EARTH TECH
A tyco INTERNATIONAL LTD. COMPANY

Letter of Transmittal

To: Mr. Christopher Alonge
NYS DEC
625 Broadway
Albany, N.Y 12233-7015

Date: 3/3/2003	Earth Tech I.D. 43015
Attention: cga	
Subject: FINAL Subsurface Investigation Report	

WE ARE SENDING YOU:

☒ Attached ☐ Prints ☐ Under separate cover via ______ the following items:
☐ Shop Drawings ☐ Change Order ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of Letter ☐ ______

COPIES	DATE	NO.	DESCRIPTION
4	3/3/2003	4	Final SI Report (three hole punched in binder)
1	3/3/2003	1	FINAL SI Report (unbound)

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 Bids Due ______, 20 ____

REMARKS:

Copy to: DMM, JMO, GH, KC, RP, ML, and PM

Signed: Mark A. Williams
Mark Williams

EARTH TECH
A tyco INTERNATIONAL LTD. COMPANY

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Rev. 12/1/98 - kas

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March 3, 2003 *HAND DELIVERED*

Christopher G. Alonge, P.E., Project Manager
NYSDEC
Division of Environmental Remediation, Bureau of Eastern Remedial Action, 11th Floor
625 Broadway
Albany, New York 12233-7015

Subject: **NYSDEC Voluntary Cleanup Program Site#: V-00322-3**
Wilsonart International, Inc., 1 Brenner Drive, Congers, New York
FINAL Subsurface Investigation Report dated March 3, 2003
Earth Tech Project #: 43015.01

Dear Mr. Alonge:

Pursuant to the requirements of the Voluntary Agreement for the above-referenced project, enclosed are four bound copies and one unbound copy of the FINAL Subsurface Investigation (SI) Report dated March 3, 2003. Copies have also been distributed to Mr. Olm (NYS DOH BEEI), Mr. Pergadia, P.E. (NYS DEC DER - Region 3), and Dr. Miller (RC DOH) to expedite the receipt and approval of the FINAL SI Report. The FINAL SI Report includes all "approved" responses to comments previously raised by the NYS DEC, NYS DOH, and/or RC DOH as well as revisions requested in your February 13, 2003 letter. These adjustments include the modified report text regarding the disposition of Investigation-Derived Wastes (IDW), a minor change to the conclusions section, and all revised Appendices.

Wilsonart's submittal of the FINAL SI Report serves in partial fulfillment for one of the final steps of the Voluntary Cleanup Program (VCP). Wilsonart understands that they must implement appropriate institutional controls and is diligently working on the appropriate deed restrictions regarding no use of groundwater at the Site.

If you have any questions regarding the submitted FINAL SI Report package, please contact me at (518) 951-2368 or via e-mail at **MARK.A.WILLIAMS@earthtech.com**. Once the FINAL SI Report has been approved and appropriate institutional controls have been implemented, Wilsonart looks forward to the Department issuing an assignable release and covenant not to sue based upon the results of the investigation.

Very truly yours,

Earth Tech, Inc.

Mark A. Williams, P.G.
Project Manager

Joseph E. Coffey, P.E.
Section Manager

Attachments

C: Paul Maxwell – Wilsonart International (with Reports)
John Olm – NYS DOH BEEI (with Report)
Daniel Miller, Ph.D. – RC DOH (with Report)
Kevin Carpenter, P.E. – NYS DEC DER BERA RSB
Ram Pergadia, P.E. – NYS DEC DER Region 3 (with Report)
Michael Lesser, Esq. – NYS DEE Albany

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Michael Lesser, Esq. – NYS DEE Albany

FINAL Subsurface Investigation Report

Former Wilsonart International, Inc. Warehouse Congers, New York

Volume 1 of 2

Prepared for:
Paul Maxwell, Manager of Environmental Affairs
Wilsonart International, Inc.
10501 NW HK Dodgen Loop
Temple, Texas 76503

Prepared by:
Earth Tech, Inc.
40 British American Boulevard
Latham, New York 12110

March 3, 2003

FINAL Subsurface Investigation Report

Former Wilsonart International, Inc. Warehouse Congers, New York

Prepared for:
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Temple, Texas 76503

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March 3, 2003

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1.0 INTRODUCTION

This report presents the findings of a subsurface investigation (SI) conducted at the Wilsonart International, Inc. (Wilsonart) former storage and distribution distribution facility in the hamlet of Congers, Town of Clarkstown, Rockland County, New York (Figure 1). Earth Tech, Inc. conducted the SI for Wilsonart under a Voluntary Cleanup Agreement (VCA: Site #V-00322-3) between Wilsonart and the New York State Department of Environmental Conservation, Division of Environmental Remediation, Bureau of Eastern Remedial Action (NYS DEC), dated August 2000. The former distribution facility, located at 1 Brenner Drive, Congers, New York (Figure 1), is currently owned and operated by Celtic Sheet Metal of Valley Cottage, New York. Historically, the Project site has been referred to as either 1 Brenner Drive or 100 Brenner Drive. Earth Tech's review of real estate documentation and Geographic Information Systems (GIS) appears to suggest that the Project site is actually located at 1 Brenner Drive in the hamlet of Congers, New York.

The following section provides an overview of the Project (Section 1.1, Project Understanding), an outline of Project objectives during the primary and supplemental stages of investigation (Section 1.2, Project Objectives), and a brief outline of the scope of work conducted to fulfill the primary and supplemental stage of project objectives (Section 1.3, Scope of Work), a detailed description and background of the Property being investigated (Section 1.4, Property Description and Background), an overview of ownership/leasing history for the Project Site (Section 1.5, Project Site Ownership), and a brief summary of previous investigations or assessments of the Project Site (Section 1.6, Previous Investigations).

The remaining portions of the Report are outlined below. Section 2.0 provides a detailed description of the field activities carried out during the primary stage of the SI. Section 3.0 provides a detailed description of additional field activities performed during the supplemental stage of the SI (spring 2001). A depiction of the regional and local geologic setting is provided in Section 4.0 while the character of regional and local hydrology and hydrogeology is supplied in Section 5.0. All laboratory analytical reports were evaluated by a qualified data validator to assess data quality and usability and Data Usability Summary Reports (DUSR) were prepared. A discussion of the nature and extent of contamination for the Project Site is assembled in Section 6.0. A qualitative baseline human health risk assessment (Section 7.0) was also performed to determine if the Site may pose a risk to human health based on the data collected as part of the SI. An overview of SI findings and recommendations are presented in Section 8.0.

1.1 PROJECT UNDERSTANDING

The NYS DEC had raised a concern regarding the presence of volatile organic compounds (VOCs) detected in groundwater on the property, and has requested an additional investigation to identify if Wilsonart is the source for this contamination. The SI was subdivided into two stages: a primary stage, which was conducted in fall 2000 and winter 2000/2001; and a supplemental stage, which was conducted during spring 2001. The Supplemental Work Plan represents a modification to the initially approved Work Plan.

The SI (primary stage and supplemental stage) was developed to provide data to address the NYS DEC's concerns, which were summarized by Mr. Dale A. Desnoyers (NYS DEC Chief, State Superfund and Voluntary Cleanup Bureau) in a January 12, 2000 letter to Mr. Ronald S. Pordy (Lester, Schwab, Katz & Dwyer, LLP of New York, N.Y.). The purpose of the SI was to compile and develop factual information to address Wilsonart's contention that the trichloroethene (TCE) impacted groundwater detected on site is the result of an off-site source(s) unrelated to Wilsonart's past use of the property. This report provides for the investigation of soil and groundwater quality to determine the source of groundwater impacts, define limits of potential soil and groundwater impacts, and further characterize groundwater flow conditions.

The SI (primary stage) was conducted in accordance with the document entitled Subsurface Investigation Work Plan (Earth Tech, Revised August 2000), and three letters from Earth Tech to NYS DEC. An August 17, 2000 letter provided an initial response to June 29, 2000 comments from the NYS DEC, New York State Department of Health (NYS DOH), and Rockland County Department of Health (RC DOH) on the May 2000 DRAFT Work Plan. The letter dated August 17, 2000 transmitted the FINAL Work Plan to the NYS DEC, NYS DOH, and RC DOH. Additional comments from the NYS DEC, NYS DOH, and RC DOH were attached to the revised SI Work Plan. A copy of the amended SI Work Plan and the other correspondences listed above are provided in Appendix A.

A status report prepared by Wilsonart was submitted to the NYS DEC, NYS DOH, and RC DOH on February 2, 2001. The Status report provided data and findings from key elements of the primary stage of the SI. Wilsonart concluded that an off-site upgradient source was migrating to the 1 Brenner Drive property via bedrock groundwater. Although the NYS DEC did acknowledge the previous round of groundwater analytical data proved an off-site upgradient source was a contributing component to the groundwater impacted at the Site, the NYS DEC raised concerns that on-site well MW-3 exhibited twice the concentration of TCE and 1,1,1-TCA then observed at upgradient well MW-8 (NYS DEC, February 23, 2001). Although agreeing with the majority of the information represented within Wilsonart's February 2, 2001 letter, the NYS DEC concluded a release could not be granted until this issue was addressed.

On March 20, 2001, Wilsonart committed to and outlined additional activities that would be performed during the supplemental stage of investigation to address data gaps or provide additional understanding of conditions at the Project site. A March 21, 2001 NYS DEC response indicated the Department conceptually agreed with the majority of the expanded investigation tasks and pledged to review the supplemental investigative data. Wilsonart submitted the Supplemental Work Plan to the NYS DEC on April 2, 2001. The Supplemental Work Plan represents a modification to the initially approved Work Plan. A copy of the Supplemental Work Plan and the other correspondences listed above are also provided in Appendix A. The NYS DEC indicated if Wilsonart's conclusion (i.e., observed groundwater contamination is most likely related to an off-site upgradient source) was substantiated, then efforts would be initiated toward the issuance of a release from liability.

1.2 PROJECT OBJECTIVES

The objectives of the SI (primary stage) were to:

- Evaluate the possibility that a source of groundwater contamination remains in the immediate vicinity of the Site;
- Define limits of potential soil and groundwater impact;
- Better characterize groundwater flow conditions at the Site; and
- Determine if contaminants at the Site pose a human health risk to either on-site or off-site receptors.

Other activities were performed during the supplemental stage of investigation to address data gaps or provide additional understanding of the Project site. The purpose of the supplemental stage of investigation was to compile and develop factual information to address Wilsonart's contention that the Freon-113 and TCE impacted groundwater detected on site, and in the region is the result of an off-site source(s) unrelated to Wilsonart's past use of the property. The objective of performing this additional work was to fulfill investigation commitments made by Wilsonart to NYS DEC and RC DOH to get to the endpoint of Wilsonart's involvement with the voluntary cleanup program.

1.3 SCOPE OF WORK

The scope of work conducted to fulfill the primary stage of project objectives, as outlined in Section 1.2, is summarized as follows:

- **Borings/Subsurface Soil Sampling/Rock Coring** - Three borings were drilled in glacial till and the upper portion of bedrock. Soil samples were selected from each soil boring for laboratory analysis.

- **Monitoring Well Installation** - Three new groundwater monitoring wells were installed and developed. Two of the wells were installed in the upper bedrock. One monitoring well was installed into the overburden to form a "well pair" with one of the shallow wells.

- **Groundwater Elevation Measurements** - Groundwater levels were recorded to further define groundwater flow patterns and hydraulic gradients at the Site.

- **Groundwater Sampling** - One round of groundwater samples were collected from the monitoring well network for laboratory analysis of VOCs.

- **Hydraulic Conductivity Testing** - Bail tests were performed in the monitoring wells to evaluate the hydraulic conductivity of the shallow overburden (weathered glacial till) and upper bedrock (Brunswick Formation).

