling not planned
GZ-23R	Y	Chlorinated VOCs detected.	Found; sampled
GZ-24	Y	In former still area	Not found (under ice/snow)
GZ-25	N	Within 20 ft. of GZ-28	Not found; sampling not planned
GZ-26	Y	In former still area	Found; sampled
GZ-27	N	Within 20 ft. of GZ-28	Not found; sampling not planned
GZ-28	Y	In former still area	Not found (under ice/snow)

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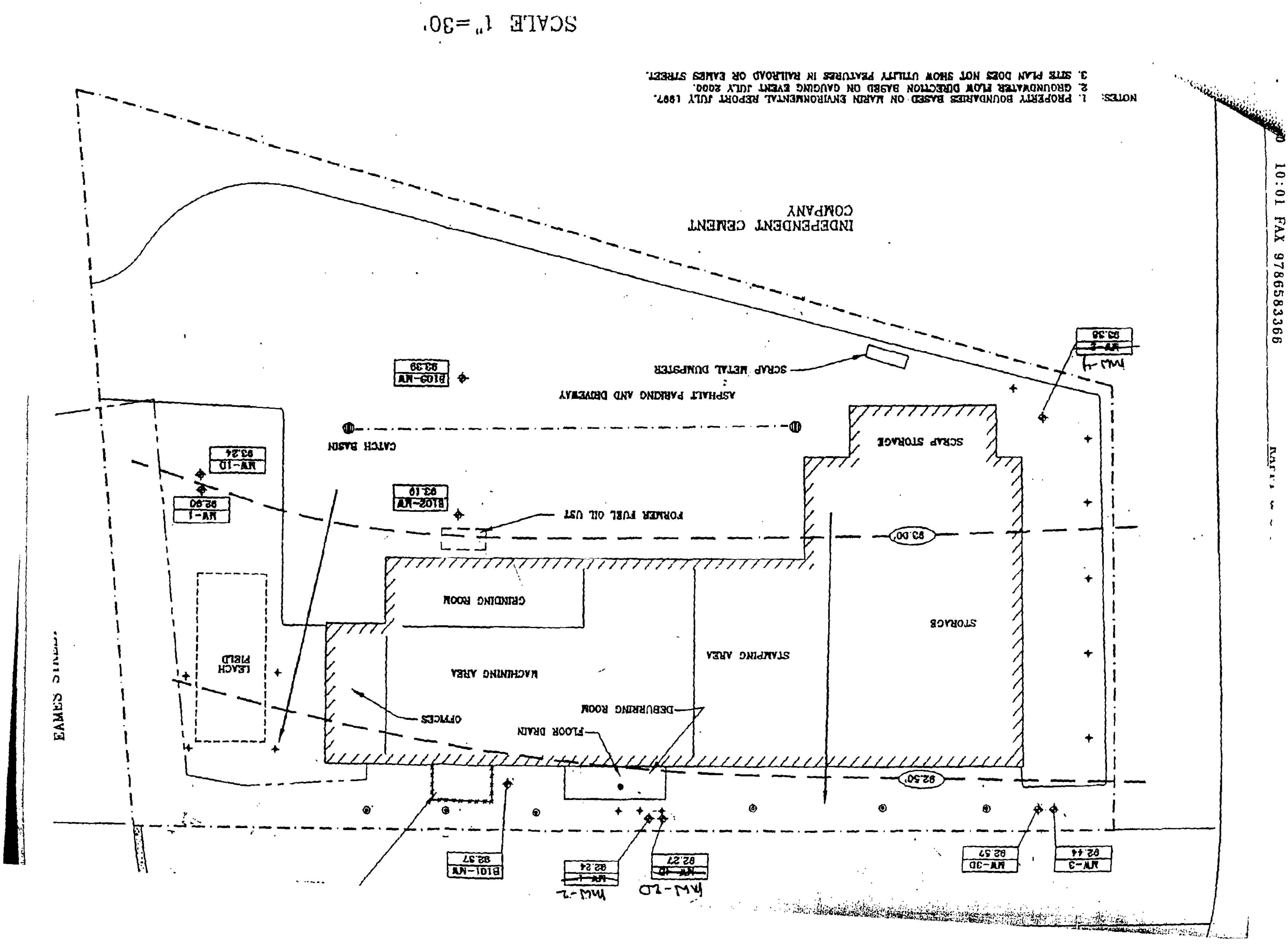
Groundwater and Surface Water Sampling Outcome, January 2001, Raffi-Swanson

Sampling Location	To Be Sampled? (Y/N)	Rationale	Sampling Outcome, January 2001
GZ-29	N	Only low levels of VOCs; downgradient wells more significant	Found; sampled
GZ-30	Y	Near well GZ-1; has not been sampled recently	Found; sampled
GZ-31	Y	Deep well in former still area	Found; sampled
GZ-32	Y	Deep well near Buildings 5 & 6	Not found (under ice/snow)
GZ-108	N	In toluene release area; floating product detected	Sampling not planned; floater present
GZ-110	Y	In toluene release area	Found; sampled
GZ-112	N	In toluene release area; floating product detected	Sampling not planned; floater present
GZ-113	N	In toluene release area; floating product detected	Sampling not planned; floater present
GZ-114	Y	In toluene release area	Found; sampled
GZ-115	N	In toluene release area; floating product detected	Not found (under ice/snow)
GZ-116	Y	In toluene release area	Floating product present
GZ-117	N	In toluene release area; floating product detected	Found; sampled
GZ-121	Y	In toluene release area	Not found (under ice/snow)
GZ-200	Y	Near toluene release area; only sampled once.	Found; sampled
GZ-201	Y	Near toluene release area; only sampled once.	Found; sampled
B101-MW	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
B102-MW	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
B103-MW	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
MW-1	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
MW-1D	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
MW-2	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
MW-2D	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
MW-3	Y	United Tool & Die well nearest R&S source areas	Sampled
MW-3D	Y	United Tool & Die well nearest R&S source areas	Sampled
MW-4	N	United Tool & Die well; not closest to Raffi & Swanson source areas	Not found (under ice/snow)
Surface Water			
DD-1	Y	Surface water, East Ditch at Eames Street	Sampled
DD-1W	Y	Surface water, West Ditch at Eames Street	Sampled
DD-2	Y	Surface water, East Ditch nearest source area	Not sampled (frozen)
DD-2W	Y	Surface water, West Ditch nearest source area	Not sampled (frozen)
DD-3	Y	Surface water, East Ditch, upstream of site	Sampled
DD-3W	Y	Surface water, West Ditch, upstream of site	Sampled

g:\11268.zra\11268-80.srh\corresp\sampleplan.xls

APPENDIX C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NOTES: 1. PROPERTY BOUNDARIES BASED ON MARIN ENVIRONMENTAL REPORT JULY 1997.
2. GROUNDWATER FLOW DIRECTION BASED ON GAUGING EVENT JULY 2000.
3. SITE PLAN DOES NOT SHOW UTILITY FEATURES IN RAILROAD OR EAMES STREET.
INDEPENDENT CEMENT COMPANY
SCRAP METAL DUMPSTER
ASPHALT PARKING AND DRIVEWAY
CATCH BASIN
SCRAP STORAGE
FORMER FUEL OIL UST
GRINDING ROOM
STORAGE
STAMPING AREA
MACHINING AREA
LEACH FIELD
OFFICES
DEBURRING ROOM
FLOOR DRAIN
EAMES STREET
MW-2 93.38
MW-4
B109-MW 93.39
MW-1D 93.24
MW-1 92.90
B102-MW 93.19
93.00'
92.50'
B101-MW 92.37
MW-4 92.24
MW-2
MW-4D 92.27
MW-2D
MW-3D 92.57
MW-3 92.44
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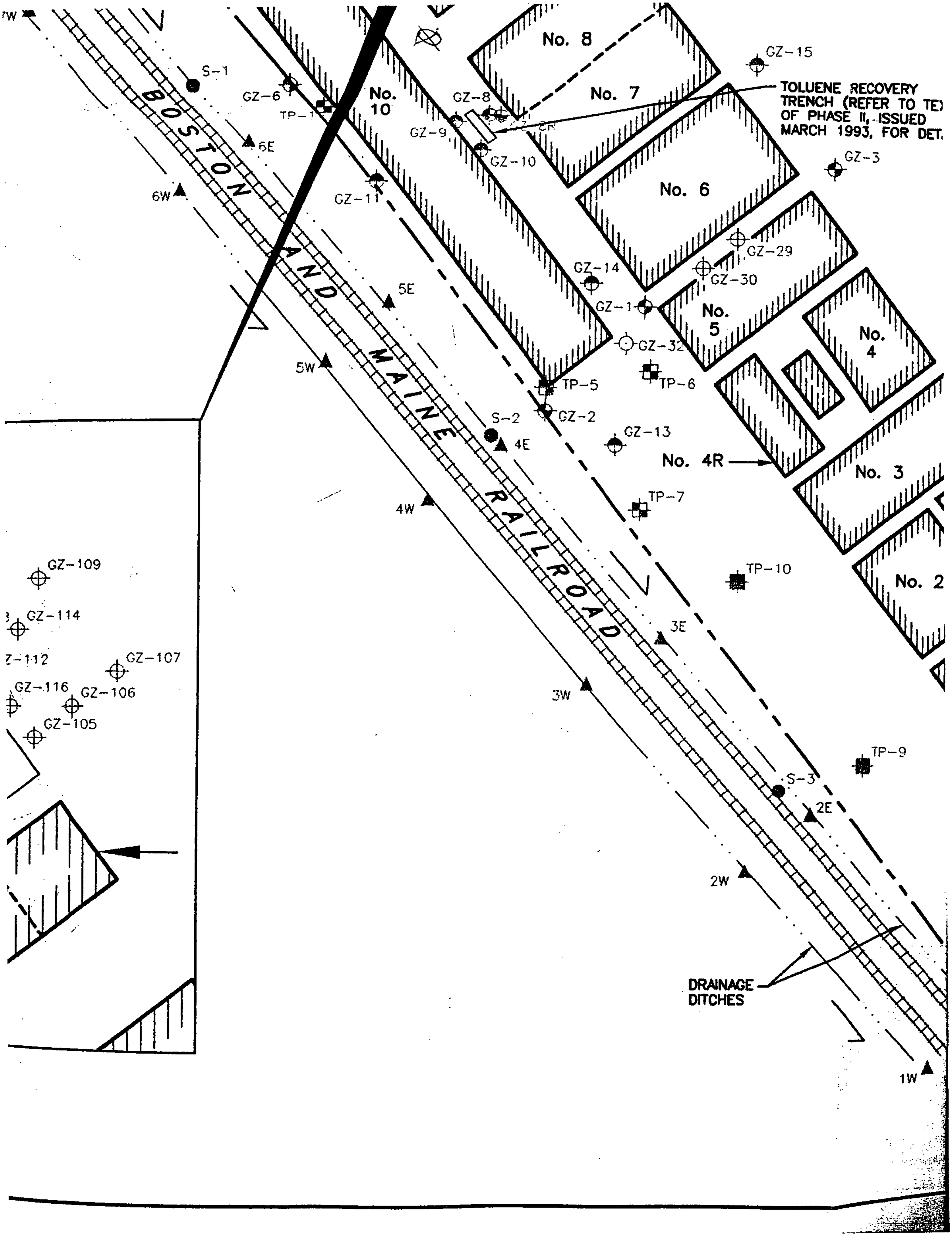

No. 8
No. 7
No. 10
No. 6
No. 5
No. 4
No. 4R
No. 3
No. 2
TOLUENE RECOVERY TRENCH (REFER TO TE
OF PHASE II, ISSUED
MARCH 1993, FOR DET
BOSTON AND MAINE RAILROAD
DRAINAGE DITCHES
S-1
S-2
S-3
GZ-1
GZ-2
GZ-3
GZ-6
GZ-8
GZ-9
GZ-10
GZ-11
GZ-13
GZ-14
GZ-15
GZ-29
GZ-30
GZ-32
GZ-105
GZ-106
GZ-107
GZ-109
GZ-114
GZ-116
TP-1
TP-5
TP-6
TP-7
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5E
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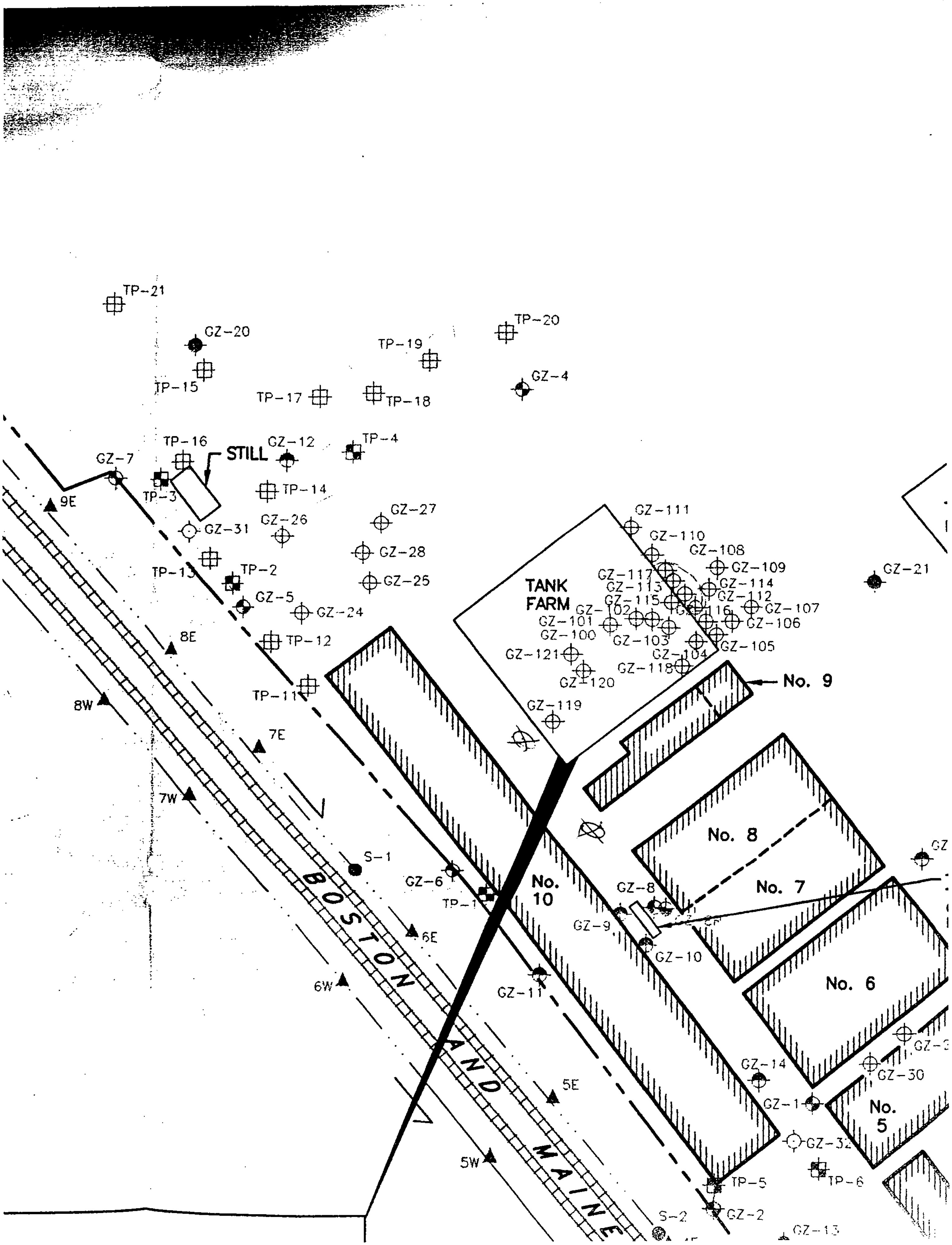
3E
2E
6W
5W
4W
3W
2W
1W



TP-21
GZ-20
TP-20
TP-19
TP-15
GZ-4
TP-17
TP-18
TP-16
STILL
GZ-12
TP-4
GZ-7
TP-3
9E
TP-14
GZ-31
GZ-26
GZ-27
GZ-28
TP-13
TP-2
GZ-25
GZ-5
GZ-24
8E
TP-12
TP-11
8W
7E
7W
GZ-111
GZ-110
GZ-108
GZ-109
GZ-117
GZ-113
GZ-114
GZ-112
GZ-115
GZ-107
TANK FARM
GZ-102
GZ-101
GZ-106
GZ-100
GZ-103
GZ-105
GZ-121
GZ-104
GZ-118
GZ-120
GZ-119
GZ-21
No. 9
No. 8
No. 7
No. 6
No. 5
No. 10
S-1
GZ-6
TP-1
GZ-8
GZ-9
GZ-10
6E
6W
GZ-11
BOSTON AND MAINE
5E
5W
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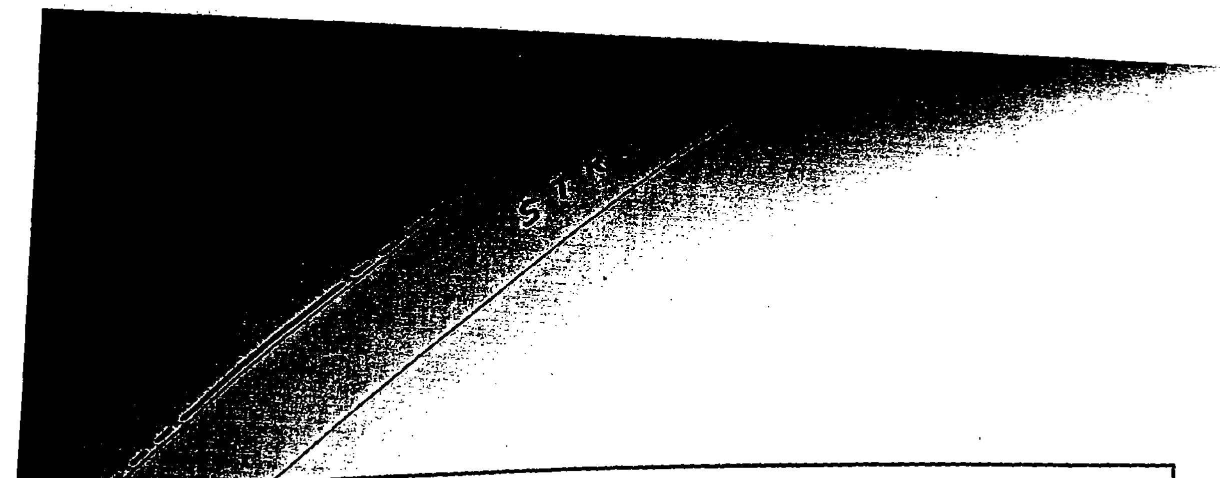
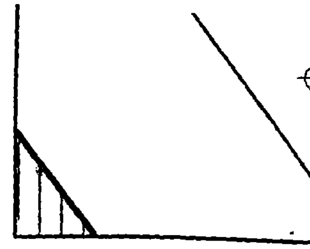
GZ-1
GZ-30
GZ-32
TP-5
TP-6
GZ-2
S-2
GZ-13





INITIAL PF

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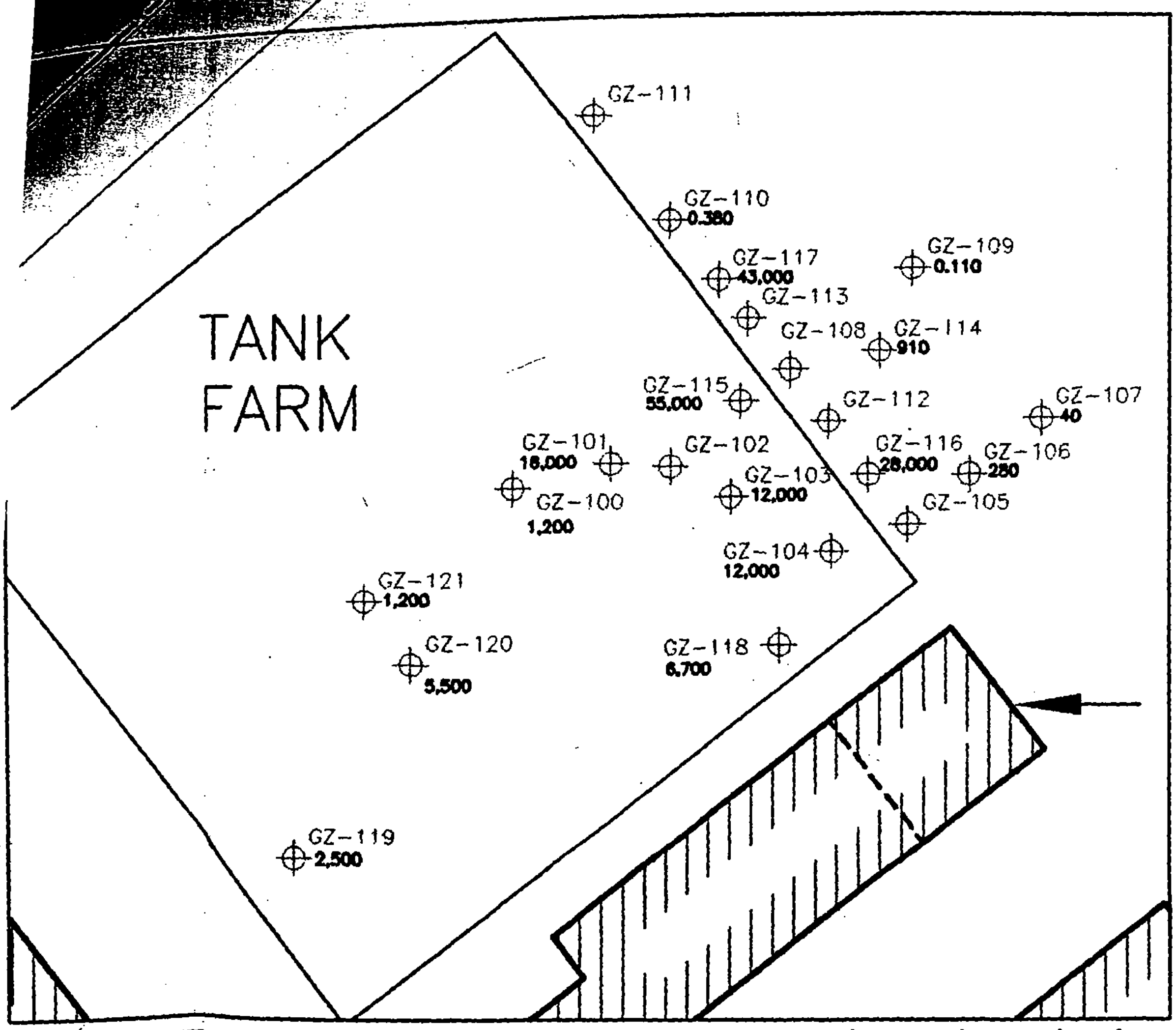

TOLUENE CONCENTRATION IN SOIL (PPM) 5/2/00

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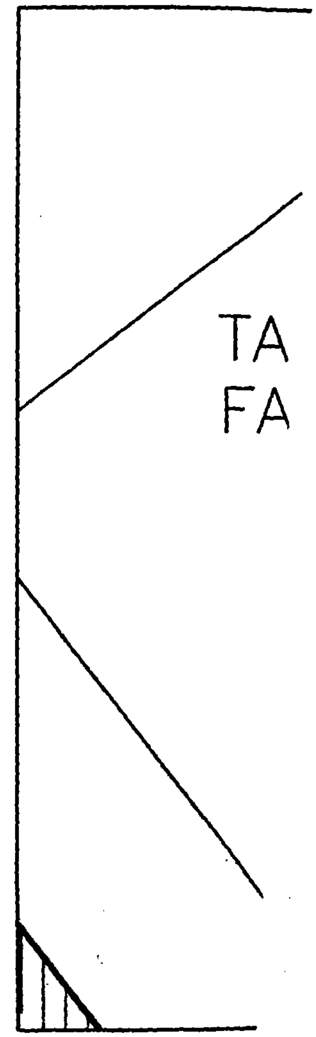
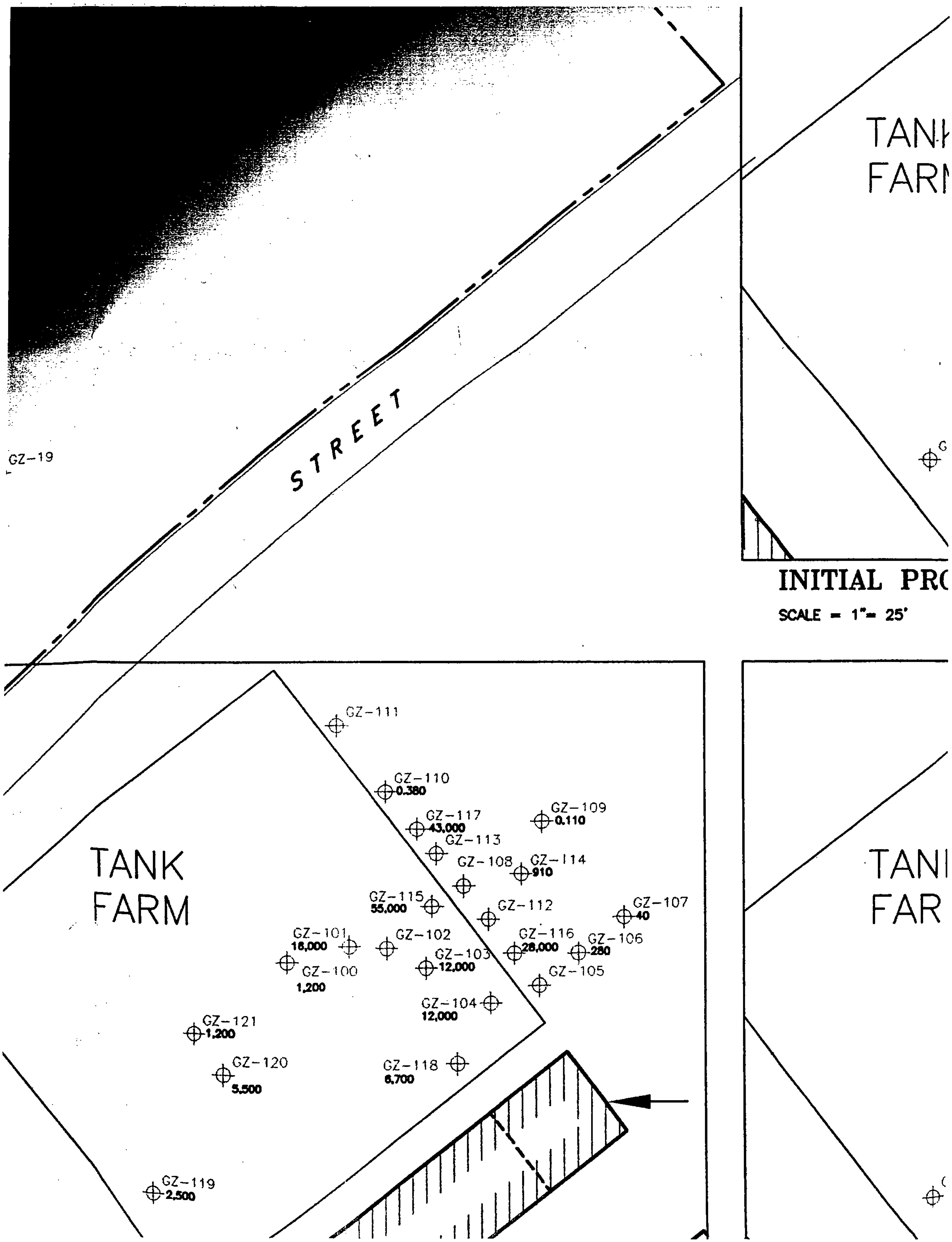


TOLUENE
(PPB) 5,

SCALE = 1"= 25

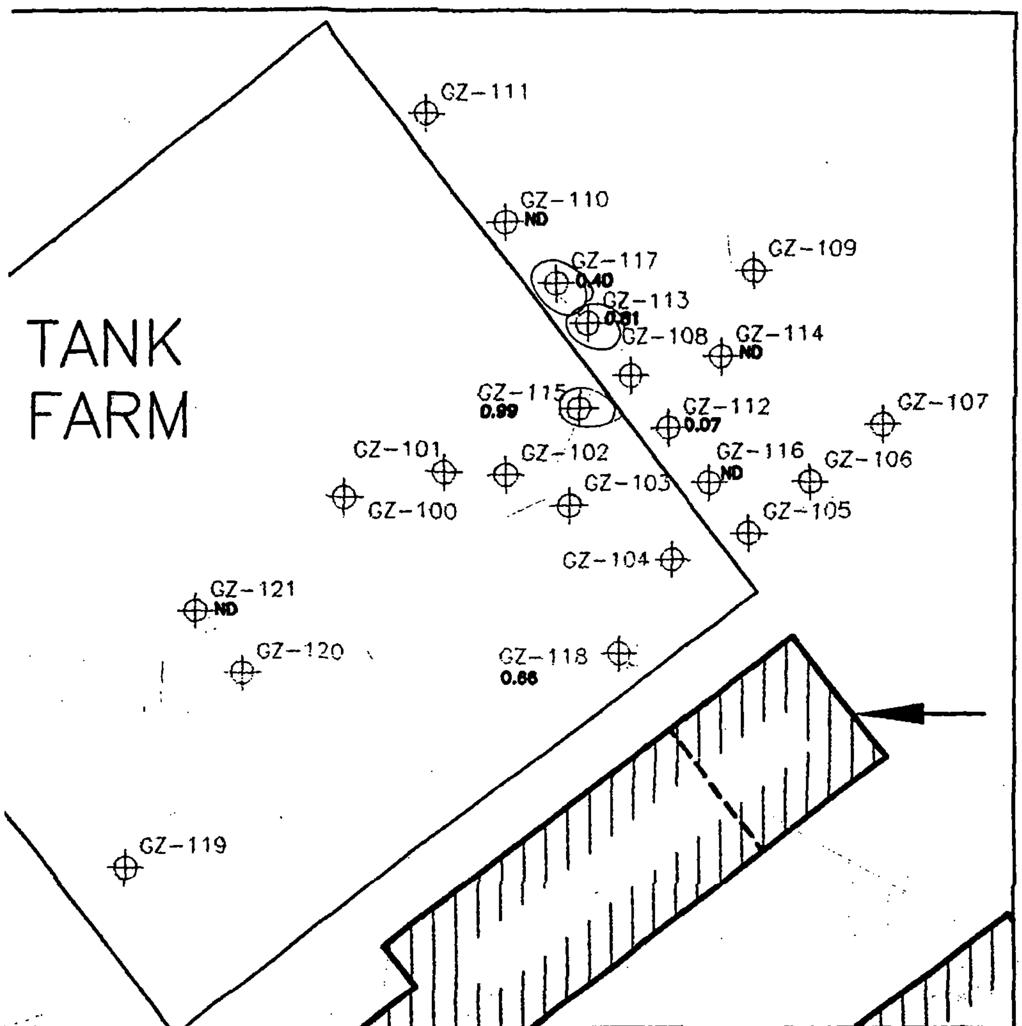
SJS, 06/02/2000, 18


GZ-19
STREET
INITIAL PR
SCALE = 1"= 25'
TANK
FARM
GZ-111
GZ-110
0.380
GZ-117
43,000
GZ-109
0.110
GZ-113
GZ-108
GZ-114
910
GZ-115
55,000
GZ-112
GZ-107
40
GZ-101
16,000
GZ-102
GZ-116
28,000
GZ-106
280
GZ-103
12,000
GZ-100
1,200
GZ-105
GZ-104
12,000
GZ-121
1,200
GZ-120
5,500
GZ-118
6,700
GZ-119
2,500

SURFACE WATER SURVEY POINT.

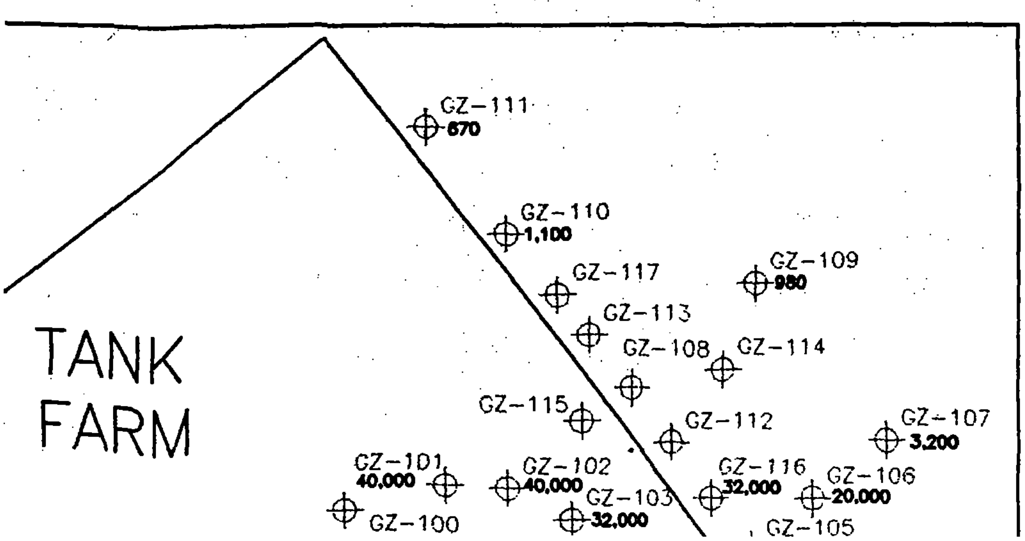
APPROXIMATE LOCATION OF HAND - AUGERED BORING.5/00.

APPROXIMATE LOCATIONS OF FORMER UNDERGROUND FUEL OIL TANKS.



AL PRODUCT THICKNESS (FT) 5/12/00

1"= 25'



SCALE: 1"=60'

0 30' 60' 120'

GZA GeoEnvironment

PROJ MGR: SRH

DESIGNED BY: SRH

REVIEWED BY: SRH

OPERATOR: SJS

DATE: 12/02/99

R AND SURFACE WATER SAMPLING PROGRAM

RAFFI & SWANSON, INC.

WILMINGTON, MASSACHUSETTS

EXPLORATION LOCATION PLAN

IDED BY DANA F. PERKINS, INC. ENTITLED "RAFFI & SWANSON, INC., WILMINGTON,
ALE 1"=80', DRAWING NO. 17442.

APPROXIMATELY DETERMINED BY TAPE MEASUREMENTS FROM EXISTING TOPOGRAPHIC
DERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 5/92.

DEEP BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 5/92.

BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 7/87.

BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 11/86.

BORING WITH OBSERVATION WELL, PERFORMED BY GZA DRILLING, INC. 6/86.

BORING WITH OBSERVATION WELL, PERFORMED BY D. L. MAHER 2/86.
OBSERVED AND LOGGED BY GZA PERSONNEL.

BORINGS WITH OBSERVATION WELLS, PERFORMED BY D. L. MAHER 5/83.
OBSERVED AND LOGGED BY GZA PERSONNEL.

TEST PITS EXCAVATED BY JAMES FLETT & CO, 7/87.
OBSERVED AND LOGGED BY GZA PERSONNEL.

TEST PITS EXCAVATED BY JAMES FLETT & CO 8/83.
OBSERVED AND LOGGED BY GZA PERSONNEL.

TEST PITS EXCAVATED BY JAMES FLETT & CO. 5/83.
OBSERVED AND LOGGED BY GZA PERSONNEL.

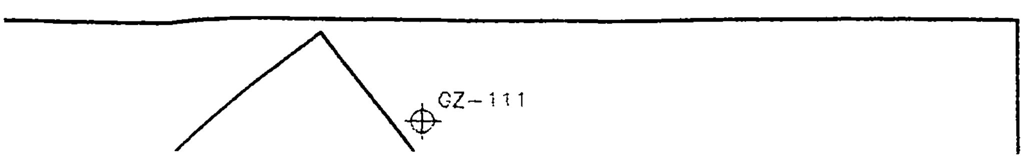
SURFACE SOIL SAMPLE

SURFACE WATER SAMPLING POINT.

SURFACE WATER SURVEY POINT.

APPROXIMATE LOCATION OF HAND - AUGERED BORING.5/00.

APPROXIMATE LOCATIONS OF FORMER UNDERGROUND FUEL OIL TANKS.



REV. NO.	DESCRIPTION	BY	DATE

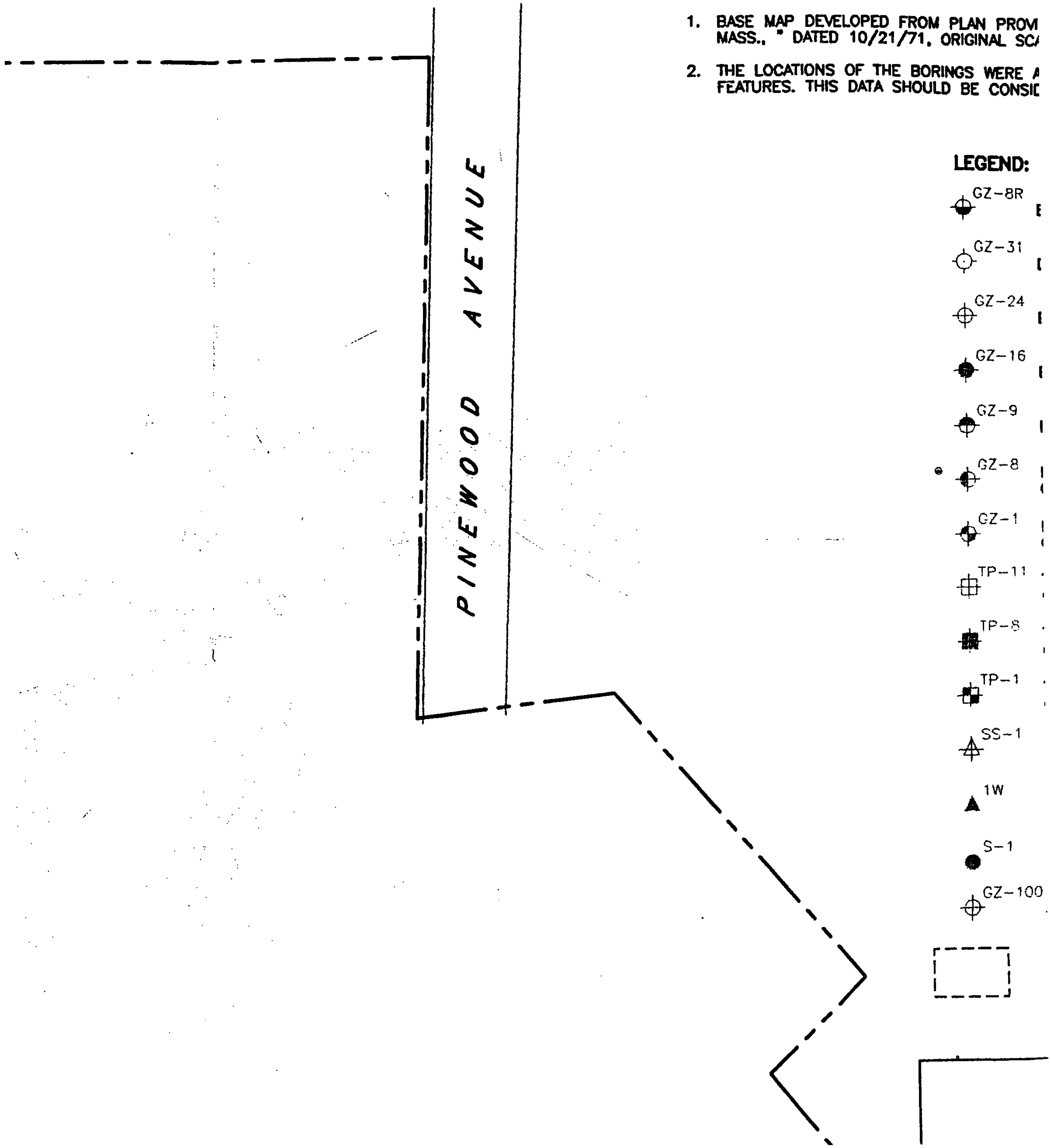
SCALE: 1"=60'

0 30' 60' 120'

GZA GeoEnvironmental, Inc.

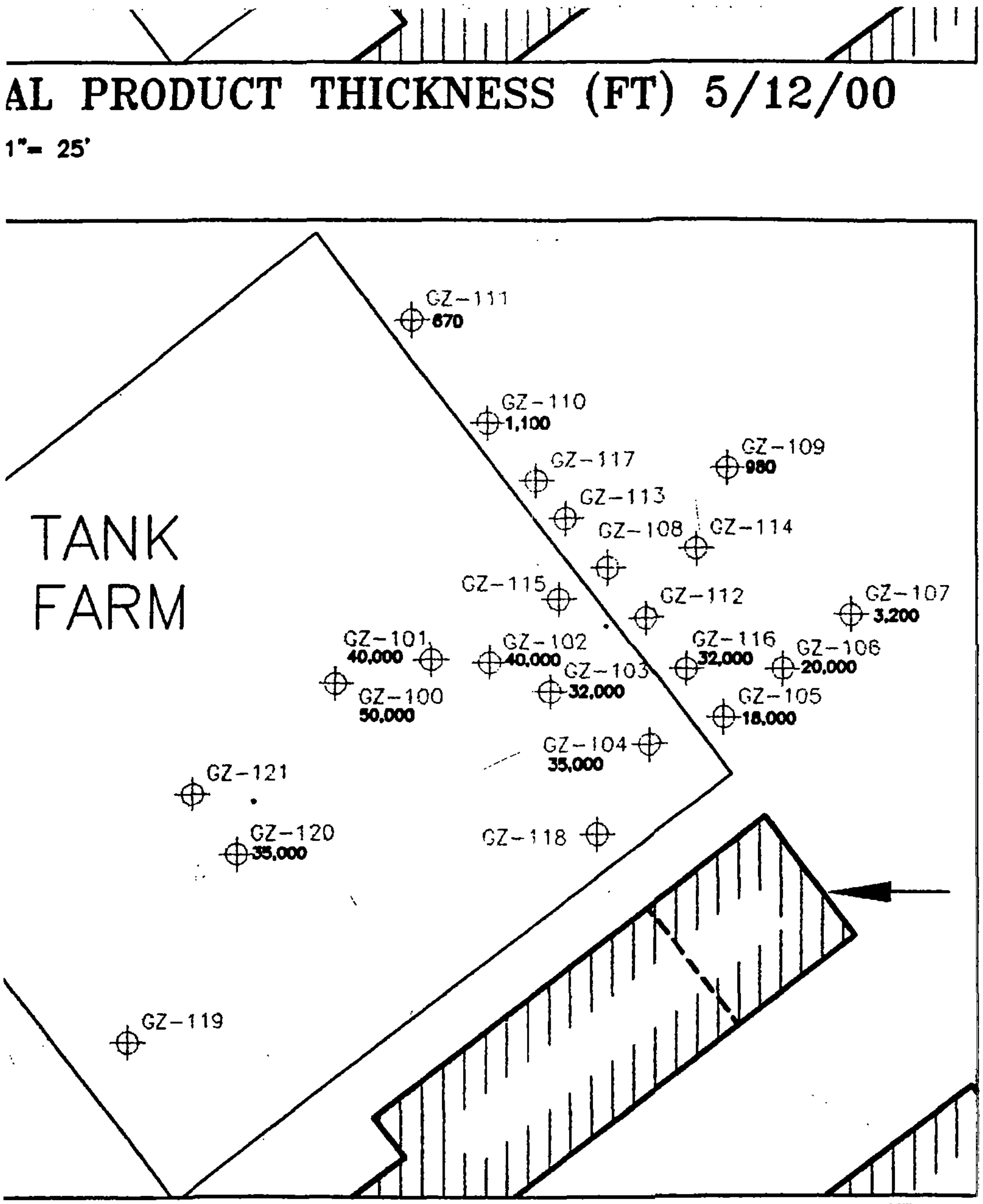
NOTES:

1. BASE MAP DEVELOPED FROM PLAN PROVI MASS., " DATED 10/21/71, ORIGINAL SCA
2. THE LOCATIONS OF THE BORINGS WERE A FEATURES. THIS DATA SHOULD BE CONSID



AL PRODUCT THICKNESS (FT) 5/12/00

1"= 25'



ENE CONCENTRATION IN GROUND WATER
5/2/00

"= 25'

GROUNDWATER AND SURFACE WATER SAMPLING

RAFFI & SWANSON, INC.

WILMINGTON, MASSACHUSETTS

EXPLORATION
LOCATION PLAN

JOB NO.
11268.77

FIGURE NO.
2

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(4)

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

FIT PROJECT

TASK REPORT TO THE ENVIRONMENTAL PROTECTION AGENCY CONTRACT NO. 68-01-6056

PRELIMINARY INVESTIGATION
of
SURFACE WATER CONTAMINATION
of the
EAST DRAINAGE DITCH
Wilmington and Woburn, Massachusetts

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TDD No. F1-8201-11

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TDD # F1-8201-11

Preliminary Investigation
of
Surface Water Contamination
of the
East Drainage Ditch
Wilmington and Woburn, Massachusetts

The following Region 1 Field Investigation Team members made major contributions to this study in the capacities noted:

Project Manager	-	David Cook
Sampling and Analysis	-	John Panaro
Photo Interpretation	-	David Cook

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SECTION 1 - INTRODUCTION

In November 1980, the Ecology and Environment, Inc. (E & E) Region I, Field Investigation Team (FIT) conducted a preliminary assessment and site inspection of the Olin Corporation, Wilmington Plant located in Wilmington, Massachusetts. Analytical data gathered during the assessment revealed significant levels (>1 ppm) of industrial solvents and other chemicals in a drainage ditch, hereafter called the East Drainage Ditch, which parellels the Boston and Maine Railroad tracks to the east of Olin property. The analytical data also showed that several major contaminants present in the Ditch, including toluene and xylene, were not present in wells located on the Olin properties.

The Ditch enters the Halls Brook Storage Area which flows into the Aberjona River. Because the Ditch may be a source of the low level (<25 ppb) volatile organic contamination detected in the Aberjona River, E & E has recommended that comprehensive sampling and analysis of the Ditch be performed to locate the source(s) of contamination. The EPA subsequently tasked E & E to perform the recommended study under TDD F1-8201-11 (Appendix A). This report presents the results of the study.

SECTION 2 - DESCRIPTION OF STUDY AREA

The East Drainage Ditch is divided into two one-mile sections by the Woburn-Wilmington boundary. Figure 1 shows the location of the study area on the U.S.G.S. topographic sheet for the Wilmington, Massachusetts Quadrangle (1979 photorevised). Figure 2 is an aerial photograph taken on 6 November 1980 by the U.S. Environment Protection Agency (Scale of 1" = 800'). This photograph covers the entire study area including the Maple Meadow Brook area in Wilmington. Because no contamination was detected north of sampling points 31W and 32E (Figure 2), an aerial photograph (Figure 3) taken on 8 May 1979 by Northeast Airphoto Associates, Inc. (Scale of 1" = 600'), which provided an enlarged view of the southern section of the study area, was used for the plotting of data.

2.1 SURFACE DRAINAGE

The surface drainage for the affected portion of the study area is mapped on Figure 3. The primary conduit is the East Drainage Ditch which flows from north to south and parallels the Boston and Maine Railroad tracks. There is active flow on both sides of the track north of Eames Street. South of Eames Street, there is continuous flow only on the west side of the track, with intermittent flow on the east side. Surface runoff enters the Ditch from both sides. From the west, three streams enter the Ditch: Halls Brook, the Outlet Channel from Olin properties and the Landfill Stream. The East Drainage Ditch enters the Halls Brook Storage Area approximately one and one-half miles south of the Olin plant. The storage area joins the Aberjona River which flows southward through Woburn and into Winchester where it enters the Mystic Lakes. The East Drainage Ditch varies from two to five feet in width and from six inches to three feet in depth.

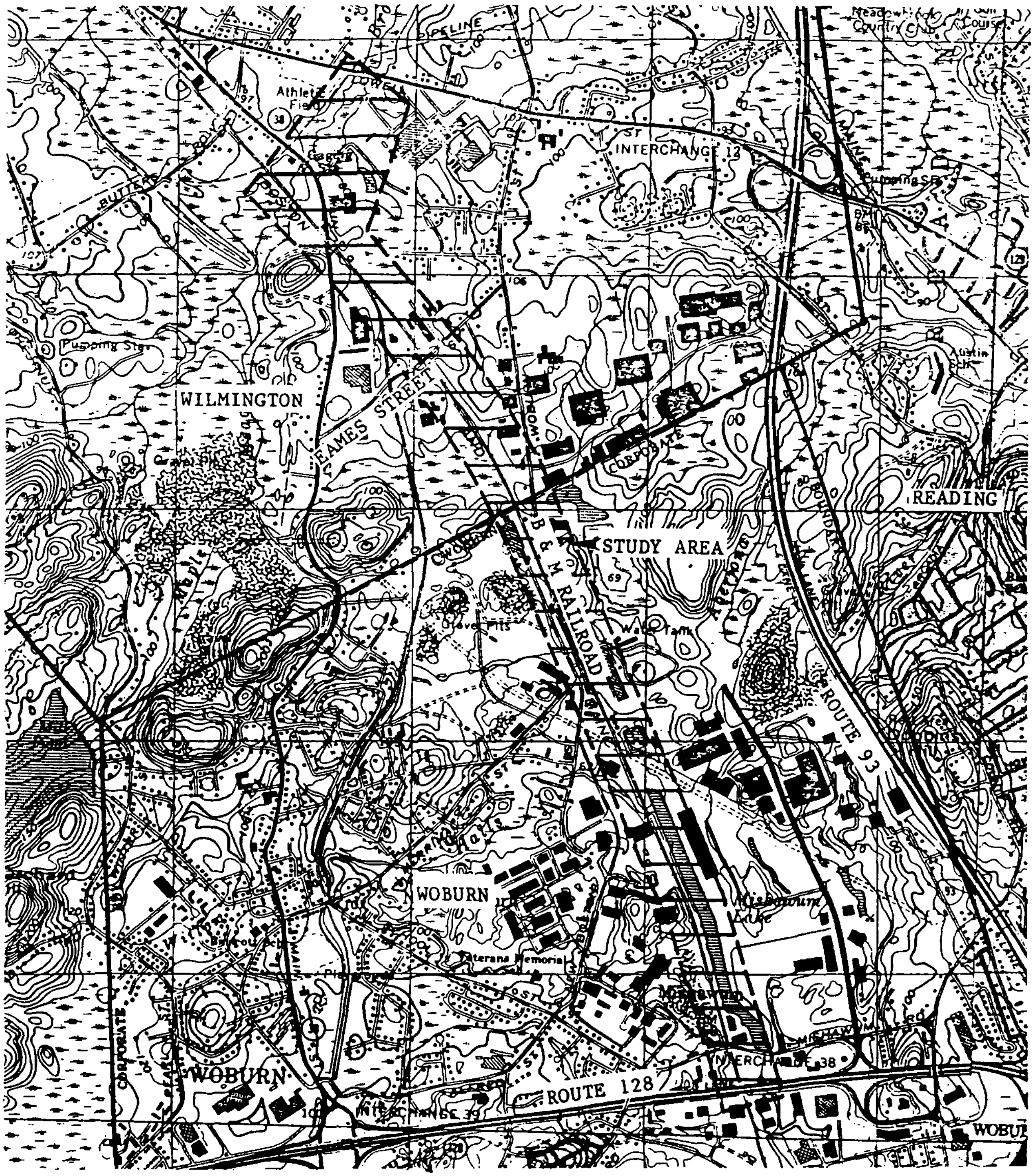


FIGURE 1: EAST DRAINAGE DITCH STUDY AREA, WILMINGTON AND WOBURN, MA.– LOCUS MAP

U.S.G.S. TOPOGRAPHIC SHEET– WILMINGTON, MA. QUADRANGLE SCALE 1:24,000

2.2 INDUSTRIAL ENVIRONMENT

The East Drainage Ditch passes through a highly industrialized area. Industries adjacent to the ditch are identified on Figures 2 and 3 and include the following:

A. Raffi & Swanson, Inc. - lacquer and paint thinner manufacturing

B. Olin Corporation, Wilmington Plant - rubber blowing agent manufacturing

C. G. H. Harnum - riggers

D. E. C. Whitney & Sons, Inc. - drum reclaiming

E. Whitney Barrel Company - drum reclaiming (storage area)

F. New England Pigments and Resins - warehouse (formerly the site of a fertilizer manufacturing plant)

G. Formerly the site of munitions, pesticides and animal glue manufacturing plants

H. Woburn Steel Drum - drum reclaiming

Other possible sources of chemical contamination in the area include the following:

I. Hide piles

J. Arsenic deposits

K. Chromium lagoon

In addition to the above, a Metropolitan District Commission (MDC) and a City of Woburn sewer line parallel the entire length of the ditch.

SECTION 3 - SURFACE WATER CONTAMINATION

3.1 SAMPLING AND ANALYSIS PRIOR TO THIS STUDY

On February 6 to 8, 1980 two samples from the East Drainage Ditch were analyzed for volatile organics at the EPA/New England Regional Laboratory (NERL) in Lexington, Massachusetts. Quality control data for this analysis are presented in Appendix B. In addition, two samples were analyzed for priority pollutants on July 28, 1980 as part of a sampling survey of Woburn conducted by the Massachusetts Department of Environmental Quality Engineering (DEQE) and the U.S. Environmental Protection Agency (Appendix C). A summary of the results of these analyses are presented in Table 1.

3.2 PLAN FOR SAMPLING AND ANALYSIS

The plan for this study consisted of two rounds of comprehensive sampling and semi-quantitative volatile organic analysis by E & E using a Model OVA-128 organic vapor analyzer and one round of selective sampling with quantitative volatile organic analysis by the EPA/NERL. The following is a list of all sampling points (See Figure 2 for the locations).

(E denotes east side of tracks, W denotes west side)

1W Just south of Eames Street overpass
2W Sand cave in
3W Just north of Olin tanks
4W Just south of Olin tanks
5W Midway between tanks and Olin Outlet Channel
6W Culvert from E. C. Whitney
7W Just upstream of Outlet Channel confluence
8W Outlet Channel
9W Just downstream of Outlet Channel confluence
10W At south end of small culverted section
11E At large gas storage tanks
12W South end of New England Resins & Pigments
13E South end of New England Resins & Pigments
14E Spring just north of missing bridge
15W Just north of missing bridge
16W Just south of Woburn Steel Drum
17W Just north of Halls Brook confluence
18W Halls Brook just before confluence
19W Culvert into East Drainage Ditch
20E Entrance to Halls Brook Storage Area

TABLE 1

Volatile Organic Analyses of Water from The East Drainage Ditch
Wilmington and Woburn, Massachusetts
February 6-8, 1980 and July 28, 1980

	1980			
	February		July	
	1W	4W	1W	5W
	(approximate location on Figure 2)			
trichloroethylene	14	54	10-50	20-100
1,2-dichloroethane	ND	<10	ND	ND
1,1,1-trichloroethane	60	20	10-50	20-100
1,1-dichloroethane	55	29	10-50	30-300
1,1-dichloroethylene	<10	ND	ND	ND
tetrachloroethylene	<10	<10	ND	ND
chloroethane	15	ND	ND	ND
1,1,2-trichloroethane	ND	12	ND	5-25
1,1-dichloroethylene	ND	<10	ND	ND
1,2-trans-dichloroethylene	ND	74	ND	20-100
toluene	ND	<10	100-1000	100-1000
vinyl chloride	ND	36	ND	ND
benzene	ND	ND	<10	<10
xylenes	ND	ND	50-200	50-200
methylene chloride	ND	ND	ND	ND

ND - not detected

3.2 Plan for Sampling and Analysis - continued

21W Disturbed sample at 9W
22W Disturbed sample at 4W
23W Culvert from cement plant
24W Just upstream of 23W
25W Just downstream of 23W
26W Disturbed sample at 25W
27E Just north of Eames Street overpass
28E At 23W
29E At tree at north end of Raffi & Swanson
30W At 29E
31W Just south of railroad spur
32E At 31W
33E Maple Meadow Brook - east of tracks
34W North of ballpark
35W West of 34W
36E Upstream of Avco Pond
37E Downstream of Avco Pond
38E Stream from Polyvinyl Pond
39E Just south of railroad spur to Polyvinyl
40W At 39E
41E 50 railroad ties south of 39E
42W Halls Brook just east of New Boston Street
43E Outlet of Halls Brook Storage Area
44E Aberjona River just upstream of confluence with Halls Brook Storage Area
45E 45 railroad ties north of 29E
46E 90 railroad ties north of 29E
47E 135 railroad ties north of 29E
48W East Drainage Ditch at 19W
49W At 45E
50E At 1W
51W At 3E
52W Halls Brook - west of New Boston Street
53E Washout at Raffi & Swanson, Inc.
54 Confluence of East Drainage Ditch and Landfill Stream
55 Landfill Stream

<u>Sampling Round 1</u> (February 8 to 15, 1982) consisted of sampling points 1 through 47. "Disturbed" samples were taken after manual disruption of the bottom sediments. All samples were collected in 44 ml septum vials and a 25 percent headspace was allowed. . Analysis was performed within 24 hours of sampling using an organic vapor analyzer (OVA) manufactured by Foxboro-Analytical.

<u>Sampling Round 2</u> (February 22, 1982) consisted of five sampling points - 1, 4, 6, 28 and 48. These points were chosen, based on the results of Round 1 analyses, for the confirmation of species identification and for quantitative information. The quantitative data were compared with peak heights on the Round 1 and 3 chromatograms. Analysis was performed approximately 24 hours after sampling at the EPA/NERL using gas chromatography with mass spectrometry (GC/MS).

3.2 Plan for Sampling and Analysis - continued

Sampling Round 3 (March 2 to 9, 1982) consisted of the following 34 sampling points: 1 to 13, 15 to 20, 23 to 25, 27 to 30, 39, 40, 42, 45, 47 and 50 to 52. These sampling points were chosen, based on Round 1 results, to further define and confirm areas of contamination. Round 1 indicated that no contamination was present north of sampling points 39 and 40. Therefore, Round 3 included no points north of these. Samples were analyzed within 24 hours of collection using the OVA.

3.3. ANALYTICAL PROCEDURES AND RESULTS

3.3.1 Analytical Procedures

All samples were collected in 44 ml septum vials with approximately 10 ml of headspace. All samples were screened within 24 hours of collection. Those samples which were not analyzed immediately after collection were stored in a cooler containing ice.

Volatile organic analyses were performed using the OVA. The T-6 and B-8 columns were used for the analyses. The T-6 column was used at room temperature and the B-8 column was used with an isothermal pack for analyses at 0°C. Chart speed on the strip chart recorder was one chart division/24 seconds.

Samples were vigorously agitated prior to withdrawal of headspace gas. The headspace gas was transferred from the septum vial to the OVA with a syringe. Standards were run with each group of samples. Tentative identifications were made by comparing the chromatograms of the unknowns with those of the standards.

Analytical procedures and conditions for the analyses performed at NERL are presented in Appendix E.

3.3 Analytical Procedures and Results - continued

3.3.2 Analytical Results

The volatile organic analysis results for Sampling Rounds 1 and 3 are presented in two formats. Tables 2 and 4 list the results for Sampling Rounds 1 and 3 respectively. Figures 5 through 9 are plots on the 8 May 1979 airphoto (1" = 600') of the five compounds detected; toluene, 1,2-trans-dichloroethylene, trichloroethylene, xylene and 1,1,1-trichloroethane. Only the highest detected level for each sampling point was plotted because the results for the two rounds were, for the most part, consistent. Estimated concentrations are as follows:

High (H) >1000 ppb
Medium (M) 500-1000 ppb
Low (L) 0-499 ppb

Figure 4 is included to facilitate correlation of sampling point numbers with detected contamination levels plotted on Figures 5 through 9.

The results of the volatile organic analyses performed at NERL (Sampling Round 2) are presented in Table 3. The major difference between the NERL analyses and the E & E analyses was the detection of medium to high levels of methyl ethyl ketone (MEK) and methyl isobutyl ketone (MIBK) by the NERL. E & E did not report these two compounds for the following reasons:

1. E & E did not have an MIBK standard at the time of analysis and therefore this compound could not be identified.
2. The MEK peak was masked by the toluene peak with the columns used by E & E.

Another difference was the detection of medium to high levels of 1,2-trans-dichloroethylene by E & E whereas the NERL reported only low levels. No reason for this difference can be given at this time.

TABLE 2

Volatile Organic Analysis Results - Sampling Round 1

Sampling Point	Toluene	1,2-Trans-Dichloroethylene	Trichloroethylene	Xylene	1,1,1,-Trichloroethane
1	H	ND	ND	ND	M
2	H	ND	ND	ND	M
3	ND	H	L	ND	ND
4	H	H	ND	ND	ND
5	H	H	ND	ND	ND
6	H	M	ND	ND	ND
7	H	H	ND	ND	ND
8	ND	M	ND	ND	ND
9	H	H	ND	ND	ND
10	H	H	L	ND	L
11	L	ND	H	ND	L
12	H	H	M	ND	L
13	ND	ND	H	ND	L
14	ND	ND	ND	ND	ND
15	H	H	M	ND	L
16	M	M	L	ND	L
17	M	M	L	ND	ND
18	ND	ND	L	ND	L
19	ND	ND	ND	ND	M
20	L	ND	L	ND	L
21	H	H	ND	ND	N
22	L	M	ND	ND	ND
23	ND	ND	ND	ND	ND
24	H	ND	ND	ND	ND
25	H	ND	ND	ND	M
26	ND	H	M	ND	ND
27	H	ND	ND	M	L
28	H	ND	ND	M	M
29	H	ND	ND	L	ND
30	L	ND	ND	ND	ND
31	ND	ND	ND	ND	ND
32	ND	ND	ND	ND	ND
33	ND	ND	ND	ND	ND
34	ND	ND	ND	ND	ND
35	ND	ND	ND	ND	ND
36	ND	ND	ND	ND	ND
37	-	-	-	-	-
38	ND	ND	ND	ND	ND
38	ND	ND	ND	ND	ND
40	ND	ND	ND	ND	ND
41	ND	ND	ND	ND	ND
42	ND	ND	L	ND	L
43	L	ND	L	ND	L
44	ND	ND	ND	ND	L
45	ND	ND	ND	ND	ND
46	ND	ND	ND	ND	ND
47	ND	ND	ND	ND	ND
48	-	-	-	-	-
49	-	-	-	-	-
50	-	-	-	-	-
51	-	-	-	-	-
52	-	-	-	-	-
53	-	-	-	-	-
54	-	-	-	-	-
55	-	-	-	-	-

H - High
M - Medium
L - Low

ND - Not Detected
(-) - Not Sampled

TABLE 3

Volatile Organic Analysis Results - Sampling Round 3

Sampling Point	Toluene	1,2-Trans-Dichloroethylene	Trichloroethylene	Xylene	1,1,1,-Trichloroethane
1	H	ND	ND	ND	ND
2	-	-	-	-	-
3	ND	ND	M	ND	ND
4	M	H	ND	ND	ND
5	M	H	ND	ND	ND
6	M	M	ND	ND	ND
7	M	ND	ND	ND	ND
8	ND	M	ND	ND	ND
9	M	M	ND	ND	ND
10	M	M	L	ND	ND
11	ND	ND	M	ND	ND
12	M	M	L	ND	ND
13	ND	ND	M	ND	ND
14	ND	ND	M	ND	ND
15	M	M	L	ND	ND
16	M	ND	ND	ND	ND
17	-	-	-	-	-
18	-	-	-	-	-
19	L	ND	ND	ND	ND
20	L	ND	L	ND	L
21	-	-	-	-	-
22	-	-	-	-	-
23	ND	ND	ND	ND	ND
24	H	ND	ND	ND	ND
25	H	ND	ND	ND	ND
26	-	-	-	-	-
27	H	ND	ND	L	ND
28	ND	ND	ND	ND	ND
29	M	ND	ND	L	ND
30	L	ND	ND	ND	ND
31	-	-	-	-	-
32	-	-	-	-	-
33	-	-	-	-	-
34	-	-	-	-	-
35	-	-	-	-	-
36	-	-	-	-	-
37	-	-	-	-	-
38	-	-	-	-	-
39	ND	ND	ND	ND	ND
40	ND	ND	ND	ND	ND
41	-	-	-	-	-
42	ND	ND	ND	ND	L
43	-	-	-	-	-
44	-	-	-	-	-
45	ND	ND	ND	ND	ND
46	-	-	-	-	-
47	ND	ND	ND	ND	ND
48	-	-	-	-	-
49	-	-	-	-	-
50	M	ND	ND	ND	ND
51	ND	M	ND	ND	ND
52	MD	ND	ND	ND	L
53	H	ND	ND	M	ND
54	H	M	H	ND	ND
55	ND	ND	ND	ND	L

H - High
M - Medium
L - Low

ND - Not Detected
(-) - Not Sampled

TABLE 4

Results of Volatile Organic Analyses Performed at NERL

Sampling Round 2

Compound	Sampling Point				
	4W	48W	1W	28E	6W
toluene	590	26	890	2600	78
xylenes	46J	ND	55J	210J	18
methyl ethyl ketone	670	ND	840	750	ND
methyl isobutyl ketone	460	6	570	2000	6
1,2-trans-dichloroethylene	ND	4	ND	ND	ND
1,1,1-trichloroethane	ND	9	ND	ND	5
trichloroethylene	ND	13	ND	ND	3J
methylene chloride	ND	ND	ND	ND	6
ethyl benzene	ND	ND	ND	ND	4
tetrahydrofuran	ND	ND	ND	ND	260J

J = Approximation

SECTION 4 - DISCUSSION AND CONCLUSIONS

The objective of this report is to identify the source(s) of contamination present in the East Drainage Ditch (Appendix A). The identities of the contaminants were established in Section 3. In this section, probable source areas will be suggested for each of the major contaminants detected.

4.1 TOLUENE

Toluene was detected in concentrations up to 2600 ppb. The highest levels were detected north of Eames Street (Figure 5). Sampling point 29 showed high toluene levels whereas Sampling Point 30, directly across the railroad tracks, showed low levels. No toluene was detected north of Sampling Points 29 and 30. This indicates that the source area for toluene is near Sampling Point 29 and to the east of the tracks based on the surface water flow directions shown in Figure 3. This property is owned by Raffi & Swanson, Inc. Paint and lacquer thinner, among other products, are manufactured at this plant. Table 5 indicates that toluene is stored and used in large quantities on the property (two 10,000-gallon tanks, 473,384 gallon annual throughput). The toluene is stored in above-ground tanks as shown in Figure 10 (A). Off-spec batches of solvent mixtures are stored in 55-gallon drums and pumped into four 2000-gallon waste solvent tanks located northeast of the tank farm pending pick-up by a solvent recovery firm (E & E Site Inspection Report, Raffi & Swanson, Inc., September 16, 1980).

It is possible that leaking drums of off-spec solvents or a leak at one of the 2000-gallon waste solvent tanks (Figure 11) located just east of Sampling Point 29 has resulted in the toluene contamination in the East Drainage Ditch. The photographs presented in Figure 11 show that area C, which is now a warehouse, was formerly used for the storage of solid waste, possibly including drums of waste solvents. Leakage from this waste area could also have resulted in the contamination of the Ditch. Toluene concentrations decrease downstream to 26 ppb near the entrance to Halls Brook Storage Area.

TABLE 5

Chemicals Stored on Raffi & Swanson, Inc. Property as of September 1980

(Provided by Mr. Ralph Swanson)

TANK NO.	MATERIAL BEING STORED	ANNUAL THRUPUT	SIZE OF CONTAINER
1.	Lacquer Thinner	75,000	10,000 (gal.)
2.	Shellacol (Denatured Ethyl Alcohol)	55,333	10,000
3.	Petrohol (Isopropyl Alcohol)	133,427	10,000
4.	Methyl Ethyl Ketone	87,000	10,000
5.	Toluol	473,384	10,000
6.	Toluol	(included in 5)	10,000
7.	Ethyl Acetate 99%	53,298	10,000
8.	D.I.B.K.	21,922	6,000
9.	Butyl Acetate 40	27,593	6,000
10.	Cellosolve	42,048	6,000
11.	1,1,1 - Trichloroethane	41,832	6,000
12.	Solox 99% (Anhydrous Ethyl Alcohol Denatured)	35,815	6,000
13.	Xylol	49,751	6,000
14.	Methyl Ethyl Ketone	(included in #4)	6,000
15.	Heptane	5,522	2,000
16.	Acetone	11,643	2,000
17.	M.I.B.K.	15,670	2,000
18.	Butyl Cellosolve	9,123	2,000
19.	Solvent 60 (Butyl Alcohol)	11,092	2,000
20.	V M & P Naphtha	6,621	2,000
21.	Ethylacrylate	85,000	6,800
22.	Methyl Methacrylate	15,000	6,800
23.	2 - Ethyl Hexylacrylate	15,000	3,400
24.	Acrylonitrile	7,500	3,400
25.	n-Butylacrylate	10,000	6,800

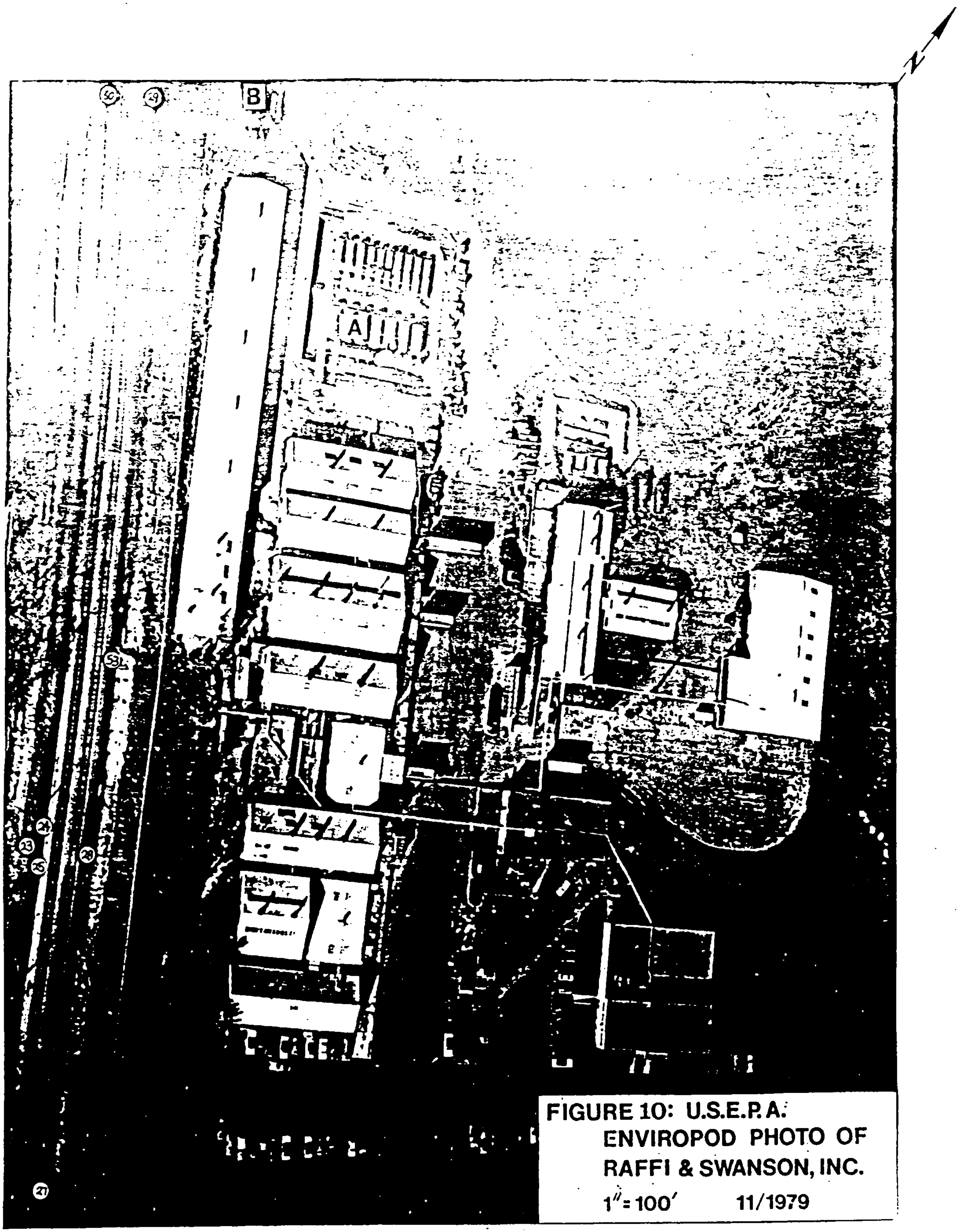
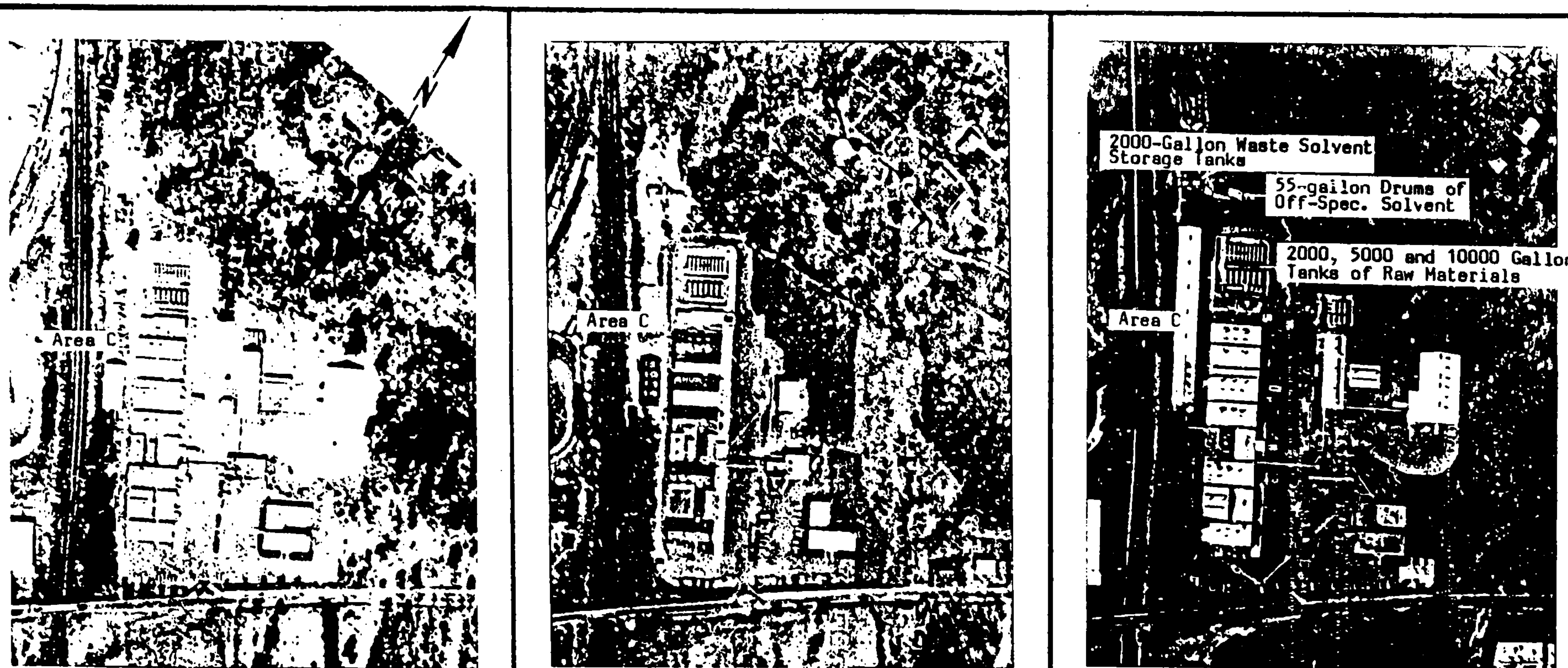


FIGURE 10: U.S.E.P.A.
ENVIROPOD PHOTO OF
RAFFI & SWANSON, INC.
1" = 100' 11/1979



APRIL 1978 | APRIL 1963 | NOVEMBER 1980

FIGURE II: COMPARATIVE AERIAL PHOTOS
RAFFI & SWANSON, INC. 1:3800

4.2 XYLENE

Xylene was detected in concentrations up to 210 ppb (Sampling Point 28) north of Eames Street and east of the railroad tracks. It is possible that activities at Raffi & Swanson, Inc. are responsible for xylene contamination of the East Drainage Ditch for the same reasons given in Section 4.1.

Table 5 indicates that 6000 gallons of xylene are stored on Raffi & Swanson property and that the annual throughput is 50,000 gallons. Sampling Point 1 is the southernmost point where xylene was detected.

4.3 METHYL ETHYL KETONE (MEK)

MEK was detected in concentrations up to 840 ppb (Sampling Point 1). The highest concentrations and distribution patterns of MEK correlate with the highest concentrations for toluene indicating that activities at Raffi & Swanson, Inc. may also be responsible for MEK contamination of the East Drainage Ditch. Table 5 indicates that 16,000 gallons of MEK are stored on Raffi & Swanson property and that the annual throughput is 87,000 gallons. MEK concentrations decrease downstream. No MEK was detected at the entrance to Halls Brook Storage Area.

4.4 METHYL ISOBUTYL KETONE (MIBK)

MIBK was detected at concentrations up to 2000 ppb (Sampling Point 28). The highest concentrations of MIBK correlate with the highest concentrations of toluene and MEK. This indicates that activities at Raffi & Swanson, Inc. may also be the source of MIBK contamination of the East Drainage Ditch. Table 5 indicates that 2000 gallons of MIBK are stored on Raffi & Swanson property and that the annual throughput is 15,670 gallons. Concentrations decrease downstream to 6 ppb near the entrance to Halls Brook Storage Area.

4.5 1,2-trans-DICHLOROETHYLENE

High concentrations of 1,2-trans-dichloroethylene were consistently detected at and south of Sampling Points 3 and 4. North of these points, it was detected only once in a disturbed sample (Sampling Point 25). Therefore, the major source of 1,2-trans-dichloroethylene

4.5 1,2-Trans-dichloroethylene - continued

is most likely located east or west of Sampling Points 3 and 4. To the east of Point 3 is an area of fill of unknown origin. To the west of Sampling Point 4 is the Olin Corporation, Wilmington Plant where rubber blowing agents are manufactured. Just northwest of Point 4 is a group of 6 large, above-ground tanks (Figure 12). A leak from one of these tanks is now contaminating the East Drainage Ditch with high concentrations of N-nitrosodiphenylamine and bis-(2-ethylhexyl) phthalate (E & E, Groundwater Quality in East & North Woburn, Massachusetts, May 6, 1981). It is possible that the 1,2-trans-dichloroethylene is generating from the same source. Although there is no record of this compound having been used or stored on Olin property, 1,2-trans-dichloroethylene was detected in the Outlet Channel which drains the Olin property (Sampling Point 8). No other source of 1,2-trans-dichloroethylene is suggested.

4-6 <u>TRICHLOROETHYLENE</u>

Concentrations of trichloroethylene were consistently detected at and south of Sampling Point 10. Highest concentrations were detected on the east side of the railroad tracks. Abutting the railroad tracks on the east side are E.C. Whitney & Sons, Inc. (a barrel reclaim operation) and the storage area for Whitney Barrel Company (also a barrel reclaim operation). Large quantities of drums and tanks are stored on these properties (See Figures 13 and 14). Leakage of liquids from these facilities may be the major source of trichloroethylene contamination of the East Drainage Ditch.

Low levels of trichloroethylene were also detected in Halls Brook upstream of its confluence with the East Drainage Ditch. Several culverts leading into Halls Brook were noted during sampling. Three (3) ppb of trichloroethylene was detected at the entrance to Halls Brook Storage area. Trichloroethylene has been detected in the Aberjona River as far as three miles south of Halls Brook Storage Area (Appendix D). The East Drainage Ditch and Halls Brook are very likely the source(s) of that contamination.

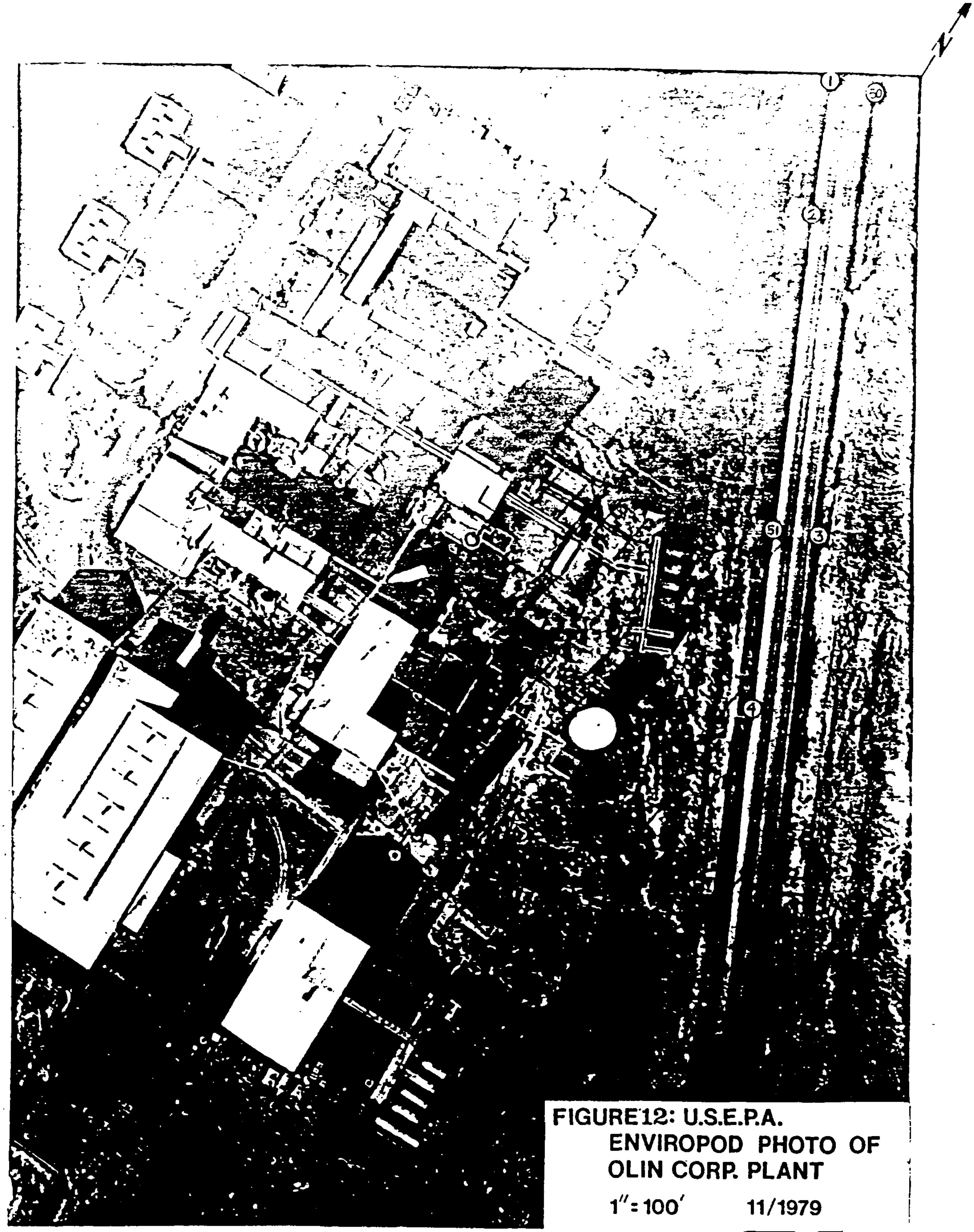


FIGURE 12: U.S.E.P.A. ENVIROPOD PHOTO OF OLIN CORP. PLANT

1″ = 100′ 11/1979

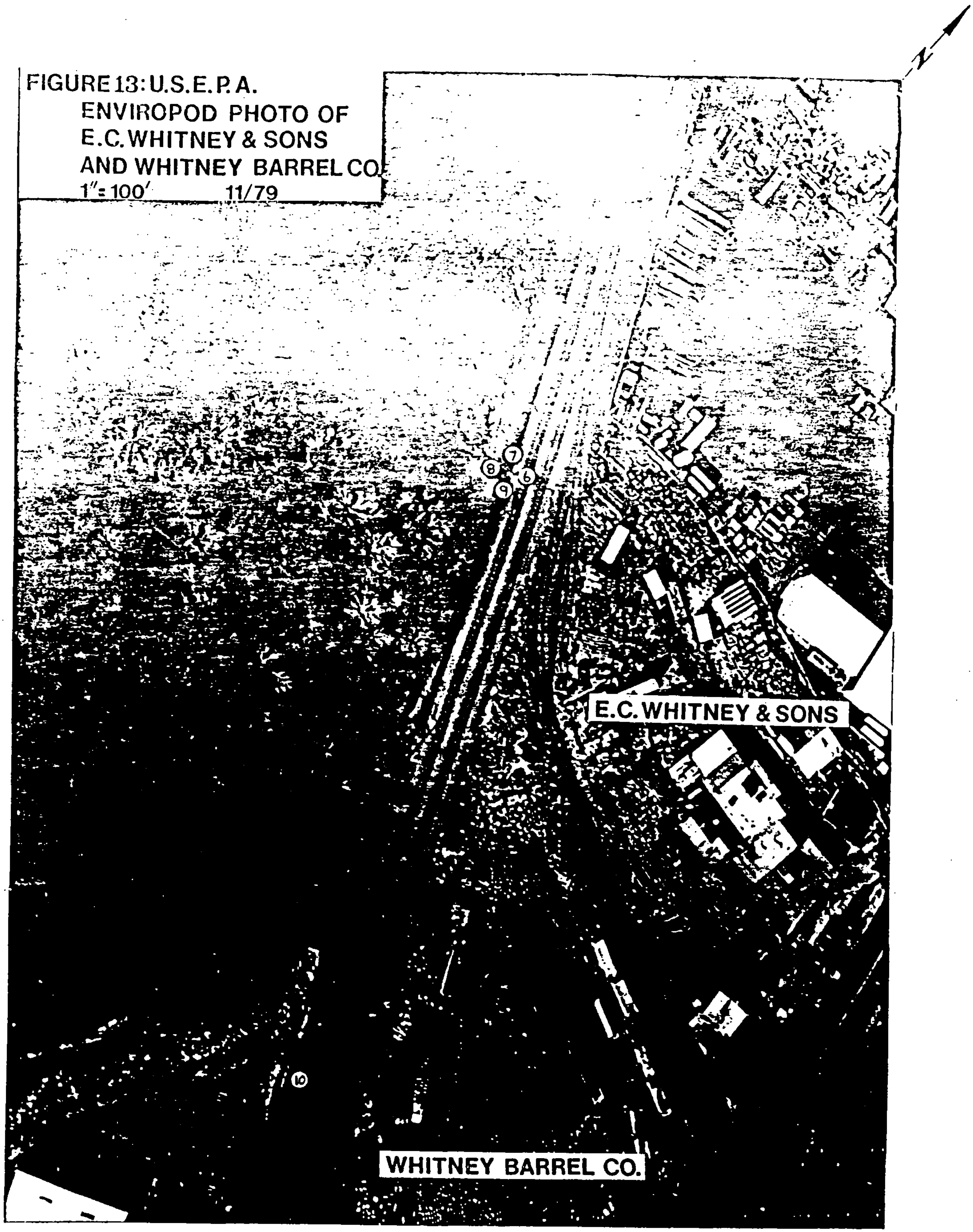


FIGURE 13: U.S.E.P.A.
ENVIROPOD PHOTO OF
E.C. WHITNEY & SONS
AND WHITNEY BARREL CO.
1" = 100'   11/79

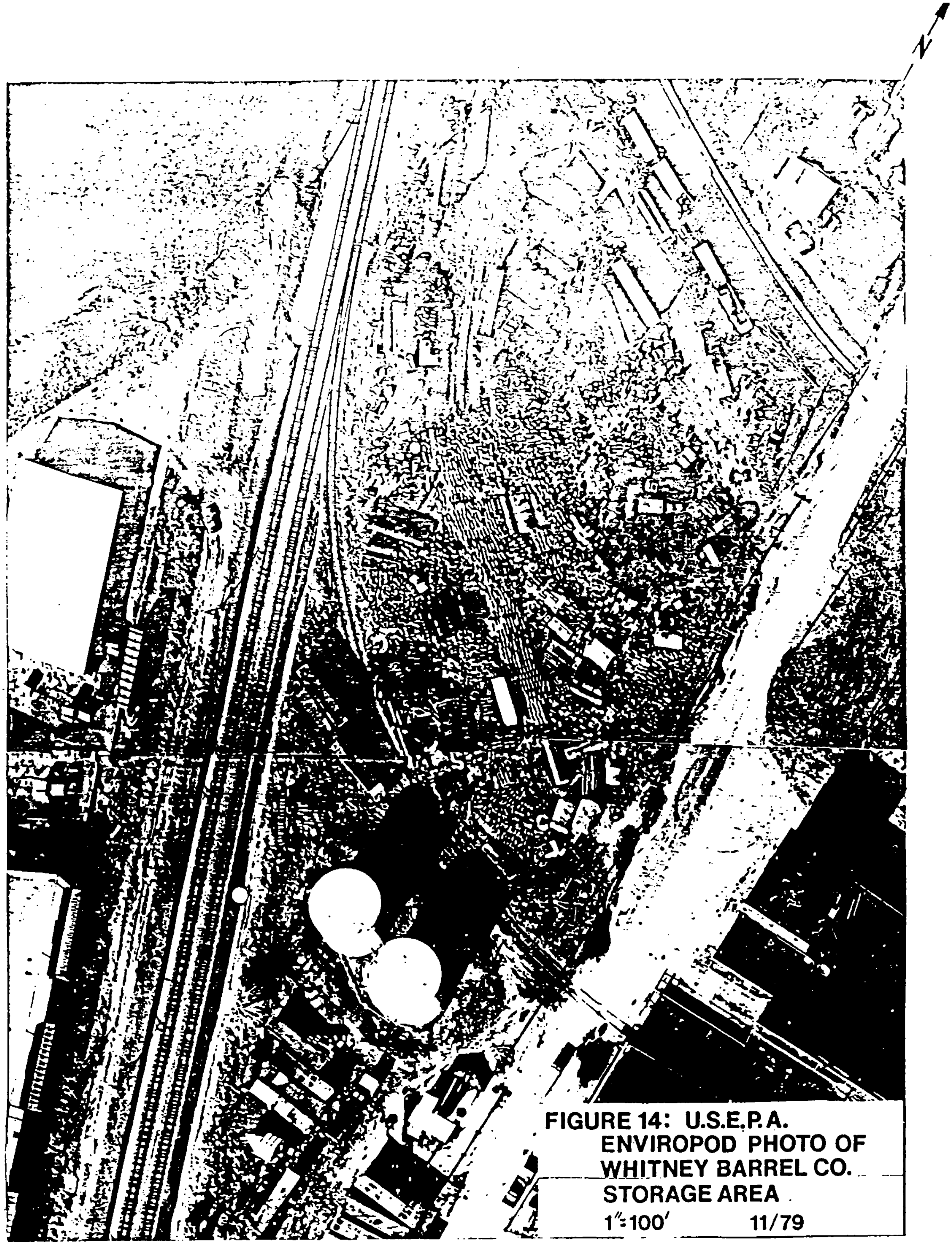


FIGURE 14: U.S.E.P.A.
ENVIROPOD PHOTO OF
WHITNEY BARREL CO.
STORAGE AREA
1"=100' 11/79

4.6 Trichloroethylene - continued

The analysis presented in Appendix F indicates that trichloroethylene is present in the waste products generated at E. C. Whitney & Sons, Inc. It is possible that trichloroethylene is entering the East Drainage Ditch from this source as a result of spillage or leakage or exfiltration from the settling basin located on property.

4.7 1,1,1-TRICHLOROETHANE

Significant concentrations of 1,1,1-trichloroethane were detected in three clusters of sampling points:

a) Just north and south of Eames Street in a configuration similar to that of xylene (Section 4.2).

b) Adjacent to the two drum reclaim and storage operations in a configuration nearly identical to that of trichloroethylene (Section 4.6).

c) In Halls Brook upstream of its confluence with the East Drainage Ditch and at the entrance of Halls Brook Storage Area.

Table 5 indicates that 6000 gallons of 1,1,1-trichloroethane are stored on Raffi & Swanson, Inc. property. The annual throughput is 40,000 gallons. It is possible that activities at Raffi & Swanson, Inc. have contributed to the 1,1,1-trichloroethane contamination of the East Drainage Ditch.

The analysis presented in Appendix F indicates that 1,1,1-trichloroethane is one of the major waste products generated at E. C. Whitney & Sons, Inc. It is possible that some of this compound has found its way into the Ditch from this source as a result of spillage or leakage or exfiltration from the settling basin present on the property. Several culverts leading into Halls Brook may be the source(s) of the 1,1,1-trichloroethane detected in the Brook. The sources of the culverts were not identified during this study.

APPENDIX F

Volatile Organic Analysis of Wastewater-
E. C. Whitney & Sons, Inc.

(From E. C. Whitney & Son, Inc. Sewer Connector to Wilmington Trunk Sewer, North Metropolitan System (MDC))

Analysis by GTE Laboratories on 3 October 1980

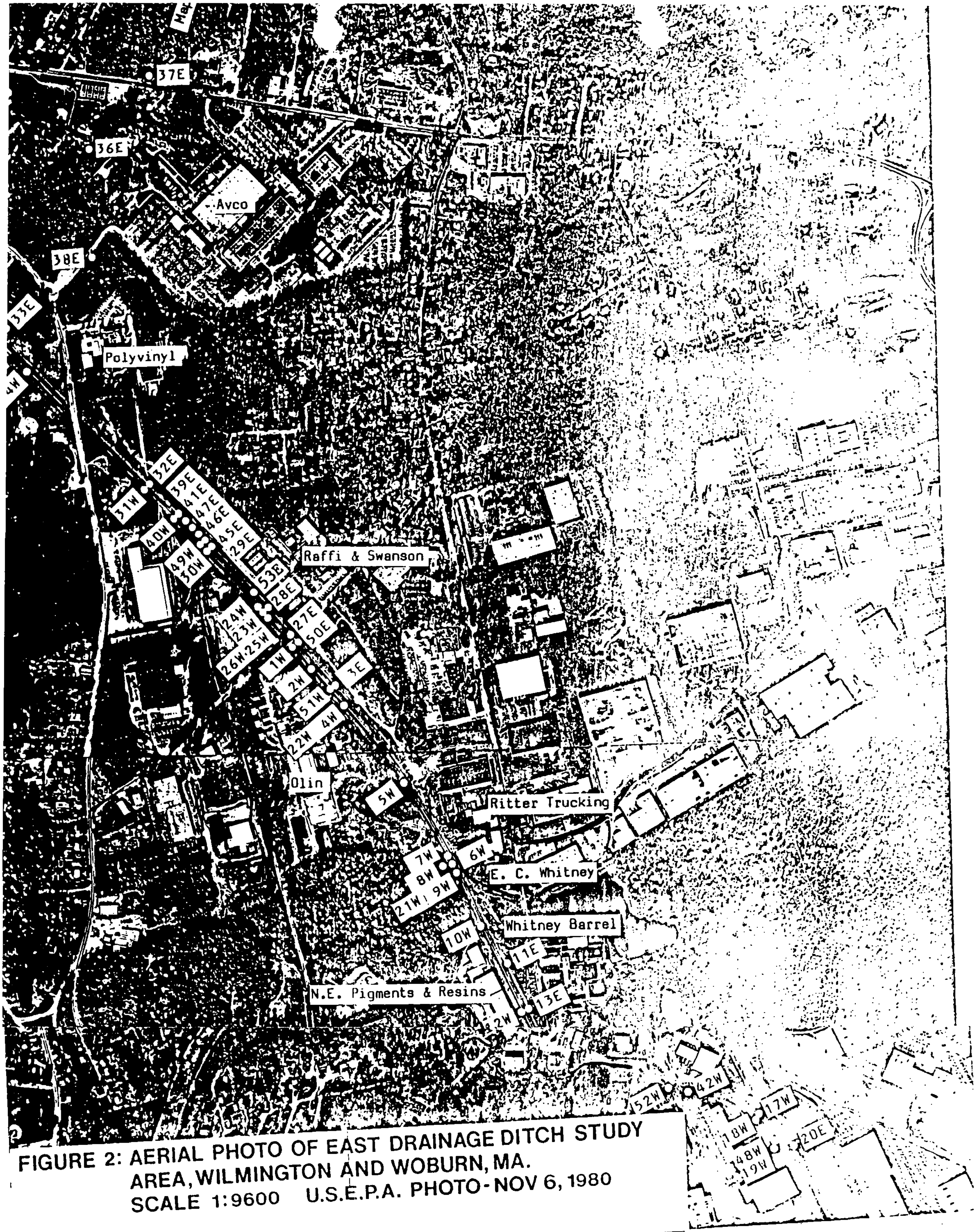
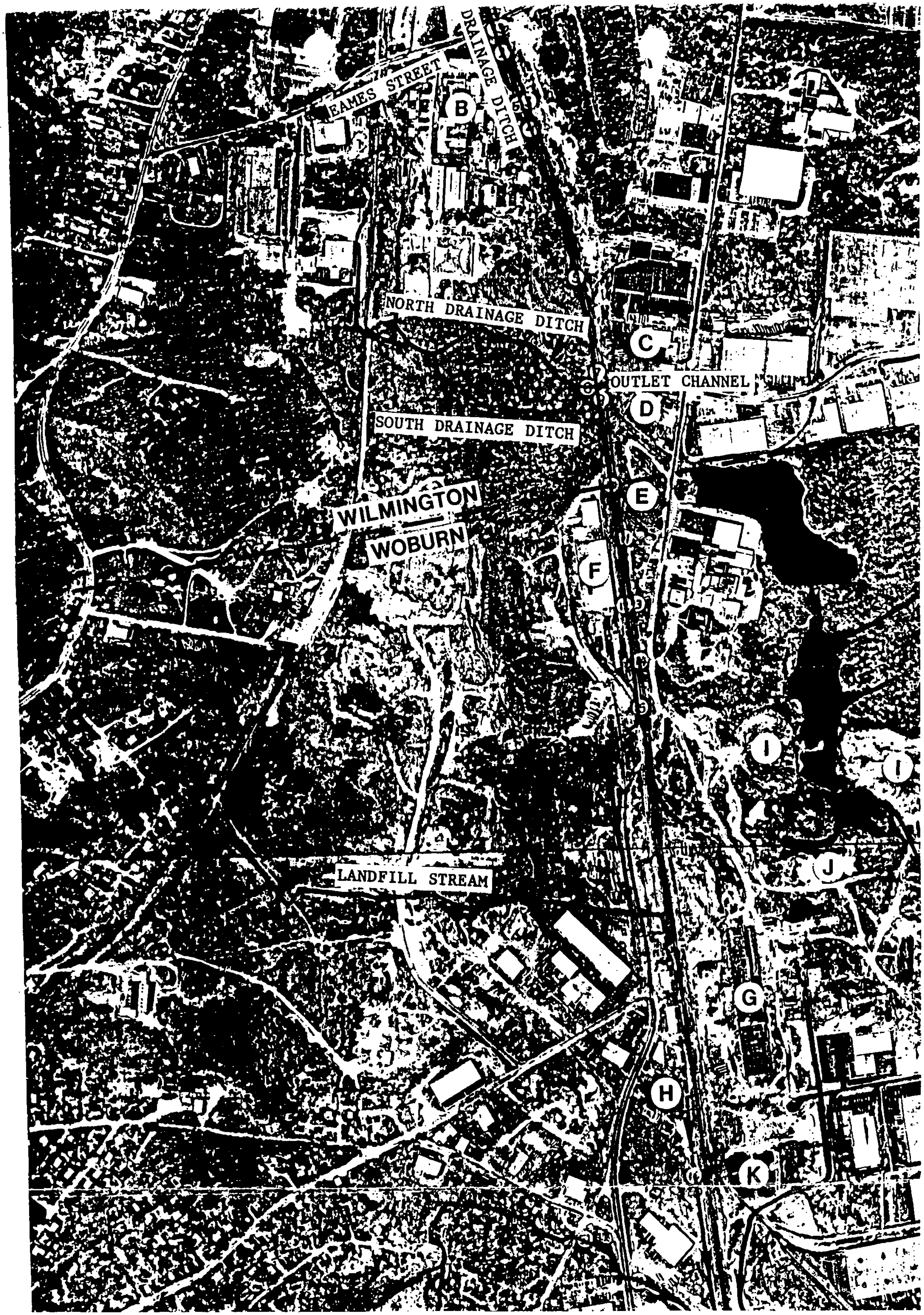


FIGURE 2: AERIAL PHOTO OF EAST DRAINAGE DITCH STUDY AREA, WILMINGTON AND WOBURN, MA.
SCALE 1:9600 U.S.E.P.A. PHOTO - NOV 6, 1980


EAMES STREET
DRAINAGE DITCH
B
NORTH DRAINAGE DITCH
C
OUTLET CHANNEL
D
SOUTH DRAINAGE DITCH
E
WILMINGTON
WOBURN
F
I
I
J
LANDFILL STREAM
G
H
K

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Metropolitan Boston – Northeast Regional Office

ARGEO PAUL CELLUCCI
Governor

TRUDY COXE
Secretary

DAVID B. STRUHS
Commissioner

DEC 08 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

E. C. Whitney & Son, Inc.
888 Woburn Street
Wilmington, MA 01887

RE: WILMINGTON
888 Woburn Street
RTN 3-12680
Downgradient Property Status

ATTN: Mr. Edward C. Whitney

NOTICE OF AUDIT FINDINGS
INTERIM DEADLINES

Dear Mr. Whitney:

The Massachusetts Department of Environmental Protection (the "Department") has conducted an audit of a Downgradient Property Status (DPS) Opinion filed for the subject site. The DPS was prepared by Capaccio Environmental Engineering, Inc., Mr. Stephen Sakakeeny, Licensed Site Professional (LSP No. 5455), and received by the Department on July 30, 1998. The purpose of this notice is to explain the results of the audit.

VIOLATIONS EXIST THAT DO NOT REQUIRE FURTHER ACTION

The Department has found that the audited response actions currently comply with applicable requirements of the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000, although violations occurred. Therefore, no further actions are necessary in this regard at this time. The enclosed Site Memorandum (Attachment A) describes activities Department personnel performed during the audit, summarizes relevant site information, and lists the violations that you have already corrected.

ESTABLISHMENT OF INTERIM DEADLINES

Given that the DPS was terminated on November 20, 1998, the release status defaults back to Tier II, as classified on July 25, 1996. General requirements and response action deadlines for Tier II Disposal Sites are described in 310 CMR 40.0560. Since the deadline for the submittal of a Phase II report, and, if applicable, a Phase III Remedial Action Plan for the subject site expired on July 25, 1998, the Department is hereby establishing the following interim deadlines pursuant to 310 CMR 40.0167:

- October 1, 1999 Submittal of a Phase II report, and, if applicable a Phase III report
- October 1, 2000 Submittal of a Phase IV Remedy Implementation Plan

The deadline for the submittal of a Response Action Outcome Statement will remain at 5 years from the date of Tier Classification or July 25, 2001.

ADDITIONAL COMMENTS

In Section VI of the Site Memorandum, the Department has provided additional observations and recommendations related to the audit. DEP provides those comments to assist E. C. Whitney & Son, Inc. (hereafter referred to as "you/your") and your LSP to better understand the Massachusetts Contingency Plan. Those comments do not constitute violations or deficiencies. Therefore, you do not need to respond to them.

LICENSED SITE PROFESSIONAL

A copy of this Notice has been sent to Mr. Stephen Sakakeeny, the Licensed Site Professional (LSP) of record for your disposal site.

LIMITATIONS

The Department relies upon the accuracy of the information reviewed during the Audit to make these findings. These findings do not: (1) apply to actions or other aspects of the site that were not reviewed in the Audit; (2) preclude future audits of past, current, or future actions at the site; (3) in any way constitute a release from any liability, obligation, action or penalty under M.G.L. c. 21E, 310 CMR 40.0000, or any other law, regulation, or requirement; or (4) limit the Department's authority to take, arrange or require any Responsible Party or Potentially Responsible Party to perform any response action authorized by M.G.L. c. 21E which the Department deems necessary to protect health, safety, public welfare or the environment.

IV. Site Operations and Investigations Summary

The E.C. Whitney & Son, Inc. facility occupies a 2.5 acre parcel on 888 Woburn Street in Wilmington, Massachusetts (See attached Figure 1). The site is located in an industrial area in Wilmington and is abutted to the north by NER Construction, to the south by a ceramics manufacturing facility, to the east by Woburn Street and to the west by railroad tracks and Olin Corp. There is a small drainage ditch west of the property, which runs parallel to the railroad tracks. The property was developed in 1966 by E.C. Whitney & Son, Inc. Prior to that, it was unoccupied. Four structures are present on-site, including: a former residential dwelling used as the main office; a single story corrugated steel building located in the center of the property where drum cleaning, painting, and shredding is conducted; a receiving office located near the property entrance; and a long building running along the north property line used for drum storage and shredding. Based upon a review of the Department's Hazardous Waste files, the E.C. Whitney & Son, Inc. facility is a small quantity generator of class D and F hazardous wastes, as well as waste oil.

E.C. Whitney & Son, Inc. has operated a drum and barrel reclamation facility at the property since 1966. Between 1966 and 1987, up to 300 drums and barrels were reconditioned at the facility per day. Reconditioning consisted of emptying the drums of residual waste and then cleaning, air drying and painting the drums. Empty drums were stored outside in the drum storage area, which has a capacity of 1,000 drums. Wastes collected from the drums were contained within a 275-gallon open-top oil collection tank for offsite disposal. Reportedly, each drum and barrel received at the facility contained less than two pints of waste. Liquids used to wash the drums were collected in a settling basin within one of the onsite buildings. Sludge from the settling basin was collected in drums. Waste liquids from the settling basin were discharged to the sewer.

Following a fire at the facility in 1987, E. C. Whitney & Son, Inc. no longer accepted drums containing residual waste. The drum cleaning operation was modified to consist of steam cleaning, vacuum drying and painting. Wash water from the steam cleaning is contained within a wastewater treatment system. Used filters within the wastewater treatment system are disposed offsite. Most of the drums are now shredded for recycling purposes, rather than reconditioned.

Five soil borings/monitoring wells have been installed at the site as part of subsurface investigations conducted at the property. Three of the wells are located in the vicinity of the drum cleaning and reconditioning area while one well couplet (wells CEE-4S and CEE-4D) is located within the drum storage area. Soil samples from boring CEE-4S were submitted for analysis of volatile organic compounds via US EPA Method 8260. Elevated levels of VOCs were detected in the soil sample collected below the water table. Groundwater samples were collected from the wells on June 12, 1996 (including three wells located on the abutting 891 Woburn Street property) and on April 28, 1998. The highest VOC concentrations in the onsite wells were noted in CEE-4S, which contained toluene concentrations above the Method 1 GW-3 standard. The groundwater sample from this well also contained elevated levels of xylenes, though the concentrations were below the GW-3 standard. Groundwater elevation data collected during both sampling events indicated that the groundwater flow direction is to the southeast, towards the 891 Woburn Street property and Woburn Street.

Downgradient Property Status

On July 30, 1998, the Department received a Downgradient Property Status Opinion for the subject site indicating that "the source of toluene, xylene, and trichloroethene in groundwater at E.C. Whitney & Son, Inc. is located on an up gradient property and that the contamination came to be located on the site as a result of groundwater migration. Available data indicates that activities at the site have not contributed or exacerbated the groundwater contamination" (page 20).

V. Audit Findings

On the basis of the information examined during the audit, the following violations of the requirements of M.G.L. c. 21E or the MCP were noted.

1. Violation

According to 310 CMR 40.0183(4), a Downgradient Property Status Opinion shall be based on investigative and assessment actions of sufficient scope and level of effort to conclude that the criteria in 310 CMR 40.0183(2)(b) have been met. Specifically, that the source of the release of oil and/or hazardous material at the downgradient property (i) is or was located on one or more upgradient properties and oil and/or hazardous material from that source has come to be located at the downgradient property as a result of migration of the oil and/or hazardous material in or on groundwater, regardless of whether the upgradient property or properties which is/are the source has/have been identified as the source of the release; or (ii) is or was located on one or more upgradient properties and oil and/or hazardous material from that source has come to be located at the downgradient property as a result of migration of the oil and/or hazardous material in or on surface water, and the upgradient property or properties that is/are the source has/have been identified. Based upon information submitted to date for the subject site, there is insufficient information to support the conclusion that the source of the release of petroleum constituents and chlorinated solvents in groundwater at 888 Woburn Street is/was located on an upgradient property. Rather, there is information to suggest that the source of the release was located at 888 Woburn Street itself. Specifically,

- According to analytical results from the Phase II Field Investigation Report for the Olin Corporation property prepared by Conestoga-Rovers & Associates dated June 25, 1993, no toluene, ethylbenzene or xylenes were detected in wells GW-4, GW-50S and GW-50D, located near the property boundary with the E.C. Whitney & Son, Inc. property. Contaminants at the Olin Corp. facility consist principally of chromium and other inorganic compounds, which are not associated with petroleum releases.

If you have any questions regarding the content of this Notice, please contact Peter Richards at (978) 661-7837 or the letterhead address. Please reference Release Tracking Number 3-12680 in any correspondence regarding the site.

Sincerely,

Pete Richards

Peter Richards
Environmental Analyst

Patricia M Donahue

Patricia Donahue
Chief, Audit Section
Bureau of Waste Site Cleanup

Attachments: A. Site Memorandum

cc: Data Entry/Files/NAFVIO
DEP/BWSC/ NERO Attn: John Fitzgerald
DEP/BWSC/Boston Attn: Tom Potter
Wilmington Board of Health, 121 Glen Road, Wilmington, MA 01887
Wilmington Board of Selectman, 121 Glen Road, Wilmington, MA 01887
Mr. Stephen Sakakeeny, Capaccio Environmental Engineering, Inc., 75 Union Avenue, Sudbury, MA 01776
Olin Corp., P.O. Box 248, Charleston, TN 37310 ATTN: Stephen Morrow
Boston & Maine RR, c/o Guilford Trans Ind., 402 Amherst Street, Ste. 300, Nashua, NH 03063
Augustine Sheehy, 891 Woburn Street, Wilmington, MA 01887

ATTACHMENT A

SITE MEMORANDUM

E. C. Whitney & Son, Inc.
Release Tracking No. 3-12680

I. Actions Audited

The purpose of this memorandum is to document the audit, pursuant to the Massachusetts Contingency Plan (MCP) 310 CMR 40.1100, of a Downgradient Property Status Opinion filed for the subject site. The DPS was prepared by Mr. Stephen Sakakeeny (LSP No. 5455) and received by the Department July 30, 1998.

II. Audit Activities

The audit included a Notice of Audit dated August 31, 1998, and a review of the following:

> "Downgradient Property Status Opinion", prepared by Capaccio Environmental Engineering, Inc., Stephen A. Sakakeeny, LSP #5455, and received by the Department on July 30, 1998.
>
> "Phase I Report for E. C. Whitney & Son, Inc., 888 Woburn Street, Wilmington, Massachusetts", prepared by Capaccio Environmental Engineering, Inc., Stephen Sakakeeny, LSP #5455, and received by the Department July 25, 1996.

III. Site Regulatory Summary

On April 18, 1995, the Department received an LSP Evaluation Opinion for 888 Woburn Street, Wilmington, Massachusetts, Release Tracking Number 3-1787, which stated that the location was not a disposal site where a release or threat of release of oil and/or hazardous materials had occurred and no further actions were necessary. Based upon a review of information available at the time, or lack thereof, the Department agreed in a Notice of Audit Findings dated December 14, 1995, that a reportable condition had not been documented to date for the site and, therefore, RTN 3-1787 was closed out. However, based upon the history of the site, the Department determined that there was adequate information to indicate the potential for releases to have occurred at the property. The Department subsequently assigned Release Tracking Number 3-12680 and issued a Notice of Responsibility (NOR) to E. C. Whitney & Son, Inc. on July 25, 1995. A Phase I report and Tier Classification were submitted to the Department on July 25, 1996. A DPS Opinion was submitted to the Department on July 30, 1998.

- Toluene and xylene were noted in groundwater samples collected from wells located on the upgradient edge of the E. C. Whitney & Son, Inc. property (wells CEE-4S and CEE-4D) during the April 28, 1998 groundwater sampling event. However, these wells are located within a potential onsite source area (i.e., the drum storage area). The elevated toluene concentration (260 parts per million) in the groundwater sample from CEE-4S suggests that the sample was collected near the source of the release.

- There are several potential source areas at the E.C. Whitney & Son, Inc. facility, including the former wastewater settling basin, the former open-top oil tank, the drum storage area and the drum cleaning/reconditioning building.

- Stained surficial soils have been documented on the property, indicating onsite releases (Phase I Report, p.9).

2. Violation

According to 310 CMR 40.0183(2)(c), no act of such person providing Downgradient Property Status shall contribute to the release. As summarized above, there is sufficient evidence to conclude that past and/or present operations at the E. C. Whitney & Son, Inc. facility have contributed to the release.

Steps to Address the Violations

Since the DPS was terminated on November 20, 1998, no additional actions are required in this regard, at this time. However, given that the DPS was terminated, the release status defaults back to Tier II, as classified on July 25, 1996. General requirements and response action deadlines for Tier II Disposal Sites are described in 310 CMR 40.0560. Since the deadline for the submittal of a Phase II report, and if applicable a Phase III Remedial Action Plan for the site expired on July 25, 1998, the Department is establishing an interim deadline of October 1, 1999 for the submittal of a Phase II report, and if applicable a Phase III report and an interim deadline of October 1, 2000 for the submittal of a Remedy Implementation Plan. The deadline for the submittal of a Response Action Outcome Statement would remain at 5 years from the date of Tier Classification or July 25, 2001.

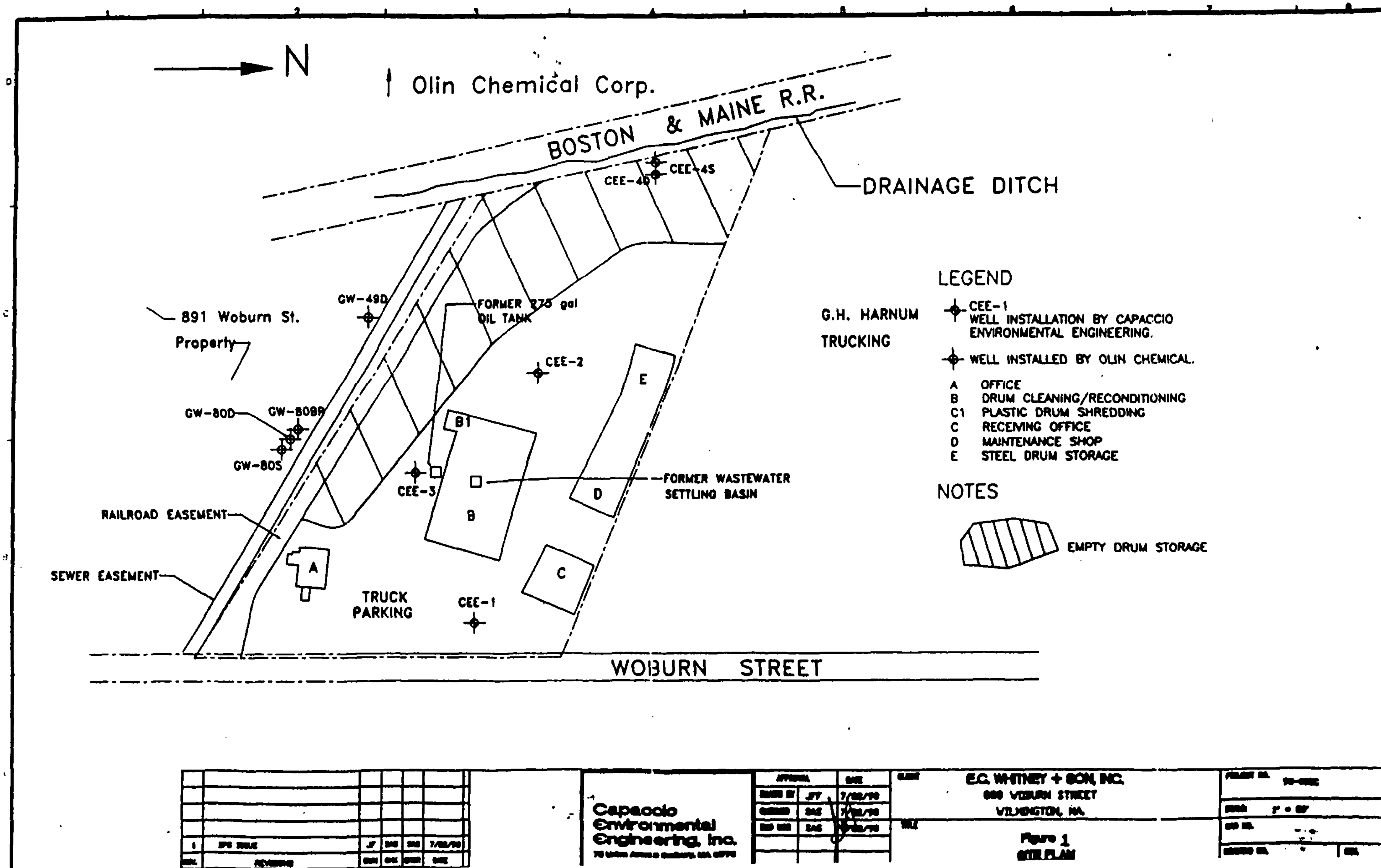
VI. Additional Comments

The items below are observations and recommendations from the Department on the actions that were audited. These observations and recommendations do NOT constitute deficiencies or violations and require no response to the Department from you. Instead, they are included to help you and your LSP better understand M.G.L. c. 21E, 310 CMR 40.0000 and other requirements applicable to the site.

- During investigations at the facility, several VOCs were detected in soil and groundwater samples collected from borings/wells for which there are no Method 1 standards. The concentrations of the VOCs detected in the soil and water for which there is no Method 1 standard were compared to the reportable concentration for S-2 soil and GW-2 water, respectively. Reportable concentrations are not always risk based and, therefore, cannot be used for comparison to Method 1 standards. For compounds, which have no Method 1 standards, Method 2 may be used to develop one.

- Soil samples were collected during the installation of each of the wells and submitted for laboratory VOC analysis. The samples were not preserved with methanol or other preservative prior to submittal to the laboratory. There is now considerable evidence and data demonstrating substantial losses (>90%) of VOCs from unpreserved sampling containers. The US EPA published in the June 13, 1997 Federal Register a method to preserve soil samples prior to VOC analysis (EPA Method 5035). As indicated in 310 CMR 40.0017, any individual undertaking response actions shall ensure that analytical data used in support of an LSP Opinion are scientifically valid and defensible and are of a level of precision and accuracy commensurate with their use. The Response Action Performance Standard (RAPS) (310 CMR 40.0191) requires the use of accurate and up-to-date methods, standards and practices in conducting response actions. Given the evidence of VOC loss during unpreserved soil sample collection, the availability of an EPA method to properly preserve soil samples and the performance standard, the Department does not consider VOC analytical results from unpreserved soil samples to be scientifically valid and defensible. Additional soil samples collected during further response actions for this site must be properly preserved in compliance with current EPA and DEP methods. VOC analytical data from unpreserved soil samples will be considered invalid and will not meet the requirements of the MCP.

- The Phase I Report indicated that the liquids contained in the drums prior to cleaning was "residual virgin oil", though the type of oil was not identified. The DPS referred to the liquids in the drums as "residual wastes". It is unclear whether any of the drums may have contained PCB-bearing transformer, waste or other oils. The soil and groundwater samples collected from the E. C. Whitney & Son, Inc. property were analyzed solely for VOCs. The Department has determined that the existing analytical data are not sufficient to characterize the release at the E. C. Whitney & Son, Inc. facility. Future response actions conducted at the property should evaluate the potential for contaminants other than petroleum hydrocarbons to be present.



N
Olin Chemical Corp.
BOSTON & MAINE R.R.
DRAINAGE DITCH
CEE-4D
CEE-4S
GW-49D
FORMER 275 gal OIL TANK
891 Woburn St. Property
G.H. HARNUM TRUCKING
CEE-2
E
B1
GW-80D
GW-80BR
GW-80S
CEE-3
FORMER WASTEWATER SETTLING BASIN
D
B
RAILROAD EASEMENT
SEWER EASEMENT
A
C
TRUCK PARKING
CEE-1
WOBURN STREET
LEGEND
CEE-1 WELL INSTALLATION BY CAPACCIO ENVIRONMENTAL ENGINEERING.
WELL INSTALLED BY OLIN CHEMICAL.
A OFFICE
B DRUM CLEANING/RECONDITIONING
C1 PLASTIC DRUM SHREDDING
C RECEIVING OFFICE
D MAINTENANCE SHOP
E STEEL DRUM STORAGE
NOTES
EMPTY DRUM STORAGE
Capaccio Environmental Engineering, Inc.
E.C. WHITNEY + SON, INC.
VILMINGTON, MA.
Figure 1

DOWNGRADIENT PROPERTY STATUS OPINION

FOR

E.C. WHITNEY & SON, INC.
888 WOBURN STREET
WILMINGTON, MASSACHUSETTS

RTNs # 3-1787 and #3-12680

JULY 1998

THIS REPORT WAS PREPARED BY
CAPACCIO ENVIRONMENTAL ENGINEERING, INC.

COMMONWEALTH OF MASSACHUSETTS
STEPHEN
A.
SAKAKEENY
NO. 5455
LICENSED SITE PROFESSIONAL

STEPHEN A. SAKAKEENY, LSP, PG
MA LICENSED SITE PROFESSIONAL NO. 5455

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VI. SUBSURFACE INVESTIGATION:

A. Drilling And Soil Sampling

A subsurface investigation was conducted by Capaccio as part of Comprehensive Response Actions. Two borings (CEE-4S and CEE-4D) were advanced on-site by at locations shown in Figure 2. Drilling was conducted by Technical Drilling Services, Inc. of Leominster, MA. Drilling was observed by Environmental Sampling Technology of Needham, MA. Both operated as subcontractors to Capaccio. Borings were advanced at the up gradient property line to determine whether contaminated groundwater was migrating on to the E.C. Whitney & Son, Inc. property. An up gradient source of contamination was suspected by Capaccio based on site conditions and E.C. Whitney & Son, Inc.'s chemical use documented in the Phase I investigation.

Boring CEE-4S was advanced to 11 feet below the ground surface. This boring was designed to install a groundwater monitoring well in the top ten feet of groundwater. CEE-4D was advanced to a total depth of 47 feet below the ground surface. Bedrock was encountered at 32 feet below the ground. This well was designed to monitor groundwater quality in shallow bedrock.

Borings were advanced through the overburden using 4.25 inch inside diameter hollow stem augers. Drilling in rock was conducted using an air hammer. Soil samples were collected using a two foot long split spoon sampler. Rock samples were not collected.

General geologic conditions beneath the site consisted of sandy material underlain by bedrock. Bedrock was encountered at 32 feet below the ground surface at boring CEE-4D. Boring logs are included in Appendix A.

Regional geology was reported in a Phase II report prepared by Conestoga-Rovers & Associates, Inc. for Olin Corporation (Olin). Olin is located west of E.C. Whitney & Son, Inc. across the Boston & Maine Railroad tracks. Their investigation included drilling and installation of four groundwater monitoring wells (GW-49, GW-80S, GW-80D, GW-80BR) on adjacent property located south of E.C. Whitney & Son, Inc.. Based on that report, area geology consists of glacial outwash, glacial ice contact deposits, glacial till, and gneiss bedrock. GW-80D verified bedrock at 16 feet deep. The report shows that E.C. Whitney & Son, Inc. is located over a bedrock valley designated by Conestoga-Rovers & Associates, Inc. as the East Bedrock Valley.

All down-hole drilling equipment (i.e., augers, drilling rods, and tools) were steam cleaned prior to drilling the first boring and between subsequent borings. The split spoon sampler was decontaminated between sample collection with an Alconox detergent wash followed by methanol and distilled water rinses.

Soil samples collected during drilling were screened in the field for total volatile organic compounds (VOCs) in headspace. Screening was conducted using an Hnu portable organic vapor meter calibrated to benzene. Screening results were used for both health and safety purposes and to quickly characterize soil quality. Results are listed in Table 1. Total VOC concentrations exceeding 2000 parts per million (ppm) were detected in all but the top two feet of soil at CEE-4. Soil collected from 0.6 to 1.6 feet deep and from 3.6 to 4.6 feet deep were submitted to Alpha Analytical of Westborough, MA and analyzed for VOCs by EPA Method 8260. The shallow sample was collected to represent soil quality located above the water table. Significant contamination of this soil would be indicative of a release at E.C. Whitney & Son, Inc. that has migrated down through the unsaturated zone. The deeper sample was collected to represent soil quality below the water table where contamination of this soil would occur from contaminated groundwater that had migrated on to the site. The groundwater table is about 2.5 feet below the ground.

B. Groundwater Monitoring Well Installation

All wells are constructed of two inch inside diameter polyvinyl chloride (PVC) well screen and solid riser. The well screen is machined with 0.010 inch slots to allow groundwater flow through the well. The annular space between the bore hole and well screen is backfilled with silica sand to prevent clogging and enhance well production. A clay seal, using bentonite pellets, was backfilled above the sand to isolate the monitoring zone. At CEE-4S, the remainder of the borehole was backfilled with natural material to six inches below the ground surface. At CEE-4D, an enhanced seal was installed to hydraulically isolate the monitoring zone of this well. The bentonite pellets were installed as a separator seal. A bentonite/cement grout was installed above the separator seal to six inches below the ground surface. A protective casing was placed over each well and set in concrete. Monitoring well construction log are included in Appendix B. Field notes are included in Appendix C.

The wells were developed to remove sediment that had accumulated in the well from drilling and to enhance groundwater production. Development was conducted by pumping groundwater from each well until groundwater was reasonable clear of sediment.

C. Groundwater Sampling

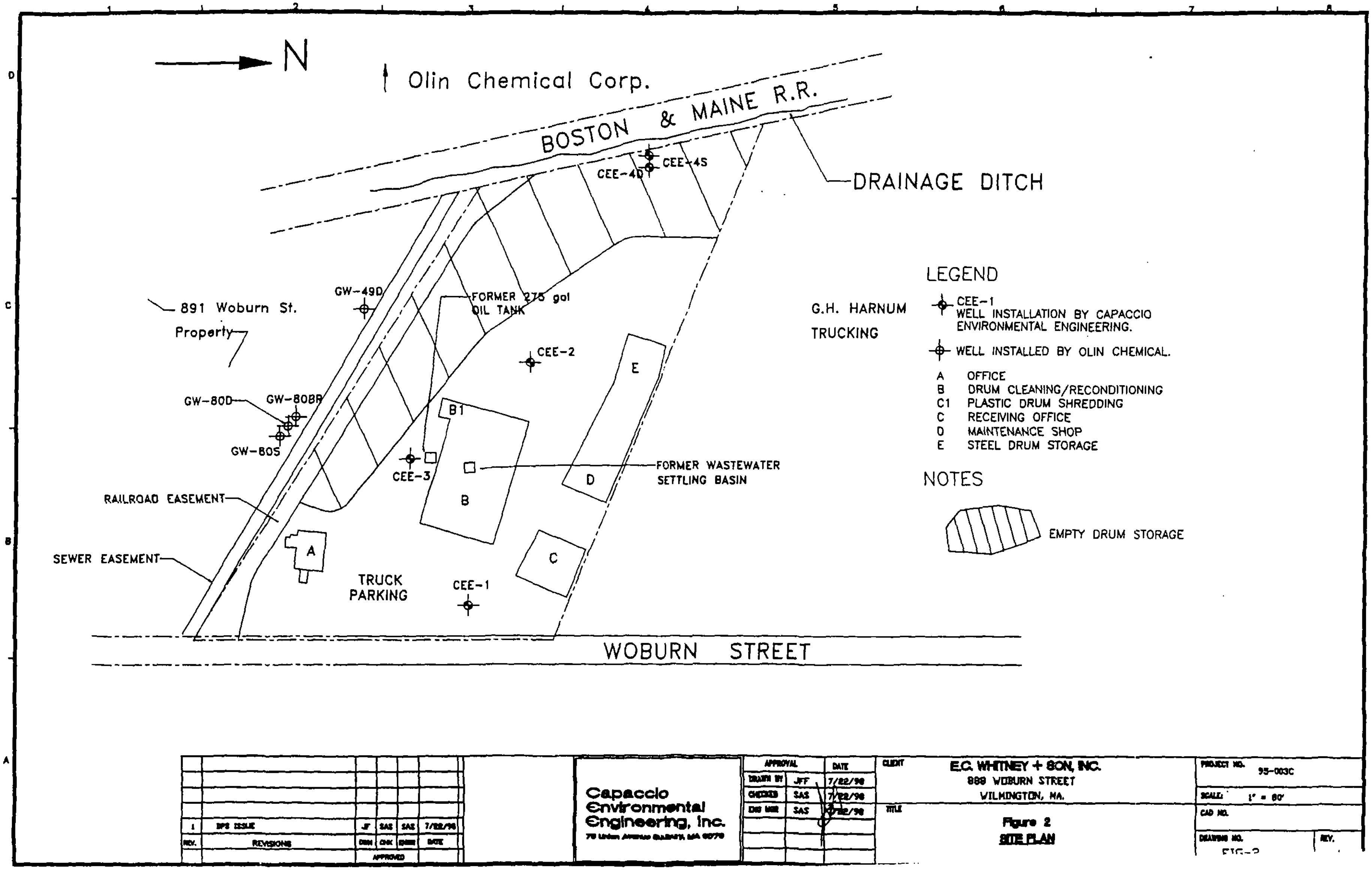
A groundwater sample was collected from the newly installed wells and from existing wells CEE-1, CEE-2, and CEE-3 by Environmental Sampling Technology, Needham, Massachusetts as subcontractors to Capaccio.

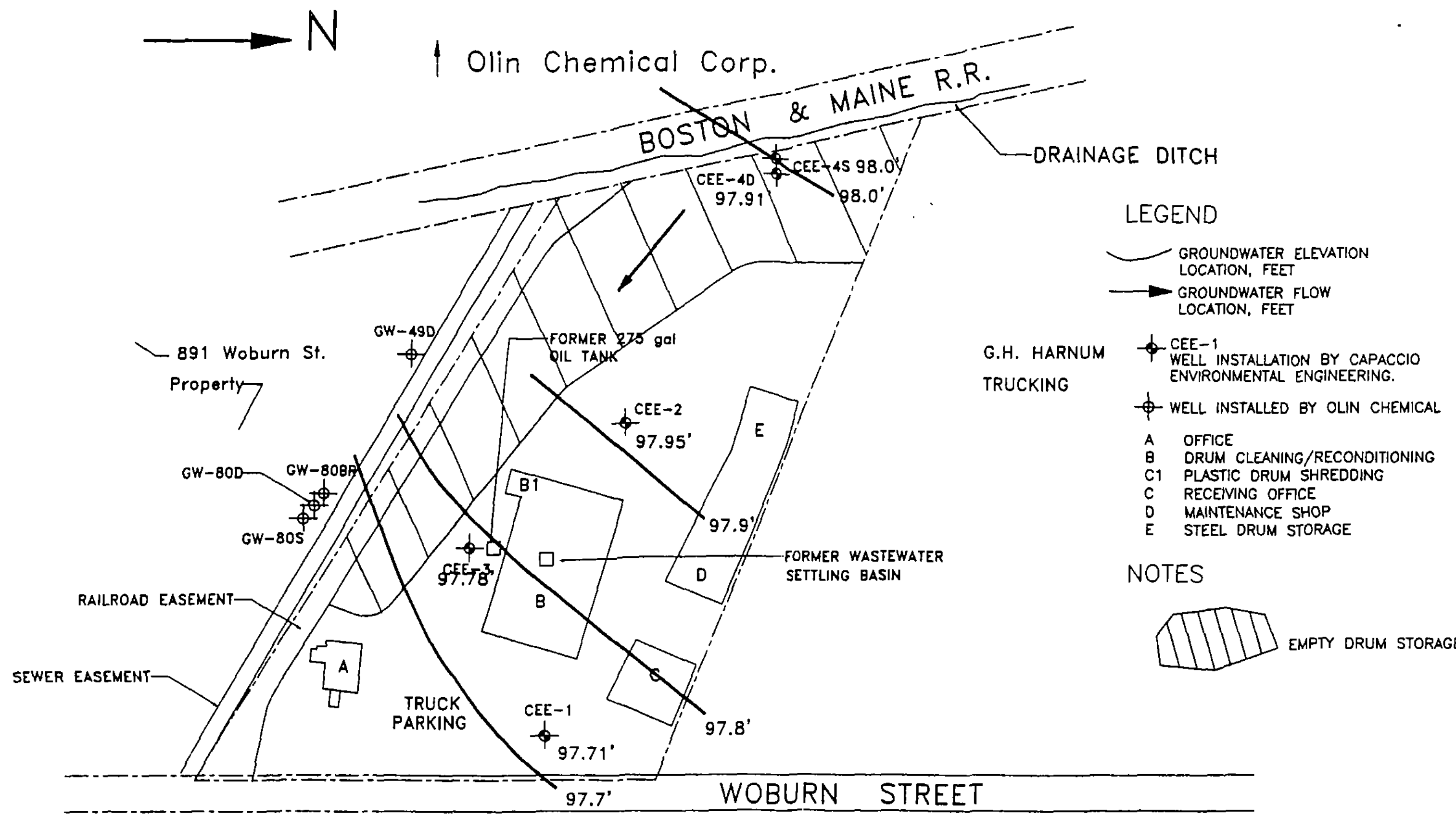
Prior to sampling, the depth to groundwater was measured. Each well was then purged of stagnant groundwater prior to sampling. Three well volumes of groundwater were purged using precleaned bailers. Temperature, pH, specific conductivity, dissolved oxygen, and oxidation/reduction potential were measured during development to ensure thorough aquifer purging. Screening results measured from the third purge volume are listed in Table 2.

Groundwater samples were collected after purging. All groundwater samples were submitted to Alpha Analytical Laboratory, Westborough, MA, a state certified laboratory, and analyzed for volatile organic compounds (VOCs) by EPA Method 8260. All samples were preserved in the field and kept cool for shipment to the laboratory.

D. Hydrogeology

Groundwater beneath E.C. Whitney & Son, Inc. was measured on April 28, 1998 and ranged from 1.2 feet to 2.5 feet deep. Top of PVC-casing elevations were surveyed by Martinage Engineering Associates, Inc., of Reading, Massachusetts and by Giles Surveying of North Andover, MA as subcontractors to Capaccio. This data are listed in Table 3. Groundwater elevation contours and flow direction are shown in Figure 3. Groundwater flow beneath the site is from northwest to southeast primarily toward Woburn Street. This flow direction is similar to that presented in Conestoga-Rovers & Associates', Inc. Phase II report for Olin. A component of groundwater flows toward the 891 Woburn Street property. The Boston & Maine railroad tracks are located immediately up gradient of E.C. Whitney & Son, Inc.. Olin is located further up gradient beyond the railroad tracks.


N
Olin Chemical Corp.
BOSTON & MAINE R.R.
CEE-4D
CEE-4S
DRAINAGE DITCH
LEGEND
CEE-1 WELL INSTALLATION BY CAPACCIO ENVIRONMENTAL ENGINEERING.
WELL INSTALLED BY OLIN CHEMICAL.
A OFFICE
B DRUM CLEANING/RECONDITIONING
C1 PLASTIC DRUM SHREDDING
C RECEIVING OFFICE
D MAINTENANCE SHOP
E STEEL DRUM STORAGE
NOTES
EMPTY DRUM STORAGE
G.H. HARNUM TRUCKING
891 Woburn St. Property
GW-49D
FORMER 275 gal OIL TANK
CEE-2
GW-80D
GW-80BR
GW-80S
B1
CEE-3
FORMER WASTEWATER SETTLING BASIN
RAILROAD EASEMENT
SEWER EASEMENT
A
B
C
D
E
TRUCK PARKING
CEE-1
WOBURN STREET
1 BPS ISSUE JF SAS SAS 7/22/98
REV. REVISIONS DRN CHK ENGR DATE
APPROVED
Capaccio Environmental Engineering, Inc.
APPROVAL DATE
DRAWN BY JFF 7/22/98
CHECKED SAS 7/22/98
ENG MGR SAS 7/22/98
CLIENT E.C. WHITNEY + SON, INC.
889 WOBURN STREET
WILMINGTON, MA.
TITLE Figure 2 SITE PLAN
PROJECT NO. 95-003C
SCALE: 1" = 80'
CAD NO.
DRAWING NO.
REV.



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		APPROVED			

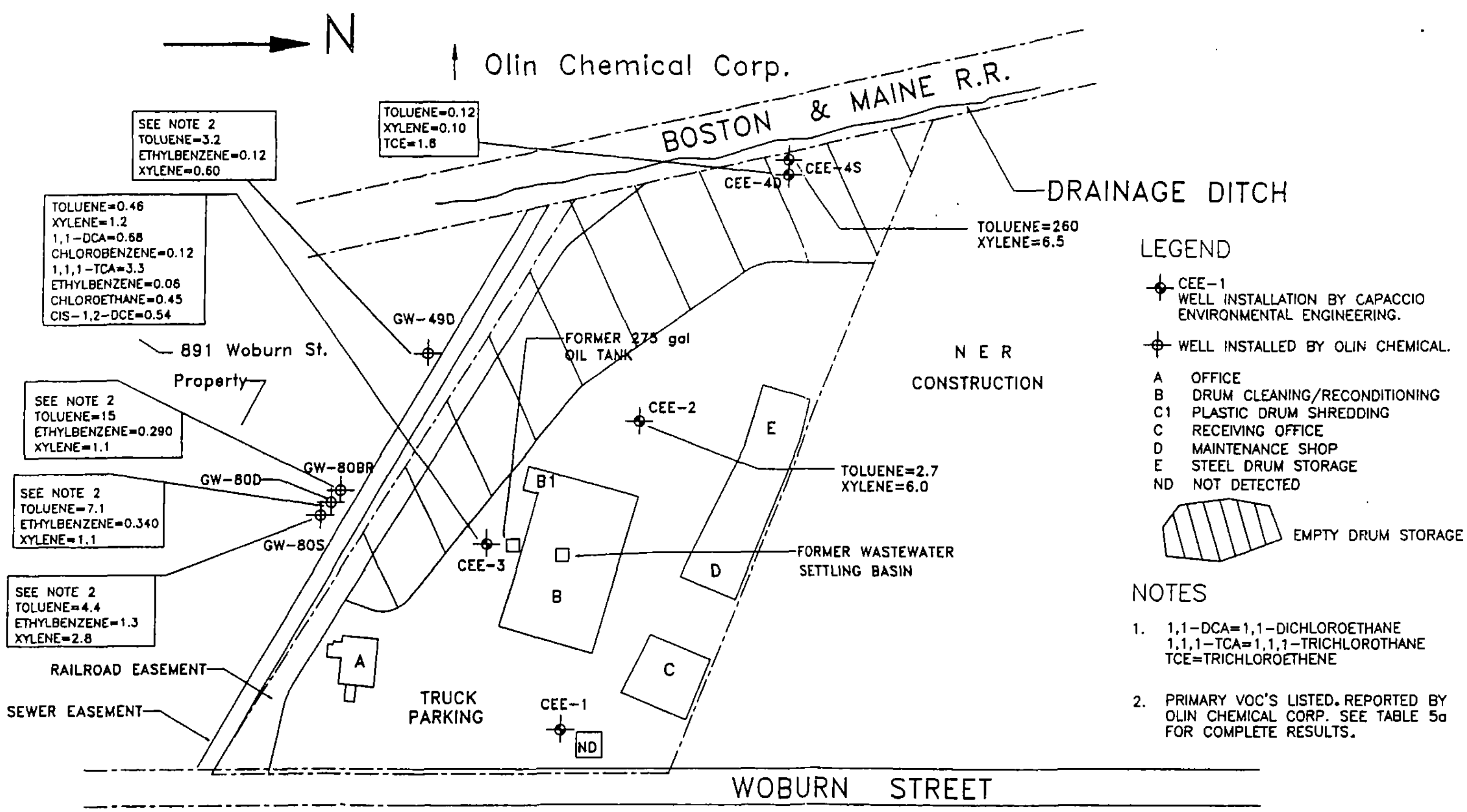
Capaccio Environmental Engineering, Inc.
75 Union Avenue Sudbury, MA 01776

APPROVAL		DATE
DRAWN BY	JFF	7/22/98
CHECKED	SAS	7/22/98
ENG MGR	SAS	7/22/98

CLIENT: E.C. WHITNEY + SON, INC.
888 WOBURN STREET
WILMINGTON, MA.

TITLE: Figure 3
GROUNDWATER FLOW April 28, 1998

PROJECT NO. 95-003C
SCALE: 1" = 80'
CAD NO.
DRAWING NO. FIG-3
REV. 1



NOTES

1. 1,1-DCA=1,1-DICHLOROETHANE
   1,1,1-TCA=1,1,1-TRICHLOROTHANE
   TCE=TRICHLOROETHENE
2. PRIMARY VOC'S LISTED. REPORTED BY OLIN CHEMICAL CORP. SEE TABLE 5a FOR COMPLETE RESULTS.

REV.	REVISIONS	DWN	CHK	ENGR	DATE
1	BPS ISSUE	JF	SAS	SAS	7/22/98
		APPROVED			

Capaccio Environmental Engineering, Inc.
75 Union Avenue Sudbury, MA 01776

APPROVAL		DATE
DRAWN BY	JFF	7/22/98
CHECKED	SAS	7/22/98
ENG MGR	SAS	7/22/98

CLIENT: E.C. WHITNEY + SON, INC.
888 WOBURN STREET
WILMINGTON, MA.

TITLE: Figure 4
DISTRIBUTION OF CONTAMINANTS, PPM
APRIL 28, 1998

PROJECT NO. 95-003C
SCALE: 1" = 80'
CAD NO.
DRAWING NO. FIG-4
REV. 1

TABLES

TABLE 1
RESULTS OF SOIL SCREENING[1]

E.C. WHITNEY & SON, INC.

Boring	Sample	Depth (feet)	Total VOCs (ppm)
CEE-1	S1	0 TO 2	3
	S2	5 TO 7	0
	S3	10 TO 12	0
CEE-2	S1	0 TO 2	7
	S2	5 TO 7	7
	S3	10 TO 12	9
CEE-3	S1	0 TO 2	1
	S2	5 TO 7	7
	S3	10 TO 12	5
CEE-4S	S-1	06 TO 1.6	38.2
	S-2	1.6 TO 2.6	> 2000
	S-3	2.6 TO 3.6	> 2000
	S-4	3.6 TO 4.6	> 2000
CEE-4D	CUTTINGS	0 TO 5	> 2000
	S-1	5 TO 7	> 2000
	S-2	10 TO 12	> 2000
	S-3	15 TO 17	> 2000
	S-4	20 TO 22	> 2000

Notes: 1. VOCs = volatile organic compounds; ppm = parts per million.

TABLE 2
RESULTS OF GROUNDWATER SCREENING[1]
28-Apr-98

E.C. WHITNEY & SON, INC.
WILMINGTON, MA

Well	pH (standard Units)	Temperature (oC)	Specific Conductivity (umhos)	Redox Potential (mV)	Dissolved Oxygen (mg/L)
CEE-1	6.82	17.1	240	-50.3	4.8
CEE-2	6.42	13.6	1010	-27.9	4.8
CEE-3	6.55	16.6	550	-45	4.6
CEE-4S	5.78	16.2	470	25.2	4.6
CEE-4D	6.83	14	3500	-40.2	3.9

Notes: 1. The measurements above were taken from the third well volume of purged groundwater

TABLE 3
GROUNDWATER ELEVATIONS, FEET

E.C. WHITNEY & SON, INC.
WILMINGTON, MA

Well	Top of PVC Casing Elevation (feet)	12-Jun-96		28-Apr-98	
		Depth	Elevation	Depth	Elevation
CEE-1	98.95	1.92	97.03	1.24	97.71
CEE-2	99.6	2.45	97.15	1.65	97.95
CEE-3	99.88	2.79	97.09	2.1	97.78
CEE-4S	100.55	Not installed	-	2.55	98
CEE-4D	100.57	Not installed	-	2.76	97.81
GW-80BR	100.56	3.68	96.88	Not measured	-
GW-80D	100.71	3.8	96.91	Not measured	-
GW-80S	100.81	4	96.81	Not measured	-

Notes: 1. Top of well casing elevations were measured by Martinage Engineering Associates, Inc. of Reading , Massachusetts and Giles Surveying of North Andover, MA. Elevations are based on an assumed onsite datum of 100 feet.

TABLE 4

Soil Results, ppm
EC Whitney Sons, Inc.
Wilmington, MA

			MCP Method 1	MCP Method 1
	#1 CEE 4S	#2CEE 4S	S1/GW2 - S1/GW3	S3/GW2 - S3/GW3
Depth (feet):	0.6 to 1.6	3.6 to 4.6		
Tetrachloroethene	0.027	LT 1.5	20	20
Toluene	0.770	**>6000**	500	500
Xylenes	0.040	**1800.0**	500	500
Ethylbenzene	LT 0.005	230.0	500	500
1,2,4-Trimethylbenzene	LT 0.005	220.0	1000 [5]	1000 [5]
Styrene	LT 0.005	**240.0**	20	20

Notes:

1. PPM = parts per million;
2. LT = less than; ND = not dedected; NT = not tested.
3. Values in **bold** indicate exceedance of Method 1 S1/GW2 - S1/GW3 Standard. Values underlined indicate exceedance of Method 1 S3/GW2 - S3/GW3 Standard.
4. For a given soil category, the lower standard is listed for a groundwater area.
5. No Method 1standard available. Value listed is S-2 Reportable Concentration threshold.

TABLE 5a
PHASE I GROUNDWATER LABORATORY RESULTS, PPB[1]
12-Jun-96

E.C. WHITNEY & SON, INC.
WILMINGTON, MA

Well	CEE-1	CEE-2	CEE-3	GW-80S	GW-80D	GW-80BR	MCP Method 1 Standards GW-2	MCP Method 1 Standards GW-3
Volatile organic compound:								
Vinyl chloride	LT 2	LT 40	LT 10	ND	410	2	2	600
1,1-Dichloroethene	LT 1	LT 20	LT 5	ND	ND	130	1	50000
1,1-Dichloroethane	LT 1.5	LT 30	93	ND	430	1500	9000	15000
Chlorobenzene	LT 3.5	LT 70	45	ND	79	190	1000	500
1,1,1-trichloroethane	LT 1.0	LT 20	21	ND	ND	2000	4000	50,000
Benzene	1.4	LT 20	61	28	94	150	2000	7000
Toluene	LT 1.5	3100	79	4400	7100	15000	6000	50000
Ethylbenzene	LT 1	220	150	1300	340	350	30000	4000
Chloroethane	LT 10	LT 40	210	NR	NR	NR	NA	NA
Xylenes	LT 1	2400	500	2800	1100	1300	6000	50000
Cis-1,2-Dichloroethene	LT 1	20	LT 20	NR	NR	NR	NA	50000
Acetone	LT 10	360	LT 50	NR	NR	NR	50000	50000
2-Butanone	LT 4.5	260	LT 23	NR	NR	NR	NA	50000[2]
4-Methyl-2-pentanone	LT 10	1000	LT 50	NR	NR	NR	NA	50000[2]
1,3,5-trimethlylbenzene	LT 1	LT 20	5.1	NR	NR	NR	NA	1000[2]
1,2,4-trimethylbenzene	1	LT 20	8.7	NR	NR	NR	NA	NA

Notes: 1. Only those compounds detected are listed above. PPB = parts per billion; LT = less than;
ND = not detected; NR= not reported; NA = not available.
Values underlined indicate exceedance of GW-3 groundwater quality standards.
Values in **bold** type indicate exceedance of GW-2 groundwater quality standard, if applicable to that well.

2. A Method 1 GW-3 standard is not available. The GW-2 reportable concentration is listed instead.

TABLE 5b

Recent Groundwater Results, ppm
April 28, 1998
EC Whitney Sons, Inc.
Wilmington, MA

Det lim > GW 2 standard.

	Well Location					MCP Method 1	MCP Method 1
	CEE-1	CEE-2	CEE-3	CEE-4D	CEE-4S	GW-2	GW-3
Tetrachloroethene	LT 0.0015	LT 0.75	LT 0.03	LT 0.075	LT 1.5	3	5
Toluene	LT 0.001	2.70	0.46	0.12	<u>**260.0**</u>	6.0	50.0
Xylenes	LT 0.001	6 [5]	1.20	0.10	6.60	6.0	50.0
Ethylbenzene	LT 0.001	LT 0.5	0.06	LT 0.05	LT 1	30.0	4.0
Trichloroethene	LT 0.001	LT 0.5	LT 0.02	1.6 [5]	LT 1	0.3	20.0
1,1-Dichloroethane	LT 0.0015	LT 0.75	0.68	LT 0.075	LT 1.5	9.0	50.0
Chlorobenzene	0.0035	LT 1.8	0.12	LT 0.18	LT 3.5	1.0	.50
1,1,1-Trichloroethane	LT 0.001	LT 0.5	3.30	LT 0.05	LT 1	4.0	50.0
Chloroethane	LT 0.002	LT 1	0.45	LT 0.1	LT 2	10 [4]	10 [4]
cis-1,2-Dichloroethene	LT 0.001	LT 0.5	0.54	LT 0.05	LT 1	30	50

Notes:

1. PPM = parts per million;
2. LT = less than; ND = not dedected.
3. Values in **bold** indicate exceedance of Method 1 GW-2 Standard where applicable.
   Values <u>underlined</u> indicate exceedance of Method 1 GW-3 Standard.
4. No Method 1 standard available. Value listed is GW-2 Reportable Concentration threshold.
5. This well is located greater than 30 feet from an occupied building; therefore, the GW-2 standards do not apply.

APPENDIX A BORING LOGS

GEOLOGIC BORING LOG	BORING NO. MW-4S

PROJECT NAME	EC WHITNEY	LOCATION	WILMINGTON, MA
PROJECT NO.	95-003C	STARTED/FINISHED	4/8/98
CONTRACTOR	TECHNICAL DRILLING	DRILLER	STEVE
INSPECTOR	B.RICHARD, EST		
CHECKED BY	S. SAKAKEENY	DATE	7/25/98

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	REMARKS	SAMPLE DESCRIPTION
1	S-1 (0.6 - 2.6	13, 17 21, 28	24	8		moist, medium, dark brown to black, SAND, mostly medium some fines, some clays, organic, SM
2						
3	S-2 (2.6 - 4.6	13, 13 21, 27	24	24		moist, medium, dark brown to black, SAND, mostly medium some fines, some clays, organics, sticks, SM
4						
5						
6						
7						
8						
9						
10						
11						
						BOTTOM OF BORING AT 11 FT.

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER
____ INTERFACE
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

GEOLOGIC BORING LOG	BORING NO. MW-4D

PROJECT NAME	EC WHITNEY	LOCATION	WILMINGTON, MA
PROJECT NO.	95-003C	STARTED/FINISHED	4/8/98
CONTRACTOR	TECHNICAL DRILLING	DRILLER	STEVE
INSPECTOR	B.RICHARD, EST		
CHECKED BY	S. SAKAKEENY	DATE	9/26/98

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	REMARKS	SAMPLE DESCRIPTION
1 2 3	S-1 (0 - 5)				Auger Cuttings	moist,dark brown, SAND, mostly fines, some mediums, some silt, SM
4 5						
6 7	S-2 (5-7)	23 24 13 11	24	4		moist, meduim, dark brown, SAND, medium, little fines, little cobbles, little coarse, SP
8 9 10						
11 12	S-3 (10-12)	11 13 15 15	24	24		moist, meduim, dark brown, SAND, mostly mediums, some silt, SM
13 14 15						
16 17	S-4 (15-17)	4 7 19 37	24	24		wet, dense, stiff, olive gray, CLAY, two layers of different color grays, CL
18						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER
____ INTERFACE
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

GEOLOGIC BORING LOG

BORING NO. MW-4D

PROJECT NAME	EC WHITNEY	LOCATION	WILMINGTON, MA
PROJECT NO.	95-003C	STARTED/FINISHED	4/8/98
CONTRACTOR	TECHNICAL DRILLING	DRILLER	STEVE
INSPECTOR	B.RICHARD, EST		
CHECKED BY	S. SAKAKEENY	DATE	7/27/98

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	REMARKS	SAMPLE DESCRIPTION
19						
20						
21	S-5 (20 - 22)	7 14 19 27	24	24		moist, medium, olive gray, SAND, mostly fine to mediums silty, little clay, SM
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						Bedrock at 32 ft.
33						
34						
35						
36						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER
____ INTERFACE
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

GEOLOGIC BORING LOG

BORING NO. MW-4D

PROJECT NAME	EC WHITNEY	LOCATION	WILMINGTON, MA
PROJECT NO.	95-003C	STARTED/FINISHED	4/8/98
CONTRACTOR	TECHNICAL DRILLING	DRILLER	STEVE
INSPECTOR	B.RICHARD, EST		
CHECKED BY	S. SAKAKEENY	DATE	7/23/98

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	REMARKS	SAMPLE DESCRIPTION
37						Bedrock from 32 ft to 47 ft.
38						
39						
40						
41						
42						
43						
44						
45						
46						
47						
						BOTTOM OF BORING AT 47 FT.

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER
____ INTERFACE
_ _ _ _ APPROX. INTERFACE

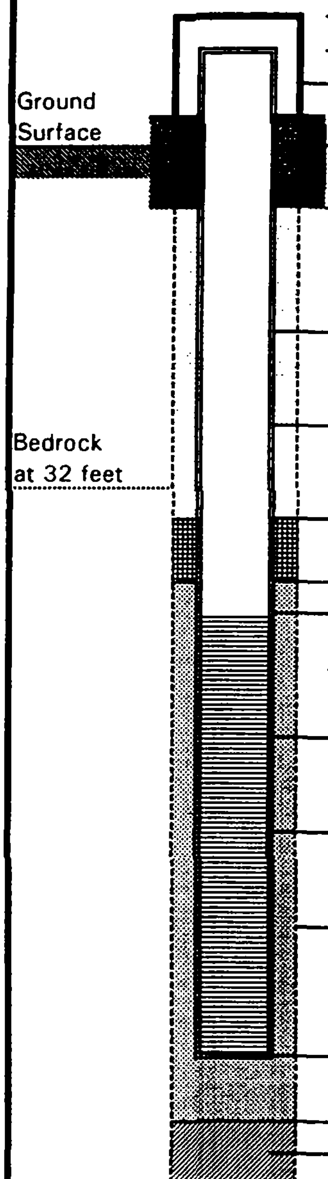
Capaccio Environmental Engineering, Inc.

APPENDIX B WELL INSTALLATION LOGS

MONITORING WELL LOG

CEE-4D

PROJECT NAME	E.C Whitney & Son	LOCATION	Wilmington, MA
PROJECT NO.	95-003C	STARTED/FINISHED	4/8/98
CONTRACTOR	Technical Drilling Services, Inc.	DRILLER	Steve
INSPECTOR	Bill Richard, EST	BORING	CEE-4D
CHECKED BY	S. Sakakeeny	DATE	7/22/98

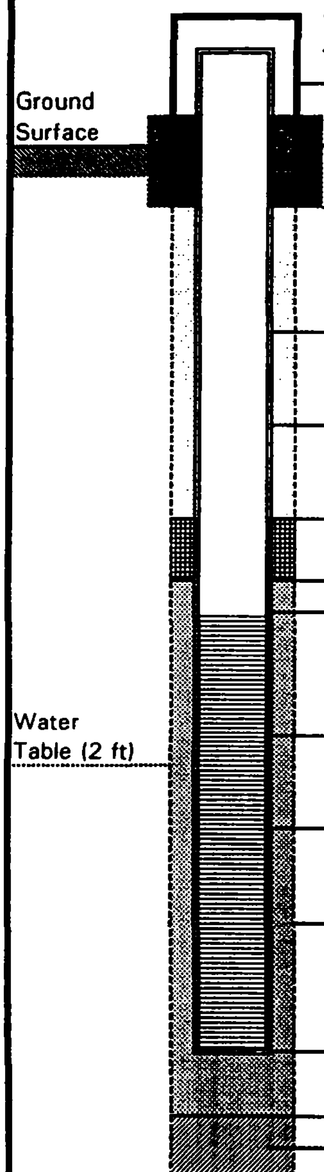


Casing stickup	0 FT
Riser pipe stickup	0 FT
Casing type and diameter	8 IN ALUMINUM
Type of surface seal	CONCRETE
Depth to bottom of seal from ground surface	6 IN
Type of backfill	TREMIED BENTONITE GROUT
Type of riser and diameter	2 IN SCHED 40 PVC
Depth to top of bentonite chip seal	34 FT 0 IN
Depth to top of filter pack	35 FT 0 IN
Depth to top of screen	37 FT 0 IN
Type of screen and diameter	2 IN SCHED 40 PVC
Slot size	0.010 IN
Type of filter pack	SILICA SAND
Depth to bottom of well	47 FT 0 IN
Depth to bottom of filter pack	47 FT 0 IN
Type of backfill	NONE
Depth to bottom of boring	47 FT 0 IN

MONITORING WELL LOG

CEE-4S

PROJECT NAME	E.C Whitney & Son	LOCATION	Wilmington, MA
PROJECT NO.	95-003C	STARTED/FINISHED	4/8/98
CONTRACTOR	Technical Drilling Services, Inc.	DRILLER	Steve
INSPECTOR	Bill Richard, EST	BORING	CEE-4S
CHECKED BY	S. Sakakeeny	DATE	7/22/98



Casing stickup	0 FT
Riser pipe stickup	0 FT
Casing type and diameter	8 IN ALUMINUM
Type of surface seal	CONCRETE
Depth to bottom of seal from ground surface	6 IN
Type of backfill	NONE
Type of riser and diameter	2 IN SCHED 40 PVC
Depth to top of bentonite chip seal	0 FT 6 IN
Depth to top of filter pack	1 FT 0 IN
Depth to top of screen	1 FT 0 IN
Type of screen and diameter	2 IN SCHED 40 PVC
Slot size	0.010 IN
Type of filter pack	SILICA SAND
Depth to bottom of well	11 FT 0 IN
Depth to bottom of filter pack	11 FT 0 IN
Type of backfill	NONE
Depth to bottom of boring	11 FT 0 IN

EST
ENVIRONMENTAL SAMPLING TECHNOLOGY
■ 368 Hillside Avenue ■ Needham ■ MA 02194 ■ (781) 455-0003 ■ Fax (781) 455-8336

GROUNDWATER MONITORING REPORT

Client: Capaccio Environmental Engineering
75 Union Ave.
Sudbury, MA 01776
Attention: Steve Sakakeeney
Report Date: 5/11/98

Site Location: **E.C. Whitney**
Sample Date: **4/28/98**
Field Technicians: **Bill Richard**
Weather Conditions: **Sunny & Warm, 60° F**

Location ID	Time	Depth (feet)	SWL (feet)	pH (S.U.)	Temp (°C)	Cond (umhos)	ORP (mV)	DO (mg/L)
CEE 4S	14:00	6.04	2.55	5.50	15.6	455	34.5	NM
				5.61	15.6	470	26.4	NM
				5.78	16.2	470	25.2	4.60
Comments:	Well purged dry, good recharge. Sample dark brown with heavy solvent odor.							
CEE 4D	14:20	48.05	2.76	6.82	13.0	3280	NM	NM
				6.87	12.9	3550	- 15.2	NM
				6.83	14.0	3500	- 40.2	3.90
Comments:	Excellent recharge. Sample coludy with a light solvent odor.							
CEE 1	15:40	10.67	1.24	6.90	16.6	238	- 43.0	NM
				6.92	16.8	240	- 42.4	NM
				6.82	17.1	240	- 50.3	4.80
Comments:	Excellent recharge, bentonite up over well cap. Sample very turbid.							
CEE 2	15:00	11.68	1.65	6.41	14.3	990	18.5	NM
				6.43	13.0	1000	- 37.2	NM
				6.42	13.6	1010	- 27.9	4.80
Comments:	Good recharge, bentonite up over well cap. Sample turbid and sudsy with a musty odor.							
CEE 3	16:25	11.39	2.10	6.42	17.5	490	- 13.2	NM
				6.58	17.9	540	- 24.9	NM
				6.55	16.6	550	- 45.0	4.6
Comments:	Good recharge. Sample black in color with a strong odor.							

888 Woburn Street.

PHASE 4 REMEDIAL IMPLEMENTATION PLAN
E.C. WHITNEY & SON, INC.
WILMINGTON, MA

888 WOBURN ST. N/A

RTN 3-1787 & 3-12680

DECEMBER 1, 2000

Prepared by:
CAPACCIO ENVIRONMENTAL ENGINEERING, INC.
75 UNION AVENUE
SUDBURY, MA 01776

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I. INTRODUCTION & BACKGROUND:

E. C. Whitney & Son, Inc. (Whitney) owns and operates a barrel reconditioning facility at 888 Woburn Street in Wilmington, Massachusetts. See Figure 1. The site was listed on the U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS, Site No. MAD053479804). The property was also listed by the Massachusetts Department of Environmental Protection (MADEP) as a Confirmed Disposal Site and was first listed a Location To Be Investigated (LTBI) January 15, 1987 based on a Preliminary Assessment conducted by the USEPA.

A Phase I Report and Tier II Classification was submitted to MADEP on July 25, 1996. A Phase II Report was submitted to MADEP on December 30, 1999, which evaluated conditions beneath Whitney, 891 Woburn Street, and 324 New Boston Street properties. See Figure 2. A Phase III Report and remedial action plan was submitted to DEP on January 4, 2000. The remedial action plan included removal of an estimated 275 to 550 tons of buried waste for off-site disposal and treatment of groundwater. Groundwater would be pumped from recovery wells and treated using an air stripper. If necessary, the system would be enhanced with air sparging wells and soil vapor extraction wells to accelerate the rate of remediation and/or to improve contaminant extraction rates. At the time of the Phase 3 report, off-gas was anticipated to be treated by thermal destruction, and groundwater effluent would be discharged to surface water under a U.S. Environmental Protection Agency (EPA) National Pollution Discharge Elimination System (NPDES) Emergency Exclusion permit.

The purpose of this Phase 4 Report is to outline design criteria, performance requirements, implementation sequences, operation and maintenance manuals, and contact information to design, construct and operate remedial systems at the site. This Phase 4 Report has been prepared in accordance with the Massachusetts Contingency Plan (MCP) regulations and is based on, in part, those findings presented in a Phase 2 and Phase 3 reports previously prepared for the Whitney site which documented that nature and extent of contamination to soil and groundwater, and the most appropriate clean up alternative to be implemented.

II. OBJECTIVE OF REMEDIAL ACTIONS:

In accordance with the MCP, a permanent Response Action Outcome (RAO) is achieved when 1) contaminant sources are eliminated or controlled, 2) substantial hazards, as defined in the MCP, are eliminated, 3) contaminants are reduced to concentrations that do not pose a Significant Risk, as defined in the MCP, and 4) contaminants are reduced to concentrations approaching background, as defined in the MCP, if feasible. The objective of clean up at Whitney is to achieve a Class A-3 RAO where remedial actions have permanently achieved a level of No Significant Risk, the level of contaminants have not been reduced to background, and an Activity and Use Limitation is required. Specifically, this means removal of buried waste and reduction of the toluene hot spot area at CEE-4S to concentrations in groundwater that approach GW-2 standards. Reducing concentrations to these standards would allow unrestricted use of the Whitney property by plant workers and office workers and allow repair or installation of utilities in the toluene hot spot area.

Figure 3 shows the areas of remediation.

III. MEDIA TO BE REMEDIATED:

A. Buried Waste

1. Characteristic, Nature & Extent

Buried waste is present immediately west of Building "E". See Figure 3. Material included sludge-like waste and rubbery material. Pieces of fiberboard and metal suggest the possibility of buried fiber and steel drums. Contaminants present in the waste include chromium, lead, acetone, ethylbenzene, styrene, toluene, 1,2,4-trimethylbenzene, xylenes, bis (2-ethyl hexyl) phthalate, PCB-1254, and petroleum hydrocarbons. No cyanide or herbicides were detected. The MCP soil standards do not apply to this material because it is a waste and not soil. For comparative purposes only; however, styrene, bis (2-ethyl hexyl) phthalate, and PCB-1254 where found to exceed the S-3/GW-2: GW-3 soil standards. PCBs also exceeded the Upper Concentration Limit.

Sampling confirmed that the waste extends about four feet below the ground and does not extend under Building "E" or onto NER Construction property. Sampling could not be conducted to confirm the west and south extent of this material because storage trailers and stacks of empty drums prevented sampling. It is possible that buried waste is present throughout the northwest corner of the property from Building "E" to the rear fence.

Compounds detected in groundwater located within the waste area include nickel, antimony, arsenic, chromium, lead, zinc, acetone methyl ethyl ketone, methyl isobutyl ketone, toluene, xylenes, phenol, bis (2-ethyl hexyl) phthalate, PCB-1254, and petroleum hydrocarbons. Of these compounds, nickel, acetone, bis (2-ethyl hexyl) phthalate, PCB-1254, and the C5-C8 volatile petroleum hydrocarbon exceeded MCP groundwater standards for the site. Cyanide and herbicides were not tested and are not expected in the groundwater because of their absence in the waste.

The dimensions of buried waste and the area expected to be removed is shown in Figure 3. The volume of waste is currently estimated to be 50 to 100 feet long, 25 feet wide, and 4 feet deep which equals 185 cubic yards (275 tons) to 370 cy (550 tons).

2. Goals of Remedial Action And Performance Requirements To Achieve RAO

The buried waste and significantly contaminated soil that may be present around the material is considered to be a continuing source of contamination to the environment. The goal of remedial actions is, at a minimum, to remove the waste material to meet the Class A RAO requirement of elimination or control of source areas. Significantly contaminated soil which may be present around the waste and considered to be a an additional source may also be excavated and disposed off-site if deemed technically appropriate and cost effective. Alternatively, the soil will be incorporated in to the subsurface remediation plan where soil vapor extraction selected as part of the groundwater clean up system may be extended to treat soil source areas.

B. Groundwater

1. Characteristic, Nature & Extent

An area of contaminated groundwater was identified by well CEE-4S. See Figure 3. It is about 60 feet south and down gradient of the area of buried waste. Compounds detected in both the soil and groundwater at CEE-4S include ethylbenzene, toluene, styrene, 1,2,4-trimethylbenzene, and xylenes. Benzene, 1,1,2-trichloroethane, and vinyl chloride were detected in groundwater and not in soil while tetrachloroethene was detected in soil and not in groundwater. Different detection limits are the likely cause for the disparity in the compounds found.

Of the compounds detected, toluene and xylenes in both soil and groundwater exceeded their standards with toluene exceeding its UCL for both media. The concentration of toluene (up to 260 ppm in groundwater and over 6,000 ppm in soil) indicate non-aqueous phase conditions. Styrene exceeded its regulatory standard in soil only. Only VOCs were tested.

The plume is primarily in the overburden aquifer being most significant near the water table. Soil screening indicated that it extends downward toward bedrock, but little contamination was present in shallow bedrock well CEE-4D. Trichloroethene, detected at 1.6 ppm, was the primary compound found in bedrock and suggests that a separate release of chlorinated compounds occurred to this aquifer. The concentration of toluene at CEE-4S characterized this area as a Hot Spot as defined in the MCP. The boundaries of the hot spot were defined by wells GP-15, CEE-2, GP-13, and GP-8. Lower concentrations of the plume extend across the Whitney property toward Woburn Street and beneath 891 Woburn Street property.

Ethylbenzene, styrene, toluene, 1,2,4-trimethylbenzene, and xylenes found at CEE-4S were also present at the area of buried waste and therefore suggest that releases from the buried waste migrated to the area of CEE-4S. The absence of significant contamination in soil above the water table at CEE-4S indicates that releases to the ground at this area did not occur and further supports the buried waste as the source.

The dimension of the hot spot expected to be remediated is shown in Figure 3. It is currently estimated to be 100 wide, 100 feet long, and up to 30 feet thick. Assuming an aquifer porosity of 0.3, the volume of contaminated groundwater to be remediated is currently estimated to be 90,000 cubic feet or 673,290 gallons. The aquifer at the site is expected to yield 10 to 15 gallons per minute per extraction well. This is based on an aquifer transmissivity (T) of 175,350 square feet per year calculated from a hydraulic conductivity (K) of 5,845 feet/year measured at the site and assuming 30 feet saturated thickness (b).

2. Goals of Remedial Action And Performance Requirements To Achieve RAO

The goal of groundwater remediation is to reduce concentrations of toluene in the volume of aquifer identified as a hot spot. Concentrations of oil and hazardous material in this area will be reduced to approach MCP Method 1 GW-2 standards and allow unrestricted use of the Whitney property by plant workers and office workers, and allow repair or installation of utilities in the toluene hot spot area at No Significant Risk.