The scope of work conducted to fulfill the supplemental stage of project objectives primarily consisted of:

- **Photo-Lineament Analysis** - The photo-lineament analysis of the study area was performed to better understand and identify observable, natural linear features (bedrock fractures, joint traces or lineaments) in the bedrock.

- **Groundwater Elevation Measurements** - Groundwater levels were recorded to further define groundwater flow patterns and hydraulic gradients at the Site.

- **Groundwater Sampling** - Groundwater samples were collected in three phases to assess the potential for dilution, stratification, and temporal changes as well as accurately characterize a representative snapshot of groundwater quality in the vicinity of the Project site. The first and third phase of groundwater sampling consisted of using a Kemmerer sampler to collect depth discrete groundwater samples from wells MW-3 and MW-9 while the second phase of sampling was for all existing monitoring wells (MW-1 through MW-9) and was completed in a consistent manner as the November 17, 2000 sampling round. All laboratory analyses were for VOCs and Freon.

- **Temperature Profiling** - Earth Tech logged temperature profiles before purging and after purging each applicable monitoring well (wells MW-3, MW-5, MW-7, and MW-8). Earth Tech measured and recorded in-well water temperatures to assess localized horizontal flow zones and in-well groundwater flow, and gain insight into Site groundwater quality trends due to inflections of the temperature logs.

1.4 PROPERTY DESCRIPTION AND BACKGROUND

The former Wilsonart distribution facility is located at 1 Brenner Drive west of State Route 303, in the western portion of a commercial and industrial area in the hamlet of Congers, Town of Clarkstown, Rockland County, New York. The Site is bounded by a sanitary sewer easement (Rockland County Sewer District No. 1), Conrail (CSX) and residential properties on the west; a drainage easement and Sturz Enterprises, Ltd. on the north; commercial/light industrial-zoned lands owned by Rendahl Corp., Diversified Properties, Inc., Precious Realty, Inc. and several other commercial / light industrial businesses on the east; and undeveloped, vacant land owned by Denlo Realty Corp. and residential properties on the south.

As mentioned previously, Wilsonart used the distribution facility exclusively for storage and distribution purposes. The 4.81-acre property was acquired by Wilsonart in 1968 and consists of a building (25%), parking lot (10%), lawn (5%) and wooded areas (60%) [Figure 2]. The footprint of the distribution facility building is approximately 30,000 square feet, approximately 20 percent of which is allocated for office space. Built in 1969, the distribution facility consists of steel frame and masonry construction with poured concrete floors. Three large loading docks are present along the eastern side of the distribution facility building. A glue room located in the southwest corner of the distribution facility building was used to store adhesive materials.

Wilsonart discontinued operations at the distribution facility in December 1994. Wilsonart is not aware of any orders, decrees or other legal documents regarding violations of the Environmental Conservation Law or equivalent federal environmental statutes.

Rockland County Sewer District 1, which also provides service adjacent to the Brenner Drive area, was also contacted regarding connections to the Site. According to Mr. Martin Dolphin, the 1 Brenner Drive property occupants (Wilsonart and Hudson Technologies, Inc. (HTI)) had no Industrial Pretreatment Permits with the Rockland County Sewer Department (August 14, 2000). This suggests the Site may not be connected to the County Sewer District 1. According to Mr. Jerry Brickwood, Town of Clarkstown Sewer Department, there is no documentation that the Site was connected to the Town's Sewer District 35 - Contract B (August 14, 2000). Further review of this subject, via the Freedom of Information Act, would document existing and historic on-site stormwater and sanitary waste management practices at the Site.

1.5 PROJECT SITE OWNERSHIP

The 4.81-acre parcel consisted of vacant land until 1969. The vacant land was owned by Karl F. Kirchner, Mike Wallace and Jerome Johnson. The aforementioned individuals were named as "owners" in a Declaration of Restrictive Covenants dated August 13, 1963 (Lester, Schwab, Katz & Dwyer, LLP, November 1999). These individuals subsequently formed a partnership known as Congers Associates, Inc. The whereabouts of these individuals or the partnership is not known. Premark International, Inc. (a.k.a. Ralph Wilson Plastics Division, Wilsonart) acquired the title of the property (by deed) on June 19, 1968 from Congers Associates, Inc. (Recorded: July 12, 1968: Liber 845, cp 810).

Premark International, Inc. built one 30,000 square foot distribution facility building in 1969. Wilsonart is a manufacturer of surfacing materials for countertops, cabinets, tub and shower surrounds, commercial fixtures and flooring. This facility served the northeastern United States and was used only for storage and distribution purposes. Wilsonart suspended operations at this location in December 1994.

Hudson Technologies, Inc. (HTI) of 275 N. Middletown Road, Pearl River, New York leased the property from Wilsonart between February 4, 1997 and August 1, 1999 to operate an aerosol packaging service facility. HTI surrendered the leasehold premises to Wilsonart by mutual consent of the parties on August 1, 1999.

In November 1999, Illinois Tool Works, Inc. (ITW) of Glenview, Illinois purchased Wilsonart. Ownership/leasing history (prior to initiating fieldwork for this SI) for the Project site is detailed below:

Prior to June 19, 1968	Lands owned by Congers Associates of Great Neck, New York
June 19, 1968 to December 1994	4.81-acre parcel acquired by Rexall Drug and Chemical Co., Inc. of Los Angeles, California; lands occupied by Premark International, Inc., Ralph Wilson Plastics Division (a.k.a. Wilsonart International of Temple, Texas)
February 4, 1997 – August 1, 1999	Building leased to HTI of Pearl River, New York
November 23, 1999	ITW acquired Wilsonart and obtained title to the parcel.

Additional environmental-related details gathered for these different episodes of occupancy are summarized below:

"Greenfield Site" (Prior to June 19, 1968)

Parcel was vacant with no improvements.

Wilsonart Occupancy (June 1968 – December 1994)

During Wilsonart's occupancy, the former distribution facility included inventories of laminate, and flammable and non-flammable adhesives. The flammable and non-flammable adhesive products were manufactured in Temple, Texas and were temporarily stored inside the distribution facility in 55-gallon drums, 5-gallon pails, 1-gallon cans, 1-quart cans and 1-pint cans. Based upon review of operational history and inventory records indicates that lactol or heptane, toluene, MEK, acetone, hexane, methanol, and 1,1,1-trichloroethane (TCA) were used to manufacture these items. A chemical inventory summary is provided in Table 1 of the SI Work Plan (Appendix A). Trichloroethene (TCE) was not used to manufacture the adhesive materials stored at the former Wilsonart distribution facility.

Diesel fuel was stored in one 12,000-gallon underground storage tank (UST) and one 6,000-gallon UST located north of the distribution facility. The USTs were installed in 1974 and were removed, along with all associated pumps and piping, in October 1987 (Appendix A of the SI Work Plan). Tank Tech performed the removal according to state guidelines in place at the time. After the tanks were removed, Mr. Bob Patterson (Rockland County Department of Health, Division of Environmental Health) inspected the excavation. No evidence of leakage from the USTs was reported (Rockland County Health Department, 1987). Clean fill was used to backfill the tank excavations.

In February 1985, the Rockland County Department of Health, Division of Environmental Health issued three violations (Appendix B of the SI Work Plan; Appendix A). The violations are listed below:

1. Emergency plans, floor plans, and hazardous material inventory statement were not submitted to RC DOH or were maintained on premises;
2. Portable containers not properly stored or handled; and

3. Required posting or labeling not present or satisfactory.

Hudson Technologies, Inc. Occupancy (February 4, 1997 – August 1, 1999)

HTI of Pearl River, New York leased the parcel from Wilsonart to house its Congers, New York production facility for its aerosol packaging line. HTI, which provides on-site refrigerant recovery, reclamation and management services along with a full stock of various refrigerant types, announced the closure of its Congers, New York facility on August 1, 1999.

HTI was contacted to provide information relating to the chemical inventory stored and used during their occupancy of the Site (Appendix C of the SI Work Plan; Appendix A). According to Mr. Stephen P. Mandracchia, Executive Vice President of HTI, the following chemicals were used and/or stored at various times and in varying quantities:

- Dichlorodifluoromethane (R-12);
- Tetrafluoroethane (R-134a);
- Chlorodifluoromethane / 2 methyl propane / chloro-1,1-difluoroethane mixture (R-406a);
- Chlorodifluoromethane (R-22);
- Chlorodifluoromethane & chloropentafluoroethane mixture (R-502);
- 2,2 dichloro-1,1,1-trifluoroethane (R-123);
- Welding gases consisting of acetylene, argon, oxygen and carbon dioxide;
- Liquid nitrogen; and
- Small containers of various and miscellaneous cleaning solutions.

1.6 PREVIOUS INVESTIGATIONS

The following investigations have been performed on the subject property. Listed below are details that pertain to the environmental assessment of the Site:

1. Environmental Products & Services, Inc. (EP&S), Phase 1 Environmental Site Assessment – 1 Brenner Drive, Congers, New York 10920, prepared for Hudson Technologies, Inc, March 2, 1998.

HTI, which expressed an interest in purchasing the property from Wilsonart, hired EP&S, a remedial firm, to prepare a Phase 1 Environmental Site Assessment (ESA) of the subject property. Conclusions made by EP&S were:

- Site is not connected to the public sanitary sewer system;
- Suspended ceiling tiles may contain asbestos in the office and maintenance area of building;
- Lead-based paint was observed in various portions of the building;
- Two debris piles were observed exterior to the building;
- Inspection of the glue room, used to store laminate materials, revealed spillage;
- No underground storage tanks (USTs) were observed on the Site. Records reviewed indicate two fuel oil USTs were removed in October 14, 1987 (Earth Tech's review (April 2000) indicated two diesel fuel USTs (one 12,000-gallon and one 6,000-gallon) existed on-Site between 1974 and 1987) existed along the exterior of the northeastern corner of the Site building); and
- NYS DEC files reviewed indicated 40 documented spills have occurred within ¼ to ½ mile of the Site (Earth Tech's later review (April 2000) indicated the environmental database search was incorrectly

centered on "100" Brenner Drive. The Site is actually located at 1 Brenner Drive, approximately ¼ mile to the west.)

EP&S recommended that a Phase II subsurface investigation be performed.

2. **Environmental Products & Services, Inc., Phase II Subsurface Investigation – "100" Brenner Drive, Congers, New York 10920, prepared for Hudson Technologies, Inc., August 31, 1998.**

EP&S installed and sampled three 30 foot deep monitoring wells (MW-1, MW-2 and MW-3) to evaluate if there were any potential environmental impacts from former Wilsonart operations. Particular emphasis was placed on the loading dock area, septic tank/leach field area and former fuel oil USTs area. Conclusions formulated by EP&S are listed below:

- Volatile Organic Compounds (VOCs) were detected at or above NYS DEC guidance values for groundwater in all three wells. While minor amounts of petroleum VOCs were evident, the majority of the VOCs detected reportedly came from sources such as solvents and degreasers.
- Direction of groundwater flow at the Site was reported as east-northeast to the west-southwest.
- The petroleum and chlorinated solvent-impacted groundwater was "allegedly" due to former operations at the Wilsonart facility. This statement had no factual or technical substantiation.

3. **Earth Tech, Inc. (Earth Tech), Supplemental Phase II Investigation Letter Report – Former Wilsonart Facility, "100" Brenner Drive, Congers, New York 10920, prepared for Wilsonart International, Inc. November 14, 1998.**

Earth Tech performed an investigation for Wilsonart to further delineate Site conditions, define the possible source of groundwater VOC impacts at the Site and to assess the possibility of off-site sources. Field activities included:

- Surveying;
- Collection of 26 passive soil gas samples, which were strategically placed throughout the Site. The samples were analyzed for VOCs by United States Environmental Protection Agency (USEPA) Method 8260 (Figure 2);
- Installation of one overburden monitoring well and two bedrock monitoring wells to provide additional geologic, hydrogeologic and environmental data. Selected subsurface soil samples were analyzed for VOCs by USEPA Method 8260; and
- Following development, the three existing wells (MW-1, MW-2 and MW-3) and three newly installed wells (MW-4, MW-5 and MW-6) were sampled for VOC analysis.

Conclusions drawn by Earth Tech included:

- Direction of groundwater flow on the Site, as observed on October 21, 1998, is generally westward with a slight flow divide along the western edge of the Site (Figure 7).
- The presence of the flow divide appears to indicate that the source of the VOC impacts in groundwater is located east of the Site.
- Wilsonart is not the likely source of the VOC impacts for the following reasons:
    a) VOCs were not detected in the overburden, either from passive soil gas sampling or subsurface soil testing;
    b) VOCs were not detected in groundwater within the shallow overburden;

c) Soil gas samples, soil boring samples and groundwater samples collected near potential former source areas (i.e., glue room and septic/leach field) were all non-detect for VOCs; and
d) The highest TCE concentrations in the bedrock water-bearing zone occur in wells MW-3 (494 micrograms per liter (μg/L)) and MW-5 (160 μg/L). The highest 1,1,1-TCA (TCA) concentrations in the bedrock water-bearing zone also occur in wells MW-3 (63 μg/L) and MW-5 (20 μg/L). The NYS DEC groundwater standard for TCE and TCA is 5 μg/L. These monitoring wells (MW-3 and MW-5) appear to be upgradient of the other existing monitoring wells (MW-1, MW-2, MW-4 and MW-6) at the Site. A summary of analytical results is provided in Appendix D of the attached Work Plan (see Appendix A).

No Freon compounds, which were packaged by HTI, were detected in any soil and/or groundwater sample.

2.0 PRIMARY STAGE APPROACH AND METHODOLOGY

This section provides an overview of the rationale for and methods used to assess potential environmental impacts to the property and the extent of the known VOC-impacted groundwater. Several activities were initiated to assess potential environmental impacts to the property and the extent of the known VOC-impacted groundwater. To the extent possible or practical, the activities were conducted in a sequential manner.

A subsurface investigation was conducted and included the collection of soil and groundwater samples. The purpose of the investigation was to compile and develop information to address Wilsonart's contention that the VOC-impacted groundwater on site is the result of an off-site source(s) unrelated to Wilsonart's use of the property. Wilsonart intends to achieve a release or "covenant not to sue" for the entire Site and, ultimately, sell the Site as a commercial property. A summary of the scope of work for the primary stage of investigation is as follows:

- Perform Site walkover;
- Review environmental records;
- Perform focused water well survey;
- Review available aerial photographs;
- Develop Site vicinity map;
- Excavate and field screen up to five test pits;
- Collect and analyze a minimum of four soil samples during the test pitting program;
- Collect and analyze surface water/sediment upgradient of impacted well MW-3, if encountered;
- Drill and field screen three soil borings/rock corings;
- Collect and analyze a minimum of four subsurface soil samples from the three borings;
- Install three bedrock groundwater monitoring wells;
- Develop the newly-installed monitoring wells;
- Monitor water levels and collect/analyze two rounds of groundwater samples from all on site groundwater monitoring wells;
- Bail test the monitoring wells to evaluate the hydraulic conductivity of the upper bedrock water-bearing zone; and
- Survey locations and elevations of newly installed monitoring wells and other monitoring points.

Specifics regarding the approach for various tasks included: a Site inspection and review of existing private water wells and aerial photographs (Section 2.1), test pit program (Section 2.2), surface water and sediment sampling program (Section 2.3), drilling program, including specifics about drilling procedures, subsurface sampling, rock coring, monitoring well installation, and environmental screening (Section 2.4), well development goals and procedures (Section 2.5), water level measurements (Section 2.6), groundwater sampling and analysis program (Section 2.7), hydraulic conductivity testing (Section 2.8), surveying (Section 2.9), management of investigation-derived waste (Section 2.10), overview of data validation procedures (Section 2.11), and a qualitative human exposure assessment (Section 2.12).

2.1 SITE INSPECTION AND REVIEW OF PRIVATE WATER WELLS & AERIAL PHOTOGRAPHS

2.1.1 Site Inspection

Representatives from Wilsonart and the NYS DEC accompanied Earth Tech during the Site walkover. Earth Tech, Wilsonart and the NYS DEC staked the proposed locations of test pits and soil borings/monitoring wells prior to mobilization using the existing Site Plan as a guide (Figure 2). Test pit and soil boring/monitoring well locations are shown on Figure 3. These locations were selected based on the documented past land uses and Site activities, access and geographical considerations, and the data gaps remaining from previous investigations.

Earth Tech inspected accessible portions of the property and, from public right-of-ways, observed adjacent parcels that were within ½ mile of the property. The purpose was to identify obvious and apparent causes for concern, such as the improper storage or use of chemicals or wastes, and the presence of tanks, stains, unusual odors, stressed vegetation, filled areas, and other indications of the potential presence of hazardous substances.

2.1.2 Review of Private Water Wells

Earth Tech reviewed of public records concerning public and private water wells within ½ mile of the Site. Data was limited as the area assessed was primarily within a commercial and residential area.

Reviews focused on the location of wells, name of owner, age and usage of the well, stratigraphic unit screened, well construction, static water levels, well yield, water quality, and any other relevant data that could be obtained. Earth Tech reviewed the chemical analytical data obtained via a FOIL request from the Rockland County Department of Health (RC DOH), NYS DOH, and NYS DEC for water supply wells in the vicinity of the property. Earth Tech's review primarily consisted of data provided from the RC DOH files, which is included in Appendix B. Findings from this data are further discussed in Sections 5.0 and 6.0.

2.1.3 Review of Historical Aerial Photographs

Historical aerial photographs that depict the property and surrounding area were reviewed. Particular attention was given to potential off-site TCE sources and the vicinity of the known groundwater impacts. The significance of each identified potential area of concern was assessed using professional judgment, considering such factors as its nature, magnitude, and known or potential impact upon the property, and if associated with an off-site source, the location of that source with respect to the property.

Earth Tech's review primarily consisted of data provided from the RC DOH files, which is included in Appendix B. Findings from this data are further discussed in Sections 4.0, 5.0, and 6.0. Once the focused water well survey and aerial photograph review were performed, a Site Vicinity Map was prepared to identify adjoining property usage, known private water wells, and potential off-site chlorinated solvent sources (Appendix B).

2.2 TEST PIT PROGRAM

The leach field at the Site is believed to be the depository for all on-site non-process water wastes and sanitary wastes. It was believed that floor drains in the "glue room" were connected to the leach field, which is north of the former distribution facility (Appendix F of the Work Plan; Appendix A). The Site inspection revealed that there were no floor drains in the glue room.

The actual configuration of the on-site stormwater and sanitary waste piping systems was defined during the site inspection and records review (Appendix B). The intent of the test pit program was to evaluate the environmental character of the soils underlying the leach field and to assess this area as a potential source of significant groundwater impact. The leach field is located north of the former distribution facility and northwest of existing monitoring well MW-1. Five exploratory test pits (TP-00-01, TP-00-02, TP-00-03, TP-00-04, and TP-00-05) were excavated between October 9 and 10, 2000 to achieve the following objectives:

- to characterize the nature and extent (lateral and vertical) of fill and its variability; and
- to collect soil samples for screening and possible laboratory analysis.

Test pits investigated specific locations, based on the documented past land uses and Site activities, access and geographical considerations, and data gaps remaining from previous investigations (Figure 3). Test pits were excavated with a backhoe with nominal 12-foot excavation depth capability. The test pits were excavated in a deliberate sequence; precautions were taken to prevent cross-contamination. Excavated materials were placed within a bermed area lined with polyethylene sheeting adjacent to each test pit to prevent contact of surface soils with excavated materials. Each test pit location was screened with a photoionization detector (PID) and visual observation prior to excavating. In addition, an Earth Tech representative performed work zone and perimeter air monitoring during this phase of investigation (Appendix C).

During excavation, the Earth Tech geologist noted the presence and depth of disturbed soils and groundwater seeps (if any); and documented soil discoloration or staining, fill characteristics, perched water zones, sheens and non-aqueous phase liquids, and so forth. The geologist sampled the sidewall soil at approximately 1 to 2-foot intervals, including the following locations:

- Ground surface, i.e., 0-2 foot depth;
- Soil or fill with the suspected highest headspace reading, if any;
- Soil or fill with the most intense or distinctive discoloration or staining, if any;
- Native soil immediately beneath the suspect leach field; and
- Native soil just above inferred water table near the bottom of the excavation.

The geologist promptly inspected each sample, classifying the soil according to Modified Burmister, logged the stratigraphy, and placed the samples into clean, labeled containers. Soil headspace was screened for organic vapors. The headspace readings and analytical laboratory submittal for all soil samples are summarized in Table 1. Pertinent field observations, including headspace readings, and the presence or absence of standing water in the excavation bottom, were documented on a test pit log (Appendix D). These observations and data were used to select which samples would be destined for subsequently laboratory analysis.

Prior to test pit backfilling, the possible presence of venting organic vapors was investigated in each test pit by lowering the PID sensor into the completed excavation measurement. The field geologist verified that the results of the discrete headspace measurements and the test pit screening appear reasonable, e.g., organic vapors detected in each test pit could be explained by organic vapors detected in a discrete sample. Photographs were taken (with scale and identifier) and the necessary observations completed before ordering each test pit to be backfilled.

Following completion of the test pit, all the excavated material was returned to the excavation sequentially, i.e. , top to top and bottom to bottom. The backfill was tamped as it was placed to ensure that all of the excavated material was returned to the excavation. After backfilling was complete, the surficial soil was screened visually to verify that the final test pit cover soil did not appear to be impacted. All excavations were surveyed for subsequent plotting on the Site map (Figure 3).

Selection of test pits samples that were submitted for laboratory analysis was based upon visual observations and field chemical screening. A NYS DEC representative was present during the two days.

At the end of each day of test pitting, the Earth Tech geologist reviewed the samples collected and recommended which samples should be laboratory analyzed to best achieve project objectives. Four samples were analyzed for VOCs (EPA SW-846 Method 8260) and Freons with Analytical Services Protocol (ASP) Category B deliverables. Samples not analyzed were archived.

Table 5 summarizes the analytical data for VOCs for all soil samples submitted from the October 2000 test pit program. In addition to presenting the concentrations of detected analytes, these tables also present the applicable NYS DEC recommended soil cleanup objective (RSCO) levels for purposes of comparison. Data packages are presented in Appendix F for the VOCs. All sample results are expressed in micrograms per kilogram (μg/kg) or parts per billion (ppb). Findings from this data are further discussed in Section 6.0.

2.3 SURFACE WATER AND SEDIMENT SAMPLING

Surface water and sediment samples were to be obtained to identify potential off-site sources that may have contributed contaminated runoff to the Site. However, no surface water was observed during the SI and no surface water and/or sediment samples could be obtained.

2.4 DRILLING PROGRAM

Prior to initiating the primary stage of the SI, information obtained from previous drilling indicated that a relatively compact glacial till overlies bedrock (Brunswick Formation) at the Site. The historical boring log data indicated that the glacial till ranged in thickness from approximately 4 feet to 22 feet below ground surface (Appendix G of the Work Plan; Appendix A). In addition, previous investigations demonstrate that the direction of groundwater flow on the Site is generally westward with a slight flow divide along the western edge of the Site.

The intent of the drilling program was to evaluate the possibility that a source of groundwater contamination remains in the immediate vicinity of the Site, define limits of potential soil and groundwater impact, and better characterize groundwater flow conditions at the Site. Based on Earth Tech's understanding of existing data, two borings were advanced east of impacted monitoring well MW-3 along the Site property boundary and one boring was drilled along the west-southwestern portion of the Site.