... SHALLOW BEDROCK

⊕	WELL INSTALLED BY OLIN CHEMICAL
X	GP-4 GEOPROBE BORING LOCATION
A	OFFICE
B	DRUM CLEANING / RECONDITIONING
B1	PLASTIC DRUM SHREDDING
C	STORAGE
D	MAINTENANCE SHOP
E	STEEL DRUM STORAGE
++++	TRAIN TRACK
— — →	STREAM AND DIRECTION OF FLOW
~~	TREE LINE

NOTES:

1. PLANS FOR E.C. WHITNEY & SON PROPERTY PREPARED BY GILES SURVEYING, INC., NORTH ANDOVER, MA ON BEHALF OF CAPACCIO ENVIROMENTAL ENGINEERING, INC., JULY 20, 1999.
2. ADJACENT PROPERTY BOUNDARIES, BUILDINGS AND ROADS TAKEN FROM CITY OF WOBURN AND TOWN OF WILMINGTON ASSESSOR MAPS, AND FROM OLIN CHEMICAL CORP. APRIL 1993 PHASE II REPORT.
3. 224 NEW BOSTON STREET PROPERTY FEATURES TAKEN FROM "WELL LOCATION PLAN" PREPARED BY BRIGGS ASSOCIATES, INC., SEPTEMBER 1994. ALL FEATURES ARE APPROXIMATE.

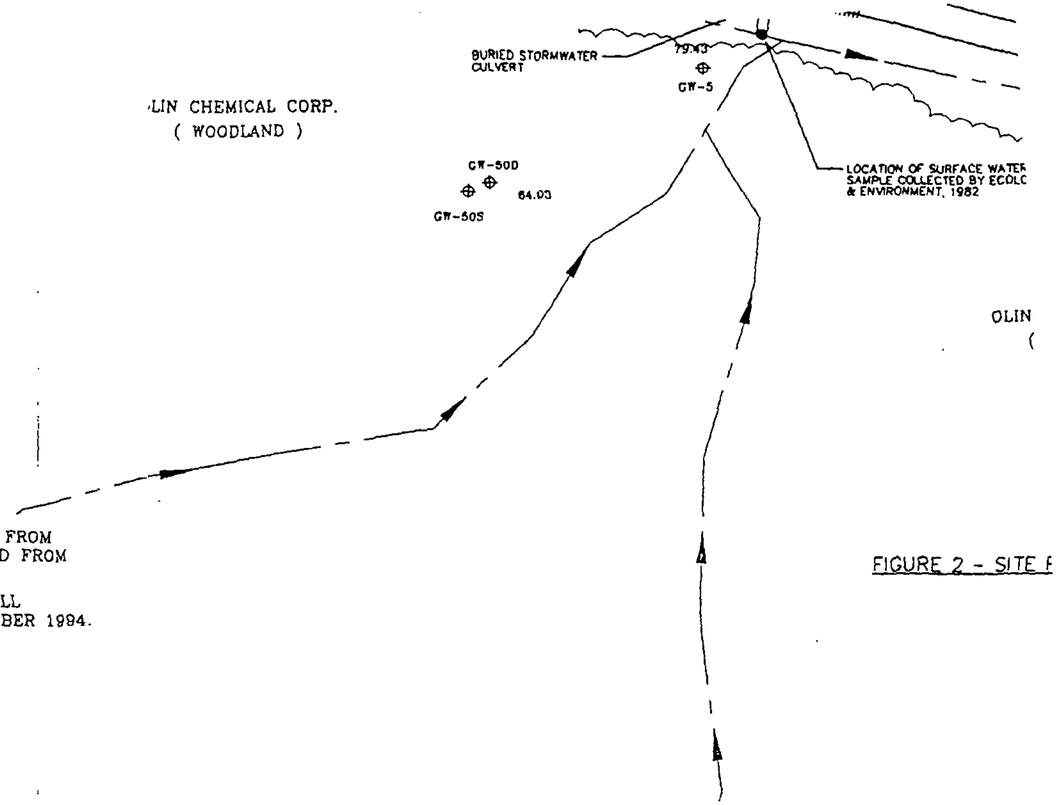
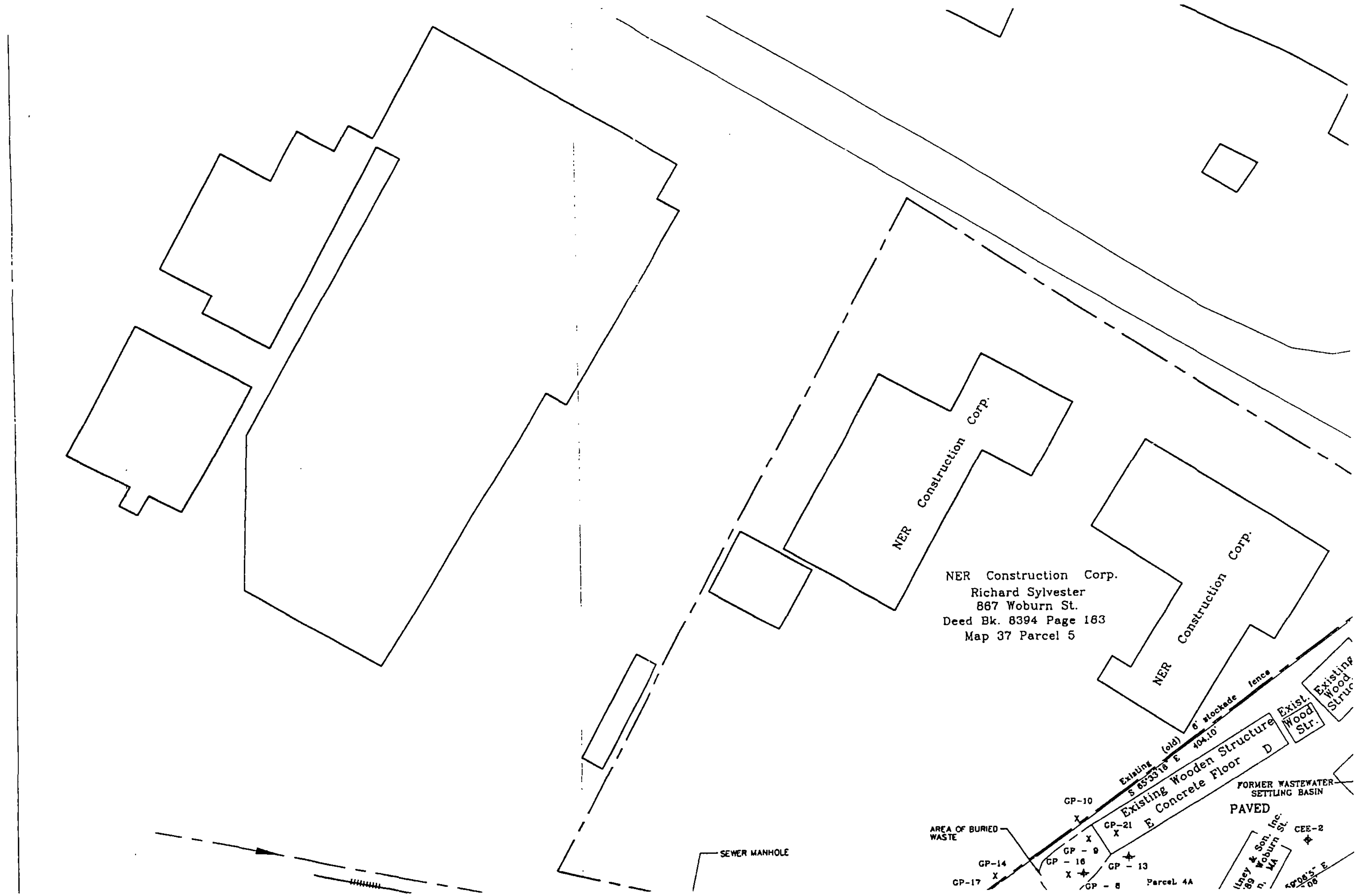
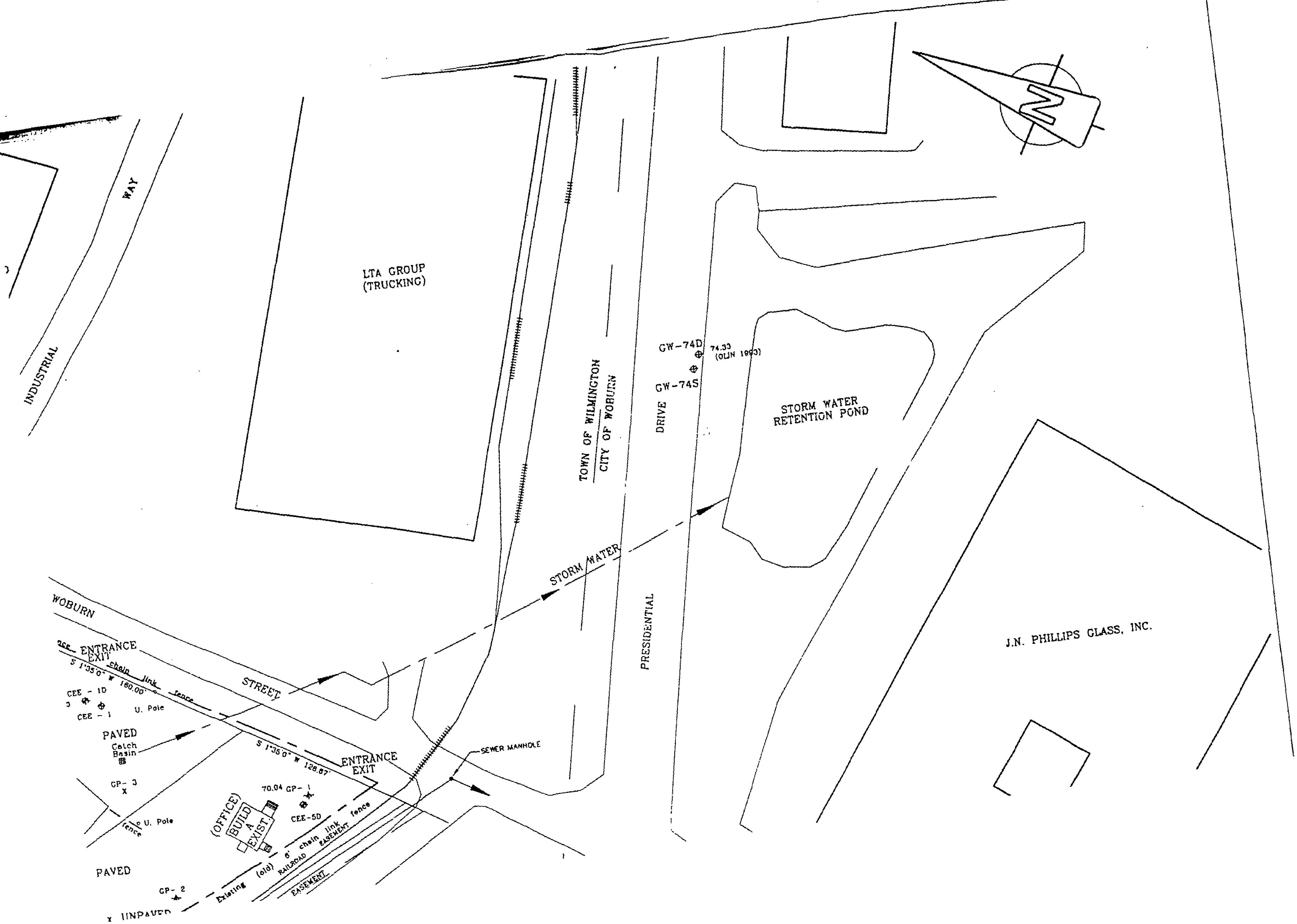


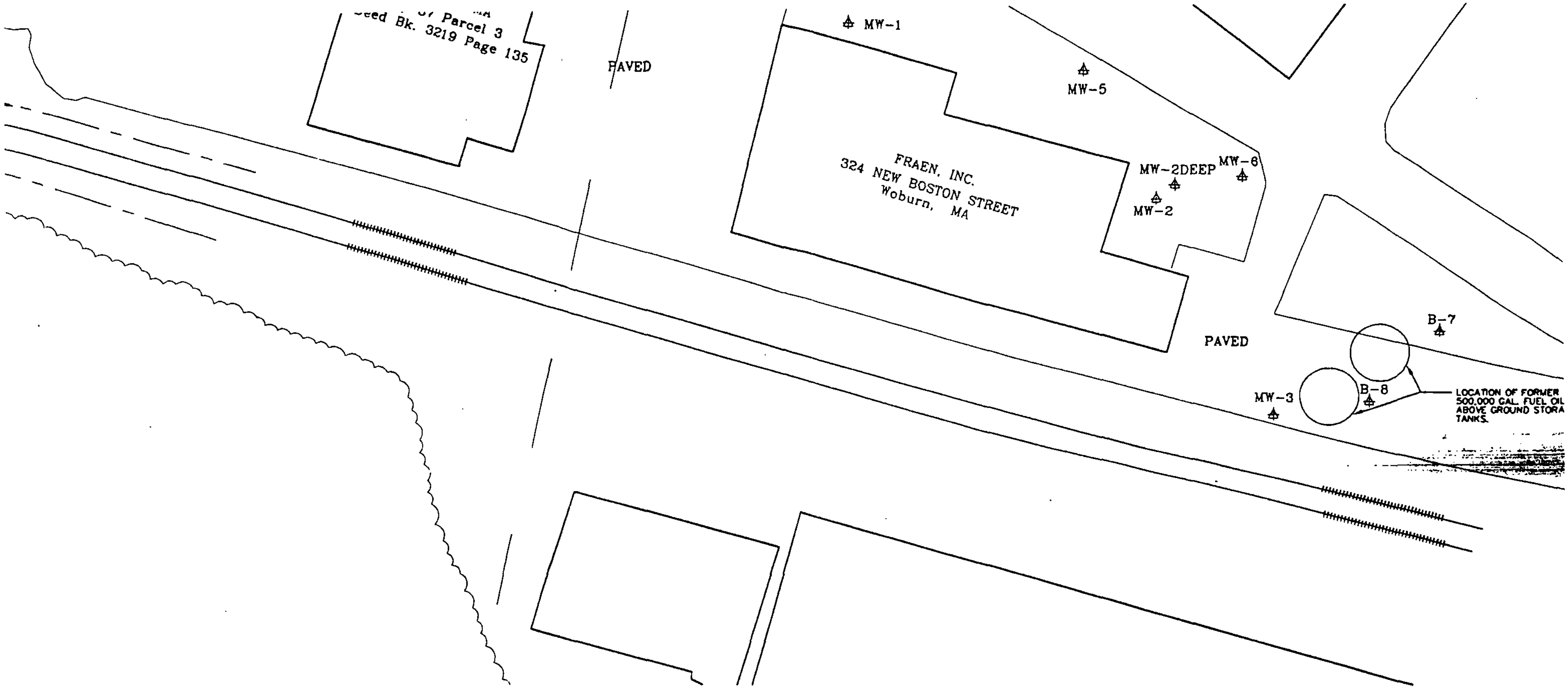
FIGURE 2 - SITE F

PLOT SCALE: 1:1



NER Construction Corp.
NER Construction Corp.
NER Construction Corp.
Richard Sylvester
867 Woburn St.
Deed Bk. 8394 Page 183
Map 37 Parcel 5
Existing (old) 6' stockade fence
S 65°33'18" E 404.10'
Existing Wooden Structure
Concrete Floor
D
E
Exist. Wood Str.
FORMER WASTEWATER SETTLING BASIN
PAVED
AREA OF BURIED WASTE
GP-10
GP-21
GP - 9
GP - 16
GP-14
GP-17
GP - 13
GP - 8
CEE-2
Parcel 4A
SEWER MANHOLE


LTA GROUP
(TRUCKING)
INDUSTRIAL
WAY
TOWN OF WILMINGTON
CITY OF WOBURN
DRIVE
PRESIDENTIAL
GW-74D
74.33
(OLIN 1993)
GW-74S
STORM WATER
RETENTION POND
J.N. PHILLIPS GLASS, INC.
STORM WATER
WOBURN
STREET
ENTRANCE
EXIT
S 1°35'0" W 160.00'
chain link fence
CEE - 1D
CEE - 1
U. Pole
PAVED
Catch
Basin
S 1°35'0" W 126.67'
ENTRANCE
EXIT
SEWER MANHOLE
GP- 3
70.04 GP- 1
CEE-5D
(OFFICE)
BUILD
A
EXIST.
U. Pole
fence
PAVED
GP- 2
Existing (old) 6' chain link fence
RAILROAD EASEMENT
EASEMENT
UNPAVED

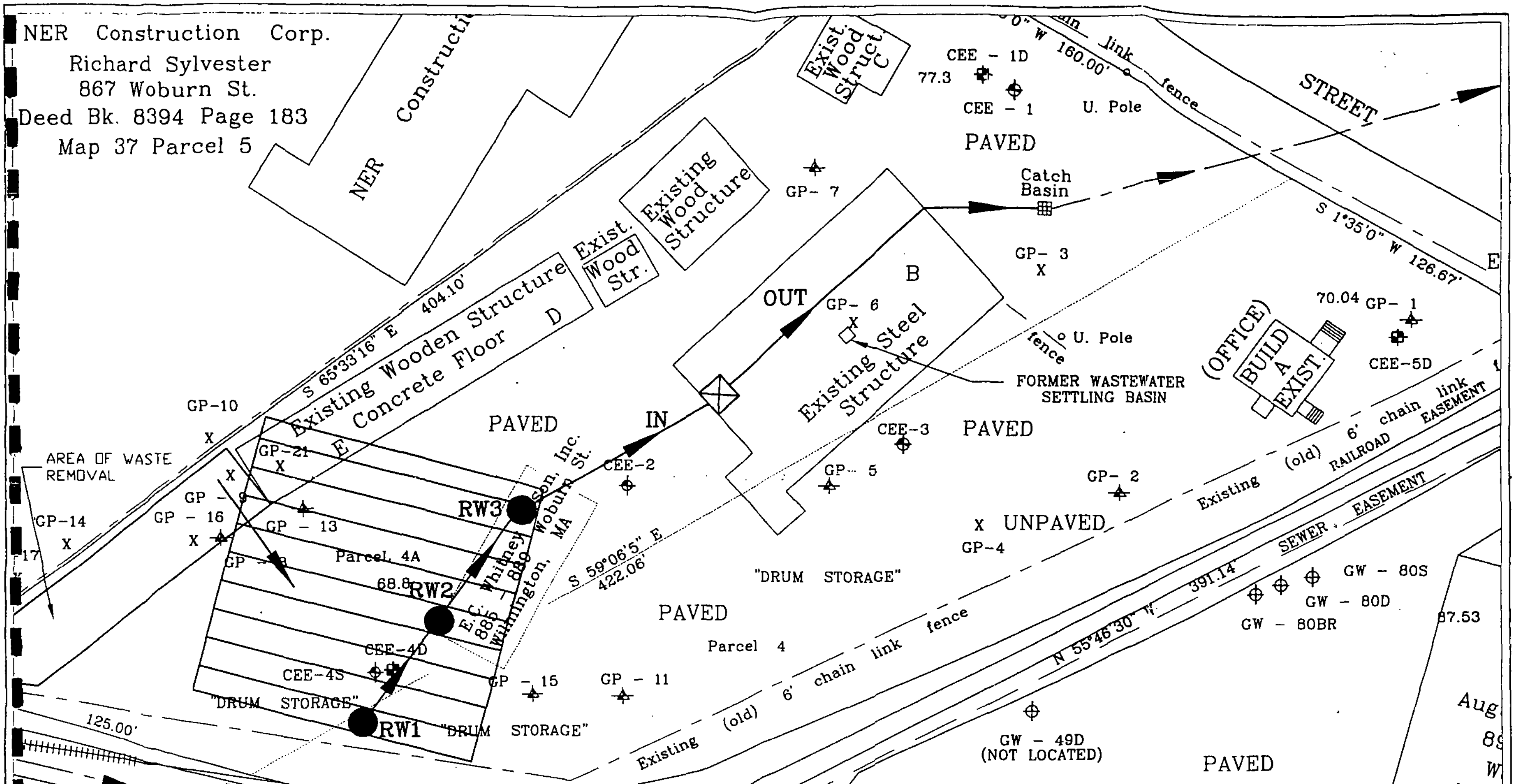


REVISION				
REV	DESCRIPTION	DRW	CHK	DATE
0	PHASE III REPORT	ES	SAS	12/14/99

Capaccio
Environmental Engineering, Inc.

75 Union Avenue Sudbury, MA 0177[illegible]

PROJECT NUMBER	CLIENT: E.C. WHITNEY & SON INC. 885-889 WOBURN ST. WILMINGTON, MA			DRAWING NO
95-003E	DRW: E. SHALHOUB	CHK: S. SAKAKEENY	ENGR: S. SAKAKEENY	C-1C
SCALE: 1"=50'	DATE: 8/18/99	DATE: 9/1/99	DATE: 9/1/99	CAD: 99-154a.D[illegible]



LEGEND

RECOVERY WELL

AREA OF GROUNDWATER TREATMENT

REVISION				
REV	DESCRIPTION	DRW	CHK	DATE
00	11x8.5 SITE PLAN	KP	SAS	12/30/99
01	17x11 SITE PLAN	KP	SAS	11/06/00

AREAS OF REMEDIATION

Capaccio Environmental Engineering, Inc.
75 Union Avenue, Sudbury, MA 01776

PROJECT NUMBER	CLIENT: E. C. WHITNEY & SON WILMINGTON, MA			DRAWING NUMBER
95-003F	DRW: K. PETERSON	CHK: S. SAKAKEENY	ENGR: S. SAKAKEENY	Figure 3
SCALE: 1/8" = 1'	DATE 11/03/00	DATE 11/06/00	DATE 11/06/00	CAD: 95-003F

TABLE 1

CHEMICAL CHARACTERISTICS OF WASTE MATERIAL [1,2]

	Location:	GP-8	MCP Method 1 Standard S-1/GW2:GW3	MCP Method 1 Standard S-3/GW-2:GW3	UCL
	Depth (feet):	(2-4')			
	Sample Date:	4/21/99			
Trace Metals (ppm)					
	Antimony	7	10	40	
	Arsenic	2.4	30	30	
	Cadmium	3	30	80	
	Chromium	169	1,000	5,000	
	Copper	32	NONE	NONE	NONE
	Lead	**520**	300	600	6,000
	Mercury	0.3	20	60	
	Nickel	12	300	700	
	Zinc	205	2,500	5,000	
Volatile Organics (ppb)					
	2-Butanone	26,000	40,000	40,000	
	Chlorobenzene	<4000	40,000	40,000	
	Chloroethane	<4000	NONE	NONE	
	1,2-Dichlorobenzene	<4000	100,000	500,000	
	1,4-Dichlorobenzene	<4000	40,000	200,000	
	1,1-Dichloroethane	<4000	100,000	400,000	
	1,2-Dichloroethane	<1000	200	200	
	cis 1,2-Dichloroethene	<4000	100,000	500,000	
	Trans 1,2-Dichloroethene	<4000	500,000	2,000,000	
	Ethylbenzene	40,000	500,000	500,000	
	p-Isopropyltoluene	12,000	NONE	NONE	
	Methylene Chloride [3]	<2000	100,000	100,000	
	Styrene	**34,000**	20,000	20,000	1,000,000
	Tetrachloroethene	<4000	20,000	100,000	
	Toluene	140,000	500,000	500,000	10,000,000
	1,2,4-Trichlorobenzene	<4000	400,000	800,000	
	1,1,1-Trichloroethane	<4000	100,000	500,000	
	Trichloroethene	<4000	20,000	20,000	
	1,2,4-Trimethylbenzene	13,000	NONE	NONE	
	Vinyl Chloride	<1000	300	400	
	o-Xylene	91,000	500,000	5,000,000	
	p-m-Xylene	220,000	500,000	5,000,000	
	Total xylenes	NA	500,000	500,000	10,000,000
Acid Extractables (ppb)		ND	-	-	
Base Neutrals (ppb)					
	Bis(-2-Ethyl Hexyl)Phthalate	**1,700,000**	200,000	500,000	10,000,000
	1,2-Dichlorobenzene	<250,000	100,000	500,000	
Pesticides (ppb)		ND	-	-	
PCBS (ppb)					
	PCB-1242	<25,000	2,000	2,000	
	PCB-1248	<25,000	2,000	2,000	
	PCB-1254	**120,000**	2,000	2,000	100,000
Herbicides (ppb)		ND	-	-	
Total Cyanide (ppb)		<1	100	400	
Extractable Petroleum Hydrocarbons (ppm)					
	Fluoranthene	<40	1,000	1,000	
	Pyrene	<40	700	5,000	
	C9-C18 Aliphatic	300	1,000	5,000	
	C19-C36 Aliphatic	600	2,500	5,000	
	C11-C22 Aromatic	**6,100**	800	5,000	10,000
Volatile Petroleum Hydrocarbons (ppb)					
	Ethylbenzene	34,000	500,000	500,000	
	Naphthalene	5,500	100,000	1,000,000	
	Toluene	140,000	500,000	500,000	
	m- & p- Xylenes	220,000	500,000	5,000,000	
	o- Xylene	120,000	500,000	5,000,000	
	C5-C8 Aliphatic	**120,000**	100,000	500,000	5,000,000
	C9-C12 Aliphatic	82,000	1,000,000	5,000,000	
	C9-C10 Aromatic	**110,000**	100,000	500,000	500,000

Notes:

1. ppm = parts per million; ppb = parts per billion; < = less than; ND = Not Detected
2. Only those compounds detected are listed
3. This compound also found in trip blank and therefore may be laboratory contamination
4. Concentrations that exceed S-1 standards are in bold typeface; concentrations that exceed S-3 standards are underlined; concentrations that exceed upper concentration limits are shaded

TABLE 2
CHEMICAL CHARACTERISTICS OF GROUNDWATER

	GP-8	CEE-2	CEE-2	CEE-2	CEE-4S	CEE-4S	MCP Standards GW-2	GW-3	UCL
Aquifer:	WT-OB	WT-OB	WT-OB	WT-OB	WT-OB	WT-OB			
Monitoring Zone (Feet):	2-8	2-12	2-12	2-12	1-11	1-11			
Sample Date:	6/1/99	6/6/96	4/28/98	5/25/99	4/28/98	5/25/99			
Trace Metals (ppm)		NA	NA	NA	NA	NA			
Nickel	<u>0.09</u>						NONE	0.08	
Antimony	0.034						NONE	0.3	
Arsenic	0.013						NONE	0.4	
Cadmium	<0.001						NONE	0.01	
Chromium	0.08						NONE	2	
Lead	0.008						NONE	0.03	
Zinc	0 2						NONE	0.9	
Volatile Organics (ppb)									
Acetone	**<u>54,000</u>**	360	<5,000	<10,000	<10,000	<2,000	50,000	50,000	100,000
Benzene	<100	<20	<500	110	<1,000	**81**	2,000	7,000	
2-Butanone (MEK)	25,000	260	<2,300	<10,000	<4,500	<2,000	50,000	50,000	
Chlorobenzene	<500	<70	<1,800	<500	<3,500	<100	1,000	500	10,000
Bromoform	<500	<70	<500	<500	<3,500	<100	800	50,000	
Chloroethane	<500	<40	<1,000	<500	<2,000	<100	NONE	NONE	
1,2-Dichlorobenzene	<500	<200	<5,000	<500	<10,000	<100	10,000	8,000	
1,4-Dichlorobenzene	<500	<200	<5,000	<500	<10,000	<100	30,000	8,000	
1,1-Dichloroethane	<500	<30	<750	<500	<1,500	<100	9,000	50,000	
1,1-Dichloroethene	<500	<20	<500	<500	<1,000	<100	1	50,000	100,000
1,2-Dichloroethane	<100	<30	<750	<100	<1,500	<20	20	50,000	
cis-1,2-Dichloroethene	<500	<20	<500	<500	<1,000	<100	30,000	50,000	
Trans 1,2-Dichloroethene	<500	<30	<750	<500	<1,500	<100	20,000	50,000	
Total 1,2-dichloroethene [3]	NA	NA	NA	NA	NA	NA	20,000	50,000	
Ethylbenzene	740	220	<500	<500	<1,000	840	30,000	4,000	
p-Isopropyltoluene	<500	<20	<500	<500	<1,000	<100	NONE	NONE	
Methylene Chloride [4]	<500	<100	<2,500	<500	<5,000	<100	50,000	50,000	
4-Methyl-2-Pentanone (MIBK)	13,000	1,000	<5,000	ND	<10,000	<1,000	50,000	50,000	
2-hexanone (MBK)	<500	<20	<500	<500	<1,000	<100	NONE	NONE	
Styrene	<500	<20	<500	<500	<1,000	400	900	50,000	
Tetrachloroethene	<500	<30	<750	<500	<1,500	<100	3,000	5,000	
Toluene	3,600	3,100	2,700	**6,100**	<u>260,000</u>	<u>170,000</u>	6,000	50,000	100,000
1,2,4-Trichlorobenzene	<500	<20	<500	<500	<1,000	<100	10,000	500	
1,1,1-Trichloroethane	<500	<20	<500	<500	<1,000	<100	4,000	50,000	
1,1,2-Trichloroethane	<500	<20	<750	<500	<1,500	430	20,000	50,000	
Trichloroethene	<500	<20	<500	<500	<1,000	<100	300	20,000	100,000
1,1,2,2-tetrachloroethane	<500	<20	<500	<500	<1,000	<100	20	20,000	
1,3,5-Trimethylbenzene	<500	<20	<500	<500	<1,000	<100	NONE	NONE	
1,2,4-Trimethylbenzene	<500	<20	<500	<500	<1,000	240	NONE	NONE	
Vinyl Chloride	<200	<40	<1,000	<200	<2,000	**68**	2	40,000	100,000
o-Xylene	2,000	NA	NA	<500	NA	1,600	6,000	50,000	
p-m-Xylene	4,600	NA	NA	1,300	NA	3,400	6,000	50,000	
Total xylenes	NA	2,400	**6,000**	NA	**6,600**	NA	6,000	50,000	
Acid Extractables (ppb)		NA	NA	NA	NA	NA			
Phenol	14,000						50,000	30,000	
2,4-dimethyl phenol							NONE	20,000	
2-methyl phenol							NONE	NONE	
4-methyl phenol							NONE	NONE	
4-chloro-3-methyl phenol							NONE	NONE	
Base Neutrals (ppb)		NA	NA	NA	NA	NA			
Bis(-2-Ethyl Hexyl)Phthalate	<u>6,500</u>						50,000	30	
1,2-Dichlorobenzene	<5000						10,000	8,000	
1,3-Dichlorobenzene	<50						10,000	8,000	
1,4-Dichlorobenzene	<5000						~~30,000~~	~~8,000~~	
Naphthalene	<50						6,000	6,000	
1,2,4-Trichlorobenzene	<50						10,000	500	
Butylbenzylphthalate	<50						NONE	NONE	
Di-n-butylphthalate	<50						NONE	NONE	
Isophorone	<50						NONE	NONE	
N-Nitrosodiphenylamine	NA						NONE	NONE	
Pesticides (ppb)	NA			NA	NA	NA	30,000	8,000	
Beta-BHC									
Heptachlor									
4,4-DDT									
Alpha-BHC									
PCBS (ppb)		NA	NA	NA	NA	NA			
PCB-1254	<u>4.2</u>						NONE	0.3	5
Herbicides (ppb)	NA	NA	NA	NA	NA	NA			
2,4,5-TP(Silvex)							NONE	NONE	
Cyanide (ppm)	NA	NA	NA	NA	NA	NA	NONE	0.01	
Extractable Petroleum Hydrocarbons (ppb)		NA	NA	NA	NA	NA			
C9-C18 Aliphatic	990						1,000	20,000	
C19-C36 Aliphatic	1,900						NONE	20,000	
C11-C22 Aliphatic	26,000						50,000	30,000	
Volatile Petroleum Hydrocarbons (ppb)		NA	NA	NA	NA	NA			
Ethylbenzene	870						30,000	4,000	
Toulene	4,100						6,000	50,000	100,000
C5-C8 Aliphatic	**<u>11,000</u>**						1,000	4,000	100,000
C9-C12 Aliphatic	1,100						1,000	20,000	100,000
C9-C10 Aliphatic	2,000						5,000	4,000	
p-m Xylenes	4,800						6,000	50,000	
Xylene	2,100						6,000	50,000	

Notes:
1. PPB = Parts Per Billion ; PPM = Parts Per Million; < = Less Than; ND = Not Detected (when no detection limit is available; NA = Not Analyzed
2. Concentrations that exceed GW-2 standards at applicable well locations are in bold typeface ; Concentrations [illegible]

DOWNGRADIENT PROPERTY
STATUS OPINION
891 WOBURN STREET
WILMINGTON, MASSACHUSETTS
RTN NO. 3-14340

PREPARED FOR:
Mr. Augustine Sheehy
Andover, Massachusetts

PREPARED BY:
GZA GeoEnvironmental, Inc.
Newton Upper Falls, Massachusetts

October 1997
File No. 14452

GZA
GeoEnvironmental, Inc.

Engineers and Scientists

October 15, 1997
File No. 14452

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
10 Commerce Way
Woburn, MA 01801

GZA

320 Needham Street
Newton Upper Falls
Massachusetts 02164
617-969-0050
FAX 617-965-7769

Re: Downgradient Property Status Opinion
891 Woburn Street Property
Wilmington, Massachusetts
DEP RTN 3-14340

Ladies and Gentlemen:

The attached report documents a Downgradient Property Status Opinion for the 891 Woburn Street Site in Wilmington, Massachusetts; a Downgradient Property Status Transmittal Form (BWSC-104) is enclosed as Appendix A of the report. GZA GeoEnvironmental, Inc. (GZA) completed the report on behalf of Mr. Augustine P. Sheehy to fulfill the requirements of 310 CMR 40.0180 et seq. This submittal is intended to address the requirements of the Massachusetts Contingency Plan which were triggered by a Release Notification Form submitted on October 10, 1996. As described in the attached report, it is our opinion that the contamination reported at the Site originates from an upgradient source and that the Site is eligible for Downgradient Property Status.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

A Subsidiary of GZA
GeoEnvironmental
Technologies, Inc.

Charles A. Lindberg, LSP
Principal

Sara R. Hanna, LSP
Project Reviewer

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APPPENDICES

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1.00 INTRODUCTION

This report documents a Downgradient Property Status (DPS) Opinion in accordance with 310 CMR 40.0180 et seq. for the 891 Woburn Street site in Wilmington, Massachusetts (the "Site"). GZA GeoEnvironmental, Inc. (GZA) completed the DPS Opinion on behalf of Mr. Augustine P. Sheehy, the owner of the 891 Woburn Street property.

As part of a regional investigation associated with the Tier 1A site at 51 Eames Street in Wilmington, the Olin Corporation installed monitoring wells on the 891 Woburn Street proprty in 1992 and 1995. Chemical analyses of groundwater samples from the wells indicated elevated levels of a number of volatile organic compounds (VOCs) and certain other constituents. Olin provided results of the analyses to Mr. Sheehy in April 1996. Mr. Sheehy subsequently engaged GZA to review the data and advise him regarding his obligations under the Massachusetts Contingency Plan (MCP). Concentrations of certain constituents in the Olin wells exceed MCP Reportable Concentrations (RCs) for groundwater category RCGW-2. Accordingly, GZA advised Mr. Sheehy of a potential notification obligation on June 13, 1996. A Release Notification Form was subsequently (October 10, 1996) filed with the Massachusetts Department of Environmental Protection (DEP) within the 120-day notification period from knowledge of the "release."

The monitoring wells installed by Olin are situated on the northern (upgradient in terms of groundwater flow) edge of the 891 Woburn Street property. This area abuts the E.C. Whitney & Son Inc. property, which is a barrel/drum reclamation facility and a listed Disposal Site in both state and federal databases. The well locations lie within 50 feet of the drum storage area within the Whitney property. Based on our review of available data on the 891 Woburn Street, Whitney and Olin sites, it is GZA's opinion that the contamination observed on the Site is attributable to an off-Site source and that the 891 Woburn Street property is eligible for DPS. This report summarizes our review of the available data and documents our DPS Opinion; a DPS Opinion Transmittal Form (BWSC-104) is presented in Appendix A.

GZA's work is subject to the limitations presented in Appendix B.

2.00 BACKGROUND

The following sections describe the physical layout of the Site, results of a regulatory review, and review of previous studies on nearby properties.

2.10 SITE DESCRIPTION AND HISTORY

The Site occupies approximately 1.5 acres of land in an industrial area on the west side of Woburn Street in Wilmington; the Woburn/Wilmington line forms the southern border of the Site. The Site is currently occupied by a single-story warehouse building which houses Smart Ceramics. The building is of concrete block/steel siding and steel frame construction with a concrete slab on grade. Municipal water and sewer lines service the Site from Woburn Street (which becomes New Boston Street in Woburn just south of the Site boundary). The exterior portion of the Site surrounding the building is almost entirely paved and used for parking or access roadways. A small area adjacent to the southern edge of the building was observed to be unpaved and unvegetated.

A warehouse/office building occupied by Evans Paper Box and Genesis Die Cutting abuts the Site to the south. The MBTA commuter rail and B&M Railroad tracks form the Site's western boundary, across which is vacant land and an industrial facility occupied by New England Resins & Pigments. A railroad spur also delineates the Site's northern border; the E.C. Whitney Company abuts the Site to the north across this spur track. The E.C. Whitney Company is a barrel reclamation facility which stores hundreds of 55-gallon steel and plastic drums, along with other containers. Several industrial and commercial facilities adjoin the Site to the east across Woburn Street.

The property has been owned by Mr. Augustine Sheehy since 1985, when it was purchased from Ruth Whitney, executrix of the estate of John E. Whitney. John Whitney owned the Site for approximately 20 years and used the Site as part of a storage area for Whitney Barrel Company, a barrel and drum reclaiming facility. The Whitney Barrel Company site (a separate operation from the adjacent E.C. Whitney Company) formerly encompassed both the 891 Woburn Street property and the adjacent parcel to the south (now known as 324 New Boston Street in Woburn). This site was previously investigated by the U.S. Environmental Protection Agency (EPA) in 1980 as part of a regional environmental study. EPA's contractor had noted housekeeping problems at the time of their study but concluded that the site did not present a hazard to the environment.

Smart Ceramics, a producer of specialty ceramics for the electronic industry, presently occupies the Site. Former occupants of the property included Belair Enterprises (snack food distributors), Hub Delivery, J. Amicone (food distributor), and Printcraft (printing facility). The Site building was constructed in 1986.

2.20 REGULATORY REVIEW

GZA reviewed selected readily accessible state and federal lists/databases maintained by environmental regulatory agencies as part of this evaluation. We reviewed the US EPA Facility Index System (FINDS), an inventory of all facilities regulated by the agency, and the Superfund National Priority List. The Site was not included on either of these databases.

Edward C. Whitney & Son, Inc. at 888 Woburn Street (northerly abutter to the Site) was listed on the FINDS database as a Resource Conservation and Recovery Act (RCRA) generator of hazardous waste. This facility was also listed on the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list of sites for possible investigation under Superfund. Ritter Trucking at 856 Woburn Street, New England Resins and Pigments at 316 New Boston Street (Woburn) and Olin Chemical were also listed as CERCLIS sites.

We also reviewed the following State lists and databases:

- List of Confirmed Disposal Sites and Locations to be Investigated and subsequent Addenda ("Sites List"), dated August 1993, April 1994 and April 1995.

- Sites Database dated March 24, 1994.

- Standard Release Report updated through July 1997.

The Site was identified on the Standard Release Report (Release Tracking Number 3-14340) due to the October 1996 notification mentioned in Section 1.00. Edward Whitney & Son at 888 Woburn Street was identified as a Location to be Investigated (LTBI) on both the Sites List and Sites Database (Site No. 3-1787). There was also a separate release listed at 888 Woburn Street "adjacent to train tracks" on the Standard Release Report. This latter incident was assigned Release Tracking Number (RTN) 3-12680 and was reported on July 25, 1995. No specific information on these listings was provided in the databases we reviewed.

The southerly abutting site (324 New Boston Street) was also identified on the Sites List and Sites Database as an LTBI. It is our understanding that this listing was related to petroleum contamination of soil and groundwater. Subsequently, chlorinated volatile organic compounds were detected in groundwater at this site and addressed under a separate site listing, which was identified on the Standard Release Report as RTN 3-12666. A Response Action Outcome (RAO) Statement was filed for this latter incident. This site appears to be downgradient of the 891 Woburn Street property in terms of groundwater flow.

There were numerous other sites within ½ mile of the 891 Woburn Street property which were identified on the various state and federal databases/lists. With the exception of the sites described below, however, these incidents would not be expected to affect the study Site due to their distance/direction relative to apparent groundwater flow patterns.

2.30 REVIEW OF OLIN STUDIES

Olin Corporation at 51 Eames Street in Wilmington is listed as a Priority/Tier 1A disposal site which is undergoing assessment activities under the MCP. As part of a regional groundwater quality evaluation connected with these MCP studies, Olin installed four monitoring wells on the 891 Woburn Street property. These wells, designated GW-49D, GW-80S, GW-80D and GW-80R were installed in December 1992 and July 1995. Olin's environmental consultant, Smith Environmental Technologies Corporation (Smith) sampled the wells in September 1992 and October 1995 and submitted the samples for broad spectrum chemical analyses. Selected results from these analyses are summarized on Table 1; data provided by Olin and Smith are presented in Appendix C.

Groundwater samples collected by Olin from the northern border of the Site indicated detectable levels of a wide variety of organic and inorganic constituents. Primary contaminants reported included aromatic compounds (benzene, toluene, ethyl benzene and xylenes) and chlorinated VOCs, including vinyl chloride. Concentrations of a number of constituents reported in Olin's analyses exceed MCP RCs for groundwater category GW-2. (Our preliminary review of Site conditions indicates that GW-2 is the appropriate reporting category for Site groundwater; none of the more stringent GW-1 criteria appear to be met.)

Olin recently filed a Supplemental Phase II Site Investigation Report with DEP documenting their MCP investigation work. Although a comprehensive review of this eight-volume report was beyond the scope of our current study, we reviewed selected elements of their investigation and discussed the main findings with Mr. Steve Morrow of Olin. The primary contaminants associated with the Olin plant include sulfates, ammonia, chloride and chromium. A dense aqueous layer of these inorganic constituents has apparently accumulated in a bedrock trough; according to Olin's report, further migration of these constituents is limited. Mr. Morrow indicated that elevated levels of chlorinated VOCs have not been found at the Olin Site.

Olin has characterized groundwater flow patterns within their study area based on water level measurements collected on several dates. Excerpts from some of the plans depicting flow directions from the Olin studies are included in Appendix C. Their data indicates that a divide is present in the northern portion of the Olin property. Flow in areas north of this zone is generally to the northwest, while groundwater flow across the majority of the Olin Site is to the southeast. In the area of the 891 Woburn Street property, the limited data from Olin's studies indicate a general southeasterly direction of flow.

2.40 REVIEW OF WHITNEY STUDIES

GZA reviewed files made available at DEP's Woburn Office on the two release listings for the Whitney Site on September 23, 1997. As indicated above, the Whitney Site was identified as an LTBI on DEP's original Sites List (Site No. 3-1787) and is also included on the current listing as RTN 3-12680. There were files for both of these listings at DEP's Office.

The Whitney Site, addressed as both 885 and 888 Woburn Street, was originally investigated by Ecology and Environmental, Inc. (E&E) in 1980 as part of a regional U.S. EPA study. E&E reported chlorinated VOCs in a sample collected from a settling basin within the Whitney property. In a March 1982 report, E&E indicated that E.C. Whitney & Son, Inc. may be a source of trichloroethylene (TCE) found in a drainage ditch (the East Drainage Ditch) adjacent to the B&M Railroad line. DEP apparently listed the Whitney Site as an LTBI based on these findings.

Whitney subsequently engaged Capaccio Environmental Engineering, Inc. (Capaccio) to prepare a Licensed Site Professional (LSP) Evaluation Opinion in 1995. This Opinion was a requirement of the MCP transition regulations for LTBIs. Capaccio's Opinion, filed in April 1995, indicated that the Whitney Site did not require remedial response pursuant to the MCP. Apparently no soil or groundwater sampling was completed in support of this Opinion.

DEP audited the April 1995 LSP Opinion, apparently as a result of the findings from Olin's work on the 891 Woburn Street property. The audit did not identify any violations or deficiencies; however, the Department stated that the historic E&E data was "indicative of a potential release situation" in an April 27, 1995 memorandum. Accordingly, they assigned a new RTN to the Whitney Site and issued a Notice of Responsibility (NOR) to Whitney on July 25, 1995. The NOR cited "evidence that there is or has been a release of OHM" at the Whitney Site and mentioned "waste lagoons" on the property.

In a follow-up internal memorandum dated August 25, 1995, DEP cited the Olin well findings and "past practices at the facility (which) had the potential to have contributed to elevated concentrations of the compounds detected" as reasons for the NOR issuance. A December 1995 Notice of Audit Findings issued by DEP also stated that "sufficient evidence exists to indicate that a potential release condition exists at the property".

In response to the July 25, 1995 NOR, Whitney engaged Capaccio to complete a Phase I Initial Site Investigation for the 888 Woburn Street Site. The Phase I study, documented in a July 1996 report, included a review of Site history and regulatory issues and a subsurface exploration and testing program. The exploration program included the drilling of three soil borings, collection of soil samples for VOC screening, installation of three monitoring wells (CEE-1 through CEE-3), measurement of groundwater elevations and analysis of groundwater samples for VOCs.

Screening of soil samples from the Whitney Site indicated total VOC levels up to 9 parts per million (ppm); no laboratory analyses were completed. Groundwater analyses (summarized in Appendix D) detected VOCs in each of three wells on the Whitney property at levels ranging from 1 to 4,400 parts per billion (ppb). Capaccio concluded that groundwater flow is to the southeast, toward Woburn Street. They also acknowledged a component of groundwater flow from the Whitney Site toward the GW-80 well cluster.

Our evaluation of the groundwater elevation data from the Capaccio report (Appendix D) clearly indicates flow from the Whitney Site onto the 891 Woburn Street property. According to their data, the large drum storage area in the southwestern portion of the Whitney Site is directly upgradient of 891 Woburn Street and the GW-80 well cluster.

Despite the groundwater flow data and the presence of VOCs on the Whitney property, Capaccio concluded that hazardous material released on the Whitney Site "is not the source, or primary source of contamination found at the off-site wells OW-49 and GW-80." Capaccio acknowledges, however, that "operations conducted by E.C. Whitney & Son, Inc., appear to have released hazardous material to groundwater beneath the property" and that "a small downgradient flow component is present from Whitney toward the GW wells" (i.e., the GW-80 well cluster). The Phase I report concludes that further response actions are required at the Whitney Site but does not indicate what these actions will entail. There was no indication of any additional response actions at the Whitney Site since the July 1996 Phase I in the DEP file.

3.00 HYDROGEOLOGIC CONDITIONS AND CONTAMINANT DISTRIBUTION

Based on available exploration logs from Olin's studies and data from surrounding sites, the Site area is underlain by fill overlying glacial till. The fill unit was described as a sandy clay or sand on the log for OW-49D and was reported to be 10 feet thick. A mixture of sand, clay and gravel which appears to be glacial till was observed underlying the fill layer. Two of the GW-80 series borings encountered bedrock at a depth of about 18 feet. On the Whitney Site, soils were generally described as well-graded sands to depths of 12 feet. These profiles - sands and sandy fills overlying glacial till - are typical of this region based on our experience.

As outlined in Section 2.00, studies at the Olin and Whitney Sites have characterized groundwater flow in the immediate area of the Site. Olin's work indicates a general southeasterly direction of flow in the area just northwest of the Site. Their data indicate complex flow patterns in areas west of the Site, with flow directions ranging from due south to northeast. Data from the Olin study is limited in the immediate vicinity of the Site, however. Groundwater elevation data from the Whitney Site clearly indicates a southerly to southeasterly flow direction. From a regional perspective, groundwater flow would be generally to the southeast toward the head-waters of the west branch of the Aberjona River (located about 1,000 feet southwest of the Site). There may also be localized southwesterly flow components toward the East Drainage Ditch. The East Drainage Ditch flows south into Halls Brook, which eventually converges with the Aberjona River about 1.5 miles south of the Site.

Elevated levels of VOCs and certain other constituents were detected in all three levels of the GW-80 well cluster and in the adjacent deep overburden well. The highest VOC levels were reported in the bedrock well (30 to 70 feet below grade) although concentrations in the overburden were only slightly lower. In their Phase II report, Olin characterized the contamination at the GW-80 cluster as an isolated hot spot with an associated plume extending toward the southeast. Based on the Whitney studies, however, the zone of elevated VOC levels also encompasses the western portion of the Whitney property. Data from the adjacent 324 New Boston Street Site in Woburn suggests that the VOC plume may extend to the south of the 891 Woburn Street property.

The suite of contaminants reported in the GW-80 well cluster was similar to that detected by Capaccio on the Whitney property. Benzene, toluene, ethylbenzene and xylenes ("BTEX") were the primary contaminants in each case with lower levels of ketones and chlorinated VOCs. The highest levels of chlorinated VOCs in the GW-80 cluster were detected in the deep bedrock well. It is noted that the Whitney wells were all shallow (12 feet) overburden wells; no deep explorations have been completed on that site.

4.00 MIGRATION PATHWAYS AND EXPOSURE POTENTIAL

GZA reviewed migration pathways and exposure potential for the contaminants reported at the 891 Woburn Street Site in general accordance with MCP guidelines. The constituents detected at the Site display low to moderate solubility in water and, therefore, can migrate substantial distances with groundwater flow in dissolved phase. Volatilization, adsorption and biodegradation will attenuate concentrations of these constituents as they migrate, but these mechanisms have only limited effects. In general, VOCs will migrate with groundwater flow toward surface water bodies (which are typically the main discharge points for groundwater in New England) or other receptors such as pumping wells. It is believed that the ultimate discharge point for groundwater flowing from the Site is the west branch of the Aberjona River and two associated ponds which are located approximately 1,500 feet southeast of the Site.

The other transport pathway of potential concern at the Site is VOC migration via soil gas. VOCs will volatilize to some extent from groundwater into the overlying soil pore spaces. These soils gases can then migrate upward to the ambient air or to confined building spaces.

Reported levels of certain VOCs (1,1-dichloroethene and vinyl chloride) in groundwater at the Site substantially exceed the MCP groundwater category GW-2 standards. These standards address the vapor intrusion exposure scenario. GW-2 exceedances in close proximity to an occupied structure may warrant further evaluation. Based on our preliminary evaluation of the vapor intrusion pathway, we do not believe that conditions pose an imminent hazard to the 891 Woburn Street building occupants. This assessment is based on the following considerations:

1. Highest concentrations of the key contaminants appear to be limited to the deeper groundwater. Concentrations reported in the shallowest well (GW-80S) are below the conservative GW-2 standards.

2. The Site building is a commercial structure with substantial air exchange rates (GW-2 standards are based on residential structures with conservative assumptions regarding ventilation rates).

3. There is no basement in the Site building.

4. The Site building is relatively new; therefore the building slab is likely to be in good condition.

Site groundwater is at a depth of 3 to 5 feet below ground surface and contamination appears to be confined to the saturated zone. Additionally, virtually all of the Site is paved or covered by the building. Accordingly there is no significant potential for direct contact with contaminants under the current Site condition. There is limited potential for exposures to VOCs during possible subsurface utility work.

Groundwater is not used for water supply on or adjacent to the Site, so no ingestion exposures are likely.

No significant environmental receptors for the documented contamination at the Site were identified. With respect to the regional contamination, discharge of groundwater to the Aberjona River would be the environmental exposure pathway of most significance. Due to the distance to the river and the dilution associated with transport via groundwater flow, detectable environmental impacts would not be anticipated.

5.00 EVALUATION OF NEED FOR IMMEIDATE RESPONSE ACTIONS

Sections 310 CMR 40.0412 of the MCP states that Immediate Response Actions (IRAs) shall be conducted at the following sites:

1. sites or vessels where a release or threat of release of oil and/or hazardous material has occurred with required notification to the Department under the "Two Hour" notification provisions of 310 CMR 40.0311 or 40.0312; (including releases which pose or could pose an Imminent Hazard);

2. sites where a release or threat of release of oil and/or hazardous material has occurred which requires notification to the Department under the "72 Hour" notification provisions of 310 CMR 40.0313 or 30.0314;

3. disposal sites where a condition of Substantial Release Migration has been identified; and

4. any other site or vessel where the Department determines that immediate or accelerated response actions are necessary to prevent, eliminate, or minimize damage to health, safety, public welfare or the environment.

Based on an evaluation of the release conditions and the available subsurface investigation information relative to the Site, conditions requiring the performance of Immediate Response Actions have not been identified. As noted in Section 4.00 above, while the VOCs in Site groundwater may pose a risk to Site building occupants, it is GZA's opinion that this condition does not represent an Imminent Hazard as defined by the MCP.

6.00 CONCLUSIONS

Based on the work completed during this study, GZA has developed the following conclusions:

1. Volatile organic compounds (VOCs) and certain other constituents were detected in groundwater on the northern (upgradient) border of the 891 Woburn Street Site. The testing which detected the groundwater contamination was conducted by Olin Corporation as part of a regional study associated with their disposal site. Mr. Augustine Sheehy, owner of the 891 Woburn Street Site, reported the contamination to the Massachusetts Department of Environmental Protection(DEP) in October 1996. DEP subsequently issued a Release Tracking Number and Notice of Responsibility.

2. We have not identified any reported releases or other incidents associated with Site operations which could have contributed to the observed contamination. Oils or hazardous materials are not used or stored on the portion of the Site where the contamination was detected.

3. Review of DEP files indicated that a release of oil and hazardous materials has been reported at the adjacent property to the north (E.C. Whitney & Son). Initial studies of the Whitney site indicated a generally southeasterly direction of groundwater flow, placing the facility upgradient of the 891 Woburn Street property.

Contaminants similar to those reported on the 891 Woburn Street property have been detected in groundwater at the Whitney Site.

4. Regional groundwater flow, as documented by Olin's studies, is generally to the southeast in the vicinity of the Site.

5. GZA has not identified any conditions requiring Immediate Response Actions at the Site. Vapor migration from contaminated groundwater into the Site building is a possible exposure scenario that may warrant further evaluation, however.

Based on this information, GZA has concluded that the source of the contamination reported in groundwater at the 891 Woburn Street Site is located on an upgradient property and that the contamination came to be located on the Site as a result of groundwater migration. Our review of available data indicates that activities at the Site have not contributed to or exacerbated the groundwater contamination. Accordingly, in our opinion, the 891 Woburn Street Site is eligible for Downgradient Property Status in accordance with 310 CMR 40.0180 et seq. A completed form BWSC-104 transmitting this opinion is included in Appendix A.

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TABLE 1

GROUNDWATER QUALITY DATA

TABLE 1

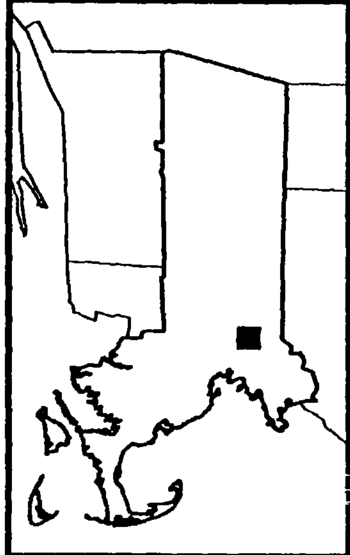
SUMMARY OF ANALYTICAL RESULTS
OLIN WELLS

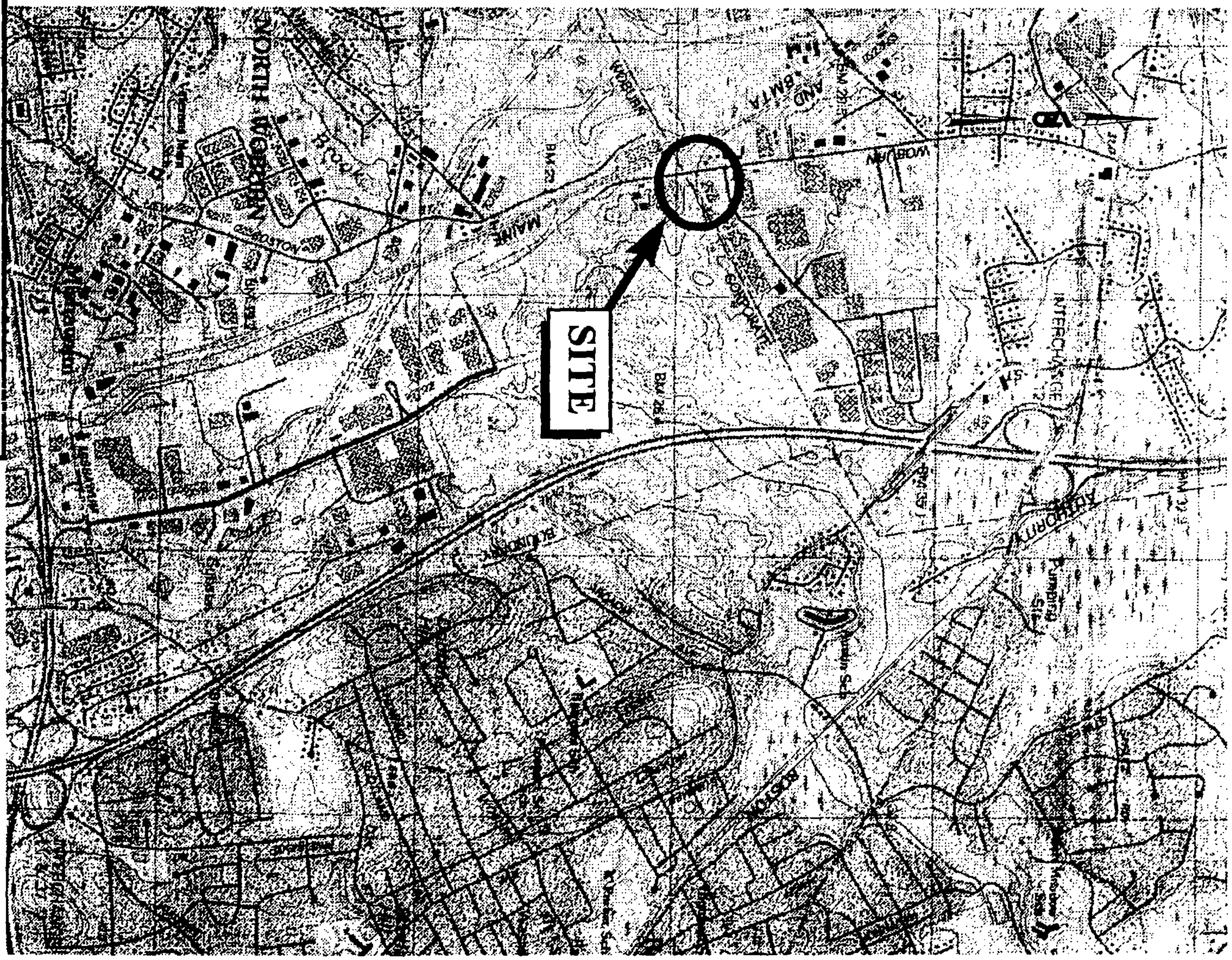
Constituents	Well Number/Concentration (ug/l)				MCP Reportable Concentrations RCGW-2
	GW-49D 8/12/92 (8-18')	GW-80S 10/19/95 (3-9')	GW-80D 10/19/95 (9.7-19.7')	GW-80-BR 10/19/95 (30-70')	
Benzene	71	28	94	130	2,000
Toluene	3,200	4,400	**7,100**	**15,000**	6,000
Ethylbenzene	120	1,300	340	290	4,000
Xylene	600	2,800	1,100	1,100	6,000
Acetone	150	52	31	280	50,000
2-Butanone	2	19	13	300	50,000
4 methyl 2 pentanone	190			1,200	50,000
2-hexanone	37				10,000
Vinyl chloride	**7**		**19**	**300**	2
Chloroethane	19		230	790	10,000
1,1-DCA			430	1,100	9,000
1,2-DCA				**23**	20
1,1-DCE			**2**	**120**	1
1,2-DCE (total)	39	14	160	1,300	50,000
1,1,1-TCA				1,500	4,000
1,1,2-TCA				26	20,000
TCE				56	300
1,1,2,2-PCA				**41**	20
PCE				43	3,000
Methylene Chloride	3B		31B	220B	50,000
Chlorobenzene	10B	1	79	170	500
Bromoform				12	800
Phenol	15	82	7	5	30,000
2,4-dimethyl phenol	7	25	12	9	20,000
2 Methyl phenol		26	17	18	
4 Methyl phenol		190	63	70	
4 Chloro-3 methyl phenol			21	4	
1,4 DCB	5		18	38	8,000
1,2 DCB	130	2	290	770	8,000
Naphthalene	11	4	27	13	6,000
Bis 2 EHP	5B	16	2	7	30
Arsenic		22	14	10	400
Lead		**30**			30

Notes:

1. See Appendix C for analytical data
2. Blank spaces - Not detected or not available.
3. B - Constituent also reported in blank sample.
4. Concentrations in **BOLDFACE** meet or exceed MCP RC.

FIGURES



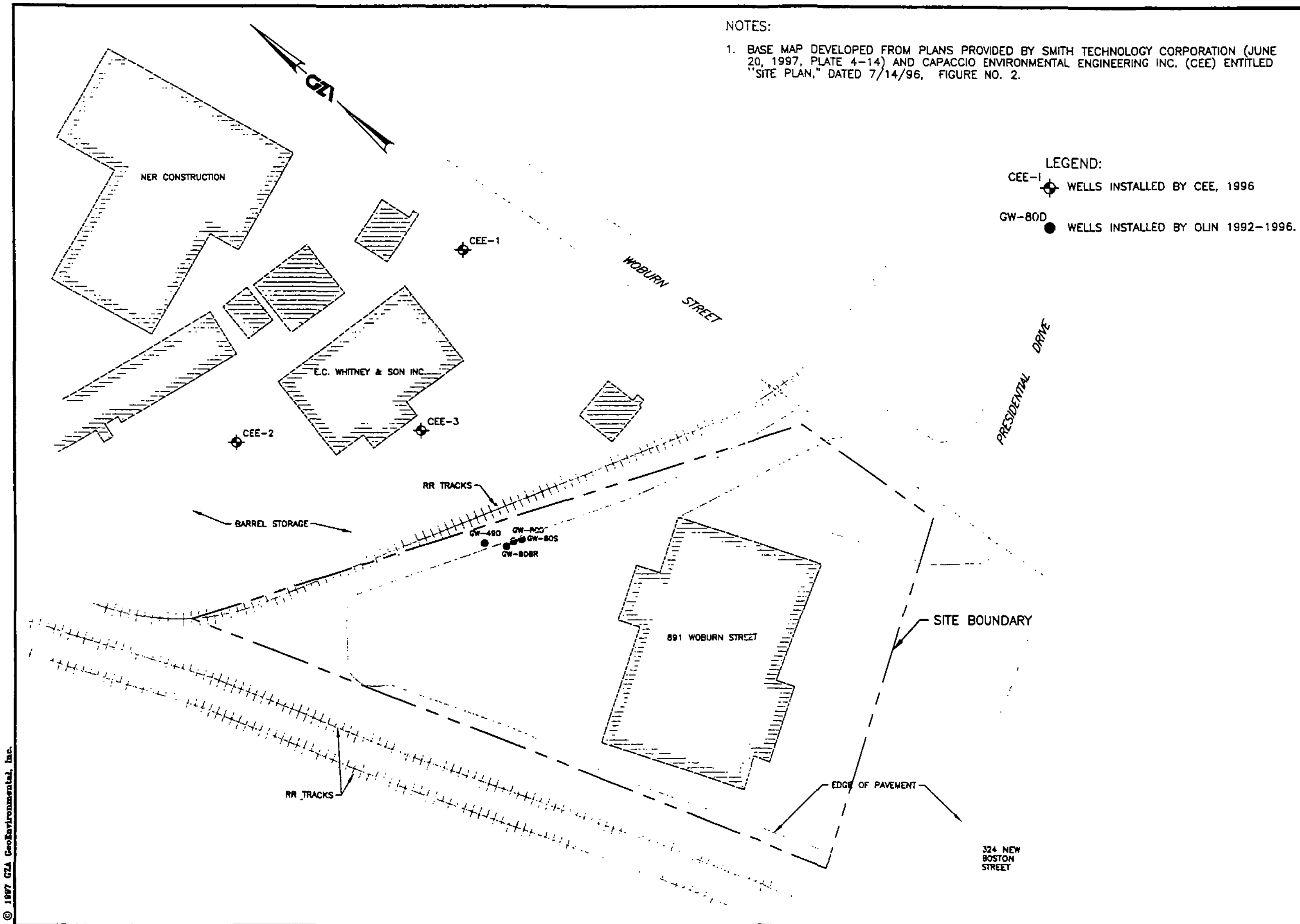


JOB NO. 14452.00 FIGURE NO. 1	ENVIRONMENTAL STUDY 891 WOBURN STREET WILMINGTON, MASSACHUSETTS LOCUS PLAN	SOURCE 1985 USGS READING, MA QUADRANGLE MAP (NOT TO SCALE)	PROJ MGR: CAL DESIGNED BY: CAL REVIEWED BY: CAL OPERATOR: NBF DATE: 10/2/97 GZA GeoEnvironmental, Inc.

NBF, 10/02/1997, 10:39:47 | PCP: PCP? | FILE: 0NO00F03.DWG

NOTES:

1. BASE MAP DEVELOPED FROM PLANS PROVIDED BY SMITH TECHNOLOGY CORPORATION (JUNE 20, 1997, PLATE 4-14) AND CAPACCIO ENVIRONMENTAL ENGINEERING INC. (CEE) ENTITLED "SITE PLAN," DATED 7/14/96, FIGURE NO. 2.



REV. NO.	DESCRIPTION	BY	DATE

PROJ MGR: CAL
DESIGNED BY: CAL
REVIEWED BY: CAL

OPERATOR: RWB
DATE: 10/2/97

GZA GeoEnvironmental, Inc.

1"=60'

0 30' 60' 120'

ENVIRONMENTAL STUDY
891 WOBURN STREET
WILMINGTON, MASSACHUSETTS

SITE PLAN

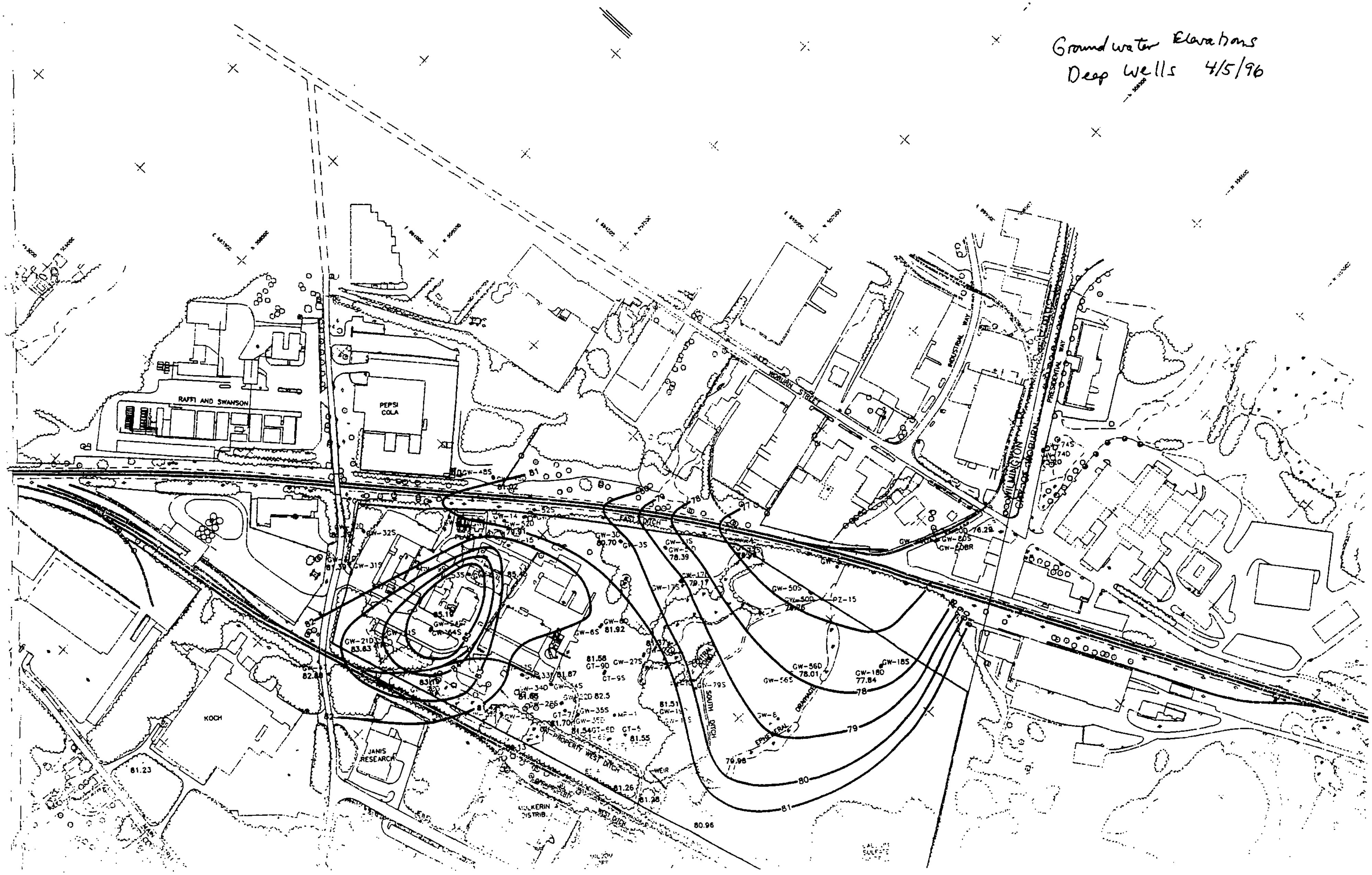
JOB NO. 14452.00

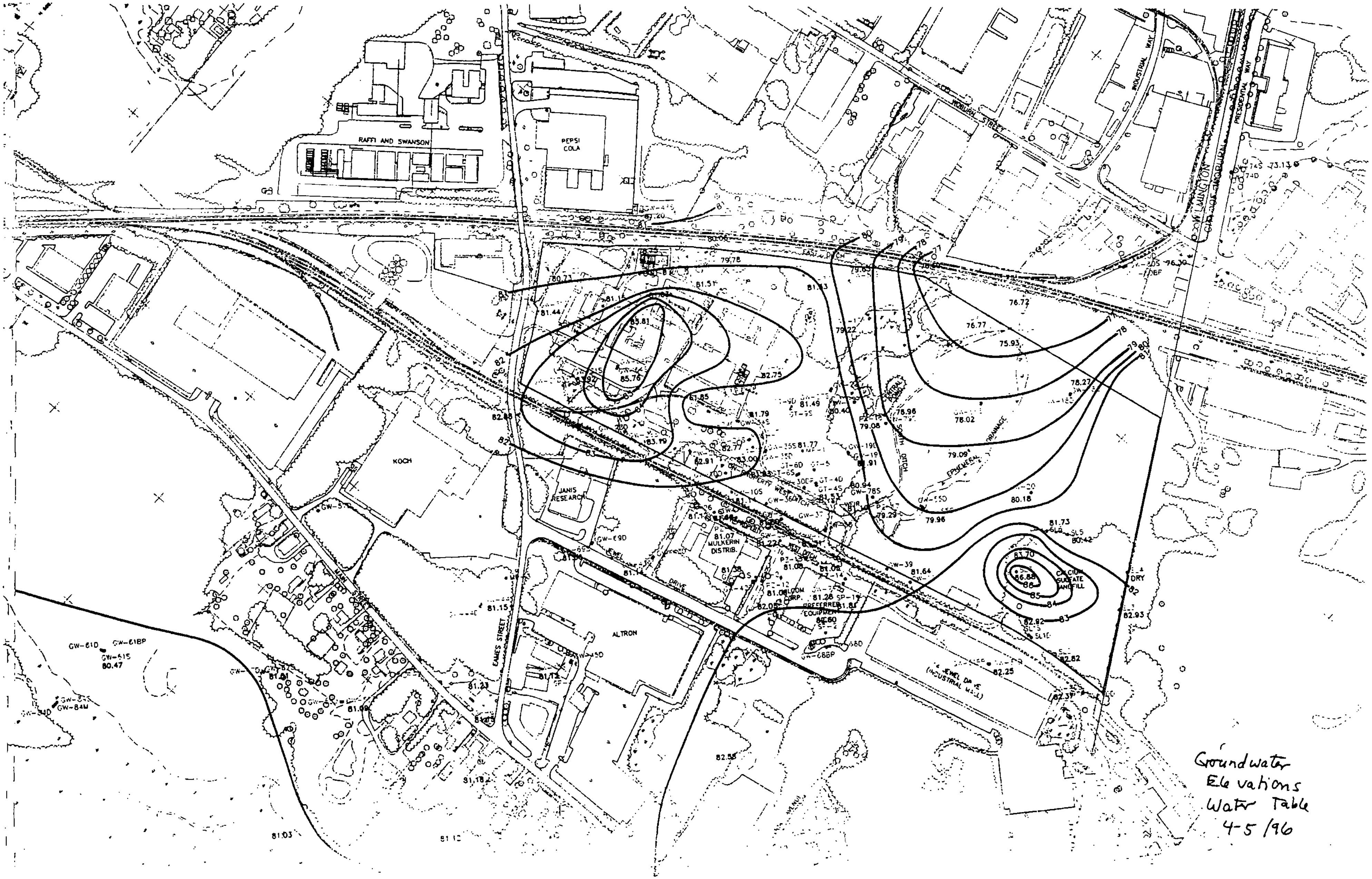
FIGURE NO. 2

APPENDIX C

DATA FROM OLIN STUDIES

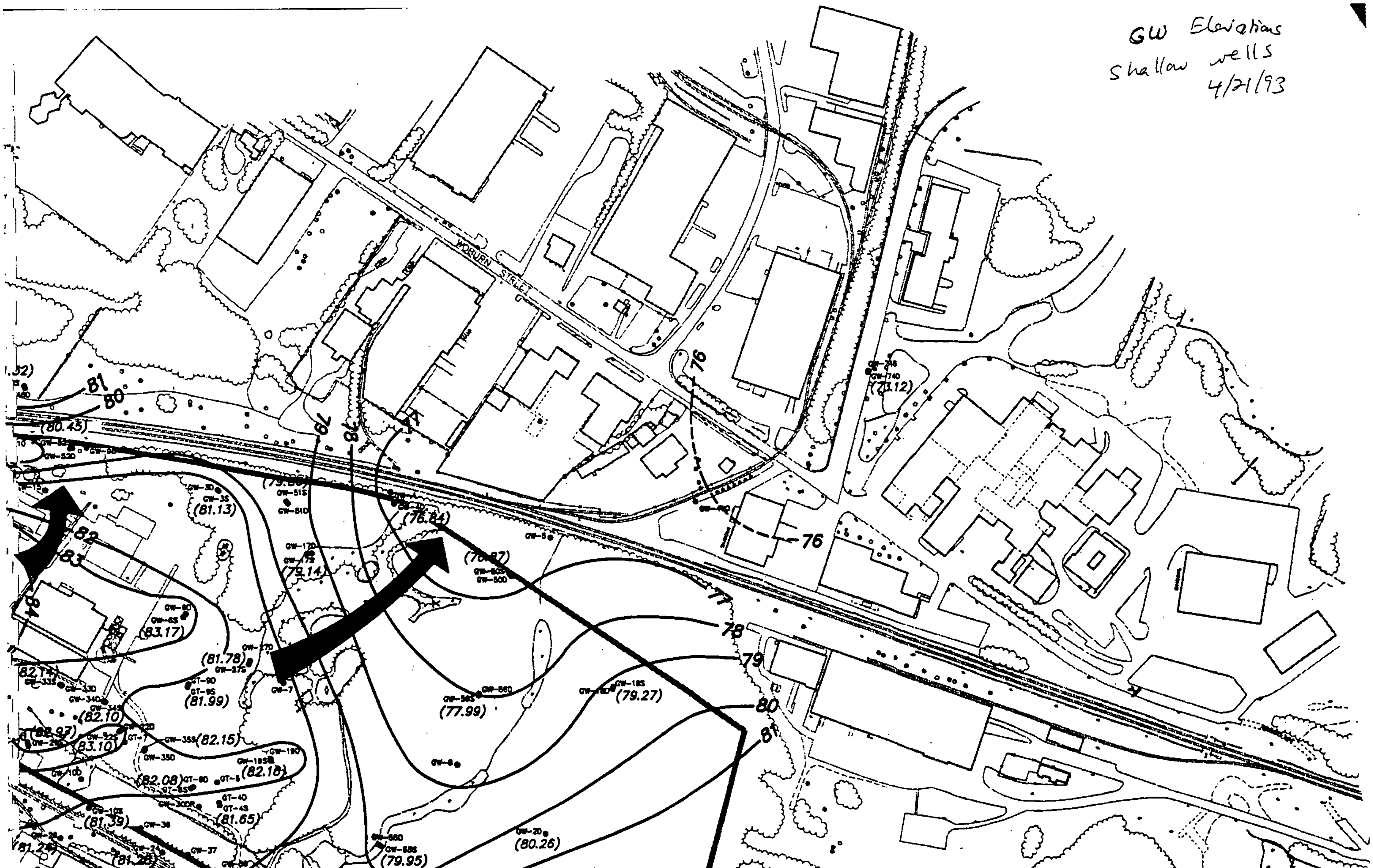
Groundwater Elevations
Deep Wells 4/5/96





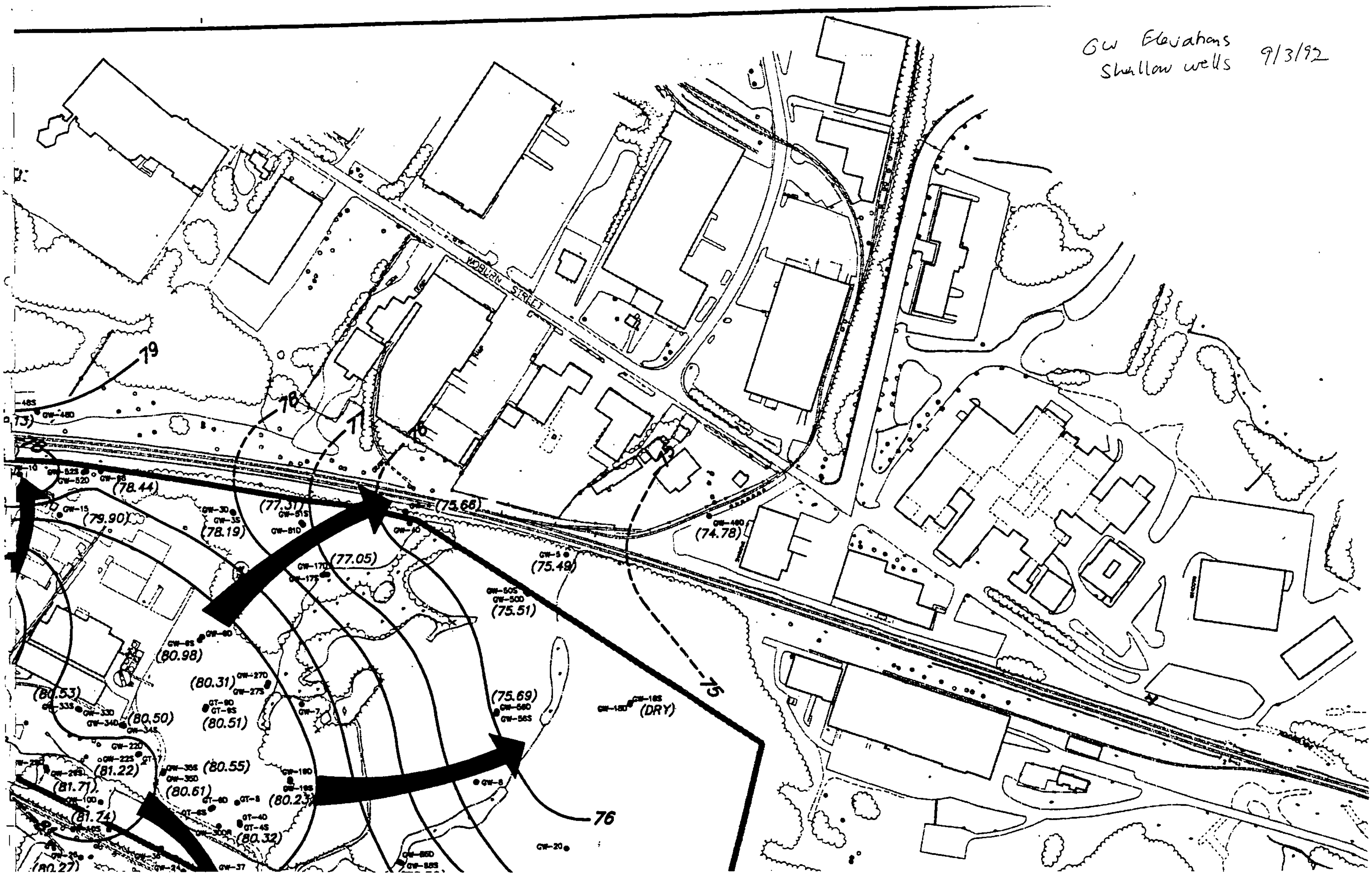
Groundwater Elevations Water Table 4-5/96

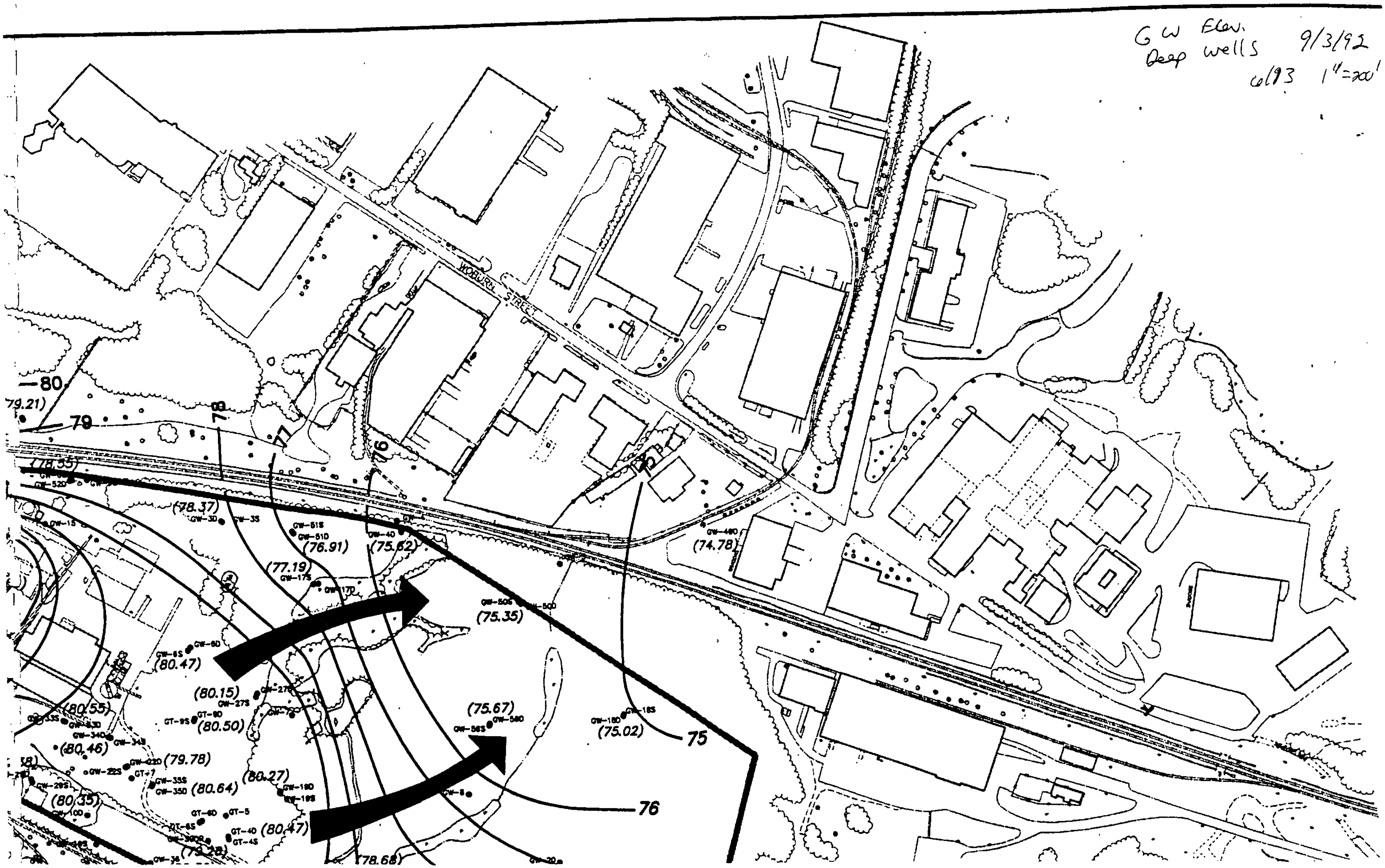
GW Elevations
shallow wells
4/21/93



GW Elevations
Deep Wells
4/21/93

GW Elevations 9/3/92
Shallow wells



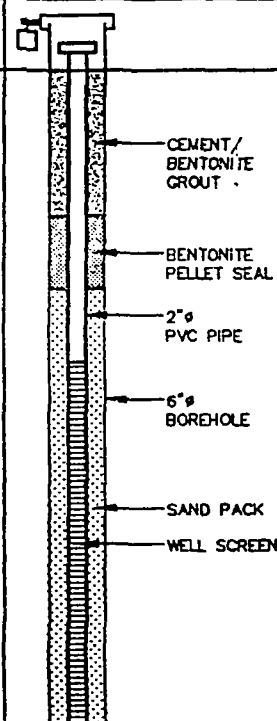

GW Elev. 9/3/92
Deep wells
6/93 1"=200'
WOBURN STREET
80
79
78
77
76
75
(79.21)
(78.55)
(78.37)
(76.91)
(75.62)
(77.19)
(75.35)
(80.47)
(80.15)
(80.55)
(80.50)
(80.46)
(79.78)
(80.64)
(80.27)
(80.35)
(80.47)
(78.68)
(75.67)
(75.02)
(74.78)

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OLIN (CSA)
PROJECT NO.: 3683
CLIENT: OLIN CORP.
LOCATION: WILMINGTON, MA.