Soil boring MW-7 was advanced along the eastern property boundary south-southeast of impacted monitoring well MW-3 to evaluate soil and groundwater quality conditions upgradient of well MW-3. Soil boring MW-8 was drilled east of existing monitoring well MW-3 to evaluate the potential for an off-site source for the groundwater impacts observed at monitoring wells MW-3 and MW-5. Soil boring MW-9 was advanced east of the drainage ditch along the west-southwestern portion of the Site downgradient from existing bedrock well MW-3 and bedrock wells MW-7 and MW-8. Borings were drilled to a depth (and elevation) consistent with the existing wells on site (approximately 35 feet). Boring locations are shown in Figure 3.

Data collected from the SI drilling program and other previous on site investigations were used to develop a better understanding of the local geologic setting (Table 2). Figure 4 shows the locations of two geologic profiles constructed using geologic information obtained from the SI drilling program and other previous on site investigations. These profiles, as shown on Figure 5, depict the unconsolidated sediments present at the Site and the topographic profile of the bedrock surface. Depth to bedrock data collected from the SI drilling activities and other previous on site investigations were also used to map the top of bedrock surface (Figure 6).

The drilling program was performed between October 11, 2000 and October 16, 2000 to complete the environmental screening, soil boring, subsurface soil sampling, rock coring, and monitoring well installation activities. All drilling, soil sampling, rock coring, and monitoring well installations were performed by Parratt-Wolff, Inc. of East Syracuse, New York. An Earth Tech geologist was on site at all times to oversee the drilling program, log each borehole/corehole, and screen, select, and prepare soil samples for laboratory analysis. An Earth Tech representative also performed work zone and perimeter air monitoring during this phase of investigation (Appendix C). Three soil borings (designated MW-7, MW-8, and MW-9) were advanced and soil samples were collected for laboratory analysis. At a minimum, two soil samples were collected for subsequent laboratory analysis from each boring. Following coring into bedrock, three groundwater monitoring wells (designated MW-7, MW-8, and MW-9) were subsequently installed at these locations.

Overburden drilling for the installation of monitoring wells was performed using a 4-inch outside diameter (O.D.) tri-cone roller bit using an air rotary method. The soil at each borehole was continuously sampled with a 2-inch O.D. split-spoon sampler to confirm subsurface geologic conditions. Samples were characterized and logged, and the headspace of all soil samples was field screened for VOCs using a PID equipped with a 10.2 eV lamp. Earth Tech prepared soil boring logs for each boring (Appendix D).

Subsurface samples selected for laboratory analysis were submitted to Adirondack Environmental Services of Albany, New York in order to provide ASP Category B deliverables. Selected soil samples were analyzed for VOCs utilizing EPA SW-846 Method 8260.

Table 5 summarizes the analytical data for VOCs for all soil samples submitted from the October 2000 drilling program. In addition to presenting the concentrations of detected analytes, these tables also present the applicable NYS DEC RSCO levels for purposes of comparison. Data packages are presented in Appendix F for the VOCs. All sample results are expressed in micrograms per kilogram (µg/kg) or parts per billion (ppb). Findings from this data are further discussed in Section 6.0.

Once the top of bedrock was encountered, drilling proceeded using 3⅞-inch O.D. HX techniques. To confirm the presence and characteristics of bedrock, the drilling penetrated the upper portion of the Brunswick Formation. A qualified on-site geologist field screened the core for VOCs using a PID equipped with a 10.2 eV lamp and also described the lithology and orientation of bedding planes and fractures. Earth Tech prepared core logs for each boring (Appendix D).

A bedrock monitoring well was installed at three locations on the Site (MW-7, MW-8, and MW-9) as depicted on Figure 3 while the well construction for these newly-installed monitoring wells are summarized in Table 3. Detailed well construction forms are provided in Appendix D. These monitoring wells were installed to screen a water-bearing zone identified in the upper portion of the bedrock that underlies the Site. Well MW-9 was also installed within the upper 20 feet of the bedrock to form a well pair with existing overburden monitoring well MW-4 at this location.

The three new monitoring wells were installed to depths ranging from 31 feet (MW-9) to 45 feet (MW-8) below grade, with well screens installed within the upper portion of the bedrock. These new bedrock wells were installed to provide a more comprehensive depiction of groundwater flow patterns, hydraulic gradients, and groundwater quality within the bedrock water-bearing zone beneath the Site.

The three bedrock monitoring wells were constructed through the drill casing using traditional monitoring well construction procedures. The wells were constructed of flush threaded 2-inch I.D. schedule 40 PVC well screen (0.01-inch slot) and threaded end cap attached to the base of a solid riser pipe. The wells were installed with a sand filter pack, appropriately graded for the 10-slot screen, that extended from at least 2 inches below the base to 1 to 2 feet above the top of the well screen. A ½-foot thick layer of fine choke sand was placed above the filter sand. A 3-foot thick bentonite seal was placed above the fine choke sand and hydrated with potable water. A thick cement-bentonite grout was tremied from the top of the bentonite seal to approximately 3 feet below grade. The well identification number was clearly labeled on the outside of each protective casing.

2.5 WELL DEVELOPMENT

Each newly constructed bedrock groundwater monitoring well was developed to:

- Remove residual, formational silts and clays, thereby reducing turbidity during sampling that could potentially interfere with chemical analyses; and

- Increase the hydraulic conductivity immediately around the well, which reduces the potential of the well to yield an insufficient volume of water during the sampling event.

The wells were developed on October 16, 2000 using a Waterra™ piston-style lift pump or bottom-filling check-valved bailer. A well development log was completed to document well development activities (Appendix D).

A goal of 50 nephelometric units (NTU) had been established for well development. Earth Tech monitored and recorded the volume of water removed from each monitoring well, temperature, pH, specific conductance, and turbidity, until it was determined that the monitoring well was yielding "representative" groundwater. If 50 NTUs could not be obtained, then well development continued until the turbidity and other field parameters had stabilized.

2.6 WATER LEVEL MEASUREMENTS

Four rounds of water level measurements were collected from all existing and newly installed wells to provide information on groundwater flow and hydraulic gradients at the Site. The measurements were recorded on October 16, 2000, November 17, 2000, and December 7, 2000. During each round, the monitoring wells were opened and allowed to vent and equilibrate to atmospheric pressure. The water levels were then recorded within as short a period of time as possible to obtain reasonably synoptic data sets. The measurements were recorded with a Solinst™ electronic water level meter.

The groundwater elevation data collected during the primary stage of the SI are summarized in Table 3. Groundwater flow patterns at the Site for October 21, 1998, October 16, 2000, November 17, 2000, and December 7, 2000 are depicted on Figures 7, 8, 9, and 10, respectively. Findings from this data are further discussed in Section 5.0.

2.7 HYDRAULIC CONDUCTIVITY TESTING

After development, each newly installed monitoring well underwent in-situ hydraulic conductivity testing on January 25, 2001. In response to NYS DEC comments on the Work Plan, all tests were conducted by bailing rather than slugging the wells. Testing was performed to estimate the horizontal hydraulic permeability of the upper bedrock water-bearing zone (MW-5, MW-6, MW-7, MW-8, and MW-9) and the overlying fill/glacial till (MW-4). The data was analyzed using the Hvorslev and/or Bouwer & Rice methods as described in the Work Plan (Appendix A). This information was used to estimate groundwater flow rates and assess potential source(s) of TCE.

Specifically, bail tests were performed by Earth Tech on January 25, 2001 in overburden monitoring well MW-4 and bedrock monitoring wells MW-5, MW-6, MW-7, MW-8, and MW-9. Results of the hydraulic conductivity testing are presented in Appendix E. In addition, the results of the hydraulic conductivity testing are discussed in Section 5.0 and summarized in Table 4.

2.8 GROUNDWATER SAMPLING AND ANALYSIS

Earth Tech collected one round of groundwater samples from each of the six existing groundwater monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6) and the three newly-installed monitoring wells (MW-7, MW-8, and MW-9). The groundwater samples were collected no sooner than 14 days after the development of the newly installed monitoring wells. Water level measurements were collected prior to initiating the groundwater sampling event.

Groundwater samples were collected using new dedicated disposable polyethylene bailers. Groundwater sampling was performed in accordance with the SOP outlined in Appendix E (Groundwater Sampling Procedures) of the Work Plan (Appendix A). Sampling QA/QC protocols also included the collection of duplicate and blank samples. Groundwater samples were submitted to AES for analysis of Target Compound List (TCL) total VOCs utilizing EPA SW-846 Method 8260 with Category B deliverables.

Two rounds of groundwater samples were collected from the existing and newly-installed groundwater monitoring wells. The first round was collected on November 17, 2000 (primary stage), and the second round was collected on March 30, 2001 (supplemental stage). As outlined in the SI Work Plan, the timing of the two sampling events were chosen to generally coincide with periods that typically represent seasonal high and low groundwater conditions.

Table 6 and Figure 12 summarize the analytical results (VOCs) for all groundwater samples collected during the November 17, 2000 sampling event. In addition to presenting the concentrations of detected analytes, Table 6 also presents the applicable NYS DEC groundwater regulatory standards for purposes of comparison. Data packages are presented in Appendix G for the VOCs. All sample results are expressed in micrograms per liter (µg/l) or parts per billion (ppb). Findings from this data are further discussed in Section 6.0.

2.9 SURVEYING

Earth Tech prepared the Site Plan (Figure 2) and other base map drawings in this report utilizing information from a site plan construction drawing provided by Wilsonart. Earth Tech surveyors identified the locations of all new soil borings and monitoring wells relative to existing site features (e.g., building corners, utility manholes, etc.). The elevation of the borings and wells were surveyed using GPS control points established by Owen Haskell, Inc. Horizontal positions are reported in feet (NAD 1983 State Plane of New York East) while elevations are reported in feet using NGVD 1929 vertical datum. The ground surface elevation of each boring and monitoring well were surveyed to the nearest 0.1 foot and the top of PVC measuring point (M.P.) of each well casing was surveyed to the nearest 0.01 foot.

2.10 INVESTIGATION-DERIVED WASTE MANAGEMENT

Field activities produced investigation-derived waste (IDW), which required appropriate management practices. All drill cuttings were field screened for VOCs prior to being spread on the ground near the respective boring. If field screening indicated possible contaminants present in the drill cuttings, appropriate measures were taken to properly containerize (i.e., open-topped 55-gallon drums [55 1A2]) and dispose of the cuttings.

The management of these materials is discussed below.

Ten drums of non-hazardous mixed waste (primarily drilling return waters, purge/development water, and sediment) were disposed of in accordance with all applicable regulations and standards. While at the Site during the consolidation and verification of the contents of the drums, Earth Tech observed the bottom of one purge water drum to be slightly bulged. The distortion in the drum was most likely a result of the contents freezing. The contents of the drum were removed and placed into other drums containing purge water. The bulged drum was inspected upon removing the contents in order to verify the integrity of the drum and ensure no purge water was released. A total of nine drums of IDW were removed from the Site. Based upon historical soil quality results and groundwater quality results, all containerized IDW was characterized as a non-hazardous waste and was labeled, transported, and disposed of as a non-hazardous, non-RCRA, and non-DOT regulated waste. All the drums were appropriately labeled, contents verified, and staged for removal from the Property. Earth Tech, on behalf of Wilsonart, manifested and characterized the on-site drums (using historical analytical data), coordinated with the transporter (St. Joseph Motor Lines US EPA I.D.#: PAD 987358587) and designated disposal Facility (Chemtron Corporation, US EPA I.D.#: OHD066060609), and finalized paperwork for disposal. Earth Tech contacted its disposal subcontractor (Corbett Management Services, LLC of Manlius, New York) and the drums were removed from the Property on Monday December 16, 2002. Earth Tech, serving as an agent for Wilsonart requested cradle-to-grave documentation for the drums to verify the final disposal location. The drums were disposed of at a permitted Facility in Avon, Ohio. A copy of the manifest is provided in Appendix I.