HOLE DESIGNATION: GW-49D
DATE COMPLETED: DECEMBER 14, 1992
DRILLING METHOD: 4 1/4 / NX / 5 7
CRA SUPERVISOR: J.W. MICHELS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	STATE
	REFERENCE POINT (Top of Riser)	81.37			
	GROUND SURFACE	79.2			
	CL–CLAY, some sand, some silt, black, product odor			1SS	
2.5				2SS	
	SP–SAND(FILL), fine grained, black, saturated, slight odor	75.2			
5.0				3SS	
7.5					
10.0	CL–CLAY, some sand, some gravel, black, saturated	69.2			
				4SS	
12.5				5SS	
15.0				6SS	
17.5	END OF HOLE @ 18.0 FT. BGS	61.2			
20.0					
22.5					
25.0					
27.5					
30.0					
32.5					



SCREEN DETAILS:
Screened Interval:
8.0 to 18.0' BGS
Length –10.0'
Diameter –2.0"
Slot # 10
Material –Plastic
Sand pack interval:
6.0 to 18.0' BGS
Material –Coarse Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯ WATER FOUND ▽ STATIC WATER LEVEL ▽

TABLE

DRAFT

MONITORING WELL CONSTRUCTION DETAILS
Olin Corporation
Wilmington, MA Facility

Monitoring Well	Date Completed	Ground Elevation (ft. MSL)	Top of Casing (ft. MSL)	Monitored Interval Elevation (ft.MSL)	Monitored Interval Depth (ft. bgs)	Sand Pack Interval Elevation (ft. MSL)	Sand Pack Interval Depth (ft. bgs)	Well Materials	Top of Bedrock Elevation (ft. MSL)	Top of Bedrock Depth (ft. bgs)
GW-67 D	11/2/92	98.2	100.39	25.7 to 10.7	72.5 to 87.5	30.2 to 10.2	68 to 88	2" PVC casing/screen	17.2	81
GW-68 D	7/23/92	90.3	90.16	83.3 to 73.3	7 to 17	85.3 to 72.3	5 to 18	2" PVC casing/screen	76.3	14
GW-68 BR	12/10/92	90.2	89.83	59.2 to 14.2	31 to 76	NA to NA	NA to NA	4" PVC casing/3" open rock	59.2	31
GW-69 S	7/27/92	90.9	92.28	77.9 to 67.9	13 to 23	82.4 to 67.9	8.5 to 23	2" PVC casing/screen	•	•
GW-69 D	7/27/92	91.1	93.05	55.1 to 45.1	36 to 46	57.1 to 45.1	34 to 46	2" PVC casing/screen	46.1	45
GW-70 S	7/26/92	92.2	91.99	78.2 to 68.2	14 to 24	80.2 to 68.2	12 to 24	2" PVC casing/screen	•	•
GW-70 D	7/28/92	92.3	92.10	40.3 to 30.3	52 to 62	42.3 to 30.3	50 to 62	2" PVC casing/screen	35.3	57
GW-71 S	11/17/92	93.9	95.60	80.9 to 70.9	13 to 23	87.9 to 70.9	6 to 23	2" PVC casing/screen	•	•
GW-71 D	11/19/92	94.4	96.65	54.4 to 44.4	40 to 50	57.4 to 44.1	37 to 50.3	2" PVC casing/screen	49.4	45
GW-72 D	11/17/92	86.0	88.19	74 to 64	12 to 22	76 to 61	10 to 25	2" PVC casing/screen	69.0	17
GW-73 S	4/19/93	83.4	83.39	68.4 to 58.4	15 to 25	70.4 to 58.4	13 to 25	2" PVC casing/screen	•	•
GW-73 D	4/19/93	83.8	83.49	29.3 to 19.3	54.3 to 64.3	31.3 to 19.3	53 to 64.5	2" PVC casing/screen	25.8	58
GW-74 S	3/31/93	77.7	77.43	67.7 to 57.7	10 to 20	69.7 to 57.7	8 to 20	2" PVC casing/screen	•	•
GW-74 D	3/31/93	77.7	77.22	57.2 to 47.2	20.5 to 30.5	59.7 to 47.2	18 to 30.5	2" PVC casing/screen	52.7	25
GW-75 S	5/6/93	81.1	83.28	71.1 to 61.1	10 to 20	73.1 to 61.1	8 to 20	2" PVC casing/screen	•	•
GW-75 D	5/6/93	81.4	83.49	45.4 to 35.4	36 to 46	47.4 to 35.4	34 to 46	2" PVC casing/screen	40.4	41
GW-76 S	1/17/95	85.9	87.10	82.9 to 72.9	3 to 13	84.4 to 72.9	1.5 to 13	2" PVC casing/screen	•	•
GW-77 S	1/17/95	84.0	85.51	83 to 73	1 to 11	83 to 73	1 to 11	2" PVC casing/screen	•	•
GW-78 S	1/16/95	82.5	84.87	82.5 to 73.5	0 to 9	82.5 to 73.5	0 to 9	2" PVC casing/screen	•	•
GW-79 S	1/16/95	79.3	81.39	79.3 to 69.3	0 to 10	79.3 to 69.3	0 to 10	2" PVC casing/screen	•	•
GW-80 S	7/24/95	79.8	79.17	76.55 to 70.3	3 to 9	77.05 to 70.3	2.5 to 10	4" PVC casing/screen	•	•
GW-80 D	7/24/95	79.4	79.06	69.71 to 59.7	9.7 to 19.7	71.41 to 58.9	8 to 20.5	4" PVC casing/screen	61.2	18.2
GW-80 BR	7/21/95	79.3	78.91	49.31 to 9.3	30 to 70	NA to NA	NA to NA	8" PVC casing/6" open rock	61.3	18
GW-81 D	7/26/95	86.1	85.86	81.14 to 71.1	5 to 15	82.14 to 71.1	4 to 15	4" PVC casing/screen	72.6	13.5
GW-81 BR	7/26/95	86.2	86.01	65.2 to 36.2	21 to 50	NA to NA	NA to NA	8" PVC casing/6" open rock	72.6	13.6
SL-1 S	11/11/87	?	86.47	? to ?	5 to ?	? to 15	? to ?	2" PVC casing/screen	?	?
SL-1 D	11/12/87	84.1	86.44	79.6 to 69.6	4.5 to 14.5	? to 14.5	? to 69.6	2" PVC casing/screen	71.6	12.5
SL-2	11/13/87	83.5	85.80	78.5 to 68.5	5 to 15	? to 15	? to 68.5	2" PVC casing/screen	70.5	13
SL-3	11/20/87	90.2	92.64	79.2 to 69.2	11 to 21	? to 21	? to 69.5	2" PVC casing/screen	71.2	19
SL-4	11/16/87	100.7	103.19	95 to 90	5.7 to 10.7	? to 10.7	? to 90	2" PVC casing/screen	92.7	8
SL-5	11/17/87	82.8	94.41	77.8 to 67.8	5 to 15	? to 15	? to 77.8	2" PVC casing/screen	79.8	3
SL-6	11/18/87	90.1	92.71	79.1 to 69.1	11 to 21	? to 21	? to 69.1	2" PVC casing/screen	71.1	19
SL-7	11/19/87	93.3	95.54	88.3 to 83.3	5 to 10	? to 10	? to 83.3	2" PVC casing/screen	88.3	7
SL-8	11/19/87	90.9	92.42	89.9 to 84.9	1 to 6	? to 6	? to 84.9	2" PVC casing/screen	87.9	3
GT-4 S	?	?	88.39	? to ?	4 to 9	? to ?	? to ?	2" PVC casing/screen	?	?
GT-4 D	?	86.3	88.51	77.3 to 62.3	9 to 24	? to ?	? to ?	2" PVC casing/screen	58.3	28

97598
Welch

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

April 3, 2002

Christopher Pyott
MADEP - Northeast Regional Office
205A Lowell Street
Wilmington, MA 01887

Dear Mr. Pyott:

This letter is in response to your request for information along the East Drainage Ditch/ New Boston Street Drainway and North Pond areas situated in North Woburn near the Woburn/ Wilmington town line. Please find enclosed a map and data summary table of sediment data collected along the East Drainage Ditch/ New Boston Street Drainway. These samples were collected in February 2001 under the Industri-Plex OU-2 Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation/ Feasibility Study (RI/FS). In addition, please find enclosed a "Final Site Inspection Prioritization Report" for Ritter Trucking Company, Wilmington, MA. This report was prepared by EPA's Superfund Technical Assessment and Response Team (START) contractor, Roy F. Weston. The START contract provides technical support to EPA's site assessment activities and response, prevention and preparedness activities.

If you should have any questions regarding this letter or the attached information, please contact me at (617) 918-1323.

Sincerely,

Joseph F. LeMay

Joseph F. LeMay, P.E.
Remedial Project Manager
Office of Site Remediation and Restoration

cc: John Beling, EPA (letter)
Anna Mayor, DEP (letter)
Gordon Bullard, TTNUS (letter)

EAST DRAINAGE DITCH ANALYTICAL RESULTS
INDUSTRIPLEX
WOBURN, MASSACHUSETTS

Sample Number	IPSD-ED01-020501		IPSD-ED02-020501		IPSD-ED03-020501		IPSD-DP01-020501		IPSD-ED03-061301		IPSD-ED04-020501		IPSD-ED05-020501		IPSD-ED06-020501		IPSD-ED07-020501	
Sample Location	ED01		ED02		ED03		ED03		ED03		ED04		ED05		ED06		ED07	
Date Sampled	2/5/2001		2/5/2001		2/5/2001		2/5/2001		6/13/2001		2/5/2001		2/5/2001		2/5/2001		2/5/2001	
Interval	0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5		0.0-0.5	
QC Identifier	None		None		Field Dup. IPSD-ED03-020501		Field Dup. IPSD-ED03-020501		None		None		None		None		None	
TAL Metal Analysis (MG/KG)																		
Aluminum	5860		4510		15700		13300		7760		11900		3670		18500		21800	
Antimony	8.3	J	6.2		2.2	J	2.3	UJ	0.26	UJ	1.8	UJ	6.3		0.44	UJ	0.50	UJ
Arsenic	113		112		384		314		138		289		149		126		120	
Barium	75.8		74.1		214		184		78.4		183		56.1		93.0		78.8	
Beryllium	0.70		0.50		2.0		1.6		0.73	UJ	1.5		0.36		2.9		3.4	
Cadmium	1.5	J	1.5	J	8.0	J	6.5	J	0.74	J	5.6	J		R	2.3	J	2.1	J
Calcium	2200		2430		9090		7840		3320		7980		1510		6620		6100	
Chromium	295		115		406		339		320		295		53.1	J	516		1180	
Cobalt	19.3	J	19.2	J	72.7	J	60.5	J	26.1		56.9	J	14.2	J	84.8	J	26.4	J
Copper	209	J	159	J	343	J	276	J	145	J	258	J	127	J	48.6	J	59.6	J
Iron	37200		29000		99000		83000		30700		79100		48300		53700		63900	
Lead	383	J	216	J	227	J	188	J	268		188	J	197	J	77.1	J	80 4	J
Magnesium	817		1080		3090		2730		1340		2580		1310		1940		1250	
Manganese	1480	J	775	J	4670	J	4070	J	756		4170	J	372	J	2800	J	545	J
Mercury	0.24	J	0.13	J	0.73		0.53			NA	0.75		0.51		0.14	J	0.25	J
Nickel	14.2	J	14.3	J	36.3	J	28.4	J	19.4		28.1	J	18.2	J	46.0	J	26.4	J
Potassium	307		386		1220		1030		526		1010		553		627		407	
Selenium	2.0	J	1.7	J	5.5	J	4.2	J		R	4.5	J	2.6	J	3.5	J	3.0	J
Silver		R		R		R		R	0.89	U		R		R		R		R
Sodium	704	J	683	J	2480	J	2010	J	263	J	1830	J	502	J	945	J	898	J
Thallium	0.47	U	0.59	U	0.68	U	0.60	U	1.8	UJ	0.60	U	0.44	U	0.67	U		R
Vanadium	10.9	J	10.0	J	39.4	J	33.2	J	18.0		30.3	J	14.8	J	31.7	J	33.5	J
Zinc	500		480		1750		1390		620		1280		385		569		446	J
Wet Chemistry Analysis																		
Chromium VI		NA		NA		R		R	5.98	U		NA		NA		NA		NA
pH		NA		NA	7.17		7.11		7.13			NA		NA		NA		NA
Redox Potential		NA		NA	10.0		8.2		195			NA		NA		NA		NA
Sulfide		NA		NA	336	J	62.1	J	11.7	J		NA		NA		NA		NA

EAST DRAINAGE DITCH ANALYTICAL RESULTS
INDUSTRIPLEX
WOBURN, MASSACHUSETTS

Sample Number	IPSD-ED08-020501		IPSD-ED09-020501		IPSD-ED10-020501	
Sample Location	ED08		ED09		ED10	
Date Sampled	2/5/2001		2/5/2001		2/5/2001	
Interval	0.0-0.5		0.0-0.5		0.0-0.5	
QC Identifier	None		None		None	
TAL Metal Analysis (MG/KG)						
Aluminum	11000		5910		2270	
Antimony	0.40	UJ	0.41	UJ	0.42	UJ
Arsenic	72.6		16.3		28.1	
Barium	112		21.3		13.9	U
Beryllium	0.91		0.75		0.40	
Cadmium	0.66	J	0.84	J	0.30	UJ
Calcium	4700		1760		1220	
Chromium	793		1240		15.3	
Cobalt	19.3		8.7		14.6	
Copper	47.7	J	32.6	J	21.1	J
Iron	17100		11900		15800	
Lead	24.6	J	31.5	J	6.2	J
Magnesium	926		651		434	
Manganese	246	J	133	J	294	J
Mercury	0.76		0.16	J	0.049	U
Nickel	37.7		9.5		6.2	
Potassium	355		193		214	
Selenium	1.0	U	1.0	U	1.0	U
Silver	0.14	U	0.14	U	0.15	U
Sodium	1040	J	326	J	126	UJ
Thallium	1.1	J	0.62	U	0.62	U
Vanadium	21.2		12.3		15.1	
Zinc	727		203		99.9	
Wet Chemistry Analysis						
Chromium VI		NA		R		NA
pH		NA	6.51			NA
Redox Potential		NA	191			NA
Sulfide		NA	84.4	J		NA

SEDIMENT SAMPLE LOCATIONS - EAST DRAINAGE DITCH		FIGURE 8-15
IP MSGRP - WOBURN, MASSACHUSETTS		TETRA TECH NUS, INC. 55 JONSPIN ROAD WILMINGTON, MA 01887 (978)658 7899
DRAWN BY: J. R. PICCUITO	DATE: DECEMBER 2001	
CHECKED BY. G. BULLARD	FILE: I/WOBURN APR 4123/0121A	

FINAL SITE INSPECTION PRIORITIZATION REPORT
FOR
RITTER TRUCKING CO.
WILMINGTON, MASSACHUSETTS

Prepared For:
U.S. Environmental Protection Agency
Region I
Office of Site Remediation and Restoration
John F. Kennedy Federal Building
Boston, MA 02203-0001

CONTRACT NO. 68-W5-0009

CERCLIS No. MAD019717412
TDD No. 98-05-0130
PCS NO. 5163
DC NO. S-172

Submitted by:
Roy F. Weston, Inc. (WESTON®)
Superfund Technical Assessment and Response Team (START)
217 Middlesex Turnpike
Burlington, MA 01803

24 September 1998

Region I START
Reviewed and Approved:

Paul H. Schrot — 9-24-98
Paul H. Schrot — Date
Site Leader

Daniel Keefe — 9/25/98
Daniel Keefe — Date
Project Leader

9/25/98
QA Review — Date

Work Order No. 11098-031-001-5163-70

DISCLAIMER

This report was prepared solely for the use and benefit of the U.S. Environmental Protection Agency (EPA Region I), Office of Site Remediation and Restoration for the specific purposes set forth in the contract between the EPA Region I and the Roy F. Weston, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START). Professional services performed and reports generated by START have been prepared for EPA Region I purposes as described in the START contract. The information, statements, and conclusions contained in the report were prepared in accordance with the statement of work, and contract terms and conditions. The report may be subject to differing interpretations or misinterpretation by third parties who did not participate in the planning, research or consultation processes. Any use of this document or the information contained herein by persons or entities other than the EPA Region I shall be at the sole risk and liability of said person or entity. START, therefore, expressly disclaims any liability to persons other than the EPA Region I who may use or rely upon this report in any way or for any purpose.

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INTRODUCTION

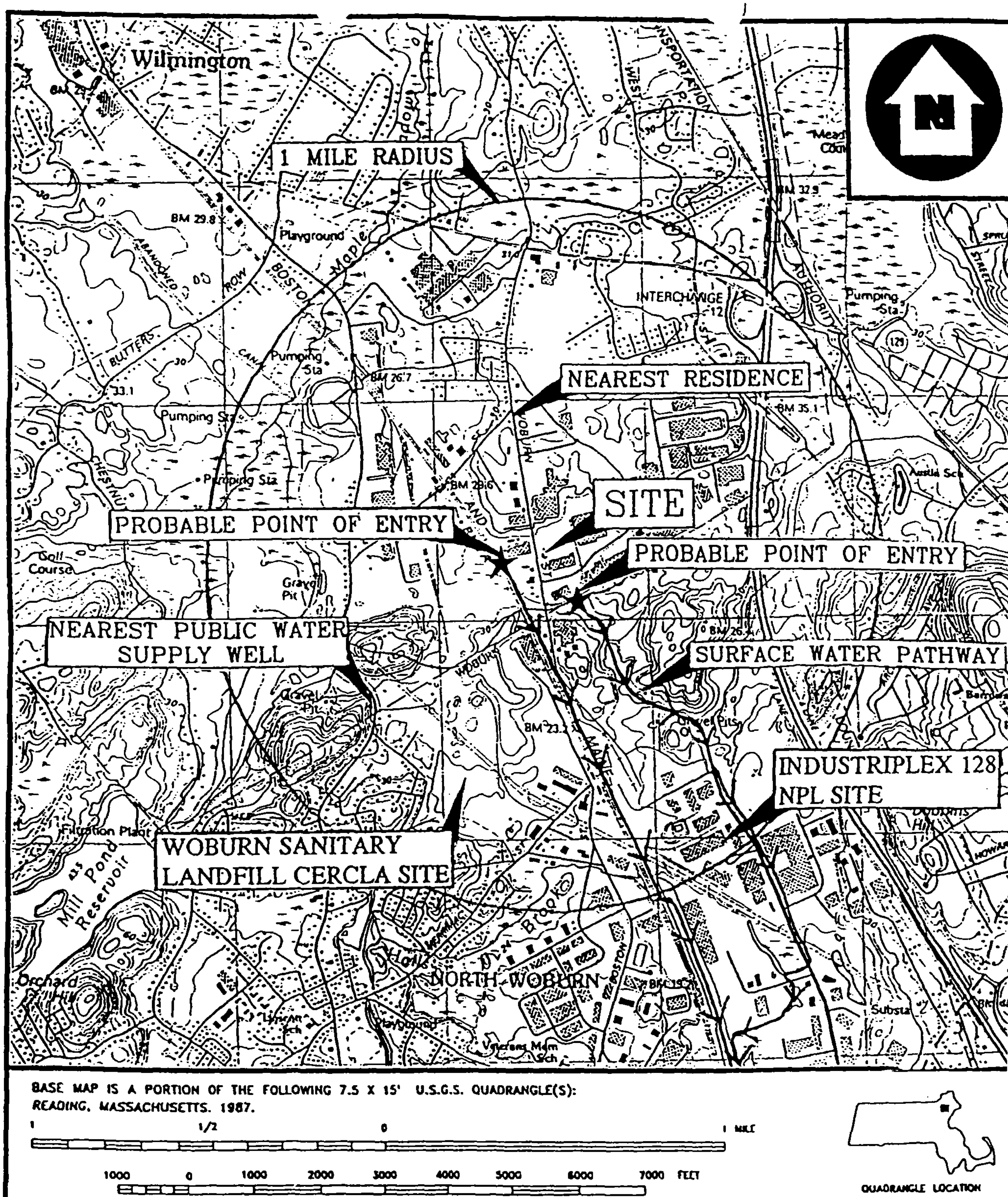
The Roy F. Weston, Inc. (WESTON®) Superfund Technical Assessment and Response Team (START) was requested by the U.S. Environmental Protection Agency (EPA Region I), Office of Site Remediation and Restoration to perform a Site Inspection Prioritization (SIP) of the Ritter Trucking Co. (RTC) property located at 856 Woburn Street in Wilmington, Massachusetts. Tasks were conducted in accordance with the SIP scope of work and technical specifications provided by EPA Region I. A Preliminary Assessment (PA) Report and a Site Inspection (SI) Report for the RTC property were prepared by Ecology and Environment, Inc./Field Investigation Team (E&E/FIT) on 6 August 1980 and 16 September 1980, respectively. On the basis of the information provided in the PA and SI, the RTC SIP was initiated.

Background information used in the generation of this report was obtained through file searches conducted at the EPA Region I and Massachusetts Department of Environmental Protection (MA DEP), telephone interviews with town officials, conversations with persons knowledgeable of the RTC property and conversations with other Federal, State, and local agencies.

This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA Region I regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State, or local regulations. SIPs are intended to provide a preliminary screening of sites to facilitate EPA Region I's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

SITE DESCRIPTION

The RTC property is located on a 1.07-acre lot at 856 Woburn Street in Wilmington, Middlesex County, Massachusetts (Figure 1). The property is listed as Lot No. 1B on Map No. 46 with the Wilmington Tax Assessor's office. The property is located in an industrial park in southeastern Wilmington just north of the Woburn-Wilmington town line and east of the Massachusetts Bay Transit Authority (MBTA)-New Hampshire Line railroad tracks [1, p. 5-2]. The property is bordered to the west by Woburn Street and the following businesses: New England Specialty Beverages, Dawson MacDonald Company, Alside Building Supply Center, and Hub Delivery, Inc. [39]. The property is bordered to the north by Comfort Foods and Middlesex Brewing Company; to the south by Wilmington Cold Storage; and to the east and northeast by a wooded area with an intermittent stream [39]. In addition, the property is located approximately 1 mile north of the Industriplex 128 EPA National Priority List (NPL) Site, approximately 2.5 miles north of the Wells G & H NPL Site, and approximately 3,000 feet (ft) north of the Woburn Sanitary Landfill Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Site [3, p. 2].



LOCATION MAP

RITTER TRUCKING CO.
856 WOBURN STREET
WILMINGTON, MASSACHUSETTS

HWRE

Civil•Environmental•Hydrologic•Structural•Hazardous Waste Engineering•Surveying

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
97-01-0030	S.R.	7/4/97

FILE NAME:	
HW-149\LOCATION	FIGURE 1

The property is rectangular and consists of approximately 46,795 square feet (ft^2), and is elevated 2 to 8 ft relative to the surrounding properties [4, p. 1]. Stormwater runoff in the area is directed through catchbasins and storm drains into North Pond, located approximately 750 ft south of the property on Presidential Way [3, p. 2]. The closest stormwater catchbasins are located south of the property at the corners of Woburn Street and Industrial Way [39]. The western two-thirds of the RTC property slope towards Woburn Street. The remaining eastern portion of the property has a relatively flat grade; however, some runoff may flow to the east into the intermittent stream [39]. The intermittent stream also discharges into North Pond.

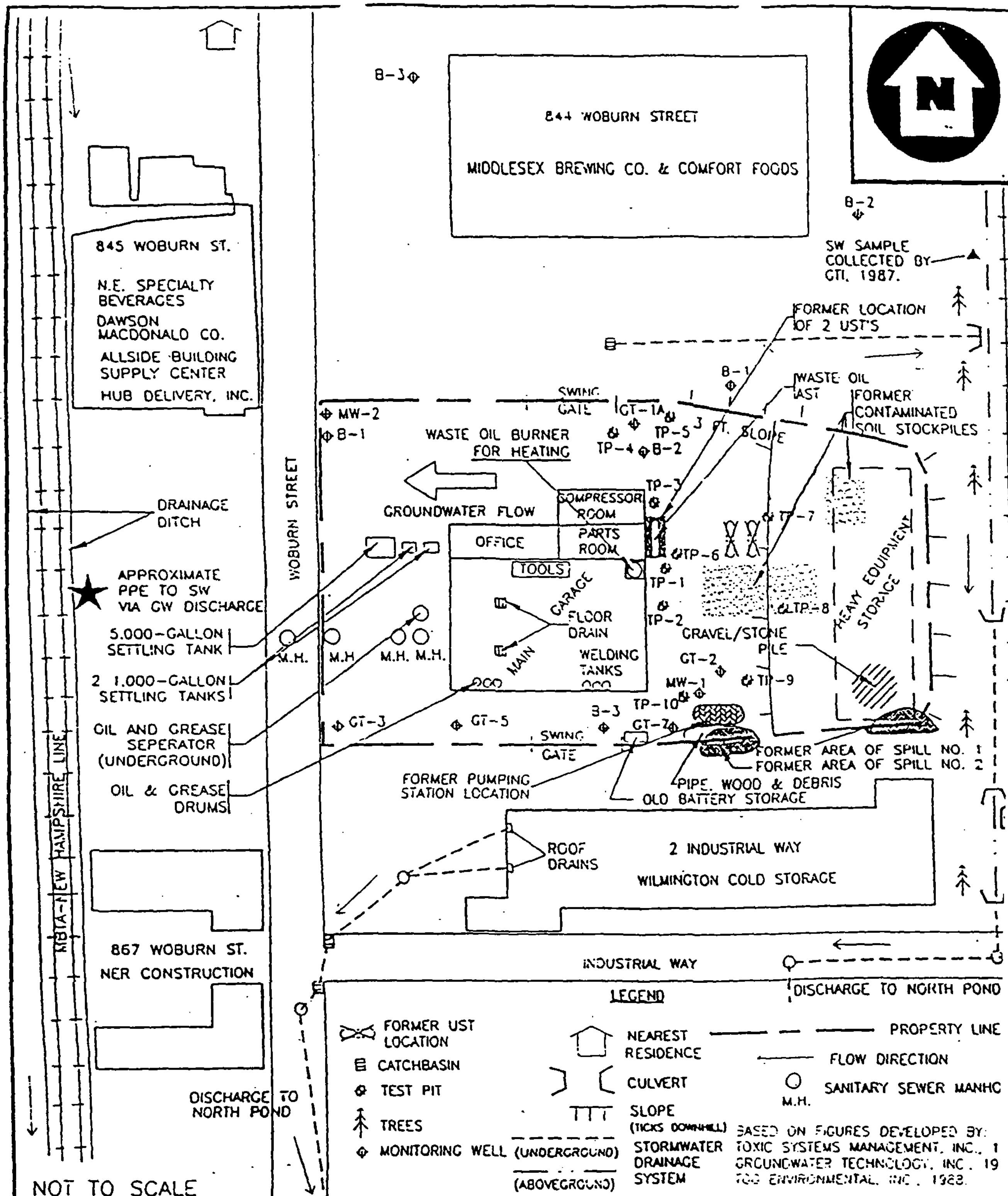
There is one large masonry building on the property which housed the RTC office and a garage for tank truck washing operations and maintenance (Figure 2). Prior to 1986, there was also a smaller building which housed a gasoline and diesel fuel pumping station, located to the southeast of the larger building. The pumping station and all associated piping was removed on 16 June 1986 [3, p. iii]. *The eastern portion of the property, located behind the larger building, was used as a parking and staging area for RTC tanker trucks.*

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

Prior to 1959, the property was residential [3, p. 4]. In 1959, Mr. Lawrence Tocci purchased the property. The existing building was constructed in 1961 and commercial usage of the property began thereafter. In 1961, the property was leased to Mr. H. R. Ritter, President of RTC. Mr. Donald H. Ritter, son of Mr. H. R. Ritter, changed the company name to Ritter Transportation and operated the business during the 1970s and 1980s. The business was sold to W.I.S.L. Transportation of New Jersey (Mr. Richard Kirk, President) on 11 July 1985. The company name remained Ritter Transportation. On 24 July 1987, Ritter Transportation filed for reorganization under Chapter 11 and the company's assets were liquidated [3, pp. 4-5]. In the late 1980s, the property was purchased by Mr. Daniel G. Donovan III who subsequently leased the property to Robert Francis Construction. In January 1998, the property was sold to Mr. Robert Francis who continues to operate Robert Francis Construction [50]. Robert Francis Construction uses the property for heavy equipment storage, a company office, and a truck and equipment maintenance garage [39; 40].

The primary activity of the RTC facility was the washing of the interior of tank trucks which were owned and operated by RTC. *RTC tank trucks transported plasticizers, natural and synthetic latex, oils, gasoline, diesel fuel, toluene, xylene, mineral spirits, and propane. Upon arriving at the facility, the trucks were washed down with cold water. The wash water drained into a floor catchbasin which then flowed into another floor catchbasin. From there, the wash water flowed through two 1,000-gallon underground storage tanks (USTs) and a 5,000-gallon UST with vertical baffles.* Sludge in the wastewater would settle in the USTs. These three USTs/settling tanks are located beneath the pavement between Woburn Street and the building. The effluent was then discharged into a Metropolitan District Commission (MDC) municipal sewer line. The sludge settling and effluent discharge system was designed by the MDC circa 1975 and the RTC facility was permitted by the MDC and the Town of Wilmington for industrial user discharge. *The sludge*

Note: Text which appears in italics indicates original portions of the Site Inspection report which were either copied or paraphrased.



SITE SKETCH

RITTER TRUCKING CO.
856 WOBURN STREET
WILMINGTON, MASSACHUSETTS

HWRE

Civil-Environmental-Hydrologic-Structural-Hazardous Waste Engineering-Surveying

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
97-01-0030	M.H.	9/02/97

FILE NAME:	
HW149\SITESKTH	FIGURE 2

collected in the settling tanks was periodically collected and disposed of by a local septage disposal company. In 1979, the MDC cited RTC for discharging material exceeding total solids and volatile solids criteria [3, p. I].

In the E&E/FIT SI Report, RTC stated that only latex trucks were washed at the Wilmington facility. Reportedly, RTC trucks which transported hazardous substances were washed at other facilities, and hazardous materials were not stored on the property [3, p. 5]. *Additionally, RTC stated that crankase oil and latex were the only materials entering the wastewater system as a result of truck washing operations; however, chemical analysis of samples collected from the wastewater system by E&E/FIT personnel indicated that volatile organic compounds (VOCs) were entering the MDC sewer from the RTC truck washing operation. On 22 August 1980, screening by gas chromatography of samples of the wastewater discharge indicated the presence of VOCs.* Laboratory analysis of a sample collected from the settling tanks indicated the presence of VOCs, including toluene, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethylene, n-heptane, methyl cyclohexane, and xylenes [3, p. 8].

E&E/FIT personnel also inspected the property east of the RTC property based on an aerial photograph taken in 1966 which depicted RTC tank trucks parked there. E&E/FIT noted that the property located to the north and east of RTC had recently been paved. As a result, the soils north-northeast of the property could not be sampled as originally planned. A pile of soil, which appeared to contain oily material, had been pushed up just east of the RTC property [2, p. 5-5]. A manhole which was thought to exist to the east of the RTC property could not be located; however, a recently removed manhole casing was observed by E&E/FIT personnel.

Conclusions of the E&E/FIT SI Report were that RTC was responsible for the following:

- Direct contamination of the MDC sewer line as a result of truck washing operations;

- RTC generated potentially hazardous wastes which, in the form of settling tank sludge, may have been dumped into the MDC sewer by the local septage hauler; and

- RTC may have dumped chemicals into the surrounding wetlands and/or wooded areas located to the east and northeast of the property [3, p. 1].

It was recommended by E&E/FIT that the MDC sewer line be investigated to determine if the sewer line was releasing contaminants into the surrounding soils. Information confirming that the sewer line was investigated could not be located by START personnel.

In addition to contamination of the MDC sewer line from tank washing operations, several spills of hazardous materials have occurred on the property as a result of other RTC operations. In April 1977, 300 to 500 gallons of No. 2 fuel oil spilled from a UST when a fill pipe cap was left off and a rainstorm displaced the contents of the tank. Jet Line Services, Inc. performed the cleanup. In 1984, oil was apparently released from a UST, flowed onto Woburn Street, and was washed into the storm drainage system by the local fire department [5, p. 2].

In July 1985, Massachusetts Department of Environmental Quality Engineering (MA DEQE) personnel responded to two areas of surface spillage which flowed from the RTC property onto the Wilmington Cold Storage, Inc. property, the southern abutter. Both spills had originated on the RTC property and flowed down an embankment onto the adjacent property [41, p. 1]. One area, Spill No.1, was identified as a phthalate ester spill from a parked RTC tanker truck, while the other incident, Spill No. 2, was tentatively identified as diesel fuel from the RTC fuel pumping station [3, p. 5]. Laboratory analysis of soil samples collected from the Wilmington Cold Storage, Inc. property indicated that VOCs and semivolatile organic compounds (SVOCs) were present in Spill No. 1.

Both spill areas were remediated by Jet Line Services, Inc. to MA DEQE's satisfaction [9, p. 3]. Surface soils which had been contaminated by the phthalate ester and diesel fuel spills were excavated and stockpiled on polyethylene sheeting on the RTC property for later disposal [3, p. 8]. Based on available file information, the volume of the contaminated soils excavated from the property could not be determined by START personnel. Post-removal soil sampling was reportedly conducted; however, START personnel were unable to obtain the analytical results [49]. Latex spills also occurred in September 1979 and September 1987, and the three settling tanks have clogged with latex sludge and overflowed in the past due to poor cleaning and maintenance [4, p. 4]. Analytical results from soil samples collected in July 1985 from the Spill Nos. 1 and 2 are discussed in detail in the Waste/Source Sampling section of this report.

In August 1985, MA DEQE required RTC to conduct a site assessment in order to determine surface and subsurface contamination. RTC contracted both Jet Line Services, Inc. for excavation and removal of the USTs and contaminated soils, and Toxic Systems Management, Inc. (TSMI) to conduct a Massachusetts General Laws (MGL) Chapter 21E Site Investigation [4, p. 4]. On 14 August 1985, TSMI installed two groundwater monitoring wells (MW-1 and MW-2) on the property. One soil sample was collected from the 3-foot interval of the MW-1 boring and was analyzed for polychlorinated biphenyls (PCBs) by EPA Method 608. No PCBs were detected in the soil sample. On 15 August 1985, groundwater samples were collected from MW-1 and MW-2 and analyzed for VOCs. The analytical results indicated 12 VOCs in both monitoring wells with concentrations up to 17,000 parts per billion (ppb). In addition, separate phase petroleum product was present in MW-1. Analytical results from the groundwater samples are discussed in detail in the Groundwater Pathway section of this report.

The TSMI study also noted that significant evidence of visible surface spills of petroleum and other unknown substances were observed in various areas on the RTC property. In addition, one 275-gallon aboveground storage tank (AST) containing waste oil was noted against the east (rear) wall of the building [4, p. 2]. Furthermore, TSMI personnel observed approximately 20 drums containing motor oil and liquid detergents stored inside the building [4, p. 2].

In October 1985, Jet Line Services, Inc. removed a 6,000-gallon UST and a 10,000-gallon UST, each containing diesel fuel. Both USTs were located to the east of the building. In addition, a 6,000-gallon sand-filled UST filled was discovered; however, the UST was left in the ground due to its proximity to the building [3, Appendix II].

In late 1985, the owner of RTC initially agreed to take the necessary actions to evaluate site conditions, but after repeated efforts by TSMI and MA DEQE to initiate further studies, the owner stated that RTC was not in a financial condition to follow-through with the site investigations [3, p. 5].

On 7 March 1986, Groundwater Technology, Inc. (GTI) was retained by the property owner to complete the investigation. The GTI investigation included the installation of additional groundwater monitoring wells (GT-1A, GT-2, and GT-3). In March 1986, analysis of groundwater samples collected from monitoring wells not containing separate phase petroleum product (MW-2, GT-1A, and GT-2) indicated contamination by six VOCs including chlorinated and aromatic hydrocarbons [3, p. 6; 51, p. 3]. In addition, GTI reported that groundwater elevation contours indicate that local groundwater flow is to the west [51, p. 3]. Analytical results are discussed in detail in the Groundwater Pathway section of this report.

In June 1986, petroleum-contaminated soils were excavated by GTI in the vicinity of the former USTs [7, p. 2]. In addition, the pumping station and all associated piping was removed from the property. Approximately 90 cubic yards (yd^3) of contaminated soils were excavated from the area of the former USTs and the pumping station and stockpiled on polyethylene sheeting on the property [3, p. 8].

An inspection of the RTC facility on 17 November 1986 by MA DEQE personnel revealed 46 55-gallon drums of waste material illegally stored on the property. The drums were unsecured and posed a "threat of release" of oil and hazardous materials [3, p. 6]. The drums were sampled and repackaged into 39 drums for disposal by Suffolk Services. Twenty 55-gallon drums of flammable liquid, three 55-gallon drums of "hazardous waste material", and 16 55-gallon drums of latex were removed in April 1987. The drums were transported to Environmental Waste Resources in Waterbury, Connecticut [3, p. 8].

On 30 December 1986, MA DEQE collected wastewater samples from the one of the floor catchbasins located in the garage portion of the on-site building, the settling tanks, and the discharge sewer line. The samples were analyzed for VOCs by EPA Method 624. The analytical results indicated contamination with nine VOCs [3, p. 8]. The analytical results are discussed in the Waste/Source Sampling section of this report.

In July 1987, TGG Environmental, Inc. (TGG) conducted an environmental assessment of the property abutting RTC to the north, at 844 Woburn Street. Activities included the installation and sampling of three monitoring wells, B-1 through B-3 [7, p. 2]. The analytical results of the groundwater samples collected from 844 Woburn Street showed the presence of VOCs largely corresponding to those previously detected beneath the RTC property with compounds being present in higher concentrations in monitoring well B-1, located closest to the RTC property. [7, p. 2].

Concurrently, GTI was conducting studies of both properties. In August 1987, approximately 15 yd^3 of contaminated soils were excavated from the RTC property by GTI from the area surrounding MW-1 [6, p. 2]. During excavation, headspace analysis of soil samples was conducted with a portable photoionization detector (PID). Readings indicated total VOC levels of 35 to 60 units above background. Laboratory analysis of soil samples (depths unknown) collected from the excavation indicated the presence of acetone, methyl ethyl ketone (MEK), benzene, toluene, total xylenes, and concentrations of total petroleum hydrocarbons (TPHs) in the soils up to 6,800 parts per million (ppm) [5, p. 7]. The excavated soil was stockpiled in the existing contaminated soil pile on the property [6, p. 3].

In October 1987, GTI conducted sampling and analyses of monitoring wells MW-2, GT-1A, GT-5, GT-7, B-1, B-2, and B-3 in order to determine groundwater flow direction and chemical composition. The resulting data suggested that groundwater flow at 844 Woburn Street is largely to the south. VOCs, including petroleum constituents and chlorinated solvents, were detected in all of the groundwater samples [7, p. 2]. Additionally, a surface water sample was collected from the intermittent stream located northeast of the property and analyzed for VOCs; however, none were detected [6, p. 4]. Analytical results of the groundwater samples are discussed in detail in the Groundwater Pathway section of this report.

On 10 December 1987, MA DEQE completed an updated SI Report because environmental conditions had significantly changed on the property and new information had become available since the initial SI Report completed by E&E/FIT in 1980 [3]. According to the updated SI Report, the 275-gallon AST containing waste oil was removed from the property in 1986.

Between March 1988 and March 1989, TGG conducted three groundwater sampling events. In March 1988, both properties (844 and 856 Woburn Street) were sampled. In March 1989, three new monitoring wells were installed by TGG on the RTC property near previous wells which were destroyed over the winter; B-1 replaced MW-2, B-2 replaced GT-1A, and B-3 replaced GT-7. The analytical results of the groundwater samples collected between March 1988 and March 1989 showed levels of contaminants to be comparable to those previously detected [8, p. 3]. Several VOCs were detected in the groundwater samples including vinyl chloride, total xylenes, ethyl benzene, 1,2-dichloroethane, 1,1-dichloroethane, benzene, and toluene [7, p. 5; 8, p. 3, Table 1]. Analytical results of the groundwater samples collected between March 1988 and March 1989 are discussed in detail in the Groundwater Pathway section of this report.

Based on the analytical results generated from the groundwater samples collected in March 1989, the need for additional exploratory work northeast of the building was recommended (by an undocumented authority). This area was chosen because it was near a recently demolished boiler room. During the demolition, apparent openings for vent pipes were noted in this area, and this location is also near the observation well where the greatest increase in levels of VOCs was observed [9, p. 4].

On 10 April 1989, TGG excavated test pits in the area of the recently demolished boiler room. In the process, a 6,000-gallon, sand-filled UST was uncovered. The UST was approximately 30 ft long and 6 ft in diameter. The UST was located immediately west of where two USTs (6,000-gallon and 10,000-gallon tank) were previously removed. The sand-filled UST had been left in-place at that time as a portion of the building (the boiler room) was built over it. TGG reported that the sand-filled UST formerly contained diesel fuel and was filled with sand and abandoned in 1965 because it was suspected of leaking. Johnson Fuel Oil of Winchester, Massachusetts was contracted to conduct the tank removal [8, p. 4].

In July 1989, during removal of the sand-filled UST, another UST was discovered adjacent to and west of the sand-filled UST. This 2,000-gallon UST contained 7 inches of liquid and was suspected of formerly containing heating oil. Both of the USTs were located in an area which was previously identified as a likely source area of contaminants present on the property [8, p. 4]. Petroleum-contaminated soils were encountered near both of the USTs. Both USTs were excavated and removed from the property for disposal. In accordance with requirements set by MA DEP, the limits of the excavation were determined during UST removal and were limited to the least amount of soil required to remove the USTs. No contaminated soil was required to be removed beyond the limits of the UST excavations [8, p. 5]. An estimated 70 to 90 yd^3 of contaminated soils were excavated and stockpiled on polyethylene sheeting [8, p. 6]. TGG reported that results of analyses from the soil showed that both petroleum compounds and chlorinated solvents were present, although chlorinated solvents were present at low levels. Furthermore, three soil samples were collected from the limits of the tank excavations and analyzed for TPHs. The highest concentration present was 5,690 ppm TPHs. The remaining two samples, with levels of 2,870 and 3,500 ppm TPHs, were considered representative of soil remaining at the limits of the excavation [8, p. 6].

Between July 1992 and January 1993, Suffolk Services, Inc. cleaned out the underground wastewater settling tank system. All residual latex was removed and the interiors of the tanks were cleaned. Once decontaminated, the tanks were filled in with concrete and left in place [39].

In March 1997, groundwater samples were collected from the RTC property from wells B-1, B-2, B-3, and GT-3 by Earth Tech and analyzed for VOCs, SVOCs, and TPHs. Several compounds were detected in the samples, including 1,1-dichloroethene, vinyl chloride, xylenes, ethyl benzene, benzene, chloroethane, isopropylbenzene, n-propylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 2-methylnaphthalene, naphthalene, di-ethylhexyl phthalate, and TPHs [42]. Analytical results from the groundwater samples are discussed in detail in the Groundwater Pathway section of this report

On 16 June 1997, START personnel conducted an on-site reconnaissance of the RTC property. START personnel met with Mr. Donovan, the property owner at that time. Mr. Donovan indicated that the property is leased to and operated by Robert Francis Construction, Inc. The building is comprised of a garage, company office, supply and parts room, and a compressor room. START personnel observed one 55-gallon drum and three 30-gallon containers of oil and/or grease in the garage. Approximately three welding tanks, numerous tools, and a waste oil burner were also observed in the garage. The waste oil burner is used to heat the building and it is fueled by a 500-gallon waste oil AST located in the rear (northeast) of the building [39, p. 2].

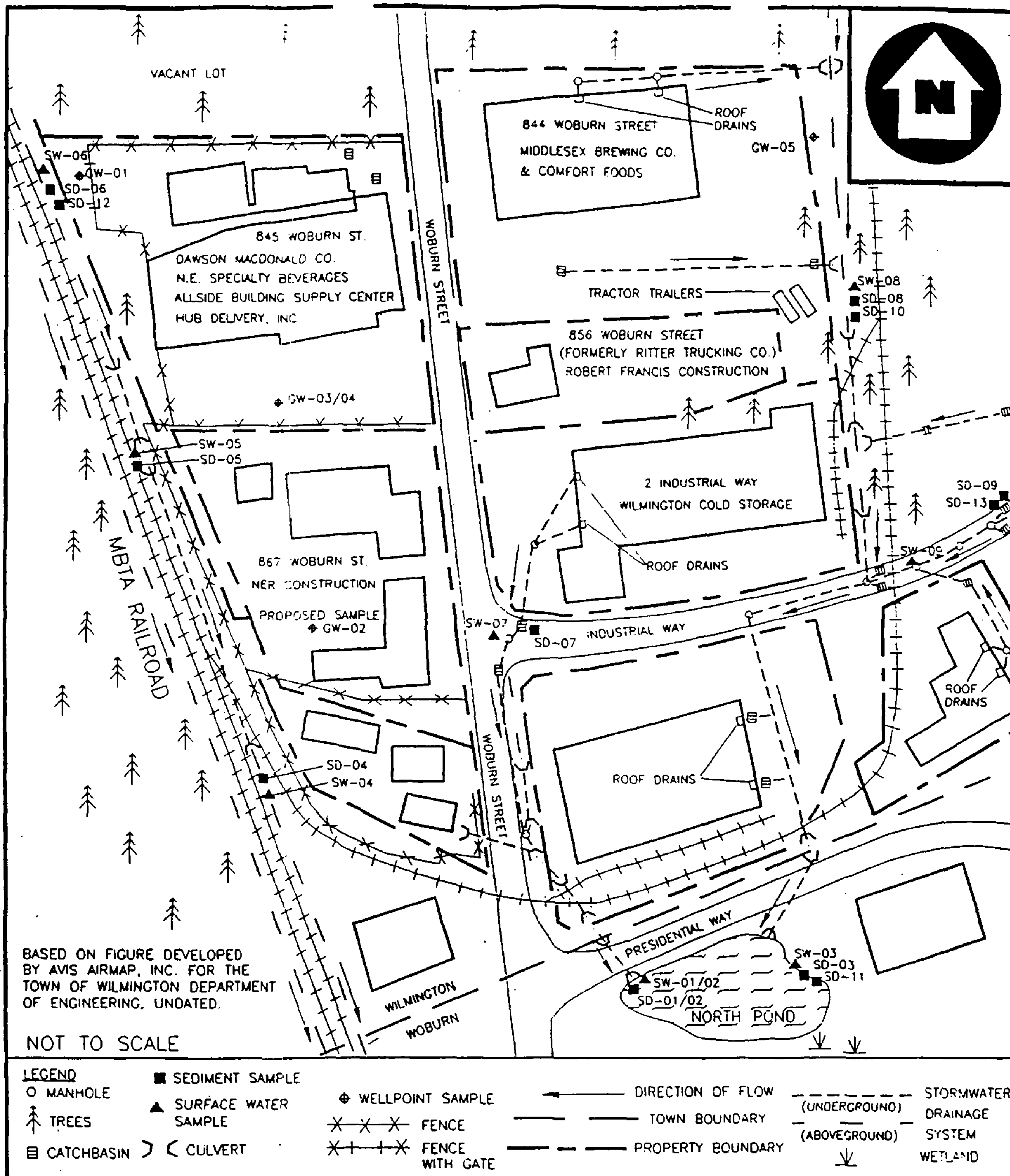
START personnel observed two floor drains in the two-bay garage area. The floor drains flow to an underground oil and grease separator tank located beneath the western parking lot between the building and Woburn Street. The effluent ultimately discharges to an MDC sewer line. The tank is inspected bi-annually by MA DEP personnel and pumped out periodically. According to the current property operator, Mr. Francis, there have been no problems with the tank in the past and the MA DEP has been satisfied during every inspection. Additionally, according to Mr. Francis, there are no petroleum USTs remaining on the property [57].

START personnel observed oil-stained asphalt in scattered areas directly outside the building to the east. Piles of wood, metal piping, and other construction debris were stored along the southeast border of the property. START members also observed two truck/automobile batteries in this area. In the rear, eastern portion of the property, START personnel observed a pile of stone and various pieces of heavy equipment [39, pp. 1-3].

Five monitoring wells were observed on the property. One of the wells, located near the northeast corner of the building, was not secured. START personnel conducted air monitoring on this well with a portable PID. No readings were detected above background levels. All other monitoring wells were secured [39, pp. 2-3].

On 22 April 1998, START personnel collected nine surface water samples (SW-01 through SW-09) and 13 sediment samples (SD-01 through SD-13) from the local stormwater drainage system which serves the RTC property, and from a drainage ditch located west of the property, to determine if there has been any groundwater to surface water migration of hazardous substances. In addition, START personnel collected four groundwater samples (GW-01, GW-03 through GW-05) from temporary wellpoints installed on properties located west and north of the RTC property, 845 and 844 Woburn Street, respectively, to determine if hazardous substances are migrating off site, via groundwater, from the RTC property (Figure 3). START personnel originally proposed to collect a groundwater sample (GW-02) from the property located southwest of the RTC property, 867 Woburn Street; however, START personnel were unable to obtain access. No samples were collected from the RTC property [39, pp. 5-21]. All of the samples were analyzed through the Contract Laboratory Program (CLP) for full Target Compound List (TCL) organic compounds, including VOCs, SVOCs, pesticides/PCBs, and Target Analyte List (TAL) metals and cyanide.

Three metals were detected in groundwater samples (GW-01, GW-03 and GW-04), one metal was detected in a surface water sample (SW-05), and two VOCs, four SVOCs, and three metals were detected in sediment samples (SD-01, SD-02, SD-04, and SD-05) at concentrations greater than three times the reference values or greater than the reference sample's sample quantitation limit (SQL) (for organic analyses) or sample detection limit (SDL) (for inorganic analyses) [58-61]. Analytical results of the groundwater, surface water, and sediment samples collected by START are discussed in detail in the Groundwater Pathway and Surface Water Pathway sections of this report.



START SAMPLING LOCATION SKETCH

RITTER TRUCKING CO.
856 WOBURN STREET
WILMINGTON, MASSACHUSETTS

HWRE

Civil•Environmental•Hydrologic•Structural•Hazardous Waste Engineering•Surveying

REGION : SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-05-0130	P.H.S.	06/16/98

FILE NAME: HW149\TRPSKH

FIGURE 3

Table 1 presents identified structures or areas on the RTC property that are documented or potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

Table 1

Source Evaluation for Ritter Trucking Co.

Source Area	Containment Factors	Spatial Location
Contaminated Soil (associated with various spills)	Property is completely covered with buildings and asphalt paving. Groundwater monitoring system in place but unknown if used regularly. Evidence of migration from source.	Throughout property.
Contaminated Soil (associated with former wastewater USTs/settling tanks)	Property is completely covered with buildings and asphalt paving. Groundwater monitoring system in place but unknown if used regularly. Evidence of migration from source.	Throughout property.
Waste Oil AST	No secondary containment.	Outside, along east (rear) side of building.
Underground Oil and Grease Separator Tank	None.	Western side of property, between building and Woburn Street.
Former Wastewater USTs/settling tanks	None; Evidence of migration.	Western side of property, between building and Woburn Street.
Former Waste Oil AST	No secondary containment.	Outside, along east (rear) side of building.
Former Drums of Motor Oil and Liquid Detergents	Inside under maintained structure.	Inside building.
Former Petroleum USTs	None.	Western and southwestern side of building.
Oil/Grease Drums	Inside under maintained structure.	Inside, along southern wall of garage.
Waste Drums	None.	Outside, along eastern property boundary.

UST = Underground Storage Tank
AST = Aboveground Storage Tank

[1-9; 39; 41-42; 49; 51-52]

Table 2 summarizes the types of potentially hazardous substances which have been disposed, used, or stored on the RTC property.

Table 2

Hazardous Waste Quantity for Ritter Trucking Co.

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Soil Contaminated with: VOCs (acetone, BTEX compounds, 1,2-dichloroethane, vinyl chloride) SVOCs (pyrene, anthracene, bis(2-ethylhexyl)phthalate, naphthalene), and metals (arsenic, cadmium, lead, mercury)	1.07 acres	1961 to present	1961 to present	Contaminated Soil
Waste oil	500 gallons	Early 1990s to present	Early 1990s to present	Waste Oil AST
Waste oil and grease	3,000 gallons	Early 1990s to present	Early 1990s to present	Oil and Grease Separator Tank
Wastewater contaminated with: VOCs (acetone, methylene chloride, 1,2-dichloroethane, 1,1,1-trichloroethane, toluene)	7,000 gallons	1975 to present	1975 to 1989	Former Wastewater USTs
Waste oil	275 gallons	1961 to 1986	1961 to 1986	Former Waste Oil AST
Motor oil and liquid detergents	Unknown	Unknown	NA	Former Drums of Motor Oil and Liquid Detergents
Gasoline, heating oil, and diesel fuel	24,000 gallons	1961 to 1989	NA	Former Petroleum USTs
Oil and/or grease	145 gallons	Unknown	NA	Oil/Grease Drums
Oil and hazardous materials including flammable liquids and latex	2,145 gallons	1986 to 1987	NA	Waste Drums

VOC = Volatile Organic Compound
BTEX = Benzene, Toluene, Ethyl benzene, and Xylenes
SVOC = Semivolatile Organic Compound
UST = Underground Storage Tank
AST = Aboveground Storage Tank
NA = Not Applicable

[1-9; 39; 41-42; 49; 51-52; 57]

There are a number of other potential sources of contamination in the vicinity of the RTC property. Approximately 50 State-listed Sites are located within 1.0-radial mile of the property [54]. There are three CERCLIS facilities located within 1.0-radial mile of the property [53; 55]. In addition, approximately 50 RCRA generators are located within 1.0-radial mile of the property [54-55].

WASTE/SOURCE SAMPLING

In July 1985, two areas of surface spillage which flowed from the RTC property onto the Wilmington Cold Storage, Inc. property, the southern abutter. Both spills had originated on the RTC property and flowed down an embankment onto the adjacent property [41, p. 1]. One area, Spill No.1, was identified as a phthalate ester spill from a parked RTC tanker truck, while the other incident, Spill No. 2, was tentatively identified as diesel fuel from the RTC fuel pumping station [3, p. 5]. One soil sample was collected from each spill area by IEP, Inc. and submitted to Resource Analysts, Inc. The soil sample collected from Spill No. 1 was analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. The soil sample collected from Spill No. 2 was analyzed for VOCs, PCBs, and metals [41].

The analytical results indicated that five VOCs were present in Spill No. 1: 1,1-dichloroethane (4.6 ppb), 1,1,1-trichloroethane (6.7 ppb), toluene (> 160 ppb), ethyl benzene (7 ppb), and total xylenes (7.2 ppb). In addition, SVOCs, including bis(2-ethylhexyl)phthalate (5,000 ppb) and di-n-octylphthalate (6,800 ppb) were present in Spill No. 1. Eight other phthalate compounds were also identified [41]. Several metals were also present in Spill No. 1, including arsenic (12 ppb), cadmium (4.6 ppb), chromium (97 ppb), copper (21 ppb), nickel (11 ppb), lead (100 ppb), and zinc (180 ppb) [41]. No pesticides or PCBs were detected in the soil sample collected from Spill No. 1 [41].

No VOCs were detected in Spill No. 2 [41]. Several metals were present in Spill No. 2, including arsenic (16 ppb), cadmium (1.8 ppb), chromium (32 ppb), copper (84 ppb), mercury (0.1 ppb), nickel (15 ppb), lead (100 ppb), and zinc (170 ppb) [41]. No PCBs were detected in the soil sample collected from Spill No. 2.

Contaminated soil from both spill areas was excavated by Jet Line Services, Inc. and stockpiled on polyethylene sheeting on the RTC property to MA DEQE's satisfaction [9, p. 3].

On 23 August 1985, resampling was conducted by IEP, Inc. personnel at each spill area to verify whether remedial measures were successful. Analysis of a soil sample from the former Spill No. 1 area revealed only methylene chloride at 1.0 ppm [49]. START personnel were unable to obtain the analytical results for the post-removal soil samples.

On 30 December 1986, MA DEQE collected wastewater samples from the one of the floor catchbasins located in the garage portion of the on-site building, the settling tanks, and the discharge sewer line. The samples were analyzed for VOCs by EPA Method 624. The sample from the floor catchbasin contained VOCs, including acetone (29,000 ppb), methylene chloride (870 ppb), 1,1-dichloroethane (10 ppb), 1,2-dichloroethylene (5 ppb), 1,1,1-trichloroethane (450 ppb), toluene (34 ppb), xylenes (42 ppb), tetrachloroethylene (73 ppb), and trichloroethylene (7.2 ppb) [3, p. 8]. VOCs detected in the settling tanks included toluene (160 ppb), 1,1,1-trichloroethane (1,900 ppb), methylene chloride (740 ppb), and 1,1-dichloroethane (56 ppb). Samples of the settling tank discharge into the sewer contained acetone (120 ppb), methylene chloride (11 ppb), 1,1,1-trichloroethane (6.6 ppb), trichloroethylene (4.6 ppb), and toluene (2.7 ppb) [3, p. 8].

Between October 1985 and April 1989, petroleum-contaminated soils in contact with the four petroleum USTs were excavated and placed on polyethylene sheeting for later disposal. Laboratory analysis of contaminated soil samples indicated concentrations of TPHs in the soils ranging up to 6,800 ppm [6, p. 3].

TGG reported that results of analyses from the soil showed that both petroleum compounds and chlorinated solvents were present, although chlorinated solvents were present at relatively low levels. Furthermore, three soil samples were collected from the limits of the tank excavations and analyzed for TPHs. The highest concentration of TPHs was present at 5,690 ppm. The remaining two samples, with levels of TPHs at 2,870 and 3,500 ppm, were considered representative of soil remaining at the limits of the excavation [8, p. 6].

In July 1991, a soil sample was collected from the contaminated soil pile on the property. START personnel were unable to determine who collected the soil sample. Furthermore, it is unknown at what depth the contaminated soil in the pile was excavated. The contaminated soil pile was created when soil was excavated from the UST removals and subsequently stockpiled on the property. The soil sample was submitted to Analytics Environmental Laboratory, Inc. of Portsmouth, New Hampshire and analyzed for VOCs and SVOCs by EPA Methods 8240 and 8270, respectively [41]. Laboratory analysis of the soil sample revealed the presence of 1,1-dichloroethane (76.6 ppb), toluene (103 ppb), ethyl benzene (78.9 ppb), xylenes (59.7 ppb), anthracene (668 ppb), and pyrene (312 ppb) [52]. The contaminated soil pile has been removed from the property; however, START personnel were unable to determine when the contaminated soil pile was removed and where it was disposed of.

Due to the availability of third party soil data, START did not collect any waste/source samples as part of the RTC SIP [39, pp. 2-21].

GROUNDWATER PATHWAY

The entire property is covered by asphalt paving or buildings [39]. Overburden beneath the property has been characterized to be very compact, dry, fine-to-medium sand with traces of inorganic silt overlying very compact, wet, gray, fine-to-medium sand with some fine-to-coarse gravel [4, p. 2]. The mean annual precipitation for Reading, Massachusetts, measured approximately 3.8 miles northeast of the property, is 46.64 inches [19].

The property is located along the northern flank of the Aberjona River Valley. This buried valley is of glacial origin and is comprised of large deposits of stratified outwash sands and gravels found at the lower elevations of the valley, overlying varying thicknesses of glacial till [3, p. 3]. *The potential yield of the aquifer was reported to be >3,000,000 gallons per day.* Groundwater fluctuates approximately 3 to 4 ft annually from 4.9 to 8.7 ft below grade in MW-2 with the hydraulic gradient on the property sloping toward the west [3, p. 3]. However, the property lies within the Mystic River Basin and groundwater flow in this basin is largely to the south-southeast direction toward the Aberjona River which eventually flows into the Mystic River [4, p. 2]. In November 1987, GTI reported that the water table elevations on the RTC property indicate a complex pattern of local groundwater flow which is influenced by recharge areas and bedrock topography [6, p. 3]. Groundwater flow across the RTC property was determined by GTI to be west, however, the groundwater flow at the northern property abutter, 844 Woburn Street, is largely towards the south [6, p. 3].

The property lies within the Milford-Dedham metamorphic zone and is described as predominantly greenschist, greenstone, felsite, and quartzite, commonly enveloped in granite. The bedrock also contains volcaniclastic and hypabyssal intrusive rocks (Proterozoic Z) including some diorite and gabbro [4, p. 2]. The bedrock surface is exposed at an outcrop in the southeast corner of the property, and slopes downward towards the front of the property 12 ft or greater below the surface. The outcrop is highly weathered with predominantly high angle fractures [3, p. 3].

All or part of the following Massachusetts cities and towns are located within 4-radial miles of the RTC property: Billerica (population 37,609); Burlington (population 23,301); North Reading (population 12,002); Reading (population 22,671); Stoneham (population 22,183); Tewksbury (population 27,266); Wakefield (population 24,825); Wilmington (population 18,488); and Woburn (population 36,407) [10-14].

The nearest documented groundwater source for public drinking water is the Wilmington Water Department's Main Street Well, located approximately 0.6 miles west-southwest of the property [14; 15]. Wilmington's municipal water is supplied by eight groundwater wells located throughout the town, all of which are located within 4-radial miles of the RTC property. Water from these wells is blended before distribution [15]. Since no single source in the system contributes more than 40% of the total system, the 18,488 persons served by the system are apportioned evenly between the eight sources [15; 21].

The City of Woburn Water Department receives 2,000,000 gallons of water per day from the Massachusetts Water Resource Authority (MWRA) from the Quabbin Reservoir. Woburn's remaining demand for water is supplied by municipal wells located near Horn Pond. The Woburn municipal wells are situated approximately 4.4 miles south of the property, outside the 4-radial mile distance ring [23]. Woburn Wells G & H are also located downgradient of the property approximately 2 miles south. These wells have been closed since 1979 due to VOC contamination with trichloroethylene, 1,1,1-trichloroethane, and perchloroethylene, which is not likely attributable to the RTC property. In addition, the Stoneham Water Department receives 100% of its drinking water supply from the MWRA, and does not rely on groundwater sources [18].

Reading's municipal drinking water is supplied by nine groundwater wells, eight of which are located off of Strout Avenue (1.6 miles to the northeast) and the other is located at the end of Beverly Road (1.2 miles to the east-northeast). Since no single source in the system contributes more than 40% of the total system, the 22,671 persons served by the system are apportioned evenly between the nine sources [17; 22].

The North Reading Water Department receives its drinking water supply from five wellfields, two of which are inactive. The Central Street and Lakeside Boulevard wellfields are outside the 4-radial miles; however, the Railroad wellfield, located on Cold Spring Road, south of Route 62 near the Wilmington town line, is approximately 3.4 miles east from the property. The North Reading Water Department supply is a blended system and serves approximately 12,002 people.

Since no single source in the system contributes more than 40% of the total system, the 12,002 persons served by the system are apportioned evenly between the three sources [20; 26].

The Burlington drinking water supply is a blended system supplied by five groundwater wells and the Mill Pond Reservoir. None of the groundwater wells are located within 4-radial miles of the property and Mill Pond Reservoir is not located along the 15-mile downstream pathway from the property [16]. Approximately 90% of Billerica's population receives its drinking water from an intake on the Concord River while the remaining 10% are served by a private well in the town, neither of which are within 4-radial miles of the property or along the 15-mile downstream pathway from the property [24].

The Tewksbury Water Department's main drinking water supply source is a Merrimack River intake which draws approximately 3,500,000 gallons per day [25]. The Merrimack River is not located along the 15-mile downstream pathway from the pathway. The Wakefield Water Department's majority of drinking water is supplied by the MWRA. Approximately 10% of it is pumped from Crystal Lake in Wakefeld [27]. Crystal Lake is not located along the 15-mile downstream pathway from the property. Table 3 summarizes the populations which rely on public groundwater sources for drinking water within 4-radial miles of the property.

Table 3

Public Groundwater Supply Sources Within 4-Radial Miles of Ritter Trucking Co.

Distance/Direction From Site	Source Name	Location of Source[a]	Est. Pop. Served	Source Type[b]
0.6 miles west-southwest	Main Street Well	Wilmington	2,311	1 overburden well
1.2 miles east-northeast	Beverly Road Well	Reading	2,519	1 overburden well
1.3 miles west-northwest	Butters Row Well Nos. 1 & 2	Wilmington	4,622	2 overburden wells
1.3 miles west-southwest	Chestnut Street Well Nos. 1 & 2	Wilmington	4,622	2 overburden wells
1.6 miles northeast	Strout Avenue Well Nos. 1 through 8	Reading	20,152	8 overburden wells
3.1 miles north	Sewell Road Well	Wilmington	2,311	1 overburden well
3.4 miles north-northeast	Railroad Wellfield	North Reading	4,001	Unknown
3.65 miles north	Andover Street Well	Wilmington	2,311	1 overburden well
3.65 miles north	Salem Street Well	Wilmington	2,311	1 overburden well

[a] Indicates town in which well is located
[b] Overburden, Bedrock, or Unknown

[15; 17; 20-23; 26]

Private groundwater supplies located within 4-radial miles of the property were estimated using equal distribution calculations of U.S. Census CENTRACTS data identifying population, households, and private water wells for "Block Groups" which lie within or partially within individual radial distance rings measured from the RTC property. The nearest private well is estimated to be located within 0.25-radial miles from the property, but has not been specifically identified due to lack of private well information for Wilmington [28]. The total population which relies on groundwater within 4-radial miles of the property is 46,405 persons and is summarized in Table 4.

Table 4

Estimated Drinking Water Populations Served By Groundwater Sources Within 4-Radial Miles of Ritter Trucking Co.

Radial Distance from Ritter Trucking Co. (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
≥ 0.00 to 0.25	2	0	2
> 0.25 to 0.50	7	0	7
> 0.50 to 1.00	32	2,311	2,343
> 1.00 to 2.00	256	31,915	32,171
> 2.00 to 3.00	454	0	454
> 3.00 to 4.00	494	10,934	11,428
TOTAL	1,245	45,160	46,405

[15; 17; 20- 23; 28]

On 14 August 1985, TSMI installed groundwater monitoring wells MW-1 and MW-2 on the RTC property. MW-1 was located immediately west and hydrologically downgradient of the pumping station. MW-2 was also installed hydrologically downgradient on the property, in the northwest corner, near Woburn Street. On 15 August 1985, TSMI personnel collected groundwater samples from MW-1 and MW-2 and analyzed them for VOCs by EPA Method 601. The resulting analytical data indicated significant quantities of VOCs in both monitoring wells. The highest concentrations were 17,000 ppb of ethyl benzene in MW-2 and 17,000 ppb of acetone in MW-1. Additional compounds present in MW-2 included chlorobenzene (2,960 ppb), bromodichloromethane (580 ppb), bromoform (tribromomethane) (1,670 ppb), toluene (1,270 ppb), benzene (240 ppb), trichloroethylene (510 ppb), and carbon tetrachloride (660 ppb). VOCs present in MW-1 included ethyl benzene (600 ppb), toluene (570 ppb), benzene (150 ppb), total xylenes (400 ppb), 1,1-dichloroethane (120 ppb), and styrene (135 ppb) [4, pp. 5-6]. In addition, separate phase petroleum product was present in MW-1. A sample was collected and analyzed for oil and grease by EPA Method 503A. Analysis indicated a 10.7% oil and grease concentration. TSMI reported that in MW-1, up to 80% of the sampling bailer contents was a brown oily substance distinctly separated from the remaining 20% of the sample which was groundwater [4, p. 3].

In March 1986, GTI installed groundwater monitoring wells GT-1A, GT-2, and GT-3. GTI gauged the depth to groundwater in each monitoring well (MW-1, MW-2, GT-1A, GT-2, and GT-3) on the property. Separate phase petroleum product was observed in MW-1 and GT-3 [51, p. 3].

On 31 March 1986, GTI sampled groundwater from the monitoring wells not containing separate phase petroleum product (MW-2, GT-1A, and GT-2) [51, p. 3]. Groundwater samples were analyzed for VOCs by EPA Method 624. The analytical results indicated contamination by a variety of VOCs including chlorinated and aromatic hydrocarbons [3, p. 6]. Compounds detected in MW-2 included trans-1,2-dichloroethene (15.7 ppb), ethyl benzene (435 ppb), xylene (128 ppb), and vinyl chloride (86.4 ppb). Compounds present in GT-2 included toluene (1,290 ppb), ethyl benzene (371 ppb), and total xylenes (534 ppb) [3, p. 7]. GT-1A had the highest concentrations of VOCs present including ethyl benzene (1,600 ppb) and total xylenes (835 ppb).

In July 1987, as part of an environmental assessment of the property abutting RTC to the north, at 844 Woburn Street, TGG installed three monitoring wells (B-1 through B-3) on the 844 Woburn Street property [7, p. 2].

In October 1987, in order to determine groundwater flow direction and chemical composition, GTI measured water levels and collected groundwater samples from the monitoring wells located at 844 Woburn Street (B-1 through B-3) and 856 Woburn Street (MW-2, GT-1A, GT-5, GT-7) and had them analyzed for VOCs by GT Environmental Laboratories of Greenville, New Hampshire using EPA Method 624. VOCs, including petroleum constituents and chlorinated solvents, were found in all of the groundwater samples at total levels ranging up to 1,159 ppb [7, p. 2]. The resulting data also indicated that groundwater flow at 844 Woburn Street is largely to the south. Monitoring well B-1, located closest to the RTC property, contained traces of vinyl chloride (4.9 ppb), 1,1,1-trichloroethane (400 ppb), 1,1-dichloroethane (260 ppb), trans-1,2-dichloroethene (18 ppb), methylene chloride (15 ppb), and 1,1-dichloroethene (28 ppb). Well B-2, located to the east of the building on 844 Woburn Street, contained 15 ppb methylene chloride and 15 ppb 1,2-dichloroethane. Well B-3, located in the northwest corner of 844 Woburn Street and the farthest upgradient, showed only the presence of 1,2-dichloroethane (3.6 ppb). MW-2 contained vinyl chloride (35 ppb), total xylenes (30 ppb), trans-1,2-dichloroethene (8.4 ppb), ethyl benzene (90 ppb), and toluene (3.4 ppb). GT-1A revealed the presence of the following VOCs: 1,2-dichloroethane (60 ppb), benzene (69 ppb), total xylenes (120 ppb), and ethyl benzene (910 ppb) [8, Table 1; Table 2].

TGG conducted an additional round of groundwater sampling of both properties in March 1988. A total of eight monitoring wells samples were submitted to Eastern Analytical Laboratories of Billerica, Massachusetts for analysis for VOCs by EPA Method 624. Analyses of samples collected from wells B-2, B-3, and GT-3 did not detect any of the VOCs found in the previous sampling round. In addition, the remaining five samples tested for VOCs were below the VOC concentration present in October 1987 [8, p. 3]. TGG and MA DEQE concluded that, based on the observed attenuation, no further remedial action was warranted at the time [7, p. 2].

Groundwater sampling was again conducted by TGG in September 1988, and submitted for analysis for VOCs by EPA Method 624. However, due to a low groundwater table, only samples from wells MW-2 and GT-1A were submitted for analysis. Additionally, wells GT-2 and GT-7 had been destroyed. The highest level of total VOCs present was in MW-2 at 1,161 ppb. Vinyl chloride was the highest component at 725 ppb. The sample from GT-1A revealed ethyl benzene as the highest VOC contaminant at 849 ppb.

In March 1989, three new monitoring wells were installed by TGG on the RTC property near previous wells which were destroyed over the winter; B-1 replaced MW-2, B-2 replaced GT-1A, and B-3 replaced GT-7. Groundwater samples were collected and analyzed for VOCs by EPA Method 624. The analytical results of the groundwater samples collected from these wells revealed levels of contaminants to be comparable to those previously detected [8, p. 3]. In addition, concentrations of VOCs in well B-2 were higher than the previous sampling round. Analytes present in well B-1 included vinyl chloride (376 ppb), total xylenes (115 ppb), ethyl benzene (452 ppb), and trans-1,2-dichloroethane (61 ppb). Monitoring well B-2 contained 1,1-dichloroethane (88.7 ppb), chloroethane (113 ppb), benzene (1,170 ppb), total xylenes (1,100 ppb), toluene (2,340 ppb), and ethyl benzene (705 ppb). Well B-3 also revealed VOC contamination including benzene (86.2 ppb), total xylenes (806 ppb), toluene (139 ppb), and ethyl benzene (177 ppb) [8, p. Table 1].

In March 1997, groundwater samples were collected from the RTC property from wells B-1, B-2, B-3, and GT-3 by Earth Tech and analyzed for VOCs, SVOCs, and TPHs. Several organic compounds were detected in the samples collected from B-1, B-2, and B-3, including 1,1-dichloroethene, vinyl chloride, total xylenes, ethyl benzene, benzene, chloroethane, isopropylbenzene, n-propylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 2-methylnaphthalene, naphthalene, di-ethylhexyl phthalate (bis(2-ethylhexyl)phthalate), and TPHs [42]. Laboratory analysis of the sample collected from well GT-3 indicated no detectable amounts of organic compounds [42]. Based on available file information, START personnel were unable to determine the detection limits for the analyses on the groundwater samples collected in March 1997. Table 5 summarizes the maximum concentrations of hazardous substances detected in the groundwater samples collected from the property.

Table 5

Maximum Concentrations of Hazardous Substances Detected in Groundwater Samples Collected by TSMI in 1985, GTI in 1987, TGG in 1988 and 1989, and Earth Tech in 1997

Compound/Element	Maximum Concentration	Sample Location	Date Collected
Acetone	17,000 ppb	MW-1	August 1985
Benzene	1,170 ppb	B-2[1]	March 1989
Bromodichloromethane	580 ppb	MW-2	August 1985
Bromoform	1,670 ppb	MW-2	August 1985
Carbon Tetrachloride	660 ppb	MW-2	August 1985
Chloroethane	113 ppb	B-2[1]	March 1989
Chlorobenzene	2,960 ppb	MW-2	August 1985
Dichloroethane, 1,1-	260 ppb	B-1[2]	October 1987
Dichloroethane, 1,2-	60 ppb	GT-1A	October 1987
Dichloroethene, trans-1,2-	69.9 ppb	MW-2	September 1988
Di-ethylhexyl phthalate	63.2 ppb	B-2[1]	March 1997
Ethyl benzene	17,000 ppb	MW-2	August 1985
Isopropylbenzene	5 ppb	B-1[3]	March 1997
N-propylbenzene	6.8 ppb	B-1[3]	March 1997
Methylnaphthalene, 2-	16.2 ppb	B-1[3]	March 1997
Naphthalene	62.8 ppb	B-1[3]	March 1997
Styrene	135 ppb	MW-1	August 1985
Toluene	2,340 ppb	B-2[1]	March 1989
Trichloroethane, 1,1,1-	400 ppb	B-1[2]	October 1987
Trichloroethylene	510 ppb	MW-2	August 1985

Table 5

Maximum Concentrations of Hazardous Substances Detected in Groundwater Samples Collected by TSMI in 1985, GTI in 1987, TGG in 1988 and 1989, and Earth Tech in 1997 (Concluded)

Compound/Element	Maximum Concentration	Sample Location	Date Collected
Trimethylbenzene, 1,2,4-	93 ppb	B-3[4]	March 1997
Trimethylbenzene, 1,3,5-	7.9 ppb	B-1[3]	March 1997
Vinyl Chloride	725 ppb	MW-2	September 1988
Xylenes, Total	1,100 ppb	B-2[1]	March 1989

[1] = Well B-2 installed on RTC property in March 1989 to replace well GT-1A which was destroyed.
[2] = Well B-1 installed on 844 Woburn Street (northern property abutter) in July 1987.
[3] = Well B-1 installed on RTC property in March 1989 to replace well MW-2 which was destroyed.
[4] = Well B-3 installed on RTC property in March 1989 to replace well GT-7 which was destroyed.
ppb = parts per billion.

[3-9; 42; 51]

On 22 April 1998, START personnel collected four groundwater samples (GW-01, GW-03, GW-04, and GW-5) from properties located west and north of the RTC property to determine if hazardous substances are migrating off site, via groundwater, from the RTC property (Figure 3). Groundwater samples were collected using a hydraulically-powered groundwater sampling device to advance a screened wellpoint to the water table at each location. START personnel originally proposed to collect a groundwater sample (GW-02) from the property located southwest of the RTC property, 867 Woburn Street; however, START personnel were unable to obtain access [39, p. 20]. Groundwater samples were not collected from the RTC property [39, pp. 5-21]. All groundwater samples were analyzed through CLP for full TCL organic compounds (VOCs, SVOCs, pesticides/PCBs), and TAL metals and cyanide [58-59]. Table 6 summarizes the groundwater samples collected by START personnel on 22 April 1998.

Table 6

Groundwater Sample Summary: Ritter Trucking Co.
Samples Collected by START on 22 April 1998

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Inches)	Sample Source
MATRIX: Aqueous					
GW-01	ANP55 MALC32	1100	Grab	NA	Sample collected in northwest corner of 845 Woburn Street, approximately 60 feet west of chain-link fence. Sample noted to be cloudy orange color; FID reading (OVA) = 0 units above background.
GW-02	NA	NA	NA	NA	Sample not collected.
GW-03	ANP57 MALC34	1300	Grab	NA	Sample collected at 845 Woburn Street, between chain-link fence and asphalt pavement edge. FID reading (OVA) = 0 units above background.
GW-04	ANP58 MALC35	1300	Grab	NA	Duplicate sample of GW-03 collected for quality control.
GW-05	ANP59 MALC36	1550	Grab	NA	Sample collected at 844 Woburn Street, as a reference sample. Sample noted to be slightly orange color; FID reading (OVA) = 0 units above background.
TB-01	ANP60	0850	Grab	NA	Trip blank sample collected for quality control. Sample analyzed for VOCs only.
RB-01	ANP61 MALC37	0920	Grab	NA	Groundwater sample equipment rinsate blank sample collected for quality control.
RB-02	ANP62 MALC38	0950	Grab	NA	Sediment sample equipment rinsate blank sample collected for quality control.

NA = Not Applicable
FID = Flame Ionization Detector
OVA = Organic Vapor Analyzer
VOCs = Volatile Organic Compounds

[39]

Complete analytical results of START groundwater samples including quantitation and detection limits are presented in Attachment A. Sample results quantified with a "J" on analytical tables are considered approximate because of limitations identified during CLP data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

No VOCs, SVOCs, or PCBs were detected in the groundwater samples [58-59]. Two pesticides, alpha-BHC and 4,4'-DDT, were detected in the reference groundwater sample (GW-05) at 0.002 ppb and 0.0086 ppb, respectively [58]. However, these substances will not be attributed to the RTC property based on sample GW-05 having been collected upgradient of the RTC property. Furthermore, pesticides have never been detected in previous samples collected from the property, *nor is it suspected that pesticides were used on the property.*

A total of 14 metals were present in the groundwater samples; however, only arsenic, cobalt, copper, iron, lead, and vanadium were detected at concentrations greater than three times the reference sample concentration or greater than the reference sample's SDL [59].

Based on available file information, it appears that groundwater sampling conducted on the RTC property in the past did not include analysis for metals, most likely because operations at the RTC property involved organic substances. As a result, it is unknown if these metals (arsenic, cobalt, copper, iron, lead, and vanadium) are present in the groundwater beneath the RTC property. However, in July 1985, analysis of soil samples collected by IEP, Inc. from the property revealed the presence of arsenic, copper, and lead; however, analysis for cobalt, iron, and vanadium was not conducted [41]. Since analysis for cobalt, iron, and vanadium has never been conducted on samples collected from the RTC property, nor is it suspected that these substances were used on the property, the presence of these metals in the groundwater samples collected by START will not be attributed to the RTC property. Arsenic, detected in START samples GW-01 (11.0 ppb), GW-03 (17.0 ppb), and GW-04 (16.2 ppb); copper, detected in START samples GW-01 (112 ppb), GW-03 (124 ppb), and GW-04 (159 ppb); and lead, detected in START samples GW-03 (14.9 ppb) and GW-04 (17.4 ppb), will be attributed to the RTC property [59].

Cyanide was detected in sample GW-01 at 7.3 ppb, which is greater than the reference sample's SDL [59]. However, based on available file information, it appears that analysis of previous samples collected from the RTC property did not include analysis for cyanide [1-9; 41-41; 51]. Since analysis for cyanide has never been conducted on previous samples collected from the RTC property, nor is it suspected that cyanide was used on the property, the presence of cyanide in sample GW-01 will not be attributed to the RTC property.

Table 7 is a summary of substances detected through CLP analyses of START groundwater samples which are at least partially attributable to the RTC property. For each sample location, a compound or element is listed if it is detected at greater than or equal to three times the higher of the reference sample concentration (GW-05). However, if the compound or element is not detected in the reference sample, the reference sample's SQL (for organic analyses) or SDL (for inorganic analyses) is used as the reference value. These compounds or elements are listed if they occurred at a value greater than or equal to the reference sample's SQL or SDL and are designated by their approximate relative concentration above these values.

Table 7

Summary of Analytical Results
Groundwater Sample Analysis for Ritter Trucking Co.
Collected by START on 22 April 1998

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration	Comments
GW-01 MALC32	INORGANICS			
	Arsenic	11.0 ppb	6.0 U ppb	1.8 × SDL
	Copper	112 J ppb	64.9 UJ ppb	1.7 × SDL
GW-03 MALC34	INORGANICS			
	Arsenic	17.0 ppb	6.0 U ppb	2.8 × SDL
	Copper	124 J ppb	64.9 UJ ppb	1.9 × SDL
	Lead	14.9 ppb	9.7 U ppb	1.5 × SDL
GW-04 MALC35	INORGANICS			
	Arsenic	16.2 ppb	6.0 U ppb	2.7 × SDL
	Copper	159 J ppb	64.9 UJ ppb	2.5 × SDL
	Lead	17.4 ppb	9.7 U ppb	1.8 × SDL

ppb = parts per billion
SDL = Sample Detection Limit
U = Indicates the compound was analyzed for but not detected and reports the detection value.
J = Quantitation is approximate due to limitations identified during the quality control review.
UJ = Indicates the compound was analyzed for but not detected and reports the estimated detection value.

[59]

START performed off-site groundwater sampling as part of the RTC SIP [39, pp. 5-21]. Based on analytical results from groundwater samples collected from the RTC property by TSMI in August 1985 and GTI in March 1986, and from groundwater samples collected upgradient and downgradient of the RTC property by START in April 1998, a release of VOCs and arsenic to groundwater from on-site sources has been documented. However, based on the location and proximity of the surrounding public water supply wells, no impacts to nearby drinking water sources are known or suspected to have been impacted by the release from on-site sources. To date, some actions (i.e., excavation and removal of USTs and some contaminated soil) have been taken to address the release to groundwater.