The IDW requiring management included the following:

- Groundwater;
- Decontamination fluids and sediments which may settle out of such fluids; and
- Personnel protective equipment (PPE) and associated debris resulting from the field activities.

2.10.1 Groundwater

Groundwater generated during the drilling, development, and sampling of on-site monitoring wells was containerized in appropriate 55-gallon drums pending receipt of analytical results. If analytical results indicated VOC concentrations below New York State groundwater standards, the groundwater was discharged to the ground surface at a point downgradient of the monitoring well and allowed to infiltrate. Groundwater in excess of these standards was transported for off-site disposal at a permitted facility.

2.10.2 Decontamination Fluids

Decontamination fluids associated with test pitting and drilling activities were containerized in appropriate 55-gallon drums and temporarily stored on-site. Upon completion of field activities, this material was properly characterized and was transported off site for disposal at a permitted facility.

2.10.3 PPE and Associated Debris

Used PPE and other associated debris (e.g., disposable sampling equipment) was containerized in appropriate 55-gallon drums and stored temporarily on site. At the conclusion of field activities, these materials were transported off site for disposal at a permitted facility.

2.11 DATA VALIDATION

Validation of the TCL analytical data was performed in accordance with EPA Region II validation guidelines, modified as appropriate for the NYS DEC's ASP. This validation was performed by personnel meeting the qualifications of the NYS DEC for data validations.

The data validation included the review and evaluation of all laboratory deliverables. The basic review covered sample request forms, chains-of-custody forms methodology summaries, laboratory chronicles and volatile organic items listed below:

- Deliverable requirements
- Case narrative
- Holding times
- Surrogate recoveries and summary
- Method blank summary and data
- GC/MS tuning and mass calibration
- Organic analysis data sheets (Form 1)
- Quantitation reports
- Mass spectral data
- EPA/National Institute of Standards (NIST) mass spectral library search for tentatively identified compounds (TICs)
- Initial calibration data (GC/MS)
- Continuing calibration data (GC/MS)
    - Internal standard areas and retention times

A Quality Assurance/Quality Control (QA/QC) program was implemented during this investigation to ensure that policies and procedures were followed that achieve several data quality objectives. The overall objective of the QA/QC program was to identify procedures for defensible sampling, chain-of-custody, laboratory analysis, and instrument calibration.

A Data Usability Summary Report (DUSR) was prepared by a qualified Earth Tech Quality Assurance officer capable of conducting full data validation in conformance with NYS DEC's guidance policy. DUSRs are attached to the analytical data packages for soil samples (Appendix F) and groundwater samples (Appendix G and H) submitted for laboratory analysis during the primary stage of the SI.

2.12 EXPOSURE ASSESSMENT

Earth Tech completed a qualitative human exposure assessment as part of the investigation to identify if people can be exposed to contaminants that may be present at the Site. The exposure assessment utilized environmental conditions identified during the primary and supplemental stages of investigation. From this, all potential exposure pathways and scenarios were determined. The qualitative baseline human health risk assessment is included in Section 7.0.

3.0 SUPPLEMENTAL STAGE APPROACH AND METHODOLOGY

This section provides an overview of the rationale for and methods used to further assess potential environmental impacts to the property and the extent of the known VOC-impacted groundwater. Specifics regarding the approach for various tasks included in the supplemental stage of investigation included: a request for historical fire insurance maps (Section 3.1), a photo-lineament analysis (Section 3.2), water level measurements (Section 3.3), a three-phased groundwater sampling and analysis program (Section 3.4) to assess the potential for dilution, stratification, and temporal changes, and temperature profiling of the water column at select on-site monitoring wells (Section 3.5).

The additional site characterization activities conducted during the supplemental stage of investigation consisted of the collection of additional existing data (i.e., collect and review available Sanborn mapping), completion of a photo-lineament analysis, groundwater elevation data, and the collection of additional groundwater samples at the Site. These additional work items are described below:

3.1 REVIEW OF SANBORN® MAPS

Earth Tech was tasked to obtain and summarize information from available Sanborn historical fire insurance maps that depict prior uses of nearby properties in the suspected source areas. It was Wilsonart's objective to obtain and review Sanborn mapping for parcels to the east (upgradient) of the Site that may indicate potential concerns. The results of the review of Sanborn mapping, if available, would be included in the Records Review section of the SI Report.

The Sanborn maps were ordered from Environmental Data Resources, Inc. (EDR) on February 12, 2001. EDR reported that there was no coverage for the study area.

3.2 PHOTO-LINEAMENT ANALYSIS

A photo-lineament analysis of the study area was performed to better understand and identify observable, natural linear features (bedrock fractures, joint traces or lineaments) in the bedrock. Fracture zones or areas of fracture concentration in the underlying bedrock are typically areas of higher permeability and may serve to control the pathways of bedrock groundwater flow in the region.

The aerial photographs were ordered from Mr. Robert W. Shuey, P.G. on February 8, 2001 and were received by Earth Tech on March 2, 2001. The fracture trace analysis was performed by Mr. Samuel Gowan, Ph.D. on March 7, 2001 and is provided in Appendix B. The results of the photo-lineament analysis are included in Section 4.0, Geology.

3.3 WATER LEVEL MEASUREMENTS

A synoptic round of water level measurements was collected from all on-site monitoring wells the day before initiating the phased groundwater sampling program (i.e., March 30, 2001). Methods employed were in accordance with procedures outlined in Section 2.7. The groundwater elevation data collected during the supplemental stage of the SI are summarized in Table 3. Groundwater flow patterns at the Site for March 30, 2001 are depicted on Figure 11. Findings from this data are further discussed in Section 5.0, Hydrogeology.

3.4 GROUNDWATER SAMPLING AND ANALYSIS

The typical approach to sampling monitoring wells for VOCs involves purging three casing volumes of water prior to collecting a groundwater sample. The November 17, 2000 groundwater samples of on site wells were collected using this methodology. Wilsonart understands that the NYS DEC, NYS DOH, and RC DOH recognize that there is "a likely upgradient off-site source that is a contributing component to the observed groundwater contamination at the Wilsonart Site." Although significant levels of Freon-113 and TCE were observed in wells MW-5, MW-7, and MW-8, which are upgradient of well MW-3, the NYS DEC raised concerns that the highest concentration of contaminants was detected at on-site well MW-3.

Earth Tech researched the sampling methodology employed and came across numerous technical abstracts that indicated that removal of three to five well volumes prior to sampling may be unnecessary, or may produce undesirable effects (e.g., integration of differing water types). Since newly installed monitoring wells MW-7 and MW-8 had slotted screens 20 feet in length, it is possible that the groundwater chemistry detected previously in these two wells may be somewhat diluted in comparison to values observed at well MW-3, which had a 10-foot screen. For example, the concentration of TCE at MW-8 (91 μg/L) was roughly one-half the concentration of TCE reported previously at well MW-3 (180 μg/L).

Table 7 and Figure 13 summarize the VOC analytical results for all groundwater samples collected during the supplemental stage of investigation. Data packages are presented in Appendix H for the VOCs. Findings from this data are further discussed in Section 6.0.

On March 30, 2001, Earth Tech obtained groundwater samples in three phases to assess the potential for dilution, stratification, and temporal changes. The rationale and methods employed during Phase 1, Phase 2, and Phase 3 groundwater sampling activities are detailed below. All purge water, decontamination fluids, PPE, and associated debris were containerized in a similar manner as outlined in Section 2.11. Data validation, performed in a similar manner as outlined in Section 2.12, was also performed on analytical data collected.

3.4.1 Phase 1

A Kemmerer sampler was used to collect depth discrete groundwater samples to characterize groundwater quality in the vicinity of the subject wells. This sampler was selected based on review of other samplers that could be used to discern potentially significant vertical concentration differences (including stratification and dilution) in the wells. The phenomenon of dilution and vertical stratification is a distinct possibility given the nature of the local aquifer and well construction differences. Prior to conducting the second groundwater sampling event, a Kemmerer sampler was gently lowered with a support line to a desired depth (i.e., 1 to 2 feet from the bottom of well) at monitoring wells MW-3 and MW-8. The sampler was secured and allowed to equilibrate overnight. The following morning (March 30, 2001), each Kemmerer sampler was "struck," closing both ends of the sampler. The Kemmerer was then raised through the water column and the collected groundwater was transferred into 40 milliliter (ml) vials for subsequent laboratory analysis. Each dedicated Kemmerer was subsequently decontaminated, as described in Appendix A, and temporarily stored in a secure area. All groundwater samples were analyzed for VOCs (EPA Method 8260), Freon-113, plus tentatively identified compounds (TICs). Category B deliverables were required for quality assurance/quality control purposes.

3.4.2 Phase 2

In order to compare to results from the first groundwater sampling event (November 17, 2000), an additional round of groundwater samples (MW-1 through MW-9) was collected from the monitoring wells via disposable bailer after three volumes had been removed. All groundwater samples were analyzed for VOCs (EPA Method 8260), Freon-113, plus TICs. Category B deliverables were required for quality assurance/quality control purposes.

3.4.3 Phase 3

In order to compare results with the Phase 1 groundwater sampling activity, monitoring wells MW-3 and MW-8 were redeveloped using a weighted PVC bailer. The water column was bailed from the base of the monitoring well. Once an additional five well volumes had been purged, the dedicated and decontaminated Kemmerer was relowered to the previously attained depth (i.e., 1 to 2 feet from bottom of well) at monitoring wells MW-3 and MW-8. Each Kemmerer was secured until the messenger was "struck," effectively closing both ends of the sampler. The Kemmerer was then raised through the water column and the collected groundwater was transferred into preserved 40 ml vials for subsequent laboratory analysis. All groundwater samples were analyzed for VOCs (EPA Method 8260), Freon-113, plus TICs. Category B deliverables were required for quality assurance/quality control purposes.

3.5 TEMPERATURE PROFILING

Earth Tech measured and recorded in-well water temperatures (wells MW-3, MW-5, MW-7, and MW-8) to assess localized horizontal flow zones, in-well groundwater flow, and gain insight into Site groundwater quality trends due to inflections of the temperature logs. Earth Tech logged temperature profiles before and after purging each applicable monitoring well. Tables 8, 9, 10, and 11 summarize the temperature data for water columns at monitoring wells MW-3, MW-5, MW-7, and MW-8, respectively. Findings from this data are further discussed in Sections 4.0, 5.0, and 6.0.

4.0 GEOLOGY

4.1 REGIONAL GEOLOGIC SETTING

The study area lies within the Triassic Lowland, a physiographic province which occupies most of Rockland County (Univ. of New York, 1966). The Lowland is bounded on the west by the Triassic border fault (Ramapo Fault system) and is characterized on the north and east by the Palisades Diabase Sill. The remainder of the Lowland extends southward into northern New Jersey. The Lowland, which is commonly referred to as the Northern Newark Basin, was created as the Appalachian Mountain Range experienced uplift and rifting during the Mesozoic Era causing near vertical or steeply dipping fracturing and faulting along its margins. A series of extensional rift valleys and basins formed along these margins. Large quantities of eroded sediments were transported into the basins creating thick sedimentary sequences concurrent with occasional volcanic episodes (e.g., the Palisades Sill, the Watchung basalt flow, and other related igneous bodies throughout the region). These sediments eventually lithified to form the bedrock observed at the Site today, i.e., conglomerates, sandstone, siltstone, and mudstone.

The sediments from which the bedrock underlying the region was formed, were deposited during the Late Triassic and Early Jurassic Periods, approximately 230 to 200 million years ago (Seidemann, 1984). The Brunswick Formation, which is believed to be approximately 7,000 feet thick in the region, comprises all of the Triassic/Jurassic (Triassic) outcropping in the study area. According to the Geologic Map of New York (Fisher, 1970), the Brunswick Formation is divided into three individual members or lithofacies. These are as follows, from oldest to youngest:

- Mudstone, sandstone, arkose member;
- Sandstone, siltstone, mudstone member; and,
- Sandstone, conglomerate member.

These members appear with the oldest outcropping in eastern Rockland County and the youngest along the Ramapo fault to the west.

The Brunswick Formation dips at approximately 8° to 10° to the west as a result of vertical displacement along the Ramapo fault. The basin subsided at a greater rate adjacent to the fault than within its more easterly portions. This was in part due to stratigraphic loading of sediments from the uplands onto the basin along the margins of the border fault. The rocks now strike between N0°E and N15°E (Savage, 1967 and 1968).

The igneous rocks of the lowland outcrop in the eastern portion of Rockland County. These consist of diabase or gabbro intrusives associated with the Palisades Sill. The Ladentown basalts in the northwestern portion of the basin probably resulted from a Triassic dike attached to the Palisades Sill (Frimpter, 1967).

The unconsolidated sediments within the study area consist primarily of glacial age sediments deposited during the Wisconsinan stage of the Pleistocene Epoch. The glacial materials typically include a thin veneer of lodgement till, overlain by various sediments which include outwash sand and gravels, glaciolacustrine silts and clays, and ice-contact and ablation till materials of highly variable clast size and textures. These deposits have been reworked to various degrees by secondary fluvial deposition adjacent to the modern-day streams. The recent fluvial materials vary from channel sands and gravels to silt and clay flood plain deposits and organic swamp and marsh deposits.

4.2 SITE GEOLOGY

Data obtained from the drilling during the primary stage of the SI were evaluated in conjunction with data from previous on-site investigations (EP&S, 1998; Earth Tech, 1998) to characterize Site geologic conditions. Subsurface conditions were further evaluated by Earth Tech through Site reconnaissance, the excavation of five test pits, drilling of three borings/rock corings, and the conversion of these borings/corings into bedrock monitoring wells. The topography of the Site appears to be somewhat radial off of a larger north to south trending bedrock-controlled ridge. Surface elevations range from near 200 feet along the mid-eastern property boundary to as low as 172 feet in the northwest corner of the Site. Based on data obtained during the primary stage of the SI and on the results of previous investigations, the geologic deposits beneath the Site is generally composed of approximately 15 to 25 feet of unconsolidated sediments of glacial and post-glacial origin overlying Triassic age sedimentary bedrock (Brunswick Formation).

Test boring logs providing a description of unconsolidated sediments encountered in soil borings drilled during the primary stage of the SI, as well as other previous investigations (EP&S, 1998; Earth Tech, 1998), are included in Appendix D. Core logs providing a lithologic and environmental description of bedrock in corings drilled during the primary stage of the SI, are included in Appendix D. Test boring/rock coring locations are shown on Figure 3. Figure 4 shows the locations of two geologic profiles constructed from the soil boring/rock coring data. These profiles, as shown on Figure 6, depict the unconsolidated sediments present at the Site and the topographic profile of the bedrock surface. The top of bedrock surface elevation is depicted on Figure 5. Cross section A-A' extending from the mid-western property boundary to the mid-eastern portion of the Site is provided on Figure 6. Cross section B-B' extending from the leach field north of the former distribution facility to the southeastern portion of the Site is provided on Figure 6. The cross sections provide an interpretation of the shallow unconsolidated geologic units present at the Site and the topographic profile of the bedrock surface.

4.2.1 Site Unconsolidated Deposits

Based on this information, the geologic materials at the Site have been grouped into four units. In order of increasing depth, these include: fill (primarily reworked native soil); alluvium associated with deposition along the railroad; glacial till, and Triassic age sandstone/siltstone bedrock.

4.2.1.1 Fill

Fill materials were not identified in any of the soil borings drilled during the primary stage of the SI. The presence of fill and the leach field was confirmed during the test pit program. The fill consists almost entirely of reworked natural sediments including silt/clay, sand, and gravel believed to originate from the native glacial till/alluvial deposits. With the exception of some occasional leach field stone (1.5 to 3.5 feet below grade), brick, asphalt, and wood and landscaping debris found in some of the test pits excavated adjacent to the leach field area (north of Site building), no man-made material was observed in the fill.

A layer of fill ranging in thickness from 1 and 8 feet overlies the native material across the immediate surroundings of the Facility building and north-northwest of monitoring well MW-1 and east-southeast of monitoring well MW-6. The fill is thickest in the mid-northern part of the Site, adjacent to the facility building.

4.2.1.2 Alluvium

In soil boring MW-9, a layer of brown, moderately stiff organic clay and silt was encountered between the depths of 0 feet and 9.7 feet. This unit is believed to be an alluvial deposit resulting from recent (post-glacial) deposition along the railroad. It is anticipated, based on review of subsurface soil samples, and on geomorphic conditions in the vicinity of the Site, that the alluvium might extend laterally from the railroad along the western and southwestern boundary of the Site, as depicted in geologic cross section A-A' (Figure 6). Alternately, it might be truncated and/or replaced with fill in areas of man-made development.

4.2.1.3 Glacial Till

Glacial till was encountered in all borings drilled in October 1998 (Earth Tech Environment & Infrastructure) and all test pits or borings drilled during the primary stage of the SI. The lack of detail of geologic logging by others in logs in MW-1, MW-2, and MW-3 have hindered Earth Tech's ability to accurately define contacts between the apparent glacial till soils and underlying bedrock. Based on historical groundwater elevation data, review of geologic cross sections, and hydrogeologic information collected during the primary and supplemental stage of the SI, it is believed that monitoring wells MW-1, MW-2, and MW-3 were installed in bedrock.

As depicted in Table 2, Summary of Geologic Information, the depth to the base of the glacial till ranges from 4.2 feet below grade (MW-5) to approximately 24.5 feet below grade (MW-3) at the Site. The depth to the base of the glacial till is 21.7 feet below grade southwest of the Site building (MW-4). The thickness of the glacial till unit ranges from 4.2 feet at well MW-5 to nearly 25 feet at well MW-3. The glacial till in all borings was generally observed to be moderately dense to dense and compact; blow counts required to advance the split-barrel sampler 6-inches ranged from 10 to over 50. The till was comprised of a fairly well graded (poorly sorted) distribution of clayey silt, fine sand, trace fine gravel and occasional to frequent cobbles and boulders. The glacial till exhibited low moisture content and consistently contained 20 to 55% clayey silt, as a matrix to the sand and gravel.

4.2.2 Site Bedrock Geology

During the primary stage of the SI, bedrock was encountered at a maximum drilling depth of 45 feet below surface grade (MW-8). The deepest bedrock elevation encountered is at bedrock monitoring well MW-9 (137.68 feet), which is located along the mid-western portion of the Site. Bedrock outcrops are not present on site, but due to the relatively thin blanket of glacial soils, bedrock outcrops are intermittently located throughout the region.

Based on descriptions of bedrock drill cuttings (MW-5 and MW-6) and core descriptions (MW-7, MW-8, and MW-9), the upper portion of bedrock beneath the Site consists of red to red-brown fine-grained sandstone and/or siltstone, which is consistent with the Geologic Map of New York. Based on boreholes drilled during the primary stage of the SI, the bedrock beneath the Site is moderately cemented and exhibited a low bedding angle (less than 5°). Despite being highly fractured, it exhibited excellent core recovery. Average Rock Quality Designator (RQD) values for cored bedrock were fair (57.9%), which is indicative of "fair" quality for in-situ rock (for engineering purposes). The uppermost cored section of bedrock appeared to be highly fractured and weathered as evidenced by the poor to very poor RQD values at MW-7 (14.5 to 20' = 6.6%) and MW-9 (18.5 to 21' = 20.0%). In general, it appears that the degree of fracturing decreased with depth and the RQD values increased with depth. However, numerous attempts to recover core from boring MW-9 (18.5 to 21.0 feet) yielded only 1.6 feet of recovered core, suggesting that the zone may be highly fractured.

4.2.3 Structural Geologic Setting

A fracture trace analysis was conducted to identify possible faults or fracture zones that could affect groundwater flow and contaminant migration. The analysis used aerial photographs and a 7.5-minute topographic map. Potential fractures identified from the aerial photographs are illustrated on the attached Figure 1 (Appendix B). These photographic linears were identified by inspecting a pair of overlapping (stereographic), black and white, air photographs that were taken on March 27, 1968 (Appendix B). The inspection was conducted by viewing the photographs through a stereoscope, which creates a three-dimensional image when used with stereographically paired photographs.

Potential fractures that were identified from the topographic map are indicated as topographic linears on the attached Figure 2 in Appendix B. These features were identified from the topographic forms observed on the Haverstraw, New York 7.5-minute USGS Quadrangle Map.

The photographic and topographic linears were combined on a Fracture Trace Map (Figure 3 in Appendix B). The results indicate that the dominant orientation of linears in the region containing the Site is north to south. Secondary orientations include; northwest-southeast in the region north of the Site, east to west in the area that contains the Site, and northeast to southwest in the area south of the Site.

Two prominent north to south linears were observed both to the east and west of the Site. The feature to the west of the Site, which is aligned with the railroad tracks, is one of the most well defined lineaments in the Site area. The two east to west oriented features that were visible to the north and south of the Site are very weakly defined. The linear features represent potential fractures that may represent preferential flow zones for groundwater.

5.0 HYDROGEOLOGY

5.1 REGIONAL HYDROGEOLOGIC SETTING

The primary surface water bodies in the region include Lake DeForest to the west (0.8-mile), Swartout Lake (0.5 mile to the east-southeast), Congers Lake (0.8 mile to the south), Rockland Lake (1.5 miles to the southeast) and the Hackensack River, which flows from north to south. This orientation was directly produced during the most recent period of (Wisconsinan) glaciation when the north to south-oriented ice flow deepened and widened the Hackensack valley.

The Site is situated within the Hackensack River drainage basin. The Hackensack River is the largest river in Rockland County and provides a water supply resource for drinking water, fishing, recreational, industrial, commercial, and agricultural uses. The Hackensack River basin has a drainage area of approximately 29.4 square miles at West Nyack. The flow in the Hackensack River was measured to be 422.7 million gallons per day (mgd) at West Nyack (Robison, 1965). The Hackensack River acts as the outlet for Lake DeForest, about 0.8 mile west of the Site. Tributaries of the Hackensack River in the Clarkstown/Orangetown area include Nauraushaun Brook, Pascack Brook and Muddy Creek. These creeks drain areas to the west of the Hackensack River. The Hackensack River is dammed at Nauraushaun, New York, about 2.5 miles south of the Site, forming Lake Tappan. The Hackensack River, serving as the outlet for Lake Tappan, continues to flow south into the state of New Jersey ultimately emptying into Newark Bay between the City of Newark and Jersey City. The Hackensack River is not under the County's jurisdiction, but is controlled by an interstate agreement because it flows from New York into New Jersey.

Groundwater in the study area occurs in both the bedrock and unconsolidated sediments. Groundwater in the bedrock is found in the Brunswick Formation. This bedrock aquifer is the dominant source of drinking water used in Rockland County. Water occurs within the Brunswick aquifer in both primary porosity features (intergranular) and in secondary openings in the rock fabric along bedding planes, fractures and joints that developed after deposition of the rock. Permeability of the aquifer is controlled mainly by the secondary porosity features with the primary porosity supplementing the water bearing capabilities of the rock. Recharge to the Formation has been estimated at between 225,000 and 350,000 gallons per day per square mile (LM&S, 1992). Maximum withdrawals from the Brunswick Formation are estimated at 25 to 30 million gallons per day (mgd) with average withdrawals being on the order of 15 mgd (LM&S, 1992).