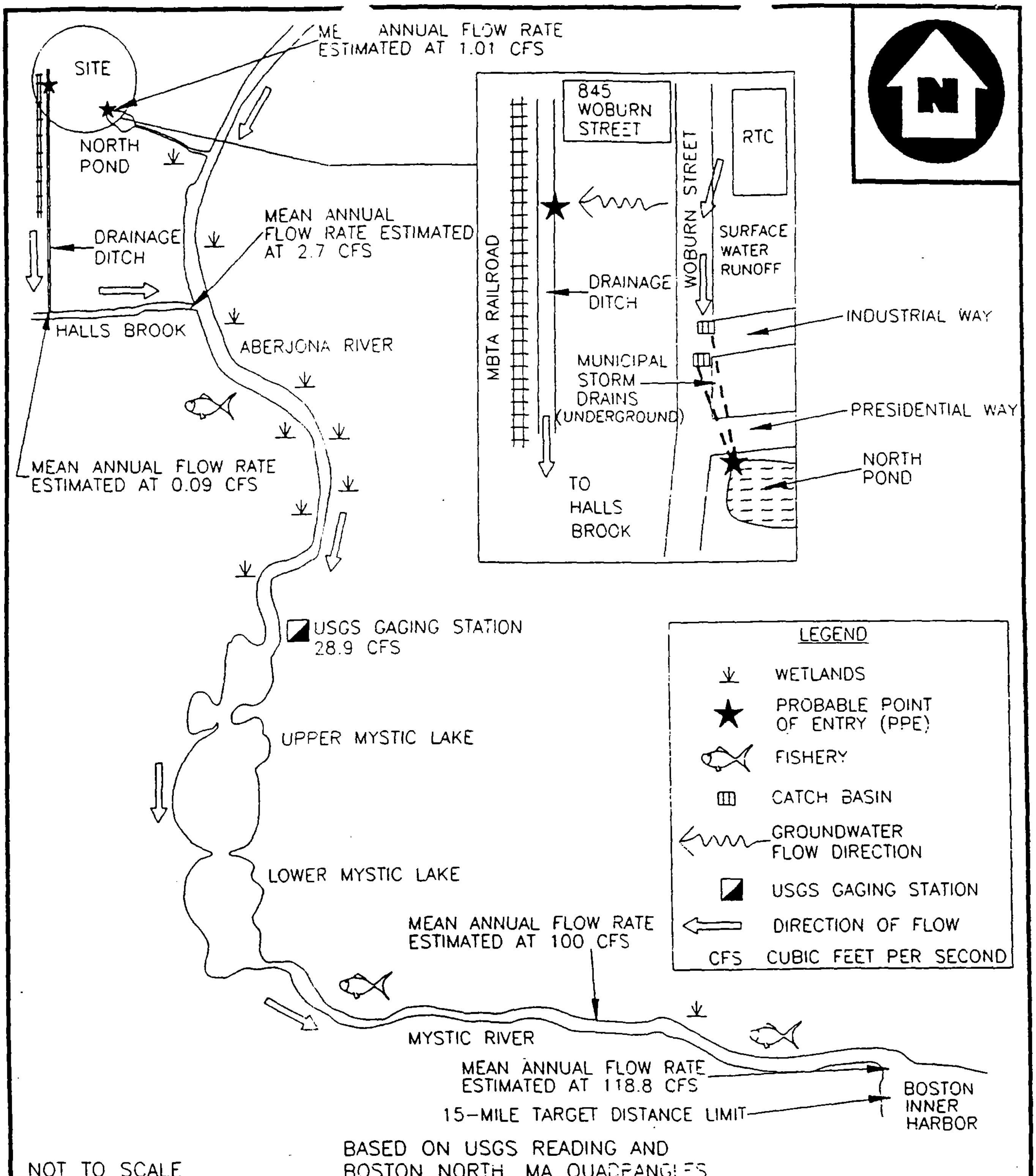
SURFACE WATER PATHWAY

Surface water runoff from the RTC property is collected by municipal storm drains which discharge to North Pond, located approximately 750 ft south of the property. The probable point of entry (PPE) to surface water is at the outfall on North Pond. North Pond in turn discharges into the Aberjona River approximately 0.5 miles downstream of the PPE (Figure 4) [3, p. 2; 12]. The Aberjona River then flows south for approximately 6.9 miles until discharging into Upper and Lower Mystic Lakes. Surface water continues to flow south in the Mystic River for approximately 6.5 miles until eventually discharging to Boston Inner Harbor [10-13; 34-37].

The North Pond drainage basin area is approximately 0.56 square miles (mi^2). Using the U.S. Geological Survey (USGS) conversion factor of 1.8 cubic feet per second (cfs)/mi^2, North Pond has a mean annual flow rate of 1.01 cfs at the PPE to surface water [47]. The Aberjona River has a mean annual flow rate of less than 28.9 cfs [29]. A USGS gaging station, located on the Aberjona River approximately 6.1 miles downstream of the PPE, has a recorded mean annual flow rate of 28.9 cfs. No additional USGS gaging stations are located on the Aberjona or Mystic Rivers [29]. The Mystic River drainage basin, measured at its mouth, is approximately 66 mi^2. Using the USGS conversion factor of 1.8 cfs/mi^2, the Mystic River has a mean annual flow rate of approximately 118.8 cfs [29; 32]. START personnel estimated the mean annual flow rate to be 100 cfs at a location on the Mystic River, approximately 12.3 miles downstream of the PPE [29; 32; 47].

Groundwater flow direction beneath the RTC property has been determined to vary (locally) but was estimated by GTI to flow west, towards Woburn Street [6, p. 3]. As a result, the likely groundwater to surface water discharge point is a drainage ditch located approximately 600 ft to the west of the property, behind 845 Woburn Street. As a result, a second PPE to surface water is the drainage ditch. The drainage ditch, which appears to be a permanent water body, is located parallel to the MBTA railroad tracks and flows in a southerly direction [48]. The drainage ditch discharges to Halls Brook approximately 0.7 miles south of the PPE. Halls Brook in turn discharges in a southerly direction to the Aberjona River approximately 1.6 miles south of the PPE [12; 48].

The drainage basin area for the drainage ditch, measured at its confluence with Halls Brook, is approximately 0.5 mi^2 [10; 12]. Using the USGS conversion factor of 1.8 cfs/mi^2, the drainage ditch has a mean annual flow rate of 0.9 cfs at the PPE to surface water [32]. The Halls Brook drainage basin, measured at its confluence with the Aberjona River, is approximately 1.5 mi^2 [12]. Using the USGS conversion factor of 1.8 cfs/mi^2, Halls Brook has a mean annual flow rate of 2.7 cfs at its confluence with the Aberjona River [32]. The 15-mile downstream terminus of the surface water pathway is in Boston Inner Harbor [10-13]. Table 8 summarizes the characteristics of surface water bodies located along the 15-mile downstream pathway from the property.



SURFACE WATER PATHWAY SKETCH

RITTER TRUCKING CO.
856 WOBURN STREET
WILMINGTON, MASSACHUSETTS

HWRE
Civil•Environmental•Hydrologic•Structural•Environmental•Hazardous Waste Engineering
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
97-01-0030	M.H.	09/05/97

FILE NAME:	
HW-149\SURFWATER	FIGURE 4

Table 8

Surface Water Bodies Along the 15-Mile Downstream Pathway from Ritter Trucking Co.

Surface Water Body	Descriptor[a]	Length of Reach* (miles)	Flow Characteristics (cfs)[b]
Drainage Ditch	Minimal stream	0.7	0.9
Halls Brook	Minimal stream	0.9	2.7
North Pond	Minimal stream	0.5	1.01
Aberjona River (via North Pond)	Small to moderate stream	6.9	28.9
Aberjona River (via drainage ditch)	Small to moderate stream	5.8	28.9
Mystic River (Reach 1)	Small to moderate stream	4.9	>28.9 to 100
Mystic River (Reach 2)	Moderate to large stream	1.6	>100 to 118.8
Boston Inner Harbor	Coastal tidal waters	1.1	Not Applicable

[a] Minimal stream < 10 cfs. Small to moderate stream 10-100 cfs. Moderate to large stream > 100-1,000 cfs. Large stream to river > 1,000-10,000 cfs. Large river > 10,000-100,000 cfs. Very large river > 100,000 cfs. Coastal tidal waters (flow not applicable).

[b] Cubic Feet Per Second.

* The length of reach for the downstream surface water pathway is >15 miles due to the site having two separate probable point of entries (PPEs) and subsequently, two separate surface water pathways. The two surface water pathways are separate until they each discharge to the Aberjona River (see Figure 4).

[11; 12; 29; 32; 34-37; 47]

No surface water drinking water intakes are located along the 15-mile downstream pathway from the RTC property [30]. Halls Brook, Aberjona River, and Mystic River are designated as Class B waterways by MA DEP along their entire lengths. A Class B waterway is designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Where designated, a Class B waterway may be suitable as a source of public water supply. Furthermore, a Class B waterway may be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process water [33]. Halls Brook and the Aberjona and Mystic Rivers are further noted as warm water fisheries along their entire lengths [33]. Approximately 4.9 miles of wetland frontage exist along the 15-mile downstream pathway from the property [34-37]. Habitats for one State-threatened species, one State-endangered species, and one Federally-endangered species are located along the Aberjona and Mystic Rivers along the 15-mile downstream pathway from the property [31]. Table 9 summarizes the sensitive environments along the 15-mile downstream pathway from the property.

Table 9

Sensitive Environments Along the 15-Mile Downstream Pathway from Ritter Trucking Co.

Sensitive Environment Name	Sensitive Environment Type	Surface Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs)
Drainage Ditch	Water body protected by CWA	Drainage Ditch	0.0 to 0.7	0.9
North Pond	Water body protected by CWA	North Pond	0.0 to 0.5	1.01
North Pond	0.7 miles wetlands	North Pond	0.0 to 0.5	1.01
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	4.81	28.9
Aberjona River	3.5 miles wetlands	Aberjona River	0.5 to 6.9	28.9
Vertebrate Aves	Federally-endangered Species Habitat	Mystic River	12.48	>100 to 118.8
Vertebrate Aves	State-endangered Species Habitat	Mystic River	13.34	>100 to 118.8
Mystic River (Reach 2)	0.7 miles wetlands	Mystic River	12.3 to 13.9	>100 to 118.8
Migratory Pathway for Alewife	Anadromous Fish Migratory Pathway	Boston Inner Harbor	13.9 to 15.0	NA
Spawning Ground for Alewife	Spawning Ground Within An Estuary	Boston Inner Harbor	13.9 to 15.0	NA

cfs = Cubic Feet Per Second
PPE = Probable Point of Entry
CWA = Clean Water Act

[31; 38]

On 7 October 1987, GTI personnel collected a surface water sample from an intermittent stream located northeast of the property. The sample was submitted for analysis for VOCs by EPA Method 624; however, none were detected [6, p. 4]. The location at which the surface water sample was collected is not downstream of the RTC property. This sample was most likely collected to determine if any off-site sources existed or if possible dumping had occurred in the stream and wooded area to the northeast of the property.

On 22 April 1998, START personnel collected nine surface water samples (SW-01 through SW-09) and 13 sediment samples (SD-01 through SD-13) at points along the drainage ditch located west of the property (and adjacent to the MBTA railroad tracks), and at points along the stormwater drainage system which includes catchbasins, manholes, an intermittent stream, and their outfall on North Pond, to determine if there has been any groundwater to surface water migration of hazardous substances (Figure 3). The surface water and sediment samples were analyzed through the CLP for full TCL organic compounds (VOCs, SVOCs, pesticides/PCBs), and TAL metals and cyanide, except for sediment samples SD-10 through SD-13, which were analyzed for metals only [39, pp. 5-21; 58-61]. Table 10 summarizes the surface water and sediment samples collected by START personnel on 22 April 1998.

Table 10

Surface Water and Sediment Sample Summary: Ritter Trucking Co.
Samples Collected by START on 22 April 1998

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Inches)	Sample Source
MATRIX: Aqueous					
SW-01	ANP46 MALC23	0940	Grab	NA	Sample collected from North Pond downstream of the stormwater drainage outfall.
SW-02	ANP47 MALC24	1005	Grab	NA	Duplicate sample of SW-01 collected for quality control.
SW-03	ANP48 MALC25	1025	Grab	NA	Sample collected from the east side of North Pond, as a reference sample.
SW-04	ANP49 MALC26	1350	Grab	NA	Sample collected from the drainage ditch adjacent to the MBTA tracks, downstream of property. Petroleum odor noted
SW-05	ANP50 MALC27	1405	Grab	NA	Sample collected from the drainage ditch adjacent to the MBTA tracks at suspected groundwater to surface water PPE. Petroleum odor noted.
SW-06	ANP51 MALC28	1440	Grab	NA	Sample collected from the drainage ditch adjacent to the MBTA tracks, upgradient of property, as a reference sample.
SW-07	ANP52 MALC29	1150	Grab	NA	Sample collected from the catchbasin in stormwater drainage system downgradient of property (MS/MSD for quality control).
SW-08	ANP53 MALC30	1550	Grab	NA	Sample collected from the stormwater drainage system upstream of property, as a reference sample.
SW-09	ANP54 MALC31	1250	Grab	NA	Sample collected from the manhole in stormwater drainage system upstream of property, as a reference sample.

Table 10

Surface Water and Sediment Sample Summary: Ritter Trucking Co. Samples Collected by START on 22 April 1998 (Continued)

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Inches)	Sample Source
MATRIX: Sediment					
SD-01	ANP63 MALC39	0940	Grab	0-6	Sample collected from North Pond downstream of the stormwater drainage outfall.
SD-02	ANP64 MALC40	1005	Grab	0-6	Duplicate sample of SD-01 collected for quality control.
SD-03	ANP65 MALC41	1025	Grab	0-6	Sample collected from the east side of North Pond, as a reference sample.
SD-04	ANP66 MALC42	1400	Grab	0-6	Sample collected from the drainage ditch adjacent to the MBTA tracks, downstream of property. Petroleum odor noted.
SD-05	ANP67 MALC43	1410	Grab	0-6	Sample collected from the drainage ditch adjacent to the MBTA tracks at suspected groundwater discharge to surface water. Petroleum odor noted.
SD-06	ANP68 MALC44	1440	Grab	0-6	Sample collected from the drainage ditch adjacent to the MBTA tracks, upgradient of property, as a reference sample.
SD-07	ANP69 MALC45	1205	Grab	0-6	Sample collected from catchbasin in stormwater drainage system downgradient of property (MS/MSD for quality control).
SD-08	ANP70 MALC46	1610	Grab	0-6	Sample collected from the stormwater drainage system northeast and upstream of property, as a reference sample.
SD-09	ANP71 MALF41	1315	Grab	0-6	Sample collected from catchbasin in stormwater drainage system southeast and upgradient of property, as a reference sample.
SD-10	MALF42	1615	Grab	0-6	Sample collected from the stormwater drainage system northeast and upstream of property, as a reference sample. Sample analyzed for metals only.

Table 10

**Surface Water and Sediment Sample Summary: Ritter Trucking Co.
Samples Collected by START on 22 April 1998 (Concluded)**

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Inches)	Sample Source
MATRIX: Sediment (Concluded)					
SD-11	MALF43	1040	Grab	0-6	Sample collected from the east side of North Pond, as a reference sample. Sample analyzed for metals only.
SD-12	MALF44	1450	Grab	0-6	Sample collected from the drainage ditch adjacent to the MBTA tracks, upgradient of property, as a reference sample. Sample analyzed for metals only.
SD-13	MALF45	1315	Grab	0-6	Sample collected from catchbasin in stormwater drainage system southeast and upgradient of property, as a reference sample. Sample analyzed for metals only.

MS/MSD = Matrix Spike/Matrix Spike Duplicate
NA = Not Applicable
PPE = Probable Point of Entry
MBTA = Massachusetts Bay Transit Authority

[39]

Complete analytical results of START surface water and sediment samples including quantitation and detection limits are presented in Attachment A. Sample results quantified with a "J" on analytical tables are considered approximate because of limitations identified during CLP data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

A total of nine VOCs were detected in the surface water samples; however, only toluene and 1,2-dichloroethene (total) were detected at a concentration greater than three times the reference sample concentration or greater than the reference sample's SQL [58]. Toluene was detected in sample SW-04 (67 ppb) and 1,2-dichloroethene (total) was detected in samples SW-01 (16 ppb) SW-02 (18 ppb). Analysis of sample SW-07, collected between the RTC property and North Pond from a manhole in the stormwater drainage system, did not reveal the presence of 1,2-dichloroethene (total); however, 1,2-dichloroethene (total) was detected in reference sample SW-09 (9 ppb). This indicates that an off-site source may exist. As a result, the presence of 1,2-dichloroethene (total) in surface water samples SW-01 and SW-02 will not be attributed to the RTC property. Due to the known disposal of toluene on the RTC property and its detection in previous sampling events, it will be considered at least partially attributable to the RTC property.

A total of eight VOCs were detected in the sediment samples; however, only three VOCs, acetone, 2-butanone, and toluene, were detected at a concentration greater than three times the reference sample concentration or greater than the reference sample's SQL [60]. Of these three VOCs, 2-butanone has never been detected on the property and it was detected in reference sample SD-08 (38 ppb), indicating that an off-site source may exist [1-9; 41-42; 51]. As a result, the presence of 2-butanone will not be attributed to the RTC property.

Acetone was detected in two downstream drainage ditch samples (SD-04 and SD-05) at concentrations (41 and 170 ppb, respectively) greater than the drainage ditch reference sample (SD-06) SQL, indicating that acetone may be migrating off site via groundwater. Acetone was also detected in two downstream North Pond samples (SD-01 and SD-02) at concentrations (220 ppb and 150 ppb, respectively) greater than three times the North Pond reference sample (SD-03) concentration [60]. Moreover, acetone was also detected (110 ppb) in the reference sample (SD-08) collected from the intermittent stream, indicating that an off-site source may also exist [60]. However, due to the known disposal of acetone on the RTC property and its detection in previous sampling events, it will be considered at least partially attributable to the RTC property.

Toluene was detected in two downstream North Pond samples (SD-01 and SD-02) at concentrations (8 and 16 ppb, respectively) greater than three times the North Pond reference sample (SD-03) concentration [60]. Due to the known disposal of toluene on the RTC property and its detection in previous sampling events, it will be considered at least partially attributable to the RTC property.

A total of eight SVOCs were detected in the surface water samples; however, none of the concentrations were concentration greater than three times the reference sample's concentration or greater than the reference sample's SQL [58].

A total of 20 SVOCs were detected in the sediment samples; however, only fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene were detected at concentrations greater than three times the reference sample concentration or greater than the reference sample's SQL [60]. In addition, only anthracene, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, and pyrene have been detected in samples previously collected from the RTC property and therefore, will be attributed to the RTC property. Anthracene was detected in samples SD-04 (5,000 ppb) and SD-05 (740 ppb); bis(2-ethylhexyl)phthalate was detected in samples SD-01 (52,000 ppb), SD-02 (48,000 ppb), SD-04 (18,000 ppb), and SD-05 (2,600 ppb); di-n-octyl phthalate was detected in SD-01 and SD-02 at 4,200 ppb; and pyrene was detected in SD-01 (8,500 ppb), SD-02 (9,000 ppb), SD-04 (43,000 ppb), and SD-05 (7,800 ppb) [60]. Bis(2-ethylhexyl)phthalate was also detected in reference sample SD-08 at a concentration of 23,000 ppb, indicating that an off-site source may exist [60]. However, due to the known disposal of bis(2-ethylhexyl)phthalate on the RTC property and its detection in previous sampling events, it will be considered at least partially attributable to the RTC property.

Based on the analytical results, the concentrations of SVOCs in sample SD-05 are significantly less than in SD-04. This suggests that the groundwater to surface water migration PPE may be further south along the drainage ditch.

Two pesticides including heptachlor and 4,4'-DDT were present in the surface water samples; however, none of the concentrations were greater than three times the reference sample's concentration or greater than the reference sample's SQL [58].

Fourteen pesticides were detected in the sediment samples; however, only delta-BHC, aldrin, 4,4'-DDE, endrin, 4,4'-DDD, endrin-aldehyde, and gamma-chlordane were detected at concentrations greater than three times the reference sample's concentration or greater than the reference sample's SQL [60]. Based on available file information, the use and/or disposal of pesticides on the RTC property is not suspected. Furthermore, analytical results of soil samples collected from the property in July 1985 revealed no detectable amounts of pesticides. As a result, the pesticides detected in the sediment samples collected by START will not be attributed to the RTC property.

Aroclor-1260 was the only PCB detected in the surface water samples. It was present in reference sample SW-03 at 0.2 ppb [58]. PCBs detected in the sediment samples at concentrations greater than three times the reference sample's concentration or greater than the reference sample's SQL included aroclor-1248 and aroclor-1254. For the purposes of this evaluation, based on analytical results of soil samples collected from the property in July 1985 by IEP, Inc. and in August 1985 by TSMI which revealed no PCBs on the property, and based on the historical use of the property, the PCBs detected in the surface water and sediment samples collected by START do not appear to be attributable to the RTC property.

A total of 14 metals were detected in the surface water samples; however, only arsenic (6.1 ppb), manganese (756 ppb), and vanadium (1.1 ppb) were detected at concentrations greater than three times the reference sample concentration or greater than the reference sample's SDL [59]. Of these three metals, only arsenic has been detected on the property in the past. As a result, manganese and vanadium will not be attributed to the RTC property.

A total of 19 metals were detected in the sediment samples; however, only cadmium, copper, lead, potassium, and thallium were detected at concentrations greater than three times the reference sample concentration or greater than the reference sample's SDL [61]. Furthermore, of these metals, only cadmium, copper, and lead have been detected in soil samples collected from the RTC property and as a result, will be attributed to the RTC property. Cyanide was not detected in any of the surface water samples or sediment samples collected by START [59; 61].

Table 11 is a summary of substances detected through CLP analyses of START surface water and sediment samples which are at least partially attributable to the RTC property. For each sample location, a compound or element is listed if it is detected at greater than or equal to three times the higher of the reference sample concentrations. However, if the compound or element is not detected in the reference sample, the reference sample's SQL (for organic analyses) or SDL (for inorganic analyses) is used as the reference value. These compounds or elements are listed if they occurred at a value greater than or equal to the reference sample's SQL or SDL and are designated by their approximate relative concentration above these values. In addition, only those substances detected in START samples that have been previously identified in groundwater beneath the RTC property or in source samples from the RTC property are included in Table 11.

Table 11

Summary of Analytical Results
Surface Water and Sediment Sample Analysis for Ritter Trucking Co.
Collected by START on 22 April 1998

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration	Comments
SW-04 (ANP49)	VOCs			
	Toluene	67 ppb	10 U ppb	6.7 × SQL
SW-05 (MALC27)	INORGANICS			
	Arsenic	6.1 J ppb	6.0 U ppb	1.0 × SDL
SD-01 (ANP63)	VOCs			
	Acetone	220 J ppb	39 J ppb	5.6 × Ref
	Toluene	8 J ppb	2 J ppb	4 × Ref
	SVOCs			
	Bis(2-ethylhexyl)phthalate	52,000 J ppb	1,700 J ppb	30.6 × Ref
	Di-n-octyl phthalate	4,200 J ppb	650 U ppb	6.5 × SQL
	Pyrene	8,500 J ppb	1,000 J ppb	8.5 × Ref
SD-02 (ANP64)	VOCs			
	Acetone	150 J ppb	39 J ppb	3.8 × Ref
	Toluene	16 J ppb	2 J ppb	8 × Ref
	SVOCs			
	Bis(2-ethylhexyl)phthalate	48,000 J ppb	1,700 J ppb	28.2 × Ref
	Di-n-octyl phthalate	4,200 J ppb	650 U ppb	6.5 × SQL
	Pyrene	9,000 J ppb	1,000 J ppb	9.0 × Ref
SD-04 (ANP66, MALC42)	VOCs			
	Acetone	41 J ppb	14 UJ ppb	2.9 × SQL
	SVOCs			
	Anthracene	5,000 J ppb	82 J ppb	61 × Ref
	Bis(2-ethylhexyl)phthalate	18,000 J ppb	320 J ppb	56.3 × Ref
	Pyrene	43,000 J ppb	710 J ppb	60.6 × Ref

Table 11

Summary of Analytical Results
Surface Water and Sediment Sample Analysis for Ritter Trucking Co.
Collected by START on 22 April 1998 (Concluded)

Sample Location	Compound/ Element	Sample Concentration	Reference Concentration	Comments
SD-04 (ANP66, MALC42)	INORGANICS			
	Cadmium	2.3 ppm	0.27 U ppm	8.5 × SDL
	Copper	151 ppm	33.4 ppm	4.5 × Ref
	Lead	104 ppm	26.4 ppm	3.9 × Ref
SD-05 (ANP67, MALC43)	VOCs			
	Acetone	170 J ppb	14 UJ ppb	12.1 × SQL
	SVOCs			
	Anthracene	740 J ppb	82 J ppb	9 × Ref
	Bis(2-ethylhexyl)phthalate	2,600 J ppb	320 J ppb	8.1 × Ref
	Pyrene	7,800 J ppb	710 J ppb	11 × Ref
	INORGANICS			
	Cadmium	2.1 ppm	0.27 U ppm	7.8 × SDL

ppm = parts per million
ppb = parts per billion
Ref = Reference sample concentration
SQL = *Sample Quantitation Limit*
SDL = Sample Detection Limit
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds
U = Indicates the compound was analyzed for but not detected and reports the detection value.
J = Quantitation is approximate due to limitations identified during the quality control review.
UJ = Indicates the compound was analyzed for but not detected and reports the estimated detection value.

[58-61]

START performed surface water pathway sampling as part of the RTC SIP [39, pp. 5-21]. Based on the START analytical results, a release of hazardous substances to the nearby drainage ditch and North Pond has been documented. As a result of the release, two Clean Water Act-protected water bodies have been impacted. No other sensitive environments are known or suspected to have been impacted. To date, no known actions have been taken to address the release to the drainage ditch or to North Pond.

SOIL EXPOSURE PATHWAY

Approximately three full-time employees work on the RTC property [39]. There are no residents on the property; the nearest residence is located approximately 2,500 ft north of the property at 779 Woburn Street [39]. The nearest school to the property is the Austin School, located approximately 1.1 miles east of the property [13]. No terrestrial environments were noted on the property [39]. An estimated 3,028 persons live within 1-radial mile of the property [28].

In July 1985, two areas of surface spillage which flowed from the RTC property onto the Wilmington Cold Storage, Inc. property, the southern abutter. Both spills had originated on the RTC property and flowed down an embankment onto the adjacent property [41, p. 1]. One area, Spill No.1, was identified as a phthalate ester spill from a parked RTC tanker truck, while the other incident, Spill No. 2, was tentatively identified as diesel fuel from the RTC fuel pumping station [3, p. 5]. Analytical results from soil samples collected from the spills are discussed in detail in the Waste/Source Sampling section of this report.

Between October 1985 and April 1989, four petroleum USTs, including one 6,000-gallon, one 1,000-gallon, one 6,000-gallon sand-filled, and one 2,000-gallon UST, were excavated and removed from the property. The USTs were located in an area which was previously identified as a likely source area for contaminants present on the property [8, p. 4]. In addition, petroleum-contaminated soils in contact with the tanks were excavated and placed on polyethylene sheeting for later disposal. Laboratory analysis of contaminated soil samples indicated concentrations of TPHs in the soils ranging up to 6,800 ppm [6, p. 3].

TGG reported that results of analyses from the soil showed that both petroleum compounds and chlorinated solvents were present, although chlorinated solvents were present at low levels. Furthermore, three soil samples were collected from the limits of the tank excavations and analyzed for TPHs.

The highest concentration of TPHs was present at 5,690 ppm. The remaining two samples, with levels of TPHs at 2,870 and 3,500 ppm, were considered representative of soil remaining at the limits of the excavation [8, p. 6]. START personnel were unable to determine the depth at which the samples were collected.

In July 1991, a soil sample was collected from the contaminated soil pile on the property. START personnel were unable to determine who collected the soil sample. Analytical results are discussed in detail in the Waste/Source Sampling section of this report.

START did not perform surface soil sampling as part of the RTC SIP [39, pp. 5-21]. It is likely that chlorinated solvent-contaminated surface soils exist on the property. However, based on site observations and conditions, distance to the nearest residence (approximately 2,500 ft), and lack of public use of the property, no impacts to nearby residential populations are known or suspected.

AIR PATHWAY

Currently, three full-time employees of Robert Francis Construction work on the former RTC property [39]. There are no on-site residents; the nearest residence is located approximately 2,500 ft north of the property on Woburn Street [39]. An estimated 114,695 persons live within 4-radial miles of the property, not including the on-site workers [28]. Table 12 summarizes the estimated population within 4-radial miles of the property.

Table 12

Estimated Populations Within 4-Radial Miles of Ritter Trucking Co.

Radial Distance from Ritter Trucking Co. (miles)	Estimated Population
On a Source	3
> 0.00 to 0.25	121
> 0.25 to 0.50	426
> 0.50 to 1.00	2,481
> 1.00 to 2.00	17,887
> 2.00 to 3.00	40,139
> 3.00 to 4.00	53,641
TOTAL	114,698

[28]

Approximately 4,269 acres of wetlands are located within 4-radial miles of the property. In addition, habitats for one State-endangered and two Federal candidate species are located within 4-radial miles of the property [31]. Table 13 summarizes the sensitive environments located within 4-radial miles of the property.

Table 13

Sensitive Environments Located Within 4-Radial Miles of Ritter Trucking Co.

Radial Distance from Ritter Trucking Co. (miles)	Sensitive Environments/Species (status)
>0.00 to 0.25	8 acres wetlands
	Water body protected by Clean Water Act
>0.25 to 0.50	60 acres wetlands
>0.50 to 1.00	264 acres wetlands
>1.00 to 2.00	859 acres wetlands
>2.00 to 3.00	One Federal candidate species habitat
	1,190 acres wetlands
>3.00 to 4.00	One State-endangered species habitat
	One Federal candidate species habitat
	1,888 acres wetlands

[31; 34-37]

During the START on-site reconnaissance, ambient air was monitored using a PID. No readings above background were noted.

START did not collect air samples as part of the RTC SIP [39, pp. 2-21]. No laboratory qualitative air samples are known to have been collected from the RTC property. Based on the available data, a release of hazardous substances to the ambient air from on-site sources is not known or suspected to have occurred; no impacts to nearby residential populations or sensitive environments are known or suspected.

SUMMARY

The Ritter Trucking Co. (RTC) property is located on a 1.07-acre lot at 856 Woburn Street in Wilmington, Middlesex County, Massachusetts. The property is located in an industrial park in southeastern Wilmington just north of the Woburn-Wilmington town line and east of the Massachusetts Bay Transit Authority (MBTA)-New Hampshire Line railroad tracks. The property is bordered to the west by Woburn Street and several businesses; to the north and south by businesses; and to the east and northeast by a wooded area with an intermittent stream.

There is one large masonry building on the property which housed the RTC office and a garage for tank truck washing operations and maintenance. Prior to 1986, there was also a smaller building which housed a gasoline and diesel fuel pumping station, located to the southeast of the larger building. The pumping station and all associated piping were removed in June 1986, as they were suspected of leaking. The eastern portion of the property, located behind the larger building, was used as a parking and staging area for RTC tanker trucks.

The property is currently owned by Mr. Robert Francis who operates Robert Francis Construction on the property. Robert Francis Construction uses the property for heavy equipment storage, a company office, and a truck and equipment maintenance garage.

RTC operated on the property from 1961 until the late 1980s. The primary activity of the RTC facility was the washing of the interior of tank trucks which were owned and operated by RTC. RTC tank trucks transported plasticizers, natural and synthetic latex, oils, gasoline, diesel fuel, toluene, xylene, mineral spirits, and propane. Reportedly, only tank trucks which transported latex were washed at the Wilmington facility. RTC tank trucks which transported hazardous substances were washed at other facilities, and hazardous materials were not stored on the property. Upon arriving at the facility, the trucks were washed down with cold water. The wastewater drained into a floor catchbasin which then flowed into another floor catchbasin. From there, the wastewater flowed through two 1,000-gallon underground storage tanks (USTs) and a 5,000-gallon UST with vertical baffles. Sludge in the wastewater would settle in the USTs. These three wastewater USTs/settling tanks are located beneath the pavement between Woburn Street and the building. The effluent was then discharged into a Metropolitan District Commission (MDC) municipal sewer line. The sludge collected in the settling tanks was periodically collected and disposed of by a local septage disposal company.

The wastewater USTs/settling tanks had a history of overflowing and spilling due to poor maintenance and were suspected of exfiltrating their contents resulting in groundwater and soil contamination. Analytical results of effluent samples collected from the wastewater catch basins, USTs/settling tanks, and sewer discharge, and groundwater samples collected from the property indicated contamination by volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs).

Four petroleum USTs (two 6,000-gallon (one sand-filled), one 10,000-gallon, and one 2,000-gallon) have been excavated and removed from the RTC property as they were suspected of contributing to groundwater and soil contamination. Petroleum-contaminated soils were removed during excavations of the petroleum USTs; however, the limits of the excavations were determined during UST removal and were limited to the least amount of soil required to remove the USTs.

No contaminated soil was required to be removed beyond the limits of the UST excavations during the UST removals. Based on analytical results from soil and groundwater samples collected from the RTC property, it is likely that metals and chlorinated solvent-contaminated soils exist on the property.

On 16 June 1997, Roy F. Weston, Inc. (WESTON®) Superfund Technical Assessment and Response Team (START) personnel conducted an on-site reconnaissance of the RTC property. On 22 April 1998, START personnel collected nine surface water samples and 13 sediment samples from the local stormwater drainage system which serves the RTC property, and from a drainage ditch located west of the property, to determine if there has been any groundwater to surface water migration of hazardous substances. Also, START personnel collected four groundwater samples from temporary wellpoints installed on properties located west and north of the RTC property, 845 and 844 Woburn Street, respectively, to determine if hazardous substances are migrating off site, via groundwater, from the RTC property. No samples were collected from the RTC property.

Hazardous substances detected in the sediment samples (and that are partially attributable to the RTC property) included: acetone, anthracene, bis(2-ethylhexyl)phthalate, cadmium, copper, di-n-octyl phthalate, lead, pyrene, and toluene. Arsenic and toluene were the only hazardous substances detected in the surface water samples. Hazardous substances detected in the groundwater samples included arsenic, copper, and lead.

Groundwater fluctuates 3 to 4 feet (ft) annually from approximately 4.9 to 8.7 ft below grade with the hydraulic gradient on the property sloping toward the west. Groundwater flow beneath the RTC property was determined by Groundwater Technology, Inc. (GTI) to be toward the west, however, the groundwater flow at the northern property abutter, 844 Woburn Street, was determined by GTI and TGG Environmental, Inc. (TGG) to be largely towards the south. The likely groundwater to surface water discharge point is a drainage ditch located approximately 600 ft to the west of the RTC property, behind 845 Woburn Street. The drainage ditch, which appears to be a permanent water body, is located parallel to the MBTA railroad tracks and flows in a southerly direction. The drainage ditch discharges to Halls Brook which in turn discharges in a southerly direction to the Aberjona River.

The nearest documented groundwater source for public drinking water is the Wilmington Water Department's Main Street Well, located approximately 0.6 miles west-southwest of the property. The nearest private well is estimated to be located within 0.25-radial miles from the property, but has not been specifically identified due to lack of private well information for Wilmington. The total population which relies on groundwater within 4-radial miles of the property is 46,405 persons.

Stormwater runoff in the area is directed through catchbasins and storm drains into North Pond, located approximately 750 ft south of the property on Presidential Way. The western two-thirds of the RTC property slope towards Woburn Street. The remaining eastern portion of the property has a relatively flat grade; however, some runoff may flow to the east into the intermittent stream. The intermittent stream also discharges into North Pond. North Pond in turn discharges into the

Aberjona River which then flows south until discharging into Upper and Lower Mystic Lakes. Surface water continues to flow south in the Mystic River until eventually discharging into Boston Inner Harbor.

Approximately three full-time employees work on the RTC property. There are no residents on the property; the nearest residence is located approximately 2,500 ft north of the property on Woburn Street. An estimated 3,028 persons live within 1-radial mile of the property and an estimated 114,695 persons live within 4-radial miles of the property, not including the on-site workers. In addition, approximately 4,269 acres of wetlands are located within 4-radial miles of the property.

RITTER TRUCKING CO.
REFERENCES

[1] E&E/FIT (Ecology & Environment, Inc./Field Investigation Team). 1980. Preliminary Site Assessment of Ritter Trucking Co., Inc. 6 August.

[2] E&E/FIT (Ecology & Environment, Inc./Field Investigation Team). 1980. Site Inspection and Safety Report for Ritter Trucking Co., Inc. 16 September.

[3] MA DEQE (Massachusetts Department of Environmental Quality Engineering). 1987. Site Inspection Report for Ritter Trucking Co., Inc. 15 August.

[4] TSMI (Toxic Systems Management, Inc.). 1985. Site Relative to Hazardous Materials for Property Located at 856 Woburn Street. 17 September.

[5] MA DEQE (Massachusetts Department of Environmental Quality Engineering). 1985. Memorandum-Wilmington Cold Storage Co./Ritter Trucking Site Investigation. 16 August.

[6] Groundwater Technology, Inc. 1987. Groundwater Monitoring and Sampling-Tocci Properties. 17 November.

[7] TGG Environmental, Inc. 1988. Environmental Studies - 856 Woburn Street. 15 November.

[8] TGG Environmental, Inc. 1989. Environmental Studies - 856 Woburn Street. 15 September.

[9] MA DEQE (Massachusetts Department of Environmental Quality Engineering). 1985. Notice of Responsibility Pursuant to Massachusetts General Law, Chapter 21E. 10 December.

[10] USGS (U.S. Geological Survey). 1965; 1979 Photorevised. Wilmington, MA. (7.5-minute series topographic map).

[11] USGS (U.S. Geological Survey). 1985. Boston North, MA. (7.5 × 15-minute series topographic map).

[12] USGS (U.S. Geological Survey). 1987. Reading, MA. (7.5 × 15-minute series topographic map).

[13] USGS (U.S. Geological Survey). 1966; 1979 Photorevised. Lexington, MA. (7.5-minute series topographic map).

[14] Street Atlas of Metro Boston and Eastern Massachusetts. 1995. Published by Arrow Map, Inc.

EAST DRAINAGE DITCH ANALYTICAL RESULTS
INDUSTRIPLEX
WOBURN, MASSACHUSETTS

Sample Number	IPSD-ED08-020501		IPSD-ED09-020501		IPSD-ED10-020501	
Sample Location	ED08		ED09		ED10	
Date Sampled	2/5/2001		2/5/2001		2/5/2001	
Interval	0.0-0.5		0.0-0.5		0.0-0.5	
QC Identifier	None		None		None	
TAL Metal Analysis (MG/KG)						
Aluminum	11000		5910		2270	
Antimony	0.40	UJ	0.41	UJ	0.42	UJ
Arsenic	72.6		16.3		28.1	
Barium	112		21.3		13.9	U
Beryllium	0.91		0.75		0.40	
Cadmium	0.66	J	0.84	J	0.30	UJ
Calcium	4700		1780		1220	
Chromium	793		1240		15.3	
Cobalt	19.3		8.7		14.6	
Copper	47.7	J	32.6	J	21.1	J
Iron	17100		11900		15800	
Lead	24.6	J	31.5	J	6.2	J
Magnesium	926		651		434	
Manganese	246	J	133	J	294	J
Mercury	0.76		0.16	J	0.049	U
Nickel	37.7		9.5		6.2	
Potassium	355		193		214	
Selenium	1.0	U	1.0	U	1.0	U
Silver	0.14	U	0.14	U	0.15	U
Sodium	1040	J	326	J	126	UJ
Thallium	1.1	J	0.62	U	0.62	U
Vanadium	21.2		12.3		15.1	
Zinc	727		203		99.9	
Wet Chemistry Analysis						
Chromium VI		NA		R		NA
pH		NA	6.51			NA
Redox Potential		NA	191			NA
Sulfide		NA	84.4	J		NA

REFERENCES (Continued)

[15] Amirault, S. (START). 1996. Phone Conversation Record with Mr. Rob Antico, Wilmington Water Department, RE: Public Water Supplies, Wilmington, MA. TDD No. 97-01-0034. 23 February.

[16] Rose, S. (START). 1997. Phone Conversation Record with Mr. Richard Dubbs, Burlington Water Department, RE: Public Water Supplies, Burlington, MA. TDD No. 97-01-0034. 20 February.

[17] Rose, S. (START). 1997. Phone Conversation Record with Mr. Peter Tassi, Reading Water Department, RE: Public Water Supplies, Reading, MA. TDD No. 97-01-0034. 20 February.

[18] Rose, S. (START). 1997. Phone Conversation Record with Ms. Marge Muir, Stoneham Water Department, RE: Public Water Supplies, Stoneham, MA. TDD No. 97-01-0034. 20 February.

[19] NOAA (National Oceanic and Atmospheric Administration). 1961-1990. "Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days." Published by the U.S. Department of Commerce.

[20] Schrot, P. (START). 1997. Project Note, Ritter Trucking Co., RE: North Reading Water Department Apportionment Calculations. TDD No. 97-01-0030. 2 June.

[21] Rose, S. (START). 1997. Project Note, New England Resins and Pigments, RE: Wilmington Water Department Apportionment Calculations. TDD No. 97-01-0034. 20 February.

[22] Rose, S. (START). 1997. Project Note, New England Resins and Pigments, RE: Reading Water Department Apportionment Calculations. TDD No. 97-01-0034. 20 February.

[23] Rose, S. (START). 1997. Phone Conversation Record with Mr. William Neeman, Woburn Water Department, RE: Public Water Supplies, Woburn, MA. TDD No. 97-01-0034. 11 February.

[24] Padden, J. (START). 1995. Phone Conversation Record with Mr. Ralph McClellan, Billerica Water Department, RE: Public Water Supplies, Billerica, MA. TDD No. 95-06-0006. 7 August.

[25] Barrows, S. M. (START). 1995. Phone Conversation Record with Mr. Leon Garrant, Tewksbury Water Department, RE: Public Water Supplies, Tewksbury, MA. TDD No. 95-07-0033. 31 August.

RITTER TRUCKING CO.
REFERENCES (Continued)

[26] LaForge, L. (START). 1995. Phone Conversation Record with Mr. Mark Clark, North Reading Water Department, RE: Public Water Supplies, North Reading, MA. TDD No. 95-07-0064. 13 December.

[27] Schrot, P. H. (START). 1997. Phone Conversation Record with Mr. David Weaver, Wakefield Water Department, RE: Public Water Supplies, Wakefield, MA. TDD. No. 97-01-0030. 9 June.

[28] Frost Associates. 1997. Project Note, Ritter Trucking Co. Site, RE: Population and Private Well Users.

[29] Rose, S. (START). 1997. Phone Conversation with Mr. Tom Sheppard, USGS (U.S. Geological Survey), RE: Mean Annual Flow Rate for Aberjona River. TDD. No. 97-01-0034. 20 February.

[30] Rose, S. (START). 1997. Phone Conversation with Ms. Carol Cogan, City of Woburn Conservation Commission, RE: Drinking Water Intakes/Fisheries Along Aberjona and Mystic Rivers. TDD No. 97-01-0034. 12 February.

[31] Charest, G. (U.S. Environmental Protection Agency). 1997. Project Note, Ritter Trucking Co. Site, RE: Rare and Endangered Species Report, Wilmington, MA. Undated.

[32] Rose, S. (START). 1997. Project Note, New England Resins and Pigments, RE: Surface Water Pathway Calculations. TDD. No. 97-01-0034. 5 March.

[33] MA DEP (Massachusetts Department of Environmental Protection). 1990. <u>Massachusetts Surface Water Quality Standards</u>. Division of Water Pollution Control. Publication No. 16, 484-114-100-90-CR.

[34] FWS (U.S. Fish & Wildlife Service). undated. National Wetlands Inventory Map for Wilmington Quadrangle, MA.

[35] FWS (U.S. Fish & Wildlife Service). undated. National Wetlands Inventory Map for Lexington Quadrangle, MA.

[36] FWS (U.S. Fish & Wildlife Service). undated. National Wetlands Inventory Map for Reading Quadrangle, MA.

[37] FWS (U.S. Fish & Wildlife Service). undated. National Wetlands Inventory Map for Boston North Quadrangle, MA.

RITTER TRUCKING CO.
REFERENCES (Continued)

[38] U.S. Fish & Wildlife Service. 1988. Atlantic Coast Ecological Inventory Map, Boston, Mass. - Conn. - ME. - NH.

[39] START. 1997. Field Logbook for Ritter Trucking Co. Site Inspection Prioritization. No. 00194-S. TDD. No. 97-01-0030.

[40] Schrot, P. H. (START). 1997. Phone Conversation Record with Mr, Daniel G. Donovan III, RE: Property Ownership of 856 Woburn Street, Wilmington, MA. TDD. No. 97-01-0030. 17 April.

[41] IEP Inc. 1985. Sample Results from Wilmington Cold Storage, Inc. 27 August.

[42] SRT, Inc. (Subsurface Remediation Technologies, Inc.). 1997. Groundwater Analytical Data Tables for 856 Woburn Street. 25 June.

[43] GIS Map (Geographic Information Systems). 1996. Wilmington, MA. (7.5-minute series GIS map).

[44] GIS Map (Geographic Information Systems). 1996. Lexington, MA. (7.5-minute series GIS map).

[45] GIS Map (Geographic Information Systems). 1996. Reading, MA. (7.5-minute series GIS map).

[46] GIS Map (Geographic Information Systems). 1996. Boston North, MA. (7.5-minute series GIS map).

[47] Schrot, P. (START). 1997. Project Note, Ritter Trucking Co., RE: Drainage Basin Area and Mean Annual Flow Rate For North Pond. TDD No. 97-01-0030. 11 August.

[48] Rose, S. (START). 1997. Field Logbook for New England Resins and Pigments Site Inspection Prioritization. No. 00158-S. TDD No. 97-01-0034.

[49] Stone, A. (IEP, Inc.) 1985. Letter to Ms. Patricia Donahue, Massachusetts Department of Environmental Quality Engineering, RE: Sample Results from Wilmington Cold Storage, Inc. 2 October.

[50] Schrot, P. H. (START). 1998. Phone Conversation Record with Mr. Daniel G. Donovan, RE: Scheduling Sampling Day. TDD. No. 97-01-0030. 14 April.

[51] Groundwater Technology, Inc. 1986. Hydrogeologic Investigation Report - 856 Woburn Street. 7 May.

RITTER TRUCKING CO.
REFERENCES (Concluded)

[52] Teague, K. (Analytics Environmental Laboratory). 1991. Letter to Mr. Daniel G. Donovan, RE: Soil sample collected at 856 Woburn Street. 1 August.

[53] EPA (U. S. Environmental Protection Agency). 1997. Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Superfund Program, Region I. Printout dated 8 October.

[54] EPA (U. S. Environmental Protection Agency). 1996. Resource Conversation and Recovery Information System (RCRIS) Superfund Program, Region I. Printout dated 16 September.

[55] U.S. EPA (U.S. Environmental Protection Agency). 1998. U.S. EPA Envirofacts Facility Databases Information. Available from http://www.epa.gov/r10earth/pickup/national. Internet, accessed 08 April.

[56] MA DEP (Massachusetts Department of Environmental Protection). 1993. Transition List of Confirmed Disposal Sites and Locations to be Investigated. Bureau of Waste Site Cleanup. August.

[57] Schrot, P. (START). 1997. Phone Conversation Record with Mr. Robert Francis, RE: Underground Oil and Grease Separator Tank. TDD. No. 97-01-0030. 3 June.

[58] Manmade, A. (START). 1998. Letter to C. Clark (EPA), RE: Case No.26145, SDG No. ANP46. Ritter Trucking Co. Site. TDD No. 98-05-0130. 12 August.

[59] Bentley, R. (START). 1998. Letter to C. Clark (EPA), RE: Case No.26145, SDG No. MALB67. Ritter Trucking Co. Site. TDD No. 98-05-0130. 12 August.

[60] Manmade, A. (START). 1998. Letter to C. Clark (EPA), RE: Case No.26145, SDG No. ANP63. Ritter Trucking Co. Site. TDD No. 98-05-0130. 17 August.

[61] Bentley, R. (START). 1998. Letter to C. Clark (EPA), RE: Case No.26145, SDG No. MALB66. Ritter Trucking Co. Site. TDD No. 98-05-0130. 4 August.

ATTACHMENT A

RITTER TRUCKING CO.

GROUNDWATER, SURFACE WATER, AND SEDIMENT SAMPLE
ANALYTICAL RESULTS
START

Samples Collected 22 April 1998

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 1
VOLATILE AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		ANP46	ANP47	ANP48	ANP49	ANP50	ANP51
SAMPLE LOCATION:		SW-01	SW-02	SW-03	SW-04	SW-05	SW-06
LABORATORY NUMBER:		890209	890218	890219	890221	890236	890239
COMPOUND	CRQL						
Chloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10	8 J	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Carbon Disulfide	10	10 UJ	10 UJ	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10	10 UJ	10 UJ	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10	5 J	5 J	10 U	10 U	10 U	10 U
1,2-Dichloroethene (Total)	10	16	18	10 U	10 U	10 U	10 U
Chloroform	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10	10 UJ	10 UJ	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10	10 U	10 U	10 U	5 J	4 J	4 J
Carbon Tetrachloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ
2-Hexanone	10	10 UJ	10 UJ	10 U	10 U	10 U	10 U
Tetrachloroethene	10	10 U	10 U	10 U	10 U	10 U	2 J
1,1,2,2-Tetrachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10	3 J	3 J	10 U	67	10 U	10 U
Chlorobenzene	10	2 J	2 J	10 U	10 U	10 U	10 U
Ethylbenzene	10	10 U	10 U	10 U	1 J	10 U	10 U
Styrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10	10 U	10 U	10 U	5 J	10 U	10 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE ANALYZED:		05/02/98	05/02/98	05/03/98	05/03/98	05/03/98	05/03/98

SITE: RITTER TRUCKING CO
CASE: 26146 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 1
VOLATILE AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		ANP52	ANP53	ANP54	ANP55	ANP57	ANP58
SAMPLE LOCATION:		SW-07	SW-08	SW-09	GW-01	GW-03	GW-04
LABORATORY NUMBER:		890245	890247	890248	890249	890250	890251
COMPOUND	CRQL						
Chloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10	10 UJ	10 UJ	10 UJ	14 UJ	10 UJ	10 UJ
Carbon Disulfide	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (Total)	10	10 U	10 U	9 J	10 U	10 U	10 U
Chloroform	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10	10 UJ	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10	10 UJ	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10	10 U	10 U	10 U	10 U	10 U	10 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE ANALYZED:		05/03/98	05/03/98	05/03/98	05/03/98	05/03/98	05/03/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 1
VOLATILE AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		ANP59	ANP60	ANP61	ANP62
SAMPLE LOCATION:		GW-05	TB-01	RB-01	RB-02
LABORATORY NUMBER:		890252	890253	890254	890255
COMPOUND	CRQL				
Chloromethane	10	10 U	10 U	50 U	10 U
Bromomethane	10	10 U	10 U	50 U	10 U
Vinyl Chloride	10	10 U	10 U	50 U	10 U
Chloroethane	10	10 U	10 U	50 U	10 U
Methylene Chloride	10	10 U	2 J	50 U	10 U
Acetone	10	10 UJ	10 UJ	250 J	10 UJ
Carbon Disulfide	10	10 U	10 U	50 U	10 U
1,1-Dichloroethene	10	10 U	10 U	20 J	10 U
1,1-Dichloroethane	10	10 U	10 U	50 U	10 U
1,2-Dichloroethene (Total)	10	10 U	10 U	50 U	10 U
Chloroform	10	10 U	7 J	8 J	8 J
1,2-Dichloroethane	10	10 U	10 U	50 U	10 U
2-Butanone	10	10 U	10 U	50 U	10 U
1,1,1-Trichloroethane	10	10 U	10 U	50 U	10 U
Carbon Tetrachloride	10	10 U	10 U	50 U	10 U
Bromodichloromethane	10	10 U	10 U	50 U	10 U
1,2-Dichloropropane	10	10 U	10 U	50 U	10 U
cis-1,3-Dichloropropene	10	10 U	10 U	50 U	10 U
Trichloroethene	10	10 U	4 J	16 J	10 U
Dibromochloromethane	10	10 U	10 U	50 U	10 U
1,1,2-Trichloroethane	10	10 U	10 U	50 U	10 U
Benzene	10	10 U	10 U	14 J	10 U
trans-1,3-Dichloropropene	10	10 U	10 U	50 U	10 U
Bromoform	10	10 U	10 U	50 U	10 U
4-Methyl-2-pentanone	10	10 UJ	10 UJ	50 UJ	10 U
2-Hexanone	10	10 U	10 U	50 U	10 U
Tetrachloroethene	10	10 U	10 U	50 U	10 U
1,1,2,2-Tetrachloroethane	10	10 U	10 U	50 U	10 U
Toluene	10	10 U	10 U	14 J	10 U
Chlorobenzene	10	10 U	10 U	14 J	10 U
Ethylbenzene	10	10 U	10 U	50 U	10 U
Styrene	10	10 U	10 U	50 U	10 U
Xylene (total)	10	10 U	10 U	50 U	10 U
DILUTION FACTOR:		1.0	1.0	5.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98
DATE ANALYZED:		05/03/98	05/03/98	05/04/98	05/04/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 2
SEMIVOLATILE WATER ANALYSIS
µg/L

SAMPLE NUMBER:		ANP46	ANP47	ANP48	ANP49	ANP50	ANP51
SAMPLE LOCATION:		SW-01	SW-02	SW-03	SW-04	SW-05	SW-06
LABORATORY NUMBER:		890209	890218	890219	890221	890236	890239
COMPOUND	CRQL						
Phenol	10	10 U	11 U	10 U	11 U	11 U	10 U
bis(2-Chloroethyl) ether	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Chlorophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
1,3-Dichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
1,4-Dichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
1,2-Dichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Methylphenol	10	10 U	11 U	10 U	1 J	11 U	10 U
2,2'-Oxybis(1-chloropropane)	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Methylphenol	10	10 U	11 U	10 U	11 U	11 U	10 U
N-Nitroso-di-n-propylamine	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachloroethane	10	10 U	11 U	10 U	11 U	11 U	10 U
Nitrobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
Isophorone	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Nitrophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dimethylphenol	10	10 U	11 U	10 U	11 U	11 U	10 U
bis(2-Chloroethoxy)methane	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dichlorophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
1,2,4-Trichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
Naphthalene	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Chloroaniline	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachlorobutadiene	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Chloro-3-methylphenol	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Methylnaphthalene	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachlorocyclopentadiene	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4,6-Trichlorophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4,5-Trichlorophenol	25	25 U	28 U	25 U	27 U	28 U	24 U
2-Chloronaphthalene	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Nitroaniline	25	25 U	28 U	25 U	27 U	28 U	24 U
Dimethylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Acenaphthylene	10	10 U	11 U	10 U	11 U	11 U	10 U
2,6-Dinitrotoluene	10	10 U	11 U	10 U	11 U	11 U	10 U
3-Nitroaniline	25	25 U	28 U	25 U	27 U	28 U	24 U
Acenaphthene	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dinitrophenol	25	25 U	28 U	25 U	27 U	28 U	24 U
4-Nitrophenol	25	25 U	28 U	25 U	27 U	28 U	24 U
Dibenzofuran	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dinitrotoluene	10	10 U	11 U	10 U	11 U	11 U	10 U
Diethylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Chlorophenyl-phenylether	10	10 U	11 U	10 U	11 U	11 U	10 U
Fluorene	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Nitroaniline	25	25 U	28 U	25 U	27 U	28 U	24 U
4,6-Dinitro-2-methylphenol	25	25 U	28 U	25 U	27 U	28 U	24 U
N-Nitrosodiphenylamine(1)	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Bromophenyl-phenylether	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
Pentachlorophenol	25	25 U	28 U	25 U	27 U	28 U	24 U
Phenanthrene	10	10 U	11 U	10 U	11 U	3 J	10 U
Anthracene	10	10 U	11 U	10 U	11 U	11 U	10 U
Carbazole	10	10 U	11 U	10 U	11 U	11 U	10 U
Di-n-butylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Fluoranthene	10	10 U	11 U	10 U	1 J	6 J	10 U
Pyrene	10	10 U	11 U	10 U	11 U	4 J	10 U
Butylbenzylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
3,3'-Dichlorobenzidine	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(a)anthracene	10	10 U	11 U	10 U	11 U	11 U	10 U
Chrysene	10	10 U	11 U	10 U	11 U	2 J	10 U
Bis(2-ethylhexyl)phthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Di-n-octylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(b)fluoranthene	10	10 U	11 U	10 U	1 J	3 J	10 U
Benzo(k)fluoranthene	10	10 U	11 U	10 U	1 J	3 J	10 U
Benzo(a)pyrene	10	10 U	11 U	10 U	11 U	1 J	10 U
Indeno(1,2,3-cd)pyrene	10	10 U	11 U	10 U	11 U	11 U	10 U
Dibenz(a,h)anthracene	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(g,h,i)perylene	10	10 U	11 U	10 U	11 U	11 U	10 U
DILUTION FACTOR:		1.0	1.12	1.0	1.08	1.12	0.95
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/28/98	04/28/98	04/28/98	04/28/98	04/28/98	04/28/98
DATE ANALYZED:		04/30/98	04/30/98	04/30/98	04/30/98	04/30/98	04/30/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP48
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 1
VOLATILE AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		ANP52	ANP53	ANP54	ANP55	ANP57	ANP58
SAMPLE LOCATION:		SW-07	SW-08	SW-09	GW-01	GW-03	GW-04
LABORATORY NUMBER:		890245	890247	890248	890249	890250	890251
COMPOUND	CRQL						
Chloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10	10 UJ	10 UJ	10 UJ	14 UJ	10 UJ	10 UJ
Carbon Disulfide	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (Total)	10	10 U	10 U	9 J	10 U	10 U	10 U
Chloroform	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10	10 UJ	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10	10 UJ	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10	10 U	10 U	10 U	10 U	10 U	10 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE ANALYZED:		05/03/98	05/03/98	05/03/98	05/03/98	05/03/98	05/03/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 2
SEMIVOLATILE WATER ANALYSIS
µg/L

SAMPLE NUMBER:		ANP52	ANP53	ANP54	ANP55	ANP57	ANP58
SAMPLE LOCATION:		SW-07	SW-08	SW-09	GW-01	GW-03	GW-04
LABORATORY NUMBER:		890245	890247	890248	890249	890250	890251
COMPOUND	CRQL						
Phenol	10	10 U	11 U	10 U	11 U	11 U	10 U
bis(2-Chloroethyl) ether	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Chlorophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
1,3-Dichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
1,4-Dichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
1,2-Dichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Methylphenol	10	10 U	11 U	10 U	11 U	11 U	10 U
2,2'-Oxybis(1-chloropropane)	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Methylphenol	10	10 U	11 U	10 U	11 U	11 U	10 U
N-Nitroso-di-n-propylamine	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachloroethane	10	10 U	11 U	10 U	11 U	11 U	10 U
Nitrobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
Isophorone	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Nitrophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dimethylphenol	10	10 U	11 U	10 U	11 U	11 U	10 U
bis(2-Chloroethoxy)methane	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dichlorophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
1,2,4-Trichlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
Naphthalene	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Chloroaniline	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachlorobutadiene	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Chloro-3-methylphenol	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Methylnaphthalene	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachlorocyclopentadiene	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4,6-Trichlorophenol	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4,5-Trichlorophenol	25	25 U	27 U	26 U	27 U	27 U	25 U
2-Chloronaphthalene	10	10 U	11 U	10 U	11 U	11 U	10 U
2-Nitroaniline	25	25 U	27 U	26 U	27 U	27 U	25 U
Dimethylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Acenaphthylene	10	10 U	11 U	10 U	11 U	11 U	10 U
2,6-Dinitrotoluene	10	10 U	11 U	10 U	11 U	11 U	10 U
3-Nitroaniline	25	25 U	27 U	26 U	27 U	27 U	25 U
Acenaphthene	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dinitrophenol	25	25 U	27 U	26 U	27 U	27 U	25 U
4-Nitrophenol	25	25 U	27 U	26 U	27 U	27 U	25 U
Dibenzofuran	10	10 U	11 U	10 U	11 U	11 U	10 U
2,4-Dinitrotoluene	10	10 U	11 U	10 U	11 U	11 U	10 U
Diethylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Chlorophenyl-phenylether	10	10 U	11 U	10 U	11 U	11 U	10 U
Fluorene	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Nitroaniline	25	25 U	27 U	26 U	27 U	27 U	25 U
4,6-Dinitro-2-methylphenol	25	25 U	27 U	26 U	27 U	27 U	25 U
N-Nitrosodiphenylamine(1)	10	10 U	11 U	10 U	11 U	11 U	10 U
4-Bromophenyl-phenylether	10	10 U	11 U	10 U	11 U	11 U	10 U
Hexachlorobenzene	10	10 U	11 U	10 U	11 U	11 U	10 U
Pentachlorophenol	25	25 U	27 U	26 U	27 U	27 U	25 U
Phenanthrene	10	10 U	11 U	10 U	11 U	11 U	10 U
Anthracene	10	10 U	11 U	10 U	11 U	11 U	10 U
Carbazole	10	10 U	11 U	10 U	11 U	11 U	10 U
Di-n-butylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Fluoranthene	10	10 U	11 U	10 U	11 U	11 U	10 U
Pyrene	10	10 U	11 U	10 U	11 U	11 U	10 U
Butylbenzylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
3,3'-Dichlorobenzidine	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(a)anthracene	10	10 U	11 U	10 U	11 U	11 U	10 U
Chrysene	10	10 U	11 U	10 U	11 U	11 U	10 U
Bis(2-ethylhexyl)phthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Di-n-octylphthalate	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(b)fluoranthene	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(k)fluoranthene	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(a)pyrene	10	10 U	11 U	10 U	11 U	11 U	10 U
Indeno(1,2,3-cd)pyrene	10	10 U	11 U	10 U	11 U	11 U	10 U
Dibenz(a,h)anthracene	10	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(g,h,i)perylene	10	10 U	11 U	10 U	11 U	11 U	10 U
DILUTION FACTOR:		1.0	1.06	1.02	1.09	1.08	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/28/98	04/29/98	04/28/98	04/28/98	04/29/98	04/28/98
DATE ANALYZED:		04/29/98	05/06/98	04/30/98	04/30/98	05/06/98	04/30/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 2
SEMIVOLATILE WATER ANALYSIS
µg/L

SAMPLE NUMBER:		ANP59	ANP61	ANP62
SAMPLE LOCATION:		GW-05	RB-01	RB-02
LABORATORY NUMBER:		890252	890254	890255
COMPOUND	CRQL			
Phenol	10	10 U	10 U	10 U
bis(2-Chloroethyl) ether	10	10 U	10 U	10 U
2-Chlorophenol	10	10 U	10 U	10 U
1,3-Dichlorobenzene	10	10 U	10 U	10 U
1,4-Dichlorobenzene	10	10 U	10 U	10 U
1,2-Dichlorobenzene	10	10 U	10 U	10 U
2-Methylphenol	10	10 U	10 U	10 U
2,2'-Oxybis(1-chloropropane)	10	10 U	10 U	10 U
4-Methylphenol	10	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	10	10 U	10 U	10 U
Hexachloroethane	10	10 U	10 U	10 U
Nitrobenzene	10	10 U	10 U	10 U
Isophorone	10	10 U	10 U	10 U
2-Nitrophenol	10	10 U	10 U	10 U
2,4-Dimethylphenol	10	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10	10 U	10 U	10 U
2,4-Dichlorophenol	10	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10	10 U	10 U	10 U
Naphthalene	10	10 U	10 U	10 U
4-Chloroaniline	10	10 U	10 U	10 U
Hexachlorobutadiene	10	10 U	10 U	10 U
4-Chloro-3-methylphenol	10	10 U	10 U	10 U
2-Methylnaphthalene	10	10 U	10 U	10 U
Hexachlorocyclopentadiene	10	10 U	10 U	10 U
2,4,6-Trichlorophenol	10	10 U	10 U	10 U
2,4,5-Trichlorophenol	25	24 U	24 U	24 U
2-Chloronaphthalene	10	10 U	10 U	10 U
2-Nitroaniline	25	24 U	24 U	24 U
Dimethylphthalate	10	10 U	10 U	10 U
Acenaphthylene	10	10 U	10 U	10 U
2,6-Dinitrotoluene	10	10 U	10 U	10 U
3-Nitroaniline	25	24 U	24 U	24 U
Acenaphthene	10	10 U	10 U	10 U
2,4-Dinitrophenol	25	24 U	24 U	24 U
4-Nitrophenol	25	24 U	24 U	24 U
Dibenzofuran	10	10 U	10 U	10 U
2,4-Dinitrotoluene	10	10 U	10 U	10 U
Diethylphthalate	10	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U
Fluorene	10	10 U	10 U	10 U
4-Nitroaniline	25	24 U	24 U	24 U
4,6-Dinitro-2-methylphenol	25	24 U	24 U	24 U
N-Nitrosodiphenylamine(1)	10	10 U	10 U	10 U
4-Bromophenyl-phenylether	10	10 U	10 U	10 U
Hexachlorobenzene	10	10 U	10 U	10 U
Pentachlorophenol	25	24 U	24 U	24 U
Phenanthrene	10	10 U	10 U	10 U
Anthracene	10	10 U	10 U	10 U
Carbazole	10	10 U	10 U	10 U
Di-n-butylphthalate	10	10 U	10 U	10 U
Fluoranthene	10	10 U	10 U	10 U
Pyrene	10	10 U	10 U	10 U
Butylbenzylphthalate	10	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10	10 U	10 U	10 U
Benzo(a)anthracene	10	10 U	10 U	10 U
Chrysene	10	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	10	10 U	10 U	10 U
Di-n-octylphthalate	10	10 U	10 U	10 U
Benzo(b)fluoranthene	10	10 U	10 U	10 U
Benzo(k)fluoranthene	10	10 U	10 U	10 U
Benzo(a)pyrene	10	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10	10 U	10 U	10 U
Dibenz(a,h)anthracene	10	10 U	10 U	10 U
Benzo(g,h,i)perylene	10	10 U	10 U	10 U
DILUTION FACTOR:		0.98	0.95	0.97
DATE SAMPLED:		04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/28/98	04/28/98	04/28/98
DATE ANALYZED:		04/30/98	04/30/98	04/30/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		ANP46	ANP47	ANP48	ANP49	ANP50	ANP51
SAMPLE LOCATION:		SW-01	SW-02	SW-03	SW-04	SW-05	SW-06
LABORATORY NUMBER:		890209	890218	890219	890221	890236	890239
COMPOUND	CRQL						
alpha-BHC	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
beta-BHC	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
delta-BHC	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
gamma-BHC(Lindane)	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
Heptachlor	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.0018 J	0.050 U
Aldrin	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
Heptachlor Epoxide	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
Endosulfan I	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
Dieldrin	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
4,4'-DDE	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
Endrin	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
Endosulfan II	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
4,4'-DDD	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
Endosulfan Sulfate	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
4,4'-DDT	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.014 J	0.10 U
Methoxychlor	0.50	0.54 U	0.54 U	0.49 U	0.53 U	0.48 U	0.50 U
Endrin Ketone	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
Endrin Aldehyde	0.10	0.11 U	0.11 U	0.098 U	0.11 U	0.095 U	0.10 U
alpha-Chlordane	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
gamma-Chlordane	0.050	0.055 U	0.054 U	0.049 U	0.053 U	0.048 U	0.050 U
Toxaphene	5.0	5.5 U	5.4 U	4.9 U	5.3 U	4.8 U	5.0 U
Aroclor-1016	1.0	1.1 U	1.1 U	0.98 U	1.1 U	0.95 U	1.0 U
Aroclor-1221	2.0	2.2 U	2.2 U	2.0 U	2.1 U	1.9 U	2.0 U
Aroclor-1232	1.0	1.1 U	1.1 U	0.98 U	1.1 U	0.95 U	1.0 U
Aroclor-1242	1.0	1.1 U	1.1 U	0.98 U	1.1 U	0.95 U	1.0 U
Aroclor-1248	1.0	1.1 U	1.1 U	0.98 U	1.1 U	0.95 U	1.0 U
Aroclor-1254	1.0	1.1 U	1.1 U	0.98 U	1.1 U	0.95 U	1.0 U
Aroclor-1260	1.0	1.1 U	1.1 U	0.20 J	1.1 U	0.95 U	1.0 U
DILUTION FACTOR:		1.10	1.09	0.98	1.06	0.95	1.01
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/28/98	04/28/98	04/28/98	04/28/98	04/28/98	04/28/98
DATE ANALYZED:		05/06/98	05/06/98	05/08/98	05/06/98	05/08/98	05/06/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		ANP52	ANP53	ANP54	ANP55	ANP57	ANP58
SAMPLE LOCATION:		SW-07	SW-08	SW-09	GW-01	GW-03	GW-04
LABORATORY NUMBER:		890245	890247	890248	890249	890250	890251
COMPOUND	CRQL						
alpha-BHC	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
beta-BHC	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
delta-BHC	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
gamma-BHC(Lindane)	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
Heptachlor	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
Aldrin	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
Heptachlor Epoxide	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
Endosulfan I	0.050	0.053 U	0.050 U	0.057 U	0.06 U	0.057 U	0.053 U
Dieldrin	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
4,4'-DDE	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
Endrin	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
Endosulfan II	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
4,4'-DDD	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
Endosulfan Sulfate	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
4,4'-DDT	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
Methoxychlor	0.50	0.53 U	0.50 U	0.57 U	0.60 U	0.57 U	0.53 U
Endrin Ketone	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
Endrin Aldehyde	0.10	0.10 U	0.10 U	0.11 U	0.12 U	0.11 U	0.11 U
alpha-Chlordane	0.050	0.053 U	0.050 U	0.057 U	0.060 U	0.057 U	0.053 U
gamma-Chlordane	0.050	0.053 U	0.050 U	0.057 U	0.060 U	0.057 U	0.053 U
Toxaphene	5.0	5.3 U	5.0 U	5.7 U	6.0 U	5.7 U	5.3 U
Aroclor-1016	1.0	1.0 U	1.0 U	1.1 U	1.2 U	1.1 U	1.1 U
Aroclor-1221	2.0	2.1 U	2.0 U	2.3 U	2.4 U	2.3 U	2.1 U
Aroclor-1232	1.0	1.0 U	1.0 U	1.1 U	1.2 U	1.1 U	1.1 U
Aroclor-1242	1.0	1.0 U	1.0 U	1.1 U	1.2 U	1.1 U	1.1 U
Aroclor-1248	1.0	1.0 U	1.0 U	1.1 U	1.2 U	1.1 U	1.1 U
Aroclor-1254	1.0	1.0 U	1.0 U	1.1 U	1.2 U	1.1 U	1.1 U
Aroclor-1260	1.0	1.0 U	1.0 U	1.1 U	1.2 U	1.1 U	1.1 U
DILUTION FACTOR:		1.05	1.01	1.15	1.20	1.14	1.06
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/28/98	04/28/98	04/28/98	04/28/98	04/28/98	04/28/98
DATE ANALYZED:		05/06/98	05/08/98	05/08/98	05/08/98	05/08/98	05/08/98

SITE: RITTER TRUCKING CO
CASE: 26145 SDG: ANP46
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL AQUEOUS ANALYSIS
µg/L

SAMPLE NUMBER:		ANP59	ANP61	ANP62
SAMPLE LOCATION:		GW-05	RB-01	RB-02
LABORATORY NUMBER:		890252	890254	890255
COMPOUND	CRQL			
alpha-BHC	0.050	0.002 J	0.050 U	0.052 U
beta-BHC	0.050	0.054 U	0.050 U	0.052 U
delta-BHC	0.050	0.054 U	0.050 U	0.052 U
gamma-BHC(Lindane)	0.050	0.054 U	0.004 J	0.052 U
Heptachlor	0.050	0.054 U	0.050 U	0.052 U
Aldrin	0.050	0.054 U	0.050 U	0.052 U
Heptachlor Epoxide	0.050	0.054 U	0.050 U	0.052 U
Endosulfan I	0.050	0.054 U	0.050 U	0.052 U
Dieldrin	0.10	0.11 U	0.10 U	0.10 U
4,4'-DDE	0.10	0.11 U	0.10 U	0.10 U
Endrin	0.10	0.11 U	0.10 U	0.10 U
Endosulfan II	0.10	0.11 U	0.10 U	0.10 U
4,4'-DDD	0.10	0.11 U	0.10 U	0.10 U
Endosulfan Sulfate	0.10	0.11 U	0.10 U	0.10 U
4,4'-DDT	0.10	0.0086 J	0.10 U	0.10 U
Methoxychlor	0.50	0.54 U	0.50 U	0.52 U
Endrin Ketone	0.10	0.11 U	0.10 U	0.10 U
Endrin Aldehyde	0.10	0.11 U	0.10 U	0.10 U
alpha-Chlordane	0.050	0.054 U	0.050 U	0.052 U
gamma-Chlordane	0.050	0.054 U	0.050 U	0.052 U
Toxaphene	5.0	5.4 U	5.0 U	5.2 U
Aroclor-1016	1.0	1.1 U	1.0 U	1.0 U
Aroclor-1221	2.0	2.2 U	2.0 U	2.1 U
Aroclor-1232	1.0	1.1 U	1.0 U	1.0 U
Aroclor-1242	1.0	1.1 U	1.0 U	1.0 U
Aroclor-1248	1.0	1.1 U	1.0 U	1.0 U
Aroclor-1254	1.0	1.1 U	1.0 U	1.0 U
Aroclor-1260	1.0	1.1 U	1.0 U	1.0 U
DILUTION FACTOR:		1.08	1.01	1.04
DATE SAMPLED:		04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/28/98	04/28/98	04/28/98
DATE ANALYZED:		05/08/98	05/08/98	05/06/98

SITE: RITTER TRUCKING
CASE: 26145 SDG: MALB67
LABORATORY: CHEMTECH CONSULTING GROUP

TABLE 1
INORGANIC WATER ANALYSIS
µg/L

SAMPLE NUMBER:			MALC23	MALC24	MALC25	MALC26	MALC27	MALC28	MALC29	
SAMPLE LOCATION:			SW-01	SW-02	SW-03	SW-04	SW-05	SW-06	SW-07	
LABORATORY NUMBER:			44335S	44336S	44337S	44338S	44339S	44340S	44341S	
INORGANIC ELEMENTS		INSTRUMENT DETECTION LIMITS (µg/L)								CONTRACT DETECTION LIMITS (µg/L)
ALUMINUM	P	6.0	310 UJ	323 UJ	288 UJ	146 UJ	321 UJ	86.0 UJ	489 UJ	200
ANTIMONY	P	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	60
ARSENIC	P	6.0	6.0 U	6.0 U	6.0 U	6.0 U	6.1 J	6.0 U	6.0 U	10
BARIUM	P	1.0	52.1	53.8	21.1	16.6	23.5	14.4	35.6	200
BERYLLIUM	P	1.0	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.3 UJ	1.0 U	5
CADMIUM	P	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.7 UJ	5
CALCIUM	P	23.0	51400	52600	34500	22700	24200	21800	13600	5000
CHROMIUM	P	1.0	7.4	6.4	9.2	4.9 U	10.9	14.9	8.4	10
COBALT	P	1.0	1.8 UJ	1.8 UJ	1.7 UJ	2.1 U	2.8 U	1.3 UJ	1.1 UJ	50
COPPER	P	1.0	17.1 J	23.7 J	13.5 J	29.7 J	17.9 J	12.1 J	73.1 J	25
IRON	P	18.0	10500	10600	3320	1090	2550	1030	1080	100
LEAD	P	2.0	7.5 J	7.3 J	7.5 J	4.2 J	6.3 J	3.3 J	11.7	3
MAGNESIUM	P	31.0	5070	5240	3460	2480	2690	2370	1040	5000
MANGANESE	P	1.0	926	948	402	210	756	169	28.2	15
MERCURY	CV	0.2	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.2
NICKEL	P	1.0	5.2 U	4.9 U	2.6 U	4.3 U	5.1 U	5.1 U	6.0 U	40
POTASSIUM	P	44.0	5860	6060	3240	2440	2640	2420	8580	5000
SELENIUM	P	4.0	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	5
SILVER	P	2.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10
SODIUM	P	30.0	59800	61800	23000	24200	25200	23800	199000	5000
THALLIUM	P	6.0	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	10
VANADIUM	P	1.0	1.1 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.3 J	50
ZINC	P	2.0	70.6 J	42.7 J	105 J	76.4 J	134 J	73.4 J	158 J	20
CYANIDE	CA	4.0	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	10

ANALYTICAL METHOD
F - FURNACE
P - ICP/FLAME AA
CV - COLD VAPOR
CA - MIDI-DISTILLATION SPECTROPHOTOMETRIC

NOTE:
J - QUANTITATION IS ESTIMATED DUE TO LIMITATIONS IDENTIFIED IN THE QUALITY CONTROL REVIEW (DATA REVIEW).
U - VALUE IS NON-DETECTED AND DETECTION LIMIT IS RAISED.
UJ VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R - VALUE IS REJECTED.