Most of the unconsolidated deposits covering the region are glacial sediments of Pleistocene age. Perlmutter (Perlmutter, 1959) has grouped those glacial deposits into: 1) glacial till and 2) stratified drift. The recent deposits have little value as a source of water due primarily to their thinness and, in many places, their low permeability. However, there are local exceptions. The stratified drift sediments are the most productive of the glacial sediments and are capable of yielding, 8 to 1700 gpm. Well yields within glacial till are generally less than 5 gpm.

5.2 SITE HYDROGEOLOGY

Groundwater beneath the Site is present in both the unconsolidated sediments (overburden) and bedrock. Nine monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8 and MW-9) are currently located at the Site (Figure 3). Table 3 presents groundwater elevation data collected during the SI: October 16, 2000, November 17, 2000, December 7, 2000, March 23, 2001, and March 30, 2001. Groundwater flow patterns at the Site for October 21, 1998 (Earth Tech, 1998), October 16, 2000, November 17, 2000, December 7, 2000, and March 30, 2001 are depicted on Figures 7, 8, 9, 10, and 11, respectively.

The geologic strata at the Site (Section 4.2) comprise three hydrogeologic units. These include a shallow unconsolidated sediments (overburden) groundwater flow zone and an upper bedrock groundwater flow zone. The third hydrogeologic unit is comprised of glacial till that likely serves as a semi-confining layer to vertical groundwater flow between the two groundwater flow zones. Following is a discussion of groundwater flow conditions in the overburden groundwater flow zone and upper bedrock groundwater flow zones.

5.2.1 Overburden Groundwater Flow Zone

The overburden groundwater flow zone is primarily comprised of the saturated fill materials, alluvium, and the upper portions of the glacial till. Groundwater in the overburden groundwater flow zone occurs under unconfined water table conditions and rises and falls with changes in recharge and discharge. The water table at the Site exists fairly close to the ground surface (6 to 10 feet below grade).

The only monitoring well installed in the overburden groundwater flow zone is MW-4 (installed prior to the SI). Groundwater in this hydrogeologic unit likely flows radially in a westerly direction beneath the Site. Groundwater flow in the unconfined unit probably mimics ground surface topography.

Based on K-tests performed on well MW-4, the horizontal hydraulic conductivity for the overburden groundwater flow zone in the well's vicinity (Table 4) is estimated to range from 5.83×10^{-5} cm/sec (0.17 feet/day) and 9.51×10^{-5} cm/sec (0.27 feet/day). Considering its location at the extreme mid-western perimeter of the Site, i.e., downgradient side, the test result for well MW-4 may not be representative of aquifer conditions in the upgradient portions of the Site.

5.2.2 Upper Bedrock Groundwater Flow Zone

Groundwater is present in the upper weathered portion of bedrock beneath the Site where there is an abundance of secondary porosity features (joints, fractures and solution cavities). Eight monitoring wells (MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, MW-8 and MW-9) screen the upper weathered and fractured portion of the bedrock. The specific well construction specifications for monitoring wells MW-1, MW-2 and MW-3, installed by others, are not known with certainty. Based on historical groundwater elevation data, review of geologic cross sections, and hydrogeologic information collected during the primary and supplemental stage of the SI, it is inferred that monitoring wells MW-1, MW-2, and MW-3 are installed in the upper bedrock. Based on similarities in groundwater elevations and hydraulic conductivities for each of the select bedrock monitoring wells, it is concluded by Earth Tech that the eight monitoring wells effectively monitor the same hydrogeologic unit and that hydrogeologic data generated from the monitoring wells can be compared. This is further discussed in the following sections.

Review of groundwater contours (October 21, 1998 [historical], October 16, 2000, November 17, 2000, December 7, 2000, and March 30, 2001) indicates that groundwater in the upper bedrock flows to the west and/or southwest. For seasonally high water table conditions (March 30, 2001), the groundwater elevation decreases by 16.45 feet over a distance of approximately 375 feet along a flow path generally between wells MW-8 and MW-9 resulting in a hydraulic gradient of 0.0439 across the Site. For March 30, 2001, the groundwater elevation decreases by 4.14 feet over a distance of approximately 150 feet between wells MW-8 and MW-3 resulting in a hydraulic gradient of 0.0276 across the Site. For the lowest water table conditions (October 16, 2000), the groundwater elevation decreases by 16.45 feet over a distance of approximately 400 feet between wells MW-8 and MW-9 resulting in a hydraulic gradient of 0.0247 across the Site. For October 16, 2000, the groundwater elevation decreases by 1.55 feet over a distance of approximately 145 feet between wells MW-8 and MW-3 resulting in a hydraulic gradient of 0.01 across the Site.

The contour maps indicate that groundwater in the upper bedrock zone flows in a west-southwesterly direction from the eastern property boundary, across the Site, to the western Site boundary. The hydraulic gradient (*i*) indicated by the maps appears to be slightly steeper on the central, northern, and western portion of the Site (average: 0.0346 ft/ft) than on the eastern side of the Site (avg. 0.007 ft/ft). The average gradient across the Site is estimated at 0.025 ft/ft.

The geometric mean horizontal hydraulic conductivity (Table 4) for wells screening the upper bedrock was calculated to be 8.50 x 10^{-4} cm/sec (2.41 feet/day) by the Bouwer and Rice method and 1.20 x 10^{-3} cm/sec (3.40 feet/day) using the Hvorslev method. The range of measured hydraulic conductivities in the bedrock was from 1.06 x 10^{-4} cm/sec (0.30 feet/day) in well MW-8 to 5.84 x 10^{-3} cm/sec (16.56 feet/day) in well MW-9 using the Hvorslev method. These values are approximately one order of magnitude greater than estimated values for the overburden groundwater flow zone.

5.2.3 Glacial Till

The glacial till deposit identified throughout the Site appears to serve as a semi-confining layer between the two water-bearing zones. This conclusion is based on the water table elevation in "overburden" monitoring well MW-4, which was typically 6.5 to 7 feet higher than that in upper bedrock monitoring MW-9 (Table 3). Although these wells are not immediately adjacent to one another, they are close enough to show that the hydraulic head in the overburden groundwater flow zone is appreciably higher than that in the upper bedrock groundwater flow zone. This suggests that the two groundwater flow zones are hydraulically isolated from one another by the glacial till.

5.2.4 Vertical Groundwater Flow Components

The vertical hydraulic gradient between the potentiometric surface in the upper bedrock flow zone and the water table was calculated for the one location at the Site where a well couplet exist (MW-4 / MW-9). The hydraulic head in MW-4 is 6.46 feet higher than in MW-9 based on review of March 30, 2001 groundwater elevation data (Table 3). The vertical distance between the midpoints of these two well screens is 21.73 feet. From these values, it is apparent that a moderate downward vertical component gradient of 0.0297 ft/ft from the overburden to the bedrock was present at this location on the date the water levels were recorded. This location represents a potential recharge zone for the upper bedrock flow zone. A downward groundwater flow component from the overburden groundwater flow zone onto the upper bedrock groundwater flow zone exists in portions of the Site. However, based on available data, it is not demonstrated that downward flow actually occurs.

5.2.5 Groundwater Flow Velocity and Travel Time

The horizontal groundwater flow velocity within the upper bedrock groundwater flow zone at the Site was estimated to determine the groundwater travel time downgradient of monitoring well MW-8. Groundwater velocity in this area was calculated using a modification of the Darcy Equation, where groundwater flow velocity is a function of the aquifer's hydraulic conductivity, effective porosity, and hydraulic gradient as follows:

$$V = ((K(h/L))/n$$

where: V = groundwater flow velocity
K = hydraulic conductivity
n = effective porosity
h/L = hydraulic gradient

The groundwater flow velocity calculations were performed utilizing a hydraulic gradient (0.025) derived from groundwater elevations recorded at the Site, the geometric mean hydraulic conductivity values obtained from wells MW-6, MW-7, MW-8, and MW-9 (3.40 feet/day), and an effective porosity value of 15%. Utilizing these values, the resultant groundwater flow velocities are summarized as follows:

HYDRAULIC CONDUCTIVITY (FT/DAY)	GROUNDWATER FLOW VELOCITY (FT/DAY)
3.40	**0.57**

Groundwater flow path between MW-8 to MW-9 was selected to determine upper bedrock groundwater travel time at the Site. The travel time along this selected flow path is calculated as the length of the flow path (L) divided by the groundwater flow velocity (V).

Groundwater flow in the upper bedrock flow zone at the Site is assumed to occur primarily in a horizontal dimension, in a west-southwesterly direction beneath the Site on March 30, 2001. Utilizing the one groundwater flow velocity summarized above, the travel time along the groundwater flow path from MW-8 to MW-9 (L= 375 feet) is estimated as 1.8 years. This estimate represents the water flow itself and not necessarily the migration of solutes, which may be diluted, biodegraded, retarded, and subject to other fate and transport processes.

6.0 NATURE AND EXTENT OF CONTAMINATION

6.1 NATURE OF CONTAMINATION

As outlined in Section 1, groundwater sampling conducted in three monitoring wells (MW-1, MW-2, and MW-3) at the Site in 1998 revealed the presence of chlorinated VOCs at concentrations that contravened the NYS DEC Ambient Water Quality Standards and Guidance Values (groundwater standards). A summary of the historical groundwater analytical results from the previous monitoring events is provided in Appendix B. The historical groundwater data is provided as a reference to which the analytical results from the SI can be compared to and aid in the assessment of the extent of Site contaminants.

During the SI, soil and groundwater samples were collected from a number of locations and analyzed for suspected Site contaminants of concern, including VOCs and Freons. The purpose of the sampling was to characterize and identify the nature, extent, and migration of contaminants in soil and groundwater on the Site in the vicinity of the leach field and impacted monitoring well MW-3 to determine if a residual source of groundwater impact remains in this area.

6.2 EXTENT OF CONTAMINATION

6.2.1 Soil Analytical Results

Subsurface soil samples were collected in October 2000 from five test pits advanced adjacent to and/or through the leach field (north of Site building), and three soil borings advanced upgradient and downgradient from impacted monitoring well MW-3. Based on visual observations and headspace screening results, as detailed in Table 1, ten subsurface soil samples were selected to be submitted for laboratory analysis of TCL VOCs. In addition, a split of sample MW0712125 (sample collected from boring MW-7 at a depth of 12.0 to 12.5 feet) was collected for matrix spike/matrix spike duplicate (MS/MSD) analysis. Table 5 provides a summary of the SI soil analytical results, and includes a comparison of the results to NYS DEC's Recommended Soil Cleanup Objectives (TAGM 4046). Copies of laboratory analytical report for the soil samples, and Earth Tech's DUSR report, are included in Appendix F. According to the DUSR, the soil analytical results are usable, and no significant data validation issues were identified.

The analytical results of the SI subsurface soil samples indicated the presence of two VOCs at low concentrations, all within acceptable limits. No chlorinated VOCs were detected in samples collected from test pits TP-00-01, TP-00-03, TP-00-04, and TP-00-05 and borings MW-7, MW-8, and MW-9.

In summary, the analytical results indicate that concentrations of VOCs are not significant in subsurface soil in the vicinity of the leach field or other portions of the Site. It also appears based on the data, that a significant potential source of residual groundwater impact is not present in the soil in these areas.