SITE: RITTER TRUCKING
CASE: 26145 SDG: MALB67
LABORATORY: CHEMTECH CONSULTING GROUP

TABLE 1
INORGANIC WATER ANALYSIS
µg/L

SAMPLE NUMBER:			MALC30	MALC31	MALC32	MALC34	MALC35	MALC36	MALC37
SAMPLE LOCATION:			SW-08	SW-09	GW-01	GW-03	GW-04	GW-05	RB-01
LABORATORY NUMBER:			44344S	44345S	44346S	44347S	44348S	44349S	44350S

INORGANIC ELEMENTS		INSTRUMENT DETECTION LIMITS (µg/L)								CONTRACT DETECTION LIMITS (µg/L)
ALUMINUM	P	6.0	1140 J	107 UJ	8420 J	16600 J	24500 J	8430 J	308 UJ	200
ANTIMONY	P	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	60
ARSENIC	P	6.0	18.5	6.0 U	11.0	17.0	16.2	6.0 U	6.0 U	10
BARIUM	P	1.0	77.5	18.9	108	158	185	87.2	2.0 U	200
BERYLLIUM	P	1.0	1.5 UJ	1.3 UJ	1.6 UJ	2.0 U	2.0 U	1.6 UJ	1.4 UJ	5
CADMIUM	P	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
CALCIUM	P	23.0	37600	31000	36800	38400	38800	38200	214 U	5000
CHROMIUM	P	1.0	5.7	13.9	18.4 UJ	45.4 UJ	73.0 UJ	52.8 UJ	14.9	10
COBALT	P	1.0	2.3 U	1.5 UJ	15.6	15.7	21.7	5.3 U	1.0 U	50
COPPER	P	1.0	46.0 J	21.0 J	112 J	124 J	159 J	64.9 UJ	14.4 J	25
IRON [1]	P	18.0	55600	2880	13000	23800	31100	8390	589	100
LEAD	P	2.0	21.7	3.4 J	12.7 U	14.9	17.4	9.7 U	2.7 J	3
MAGNESIUM	P	31.0	3680	3330	6620	10600	13500	8870	113 U	5000
MANGANESE	P	1.0	617	439	695	328	390	269	6.5	15
MERCURY	CV	0.2	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	1.5	0.2
NICKEL	P	1.0	6.9 U	3.3 U	19.3	29.8	41.3	37.9	5.9 U	40
POTASSIUM	P	44.0	3500	2840	8270	5070	6170	4090	53.4 UJ	5000
SELENIUM	P	4.0	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	5
SILVER	P	2.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10
SODIUM	P	30.0	23100	30700	22600	27200	27800	35400	331	5000
THALLIUM	P	6.0	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	10
VANADIUM	P	1.0	11.6	1.0 U	25.0	54.7	67.3	11.7	1.0 U	50
ZINC	P	2.0	218 J	39.2 J	75.9 UJ	145 UJ	132 UJ	116 UJ	99.5 J	20
CYANIDE	CA	4.0	4.0 U	4.0 U	7.3 J	4.0 U	4.0 U	4.0 U	4.0 U	10

ANALYTICAL METHOD
F - FURNACE
P - ICP/FLAME AA
CV - COLD VAPOR
CA - MIDI-DISTILLATION SPECTROPHOTOMETRIC

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SITE: RITTER TRUCKING
CASE: 26145 SDG: MALB67
LABORATORY: CHEMTECH CONSULTING GROUP

TABLE 1
INORGANIC WATER ANALYSIS
µg/L

SAMPLE NUMBER: MALC38
SAMPLE LOCATION: RB-02
LABORATORY NUMBER: 44351S

INORGANIC ELEMENTS		INSTRUMENT DETECTION LIMITS (µg/L)		CONTRACT DETECTION LIMITS (µg/L)
ALUMINUM	P	6.0	87.6 UJ	200
ANTIMONY	P	5.0	5.0 U	60
ARSENIC	P	6.0	6.0 U	10
BARIUM	P	1.0	1.2 UJ	200
BERYLLIUM	P	1.0	1.4 UJ	5
CADMIUM	P	1.0	1.0 U	5
CALCIUM	P	23.0	166 U	5000
CHROMIUM	P	1.0	3.7 U	10
COBALT	P	1.0	1.0 U	50
COPPER	P	1.0	19.5 J	25
IRON	P	18.0	162 U	100
LEAD	P	2.0	2.2 J	3
MAGNESIUM	P	31.0	35.9 UJ	5000
MANGANESE	P	1.0	2.1	15
MERCURY	CV	0.2	0.20 UJ	0.2
NICKEL	P	1.0	2.5 U	40
POTASSIUM	P	44.0	44.0 U	5000
SELENIUM	P	4.0	4.0 UJ	5
SILVER	P	2.0	2.0 U	10
SODIUM	P	30.0	332	5000
THALLIUM	P	6.0	6.0 UJ	10
VANADIUM	P	1.0	1.0 U	50
ZINC	P	2.0	41.8 J	20
CYANIDE	CA	4.0	4.0 U	10

ANALYTICAL METHOD
F - FURNACE
P - ICP/FLAME AA
CV - COLD VAPOR
CA - MIDI-DISTILLATION SPECTROPHOTOMETRIC

NOTE:
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SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 1
VOLATILE SOIL ANALYSIS - LOW LEVEL
µg/kg

SAMPLE NUMBER:		ANP63	ANP64	ANP65	ANP66	ANP67	ANP68
SAMPLE LOCATION:		SD-01	SD-02	SD-03	SD-04	SD-05	SD-06
LABORATORY NUMBER:		890270	890279	890280	890281	890282	890283
COMPOUND	CRQL						
Chloromethane	10	20 U	28 U	20 U	17 U	17 U	14 U
Bromomethane	10	20 U	28 U	20 U	17 U	17 U	14 U
Vinyl Chloride	10	20 U	28 U	20 U	17 U	17 U	14 U
Chloroethane	10	20 UJ	28 UJ	20 UJ	17 UJ	17 UJ	14 UJ
Methylene Chloride	10	20 U	28 U	20 U	17 U	17 U	14 U
Acetone	10	220 J	150 J	39 J	41 J	170 J	14 UJ
Carbon Disulfide	10	20 U	28 U	20 U	17 U	17 U	14 U
1,1-Dichloroethene	10	20 U	28 U	20 U	17 U	17 U	14 U
1,1-Dichloroethane	10	20 U	28 U	20 U	9 J	17 U	14 U
1,2-Dichloroethene (Total)	10	20 U	28 U	20 U	17 U	17 U	14 U
Chloroform	10	20 U	28 U	20 U	17 U	17 U	14 U
1,2-Dichloroethane	10	20 UJ	28 UJ	20 UJ	17 UJ	17 UJ	14 UJ
2-Butanone	10	65 J	55 J	20 UJ	30 J	51 J	14 UJ
1,1,1-Trichloroethane	10	20 U	28 U	20 U	17 U	17 U	14 U
Carbon Tetrachloride	10	20 U	28 U	20 U	17 U	17 U	14 U
Bromodichloromethane	10	20 U	28 U	20 U	17 U	17 U	14 U
1,2-Dichloropropane	10	20 U	28 U	20 U	17 U	17 U	14 U
cis-1,3-Dichloropropene	10	20 U	28 U	20 U	17 U	17 U	14 U
Trichloroethene	10	20 U	28 U	20 U	17 U	17 U	14 U
Dibromochloromethane	10	20 U	28 U	20 U	17 U	17 U	14 U
1,1,2-Trichloroethane	10	20 U	28 U	20 U	17 U	17 U	14 U
Benzene	10	20 U	28 U	20 U	17 U	17 U	14 U
trans-1,3-Dichloropropene	10	20 U	28 U	20 U	17 U	17 U	14 U
Bromoform	10	20 U	28 U	20 U	17 U	17 U	14 U
4-Methyl-2-pentanone	10	20 U	28 U	20 U	17 U	17 U	14 U
2-Hexanone	10	20 U	28 U	20 U	17 U	17 U	14 U
Tetrachloroethene	10	20 U	28 U	20 U	17 U	17 U	14 U
1,1,2,2-Tetrachloroethane	10	20 U	28 U	20 U	17 U	17 U	14 U
Toluene	10	8 J	16 J	2 J	3 J	17 U	14 U
Chlorobenzene	10	20 U	18 J	20 U	17 U	17 U	14 U
Ethylbenzene	10	20 U	28 U	20 U	17 U	17 U	14 U
Styrene	10	20 U	28 U	20 U	17 U	17 U	14 U
Xylene (total)	10	8 J	8 J	20 U	17 U	17 U	14 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE ANALYZED:		05/05/98	05/05/98	05/05/98	05/05/98	05/05/98	05/05/98
% MOISTURE:		50	65	49	42	42	28

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 1
VOLATILE SOIL ANALYSIS - LOW LEVEL
µg/kg

SAMPLE NUMBER:		ANP69	ANP70	ANP71
SAMPLE LOCATION:		SD-07	SD-08	SD-09
LABORATORY NUMBER:		890284	890285	890286
COMPOUND	CRQL			
Chloromethane	10	12 U	28 U	13 UJ
Bromomethane	10	12 U	28 U	13 U
Vinyl Chloride	10	12 U	28 U	13 UJ
Chloroethane	10	12 UJ	28 UJ	13 UJ
Methylene Chloride	10	12 U	28 U	13 U
Acetone	10	13 J	110 J	13 UJ
Carbon Disulfide	10	12 U	28 U	13 U
1,1-Dichloroethene	10	12 U	28 U	13 U
1,1-Dichloroethane	10	8 J	28 U	13 UJ
1,2-Dichloroethene (Total)	10	6 J	28 U	13 U
Chloroform	10	12 U	28 U	13 U
1,2-Dichloroethane	10	12 UJ	28 UJ	13 U
2-Butanone	10	12 UJ	38 J	13 UJ
1,1,1-Trichloroethane	10	12 U	28 U	13 U
Carbon Tetrachloride	10	12 U	28 U	13 U
Bromodichloromethane	10	12 U	28 U	13 U
1,2-Dichloropropane	10	12 U	28 U	13 UJ
cis-1,3-Dichloropropene	10	12 U	28 U	13 U
Trichloroethene	10	3 J TB	28 U	13 U
Dibromochloromethane	10	12 U	28 U	13 U
1,1,2-Trichloroethane	10	12 U	28 U	13 U
Benzene	10	12 U	28 U	13 U
trans-1,3-Dichloropropene	10	12 U	28 U	13 U
Bromoform	10	12 U	28 U	13 U
4-Methyl-2-pentanone	10	12 U	28 U	13 U
2-Hexanone	10	12 U	28 U	13 UJ
Tetrachloroethene	10	12 U	28 U	13 U
1,1,2,2-Tetrachloroethane	10	12 U	28 U	13 U
Toluene	10	12 U	28 U	13 U
Chlorobenzene	10	12 U	28 U	13 U
Ethylbenzene	10	12 U	28 U	13 U
Styrene	10	12 U	28 U	13 U
Xylene (total)	10	12 U	28 U	13 U
DILUTION FACTOR:		1.0	1.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98
DATE ANALYZED:		05/05/98	05/05/98	05/06/98
% MOISTURE:		20	65	22

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 2
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		ANP63	ANP64	ANP65	ANP66	ANP67	ANP68
SAMPLE LOCATION:		SD-01	SD-02	SD-03	SD-04	SD-05	SD-06
LABORATORY NUMBER:		890270	890279	890280	890281	890282	890283
COMPOUND	CRQL						
Phenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
bis(2-Chloroethyl) ether	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2-Chlorophenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
1,3-Dichlorobenzene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
1,4-Dichlorobenzene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
1,2-Dichlorobenzene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2-Methylphenol	330	6600 U	9400 U	82 J	17000 U	2800 U	460 U
2,2'-Oxybis(1-chloropropane)	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
4-Methylphenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
N-Nitroso-di-n-propylamine	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Hexachloroethane	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Nitrobenzene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Isophorone	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2-Nitrophenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2,4-Dimethylphenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
bis(2-Chloroethoxy)methane	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2,4-Dichlorophenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
1,2,4-Trichlorobenzene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Naphthalene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
4-Chloroaniline	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Hexachlorobutadiene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
4-Chloro-3-methylphenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2-Methylnaphthalene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Hexachlorocyclopentadiene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2,4,6-Trichlorophenol	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2,4,5-Trichlorophenol	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
2-Chloronaphthalene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2-Nitroaniline	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
Dimethylphthalate	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Acenaphthylene	330	6600 U	9400 U	650 U	17000 U	300 J	460 U
2,6-Dinitrotoluene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
3-Nitroaniline	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
Acenaphthene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2,4-Dinitrophenol	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
4-Nitrophenol	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
Dibenzofuran	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
2,4-Dinitrotoluene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Diethylphthalate	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
4-Chlorophenyl-phenylether	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Fluorene	330	6600 U	9400 U	650 U	2500 J	2800 U	460 U
4-Nitroaniline	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
4,6-Dinitro-2-methylphenol	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
N-Nitrosodiphenylamine(1)	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
4-Bromophenyl-phenylether	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Hexachlorobenzene	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Pentachlorophenol	830	17000 U	24000 U	1600 U	43000 U	7200 U	1200 U
Phenanthrene	330	3800 J	4000 J	480 J	28000	3600	300 J
Anthracene	330	6600 U	9400 U	650 U	5000 J	740 J	82 J
Carbazole	330	700 J	9400 U	100 J	6000 J	840 J	46 J
Di-n-butylphthalate	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Fluoranthene	330	9800 J	11000 J	1200 J	53000 J	11000 J	660 J
Pyrene	330	8500 J	9000 J	1000 J	43000 J	7800 J	710 J
Butylbenzylphthalate	330	6600 U	9400 U	650 U	17000 U	2800 U	140 J
3,3'-Dichlorobenzidine	330	6600 U	9400 U	650 U	17000 U	2800 U	460 U
Benzo(a)anthracene	330	3100 J	3200 J	390 J	20000 J	4500 J	350 J
Chrysene	330	5700 J	5800 J	790	26000	5400	510
Bis(2-ethylhexyl)phthalate	330	52000 J	48000 J	1700 J	18000 J	2600 J	320 J
Di-n-octylphthalate	330	4200 J	• 4200 J	650 U	17000 U	2800 U	460 U
Benzo(b)fluoranthene	330	9100 J	8700 J	1000 J	39000 J	6000	560 J
Benzo(k)fluoranthene	330	10000 J	9800 J	1200 J	44000 J	4600	410 J
Benzo(a)pyrene	330	3900 J	4000 J	480 J	21000 J	3400 J	290 J
Indeno(1,2,3-cd)pyrene	330	3000 J	3100 J	400 J	14000 J	2900 J	210 J
Dibenz(a,h)anthracene	330	1400 J	9400 U	150 J	17000 U	2800 U	110 J
Benzo(g,h,i)perylene	330	3100 J	3000 J	300 J	13000 J	2300 J	210 J
DILUTION FACTOR:		10	10	1.0	30	5.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/29/98	04/29/98	04/29/98	04/29/98	04/29/98	04/29/98
DATE ANALYZED:		05/06/98	05/06/98	05/06/98	05/06/98	05/06/98	05/06/98
% MOISTURE:		50	65	49	42	42	28

• RESULT REPORTED FROM DILUTED ANALYSIS

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 2
SEMIVOLATILE SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		ANP69	ANP70	ANP71
SAMPLE LOCATION:		SD-07	SD-08	SD-09
LABORATORY NUMBER:		890284	890285	890286
COMPOUND	CRQL			
Phenol	330	410 U	940 U	420 U
bis(2-Chloroethyl) ether	330	410 U	940 U	420 U
2-Chlorophenol	330	410 U	940 U	420 U
1,3-Dichlorobenzene	330	410 U	940 U	420 U
1,4-Dichlorobenzene	330	410 UJ	940 U	420 U
1,2-Dichlorobenzene	330	410 U	940 U	420 U
2-Methylphenol	330	410 U	940 U	420 U
2,2'-Oxybis(1-chloropropane)	330	410 U	940 U	420 U
4-Methylphenol	330	410 U	940 U	420 U
N-Nitroso-di-n-propylamine	330	410 U	940 U	420 U
Hexachloroethane	330	410 U	940 U	420 U
Nitrobenzene	330	410 U	940 U	420 U
Isophorone	330	410 U	940 U	420 U
2-Nitrophenol	330	410 U	940 U	420 U
2,4-Dimethylphenol	330	410 U	940 U	420 U
bis(2-Chloroethoxy)methane	330	410 U	940 U	420 U
2,4-Dichlorophenol	330	410 U	940 U	420 U
1,2,4-Trichlorobenzene	330	410 U	940 U	420 U
Naphthalene	330	410 U	940 U	420 U
4-Chloroaniline	330	410 U	940 U	420 U
Hexachlorobutadiene	330	410 U	940 U	420 U
4-Chloro-3-methylphenol	330	410 U	940 U	420 U
2-Methylnaphthalene	330	410 U	940 U	420 U
Hexachlorocyclopentadiene	330	410 U	940 U	420 U
2,4,6-Trichlorophenol	330	410 U	940 U	420 U
2,4,5-Trichlorophenol	830	1000 U	2400 U	1100 U
2-Chloronaphthalene	330	410 U	940 U	420 U
2-Nitroaniline	830	1000 U	2400 U	1100 U
Dimethylphthalate	330	410 U	940 U	420 U
Acenaphthylene	330	410 U	940 U	420 U
2,6-Dinitrotoluene	330	410 U	940 U	420 U
3-Nitroaniline	830	1000 U	2400 U	1100 U
Acenaphthene	330	55 J	940 U	420 U
2,4-Dinitrophenol	830	1000 UJ	2400 U	1100 U
4-Nitrophenol	830	1000 UJ	2400 U	1100 U
Dibenzofuran	330	410 UJ	940 U	420 U
2,4-Dinitrotoluene	330	410 U	940 U	420 U
Diethylphthalate	330	410 U	940 U	420 U
4-Chlorophenyl-phenylether	330	410 U	940 U	420 U
Fluorene	330	82 J	940 U	420 U
4-Nitroaniline	830	1000 U	2400 U	1100 U
4,6-Dinitro-2-methylphenol	830	1000 U	2400 U	1100 U
N-Nitrosodiphenylamine(1)	330	410 U	940 U	420 U
4-Bromophenyl-phenylether	330	410 U	940 U	420 U
Hexachlorobenzene	330	410 U	940 U	420 U
Pentachlorophenol	830	1000 U	2400 U	1100 U
Phenanthrene	330	710	240 J	140 J
Anthracene	330	77 J	940 U	420 U
Carbazole	330	150 J	940 U	420 U
Di-n-butylphthalate	330	410 U	940 U	130 J
Fluoranthene	330	1200 J	590 J	340 J
Pyrene	330	1000 J	500 J	340 J
Butylbenzylphthalate	330	49 J	940 U	420 U
3,3'-Dichlorobenzidine	330	410 U	940 U	420 U
Benzo(a)anthracene	330	420 J	230 J	97 J
Chrysene	330	510	390 J	220 J
Bis(2-ethylhexyl)phthalate	330	860 J	* 23000 J	280 J
Di-n-octylphthalate	330	410 U	710 J	420 U
Benzo(b)fluoranthene	330	820 J	440 J	180 J
Benzo(k)fluoranthene	330	710 J	380 J	190 J
Benzo(a)pyrene	330	430 J	320 J	120 J
Indeno(1,2,3-cd)pyrene	330	280 J	230 J	110 J
Dibenz(a,h)anthracene	330	110 J	940 U	420 U
Benzo(g,h,i)perylene	330	300 J	220 J	100 J
DILUTION FACTOR:		1.0	1.0/3.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/29/98	04/29/98	04/29/98
DATE ANALYZED:		05/06/98	05/08/98	05/08/98
% MOISTURE:		20	65	22

* RESULT REPORTED FROM DILUTED ANALYSIS

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		ANP63	ANP64	ANP65	ANP66	ANP67	ANP68
SAMPLE LOCATION:		SD-01	SD-02	SD-03	SD-04	SD-05	SD-06
LABORATORY NUMBER:		890270	890279	890280	890281	890282	890283
COMPOUND	CRQL						
alpha-BHC	1.7	3.4 U	4.8 U	3.3 U	* 29 U	73 U	2.4 U
beta-BHC	1.7	3.4 U	4.8 U	3.3 U	2.9 U	73 U	2.4 U
delta-BHC	1.7	5.5 J	* 13 J	3.3 U	2.9 U	73 U	2.4 U
gamma-BHC (Lindane)	1.7	3.4 U	4.8 U	3.3 U	2.9 U	73 U	2.4 U
Heptachlor	1.7	3.4 U	4.8 U	3.3 U	* 29 U	73 U	R
Aldrin	1.7	13 J	4.8 UJ	2.5 J	7.9 J	73 U	R
Heptachlor Epoxide	1.7	3.4 U	4.8 U	9.7	2.9 U	73 U	2.4 U
Endosulfan I	1.7	3.4 U	4.8 U	3.3 U	2.9 U	73 U	2.4 U
Dieldrin	3.3	6.6 U	9.4 U	R	5.7 U	140 U	4.6 U
4,4'-DDE	3.3	29 J	56 J	26	35 J	140 U	5.6 J
Endrin	3.3	16	24	6.5 U	5.7 U	140 U	4.6 U
Endosulfan II	3.3	R	R	6.5 U	5.7 U	5.6 J	R
4,4'-DDD	3.3	58 J	87 J	21	R	140 U	4.6 U
Endosulfan Sulfate	3.3	R	9.4 U	4.6 J	5.7 U	140 U	4.6 U
4,4'-DDT	3.3	* 33 U	* 47 U	6.5 U	5.7 U	* 1400 U	R
Methoxychlor	17	R	310 J	33 U	* 780 J	* 460 J	R
Endrin Ketone	3.3	R	* 47 U	6.5 U	* 57 U	140 U	R
Endrin Aldehyde	3.3	16 J	43 J	37 J	* 120 J	140 U	0.78 J
alpha-Chlordane	1.7	39	65	R	* 29 U	73 U	1.0 J
gamma-Chlordane	1.7	* 77	* 110	13	2.9 U	* 38 J	R
Toxaphene	170	340 U	480 U	330 U	290 U	7300 U	240 U
Aroclor-1016	33	66 U	94 U	65 U	57 U	1400 U	46 U
Aroclor-1221	67	130 U	190 U	130 U	120 U	2900 U	93 U
Aroclor-1232	33	66 U	94 U	65 U	57 U	1400 U	46 U
Aroclor-1242	33	66 U	94 U	65 U	57 U	1400 U	46 U
Aroclor-1248	33	2200 J	3600 J	65 U	57 U	1400 U	110 J
Aroclor-1254	33	66 U	94 U	65 U	* 3700 J	1400 U	46 U
Aroclor-1260	33	66 U	94 U	860	57 U	1400 U	46 U
DILUTION FACTOR:		1.0/5.0	1.0/5.0	1.0	1.0/10.0	25/250	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/29/98	04/29/98	04/29/98	04/29/98	04/29/98	04/29/98
DATE ANALYZED:		05/30/98	05/30/98	05/30/98	06/01/98	05/30/98	05/30/98
% MOISTURE:		50	65	49	42	42	28

*RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		ANP69	ANP70	ANP71
SAMPLE LOCATION:		SD-07	SD-08	SD-09
LABORATORY NUMBER:		890284	890285	890286
COMPOUND	CRQL			
alpha-BHC	1.7	2.1 U	4.8 U	0.36 J
beta-BHC	1.7	2.1 U	4.8 U	2.2 U
delta-BHC	1.7	2.1 U	4.8 U	2.2 U
gamma-BHC (Lindane)	1.7	2.1 U	4.8 U	2.2 U
Heptachlor	1.7	2.1 U	4.8 U	2.2 U
Aldrin	1.7	2.1 U	4.8 U	2.2 U
Heptachlor Epoxide	1.7	2.1 U	1.6 J	R
Endosulfan I	1.7	2.1 U	4.8 U	2.2 U
Dieldrin	3.3	4.1 U	9.4 U	2.3 J
4,4'-DDE	3.3	4.1 U	16	4.2 U
Endrin	3.3	4.1 U	9.4 U	4.2 U
Endosulfan II	3.3	R	9.4 U	4.2 U
4,4'-DDD	3.3	4.1 U	12	4.2 U
Endosulfan Sulfate	3.3	R	9.4 U	1.1 J
4,4'-DDT	3.3	R	9.4 U	4.2 U
Methoxychlor	17	R	R	R
Endrin Ketone	3.3	4.1 U	9.4 U	4.2 U
Endrin Aldehyde	3.3	1.6 J	5.1 J	7.8 J
alpha-Chlordane	1.7	2.1 U	3.2 J	2.2 U
gamma-Chlordane	1.7	R	2.0 J	2.2 U
Toxaphene	170	210 U	480 U	220 U
Aroclor-1016	33	41 U	94 U	42 U
Aroclor-1221	67	84 U	190 U	86 U
Aroclor-1232	33	41 U	94 U	42 U
Aroclor-1242	33	41 U	94 U	42 U
Aroclor-1248	33	41 U	94 U	42 U
Aroclor-1254	33	41 U	94 U	42 U
Aroclor-1260	33	41 U	110	190 J
DILUTION FACTOR:		1.0	1.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/29/98	04/29/98	04/29/98
DATE ANALYZED:		*05/27/98*	*05/30/98*	*05/30/98*
% MOISTURE:		20	65	22

*RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: *COMPUCHEM ENV. CORP.*

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		ANP63	ANP64	ANP65	ANP66	ANP67	ANP68
SAMPLE LOCATION:		SD-01	SD-02	SD-03	SD-04	SD-05	SD-06
LABORATORY NUMBER:		890270	890279	890280	890281	890282	890283
COMPOUND	CRQL						
alpha-BHC	1.7	3.4 U	4.8 U	3.3 U	*29 U	73 U	2.4 U
beta-BHC	1.7	3.4 U	4.8 U	3.3 U	2.9 U	73 U	2.4 U
delta-BHC	1.7	5.5 J	*13 J	3.3 U	2.9 U	73 U	2.4 U
gamma-BHC (Lindane)	1.7	3.4 U	4.8 U	3.3 U	2.9 U	73 U	2.4 U
Heptachlor	1.7	3.4 U	4.8 U	3.3 U	*29 U	73 U	R
Aldrin	1.7	13 J	4.8 UJ	2.5 J	7.9 J	73 U	R
Heptachlor Epoxide	1.7	3.4 U	4.8 U	9.7	2.9 U	73 U	2.4 U
Endosulfan I	1.7	3.4 U	4.8 U	3.3 U	2.9 U	73 U	2.4 U
Dieldrin	3.3	6.6 U	9.4 U	R	5.7 U	140 U	4.6 U
4,4'-DDE	3.3	29 J	56 J	26	35 J	140 U	5.6 J
Endrin	3.3	16	24	6.5 U	5.7 U	140 U	4.6 U
Endosulfan II	3.3	R	R	6.5 U	5.7 U	5.6 J	R
4,4'-DDD	3.3	58 J	87 J	21	R	140 U	4.6 U
Endosulfan Sulfate	3.3	R	9.4 U	4.6 J	5.7 U	140 U	4.6 U
4,4'-DDT	3.3	*33 U	*47 U	6.5 U	5.7 U	*1400 U	R
Methoxychlor	17	R	310 J	33 U	*780 J	*460 J	R
Endrin Ketone	3.3	R	*47 U	6.5 U	*57 U	140 U	R
Endrin Aldehyde	3.3	16 J	43 J	37 J	*120 J	140 U	0.78 J
alpha-Chlordane	1.7	39	65	R	*29 U	73 U	1.0 J
gamma-Chlordane	1.7	*77	*110	13	2.9 U	*38 J	R
Toxaphene	170	340 U	480 U	330 U	290 U	7300 U	240 U
Aroclor-1016	33	66 U	94 U	65 U	57 U	1400 U	46 U
Aroclor-1221	67	130 U	190 U	130 U	120 U	2900 U	93 U
Aroclor-1232	33	66 U	94 U	65 U	57 U	1400 U	46 U
Aroclor-1242	33	66 U	94 U	65 U	57 U	1400 U	46 U
Aroclor-1248	33	2200 J	3600 J	65 U	57 U	1400 U	110 J
Aroclor-1254	33	66 U	94 U	65 U	*3700 J	1400 U	46 U
Aroclor-1260	33	66 U	94 U	860	57 U	1400 U	46 U
DILUTION FACTOR:		1.0/5.0	1.0/5.0	1.0	1.0/10.0	25/250	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98	04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/29/98	04/29/98	04/29/98	04/29/98	04/29/98	04/29/98
DATE ANALYZED:		05/30/98	05/30/98	05/30/98	06/01/98	05/30/98	05/30/98
% MOISTURE:		50	65	49	42	42	28

*RESULT REPORTED FROM DILUTED ANALYSIS. NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: ANP63
LABORATORY: COMPUCHEM ENV. CORP.

TABLE 3
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSIS
µg/kg

SAMPLE NUMBER:		ANP69	ANP70	ANP71
SAMPLE LOCATION:		SD-07	SD-08	SD-09
LABORATORY NUMBER:		890284	890285	890286
COMPOUND	CRQL			
alpha-BHC	1.7	2.1 U	4.8 U	0.36 J
beta-BHC	1.7	2.1 U	4.8 U	2.2 U
delta-BHC	1.7	2.1 U	4.8 U	2.2 U
gamma-BHC (Lindane)	1.7	2.1 U	4.8 U	2.2 U
Heptachlor	1.7	2.1 U	4.8 U	2.2 U
Aldrin	1.7	2.1 U	4.8 U	2.2 U
Heptachlor Epoxide	1.7	2.1 U	1.6 J	R
Endosulfan I	1.7	2.1 U	4.8 U	2.2 U
Dieldrin	3.3	4.1 U	9.4 U	2.3 J
4,4'-DDE	3.3	4.1 U	16	4.2 U
Endrin	3.3	4.1 U	9.4 U	4.2 U
Endosulfan II	3.3	R	9.4 U	4.2 U
4,4'-DDD	3.3	4.1 U	12	4.2 U
Endosulfan Sulfate	3.3	R	9.4 U	1.1 J
4,4'-DDT	3.3	R	9.4 U	4.2 U
Methoxychlor	17	R	R	R
Endrin Ketone	3.3	4.1 U	9.4 U	4.2 U
Endrin Aldehyde	3.3	1.6 J	5.1 J	7.8 J
alpha-Chlordane	1.7	2.1 U	3.2 J	2.2 U
gamma-Chlordane	1.7	R	2.0 J	2.2 U
Toxaphene	170	210 U	480 U	220 U
Aroclor-1016	33	41 U	94 U	42 U
Aroclor-1221	67	84 U	190 U	86 U
Aroclor-1232	33	41 U	94 U	42 U
Aroclor-1242	33	41 U	94 U	42 U
Aroclor-1248	33	41 U	94 U	42 U
Aroclor-1254	33	41 U	94 U	42 U
Aroclor-1260	33	41 U	110	190 J
DILUTION FACTOR:		1.0	1.0	1.0
DATE SAMPLED:		04/22/98	04/22/98	04/22/98
DATE EXTRACTED:		04/29/98	04/29/98	04/29/98
DATE ANALYZED:		05/27/98	05/30/98	05/30/98
% MOISTURE:		20	65	22

*RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

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SITE: RITTER TRUCKING CO.
CASE: 25145 SDG: MALB66
LABORATORY: CHEMTECH CONSULTING GROUP

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

INORGANIC ELEMENTS		INSTRUMENT DETECTION LIMITS (mg/kg)	MALC39	MALC40	MALC41	MALC42	MALC43	MALC44	MALC45	CONTRACT DETECTION LIMITS (mg/kg)
SAMPLE NUMBER:			MALC39	MALC40	MALC41	MALC42	MALC43	MALC44	MALC45	
SAMPLE LOCATION:			SD-01	SD-02	SD-03	SD-04	SD-05	SD-06	SD-07	
LABORATORY NUMBER:			44356S	44357S	44358S	44359S	44360S	44361S	44362S	
			43.6	43.7	56.9	65.7	68.9	71.0	80.7	
ALUMINUM	P	1.2	10600	13100	8980	6180	6340	10100	3120	40
ANTIMONY	P	1.0	4.4 J	3.7 J	4.9	2.9 J	1.5 J	1.4 J	1.2 U	12
ARSENIC	P	1.2	19.7	26.2	11.3	6.1	21.5	12.6	2.1	2
BARIUM	P	0.2	69.4	90.3	38.4	111	48.1	58.3	16.8	40
BERYLLIUM	P	0.2	0.69 UJ	0.80 UJ	0.81 UJ	0.53 UJ	0.52 UJ	0.60 UJ	0.24 U	1
CADMIUM	P	0.2	2.9	2.8	0.67 UJ	2.3	2.1	0.27 U	0.24 U	1
CALCIUM	P	4.6	5280	5250	4890	3350	1940	2840	1360	1000
CHROMIUM	P	0.2	220 J	230 J	658 J	40.4 J	51.4 J	69.8 J	R	2
COBALT	P	0.2	9.4	11.0	6.6	6.4	22.1	9.7	2.4	10
COPPER	P	0.2	98.9	94.7	48.2	151	65.4	33.4	14.0 U	5
IRON	P	3.6	22800	31900	11200	25800	18700	15400	7700	20
LEAD	P	0.4	147	141	73.0	104	66.9	26.4	11.6	0.6
MAGNESIUM	P	6.2	4420	5610	2900	2840	2250	2760	1850	1000
MANGANESE	P	0.2	251	285	229	186	325	298	64.7	3
MERCURY	CV	0.1	0.23 UJ	0.23 UJ	0.18 UJ	0.14 UJ	0.15 UJ	0.13 UJ	0.12 UJ	0.1
NICKEL	P	0.2	24.5	25.2	14.3	21.8	37.7	15.1	6.1 U	8
POTASSIUM	P	8.8	1340 J	2030 J	614 J	733 J	658 J	867 J	487 J	1000
SELENIUM	P	0.8	1.8 UJ	1.8 UJ	1.4 UJ	1.2 UJ	1.1 UJ	1.1 UJ	0.97 U	1
SILVER	P	0.4	R	R	R	R	R	R	R	2
SODIUM	P	6.0	509 U	533 U	236 U	317 U	247 U	337 U	130 U	1000
THALLIUM	P	1.2	2.6 UJ	2.7 UJ	2.1 UJ	1.8 UJ	1.7 J	1.6 UJ	1.5 UJ	2
VANADIUM	P	0.2	46.0	63.0	28.8	28.9	27.3	24.9	10.7	10
ZINC	P	0.4	406 J	387 J	R	337 J	552 J	R	R	4
CYANIDE	CA	0.2	0.46 U	0.45 U	0.35 U	0.30 U	0.28 U	0.28 U	0.25 U	0.5

ANALYTICAL METHOD
P - ICP/FLAME AA
CV - COLD VAPOR
CA - MIDI-DISTILLATION SPECTROPHOTOMETRIC

NOTE: J = QUANTITATION IS ESTIMATED DUE TO LIMITATIONS IDENTIFIED IN THE QUALITY CONTROL REVIEW (DATA REVIEW).
U = VALUE IS NON-DETECTED.
UJ = VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R = VALUE IS REJECTED.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS

SITE: RITTER TRUCKING CO.
CASE: 26145 SDG: MALB66
LABORATORY: CHEMTECH CONSULTING GROUP

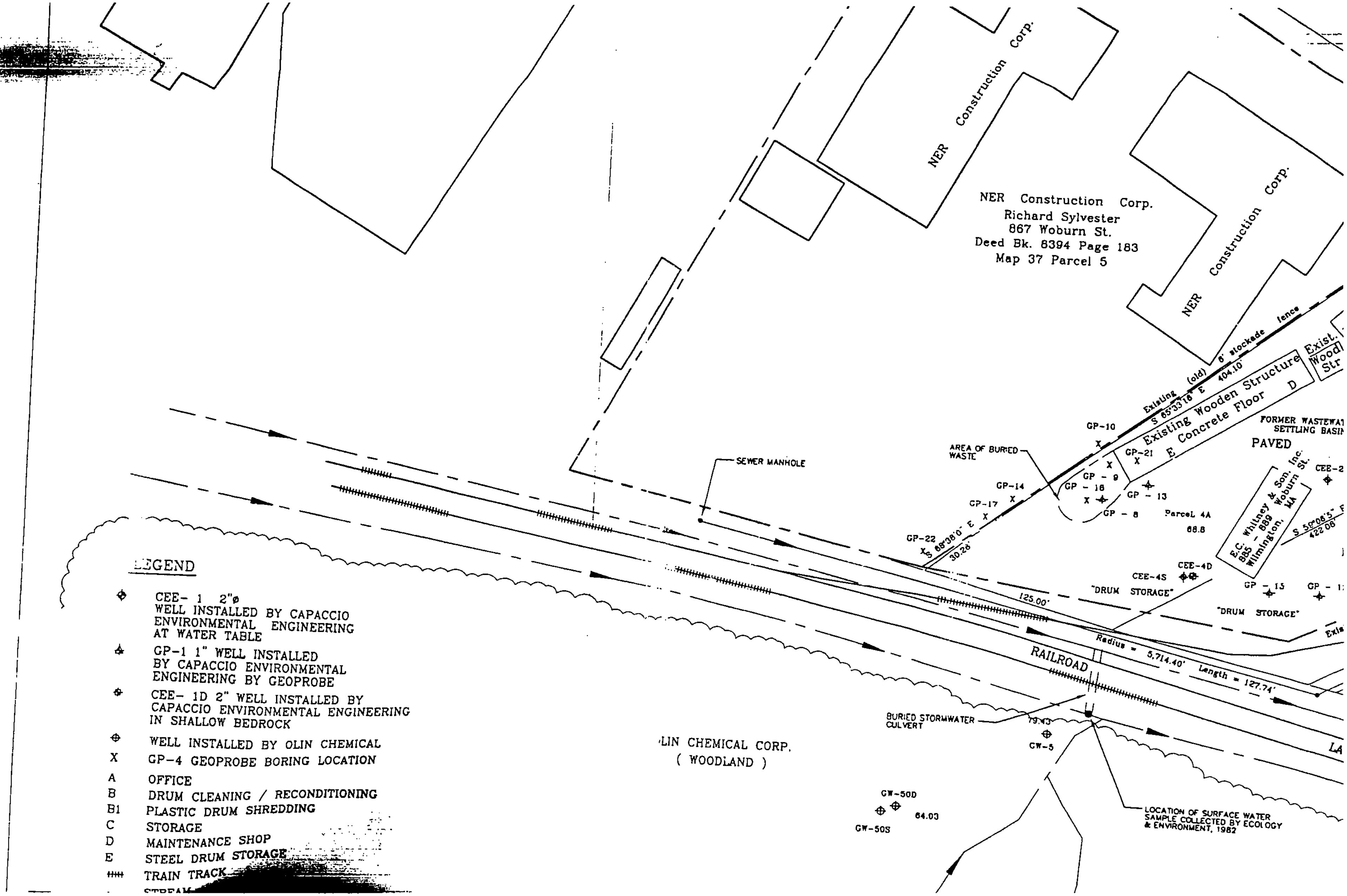
TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

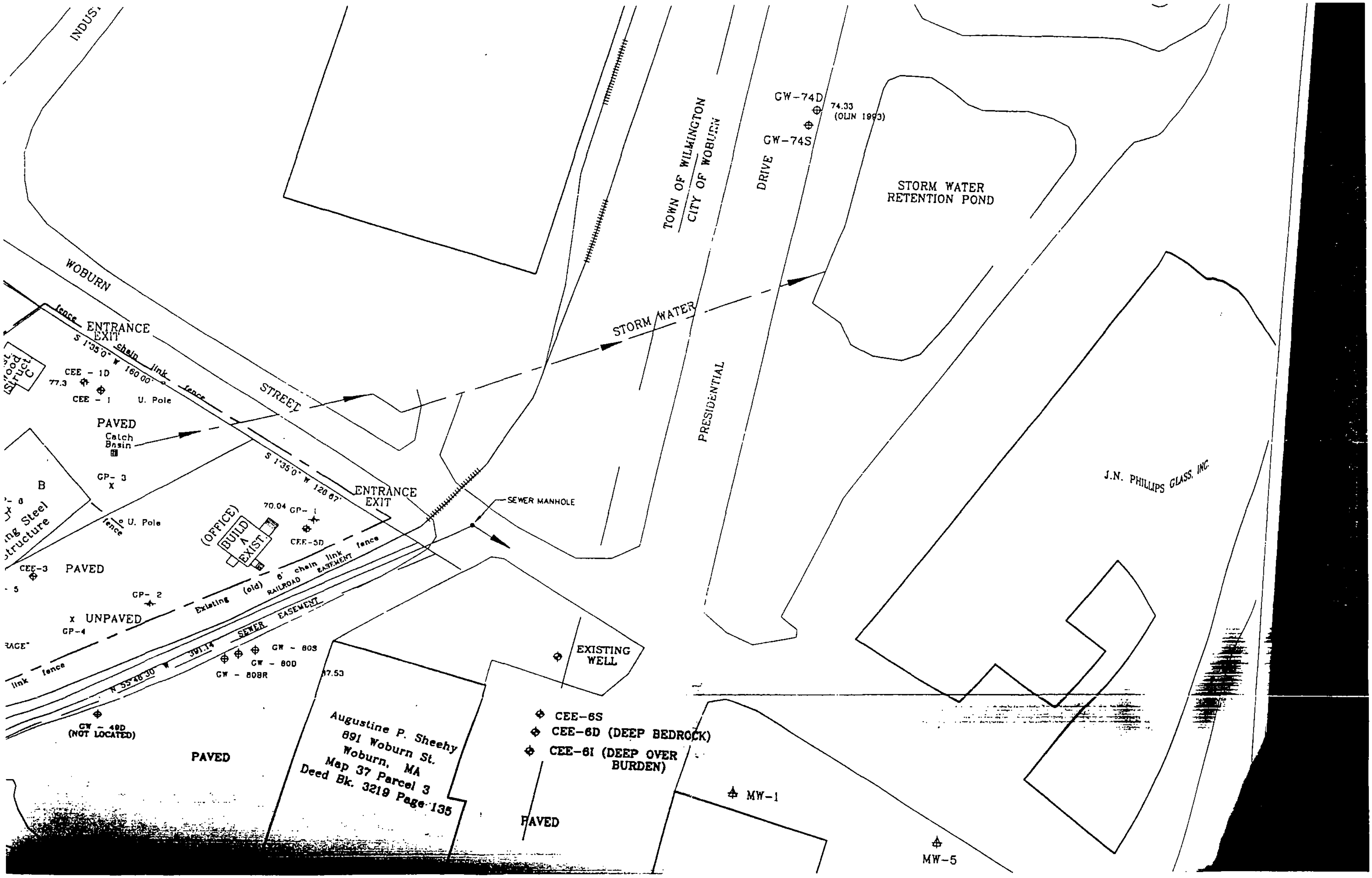
SAMPLE NUMBER:			MALC46	MALF41	MALF42	MALF43	MALF44	MALF45	
SAMPLE LOCATION:			SD-08	SD-09	SD-10	SD-11	SD-12	SD-13	
LABORATORY NUMBER:			44365S	44364S	44365S	44368S	44369S	44370S	
			47.4	83.5	33.2	36.6	76.8	81.5	
INORGANIC ELEMENTS		INSTRUMENT DETECTION LIMITS (mg/kg)							CONTRACT DETECTION LIMITS (mg/kg)
ALUMINUM	P	1.2	7600	2990	6440	7260	7350	2490	40
ANTIMONY	P	1.0	2.3 J	1.2 U	3.0 U	12 6	1.3 U	1.2 U	12
ARSENIC	P	1.2	7.6	2.1	8.4	17.8	13.0	3.8	2
BARIUM	P	0.2	89.8	11.2	69.0	48.3	42.9	12.2	40
BERYLLIUM	P	0.2	0.80 UJ	0.36 UJ	1.1 UJ	1.4 UJ	0.25 U	0.24 U	1
CADMIUM	P	0.2	1.1 U	0.24 U	1.7 U	1.1 UJ	0.25 U	0.24 U	1
CALCIUM	P	4.6	3950	1130	9290	7420	2230	1070	1000
CHROMIUM	P	0.2	R	R	R	2450 J	84.7 J	R	2
COBALT	P	0.2	4.4	2.3	4.0 U	9.0	8.9	2.3	10
COPPER	P	0.2	42.4	12.2 U	57.6 U	98.4	31.3	14.0 U	5
IRON	P	3.6	15800	7810	13300	11200	15400	6770	20
LEAD	P	0.4	110	15.7	86.5	112	27.2	17.2	0.6
MAGNESIUM	P	6.2	1690	1810	1700	1680	2560	1360	1000
MANGANESE	P	0.2	124	78.2	190	266	290	52.7	3
MERCURY	CV	0.1	0.61 U	0.12 UJ	0.87 U	0.64 U	0.12 UJ	0.11 UJ	0.1
NICKEL	P	0.2	14.7	6.0 U	14.5 U	15.0 U	14.0	5.1 U	8
POTASSIUM	P	8.8	360 J	388 J	380 J	331 J	713 J	364 J	1000
SELENIUM	P	0.8	1.6 UJ	0.96 UJ	2.4 UJ	2.2 UJ	1.0 U	0.96 U	1
SILVER	P	0.4	R	R	R	R	R	R	2
SODIUM	P	6.0	262 U	145 U	350 U	365 U	225 U	115 U	1000
THALLIUM	P	1.2	2.5 UJ	1.4 UJ	3.6 UJ	3.2 UJ	1.5 UJ	1.4 UJ	2
VANADIUM	P	0.2	25.4	10.5	28.6	31.6	21.3	9.1	10
ZINC	P	0.4	598 J	R	502 J	296 J	R	R	4
CYANIDE	CA	0.2	0.42 U	0.23 U	0.60 U	0.53 U	0.26 U	0.25 U	0.5

ANALYTICAL METHOD
P - ICP/FLAME AA
CV - COLD VAPOR
CA - MIDI-DISTILLATION SPECTROPHOTOMETRIC

NOTE: J = QUANTITATION IS ESTIMATED DUE TO LIMITATIONS IDENTIFIED IN THE QUALITY CONTROL REVIEW (DATA REVIEW).
U = VALUE IS NON-DETECTED.
UJ = VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R = VALUE IS REJECTED.
NA = NOT ANALYZED

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS


NER Construction Corp.
NER Construction Corp.
Richard Sylvester
867 Woburn St.
Deed Bk. 8394 Page 183
Map 37 Parcel 5
NER Construction Corp.
Existing (old) 8' stockade fence
S 65°33'16" E 404.10'
Existing Wooden Structure
E Concrete Floor
D
FORMER WASTEWA
SETTLING BASI
PAVED
GP-10
AREA OF BURIED WASTE
GP-21
GP-9
GP-16
GP-13
GP-8
GP-14
GP-17
GP-22
Parcel 4A
66.8
E.C. Whitney & Son, Inc.
885 - 889 Woburn St.
Wilmington, MA
CEE-2
CEE-4D
CEE-4S
"DRUM STORAGE"
"DRUM STORAGE"
GP-15
125.00'
SEWER MANHOLE
RAILROAD
Radius = 5,714.40'
Length = 127.74'
BURIED STORMWATER CULVERT
79.43
GW-5
GW-50D
GW-50S
64.03
LOCATION OF SURFACE WATER SAMPLE COLLECTED BY ECOLOGY & ENVIRONMENT, 1982
OLIN CHEMICAL CORP.
(WOODLAND)
LEGEND
CEE- 1 2"ø WELL INSTALLED BY CAPACCIO ENVIRONMENTAL ENGINEERING AT WATER TABLE
GP-1 1" WELL INSTALLED BY CAPACCIO ENVIRONMENTAL ENGINEERING BY GEOPROBE
CEE- 1D 2" WELL INSTALLED BY CAPACCIO ENVIRONMENTAL ENGINEERING IN SHALLOW BEDROCK
WELL INSTALLED BY OLIN CHEMICAL
X GP-4 GEOPROBE BORING LOCATION
A OFFICE
B DRUM CLEANING / RECONDITIONING
B1 PLASTIC DRUM SHREDDING
C STORAGE
D MAINTENANCE SHOP
E STEEL DRUM STORAGE
TRAIN TRACK



WOBURN STREET
ENTRANCE EXIT
ENTRANCE EXIT
S 1°35'0" W 160.00'
S 1°35'0" W 128.67'
N 55°46'30" W 391.14'
fence
chain link fence
CEE - 1D
CEE - 1
77.3
U. Pole
PAVED
Catch Basin
GP- 3
GP- 1
GP- 2
GP-4
70.04
(OFFICE) BUILD. A EXIST.
CEE-5D
CEE-3
PAVED
UNPAVED
Existing (old) 6' chain link fence
RAILROAD EASEMENT
SEWER EASEMENT
GW - 80S
GW - 80D
GW - 80BR
GW - 49D (NOT LOCATED)
PAVED
SEWER MANHOLE
STORM WATER
TOWN OF WILMINGTON
CITY OF WOBURN
PRESIDENTIAL DRIVE
GW-74D
74.33 (OLIN 1993)
GW-74S
STORM WATER RETENTION POND
J.N. PHILLIPS GLASS, INC.
EXISTING WELL
CEE-6S
CEE-6D (DEEP BEDROCK)
CEE-6I (DEEP OVER BURDEN)
MW-1
MW-5
PAVED
Augustine P. Sheehy
891 Woburn St.
Woburn, MA
Map 37 Parcel 3
Deed Bk. 3219 Page 135
87.53

Memorandum

To: Margret Hanley

CC: Steve Morrow

From: Dan Stone

Date: 4/2/02

Re: Information for North Pond SOW letter

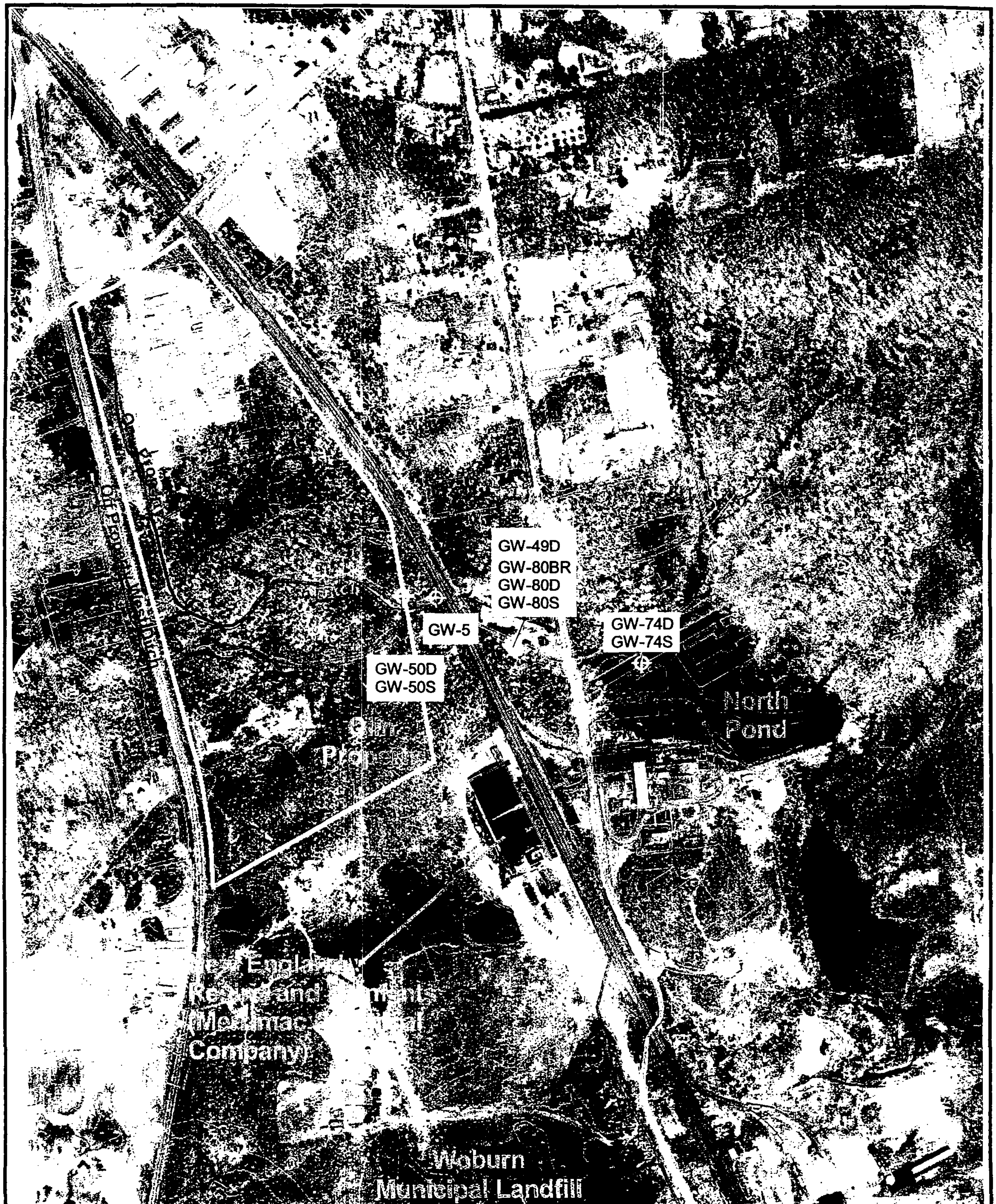
This memorandum and its attachments provide the information you requested to support the North Pond SOW letter to MADEP. I have also made redline–strikeout changes to the draft letter you sent last week to incorporate some of the missing information. A copy of the revised draft letter is being sent to you separately via email.

The stratigraphic log for well GW-74D (attached) indicates that approximately 9 feet of fill has been placed over native soil at the location of the GW-74 well cluster. Because the GW-74 wells were installed at a location that was formerly within the western part of the North Pond (Figure 1), the fill/native soil contact at that location is assumed to correspond to the bottom of the former pond, which is at an elevation of 68.7 feet AMSL. The shallower GW-74S well is screened between 57.7 and 67.7 feet AMSL, so the top of that well screen is about one foot below the inferred elevation of the bottom of North Pond. The deeper GW-74D well is screened between 47.2 and 57.2 feet AMSL across the overburden–bedrock contact.

Over the last 10 years, groundwater levels have been measured 6 times in the GW-74 wells and 9 to 15 times in other Olin wells (GW-49D and the GW-80 cluster) east of the MBTA right-of-way (Table 1). In general, there is very little difference (<0.3 ft) between hydraulic heads in the shallow and deep wells. The measurements show that groundwater in that area typically ranges between about 2 and 6 feet below ground surface, which corresponds to an elevation range of approximately 77 to 73 feet AMSL. This, in combination with the inferred bottom of the former North Pond, suggests that there might have been roughly 4 to 8 feet of water in the western part of the pond. Sedimentation in the North Pond over the couple of decades (1950s and 60s) prior to its partial filling in the 1970s would have resulted in accumulation of sediment at elevations consistent with the top portion of the GW-74S well screen.

Collectively, the Olin wells east of the MBTA right-of-way have been sampled 9 times over the last 10 years, and those samples have been analyzed for more than 1,300 parameters. Of those 1,300 analyses, 345 have resulted in detections above the method limits. A summary of historical water quality testing for the Olin wells east of the MBTA right-of-way that resulted in detections above the method limits is presented on Table 2.

2995 Baseline Road, Suite 202, Boulder, CO 80303 ! Tel 303-443-9117 ! Fax 303-938-8123



Generation Date; 4/2/02	**Figure 1. East Ditch area with 1955 aerial photo**	Geomega

I:\Projects\olin\east_ditch.apr layout 4

Table 1. North Pond Area Water Levels in Olin Wells

Location	DateSampled	ReferenceElev (feet AMSL)	Measurement (feet)	WaterElevation (feet AMSL)	GroundElev (feet AMSL)	Depth (feet BGS)
GW-49D	8/14/92	81.37	6.02	75.35	79.20	3.85
GW-49D	9/3/92	81.37	6.59	74.78		4.42
GW-49D	1/7/93	81.37	5.07	76.30		2.90
GW-49D	4/21/93	81.37	5.12	76.25		2.95
GW-49D	10/8/95	81.37	5.92	75.45		3.75
GW-49D	4/30/96	81.37	5.33	76.04		3.16
GW-49D	4/7/98	81.37	5.72	75.65		3.55
GW-49D	5/1/01	81.37	7.23	74.14		5.06
GW-49D	10/30/01	81.37	8.01	73.36		5.84
GW-74D	4/21/93	77.22	4.11	73.11	77.70	4.59
GW-74D	10/8/95	77.22	4.18	73.04		4.66
GW-74D	4/30/96	77.22	4.02	73.20		4.50
GW-74D	4/7/98	77.20	4.29	72.91		4.79
GW-74D	5/1/01	77.20	1.81	75.39		2.31
GW-74D	10/30/01	77.20	3.76	73.44		4.26
GW-74S	4/21/93	77.43	4.31	73.12	77.70	4.58
GW-74S	10/8/95	77.43	4.42	73.01		4.69
GW-74S	4/30/96	77.43	4.30	73.13		4.57
GW-74S	4/7/98	77.41	4.57	72.84		4.86
GW-74S	5/1/01	77.41	2.29	75.12		2.58
GW-74S	10/30/01	77.41	4.20	73.21		4.49
GW-80BR	10/8/95	78.91	3.34	75.57	79.30	3.73
GW-80BR	4/30/96	78.91	2.67	76.24		3.06
GW-80BR	4/7/98	78.91	3.10	75.81		3.49
GW-80BR	5/2/01	78.91	3.21	75.70		3.60
GW-80BR	10/31/01	78.91	4.73	74.18		5.12
GW-80D	10/8/95	79.06	3.46	75.60	79.40	3.80
GW-80D	4/30/96	79.06	2.77	76.29		3.11
GW-80D	3/10/98	79.06	2.01	77.05		2.35
GW-80D	4/7/98	79.06	3.20	75.86		3.54
GW-80D	5/13/98	79.06	2.41	76.65		2.75
GW-80D	6/9/98	79.06	3.11	75.95		3.45
GW-80D	7/8/98	79.06	3.42	75.64		3.76
GW-80D	8/3/99	79.06	4.17	74.89		4.51
GW-80D	11/3/99	79.06	2.88	76.18		3.22
GW-80D	5/5/00	79.06	2.92	76.14		3.26
GW-80D	8/8/00	79.06	3.60	75.46		3.94
GW-80D	11/10/00	79.06	3.33	75.73		3.67
GW-80D	5/2/01	79.06	3.16	75.90		3.50
GW-80D	8/23/01	79.06	2.80	76.26		3.14
GW-80D	10/31/01	79.06	4.77	74.29		5.11
GW-80S	10/8/95	79.17	3.28	75.89	79.60	3.71
GW-80S	4/30/96	79.17	2.87	76.30		3.30
GW-80S	3/10/98	79.17	2.12	77.05		2.55
GW-80S	4/7/98	79.17	3.21	75.96		3.64
GW-80S	5/13/98	79.17	2.22	76.95		2.65
GW-80S	6/9/98	79.17	3.28	75.89		3.71
GW-80S	7/8/98	79.17	3.57	75.60		4.00
GW-80S	8/3/99	79.17	4.43	74.74		4.86
GW-80S	11/3/99	79.17	3.13	76.04		3.56
GW-80S	5/5/00	79.17	2.91	76.26		3.34
GW-80S	8/8/00	79.17	3.70	75.47		4.13
GW-80S	11/10/00	79.17	3.36	75.81		3.79
GW-80S	5/2/01	79.17	3.18	75.99		3.61
GW-80S	8/23/01	79.17	2.81	76.36		3.24

Table 2. Detected Analytes in Olin Wells in North Pond Area

Location	DateSampled	ParameterName	Result	Units
GW-49D	11/16/92	1,1-Dichloroethane	0.02	mg/l
GW-49D	8/12/92	1,2-Dichlorobenzene	0.13	mg/l
GW-49D	11/16/92	1,2-Dichlorobenzene	0.099	mg/l
GW-49D	8/12/92	1,2-Dichloroethene (total)	0.039	mg/l
GW-49D	11/16/92	1,2-Dichloroethene (total)	0.074	mg/l
GW-49D	8/12/92	1,4-Dichlorobenzene	0.005	mg/l
GW-49D	8/12/92	2,4-Dimethylphenol	0.007	mg/l
GW-49D	8/12/92	2-Butanone (MEK)	0.002	mg/l
GW-49D	8/12/92	2-Hexanone	0.037	mg/l
GW-49D	11/16/92	4,4'-DDT	0.00012	mg/l
GW-49D	8/12/92	4-Methyl-2-Pentanone (MIBK)	0.19	mg/l
GW-49D	11/16/92	4-Methyl-2-Pentanone (MIBK)	1.4	mg/l
GW-49D	11/16/92	4-Methylphenol (p-Cresol)	0.058	mg/l
GW-49D	8/12/92	Acetone	0.15	mg/l
GW-49D	11/16/92	Acetone	1.4	mg/l
GW-49D	11/16/92	Alpha-BHC	0.00005	mg/l
GW-49D	8/12/92	Arsenic, Dissolved	0.024	mg/l
GW-49D	11/16/92	Arsenic, Dissolved	0.024	mg/l
GW-49D	8/12/92	Barium, Dissolved	0.039	mg/l
GW-49D	11/16/92	Barium, Dissolved	0.034	mg/l
GW-49D	8/12/92	Benzene	0.071	mg/l
GW-49D	11/16/92	Benzene	0.12	mg/l
GW-49D	11/16/92	Beta-BHC	0.000052	mg/l
GW-49D	8/12/92	Calcium, Dissolved	100	mg/l
GW-49D	11/16/92	Calcium, Dissolved	85	mg/l
GW-49D	8/12/92	Chloride	100	mg/l
GW-49D	11/16/92	Chloride	72	mg/l
GW-49D	11/16/92	Chlorobenzene	0.053	mg/l
GW-49D	8/12/92	Chloroethane	0.019	mg/l
GW-49D	11/16/92	Chloroethane	0.049	mg/l
GW-49D	8/12/92	Ethylbenzene	0.12	mg/l
GW-49D	8/12/92	Iron, Dissolved	68	mg/l
GW-49D	11/16/92	Iron, Dissolved	62	mg/l
GW-49D	8/12/92	Magnesium, Dissolved	12	mg/l
GW-49D	11/16/92	Magnesium, Dissolved	9.7	mg/l
GW-49D	8/12/92	Manganese, Dissolved	9	mg/l
GW-49D	11/16/92	Manganese, Dissolved	7.6	mg/l
GW-49D	8/12/92	Naphthalene	0.011	mg/l
GW-49D	11/16/92	Nitrogen, Ammonia	7.2	mg/l
GW-49D	8/12/92	pH	6.1	Std. Units
GW-49D	11/16/92	pH	6.7	Std. Units
GW-49D	8/12/92	Phenol	0.015	mg/l
GW-49D	8/12/92	Potassium, Dissolved	9.3	mg/l
GW-49D	11/16/92	Potassium, Dissolved	7.5	mg/l
GW-49D	8/12/92	Sodium, Dissolved	42	mg/l
GW-49D	11/16/92	Sodium, Dissolved	41	mg/l
GW-49D	8/12/92	Specific Conductance	700	umhos/cm
GW-49D	11/16/92	Specific Conductance	355	umhos/cm
GW-49D	8/12/92	Temperature	15	deg. C
GW-49D	11/16/92	Temperature	13.2	deg. C
GW-49D	8/12/92	Toluene	3.2	mg/l

Table 2. Detected Analytes in Olin Wells in North Pond Area

Location	DateSampled	ParameterName	Result	Units
GW-49D	11/16/92	Toluene	12	mg/l
GW-49D	8/12/92	Vinyl Chloride	0.007	mg/l
GW-49D	8/12/92	Xylenes, Total	0.6	mg/l
GW-49D	11/16/92	Xylenes, Total	0.75	mg/l
GW-74D	4/20/93	1,1-Dichloroethane	0.008	mg/l
GW-74D	4/20/93	1,2-Dichloroethene (total)	0.009	mg/l
GW-74D	4/20/93	Barium, Dissolved	0.026	mg/l
GW-74D	4/20/93	Calcium, Dissolved	52	mg/l
GW-74D	4/20/93	Chloride	71	mg/l
GW-74D	4/20/93	Cobalt, Dissolved	0.017	mg/l
GW-74D	4/20/93	Iron, Dissolved	1.1	mg/l
GW-74D	4/20/93	Magnesium, Dissolved	11	mg/l
GW-74D	4/20/93	Manganese, Dissolved	0.85	mg/l
GW-74D	4/20/93	pH	6.4	Std. Units
GW-74D	4/20/93	Potassium, Dissolved	5	mg/l
GW-74D	4/20/93	Sodium, Dissolved	32	mg/l
GW-74D	4/20/93	Specific Conductance	400	umhos/cm
GW-74D	4/20/93	Sulfate as SO4	24	mg/l
GW-74D	4/20/93	Temperature	8	deg. C
GW-74D	4/20/93	Trichloroethene (TCE)	0.012	mg/l
GW-74S	4/20/93	1,2-Dichloroethene (total)	0.006	mg/l
GW-74S	4/20/93	Barium, Dissolved	0.022	mg/l
GW-74S	4/20/93	Chloride	71	mg/l
GW-74S	4/20/93	Iron, Dissolved	1.8	mg/l
GW-74S	4/20/93	Magnesium, Dissolved	11	mg/l
GW-74S	4/20/93	Manganese, Dissolved	0.85	mg/l
GW-74S	4/20/93	Nitrogen, Ammonia	0.1	mg/l
GW-74S	4/20/93	pH	6.4	Std. Units
GW-74S	4/20/93	Potassium, Dissolved	5.2	mg/l
GW-74S	4/20/93	Sodium, Dissolved	31	mg/l
GW-74S	4/20/93	Specific Conductance	300	umhos/cm
GW-74S	4/20/93	Sulfate as SO4	21	mg/l
GW-74S	4/20/93	Temperature	8	deg. C
GW-74S	4/20/93	Trichloroethene (TCE)	0.009	mg/l
GW-80BR	10/19/95	1,1,1-Trichloroethane (TCA)	1.5	mg/l
GW-80BR	10/19/95	1,1-Dichloroethene	0.12	mg/l
GW-80BR	10/19/95	1,2,4-Trichlorobenzene	0.02	mg/l
GW-80BR	10/19/95	1,2-Dichlorobenzene	0.77	mg/l
GW-80BR	10/19/95	1,2-Dichloroethane-d4 (SUR)	96	%
GW-80BR	10/19/95	1,2-Dichloroethene (total)	1.3	mg/l
GW-80BR	10/19/95	1,4-Dichlorobenzene	0.038	mg/l
GW-80BR	10/19/95	2,4,5,6-Tetrachloro-m-xylene	134	%
GW-80BR	10/19/95	2,4,6-Tribromophenol (SUR)	35	%
GW-80BR	10/19/95	2-Butanone (MEK)	0.3	mg/l
GW-80BR	10/19/95	2-Fluorobiphenyl (SUR)	85	%
GW-80BR	10/19/95	2-Fluorophenol (SUR)	37	%
GW-80BR	10/19/95	4-Methyl-2-Pentanone (MIBK)	1.2	mg/l
GW-80BR	10/12/95	Alkalinity	412	mg/l
GW-80BR	10/12/95	Arsenic, Dissolved	0.01	mg/l
GW-80BR	10/12/95	Arsenic, Total	0.012	mg/l
GW-80BR	10/12/95	Barium, Dissolved	0.061	mg/l

Table 2. Detected Analytes in Olin Wells in North Pond Area

Location	DateSampled	ParameterName	Result	Units
GW-80BR	10/17/00	Barium, Dissolved	0.064	mg/l
GW-80BR	4/25/01	Barium, Dissolved	0.058	mg/l
GW-80BR	10/24/01	Barium, Dissolved	0.075	mg/L
GW-80BR	10/12/95	Barium, Total	0.068	mg/l
GW-80BR	10/19/95	Benzene	0.13	mg/l
GW-80BR	10/12/95	Bicarbonate alkalinity as CaCO3	380	mg/l
GW-80BR	8/24/98	Bicarbonate alkalinity as CaCO3	280	mg/l
GW-80BR	8/24/98	Bicarbonate alkalinity as CaCO3	288	mg/l
GW-80BR	12/10/98	Bicarbonate alkalinity as CaCO3	300	mg/l
GW-80BR	10/17/00	Bicarbonate alkalinity as CaCO3	340	mg/l
GW-80BR	4/25/01	Bicarbonate alkalinity as CaCO3	40	mg/l
GW-80BR	10/24/01	Bicarbonate alkalinity as CaCO3	360	mg/L
GW-80BR	10/12/95	Bromide, Dissolved	3	mg/l
GW-80BR	10/12/95	Calcium, Dissolved	140	mg/l
GW-80BR	8/24/98	Calcium, Dissolved	89	mg/l
GW-80BR	8/24/98	Calcium, Dissolved	67	mg/l
GW-80BR	12/10/98	Calcium, Dissolved	120	mg/l
GW-80BR	4/25/01	Calcium, Dissolved	120	mg/l
GW-80BR	10/24/01	Calcium, Dissolved	140	mg/L
GW-80BR	10/12/95	Calcium, Total	170	mg/l
GW-80BR	10/17/00	Calcium, Total	1000	mg/l
GW-80BR	10/12/95	Chloride	210	mg/l
GW-80BR	8/24/98	Chloride	116	mg/l
GW-80BR	8/24/98	Chloride	126	mg/l
GW-80BR	12/10/98	Chloride	120	mg/l
GW-80BR	10/17/00	Chloride	140	mg/l
GW-80BR	4/25/01	Chloride	130	mg/l
GW-80BR	10/24/01	Chloride	140	mg/L
GW-80BR	10/19/95	Chlorobenzene	0.17	mg/l
GW-80BR	10/19/95	Decachlorobiphenyl	54	%
GW-80BR	10/12/95	Dissolved Organic Carbon (DOC)	95	mg/l
GW-80BR	10/12/95	Eh	93	mv
GW-80BR	10/19/95	Ethylbenzene	0.29	mg/l
GW-80BR	4/25/01	Hexavalent Chromium, Dissolved	0.0094	mg/l
GW-80BR	10/12/95	Iron, Dissolved	26	mg/l
GW-80BR	8/24/98	Iron, Dissolved	16	mg/l
GW-80BR	8/24/98	Iron, Dissolved	12	mg/l
GW-80BR	12/10/98	Iron, Dissolved	22	mg/l
GW-80BR	10/17/00	Iron, Dissolved	29	mg/l
GW-80BR	4/25/01	Iron, Dissolved	19	mg/l
GW-80BR	10/24/01	Iron, Dissolved	26	mg/L
GW-80BR	10/12/95	Iron, Total	29	mg/l
GW-80BR	10/12/95	Magnesium, Dissolved	19	mg/l
GW-80BR	8/24/98	Magnesium, Dissolved	10	mg/l
GW-80BR	8/24/98	Magnesium, Dissolved	7.2	mg/l
GW-80BR	12/10/98	Magnesium, Dissolved	14	mg/l
GW-80BR	10/17/00	Magnesium, Dissolved	14	mg/l
GW-80BR	4/25/01	Magnesium, Dissolved	12	mg/l
GW-80BR	10/24/01	Magnesium, Dissolved	18	mg/L
GW-80BR	10/12/95	Magnesium, Total	20	mg/l
GW-80BR	10/12/95	Manganese, Dissolved	9.8	mg/l

Table 2. Detected Analytes in Olin Wells in North Pond Area

Location	DateSampled	ParameterName	Result	Units
GW-80BR	8/24/98	Manganese, Dissolved	4.6	mg/l
GW-80BR	8/24/98	Manganese, Dissolved	3.3	mg/l
GW-80BR	12/10/98	Manganese, Dissolved	6.8	mg/l
GW-80BR	10/17/00	Manganese, Dissolved	6.8	mg/l
GW-80BR	4/25/01	Manganese, Dissolved	5.4	mg/l
GW-80BR	10/24/01	Manganese, Dissolved	7.9	mg/L
GW-80BR	10/12/95	Manganese, Total	11	mg/l
GW-80BR	10/19/95	Methylene Chloride	0.22	mg/l
GW-80BR	10/19/95	Naphthalene	0.013	mg/l
GW-80BR	4/25/01	Nitrate as N	0.12	mg/l
GW-80BR	10/19/95	Nitrobenzene-d5 (SUR)	76	%
GW-80BR	8/24/98	Nitrogen, Ammonia	1.46	mg/l
GW-80BR	8/24/98	Nitrogen, Ammonia	1.38	mg/l
GW-80BR	12/10/98	Nitrogen, Ammonia	2.2	mg/l
GW-80BR	10/17/00	Nitrogen, Ammonia	3	mg/l
GW-80BR	4/25/01	Nitrogen, Ammonia	2.3	mg/l
GW-80BR	10/24/01	Nitrogen, Ammonia	2.7	mg/L
GW-80BR	10/12/95	Orthophosphate as P	0.12	mg/l
GW-80BR	10/12/95	pH	6.35	Std. Units
GW-80BR	10/19/95	pH	6.31	Std. Units
GW-80BR	8/24/98	pH	6.41	Std. Units
GW-80BR	8/24/98	pH	6.36	Std. Units
GW-80BR	12/10/98	pH	6.28	Std. Units
GW-80BR	10/19/95	Phenol-d5 (SUR)	41	%
GW-80BR	10/12/95	Potassium, Dissolved	5.5	mg/l
GW-80BR	8/24/98	Potassium, Dissolved	9.8	mg/l
GW-80BR	8/24/98	Potassium, Dissolved	9.8	mg/l
GW-80BR	12/10/98	Potassium, Dissolved	8.1	mg/l
GW-80BR	10/17/00	Potassium, Dissolved	6.2	mg/l
GW-80BR	4/25/01	Potassium, Dissolved	7.4	mg/l
GW-80BR	10/24/01	Potassium, Dissolved	6.7	mg/L
GW-80BR	10/12/95	Potassium, Total	5.9	mg/l
GW-80BR	10/12/95	Selenium, Dissolved	0.005	mg/l
GW-80BR	10/12/95	Silicon, Dissolved	16	mg/l
GW-80BR	10/12/95	Silicon, Total	18	mg/l
GW-80BR	10/12/95	Sodium, Dissolved	50	mg/l
GW-80BR	8/24/98	Sodium, Dissolved	36	mg/l
GW-80BR	8/24/98	Sodium, Dissolved	32	mg/l
GW-80BR	12/10/98	Sodium, Dissolved	54	mg/l
GW-80BR	10/17/00	Sodium, Dissolved	56	mg/l
GW-80BR	4/25/01	Sodium, Dissolved	57	mg/l
GW-80BR	10/24/01	Sodium, Dissolved	58	mg/L
GW-80BR	10/12/95	Sodium, Total	56	mg/l
GW-80BR	10/12/95	Specific Conductance	175	umhos/cm
GW-80BR	10/19/95	Specific Conductance	185	umhos/cm
GW-80BR	8/24/98	Specific Conductance	884	umhos/cm
GW-80BR	8/24/98	Specific Conductance	921	umhos/cm
GW-80BR	12/10/98	Specific Conductance	710	umhos/cm
GW-80BR	10/17/00	Specific Gravity	0.94	g/ml
GW-80BR	10/12/95	Sulfate as SO4	4	mg/l
GW-80BR	8/24/98	Sulfate as SO4	0.33	mg/l

Table 2. Detected Analytes in Olin Wells in North Pond Area

Location	DateSampled	ParameterName	Result	Units
GW-80BR	8/24/98	Sulfate as SO4	2	mg/l
GW-80BR	10/17/00	Sulfate as SO4	1.8	mg/l
GW-80BR	4/25/01	Sulfate as SO4	1.7	mg/l
GW-80BR	10/12/95	Temperature	12.9	deg. C
GW-80BR	10/19/95	Temperature	13	deg. C
GW-80BR	10/19/95	Terphenyl-d14 (SUR)	91	%
GW-80BR	10/12/95	Thallium, Total	0.012	mg/l
GW-80BR	10/19/95	Toluene	15	mg/l
GW-80BR	10/19/95	Toluene d-8 (SUR)	96	%
GW-80BR	10/12/95	Total Dissolved Solids (TDS)	1000	mg/l
GW-80BR	10/19/95	Trichloroethene (TCE)	0.056	mg/l
GW-80BR	10/17/00	Turbidity	110	NTU
GW-80BR	10/24/01	Turbidity	90	NTU
GW-80BR	10/12/95	Viscosity	3	cpoise
GW-80BR	10/19/95	Xylenes, Total	1.1	mg/l
GW-80D	10/19/95	1,1-Dichloroethane	0.43	mg/l
GW-80D	10/19/95	1,2-Dichlorobenzene	0.29	mg/l
GW-80D	10/19/95	1,2-Dichloroethane-d4 (SUR)	103	%
GW-80D	10/19/95	1,2-Dichloroethene (total)	0.16	mg/l
GW-80D	10/19/95	1,4-Dichlorobenzene	0.018	mg/l
GW-80D	10/19/95	2,4,5,6-Tetrachloro-m-xylene	84	%
GW-80D	10/19/95	2,4,6-Tribromophenol (SUR)	121	%
GW-80D	10/19/95	2,4-Dimethylphenol	0.012	mg/l
GW-80D	10/19/95	2-Fluorobiphenyl (SUR)	95	%
GW-80D	10/19/95	2-Fluorophenol (SUR)	90	%
GW-80D	10/19/95	2-Methylphenol (o-Cresol)	0.017	mg/l
GW-80D	10/19/95	4-Chloro-3-methylphenol	0.021	mg/l
GW-80D	10/12/95	Alkalinity	325	mg/l
GW-80D	10/12/95	Aluminum, Total	0.13	mg/l
GW-80D	10/12/95	Arsenic, Dissolved	0.014	mg/l
GW-80D	10/12/95	Arsenic, Total	0.023	mg/l
GW-80D	10/12/95	Barium, Dissolved	0.026	mg/l
GW-80D	10/12/95	Barium, Total	0.041	mg/l
GW-80D	10/19/95	Benzene	0.094	mg/l
GW-80D	10/12/95	Bicarbonate alkalinity as CaCO3	270	mg/l
GW-80D	10/12/95	Bromide, Dissolved	2	mg/l
GW-80D	10/12/95	Calcium, Dissolved	58	mg/l
GW-80D	10/12/95	Calcium, Total	86	mg/l
GW-80D	10/12/95	Chloride	100	mg/l
GW-80D	10/19/95	Chlorobenzene	0.079	mg/l
GW-80D	10/19/95	Decachlorobiphenyl	47	%
GW-80D	10/12/95	Dissolved Organic Carbon (DOC)	60	mg/l
GW-80D	10/12/95	Eh	55	mv
GW-80D	10/19/95	Ethylbenzene	0.34	mg/l
GW-80D	10/12/95	Iron, Dissolved	29	mg/l
GW-80D	10/12/95	Iron, Total	45	mg/l
GW-80D	10/12/95	Magnesium, Dissolved	7.4	mg/l
GW-80D	10/12/95	Magnesium, Total	11	mg/l
GW-80D	10/12/95	Manganese, Dissolved	4.6	mg/l
GW-80D	10/12/95	Manganese, Total	7	mg/l
GW-80D	10/19/95	Methylene Chloride	0.031	mg/l

Table 2. Detected Analytes in Olin Wells in North Pond Area

Location	DateSampled	ParameterName	Result	Units
GW-80D	10/19/95	Naphthalene	0.027	mg/l
GW-80D	10/12/95	Nitrogen, Ammonia	0.32	mg/l
GW-80D	10/12/95	Nitrogen, Ammonia	0.27	mg/l
GW-80D	10/12/95	Orthophosphate as P	0.29	mg/l
GW-80D	10/12/95	pH	6.49	Std. Units
GW-80D	10/19/95	pH	6.45	Std. Units
GW-80D	10/19/95	Phenol-d5 (SUR)	84	%
GW-80D	10/12/95	Potassium, Dissolved	4.7	mg/l
GW-80D	10/12/95	Potassium, Total	7.6	mg/l
GW-80D	10/12/95	Silicon, Dissolved	11	mg/l
GW-80D	10/12/95	Silicon, Total	18	mg/l
GW-80D	10/12/95	Sodium, Dissolved	33	mg/l
GW-80D	10/12/95	Sodium, Total	51	mg/l
GW-80D	10/12/95	Specific Conductance	646	umhos/cm
GW-80D	10/19/95	Specific Conductance	630	umhos/cm
GW-80D	10/12/95	Sulfate as SO4	2	mg/l
GW-80D	10/12/95	Temperature	14.9	deg. C
GW-80D	10/19/95	Temperature	14.9	deg. C
GW-80D	10/19/95	Terphenyl-d14 (SUR)	88	%
GW-80D	10/19/95	Toluene	7.1	mg/l
GW-80D	10/19/95	Toluene d-8 (SUR)	91	%
GW-80D	10/12/95	Total Dissolved Solids (TDS)	490	mg/l
GW-80D	10/19/95	Vinyl Chloride	0.019	mg/l
GW-80D	10/12/95	Viscosity	3.5	cpoise
GW-80D	10/19/95	Xylenes, Total	1.1	mg/l
GW-80S	10/19/95	1,2-Dichloroethane-d4 (SUR)	95	%
GW-80S	10/19/95	1,2-Dichloroethene (total)	0.014	mg/l
GW-80S	10/19/95	2,4,5,6-Tetrachloro-m-xylene	70	%
GW-80S	10/19/95	2,4,6-Tribromophenol (SUR)	88	%
GW-80S	10/19/95	2,4-Dimethylphenol	0.025	mg/l
GW-80S	10/19/95	2-Butanone (MEK)	0.019	mg/l
GW-80S	10/19/95	2-Fluorobiphenyl (SUR)	83	%
GW-80S	10/19/95	2-Fluorophenol (SUR)	70	%
GW-80S	10/19/95	2-Methylphenol (o-Cresol)	0.026	mg/l
GW-80S	10/19/95	4-Methylphenol (p-Cresol)	0.19	mg/l
GW-80S	10/12/95	Alkalinity	391	mg/l
GW-80S	10/12/95	Aluminum, Dissolved	0.6	mg/l
GW-80S	10/12/95	Aluminum, Total	17	mg/l
GW-80S	10/12/95	Antimony, Total	0.006	mg/l
GW-80S	10/12/95	Arsenic, Dissolved	0.022	mg/l
GW-80S	10/12/95	Arsenic, Total	0.054	mg/l
GW-80S	10/12/95	Barium, Dissolved	0.08	mg/l
GW-80S	10/12/95	Barium, Total	0.25	mg/l
GW-80S	10/19/95	Benzene	0.028	mg/l
GW-80S	10/12/95	Bicarbonate alkalinity as CaCO3	240	mg/l
GW-80S	10/12/95	Calcium, Dissolved	59	mg/l
GW-80S	10/12/95	Calcium, Total	74	mg/l
GW-80S	10/12/95	Chloride	15	mg/l
GW-80S	10/12/95	Chromium, Total	0.068	mg/l
GW-80S	10/12/95	Copper, Total	0.08	mg/l
GW-80S	10/19/95	Decachlorobiphenyl	51	%

Table 2. Detected Analytes in Olin Wells in North Pond Area

Location	DateSampled	ParameterName	Result	Units
GW-80S	10/12/95	Dissolved Organic Carbon (DOC)	63	mg/l
GW-80S	10/12/95	Eh	54	mv
GW-80S	10/19/95	Ethylbenzene	1.3	mg/l
GW-80S	10/12/95	Iron, Dissolved	64	mg/l
GW-80S	10/12/95	Iron, Total	100	mg/l
GW-80S	10/12/95	Lead, Dissolved	0.03	mg/l
GW-80S	10/12/95	Lead, Total	0.4	mg/l
GW-80S	10/12/95	Magnesium, Dissolved	3.3	mg/l
GW-80S	10/12/95	Magnesium, Total	6.4	mg/l
GW-80S	10/12/95	Manganese, Dissolved	1.7	mg/l
GW-80S	10/12/95	Manganese, Total	2.4	mg/l
GW-80S	10/12/95	Mercury, Total	0.00058	mg/l
GW-80S	10/12/95	Nitrogen, Ammonia	0.22	mg/l
GW-80S	10/12/95	Nitrogen, Ammonia	0.2	mg/l
GW-80S	10/12/95	Orthophosphate as P	0.16	mg/l
GW-80S	10/12/95	pH	6.4	Std. Units
GW-80S	10/19/95	pH	6.38	Std. Units
GW-80S	10/19/95	Phenol-d5 (SUR)	86	%
GW-80S	10/12/95	Potassium, Dissolved	5.5	mg/l
GW-80S	10/12/95	Potassium, Total	8.2	mg/l
GW-80S	10/12/95	Silicon, Dissolved	13	mg/l
GW-80S	10/12/95	Silicon, Total	47	mg/l
GW-80S	10/12/95	Sodium, Dissolved	8	mg/l
GW-80S	10/12/95	Sodium, Total	10	mg/l
GW-80S	10/12/95	Specific Conductance	1060	umhos/cm
GW-80S	10/19/95	Specific Conductance	1000	umhos/cm
GW-80S	10/12/95	Sulfate as SO4	5	mg/l
GW-80S	10/12/95	Sulfide	6	mg/l
GW-80S	10/12/95	Temperature	19.1	deg. C
GW-80S	10/19/95	Temperature	19	deg. C
GW-80S	10/19/95	Terphenyl-d14 (SUR)	41	%
GW-80S	10/19/95	Toluene	4.4	mg/l
GW-80S	10/19/95	Toluene d-8 (SUR)	91	%
GW-80S	10/12/95	Total Dissolved Solids (TDS)	320	mg/l
GW-80S	10/12/95	Vanadium, Total	0.074	mg/l
GW-80S	10/12/95	Viscosity	3	cpoise
GW-80S	10/19/95	Xylenes, Total	2.8	mg/l
GW-80S	10/12/95	Zinc, Total	0.39	mg/l

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

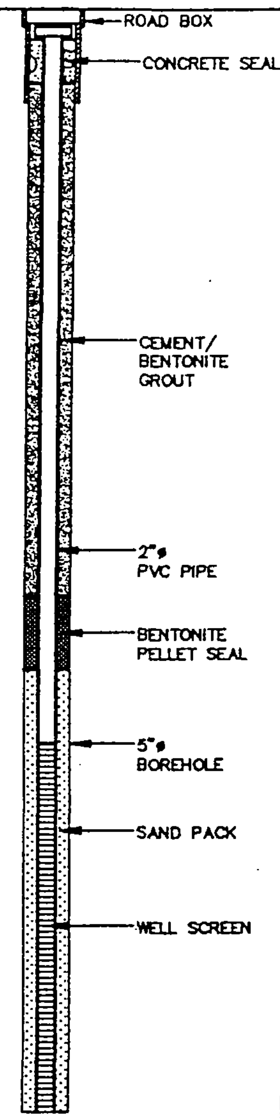
(L144)

PROJECT NAME: OLIN (USA)
PROJECT NO.: 3683
CLIENT: OLIN
LOCATION: WILMINGTON, MA.

HOLE DESIGNATION: GW-74D (Page 1 of 2)
DATE COMPLETED: MARCH 25, 1993
DRILLING METHOD: 4 1/4" ID HSA
CRA SUPERVISOR: J.W. MICHELS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
	REFERENCE POINT (Top of Riser)	77.22			
	GROUND SURFACE	77.7			
	ASPHALT	77.0			
	SW-SAND(FILL), some gravel, brown, moist		1SS	X	12
2.5			2SS	X	17
5.0			3SS	X	15
	- saturated		4SS	X	30
7.5					
	SW-SAND, some gravel, medium to coarse grained, brown, outwash	68.7			
10.0			5SS	X	43
12.5			6SS	X	20
15.0			7SS	X	42
17.5					
20.0					
22.5			8SS	X	32
25.0	BEDROCK - Gneiss, fine grained, weakly fractured	52.7	9SS	X	>100
	END OF OVERBURDEN HOLE @ 25.0 FT. BGS				
27.5					
30.0					
32.5					

MONITOR INSTALLATION



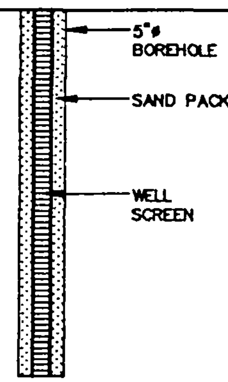
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

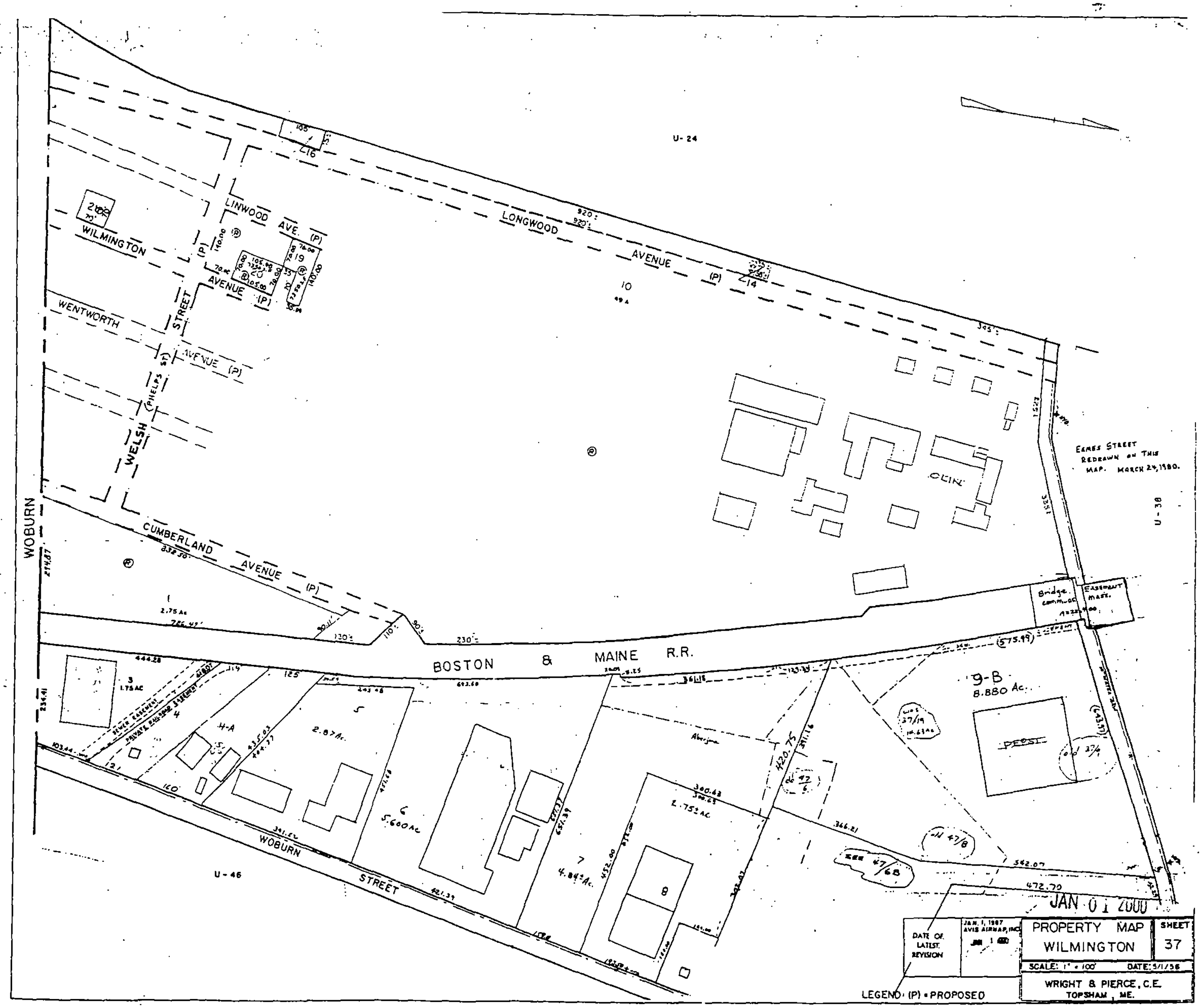
(L145)

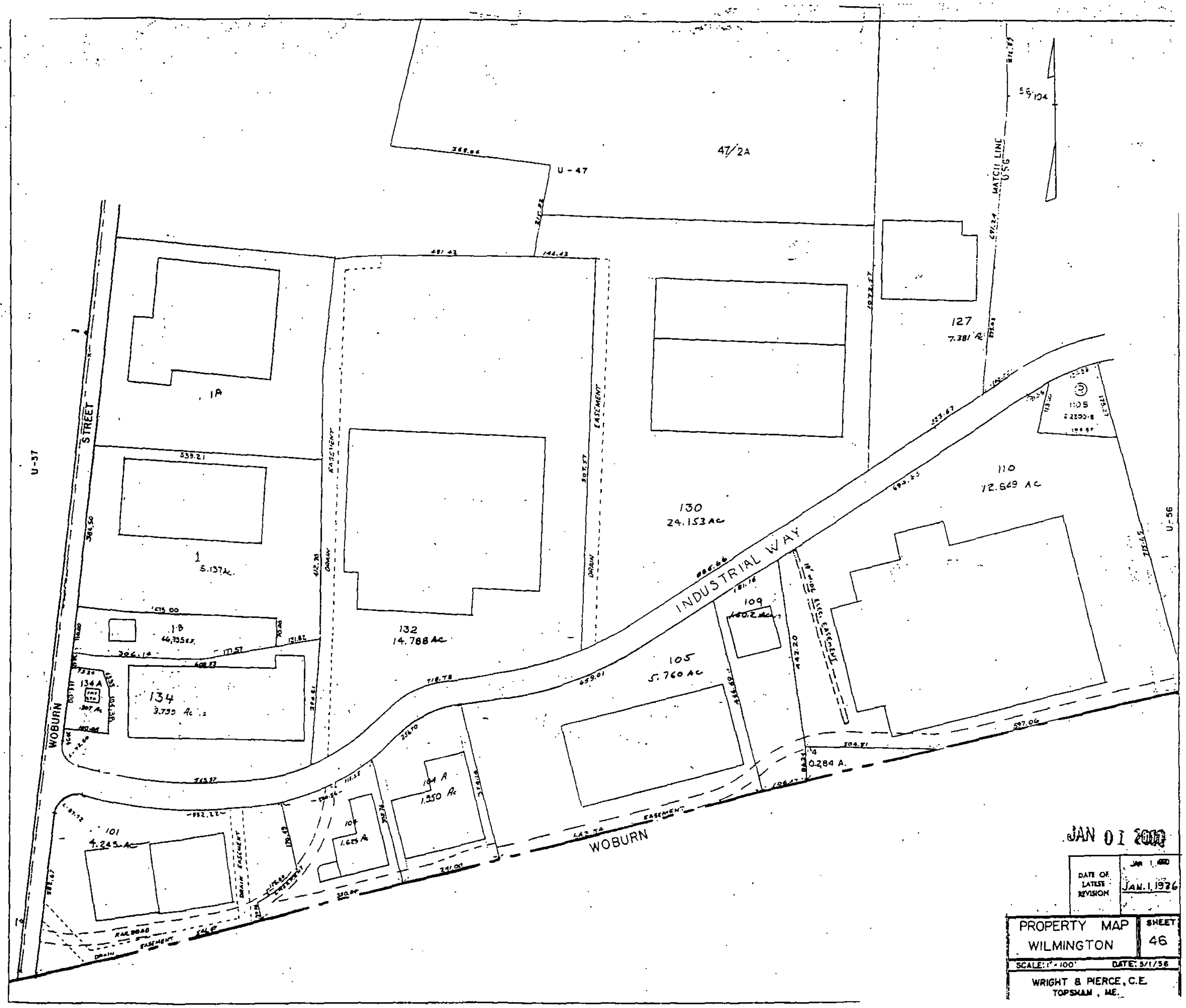
PROJECT NAME:	OLIN (USA)	HOLE DESIGNATION:	GW-74D (Page 2 of 2)
PROJECT NO.:	3683	DATE COMPLETED:	MARCH 25, 1993
CLIENT:	OLIN	DRILLING METHOD:	4 1/4" ID HSA
LOCATION:	WILMINGTON, MA.	CRA SUPERVISOR:	J.W. MICHELS

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BEDROCK INTERVAL	RUN NUMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	Overburden							
22.5								
25.0	BEDROCK(Gneiss): fine grained, weakly fractured	52.7						
27.5								
30.0	END OF HOLE @ 30 FT. BGS	47.7	SCREEN DETAILS: Screened Interval: 20.0 to 30.0' BGS Length -10.0' Diameter -2.0" Slot # 10 Material -PVC Sand pack interval: 18.0 to 30.0' BGS Material -Coarse					
32.5								
35.0								
37.5								
40.0								
42.5								
45.0								
47.5								
50.0								

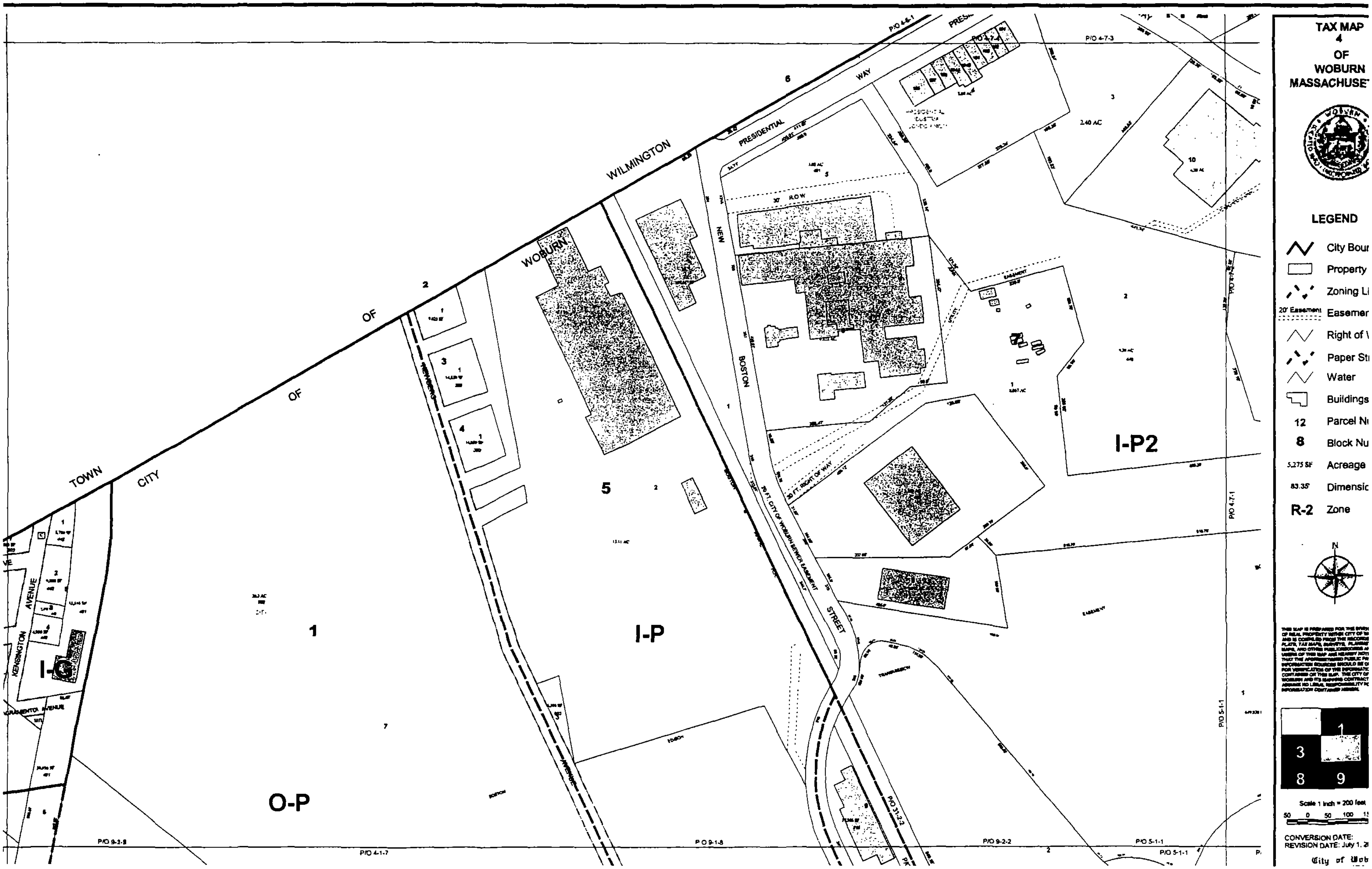
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM - NOT MEASURED

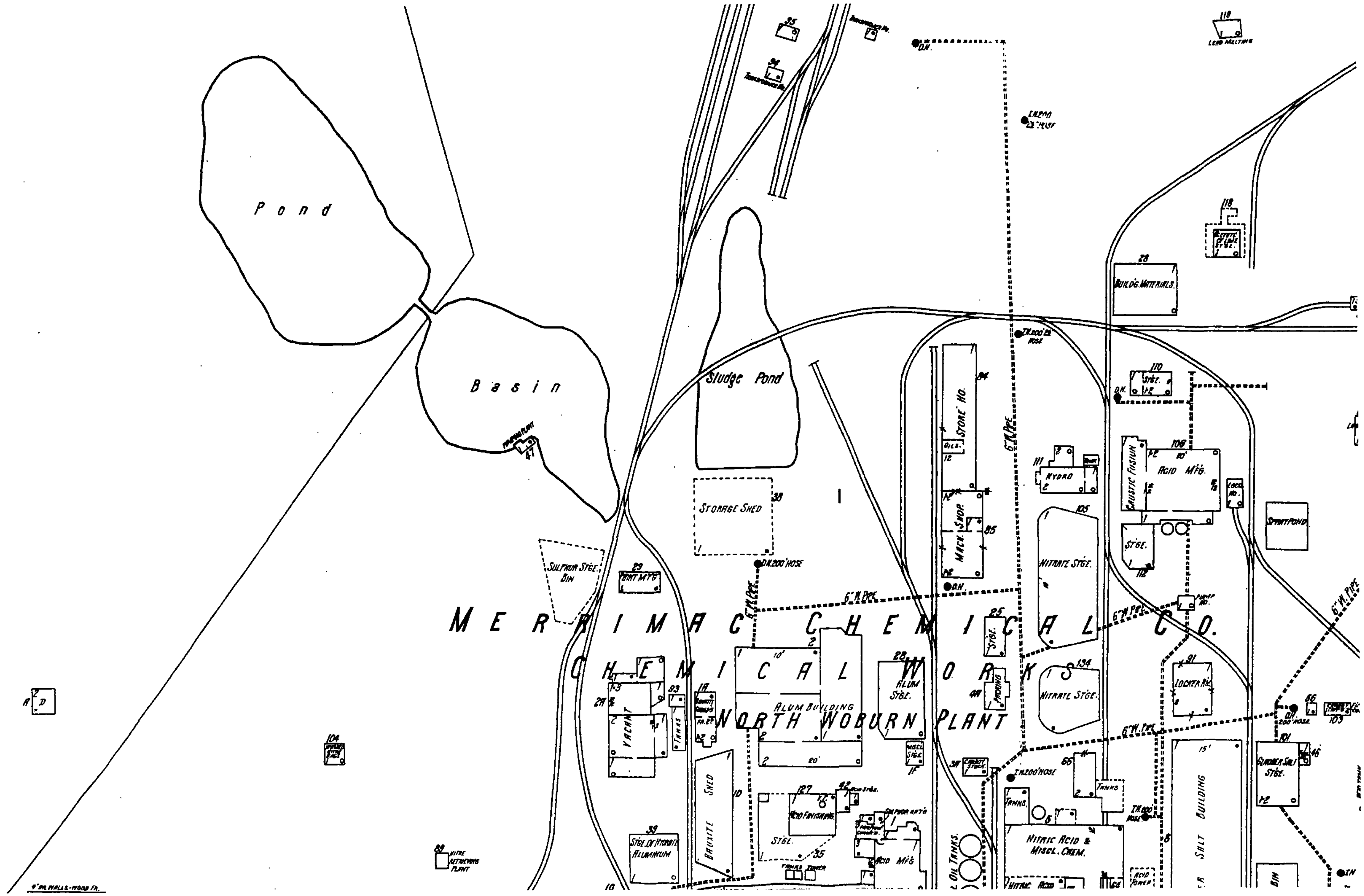

U-24
LONGWOOD
AVENUE (P)
LINWOOD AVE. (P)
WILMINGTON
AVENUE (P)
WENTWORTH
AVENUE (P)
WELSH
(PHELPS ST)
STREET
CUMBERLAND
AVENUE (P)
WOBURN
BOSTON & MAINE R.R.
WOBURN
STREET
U-46
U-38
EAMES STREET REDRAWN ON THIS MAP. MARCH 24, 1980.
Bridge comm.
Easement
9-B
8.880 Ac.
PEPSI
2.75 Ac
1.75 AC
2.87 Ac.
5.600 Ac
4.84± Ac.
2.75± Ac.
JAN 01 2000
DATE OF LATEST REVISION
JAN. 1, 1987 AVIS AIRMAP, INC.
PROPERTY MAP
WILMINGTON
SHEET
37
SCALE: 1" = 100'
DATE: 5/1/56
WRIGHT & PIERCE, C.E.
TOPSHAM, ME.
LEGEND: (P) = PROPOSED



47/2A
U - 47
MATCH LINE U56
127
7.381 Ac
1A
1
5.137 Ac.
132
14.788 Ac
130
24.153 Ac
110
12.649 AC
INDUSTRIAL WAY
109
105
5.760 Ac
134
3.799 Ac
134 A
WOBURN STREET
U-37
U-56
EASEMENT
DRAIN
101
4.245 Ac
104 A
1.950 Ac
0.284 A.
WOBURN
JAN 01 2000
DATE OF LATEST REVISION
JAN. 1, 1986
PROPERTY MAP
WILMINGTON
SHEET
46
SCALE: 1" = 100'
WRIGHT & PIERCE, C.E.
TOPSHAM, ME.



TAX MAP
4
OF
WOBURN
MASSACHUSE
LEGEND
City Bou
Property
Zoning L
20' Easement
Easeme
Right of
Paper St
Water
Buildings
12
Parcel N
8
Block Nu
5,275 SF
Acreage
83.35'
Dimensi
R-2
Zone
N
Scale 1 inch = 200 feet
CONVERSION DATE:
REVISION DATE: July 1, 2
City of Wob
TOWN
OF
WILMINGTON
CITY
OF
WOBURN
PRESIDENTIAL
WAY
NEW
BOSTON
STREET
KENSINGTON
AVENUE
SACRAMENTO AVENUE
30' ROW
20 FT. CITY OF WOBURN SEWER EASEMENT
30 FT. RIGHT OF WAY
O-P
I-P
I-P2
I-G
2.40 AC
P/O 4-7-3
P/O 4-7-1
P/O 9-2-8
P/O 4-1-7
P/O 9-1-8
P/O 9-2-2
P/O 5-1-1
P/O 31-2-2



Sanborn Map
1924
Source: Woburn
Engineering
Department
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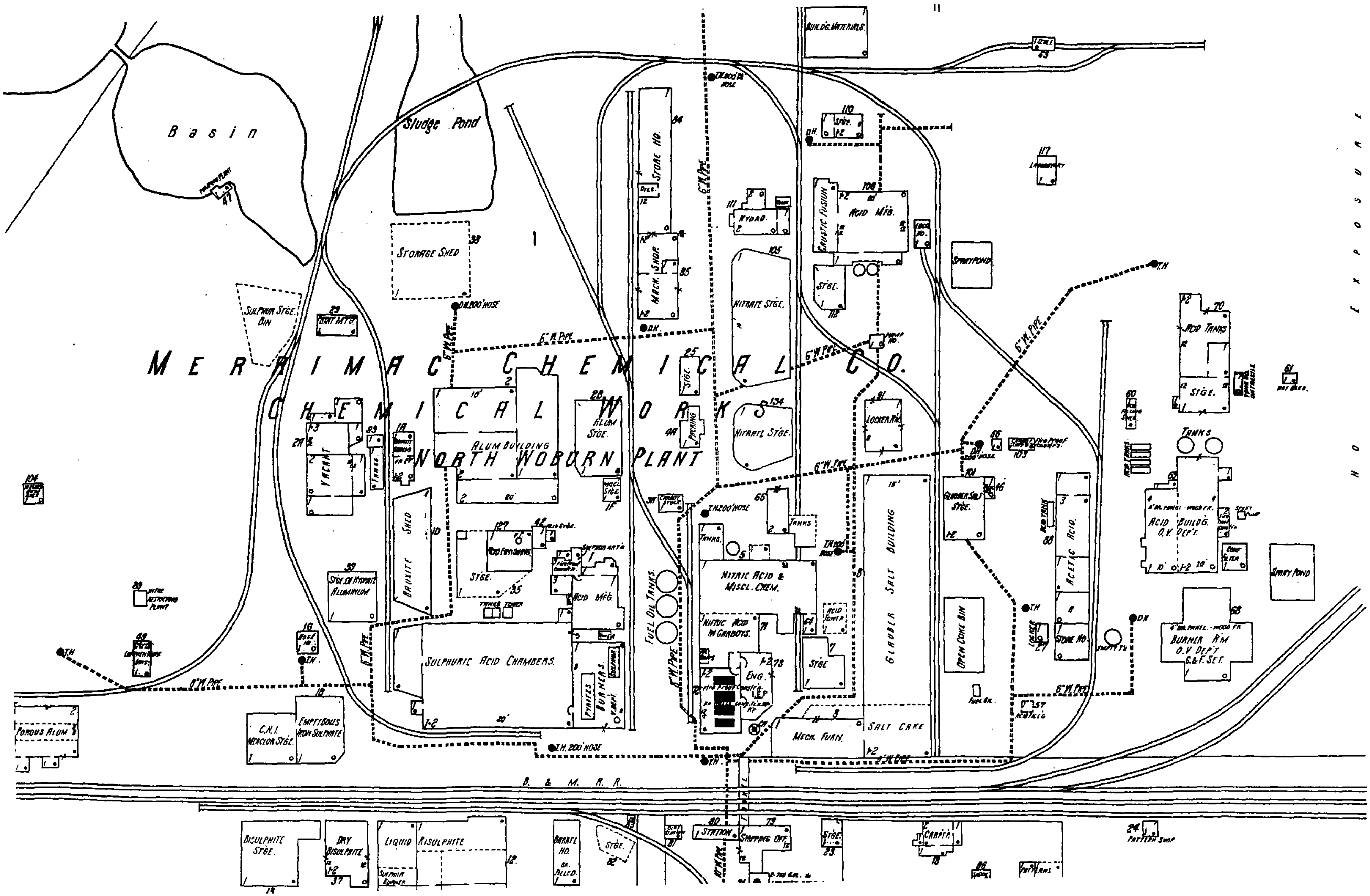

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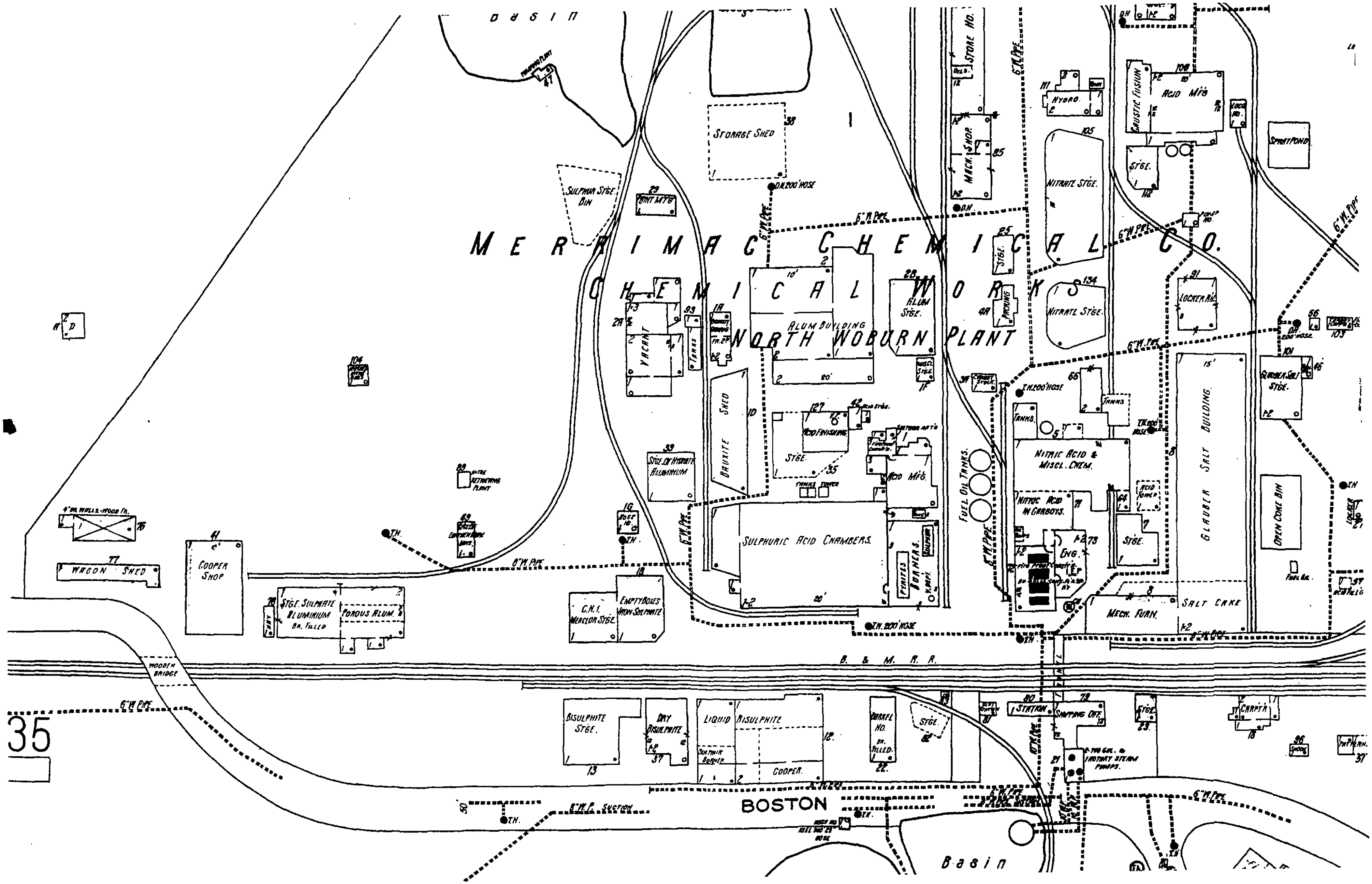

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Appendix E

North Pond Fill and Industri-Plex Information

PUBLIC HEALTH ASSESSMENT

INDUSTRI-PLEX
WOBURN, MIDDLESEX COUNTY, MASSACHUSETTS
CERCLIS NO. MAD076580950

December 26, 1995

Prepared by

The Bureau of Environmental Health Assessment
Massachusetts Department of Public Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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PUBLIC HEALTH ASSESSMENT

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SUMMARY

The 244 acre Industriplex site is located in Woburn, Massachusetts, and was previously the location of various chemical manufacturing plants, and most recently a hide glue manufacturing plant. The U.S. Environmental Protection Agency has included the site in a study area that extends west of the site to New Boston Street and south to Mishawaum Road. Various chemicals have been detected on-site and off-site in the surrounding study area. Arsenic, chromium, lead, benzene, and toluene are the primary contaminants on-site and were generally detected at elevated concentrations in soils and sediments. Volatile organic compounds (VOCs), semi-volatile organic compounds (semi-VOCs), polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and other metals were also detected on-site and in the study area.

Populations with the greatest potential for historical exposures to contaminants originating from the site are on-site workers, unauthorized individuals who accessed the site, and workers and residents in the site vicinity. Exposure pathways of concern include inhalation of contaminated fugitive dusts, ingestion of soils, sediments, and surface water, and absorption due to dermal contact. Based on the available information, this site represents a public health hazard due to the risk to human health resulting from probable exposure to hazardous substances at the site in the past. The chemical present at concentrations at which adverse human health effects is known to occur is arsenic. Individuals who may have accessed the site in the past would have been at the greatest risk of exposure due to contamination of the soil (0-12 inch depth), subsurface soil, and sediment. The main exposure route at the site would have been ingestion of these contaminated media. It should be noted that the sampling in surface soil and sediment were done at 0-12 inches depth. However, the ATSDR considers soil and sediment from the top 0-3" to represent the depth to which most people are likely to be exposed. If the contaminants are concentrated in the top three inches of the media, sampling at 0-12" will in general underestimate exposure. Conversely, if the contaminants increase in concentration as you increase in depth, the exposure will be overestimated. At the time of the writing of this health assessment no data were available for soil or sediment sampling at 0-3".

The health effects which are expected to occur as a result of exposure to site related contaminants are mainly associated with exposure to contaminants in on and off-site soil 0-12". Ingestion of arsenic contaminated soil 0-12" may have resulted in abdominal pain, diarrhea, and sore throat. Dermal exposure to chromium in this media could have enhanced already existing dermatitis. Ingestion of lead contaminated soil may have caused mild hematological effects by disrupting enzyme activity. All these effects are reversible and would have been effectively halted with the termination of exposure.

The site is currently considered a no apparent public health hazard because no exposures to levels of concern are believed to be ongoing. Exposure to contaminated soil is reduced by the present remediation activities which include the decontamination of workers and equipment that enter and leave the site. The presence of soil cover over approximately one-third of the site, fencing, and a 24 hour security guard also reduce opportunities for exposure via ingestion, inhalation, and dermal contact with contaminated soil. An air sparging system that removes VOCs in ground water will also reduce the potential for volatilization of VOCs into the indoor air of buildings in the path of the groundwater plume. Exposure to contaminants through contact with surface water is also limited by the location and site of on-site surface water bodies which make them highly undesirable for recreational use. However, the extent of residents' access and whether or not they fish in these waters should be evaluated. Finally, the current remediation of the site has reduced the risk of soil gas migration and contamination of indoor air.

Recommendations made in this public health assessment call for prevention of the future use of contaminated groundwater in the Aberjona River aquifer for drinking water supplies. Community education to discuss the site issues is also recommended.

The data and information developed in the public health assessment for the Industri-plex Site have been evaluated by ATSDR's Health Activities Recommendation Panel. Because of probable past exposure and community health concerns regarding adverse health effects, the HARP determined that community education, including the results of the Woburn Environment and Birth Study and Woburn Childhood Leukemia Follow-Up Study, should be provided. The MDPH will provide this education to the Woburn community to assist in their understanding of potential exposures and assessing any adverse health occurrences. HARP concluded that no other health studies or actions are needed at this time because of these two studies. However, the MDPH will continue to monitor cancer incidence rates for the town of Woburn through the Massachusetts Cancer Registry at MDPH.

Should additional information become available that alters the findings of this public health assessment or addresses the data needs described herein, a health consultation will be written to address any additional issues surrounding this site.

BACKGROUND

A. Site Description and History

Site Location and Current Physical Appearance

The Industriplex National Priority List (NPL) site is located in Woburn, Middlesex County, Massachusetts, approximately ten miles north of Boston (Figure A-1). The Industriplex site is located at the north end of an industrial park known as the Industriplex property (Figure A-2). The site is bounded to the east by Route 93, to the north by private property, to the west by the boundaries of the Boston Edison Right-of-Way, New England Pigments and Resin and private property, and to the south on a line running perpendicular to the railroad tracks in the area south of Atlantic Avenue. It is located near the intersection of two major highways, Interstate 93 and Interstate 95. The 244 acre site was placed on the U.S. Environmental Protection Agency (EPA) Interim List of "115" Top Priority Sites in December 1981. EPA's National Priority List is a list of top priority hazardous waste sites that are eligible to receive federal funding towards site investigation and cleanup [19].

Between 1853 and 1931 the site was the location for production of a variety of chemical products. For a short period between 1931 and 1934 no manufacturing operations were conducted at the site. From 1934 to 1968 the site was the location of two successive glue manufacturing companies. In 1968 the site was purchased by Mark Phillip Trust to be developed as an industrial park [19]. Currently, the site is enclosed by a chain link fence topped with barbed wire. Within the fence are the following: (1) the arsenic pit (11 acres); (2) the chromium lagoons (9.5 acres); (3) the east hide pile (3.2 acres), the west hide pile (2.6 acres), the east central buried hides (5.7 acres), the south central hide pile (1.4 acres); and (4) the remains of a former factory (Figure A-3). A total of seven air monitoring stations are located on-site. Three of these stations are at set locations, and four of the stations are mobile. Approximately one-third of the land on-site has been covered with soil cover (on the west side of the MBTA tracks) and remediation of the remaining two-thirds is presently under way. Wetland remediation is also underway at the site. The foundation of an air sparging system is located on the Digital Equipment Corporation (DEC) property. This system was not completed and a new air sparging system is in place off-site, north of the Halls Brook Holding Area on the Edison Right of Way. In November 1994, pilot studies were conducted to test the efficacy of this new system.

Since the completion of these pilot studies, a proposed work plan was submitted, in September 1995, for an enhanced demonstration of this proposed remedial option. This latest plan is based upon oxygen injection system, and is currently under review.

Operational Activities

Industriplex was designated an NPL site in 1981 by the U.S. Environmental Protection Agency (EPA) based on contamination of water and soil. From 1934 to 1969, Stauffer Chemical Company (and companies Stauffer acquired) owned and operated a hide glue manufacturing plant on 184 acres of the 244 acre site. The site boundary and former Stauffer property is shown in Figure A-4. A Consent Order between Stauffer, the EPA, and the Department of Environmental Quality Engineering (DEQE, now the DEP) was signed in May 1982 which required Stauffer to undertake a two phase remedial investigation and recommend appropriate remedial action for the site. A Remedial Investigation is a summary report of the information collected on the nature and extent of contamination found at a Superfund site and the problems that the contamination causes. Remedial action is action taken to correct site contamination problems through identifying the nature and extent of cleanup strategies under the Superfund program.

Since 1853, the Industriplex site was used for manufacturing various products. Between 1853 and 1933, Woburn Chemical Works, Merrimac Chemical Company, and Monsanto Chemical Company occupied the site. From 1934 to 1969, New England Chemical Company, Consolidated Chemical Company, and Stauffer Chemical Company operated on-site. Since 1969, Mark Phillip Trust and a few other parties have occupied the site, during which time construction activity for an industrial park uncovered the industrial by-products and wastes that had accumulated on the site during the previous 120 years [21].

Between 1853 and 1933, chemical manufacturing for local textile mills, leather and paper industries, and for arsenic insecticides, acetic acid, and dry colors was conducted on-site by Woburn Chemical Works (1853 - 1863), Merrimac Chemical Company (1863 - 1929), and the Merrimac Division of Monsanto (1929 - 1933) [21].

A major chemical produced at the site during that time was sulfuric acid, which was subsequently used to manufacture hydrochloric acid and tin chlorides. The major substances used in the manufacturing processes were lead, arsenic, sulfur, pyrite ore, and dry colors. The pyrite ore contained a number of heavy metals and the dry colors probably contained lead, mercury, and chromium [21].

Based on available information, it appears that most wastes from these operations were disposed of on-site by filling in swampy, low-lying areas [21]. According to the Phase I Investigation, two streams and ponds or swamps ran through the site in 1888. However, by 1926, large areas of ponds or swamps had been filled in (Figure A-5). Up to 10 feet of artificial fill covers approximately 26 acres of the 244 acre site [21]. This artificial fill includes waste deposits from manufacturing operations. A settling lagoon area was present in the vicinity of the present arsenic pit in the north central portion of the site [21].

From 1931 - 1934 the property was vacant and no operations were conducted on-site. In 1934, the property was sold to the New England Chemical Company, and an animal glue manufacturing plant was constructed on-site. The property was purchased by Consolidated Chemical Company in 1936, and then by Stauffer Chemical Company in the late 1950's. The glue manufacturing process involved cooking raw animal hides and waste chrome tanned hides to extract the glue and then concentrating the extract by evaporation and drying. Chromium present in the chrome tanned hides was removed before cooking. This chrome tankage and other wastes were then hauled to burial pits on-site. Sodium hydroxide, sulfuric acid, and magnesium carbonate were used to speed the extraction process [21].

Wastewater from the glue manufacturing process was discharged to a primary treatment system consisting of a small settling basin (75' to 100' on each side), a series of grease collection basins, and a large settling lagoon (300' x 400'). The large settling lagoon constructed in 1938 was split into 2 sections after 10 years of operation. One section of the lagoon was only used for a year and then taken out of service to dewater. After treatment, the wastewater was discharged to the municipal sewer system. Sludge, consisting primarily of lime, hair, and larger pieces of hide, was allowed to settle to the bottoms of the basins and lagoon. The sludge was then removed and hauled to the disposal pits or spread on the ground east of the main plant building [21].

Other solid waste consisted of trash, dewatered solids from pits on the east and west side of the small concrete settling basin, dewatered solids from wastewater settling lagoons, and tankage and wood shavings left after cooking the hides for glue. All solid waste was buried on-site in pits, a few of which are estimated to be up to 18-20 feet deep [21]. These pits were covered with soil when filled.

The area where Stauffer buried waste on the site was located in the south central and central portions of the site. For an approximate location of Stauffer waste burial material, refer to Figure A-6.

In 1969, Stauffer sold the major portion of its property to the Mark Phillip Trust and a small fraction to others. The Mark Phillip Trust began to develop the site for industrial use. Excavation activities during this development period created noxious odors by exposing decaying hide material. In addition, these activities relocated and combined many waste deposits into piles near swampy areas on the property [21]. Waste deposits were relocated into the current east and west waste piles which cover several acres adjacent to or in the north pond. In addition, the site was allegedly used by third parties for dumping various sludge and liquids. According to local newspaper articles, various wastes were observed being dumped at the site [21].

Site Regulatory History

The excavation of the site by Mark Phillip Trust in the late 1970's uncovered the hide disposal areas and created noxious odors. Due to continuing noxious odors and site development, concerned local citizens attempted through local, state, and federal officials to force the Mark Phillip Trust to either control odors and dust or to stop development completely. The DEQE (now the DEP) and the Town of Reading obtained a restraining order in 1977. However, activity continued until EPA obtained a Court Order stopping development in 1979. In 1981, the site was listed on the Superfund Interim List of "115" Top Priority Hazardous Waste Sites [21]. About 150 acres of the site were fenced in 1984 [22].

Remediation History

In May 1982, the Stauffer Chemical Company voluntarily signed a Consent Order with the EPA and the DEQE (now the DEP). Stauffer agreed to evaluate the site to collect information needed to locate waste deposits, assess the environmental impacts of waste deposits, delegate responsibilities, and evaluate and recommend remedial actions.

In April 1983, Phase I of the Woburn Environmental Studies Investigation was completed. It was designed to screen the site to locate waste deposits and gather information on groundwater, surface water, and odors needed to assess the extent of environmental contamination [21].

Phase II of the investigation consisted of a Remedial Investigation and a Feasibility Study which were completed in August 1984. During Phase II investigations, additional site data were collected on soil and waste deposits, groundwater quality, and volatile chemical emissions [22].

As part of the "Pre-Design Investigation (PDI) Task GW-2", the sampling and analysis of the discharge water from the step test and the pumping test was performed in October 1990 to determine if the groundwater might contain contaminants at concentrations that could adversely effect stream plants and animals [15].

In April and June of 1990, sediment samples were collected and analyzed as part of the "PDI Task SW-1" to determine the extent of hazardous substances in wetland and surface water sediments [18].

Air monitoring data were presented in three reports: "The Interim Report of Particulate Monitoring at the Woburn Hazardous Waste Site" in December 1980, "The Evaluation of Hydrogen Sulfide Concentrations at Residential and Commercial Sites Surrounding a Woburn Construction Area" in August 1977, and "The Analysis of Industriplex 128 Hi-Vol Filters by Inductively Coupled Argon Plasma (ICAP)" in June 1981 [10,4,9]. A baseline air survey was conducted in August, 1990 for the "PDI Task A-1" to establish an effective air monitoring program and to determine acceptable on-site and off-site air quality standards for hazardous volatile compounds and/or other odorous compounds and dusts (14).

The "PDI Task S-1" and its "Supplemental Report" were conducted to assess, by soil boring and test pits, the horizontal and vertical extent of hazardous substances within the site. Developed areas of the site were sampled as well as undeveloped areas of the site where existing data are inadequate. The "PDI Task S-1" and the "Supplemental Report" were completed in September 1990 and in January 1991, respectively [16,17].

Groundwater quality was also tested in 1980 in two reports entitled "The Evaluation of the Hydrogeology and Groundwater Quality of East and North Woburn, MA" (June 1982) and "The Inventory and Analysis of Existing Well Data for East and North Woburn, MA" (January 1981) [5,6]. In a report conducted by the DEQE (now the DEP) in October 1979, the sampling of soils for metals was conducted at the Industriplex site [3].

"The Groundwater/ Surface Water Investigation Plan (GSIP I) Phase 1 RI Final Report", from June 1991 characterized the contaminants present in the groundwater and surface water and stream sediment on site [24]. In May 1992, "GSIP II" further characterized groundwater conditions and HBHA sediments [25]. "The 100% Design Report Part 1", completed in April 1992, details design information on the selected remedy for groundwater, surface soil, soil gas, and surface water [28]. "The Surface Water Quality Sampling Report for the Fourth Quarter at the: Industriplex Site Remediation Project-October - December 1993 was completed in January 1994. This report dealt with surface water quality at the site [23].

B. Site Visit

On June 25, 1992, a site visit was conducted at the Industriplex site by a MDPH Environmental Analyst (Gail Garron Whyte) and a Toxicologist from the Woburn Environment and Birth Study (Elaine Krueger). During the course of the site visit, the current site appearance (physical hazards and security) was noted. The undeveloped portion of the site is surrounded by a fence topped with barbed wire. The access gate is well maintained, and warning signs are prominently placed on the gates and periodically along the entire fence. Physical hazards at the site include the arsenic pit, the chromium lagoons, animal hides, both buried and in piles, the remains of the former on-site factory, several trailers, and various pieces of debris (tires, car batteries, empty drums, pieces of wood and iron) which appear to have been thrown over the fence onto the site. The items mentioned here would be accessible to unauthorized individuals who access the site. However, it is unlikely that people will gain entry. A small child might be able to fit through the fence, but there is no evidence of human activity on-site. Other observations included the presence of grass and plants covering the hide piles, the location of surface water bodies, the location of nearby businesses and residences, and the overall maintenance of the site. The site is generally clean and well maintained.

Located on-site are streams, ponds, operating facilities (i.e., chemical corporations, manufacturing facilities, and offices), the remains of an abandoned chemical factory, waste deposits buried and in piles, railroad tracks, and utility rights-of-way. The site has several small surface water bodies including the Aberjona River and its three tributaries which discharge into the Mystic River. Other on-site surface water bodies include the railroad drainage ditch which is fed by several smaller ditches, Phillips Pond next to Route 93, and two to three other ponds east of Commerce Way. The Boston and Maine Railroad tracks run through the western portion of the site and the Boston Edison Right-of-Way runs along the western site border.

An additional site visit was conducted on February 22, 1994 to the Industriplex site in Woburn, Massachusetts. The visit was carried out by an MDPH Environmental Analyst (Julie Watts), the DEP Project Manager for the site, the Remedial Trust Site Manager, and the coordinator for the Industriplex Site Remedial Trust (ISRT).

Several changes had occurred on-site since the last site visit in June 1992. Most notably, workers are on-site doing remediation work. None of the physical hazards noted above are currently present on-site. Physical hazards observed during the February 1994 site visit are presented in the "Environmental Contamination and Other Hazards" section.

The site is located in a light industrial area near a shopping mall, bus depot, and residential neighborhood. The main entrance to the site is secured by a chain link fence and a 24 hour security guard. The area is covered with vegetation and gravel. The hide piles were evidenced by an increase in the elevation of land in some areas on the site. Four fixed air monitoring stations were pointed out by the Site Manager. The Aberjona River and MBTA tracks were seen during the visit. Remediation workers were observed on-site in several of the areas. A slight odor was noticeable during the visit. There was no evidence of trespassing.

Halls Brook Holding Area was seen in the study area, off the site boundary. It is readily accessible to residents and trespassers. However, the area is undesirable and no one was observed using the area during the site visit. Nevertheless, the extent of residents' access to the Halls Brook Holding Area and any fishing activity should be evaluated. Light industrial and office buildings were observed on and off-site, within the study area. The foundation of an air sparging station was observed on the property of Digital Equipment Corporation. This has been abandoned, and another station has been built nearby.

C. Demographics, Land Use, and Natural Resource Use

Demographics

The Industriplex site is located in the northeastern section of Woburn, with Reading bordering the site to the east and Wilmington to the north. The 1990 U.S. Census indicated 35,943 individuals live within the City of Woburn [20]. The population size decreased by 1.9% during the period 1980 to 1990. The closest residences are located approximately one and a quarter miles to the south of the site on Mishawum Road, a mile to the east of the site in Reading across Route 93, half a mile to the north of the site in Wilmington on Oxbow Drive, and half a mile to the west of the site at the intersection of North Maple and Merrimac Streets. The closet school is a daycare center located on School street less than 1 mile from the site. The closest businesses are located both on-site and adjacent to the site to the south, west, and north.

The city of Woburn obtains its drinking water from wells in the Horn Pond aquifer in south central Woburn approximately three and a half miles southwest of the site. The Horn Pond aquifer is separate from the aquifer affected by the site. The municipal supply is supplemented by the Metropolitan District Commission (MDC) with water originating at a surface water reservoir located in western Massachusetts [8].

There is only one school in Woburn within a one-mile radius of the Industriplex site. The Altavesta School on Main Street and the Linscott School on Elm Street are located just outside the one-mile radius [13]. There are no hospitals within a one-mile radius of the site. The Choate Clinic, located more than two miles southwest of the site on Warren Avenue, is the closest medical facility. Neither of the two nursing homes in Woburn are located within one mile of the site. Of the four elderly housing complexes within the city of Woburn, none are located within one mile of the site. The closest is located just outside the one-mile radius on the Nichols Street Extension [11].

Land Use

Land use on-site and in the site vicinity is mainly commercial/industrial. The site from south of Commerce Way to the Wilmington border is zoned as an Industrial Park [12]. The undeveloped portion of the site, parts of which are wetlands, is situated north of Commerce Way and Atlantic Avenue and extends to the northern site boundary. Currently, this portion of the site is fenced and guarded to prevent access by unauthorized personnel. It has been reported that in the past, portions of the fence have been cut and access was obtained for recreational vehicle use [12]. However, according to the Woburn Planning Office, no known access has occurred within the past year.

Within the Department of Environmental Protection (DEP) "List of Confirmed Disposal Sites and Locations to be

Investigated, March 1990", at least thirty DEP known or suspected sites are listed within a mile of the site [7]. The nine DEP sites closest to Industriplex are Dundee Park, New England Resins and Pigments, Globe Ticket Company, Three C Company, Winn Trucking Terminal, and Stafford Manufacturing Company on New Boston Street, Destafano Studios on Commerce Way, Chomerics on Commonwealth Avenue in Woburn, and Edward Whitney and Son on Woburn Street in Wilmington. Woburn's sanitary landfill is located adjacent to the northwestern corner of the site just west of the railroad tracks.

Natural Resource Use

Historically, the Woburn municipal drinking water supply has been primarily obtained from wells in the Horn Pond and the Aberjona River aquifers. Prior to 1979, Woburn received its drinking water primarily from two sets of wells. Seven municipal drinking water wells are located in the vicinity of Horn Pond in the southern part of Woburn and two wells, Wells G and H, are situated near the Aberjona River. Wells G and H were closed in 1979 due to the presence of contaminants in the groundwater [8]. They were listed as a separate NPL site by the EPA in 1982. ATSDR has evaluated contamination in those wells in a public health assessment specific to that site.

Currently, Woburn drinking water comes from the seven Horn Pond aquifer groundwater wells, supplemented with water from the MDC which originates at a surface water reservoir located in western Massachusetts. The Horn Pond aquifer is separate from the Aberjona aquifer and the water quality of the Horn Pond wells is not affected by contamination in the Aberjona watershed [8].

The Woburn study area is located entirely within the Aberjona River Watershed. The Aberjona River, which drains the watershed, has its headwaters in Reading and flows to the south for 8.7 miles before discharging into the Upper Mystic Lake.

The study area is underlain and surrounded by a large aquifer. The site is located within a regional buried glacial valley which is incised into igneous bedrock. This feature, called the Fresh Pond Buried Valley, trends south-southeast, and begins just to the north of the site. The Fresh Pond Buried Valley has been traced from Wilmington to Boston and coincides with the course of the Aberjona River. Beneath the site, this remnant valley measures approximately 2 miles across and up to 170 feet deep in places. The unconfined aquifer underlying the Industriplex study area (the Aberjona River aquifer) is comprised of mainly unconsolidated stratified glacial drift deposited during and subsequent to glaciation of the area. The unconfined aquifer thins to less than 10 feet in the northern portion of the study area and thickens to greater than 100 feet in the south-central portion. The site is underlain by bedrock of low permeability. Unconsolidated deposits overlying the bedrock are low permeability glacial till, permeable outwash sands, peat, and miscellaneous fill deposits (including chemical wastes and hide residues).

The water table within the study area exhibits a valley or trough-like shape similar to the buried bedrock valley beneath. Groundwater enters the site from the north. The primary direction of groundwater flow is to the south through the central portions of the aquifer. Along the edges of the aquifer, the water table is steep and surficial deposits are thinner. Groundwater west of the buried valley will flow towards the southeast, whereas groundwater east of the valley will flow towards the southwest.

It is known that there are no industrial wells drawing water from the site. The current installation of groundwater wells is limited to those used for remedial purposes [12]. The only known currently operating industrial wells are used for the irrigation of the lawns of businesses on Constitution Way [12]. There are no known potable supply wells in the Aberjona valley downgradient of the site within the area of investigation north of Mishawum Road [21]. Mishawum Road is located approximately 1.25 miles to the south of the site and is hydrogeologically downgradient of the site. Three domestic wells are located downgradient and further south of the site, but the status of their use is not known. These wells are located 1.5 miles to the south, 1.5 miles to the southwest, and 3 miles to the south of the site. Although required by state law to report the installation of private domestic water supply wells to the local board of health, it should be emphasized that the ownership of such wells is self-reported, and that non-reported wells may exist. Enforcement of the law by towns within the state is variable. Older private wells are not likely to be reported.

Currently, Horn Pond to the southwest of the site is the only known surface water body used for recreational purposes in the area [8]. This pond is not affected by the Industriplex site because it is fed by a different aquifer. Surface water bodies on and around the site are not used recreational due to their location and size. The Aberjona River runs through the center of Commerce Way and is the size of a small stream at this point. The wetland areas of the site are surrounded by industries and are not appealing to the public as areas of recreation.

D. Health Outcome Data

Relevant health outcome data were obtained from the Massachusetts Cancer Registry which is maintained by the MDPH Bureau of Health Statistics, Research and Evaluation. Cancer incidence data for the years 1982 - 1988 included types of cancer determined to be of concern based on exposure to chemicals at the site and community concerns. Analyses were made at the city and census tract levels. Population data were obtained from the Region I Office of the U.S. Census.

COMMUNITY HEALTH CONCERNS

Community concerns about the Industriplex site are evident. Numerous newspaper articles have reported on health impacts from the site and a high volume of correspondence has been received by state and federal regulatory and health officials. On the community level, a citizen group called "For a Cleaner Environment" (FACE) was established because residents were concerned about the number of childhood leukemia cases in the area.

Topics identified as being of particular public health concern include the past, present, and future threat to public health due to site related contaminants in soil, air, and groundwater. Citizens have also continued to express concern about adverse health effects including leukemia, reproductive outcomes, and child health issues that may be related to environmental exposures. Specific health concerns are stated as follows:

1. Could exposure of children or their parents to chemicals from the site be responsible for the excess of leukemia cases?
2. Is the incidence of adverse reproductive outcomes in the site vicinity elevated when compared to the normal or average population?
3. Are the chemicals at the site posing a current health risk?
4. Could the odorous gases emanating from the site during the excavation of hide piles have affected the public health?

On August 11, 1995, in the **Daily Times Chronicle**, the MDPH invited public comments on the public health assessment for the Industri-plex site. During the public comment period, which ended on September 12, 1995, no comments were received.

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PUBLIC HEALTH ASSESSMENT

INDUSTRI-PLEX
WOBURN, MIDDLESEX COUNTY, MASSACHUSETTS

CONCLUSIONS

1. The site is judged a public health hazard because of the risk to human health resulting from probable exposure to hazardous substances at the site in the past. Ingestion of arsenic contaminated soil 0-12" may have resulted in abdominal pain, diarrhea, and sore throats. Dermal exposure to chromium in this media could have enhanced already existing dermatitis. Ingestion of lead contaminated soil may have caused mild hematological effects by disrupting enzyme activity. All these effects are reversible and would have been effectively halted with the termination of exposure, which is no longer believed to be ongoing.

2. Currently, the site poses a no apparent public health hazard for several reasons: (1) the presence of a fence and 24 hour security prevents access to the site by unauthorized personnel; (2) on going remediation has reduced the migration of contaminants off-site and the release of contaminants into the ambient air; and (3) the use of Hall's Brook Holding area for recreational purposes is highly unlikely due to it's location in an industrialized area.

3. Concerns about the impact of the Woburn environment on human health focused on the serious elevation is both total and male childhood leukemia incidence, as well as elevations in kidney cancer mortality. A panel of experts was convened by the MDPH to determine if a link exists between environmental contamination originating from this site and health problems in the vicinity of the site. Along with Woburn Environment and Birth Study (WEBS), which was designed to address the concerns of the panel, the MDPH conducted an expanded case control study of childhood leukemia.

4. An analysis of health outcome data (WEBS study) did not indicate an elevated incidence of adverse reproductive outcomes in Woburn when compared to twelve surrounding communities. Analyses of health outcome data within Woburn itself did not indicate that environmental contaminants in the public water supply had an adverse effect on the reproductive health of exposed subgroups of Woburn residents.

5. Site related contaminants have reached the Aberjona River and the groundwater of the Aberjona River aquifer. Since the Aberjona River aquifer is not used as a potable water supply it is unlikely that exposure will occur via this pathway. Contaminants are present in the Aberjona River at low concentrations which are not expected to result in adverse health effects to people who use the river for recreational purposes.

6. Elevated levels of hydrogen sulfide in soil gas (or bore hole air) occurred in the past; however, hydrogen sulfide has not been detected in ambient air at the site. Currently, the risk of exposure to hydrogen sulfide in soil gas has been effectively reduced by stabilization of the hide piles and thermal oxidation of the soil gas. Past elevations of hydrogen sulfide in soil gas were such that anyone exposed without proper personal protective equipment were at risk of severe health effects.

RECOMMENDATIONS

1. Prohibit the use of contaminated portions of the Aberjona River Aquifer for potable purposes.

2. Determine the extent of site contamination in sediments downstream in the Aberjona River.

3. Provide personal protective gear to workers on site during remediation in order to minimize their exposure and the subsequent risk of adverse health effects.

4. The MDPH should provide community education related to various site issues.

5. Monitor incidence of childhood leukemia and kidney cancer in Woburn through the Massachusetts Cancer Registry.

6. Should additional information become available that alters the findings of this public health assessment or addresses the data needs described herein, this public health assessment will be modified by a health consultation when

appropriate.

7. Determine whether people are fishing in the Hall's Brook Holding Area.

HEALTH ACTIVITIES RECOMMENDATION PANEL (HARP) RECOMMENDATION

The data and information developed in the public health assessment for the Industri-plex Site, Woburn, Massachusetts, have been evaluated by ATSDR's Health Activities Recommendation Panel for appropriate follow-up with respect to health activities. Because of probable past exposure and community health concerns regarding adverse health effects, the HARP determined that follow-up health actions are indicated. Community education is the primary activity indicated by HARP in order to assist the community in understanding its potential for exposures and assessing any adverse health occurrences. The results of the Woburn Environment and Birth Study and Woburn Childhood Leukemia Follow-up Study should also be addressed within this education program. HARP concluded that no other health studies or actions are needed at this time because of WEBS and the Childhood Leukemia Follow-Up Study.

PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan (PHAP) for the Industri-Plex NPL Site contains a description of actions to be taken by ATSDR and/or the MDPH at and in the vicinity of the site subsequent to the completion of this Public Health Assessment. For those actions taken at the site, please see the Background section of this document. The purpose of the PHAP is to ensure that this health assessment not only identifies public health hazards but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR/MDPH to ensure that it is implemented. The public health actions to be implemented are as follows:

1. The MDPH will continue to monitor cancer incidence rates for the town of Woburn through the Massachusetts Cancer Registry at the MDPH.

2. The MDPH will provide education to the Woburn community to assist in their understanding of potential exposures and assessing any adverse health occurrences. The results of the Woburn Environment and Birth Study and Woburn Childhood Leukemia Follow-Up Study will also be addressed within this education program.

CERTIFICATION

The public health assessment for the Industri-plex site was prepared by the Massachusetts Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was begun.

Gregory V. Ulirsch
Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment, and concurs with its findings.

Richard Gillig
for Director, DHAC, ATSDR

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REFERENCES

1. Agency for Toxicological Substances and Disease Registry, U.S. Public Health Service. Health Assessment for Wells G and H Site. Cerclis No. MAD001002252. Woburn, Massachusetts. February 21, 1989.

2. Agency for Toxicological Substances and Disease Registry, U.S. Public Health Service. Toxicological Profiles for -
   Antimony, September 1992
   Arsenic, April 1993
   Cadmium, Update April 1993
   Chromium, Update April 1993
   Copper, December 1990
   1,2-DCA, Update May 1994
   Di(2-ethylhexyl) phthalate, Update April 1993
   Lead, Update April 1993
   Manganese, July 1992
   2-Butanone (MEK), July 1992
   PCBs, Update April 1993
   PAHs, Draft - Update October 1993
   Thallium, July 1992
   1,1,1-TCA, Draft - Update October 1993
   Zinc, Update October 1992

3. The Commonwealth of Massachusetts Department of Environmental Quality Engineering, "Special Analysis Woburn Waste Site Project." October 1979.

4. "Evaluation of Hydrogen Sulfide Concentrations at Residential and Commercial Sites Surrounding a Woburn Construction Area." Bolt Beranek and Newman, Inc. August 1977.

5. "Evaluation of the Hydrogeology and Groundwater Quality of East and North Woburn, Massachusetts." Ecology and Environment Inc. June 25, 1982.

6. "Inventory and Analysis of Existing Well Data for East and North Woburn, Massachusetts." January 1981.
7. Massachusetts Department of Environmental Protection, Division of Hazardous Wastes. "List of Confirmed Disposal Sites and Locations To Be Investigated." March 1990.
8. Massachusetts Department of Public Health and Massachusetts Health Research Institute. "Scientific Protocol for the Woburn Environment and Birth Study." May 1990.
9. Memorandum To: Dick Chelpin from Jim Miller, June 10, 1981 Re: Analysis of Industriplex-128 Hi-Vol Filters by Inductively Coupled Argon Plasma.
10. Miller, Jim. "Interim Report of Particulate Monitoring at the Woburn Hazardous Waste Site." December 12, 1980.
11. Personal Communication with Woburn Elderly Housing Office. July 1992.
12. Personal Communication with Woburn Planning Office. July 1992.
13. Personal Communication with Woburn School Department. July 1992.
14. "PDI, Task A-1. Baseline Air Survey. Industriplex Site, Woburn, Massachusetts." Golder Associates Inc. September 1990.
15. "PDI, Task GW-2. Hydrogeologic Characterization for the Extraction/Recharge System, Interim Final Report. Industriplex Site, Woburn, Massachusetts." Golder Associates Inc. December 1990.
16. "PDI, Task S-1. Extent of Hazardous Substances in Soils, Interim Final Report. Industriplex Site, Woburn, Massachusetts." Golder Associates Inc. September 1990.
17. "PDI, Task S-1. Extent of Hazardous Substances in Soils, Supplemental Report. Industriplex Site, Woburn, Massachusetts." Golder Associates Inc. January 1991.
18. "PDI, Task SW-1. Extent of Hazardous Substances in Wetlands and Surface Water Sediments, Interim Report. Industriplex Site, Woburn, Massachusetts." Golder Associates Inc. August 1990.
19. "Record of Decision - Remedial Alternative Selection." EPA Region I. September 1986.
20. U.S. Department of Commerce. "1990 Census of Population: General Population Characteristics, Massachusetts." Washington, D.C., U.S. Government Printing Office.
21. "Woburn Environmental Studies Phase I Report." Stauffer Chemical Company. April 1983.
22. Woburn Environmental Studies Phase II Report." Stauffer Chemical Company. August 1984.
23. Surface Water Quality Sampling Report for the Fourth Quarter at the Industriplex Site Remediation Project. October - December 1993. USEPA January 1994
24. Groundwater/Surface Water Investigation Plan Phase I Remedial Investigation Plan Draft Report. Roux Associates. June 1991
25. Groundwater/Surface Water Investigation Plan Phase II Remedial Investigation Plan Draft Report. Roux Associates. May 1992
26. Digital Equipment Corporation - Results of an Indoor Air Monitoring Study. Courtesy of Massachusetts Department of Environmental Protection. December 17, 1993
27. Digital Equipment Corporation - Results of VOC Personal Sampling. Courtesy of Massachusetts Department of Environmental Protection. March 8, 1993
28. 100% Design Report Part I Industriplex Site, Woburn, Massachusetts Vol. 1. Golder Associates April 1992

29. Preliminary Design Report - Interim Groundwater Remedy, Industriplex Site Woburn, Massachusetts. ISRT. October 1992

30. PDI Task A-2 Gas Treatability Interim Final Report, Industriplex Site, Woburn, Massachusetts. October 1990

31. MIT Superfund Basic Research Program. MIT Center for Environmental Health Sciences June 1994

32. Arena, J. M. and Drew, R. H. (eds) Poisoning: Toxicology, Symptoms, and Treatments 5th Ed. Charles C. Thomas Springfield 1986

33. Klassen, D. C.; Amdur M. O. and Doull, J. (eds) Casarett and Doull's Toxicology: The Basic Science of Poisons 3rd Ed. Macmillan Publishing Co. New York 1986

REFERENCES REVIEWED BUT NOT CITED

PDI Task SW-2 Surface Water Treatability Interim Final Report - Industriplex Site Vol 1. Golder Associates Inc. April 1991

PDI Task GW-3 Groundwater Treatability Interim Final Report - Industriplex Site Vol 1. Golder Associates Inc. April 1991

PDI Task A-1 Baseline Air Survey Industriplex Site, Woburn, Massachusetts Golder Associates Inc. May 1991

PDI Task S-2 Stability of Hide Piles Interim Final Report Industriplex Site Woburn, Massachusetts September 1990

PDI Task GW-1 Plume Delineation Interim Final Report Industriplex Site, Woburn, Massachusetts Vol 1 and 2. Golder Associates January 1991

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PUBLIC HEALTH ASSESSMENT

INDUSTRI-PLEX
WOBURN, MIDDLESEX COUNTY, MASSACHUSETTS

APPENDIX A: FIGURES

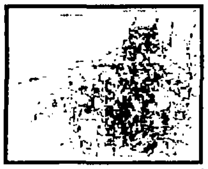

Figure A-1: Map of Woburn, Massachusetts

Figure A-2: Industriplex Site

Figure A-3: Industriplex Site West of Commerce Way

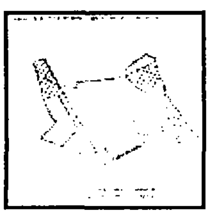

Figure A-4: Site Boundary and Former Stauffer Property

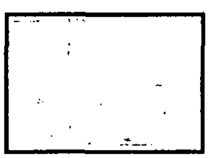

Figure A-5: Former Surface Water Body Locations

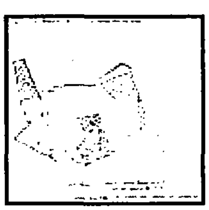

Figure A-6: Boundary of Stauffer Waste Burial Area

Figure A-1: Map of Woburn, Massachusetts

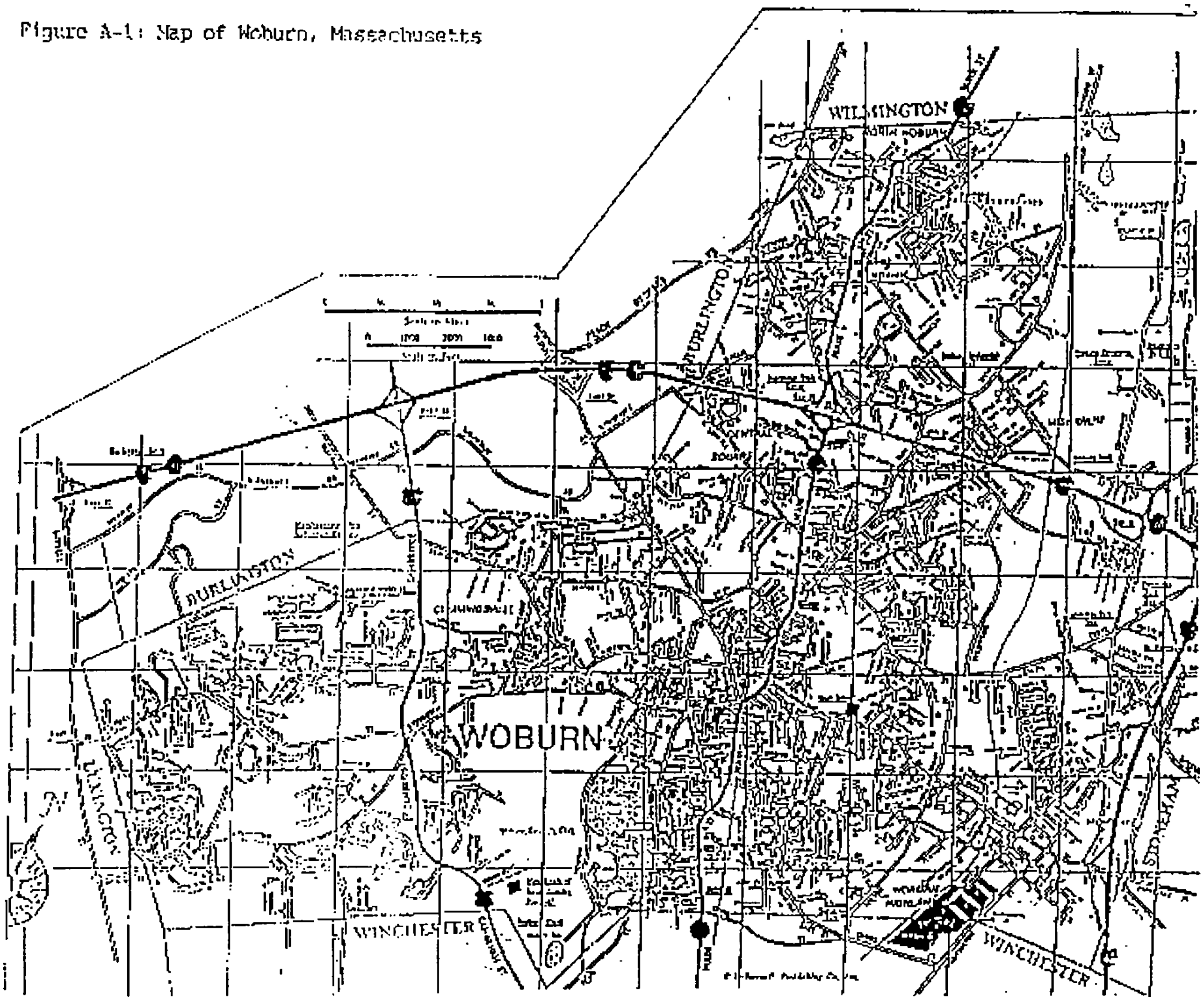

Figure A-2: Industriplex Site

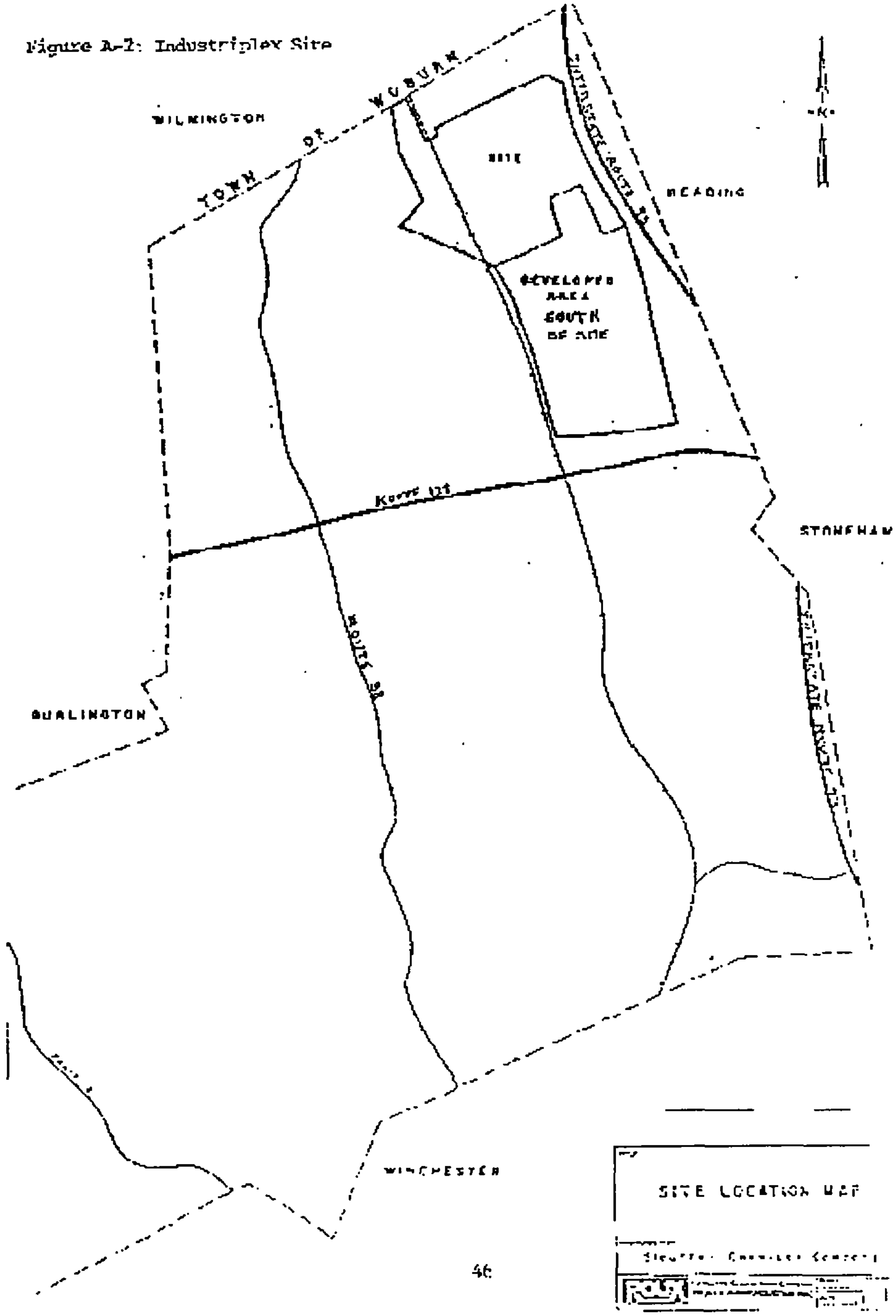

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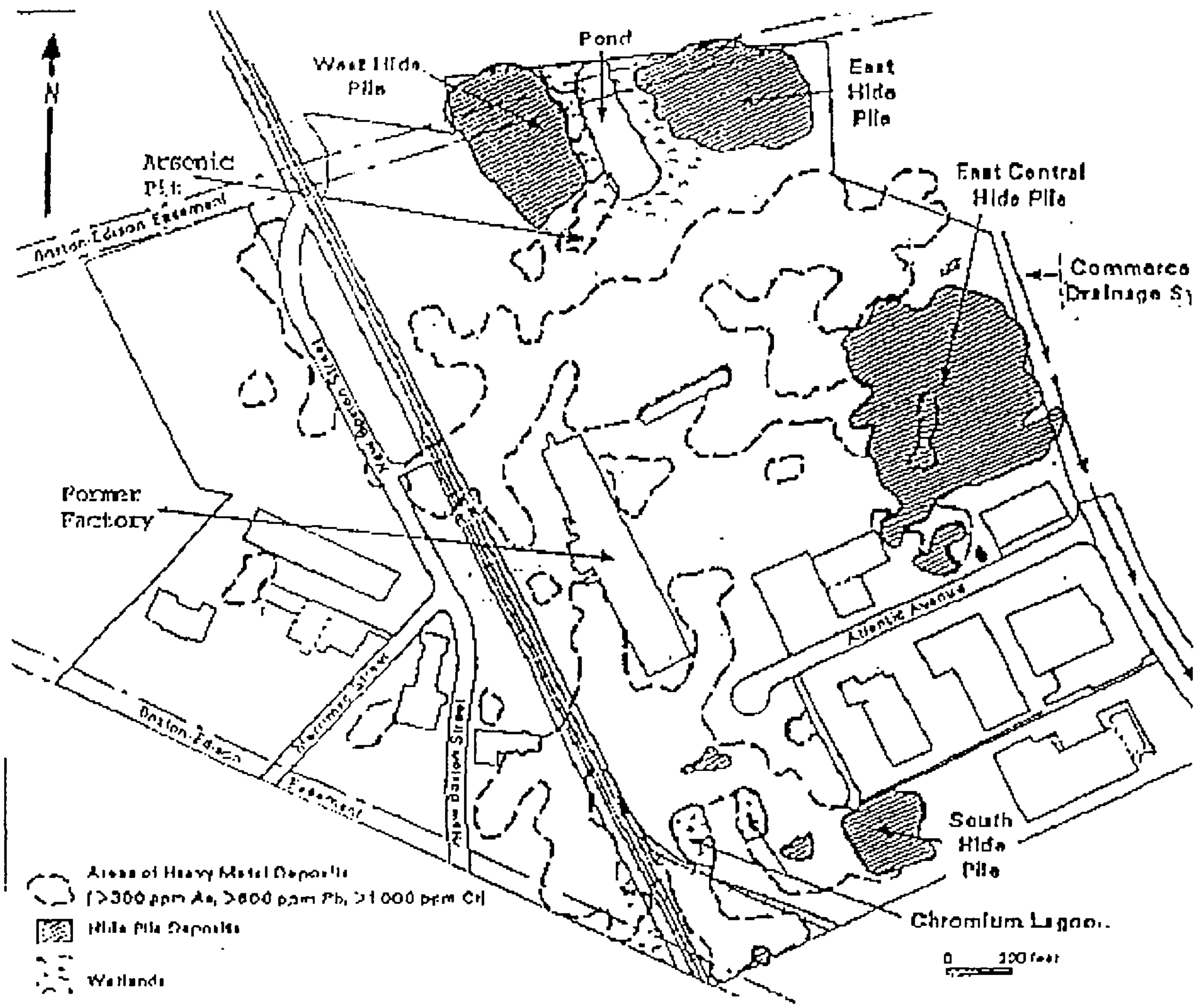
Figure A-3: Industriplex Site West of Commerce Way



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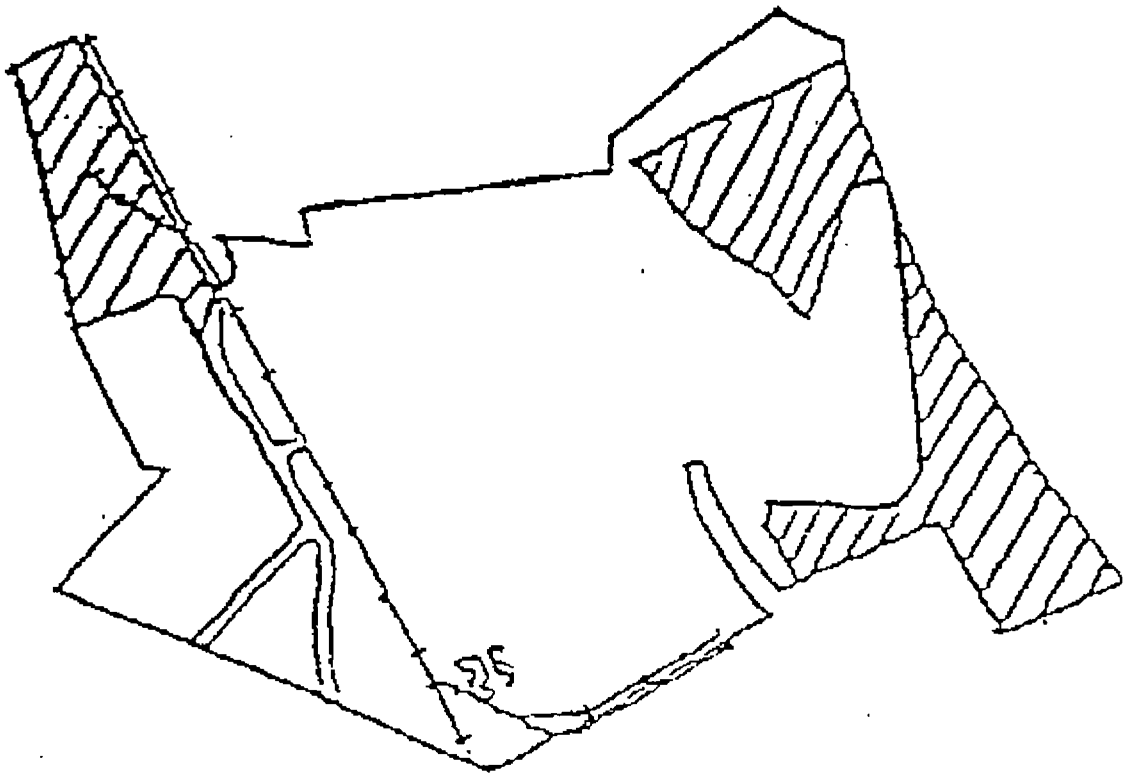


Clear Area Formerly Owned By
Stauffer Chemical Company

Figure A-5: Former Surface Water Body Locations

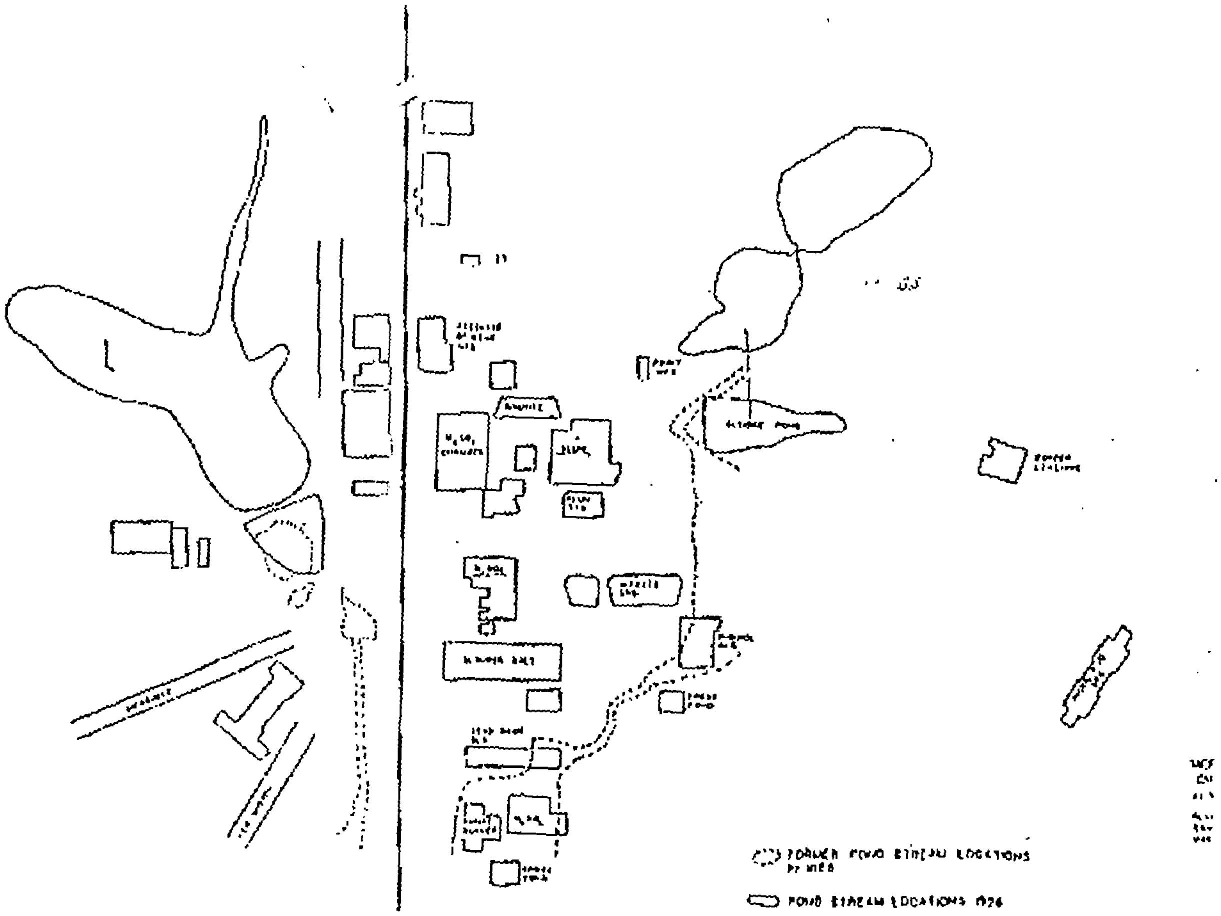
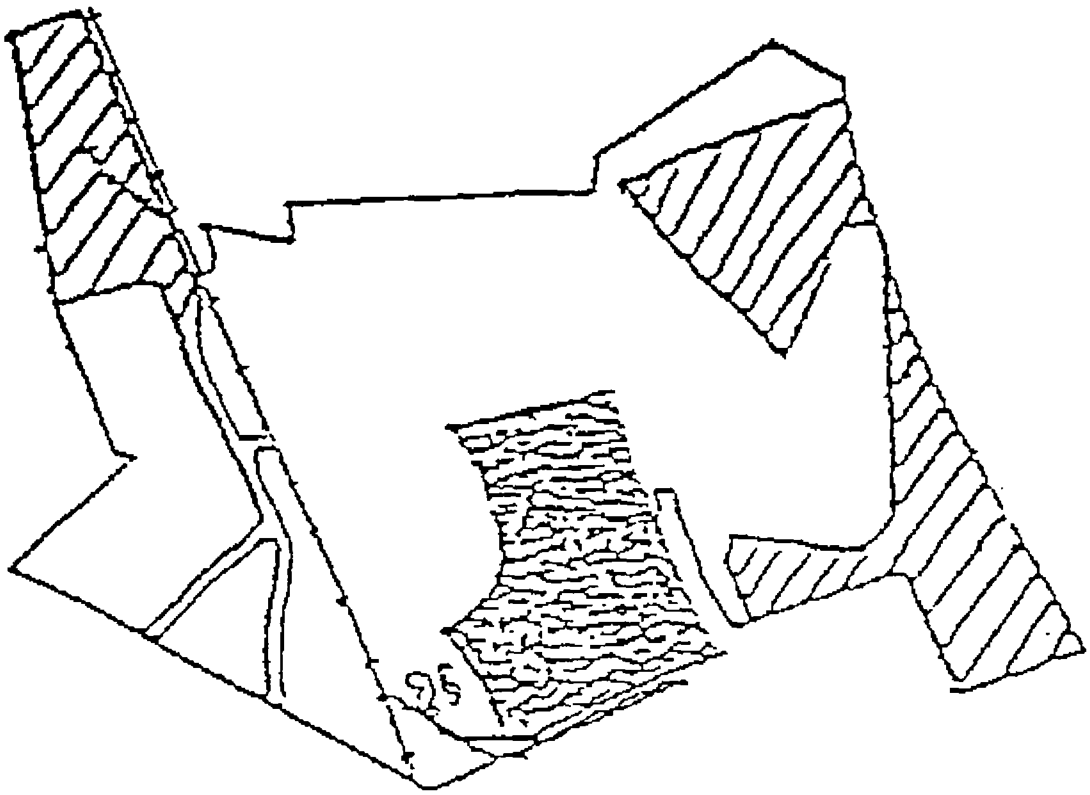
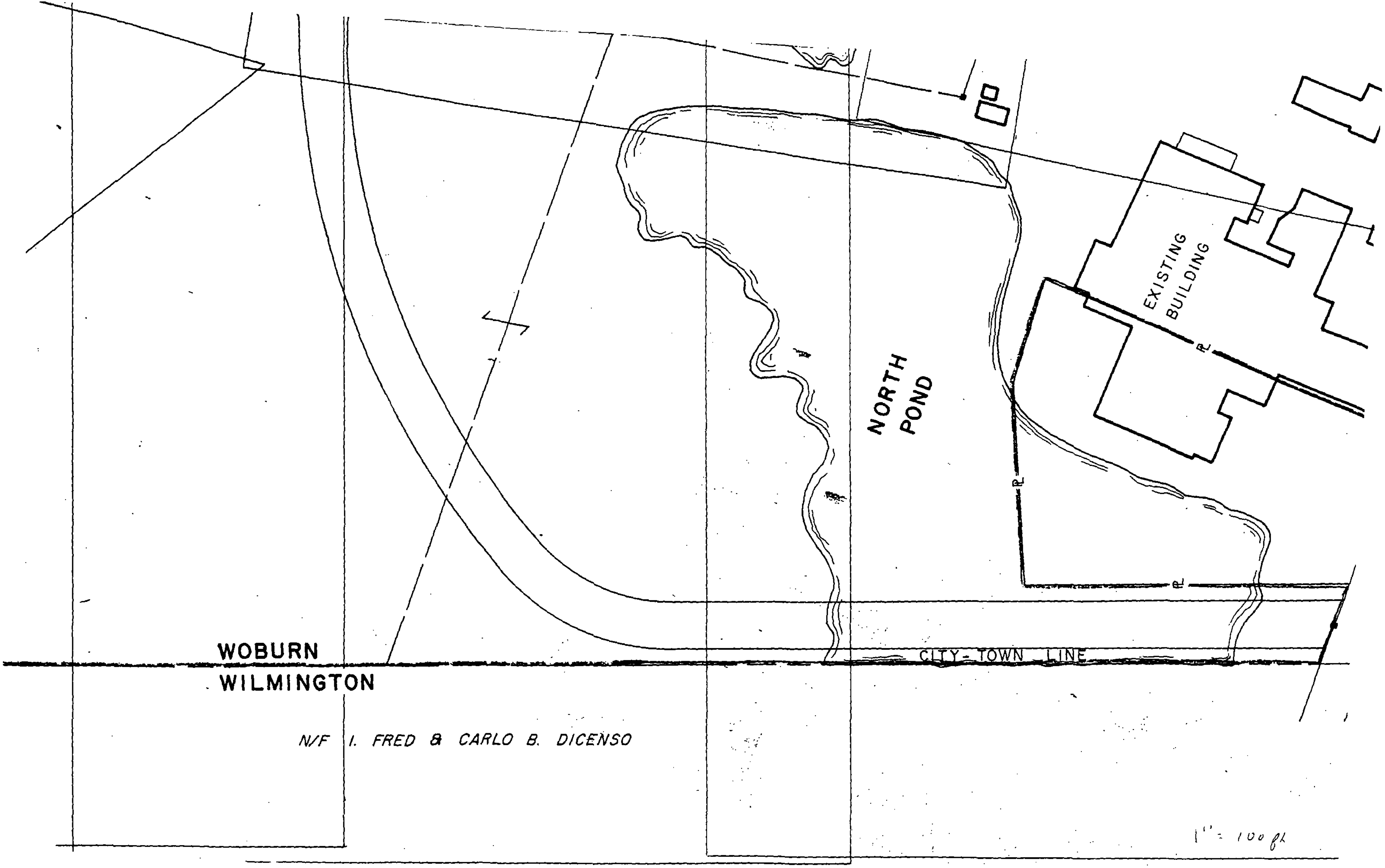


Figure A-6: Boundary of Stauffer Waste Burial Area



Dark Area - Approximate Location Of Stauffer Waste Burial

Crossed Hatched - Property Not Owned By Stauf



Presidential Way
Development Plans
Source: Woburn
Engineering
Department

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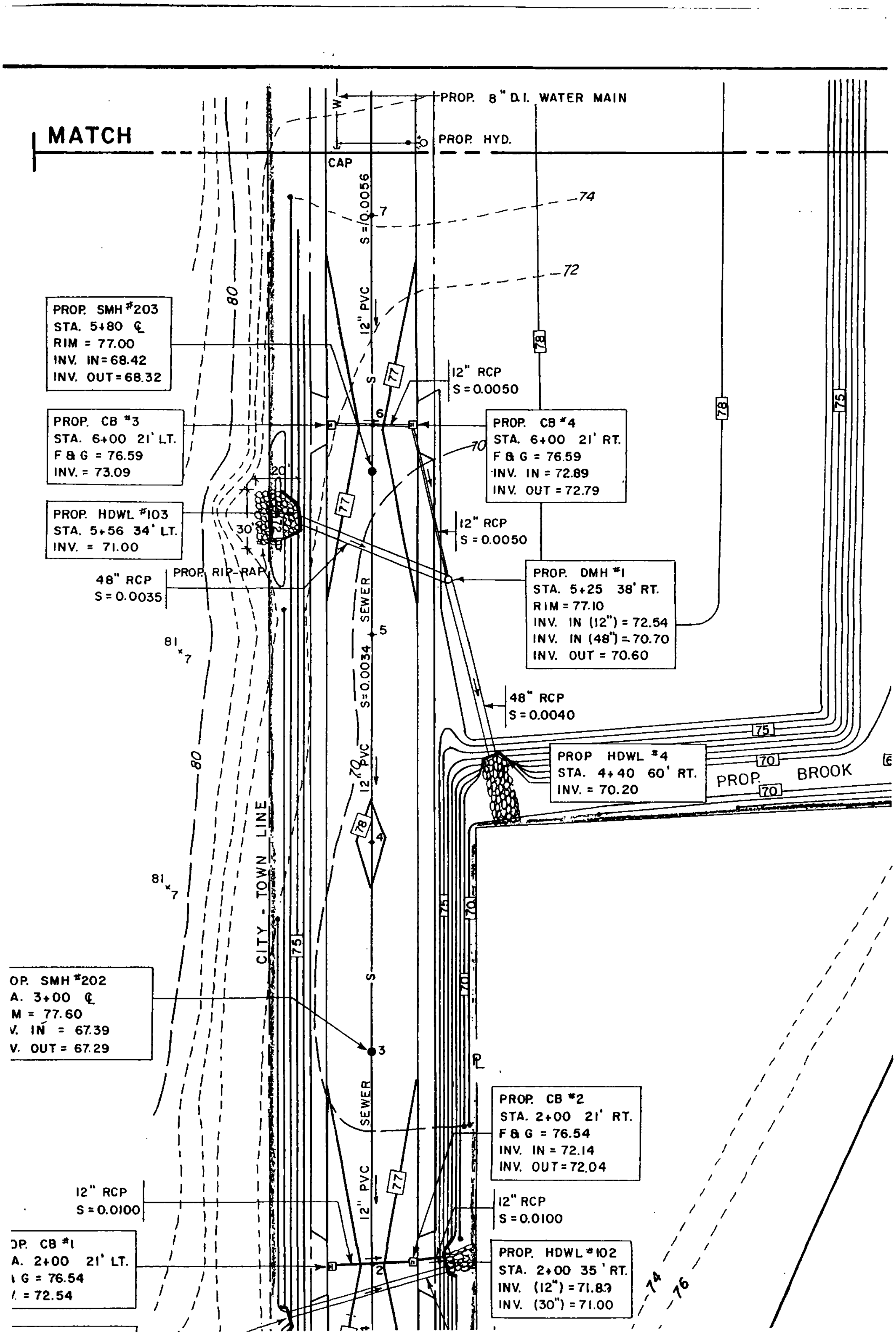
1" = 100'



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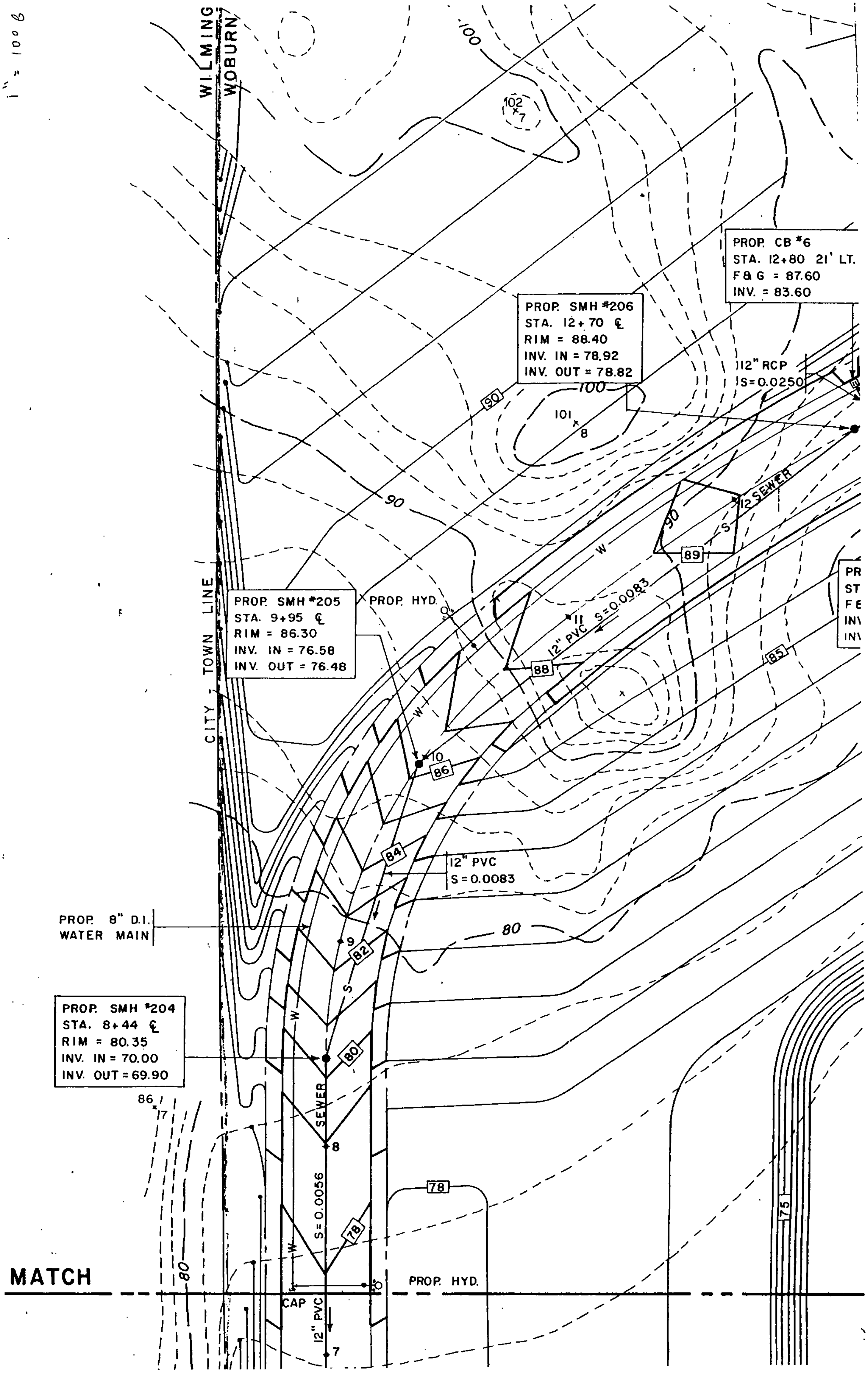

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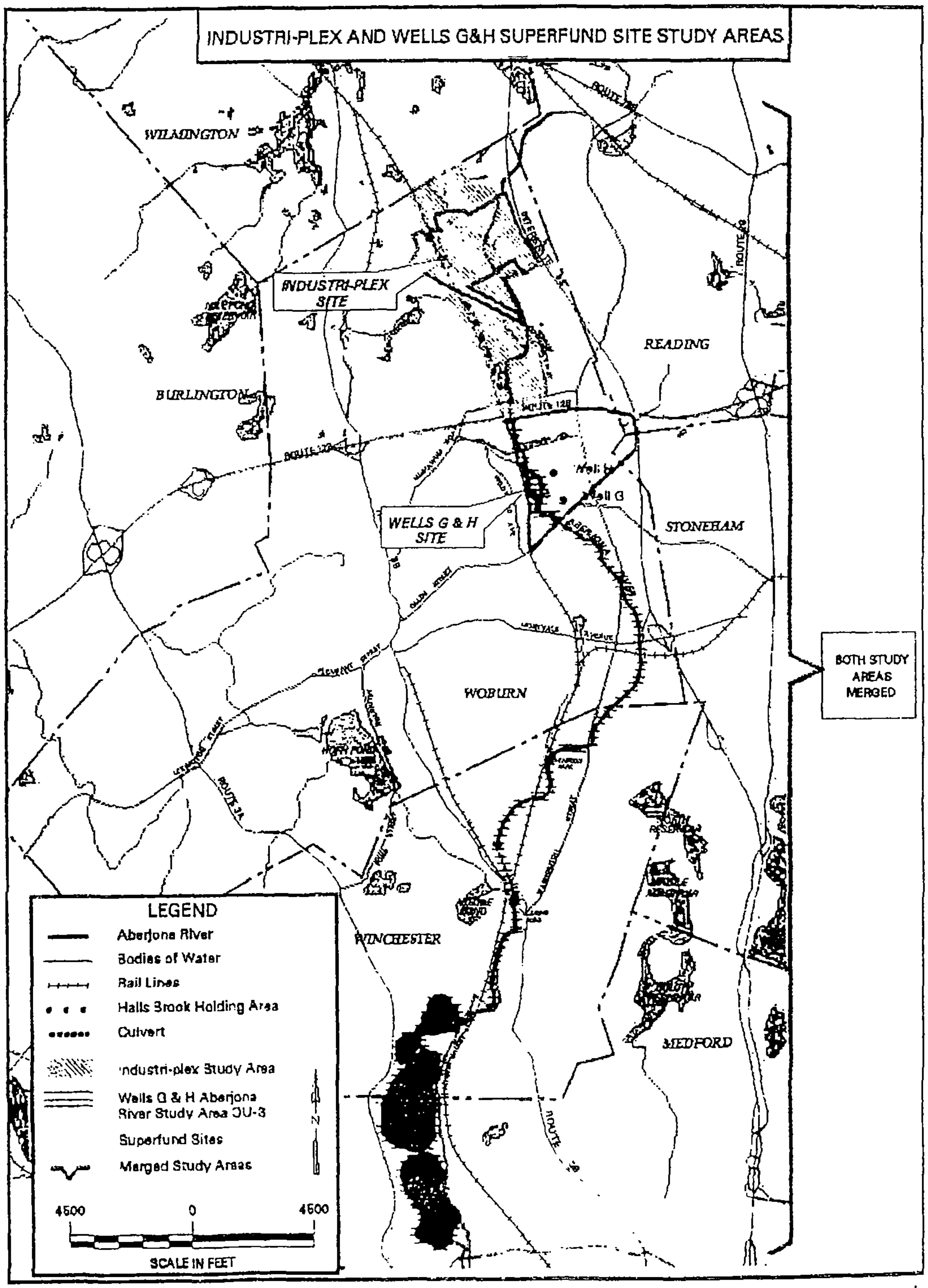
Aberjona River
Industri-Plex and Wells G & H Superfund Sites, Woburn, MA
Spring 2002

EPA Merges Two Aberjona River Studies

The Industri-Plex and Wells G&H Superfund Sites require two separate studies of the Aberjona River to evaluate the nature and extent of contamination and assess its potential threat to human health and the environment. The Industri-Plex Study Area, illustrated on the map with red hash lines, investigates the Halls Brook Holding Area and a portion of the upper reach of the Aberjona River; and the Wells G&H Aberjona River Study Area, illustrated on the map with green hash lines, investigates the lower reach of the Aberjona River. EPA plans to merge theses studies into one, which will provide a more efficient and cost effective approach to managing the investigation of the Aberjona River.

The Aberjona River flows north to south from it's head waters in Reading through the Industri-Plex Superfund site and along Commerce Way and then merges with the Halls Brook Holding Area at Mishawum Road in Woburn. The River then proceeds under Route 128,

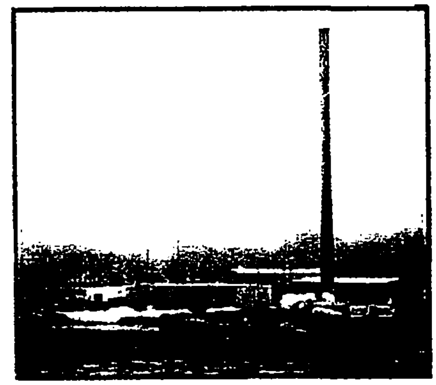
continued on page 5



The Aberjona River and current Industri-Plex and Wells G & H study areas which will be merged into one.

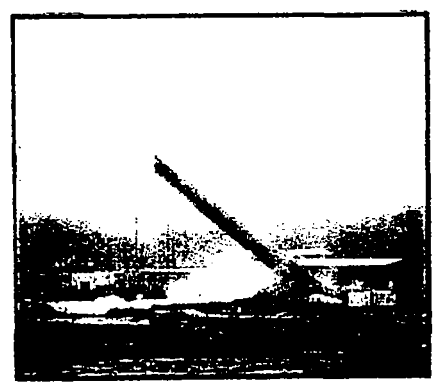
Progress & Renewal: Industri-Plex Site

The Industri-Plex Superfund Site is a 245-acre industrial park. From 1853 until 1980, the site was used for manufacturing and then was developed for industrial use. The by-products and wastes from nearly 130 years of chemical manufacturing, light industry, and glue manufacturing contaminated soil and wetlands with heavy metals including arsenic, lead and chromium. The groundwater is contaminated with toluene, benzene and arsenic.



A before picture of the Industri-Plex site.

In 1983 the area was listed as a Superfund site. As part of EPA's 1986 cleanup decision, called a Record of Decision, and a 1989 agreement between EPA, MA DEP and the parties responsible for the cleanup, the first phase of cleanup called for a protective cap over approximately 110 acres of contaminated soil to prevent people from coming into contact with the contamination. To date, all of the protective caps have been constructed. Portions of the site have been safely redeveloped and put into productive uses such as a Regional Transportation Center, an Interstate-93 Interchange, a public road extension, a Target Store, and an Office Park. This initial cleanup and redevelopment success has created jobs, enhanced property values and increased state and local tax revenues.



The smokestacks were demolished in 1996.

The 1986 Record of Decision and 1989 agreement also required the responsible parties to investigate the nature and extent of contamination migrating from the site into downstream surface water and sediments. In addition, EPA has been investigating other potential sources of contamination to the groundwater, surface water and sediments, in accordance with the 1986 decision and 1989 agreement. These investigations comprise the second phase of cleanup associated with the site and includes the investigation of Halls Brook Holding Area and the Aberjona River from the Industri-Plex site south to Route 128 (displayed on page one as the Industri-Plex Study Area). This second phase will be merged with the Wells G&H Aberjona River Study Area (displayed on page one) to form one comprehensive investigation. As part of this comprehensive investigation, EPA installed ten surface water sampling stations along the entire Aberjona River in May 2001 to continuously monitor surface water flow and automatically collect surface water samples during storm events. These stations will help EPA evaluate how contaminants are migrating in surface water under various conditions.

EPA United States Environmental Protection Agency New England

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Welcome
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Site Type: Long Term/National Priorities List (NPL)

INDUSTRI-PLEX
North Woburn, Massachusetts

Click here for interactive map

Middlesex County

Street Address:	COMMERCE & ATLANTIC
Zip Code:	01801
Congressional District(s):	07
EPA ID #:	MAD076580950
Site ID #:	0100580
Site Aliases:	Mark Phillip Trust, Woburn Site, Industri-Plex 128 Site

Site Responsibility: Federal, Potentially Responsible Parties

NPL LISTING HISTORY	
Proposed Date	10/23/1981
Final Date	09/08/1983

Site Description

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The Industri-Plex site is a 245-acre industrial park. From 1853 to 1931, the site was used for manufacturing chemicals such as lead-arsenic insecticides, acetic acid, and sulfuric acid for local textile, leather, and paper manufacturing industries. Chemicals manufactured by other industries at the site include phenol, benzene, and toluene. From 1934 to 1969, the site was used to manufacture glue from raw animal hide and chrome-tanned hide wastes. The by-products and residues from these industries caused the soils within the site to become contaminated with elevated levels of metals, such as arsenic, lead and chrome. From 1969 to 1980, the site was developed for industrial use. Excavation in the 1970's uncovered and mixed industrial by-products and wastes accumulated over 130 years. During this period, residues from animal hide wastes used in the manufacture of glue were relocated on-site from buried pits to piles near swampy areas on the property. Many of the animal hide piles and lagoons on-site were leaching toxic metals into the environment. In the 1980's, the site contained streams and ponds, a warehouse and office buildings, remnant manufacturing buildings, and hide waste deposits buried on the site. Animal hide residues are found on approximately 20 acres of the site in four different piles. Portions of the animal hide piles sloughed off, causing the release of hydrogen sulfide gases to the atmosphere and toxic metals to surrounding wetlands. Residences are located within 1,000 feet of the site, and more than 34,000 people live within 3 miles of the site.

Threats and Contaminants

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The groundwater is contaminated with volatile organic compounds (VOCs) including benzene and toluene, as well as arsenic and chromium. The soil is contaminated with heavy metals including arsenic, chromium, and lead. Also, a pervasive "rotten egg" odor has been caused by hydrogen sulfide gas generated by the decay of the buried animal hides from glue manufacturing wastes. People who accidentally ingest or come into contact with contaminants may be at risk. The potential exposure most likely is limited to trespassers and workers on the site during future construction. The contaminated groundwater has the potential to migrate towards two Woburn municipal drinking wells, which are currently inactive. Wetlands near the site are threatened by site runoff.

Cleanup Approach

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The site is being addressed in three stages: initial actions and two long-term remedial phases focusing on site stabilization and cleanup of groundwater contamination.

Response Action Status

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Initial Action	In 1986, the EPA installed 10,000 feet of fence to restrict site access. Extensive damage to the main areas of the fence occurred, and drums were dumped illegally on the site. Areas of the fence requiring repairs were identified by the EPA, and work to re-secure the site was completed in 1988. Warning signs also were posted.
Site Stabilization	In 1986, the EPA selected a cleanup remedy that is being implemented by the potentially responsible parties (PRPs). The remedy includes the following: 1) Design and construct permeable caps over approximately 105 acres of soils and sediments contaminated with lead, arsenic, and chromium in excessive levels of 300 parts per million (ppm), 600 ppm, and 1000 ppm, respectively. The permeable caps may consist of various designed covers containing 16 inches of clean fill and a geotextile fabric placed over the contaminated soils and sediments, as well as equivalent covers such as concrete foundations or bituminous parking lots. This portion of the remedy serves to prevent physical contact with the contaminated soils and sediments, including the West, East-Central and South Hide Piles; 2) Design and construct an impermeable cap over the approximately 5 acres of East Hide Pile, and gas collection and treatment system. This portion of the remedy serves to prevent the infiltration of water through the hide pile, and prevent the release of hydrogen sulfide gas into the atmosphere; 3) Design and

	construct an interim groundwater treatment system to treat a groundwater hot spot contaminated with toluene and benzene. This interim system is designed to reduce the concentration of the hot spot by eighty percent and limit contamination migration off-site; 4) Conduct a Groundwater and Surface Water Investigation Plan (GSIP) to evaluate the degree of groundwater and surface water contamination from the site; and 5) Design and implement Institutional Controls for the site which will restrict future land use. The purpose of the Institutional Controls is to preserve the effectiveness of the remedy, so that human health and the environment remains protected, and allow each property owner the fullest possible use of their property. The PRPs began designing the cleanup remedies in 1989. Design of the site permeable and impermeable cap was finalized in 1992. Construction of the permeable and impermeable cap began in 1993. Currently, the impermeable cap, gas collection and treatment system, and the permeable cap are complete. Cover certification reports, which document the proper installation of the protective caps, remain to be completed for all the properties on the Site. The design of the interim groundwater treatment system was completed initially in the fall of 1992; however, the system was altered to reflect changes resulting from a pilot air sparging design in 1993. The pilot air sparging system was designed and operational for a short period in the summer of 1994, when it was discovered that the system failed to meet the design standards. Currently, additional ground water data is being collected and other innovative approaches to treatment are being evaluated. In the early 1990's, the potentially responsible parties conducted two phases of the GSIP. In 1999, the potentially responsible parties implemented a comprehensive third investigation which will continue through 2001 (see below). In 1995, EPA established a working group for the institutional controls consisting of state, landowner, and potentially responsible party representatives, and the group established a draft outline. Currently, EPA and DEP are revising the draft institutional controls to be consistent with the Massachusetts Contingency Plan (MCP) Activity and Use Limitations (AULs) format. The institutional controls are expected to be finalized in 2002.
Groundwater Contamination	In 1990, the potentially responsible parties began the GSIP investigation into the nature and extent of the site-related groundwater, surface water and sediment contamination. The potentially responsible parties completed two investigations and prepared a GSIP Phase 1 and 2 Report. In the Fall of 1998, EPA completed negotiations with the potentially responsible parties regarding the Industri-Plex Consent Decree requirements and content of a more comprehensive investigation. The potentially responsible parties agreed to implement a comprehensive investigation, entitled the Final GSIP, which investigates the extent of site-related metals and organics contamination in groundwater, surface water, and sediments, and evaluates any environmental and human health risks posed by the contamination. In 1999, the parties implemented a portion of the Final GSIP by collecting various surface water, sediment, and fish samples

	from the Halls Brook Holding Area (HBHA), which merges with the Aberjona River at Mishawum Road, Woburn, MA. In 2001, most of the Final GSIP data collection was completed. In addition, the 1986 Record of Decision (ROD) requires EPA to conduct a Multiple Source Groundwater Response Plan (MSGRP) which serves as a second operable unit (OU-2) for the Site. The MSGRP was required to investigate other potential contamination impacts on the area wide aquifer, and determine if additional remedies may be necessary to clean up the aquifer within the Industri-Plex Study Area. The approximate boundaries of the Industri-Plex Study Area include the Woburn/Wilmington Town Line to the north, Route 128/Interstate 95 to the south, Interstate 93 to the east, and the Massachusetts Bay Transit Authority (MBTA) Right of Way for the Lowell-Boston Commuter Rail to the west. The MSGRP will incorporate the potentially responsible parties' GSIP data, and serve as a comprehensive Remedial Investigation/Feasibility Study (RI/FS) supporting a future ROD for the aquifer and any residual surface water and sediment contamination within the Industri-Plex Study Area. In 1997, the EPA prepared a Preliminary MSGRP Report based upon existing analytical data. In August 1998, EPA prepared a Historical Aerial Photographical Analysis of the Industri-Plex Study Area, illustrating property use and watershed changes since 1938. In 1999, EPA also evaluated the preliminary surface water and sediment data collected under the Wells G&H Operable Unit 3 (OU-3), Aberjona River Study. The Wells G&H Superfund Site is located to the south and immediately downstream of the Industri-Plex Study Area. The Aberjona River Study collected surface water and sediment samples from Route 128 downstream to the Mystic Lakes. The preliminary Aberjona River Study data indicates the primary contaminants of concern in the surface water and sediments are metals. Based upon these preliminary reports and data, EPA will merge the Wells G&H OU-3, Aberjona River Study data, with the Industri-Plex OU-2 MSGRP data, and form one comprehensive RI/FS for the entire river system. The comprehensive MSGRP RI/FS will collect additional environmental samples from the river to fill in any significant data gaps with the Wells G&H OU-3, Aberjona River Study, and the Industri-Plex GSIP, and collect additional groundwater data to evaluate other potential groundwater sources within the Industri-Plex Study Area. In July 2000, the MSGRP RI/FS environmental sampling program was initiated, and will continue through Summer 2002.
Enforcement Highlights	In 1979, in response to illegal filling of wetlands, the EPA obtained a court order to stop further development activities. The EPA and the State entered into a Consent Order with Stauffer Chemical in 1982, whereby Stauffer was to conduct an investigation and recommend cleanup actions. In 1989, the EPA and the potentially responsible parties signed a Consent Decree in which the parties agreed to implement the remedy for stabilizing the site and to reimburse the EPA for past and future oversight costs.

Environmental Progress

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Fencing and posting warning signs around the site have restricted access to the Industri-Plex site and made it safer while final cleanup activities continue. Upon completion of the final cleanup remedies, the soil and groundwater contamination levels at the Industri-Plex site will be reduced to meet established health and ecological standards. At the same time remediation has been proceeding, significant portions of the site are being developed or redeveloped for economic reuse. The Custodial Trust (a trust created by EPA, DEP, and the potentially responsible parties in the 1989 Consent Decree to hold, manage and sell developable property on the site), EPA, and the potentially responsible parties have worked with state, local governments, prospective purchasers, and developers to establish some commercial re-development on the site. In 1996, EPA modified the permeable cap design for a 36 acre portion of the site to accommodate the construction of a 2,400 vehicle Regional Transportation Center (RTC) on the site. Implementation of the design modification will improve the protectiveness of the remedy by increasing the depth of the permeable cap's clean fill to approximately 48 inches, including an asphalt parking lot. The RTC will also facilitate compliance with the Clean Air Act by removing 2,400 vehicles from the interstate and reducing vehicle air emissions in the metropolitan Boston area. The construction of the alternative RTC design cap was completed in early 1997. EPA has entered into five Prospective Purchaser Agreements (PPA) with purchasers of five different parcels on the site, which protect those parties from Superfund liability related to the existing environmental conditions.

The first PPA was entered in 1996 with Vining Disposal, Inc. (Vining), for a property that had already been developed. Since the property sale, Vining has been operating a recycling center at the property.

A second PPA was entered in December 1996, with the Massachusetts Port Authority (MPA), Massachusetts Bay Transportation Authority (MBTA), and Massachusetts Highway Department (MHD) for the RTC 36 acre property. This PPA required the parties to construct the above alternative RTC Design cap, adhere to the institutional controls for the site, and provide access for any future Superfund activities. The RTC construction is expected to be completed in Spring 2001. A third PPA was entered in 1997, with a prospective purchaser for a 29.6 acre (19.0 buildable acres) retail property on the site. On December 12, 1997, Dayton-Hudson Corporation purchased the retail property, and Target Stores will anchor the property's retail development. Construction of the Target Store paralleled the construction of MHD's new Interstate 93 (I-93) interchange and the City of Woburn's Commerce Way Extension and Improvements. In October 2000, construction was completed and Target Stores, I-93 Interchange and Commerce Way Extension were open to the public. The I-93 Interchange and Commerce Way Extension will help to alleviate traffic congestion at the intersection of I-93 and I-95, improve traffic conditions in the City of Woburn, and provide access to the RTC. A fourth PPA was entered in August 1999, with 100 Metro-North Corporation (affiliate of National Development of New England, Inc.) for approximately 50 acres on the Site. The parcel will be developed for commercial office park, hotel, and restaurant use, and be anchored by Genuity Corporation. Genuity Phase 1 construction was completed in September 2000. Construction for hotel and additional phases of Genuity are expected to be completed in 2001. The fifth PPA was entered in March 2000, with Transcom, Inc. (Transcom), for 2 acres of property that had already been developed. Transcom is expected to use the property's building and parking lot for its business operations. Transcom began its operations in the Summer 2000.

All proposed developments within the boundaries of the Site, that could potentially effect the remedy, were required to submit construction specifications, work plans, health and safety plans, in accordance with the Consent Decree and interim institutional controls. EPA reviewed and approved these development documents and conducted periodic oversight of significant intrusive construction activities.

Current Site Status

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By early 1998, approximately 110 acres of the site are covered with a protective cap to prevent human exposures to soils contaminated with metals (e.g. arsenic, lead and chromium). Portions of the site have been redeveloped for a multi-modal Regional Transportation Center, Interstate-93 Interchange, public road extension, Target Stores, and Metro-North Office Park including GTE. Currently, Metro-North Office Park is constructing a hotel on the Site, which is expected to be open in 2003. The responsible parties under the first operable unit (OU1) and the EPA under the second operable unit (OU2) are conducting investigations into the extent of the groundwater contamination and residual migration of metals from the site in the downstream wetlands and Aberjona River. The data collected by the responsible parties will be incorporated into EPA's comprehensive OU2 Remedial Investigation/Feasibility Study (RI/FS), which will support a future Record of Decision (ROD) for the study area and entire Aberjona River. This ROD will primarily focus on metals within the Aberjona River Watershed from the Industri-Plex site south to the upper Mystic Lake.

Site Photos

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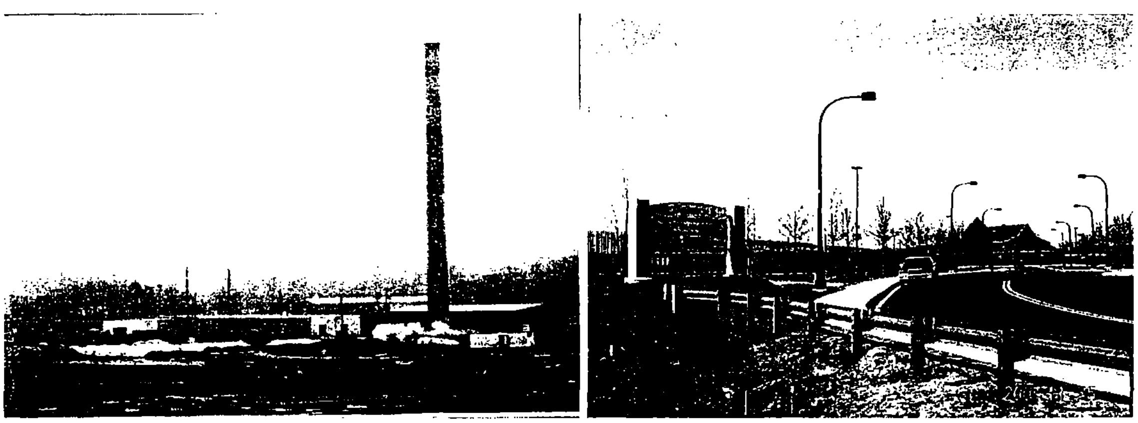

Before, Industrial remnants ... After, Regional Transportation Center!!

Links to Other Site Information

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Disclaimer Instructions about PDF

Newsletters & Press Releases:
Cleanup Progress Fact Sheet, April 1999
Superfund Redevelopment Success Fact Sheet, July 1998

Federal Register Notices:
Final NPL Listing

Decision Documents:

ROD Abstracts

Other Links:
NPL Site Narrative at Listing:

Site Repositories
[Back to Top]

Reading Public Library, 45 Pleasant Street, Woburn, MA 01801 (617) 937-01482
EPA New England Records Center, One Congress Street, Boston, MA 02114 (617) 918-1440

Contacts
[Back to Top

EPA Remedial Project Manager:	**Joseph LeMay**
Address:	
Phone #:	(617) 918-1323
E-Mail Address:	Lemay.Joe@epa.gov
EPA Community Involvement Coordinator:	**Angela Bonarrigo**
Address:	1 Congress Street Suite 1100 Boston, MA 02114
Phone #:	(617) 918-1034
E-Mail Address:	Bonnarigo.Angela@epa.gov

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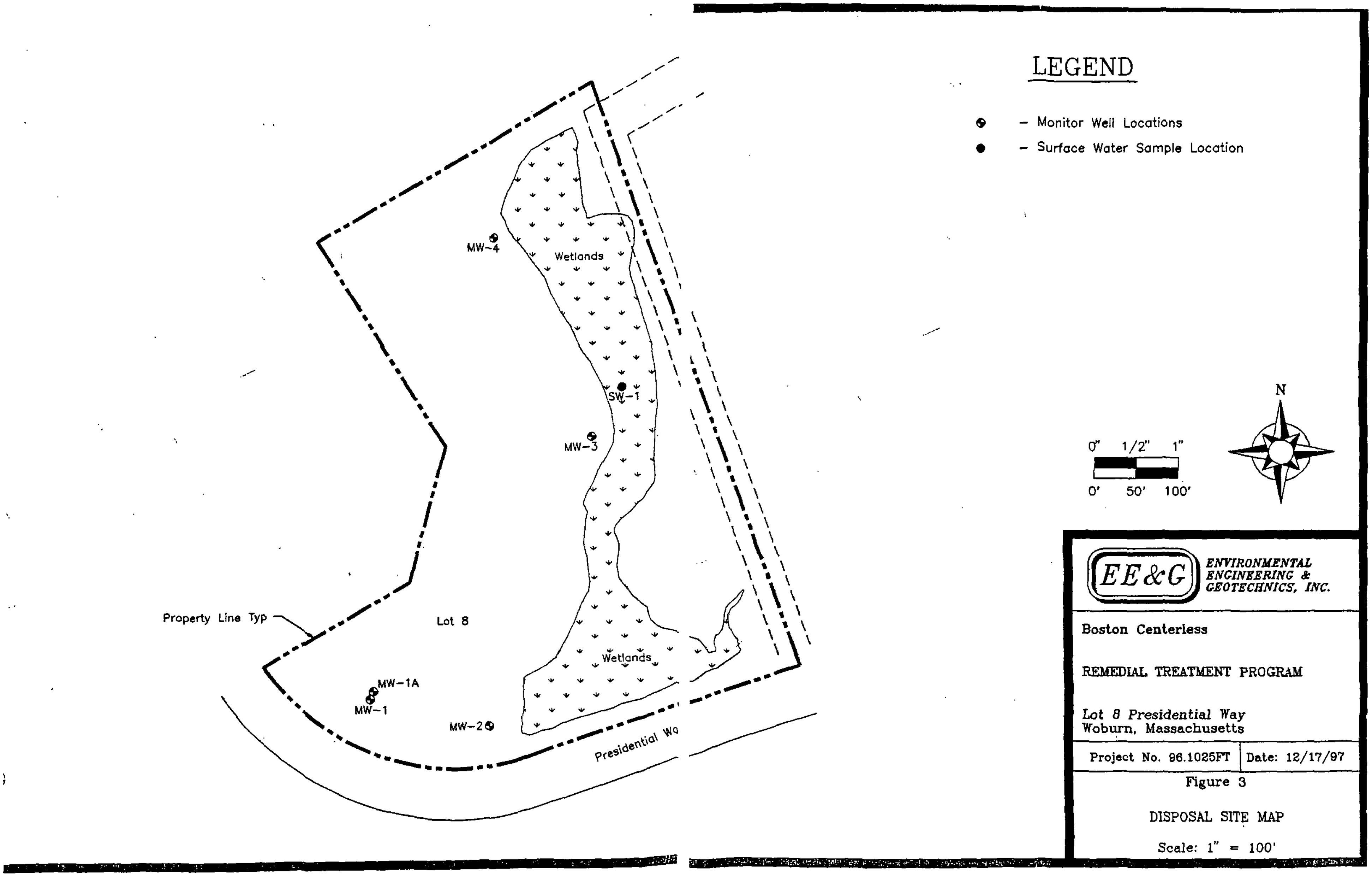
Last Revised:February 8, 2002


LEGEND
– Monitor Well Locations
– Surface Water Sample Location
Wetlands
MW-4
SW-1
MW-3
Lot 8
Property Line Typ
MW-1A
MW-1
MW-2
Wetlands
Presidential Wa
0" 1/2" 1"
0' 50' 100'
N
EE&G
ENVIRONMENTAL ENGINEERING & GEOTECHNICS, INC.
Boston Centerless
REMEDIAL TREATMENT PROGRAM
Lot 8 Presidential Way
Woburn, Massachusetts
Project No. 96.1025FT
Date: 12/17/97
Figure 3
DISPOSAL SITE MAP
Scale: 1" = 100'

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
323 New Boston Street Woburn, MA 01801

ANTHONY D. CORTESE, Sc.D.
Commissioner
727-5194
935-2160

File ✓
A-3653-1

July 24, 1984

Mr. Walter J. Petruck, et al.,
6 Fairview Terrace
Woburn, MA 01801

RE: WOBURN/WETLANDS #348-98
SUPERSEDING ORDER OF CONDITIONS

Dear Mr. Petruck, et al.,

The Northeast Regional Office of the Department of Environmental Quality Engineering, Division of Wetlands Protection, has made a through and extensive review of the above referenced file in preparation to issuing a Superseding Order of Conditions. Due to the fact that a portion of the project site is known to contain hazardous waste and other waste material and is also immediately adjacent to one of the larger hazardous waste sites in the country, besides the standard Notice of Intent, the file also contains additional supportive information which consists of the following documents:

1) "Proposed Pond Reconstruction of Sheehy Industrial Park in Woburn, MA", (GHR Engineering Corporation, June 1982);

2) "Site Assessment, Dundee Park Properties, Woburn, MA", (Goldberg-Zoino & Associates, Inc., July 1982); and

3) Draft and Final Environmental Impact Reports (EOEA #4709, GHR Engineering Corporation, November 1983, March 1984) which were prepared for the Massachusetts Executive Office of Environmental Affairs.

Pursuant to the Massachusetts General Law, Chapter 131 Section 40 (the Wetlands Protection Act), this Department is issuing the attached Superseding Order which allows the project on the basis of the information submitted and described above along with Conditions the Department has deemed necessary to safeguard the public interests identified in the Wetlands Protection Act. The public interests associated with the freshwater wetland present on this site consist of: flood control, storm damage prevention, prevention of pollution and ground water supply. It is important to note that the Notice of Intent for this project was filed in June 1982 and consequently the proposed project is subject to the provisions of the Wetland Regulations (310 CMR 10.0) that were in effect at that time.

Public interests identified in the September 16, 1982 appeal for a Superseding Order of Conditions by ten residents of Woburn include those referred to above and in addition, protection of fisheries. The appeal letter indicates drainage from the site via the Aberjona River "empties into Mystic Lake which supports anadromous fish." The site of the proposed project is located approximately 5 river miles upstream of Mystic Lakes. In addition a review of the Coastal Atlas by Coastal Zone Management indicates the limits of this river system as an anadromous fish run are in the vicinity of the confluence of the Mystic and Malden Rivers. Furthermore this Department has determined the project will not effect the migration or spawning of anadromous fish or change the volume or flow rate within the fish run (310 CMR 10:35:3). Consequently, the Department has determined protection of fisheries is not an interest associated with the wetlands on the site. The public interests identified above which are associated with the site are further discussed and addressed in this cover letter and the attached Superseding Order.

The project site is a 60 acre parcel of land located off New Boston Street in North Woburn immediately to the south of the Woburn/Wilmington town line. The Wilmington Industrial Park and the Woburn Industri-plex lie to the north and south respectively of the site. In order to develop the 60 acre parcel for industrial purposes, the proposed project consists of constructing an access road and considerable modification of two ponds which are intended to receive drainage from the site.

The proposed access road will originate from New Boston Street and run in an easterly direction which is parallel and immediately adjacent to the Woburn/Wilmington town line. Within 100 feet of its junction with New Boston Street, the access road will cross 550 feet of "North Pond". The foot print of the access road to this point will require filling approximately 60,000 square feet of pond and freshwater wetland. After crossing the pond, the access road bends to the south and extends for a distance of approximately 800 feet to terminate in a cul de sac.

"North" and "South" Ponds are the two ponds located behind existing buildings on the westerly border of the property. The eutrophic North Pond was built as a fire protection pond for these buildings and is controled by a dike with a 6 foot wide spillway. The spillway is located near the top (elevation 74 MSL) of the dike (elevation 75 MSL) which leaks due to lack of maintenance. Consequently, the existing North Pond is ineffective as flood storage due to the position of the spillway with respect to the top of the dike because the water level already impounded by the dike causes the pond to overflow the dike during the early stages of a rain storm.

Water from North Pond flows to South Pond which drains via a ditch along Commerce Way into the Aberjona River. Within the southern boundary of the site, mounds of fill referred to as the "Hide Piles" are located on the east and west sides of South Pond and extend onto the adjacent Stauffer Chemical Company property to the south. The mounds consist of hides and other tannery wastes and are known to contain high levels of arsenic, chromium and lead. Water levels of the South Pond range from 68 to 70 ft. MSL and when at the higher levels can inundate the lower slopes of the "Hide Piles".

The proposed modification of both the North and South Ponds will consist of constructing dikes and spillways and filling and will result in: 1) improved flood control at the site and further downstream, 2) better protection of the "Hide Piles" from flooding and 3) industrial development of the site.

At the North Pond, in the location of the existing dike, a new ten foot wide dike having a surface elevation of 77 ft. MSL will be constructed from relatively impermeable material. A 24 inch culvert will be located at the base (elevation 70) to accommodate normal flow conditions and a 25 foot wide concrete spillway will be constructed at elevation 76 ft. MSL to accommodate the water levels associated with the 100 year storm. In addition, an area behind (to the north) of the dike, will be dredged to elevation 62 ft. causing the pond to have a depth of 8 feet under normal flow conditions. Besides the area filled for the access road, additional fill will be placed in North Pond along the northern edge of the dredged area to create peninsulas and an island. Four acres of freshwater marsh will be created to the north of the peninsulas and islands which will act as a filter of sedimentation and pollutants. In summary, the net effect of the modification of North Pond will be to provide improved flood control and increase flood storage for the 100 year storm by approximately 270,000 cubic feet.

A 12 foot wide dike having a top elevation of 76 ft. MSL is proposed to be constructed across South Pond approximately 20 feet to the north of the "Hide Piles". Two 24 inch culverts will be located at the base (elevation 67.5 MSL) to accommodate normal flow conditions and a 25 foot wide concrete spillway will be constructed at elevation 69.6 ft. MSL to accommodate water levels associated with the 100 year storm. Upon completion of the proposed dike, the water level of South Pond will remain at the present approximate elevation of 68.0 ft. MSL.

The proposed dike across South Pond will supplement the flow control structure across North Pond in providing flood control and will also protect the "Hide Piles" from inundation by high water levels. Calculations prepared by GHR Engineering Corporation indicate the combined effect of the proposed changes for North and South Ponds will decrease the discharge off site due to the 100 year storm from the existing 401 CFS to 172 CFS which is less than half of present conditions.

In order to construct the access road, dredge part of North Pond and construct the dike across South Pond, The Final Environmental Impact Report indicates the total volume of pond sediments to be dredged amounts to 6,000 cubic yards. The Department of Water Pollution Control determined in their review of the analyses submitted with the Draft and Final Environmental Impact Reports, the dredge material should be disposed of on the upland portion of the site rather than being used as fill material for North Pond. As indicated in Section 1.3 of the Final Report, the disposal of dredged material on upland portions of the site "will avoid the potential for reintroduction of sediments into pond waters/ or downstream." In evaluating locations for the disposal of the dredge spoils, the Department has determined the most suitable stockpile location for this material is in the area designated to be filled which lies immediately to the east of South Pond and to the west of the Symmes Lot. Further requirements for the dewatering of this material are described in the attached Superseding Order. Additional requirements may be included in the Water Quality Certification to be issued by the Division of Water Pollution Control.

An additional concern raised during the review of this project, which also relates to prevention of pollution, is the "Tahby Dump". The dump covers approximately 1.5 acres, contains miscellaneous fill and as Figure 2-2 of the Draft EIR indicates, is located on the west bank of the existing stream which connects North and South Pond. The Conditions of the attached Order describe the required clean-up for this area, particularly within 100 feet of the stream.

In regard to the interest, groundwater supply, this Department's Water Supply Protection Atlas indicates the site has low valve as an aquifer. This is due to the subsurface geology which consists of bedrock mantled by till. Above the till and particularly beneath the ponds are glaciofluvial deposits comprised of sand. On the basis of the levels of contaminants in those glaciofluvial deposits and the estimated groundwater transport velocities in the Goldberg-Zoino and Associates, Incorporated Report (1982), the Department has determined pollution of groundwater in this area will be of the existing extent. Furthermore, the Final Environmental Impact Report considers the ponds to be discharge areas rather than recharge areas of an aquifer. On this basis and due to the apparent affinity of the metals encountered to sediment surfaces, metals disturbed during dredging and excavation will be contained by the hay bale erosion control barriers.

Please be advised that it has been the Department's responsibility to address those interests of the Wetlands Protection Act which are significant to this project, and to determine from its review, the conditions that are necessary to prevent any adverse impacts in relation to those interests. This Order addresses the provisions of the Massachusetts General Laws, Chapter 131, Section 40, and does not relieve the necessity of complying with all other applicable federal, state or local statures, ordinances, by-laws and/or regulations.

Should any party dispute these findings, your attention is directed to the attached "NOTICE" regarding an adjudicatory hearing. Should a hearing be requested, you must be prepared to present factual material supporting your objection(s).

If you have further questions regarding this project, contact Ms. Shirley Dilg, Chief of the Division of Wetlands at the letterhead address or telephone 935-2160.

Very truly yours,

William A. Krol

William A. Krol, P.E.
Deputy Regional Environmental Engineer

WAK/CP/gg

5. Any fill used in connection with this project shall be clean fill, containing no trash, refuse, rubbish or debris, including, without limiting the generality of the foregoing, lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles or parts of any of the foregoing.

6. No work may be commenced until all appeal periods have lapsed from the order of the Conservation Commission or from a final order by the Department of Environmental Quality Engineering.

7. No work shall be undertaken until the final order, with respect to the proposed project, has been recorded in the Registry of Deeds for the district in which the land is located within the chain of title of the affected property. The Document number indicating such recording shall be submitted on the form at the end of this order to the issuer of this order prior to commencement of work.

8. A sign shall be displayed at the site not less than two square feet or more than three square feet bearing the words, "Massachusetts Department of Environmental Quality Engineering, Number 348-98 ".

9. Where the Department of Environmental Quality Engineering is requested to make a determination and to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before the Department.

10. Upon completion of the work described herein, the applicant shall forthwith request, in writing, that a Certificate of Compliance be issued stating that the work has been satisfactorily completed, in accordance with this Order and plans referenced therein.

11. The work shall conform to the following described plans and additional conditions:

Work shall conform in all respects, except as noted in additional conditions, to the plans entitled "Sheehy Properties", Sheets 1 through 13, Dwq. #'s KP-1, PL-1, PL-2, SG-1, SG-2, SG-3, SG-4, SG-5, PR1 and PR2, dated 6-4-82; and Dwq. #'s SD-1, SD-2 and SD-3, dated 6-2-82, by GHR Engineering Corporation, 75 Tarkiln Hill Rd., New Bedford, Ma., stamped and signed by Richard J. Rheaume, Registered Professional Engineer #28373; and to "Proposed Pond Reconstruction at Sheehy Industrial Park in Woburn, Massachusetts", dated June 7, 1982, by GHR Engineering, signed and stamped by Richard J. Rheaume, R.P.E. Work on the South Pond dyke shall conform to the cross section conceptual sketch prepared by Goldberg Zoino and Associates, File No.: A-3653, July, 1984

ORDER OF CONDITIONS
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12) During any phase of the project which will require excavation within 200 ft. of the "Hide Piles" or edges of North or South Ponds an engineer who is knowledgeable of and experienced with the hazardous waste conditions at the site shall be present on site and shall have the authority to require appropriate action which shall include stopping work in the event that conditions are encountered which could result in the release of contaminents or hazardous materials. In the event that such actions are required the Northeast Regional Office of the DEQE shall be notified immediately.

13) Prior to any work within 200 ft. of the Hide Piles, the base of the Hide Pile slopes shall be prominently identified with stakes spaced at a 50 ft. interval. Identification of base of slope shall be done with the presence of representatives from DEQE, Woburn Conservation Commission and the Environmental Protection Agency. The layout of the dike across South Pond shall also be identified at this time with stakes.

14) The sequence of construction shall conform to the specifications of the above described plans and shall proceed as follows:

I <u>Rebuild dike at south end of north pond:</u>

A) Place staked haybales along downstream toe of proposed dike.

B) Install culvert.

C) Clear and grub existing dike.

D) Place glacial till soil to form proposed dike grades.

E) Install water main.

F) Loam and seek dike slopes immediately upon completion. Mulch as necessary.

G) Construct concrete spillway.

II <u>Construct Dike Across South Pond</u>

A) Place double silt fence across South Pond ten feet downstream of the toe of proposed dike.

B) Strip muck and other unsuitable soil from bottom of pond to 5 feet beyond base of proposed dike. Stockpile this material in designated upland area.

C) Install proposed culvert.

D) Place glacial till soil to form proposed dike grades.

E) Loam and seed dike slopes immediately upon completion. Mulch as necessary Rip rap to stablize areas below the normal water level (both upstream and downstream).

cc: Augustine P. Sheehy
Dundee Park Property
Andover, MA 01810

Woburn Conservation Commission
Town Hall
Woburn, MA 01801

Wilmington Conservation Commission
Town Hall
Wilmington, MA 01887

G.H.R. Engineering Corp.
75 Tarklin Hill Rd.
New Bedford, MA 02745
Attn: Richard Rheaume

Executive Office of Environmental
Affairs, MEPA Unit
100 Cambridge St., 20th Floor
Boston, MA

Goldberg-Zoino & Assoc.
The Geo Bldg.
320 Needham St.
Newton Upper Falls, MA 02164
Attn: Charles Lindbergh

U.S. Environmental Protection Agency
J.F.K. Bldg.
Boston, MA 02203
Attn: Richard Leighton

Department of Environmental
Quality Engineering
Division of Water Pollution Control
One Winter St.
Boston, MA 02108
Attn: Judy Purdue

Department of the Army
Corp of Engineers
424 Trappelo Road
Waltham, MA 02254
Attn: William Lawless
Chief Regulatory Branch

Department of Environmental Quality
Engineering
Division of Hazardous Waste
One Winter Street
Boston, MA 02108
Attn: Robert Cleary

ORDER OF CONDITIONS

WETLANDS PROTECTION ACT

G.L. c. 131, s. 40

CITY/TOWN Woburn FILE NUMBER 348-98

TO: NAME A.P. Sheehy ADDRESS Dundee Park

CERTIFIED MAIL NUMBER ______ Andover, MA 01810

PROJECT LOCATION:
Address New Boston Street, Woburn, MA 01801

Recorded at Registry of Middlesex (south), Book 13758, Page 228.

Certificate (if registered) ______

REGARDING:
Notice of Intent dated June 7, 1982

and plans titled and dated as listed in Condition 11 on Page 2 of this Order

THIS ORDER IS ISSUED ON (date) ______

Pursuant to the authority of G.L. c. 131, s. 40, the Department of Environmental Quality Engineering (D.E.Q.E.) has reviewed your Notice of Intent and plans identified above, and determined that the area on which the proposed work is to be done is significant to one or more of the interests listed in G.L. c. 131, s. 40. The Commissioner hereby orders that the following conditions are necessary to protect said interests and all work shall be performed in strict accordance with them and with the Notice of Intent and plans identified above except where such plans are modified by said conditions.

CONDITIONS

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this order.

2. This order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.

3. This order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state or local statutes, ordinances, by-laws and/or regulations.

4. The work authorized hereunder shall be completed within one (1) year from the date of this order unless it is for a maintenance dredging project subject to Section 5(9). The order may be extended by the issuing authority for one or more additional

II Construct Dike Across South Pond: (continued)

F) Construct concrete spillway.

G) A six (6) ft. high fence shall be erected to connect with the existing 6 ft. fence which end on the east and west sides at South Pond.

NOTE: Order of I and II may be reversed. However, both dikes shall be constructed before commencement of any other site alterations.

III Construct Industrial Park Roadway Across Pond:

A) Remove muck, stockpile in designated area.

B) Install sewer line.

C) Commence earth and rockfill.

D) Install culverts, install downstream staked haybale check dams.

E) Complete roadway fill.

F) Install catch basins.

G) Complete roadway, pavement, etc.

H) Loam and seed areas of exposed earth. Mulch as necessary.

IV Construct Industrial Park Roadway on Upland Area East of North Pond:

A) Each culvert to have minimum of two staked haybale dams downstream.

B) Slopes to be temporarily stablized immediately upon complation.

V Fill North End of North Pond and Wetland Areas:

A) Proposed deep pond may be dredged at this point.

B) Area to be filled shall have muck stripped and stockpiled in designated area. Fill shall not be dredged material.

C) Staked haybale check dam and/or silt fence to be placed along toe of slope.

D) Slopes to be loamed and seeded immediataly upon completion.

E) Construct peninsulas and island from uncontaminated fill material.

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V <u>Fill North End of North Pond and Wetland Areas: (continued)</u>

F) Loam and seed immediately upon completion.

G) The north pond shall be reconstructed in accordance with U.S.D.A. Soil Conservation Service Guidelines for "Wildlife Pond", 6 sheets, submitted by GHR Engineering with the Notice of Intent and received 7/15/82.

VI <u>Creation of Four Acre Marsh to North of Peninsulas and Island:</u>

A) Under normal flow conditions, water depth in the proposed marsh area shall not exceed a depth of 12 inches. Filling may be necessary to achieve this depth.

B) The upper 6-12 inches of substrate in the proposed marsh area shall consist of an uncontaminated organic rich soil or peat. This shall not be dredged material.

C) Cattail (Typha sp.) sprigs or seedlings shall be planted on a 3 ft. grid spacing over the entire proposed marsh area at a beginning of the next growing season (April - May).

D) At least a 75% cover of wetland vegetation shall be established by the middle of the following growing season (July - August). Replanting of plants which did not survive the initial growing season shall be required to achieve a 75% cover.

NOTE: IV, V, & VI may be undertaken concurrently.

VII <u>Fill Wetlands on East Side of South Pond:</u>

A) Area to be filled shall have muck stripped and stockpiled in designated area. Fill shall not be dredged material.

B) Haybale check dam and/or silt fence to be placed along toe of slope.

C) Slopes to be loamed and seeded immediately upon completion.

15. Construction of the peninsulas and islands in the proposed "Wildlife Pond" shall include the installation of 2½" galvanized pipes as shown on drawings SG-1 and SG-2 of approved plans cited in Condition 11 above. Upon completion of "V" in the sequence of construction listed in Condition 14, the petitioner shall supply to the Woburn Fire Department, a sufficient number of "Petro-Traps", or acceptable equal, including all accessory equipment and instructions, to provide for the containment and collection of unexpected introduction of petroleum products into the northern part of the pond. A copy of a letter of receipt by the Fire Chief shall be supplied by the Petitioner to the Conservation Commission and the DEQE, Division of Wetlands Protection.

ORDER OF CONDITIONS
#348-98

16. The proposed pond, culverts and dikes shall be maintained by the petitioner and/ his successors to be functional, clean and non-erosive. This condition shall re main in effect in perpetuity.

17. Material dredged from North and South Ponds shall be stockpiled to dewater in th area designated to receive approximately 6 to 8 vertical ft. of fill upslope of the proposed 84 ft. contour and to the east of South Pond and to the west of the Symmes Lot. Staked haybales shall be located around the downslope perimater of th stockpile.

18. After stockpiled material has dewatered, the dredge material shall be mixed in layers with the clean fill proposed for this area and then covered with a minimu of a 2 ft. cover of cleanfill. Dredged material shall not be used as fill for wetland areas.

19. In the event that nuisance odors develop from the stockpiled dredged material, a covering of lime or some other measures shall be taken to abate the impact of th odors.

20. Any material identified in Condition 5 above encountered in the vincinity of the "Tubby Dump (Fig. 2-2 DEIR) or anywhere else on site and within 100 ft. of wet- lands shall be removed to a depth of two feet below the proposed grade and then disposed of at an approved sanitary landfill. The area shall then be capped wit two feet of impervious material and then loamed and seeded.

21. Any refuse or solid waste encountered in the vicinity of the "Tabby Dump or else where on the site and greater than 100 ft. from the edge of the wetlands shall b disposed of in accordance with the provisions of Massachusetts General Law Chapt 111, Section 150A and the requirements of the Woburn Board of Health. A copy of Woburn Board of Health's requirements shall be forwarded to the Division of Wetl Protection.

22. Disturbed soil areas within 100 linear ft. of ponds or wetlands shall be loamed seeded. If weather does not permit, these areas shall be stabilized with hay mu wood chips or an approved equivalent until such planting may be done.

23. Temporary and permanent erosion control methods, consistent with U.S.D.A. Soil C servation Service "Guidelines for Soil and Water Conservation in Urbanizing Area of Massachusetts", issued April 1975 in Amherst, MA, shall be provided during ev phase of site development along the edge of ponds and wetlands immediately downs of excavation or other disturbed soil areas.

24. The petitioner and/or his successors or agents shall submit to the Division of W Protection, Division of Water Pollution Control (Attn: Judy Purdue) and the Wob Conservation Commission written interim reports from the date of issuance of thi Order until a final Certificate of Compliance has been issued. Interim reports include but are not limited in scope to, the status of any other permits or appl required for this project; alterations on site particularly with respect to Work Sequence status (Condition 14) since filing last report, and results of any addi testing which may have been required by other agencies having jurisdiction over site. Reports shall be submitted on a monthly basis until all work described in Sequency Schedule of Condition 14 and then once every three months.

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25. Members and agents of the DEQE and the Woburn Conservation Commission shall have the right to enter and inspect the premises to evaluate compliance with this Order and to require the submittal of any data deemed necessary by this Department for that evaluation.

26. Any change made or intended to be made in the above described plans shall require the applicant to inquire of this Department, in writing, whether the change is substantial enough to require the filing of a new Notice of Intent.

Findings Pursuant to M.G.L. Chapter 30,
Sections 61 to 62H Inclusive
(M.E.P.A.)

A final Environmental Impact Report (FEIR) for this project was filed on March 15, 1984 with the Secretary of Environmental Affairs. Said FEIR, EOEA #4709, described the environmental impact of this project and sets forth those measures necessary to minimize and prevent any potential significant adverse impacts to the environment. Said measures were reflected in the conditions of the Secretary's findings issued on April 25, 1984, stating that the report adequately and properly complied with G.L. Chapter 30, Sections 62 and 62H inclusive.

The applicant, any person aggrieved by this order, any owner of land abutting the land upon which the proposed work is to be done, or any ten residents of the city or town in which such land is located, are hereby notified of their right to a formal hearing pursuant to the provisions of G.L. Chapter 30A, Section 10. The request for a hearing must be made in writing to the Department of Environmental Quality Engineering within ten (10) days of the date of issuance of this Superseding Order and should be addressed to: Docket Clerk, Department of Environmental Quality Engineering, One Winter Street, 5th Floor, Boston, MA 02108. A copy of the request shall be sent to the Conservation Commission and the Applicant.

ISSUED BY: William J. St. Hilaire

William J. St. Hilaire, P.E.
Regional Environmental Engineer
Metropolitan Boston/N.E. Region

On this 24th day of JULY, 1984, before me personally appeared ______________________ to me known to be the person described in, and who executed, the foregoing instrument and acknowledged that he executed the same as his free act and deed.

Ralph E. Kodor
Notary Public

My Commission Expires Feb. 9, 1990

. . . .

DETACH ON DOTTED LINE AND SUBMIT TO THE ISSUEER OF THIS ORDER PRIOR TO COMMENCEMENT OF WORK

TO: ______________________________________ (Issuing Authority)

PLEASE BE ADVISED THAT THE ORDER OF CONDITIONS FOR THE PROJECT AT ____________________,

FILE NUMBER ______________, HAS BEEN RECORDED AT THE REGISTRY OF ____________________,

ON ____________________ (Date).

If recorded land, the instrument number which identifies this transaction is __________.

If registered land, the document number which identifies this transaction is __________.

COMMONWEALTH OF MASSACHUSETTS
DEPAR[illegible]T OF ENVIRONMENTAL QUALITY EN[illegible]ERING
OFFICE OF GENERAL COUNSEL

One Winter Street
Boston, Massachusetts 02108
Telephone (617) 292-5568

FORM AND CONTENT OF NOTICE OF CLAIM FOR ADJUDICATORY HEARING UNDER THE WETLANDS PROTECTION ACT, G.L. C. 131, S.40

The Department of Environmental Quality Engineering's "Rules for Adjudicatory Proceedings," 310 CMR 1.00, require that certain information be submitted as part of a request for an adjudicatory hearing on a Superseding Order of Conditions issued by the Department under the Wetlands Protection Act. This information is necessary to ensure that each request for a hearing may be handled efficiently and that the rights of all parties are protected. Failure to submit all of the necessary data may result in dismissal by the Department of the request for a hearing.

The key elements which are required are a statement of the facts explaining why the person requesting a hearing claims that the Superseding Order should be changed and what it should be changed to. A simple enumeration of the public interests identified in the Wetlands Protection Act will not be sufficient.

A notice of Claim for Adjudicatory Hearing must include the following information:

(1) A title which indicates the name of the case (I.E., DEQE Wetlands File Number, City/Town, Name of Applicant);

(2) The complete name, address and telephone number of the party filing the request for a hearing and, if represented by counsel, the name and address of the attorney;

(3) The names and addresses of all other parties and their representatives, if known;

(4) A clear statement that a formal adjudicatory hearing is being requested;

(5) A clear and concise statement of the objections to the Superseding Order;

(6) A clear and concise statement of the facts upon which the request for a hearing is based.

(7) A clear and concise statement of the changes which are sought in the Superseding Order; and

(8) A statement that a copy of the request is being sent by CERTIFIED MAIL or hand delivered at the same time to the applicant, the conservation commission and each other party or representative of the party, if known.

Notice of Claim for Adjudicatory hearing must be filed within ten business days of the [illegible] of issuance of the Superseding Order and must be sent CERTIFIED MAIL or hand de[illegible]d to:

Suzanne Carnevale, Docket Clerk
Office of General Counsel
Department of Environmental Quality Engineering
One Winter Street
Boston, MA 02108
(617) 292-5568

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

VIA HAND DELIVERY

SEP 13 1988

Richard A. Johnston, Esq.
Hale & Dorr
60 State Street
Boston, MA 02109

Re: Industri-plex Superfund Site, Woburn, Massachusetts

Dear Mr. Johnston:

As we discussed on the telephone on Friday, September 9, the United States Environmental Protection Agency is transmitting to you, as attorney for Lipton Industries, Inc., the enclosed Notice of Potential Responsibility and Request for Information regarding the Industri-plex Superfund Site in Woburn, Massachusetts. In our telephone conversation you stated to me that you are authorized to accept service of this document on behalf of Lipton Industries, Inc.

Also enclosed is a copy of a draft administrative order to compel the responsible parties to perform the remedial action for the Site. Although this draft does not name Lipton as a respondent, the final draft will so name Lipton and will contain a finding that Lipton was an owner of the facility at the time of disposal of hazardous substances.

EPA will issue this order at 4:00 p.m. on September 22, 1988, unless prior to that time the responsible parties have signed a consent decree with the United States and the Commonwealth of Massachusetts regarding the performance of the remedial action. EPA reserves all rights, specifically including the right to issue this order or any other order prior to that time if it determines that satisfactory progress is not being made toward settlement.

The owners and operators at the Industri-plex Superfund Site have organized a Landowner Steering Committee to attempt to negotiate a settlement of their liability with respect to the Site. You and/or your counsel may wish to contact them. If so, I would suggest that you contact Attorney Michael Leon of Warner & Stackpole, 28 State Street, Boston 02109, telephone (617) 725-1400.

Please feel free to contact me (617-565-3334) if you have any questions.

Very truly yours,

Gregory M Kennan

Gregory M. Kennan
Assistant Regional Counsel

cc: Marilyn Wade, Remedial Project Manager
William D. Brighton, U.S. Department of Justice
Madelyn Morris, Mass. Office of the Attorney General
Anne Kelly, DEQE Office of General Counsel

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

URGENT LEGAL MATTER -- PROMPT REPLY NECESSARY
VIA HAND DELIVERY

September 13, 1988

Lipton Industries, Inc.
c/o Richard A. Johnston
Hale & Dorr
60 State Street
Boston, MA 02109

RE: Industri-plex Superfund Site, Woburn, Massachusetts
Notice of Potential Liability; Request for Information

Dear Sir or Madam:

NOTICE OF POTENTIAL LIABILITY

This letter is to notify you of potential liability which you and/or your company may incur or may have incurred with respect to the Industri-plex Superfund Site (the "Site"), to make a formal demand for reimbursement of the costs, including interest, that have been or will be incurred in response to the environmental problems at the Site, and to notify you of forthcoming cleanup response activities at the Site which you will be asked to perform or finance.

The United States Environmental Protection Agency ("EPA") has documented the release and threatened release of hazardous substances, pollutants, and contaminants at the Site. EPA has spent and is considering spending public funds on actions to investigate and control such releases or threatened releases. Under Sections 106(a) and 107(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9606(a) and 9607(a), and Section 7003 of the Solid Waste Disposal Act, as amended (SWDA), 42 U.S.C. § 6973, and other laws, responsible parties may be obligated to implement response actions deemed necessary by EPA to protect the public health or welfare or the environment and may be liable for all costs incurred by the government in responding to any release or threatened release at the Site. Such costs may include, but are not limited to, expenditures for investigation, planning, response, and enforcement activities. In addition, unless EPA reaches an agreement under which a responsible party or parties will properly perform or finance such actions, EPA is empowered to perform these actions itself pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, and seek recovery of the costs expended from responsible parties.

Responsible parties under CERCLA include current and former owners and operators of the Site, persons who arranged for disposal of hazardous substances found at the Site, and persons who accepted hazardous substances for transport to the Site.

Based on real estate title records and other information, EPA has reason to believe that you were an owner/operator of the facility at the time of disposal of hazardous substances, and are therefore a potentially responsible party with respect to the Site. By this letter, EPA notifies you of your potential liability and encourages you, as a potentially responsible party, to reimburse EPA for the costs incurred to date and to voluntarily perform or finance the response activities described below that EPA has determined are required at the Site.

DEMAND FOR PAYMENT OF COSTS

In accordance with CERCLA and other authorities, EPA has already undertaken certain actions and incurred certain costs in response to conditions at the Site. These response actions include development and issuance of the Record of Decision, various enforcement activities, and certain emergency actions including fencing certain areas of the Site. The cost to date of the response actions performed through EPA funding is approximately $1.35 million. The agency anticipates expending additional funds for response activities at the Site under the authority of CERCLA and other laws, including the response activities described below. In accordance with section 107(a)(4)(d) of CERCLA, EPA makes demand for payment of the above amount plus any and all interest authorized to be recovered under that section or under any other provisions of law. EPA also makes demand under these authorities for payment of interest on all future costs that EPA may accrue in regard to the Site. Current estimates of the total costs for the Site cleanup are as much as approximately $31 million.

RESPONSE ACTIVITIES AT THE SITE

EPA has issued a Record of Decision dated September 30, 1986, setting forth its determination of the appropriate remedial actions to be undertaken at the Site. These actions include regrading and restructuring the "hide piles" and construction of a facility to treat air emissions from the piles; construction of caps or covers in areas of metal contamination; design and construction of an interim groundwater remedy consisting of interceptor wells and a treatment facility; implementation of certain "institutional controls" to ensure the integrity of the remedial measures and prevent the unauthorized modification or disturbance of caps or existing ground-covering features such as buildings or other structures, roads, and parking lots which serve as the caps in developed areas of the Site; and long-term operation and maintenance and ground-water monitoring. The remedial actions are described in detail in the Record of Decision, which is available for public inspection.

In addition to those enumerated above, EPA may, pursuant to its authorities under CERCLA and other laws, decide that other clean-up activities are necessary to protect the public health or welfare or the environment.

REQUEST FOR INFORMATION

In addition to notifying you of potential liability, EPA is seeking certain information from you and/or your company pursuant to CERCLA § 104(e), 42 U.S.C. § 9604(e), and SWDA § 3007, 42 U.S.C. § 6927. Specifically, please provide EPA with any and all information and documents in the possession of the addressee and/or any officers, employees, agents, servants, attorneys, representatives, subsidiaries, affiliated or related corporations, and all operational divisions thereof, which are responsive to the questions below.

Your response must be in writing and must include a separate numbered response to each question below. You must also provide copies of each and every document you consulted in preparing your answer, which forms the basis for your answer, or which relates in any way to the question or your answer. Whether or not information or documents are available, the response to this information request should be provided in the form of a notarized affidavit.

The term "documents" used above means any way of recording, storing, or transmitting information, including but not limited to writings, memoranda, contracts, purchase orders, shipping documents, bills of lading, manifests, invoices, photographs, audio or video tapes, and computer tapes or disks (including identification of the hardware and software used to produce the tape or disk).

For purposes of this request for information, the term "Site" means the Industri-plex Superfund Site in Woburn, Massachusetts, the general location of which is depicted on Attachment A, and includes those areas of the property now or formerly owned by Augustine Sheehy, d/b/a Dundee Park Properties, where animal hide wastes and chemical sludge were or allegedly were dumped or redeposited in connection with development activities at the Industri-plex 128 Industrial Park.

Please note that unless specifically stated otherwise, these questions concern the entire Site, and not just the parcel that you or your company or business owns or occupies or owned or occupied. It will benefit both you (or your company) and EPA to ensure that all potentially responsible parties have been identified.

1. Identify the individual answering these requests on behalf of you or your company or business, and all persons consulted in preparation of these responses. Please describe in general the information or documents in the possession of each person identified.

2. On what date did you and/or your company purchase property and/or commence operations at the Site, and sell or convey property and/or cease operations at the Site? Please provide copies of all deeds and other documents reflecting acquisition, sale, conveyance, leasing, or occupancy of property at the Site, including but not limited to deeds and purchase and sale agreements.

3. Please identify and describe the nature of your company or business that owns or occupies or owned or occupied property at the Site, describe in general the nature of its business, and describe fully all activities undertaken by such company at the Site at any time. Provide the certificate of incorporation, deed of trust, or certificate of limited partnership, for your company or business which owns or occupies, or owned or occupied, property at the Site.

4. If you and/or your company or business rented, leased, or otherwise occupied property at the Site but do not or did not own such property, identify the current and all previous owners of the property.

5. Identify all lessees and sublessees (past and present) of any and all property you and/or your company own or occupy or owned or occupied at the Site. State the periods during which such leases were effective. Describe the businesses or operations conducted by such persons. Provide copies of leases or other documents under which such persons occupy or occupied the property.

6. Identify the owner(s) and, if different, all occupant(s) and/or lessee(s) of the property you or your company or business owns or occupies or owned or occupied at the Site prior to your or your company's ownership and /or occupancy. Describe activities on and/or use of the property prior to ownership and/or occupancy of that property by you or your company or business.

7. Describe briefly the type and nature of any other business(es) presently operating on the property presently or formerly owned or occupied by you or your company or business at the Site.

8. Please provide all financial statements and reports, whether audited or unaudited, including all filings made to the Securities and Exchange Commission, and all federal income tax returns, for your company or business which owns or occupies, or has owned or occupied, property at the Site, for the period January 1, 1985 to the present.

9. Please provide all financial statements and reports, whether audited or unaudited, including all filings made to the Securities and Exchange commission, and all federal income tax returns, for all parent and subsidiary companies of the company referred to in the preceding question, for the period January 1, 1985 to the present.

10. Identify and provide any engineering, geotechnical, or other studies or investigations conducted by or on behalf of any person to characterize the environmental and soil characteristics of (1) the property now or formerly owned or occupied by you or your company or business at the Site and (2) any other property at the Site. This shall include studies and investigations prior to and for construction of buildings on the properties.

11. Did any person acting on behalf of you or your company or business ever test or arrange for the testing of any samples of water, soil, dust, sediment or other samples from the property now or formerly owned or occupied by you or your company or business to determine whether any hazardous substances, hazardous wastes, pollutants, or contaminants (as defined in CERCLA and/or SWDA) were present? If so:

    a. identify and describe the type of each sample (whether water, soil, etc.) and the location from which each sample was taken;

    b. describe test results for each sample, including lists of any contaminants identified, and the concentration of the contaminant;

    c. give the dates the samples were taken; and

    d. identify the laboratory or party that conducted each of the tests.

12. If you are aware of any testing described in the previous paragraph conducted by or on behalf of any person with respect to any other property at the Site, please provide to the extent possible the information requested in the preceding paragraph with respect to such testing.

13. Has any employee or representative of your company ever disposed of any material, liquid or solid, new or used, in, on, or near (1) the property now or formerly owned or occupied by you or your company or business at the Site, or (2) anywhere else on the Site?

14. Has any employee or representative of your company ever had knowledge of disposal by any person of any material, liquid or solid, new or used, in, on, or near the Site?

15. If the answer to questions 13 or 14 or any part of those questions is yes, please provide the following:

    a. identify the person(s) that have disposed of the material and the dates and time periods such disposal took place;

    b. describe the exact location of all deposited material;

    c. describe the content and quantity of all deposited material, indicate whether liquid or solid and identify any chemicals or chemical products and specify concentrations;

    d. indicate whether the material was in containers or deposited directly in or onto the ground or water.

16. Did any person acting on behalf of you or your company or business ever undertake any efforts to remove and/or arrange for the removal of any materials deposited and/or buried on the property owned or occupied by you or your company or business at the Site? If so:

    a. give the dates of all such arrangements and/or efforts;

    b. give the specific locations of all such efforts;

    c. describe the material removed;

    d. indicate how long the material had been present on-site before removal;

    e. describe the removal efforts;

f. identify all parties involved in removal efforts; and

g. identify the location where the material was ultimately deposited.

17. Did any person ever undertake any efforts to remove and/or arrange for the removal of any materials deposited and/or buried at the Site? If so, please provide the information specified in parts (a)-(g) of the preceding question for all such efforts or occurences.

18. Provide all documents containing any information concerning the presence of hazardous substances, hazardous wastes, pollutants, or contaminants (as those terms are used in CERCLA and/or SWDA), or any other form of contamination or pollution, on or near property now or formerly owned by Augustine Sheehy, d/b/a Dundee Park Properties, including but not limited to all pleadings, discovery, and other documents filed, developed, collected, or compiled in connection with litigation between Augustine Sheehy, d/b/a Dundee Park Properties, and Lipton Industries, Inc., in the Massachusetts state courts.

19. Provide all documents containing any information concerning the presence of hazardous substances, hazardous wastes, pollutants, or contaminants (as those terms are used in CERCLA and/or SWDA), or any other form of waste, contamination, or pollution, on or near any property at the Site not included in the description in the preceding paragraph.

20. Identify all persons known to you, or believed by you, to have information or documents concerning the presence, disposal, transportation, excavation, or handling of hazardous substances, hazardous wastes, pollutants, or contaminants (as those terms are used in CERCLA and/or SWDA), or any other form of waste, contamination, or pollution,

a. on or near property now or formerly owned by Augustine Sheehy, d/b/a Dundee Park Properties, at the Site, and

b. on or near any other property on the Site,

and summarize the information and describe the documents you know or believe each person to have.

21. Has benzene or any product containing benzene been used or stored on property at or near the Site owned or occupied by you or your company or business at any time since you or

your company or business owned or occupied the property until the present? If so, state:

a. each year in which benzene or a product containing benzene was purchased, and the quantity purchased;

b. identify the storage location of the benzene or the products containing benzene;

c. describe the containers used for storing benzene or the products containing benzene;

d. describe the uses of benzene or products containing benzene including all processes in which such products were used, and the quantities and concentrations used;

e. describe the nature and amount of waste generated by each process and use listed in (d), above. Indicate whether the waste was liquid, solid or gaseous and describe the components of the waste, including all chemicals and by-products of chemicals;

f. describe the treatment, storage and disposal methods for all above wastes.

22. Has toluene or any products containing toluene been used or stored on property at or near the Site owned or occupied by you or your company or business at any time since you or your company or business owned or occupied the property until present? If so, indicate:

a. each year in which toluene or a product containing toluene was purchased, and the quantity purchased;

b. identify the storage location of toluene or the products containing toluene;

c. describe the containers used for storing toluene or the products containing toluene;

d. describe the uses of toluene or products containing toluene including all processes in which such products were used, and the quantities and concentrations used;

e. describe the nature and amount of waste generated by each process and use listed in (d), above. Indicate whether the waste was liquid, solid or gaseous and describe the componets of the waste, including all chemicals and by-products of chemicals;

f. describe the treatment, storage and disposal methods for all above wastes.

23. If you know or believe that benzene, toluene, or any substance containing benzene or toluene has ever been used or stored by any person at the Site, please provide the information called for in parts (a)-(f) of the two preceding questions.

24. Have any solids and/or liquid wastes been treated and/or stored on the premises at any time during which you or your company or business owned or occupied the property, and since that time until the present? If so:

a. describe all waste material treated and/or stored;

b. describe each treatment process used;

c. provide the annual quantity of waste processed in each treatment process;

d. describe the containers used for storage;

e. describe the location on the property of all storage containers;

f. for each waste product, describe the maximum quantity stored at any one time period the waste was stored;

g. for each waste product, describe the ultimate disposal methods.

25. Were any above or below ground storage containers (1) on the property owned or occupied by you or your company or business at the Site or (2) anywhere on the Site ever emptied into or onto the ground, ever ruptured or punctured, corroded, over-filled or otherwise compromised so that is leaked onto the ground?

26. If the answer to the preceding question is yes:

a. identify the contents of all material spilled and/or deposited onto the ground; identify any chemicals and their concentrations;

b. identify the quantity of all material spilled and/or deposited onto the ground;

c. indicate the number of incidents and the dates of each of the occurrences, or the time period of these practices;

d. describe the exact location of all spills and/or deposit site.

27. If not already addressed in your responses to the preceding question, describe in detail any and all incidents (1) on the property owned or occupied by you or you company or business at the Site or (2) any where on the Site that involved spillage, leakage, or accidental or purposeful discharge of any chemical or product containing chemicals used in connection with any manufacturing operation, process, cleaning and/or maintenance operation.

TIMING AND FORM OF RESPONSES TO THIS LETTER

As a potentially responsible party, you should respond to the Notice of Potential Liability contained in this letter by notifying EPA in writing within five days from the receipt of this letter of your willingness to perform or finance the activities described above. If EPA does not receive a timely response, EPA will assume that you and your company or business do not wish to negotiate a resolution of their liabilities in connection with the Site and decline any voluntary involvement in performing the response activities.

Your letter should specify the appropriate name, address, and telephone number for further contact with you. If you are already involved in discussions with state or local authorities, engaged in voluntary clean-up action, or involved in a lawsuit regarding this Site, you should continue such activities as you see fit. This letter is not intended to advise you or direct you to restrict or discontinue any such activities; however, you are advised to report the status of those discussion or actions in your response to the Notice of Potential Liability in this letter and to provide a copy of your response to any other parties involved in those discussions or actions.

Your response to the Request for Information contained in this letter should be separate and distinct from your reply relating to participation in clean-up activities at the facility. It should be sent to EPA within fifteen days after receipt of this letter. Under Section 104(e) of CERCLA, 42 U.S.C. § 9604(e), and Section 3008 of SWDA, 42 U.S.C. § 6928, failure to comply with this request within the specified time period may result in an administrative order requiring compliance or a civil action for appropriate relief, including penalties of up to $25,000 per day of continued noncompliance.

The response to the Request for Information should include a notarized affidavit from a responsible company official stating that a diligent record search has been completed and there has been a diligent interviewing process with present and former employees who may have knowledge of operations and any and all other information pertinent to the request, a statement that all information responsive to EPA's letter has been forwarded to EPA.

You may, if you so desire, assert a business confidentiality claim covering part of all of the information requested, in the matter described by 42 U.S.C. Section 9604(e)(7) and 40 C.F.R. Section 2.203(b). Information covered by such a claim will be disclosed by EPA only to the extent and by means of the procedures set forth in 40 C.F.R. Part 2, Subpart B. If no such claim accompanies the information when it is received by EPA, it may be made available to the public by EPA without further notice to you.

This information request is not subject to the approval requirements of the Paperwork Reduction Act of 1980, 44 U.S.C. § 3501, et seq.

Your responses should be sent to:

Marilyn Wade, P.E.
U.S. Environmental Protection Agency
Massachusetts Superfund Section
JFK Federal Building, HRS-CAN3
Boston, MA 02203-2211.

Please direct any questions of a legal nature, and all communications from attorneys, to:

Gregory M. Kennan
Office of Regional Counsel
U.S. Environmental Protection Agency
JFK Federal Building RRC-2203
Boston, MA 02203
(617) 565-3334.

The factual and legal discussions in this letter are intended solely to provide notice and information, and such discussions are not to be construed as a final agency position on any matter set forth herein. Due to the seriousness of the environmental and legal problems posed by conditions at the Site, EPA urges that immediate attention and a prompt response be given to this letter.

By copy of this letter, EPA is notifying the Commonwealth of Massachusetts of its intent to perform, compel, or enter into negotiations for the performance or financing of, response actions at the Site.

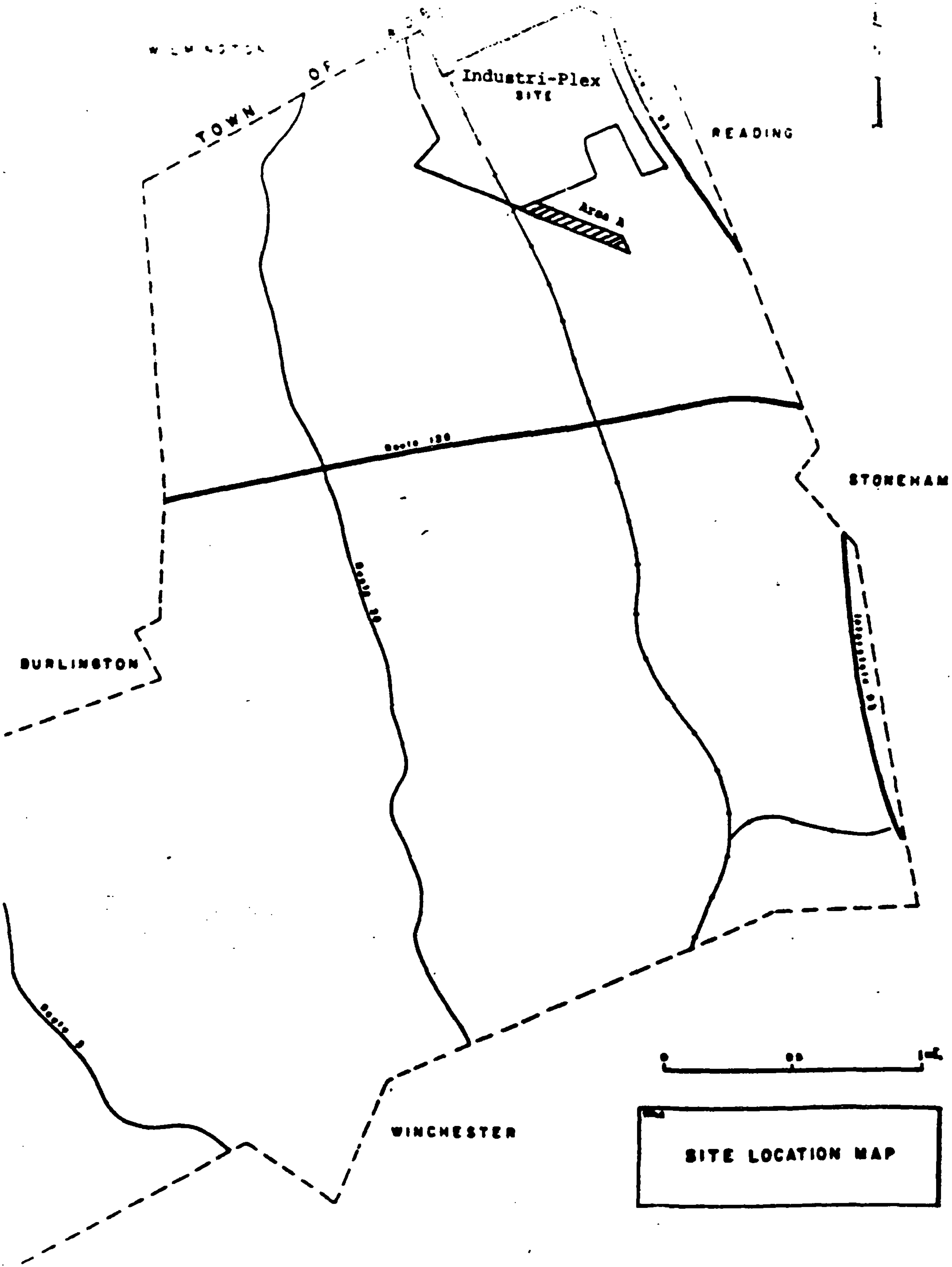
Sincerely,

Merrill S. Hohman

Merrill S. Hohman, Director
Waste Management Division

Attachments

cc: Director, Office of Waste Programs Enforcement
Director, Office of Emergency and Remedial Response
Office of Enforcement and Compliance Monitoring
Marilyn Wade, Remedial Project Manager
Gregory M. Kennan, Office of Regional Counsel
Madelyn Morris, Mass. Dept. of Attorney General



ATTACHMENT E