6.2.2 Groundwater Analytical Results

Two rounds of groundwater samples were collected during the SI, from nine newly installed groundwater monitoring wells. These wells included one well installed in the shallow overburden zone (MW-4) and eight wells installed in the upper bedrock (MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, MW-8, and MW-9). The first round was conducted on November 17, 2000 (primary stage of the SI), and the second round was conducted on March 30, 2001 (Phase 2 of supplemental stage of the SI). The groundwater samples were analyzed for EPA Method 8260 VOAs plus tentatively identified compounds (TICs) with Category B deliverables (November groundwater sampling event) or EPA 624 VOA, Freon-113 plus

TICs with Category B deliverables. During the November 2000 groundwater sampling round, a blind duplicate sample (FD111700) was collected from monitoring well MW-3. In addition, a split of the groundwater sampled from monitoring well MW-4 was collected for matrix spike/matrix spike duplicate (MS/MSD) analysis. During the March 2001 groundwater sampling round, a blind duplicate sample (DUP033001) and equipment blank was collected from monitoring well MW-8. In addition, a split of the groundwater sampled from monitoring well MW-9 was collected for matrix spike/matrix spike duplicate (MS/MSD) analysis.

A summary of the groundwater analytical results from these two rounds of sampling is provided in Table 6 (November 17, 2000 results) and Table 7 (March 30, 2001 results), and in Figure 12 (November 17, 2000 results) and Figure 13 (March 30, 2001 results). The summary tables include a comparison of the results to NYS DEC groundwater standards. Copies of laboratory analytical reports for the November 2000 and March 2001 groundwater samples, and Earth Tech's DUSR report, are included in Appendices G and H, respectively. According to the DUSRs, the groundwater analytical results are usable, and no significant data validation issues were identified.

The analytical results of the two rounds of samples were fairly consistent with each other in terms of the compounds and concentrations detected. Taking into account groundwater sample results from all wells from both stages of the SI, five VOCs were detected in the upper bedrock hydrogeologic unit at concentrations above the laboratory detection limits. The VOCs that were detected above NYS DEC groundwater standards included Freon-113 (wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8), TCE (wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8), and 1,1,1-TCA (wells MW-3, MW-8, and MW-8).

During the November 2000 groundwater sampling (primary stage of the SI), the highest concentrations of VOCs were detected in monitoring well MW-3, located southeast of the Site building in the southwestern portion of the parking lot, with total VOC levels of 786 parts per billion (ppb) (906 in field duplicate sample). The data indicates that well MW-8, located at the upgradient Site boundary, contains the next highest concentration of VOCs. The total VOC concentration in this well was reported at 628 ppb. The compounds exhibiting the highest concentrations in these well were Freon-113 and TCE. Lower concentrations of a few VOCs were detected in wells MW-1, MW-2, MW-5, MW-6, MW-7, and MW-9 during this sampling round. No VOCs were detected in MW-4 during the November 2000 groundwater sampling event.

During the March 2001 groundwater sampling (Phase 2 of the supplemental stage of the SI), the highest concentrations of VOCs were detected in well MW-8, located at the upgradient Site boundary, with total VOC levels of 470 (462 ppb in the field duplicate sample). The data indicates that well MW-1, located along the northwestern corner of the Site, contains the next highest concentration of VOCs, 149 ppb. Lower concentrations of a few VOCs were detected in wells MW-2, MW-3, MW-5, MW-6, and MW-9 during this sampling round. The total VOC concentration in MW-3, which was highest on the November 17, 2000 sampling event, was only 38 ppb. The compounds exhibiting the highest concentrations in these wells were Freon-113 and TCE. Mapping of the primary contamination contours (Freon-113 and TCE) was performed to illustrate the observed distribution of these contaminants at the Site. Based on available data, the primary VOC contaminants (Freon-113 and TCE) noted at the Site were greatest at the mid-eastern perimeter (upgradient portion) of the Site and lowest along the southwestern areas of the Site (Figures 14 and 15). No VOCs were detected in well MW-4 during the March 2001 groundwater sampling event.

No VOCs were detected in MW-4 during the first round or second round. The data indicates that groundwater in the overburden hydrogeologic unit at well MW-4 is not impacted by TCE, 1,1,1-TCA or Freons.

Prior to initiating the second groundwater sampling event, additional efforts were undertaken to better understand localized horizontal flow zones in the upper bedrock groundwater and gain insight into Site groundwater quality trends. Earth Tech initiated efforts to assess if groundwater in on-site bedrock wells is stratified, and, therefore assess the importance of groundwater sampling techniques. This was accomplished by comparing groundwater quality results (i.e., field parameters and analytical parameters) for the screened interval with the stagnant zone above the screened interval.

On March 23, 2001, Earth Tech measured and recorded field parameters (i.e., temperature, specific conductivity, pH, turbidity, and dissolved oxygen) at monitoring wells MW-3, MW-5, MW-7, and MW-8. The temperature profiling data collected from MW-3, MW-5, MW-7, and MW-8 are provided in Tables 8, 9, 10, and 11, respectively. Although it is important not to over interpret the profiling data, results indicate a change in temperature in the screened interval of each tested bedrock monitoring well. Further observations include:

- General comparable field parameter trends noted between MW-3 / MW-8 and MW-5 / MW-7;
- Changes in temperature within the screened interval may reflect the most degree of fracturing and possibly greatest potential for bedrock groundwater flow (best exhibited at MW-3 [20-24'], MW-5 [20-24'], MW-7 [23-27'], and MW-8 [26-31'];
- Observed specific conductivity values appeared to be, in general, more stable and slightly higher (5 to 10 μmhos) in the screened interval than the upper portion of the water column;
- No consistent patterns emerged from the evaluation of the pH data although consistent trends were noted during testing of each individual monitoring well;
- Turbidity readings appear to be, in general, higher with depth (most notably at wells MW-3 and MW-8). Variations in turbidity within the screened interval likely reflect "stirring up" sediment from the well sump or due to minor differences in groundwater flow rates within the fractured bedrock; and
- Observed dissolved oxygen readings were lower in the screened interval (ranged from 0.33 mg/L at MW-3 to 1.3 mg/L at MW-8) than the upper portion of the water column.

Typically, temperatures were 2° Celsius warmer in the screened interval, which reaffirmed the need to further characterize groundwater quality (collect groundwater samples at depth discrete intervals), compare results, and assess the potential for dilution, stratification, and temporal changes.

A Kemmerer sampler was used to collect depth-discrete (i.e., 1 to 2 feet from the bottom of each monitoring well) groundwater samples from impacted monitoring wells MW-3 and MW-8 to further characterize groundwater quality and assess the potential for dilution, stratification, and temporal changes. These groundwater samples were analyzed for EPA 624 VOA, and Freon-113 plus TICs with Category B deliverables. A summary of the groundwater analytical results from this round of sampling (March 30, 2001) is included in Table 7 and Figure 13. Copies of the laboratory analytical report for the Phase 1 groundwater sampling (supplemental stage of the SI) and Earth Tech's DUSR report are included in Appendix H. According to the DUSRs, the groundwater analytical results are usable, and no significant data validation issues were identified.

During Phase 1 of the March 2001 groundwater sampling (supplemental stage), the highest concentrations of VOCs were detected in well MW-8, located at the upgradient Site boundary, with total VOC levels of 565 ppb. The data indicates that well MW-3, located along the southwestern portion of the Site parking lot, contained total VOC levels of 54 ppb. The compounds exhibiting the highest concentrations in these wells were Freon-113 and TCE. This groundwater sampling demonstrated that the concentration of Freon-113 and TCE was highest along the mid-eastern Site boundary in the upper bedrock hydrogeologic unit. MW-8 is approximately 150 feet and upgradient of monitoring well MW-3.

Following the Phase 2 groundwater sampling event (supplemental stage of the SI), monitoring wells MW-3 and MW-8 were redeveloped using a weighted PVC bailer. The water column was bailed from the base of each monitoring well. Once an additional five well volumes had been purged, the dedicated and decontaminated Kemmerer was re-lowered to the previously attained depth at monitoring wells MW-3 and MW-8 in order to collect samples that could be compared results with the Phase 1 groundwater samples. These groundwater samples were analyzed for EPA 624 VOA, Freon-113 plus TICs with Category B deliverables. A summary of the groundwater analytical results from this round of sampling is included in Table 7 (March 30, 2001 results) and Figure 13 (March 30, 2001 results). Copies of the laboratory analytical report for the Phase 3 groundwater sampling (supplemental stage) and Earth Tech's DUSR report are included in Appendix H. According to the DUSRs, the groundwater analytical results are usable, and no significant data validation issues were identified.

During Phase 3 of the March 2001 groundwater sampling (supplemental stage), the highest concentrations of VOCs were also detected in well MW-8, located at the upgradient Site boundary, with total VOC levels of 586 ppb. The data indicates that well MW-3 only contained total VOC levels of 55 ppb. The compounds exhibiting the highest concentrations in these wells were Freon-113 and TCE. This groundwater sampling confirmed that the concentration of Freon-113 and TCE was highest along the mid-eastern Site boundary in the upper bedrock hydrogeologic unit. These results were similar to trends observed during the Phase 1 and Phase 2 groundwater sampling during the supplemental stage of the SI.

6.2.3 Extent of Groundwater Impacts

The extent of groundwater impact at the Site was assessed by evaluating the SI groundwater results and previous (1998) groundwater analytical results (Appendix A) in conjunction with the conceptual groundwater flow regime presented in Section 5.2. Comparison of SI analytical results for wells MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6 (Tables 6 and 7) with those of past sampling (Appendix B) shows that VOC concentrations during the SI were generally similar to conditions during the last two groundwater sampling events (EP&S, March 1998; Earth Tech, October 1998). Excluding Freon-113 (which was not analyzed by EP&S or Earth Tech), the individual compound with the highest concentration during both periods was TCE, followed by 1,1,1-TCA.

Data from new monitoring well MW-9 indicate that groundwater quality approximately 250 feet downgradient of impacted monitoring well MW-3 exhibits reduced Freon-113 and TCE levels as groundwater approaches the western Site boundary. Groundwater sampling performed during the primary and supplemental stages of the SI do not indicate the presence of Freon-113 or TCE in groundwater samples collected from MW-9. The groundwater quality in this downgradient area might reflect dilution of contaminants in the upper bedrock zone, natural attenuation processes and/or varying groundwater flow paths. It is likely a combination of these conditions accounts for the changes in concentrations in this area of the plume.

Data from new monitoring wells MW-7 and MW-8, along the eastern Site boundary, indicate that groundwater quality approximately 100 to 150 feet upgradient of impacted monitoring well MW-3 exhibits the presence of Freon-113 and TCE. Additional groundwater sampling results during the second groundwater sampling event indicate that monitoring well MW-8 exhibits appreciably higher concentrations of Freon-113 and TCE than groundwater from monitoring well MW-3. In addition, significant levels of Freon-113 and TCE were also observed in wells MW-5 and MW-7, which are also upgradient of well MW-3. Although the highest concentration of contaminants were detected at on site well MW-3 during the November 2000 groundwater sampling event, it appears that dilution effects could misrepresent the actual chemistry of the upper bedrock water bearing zone at well MW-8.

The SI groundwater analytical results from monitoring well MW-6 indicates that concentrations of VOCs (Freon-113 and TCE) slightly above groundwater standards extend beyond the northwestern Site boundary, and onto the neighboring property. In addition, the SI groundwater analytical results from monitoring well MW-9 indicates that concentrations of 1,1,1-TCA slightly exceed groundwater standards beyond the mid-western Site boundary, and onto the neighboring property.

In order to evaluate potential public health concerns the RC DOH conducted an extensive water well survey of the Congers area (Appendix B). The RC DOH also sampled several private water wells during the course of this investigation. A summary of the groundwater analytical results from these sampling activities is provided in Table 12. This summary table includes results for Freon-113, TCE, Freon-11, THM-chloroform, 1,1,1-TCA, PCE, and MTBE along with a comparison of the results to NYS DEC groundwater standards and/or guidance values and NYS DOH drinking water standards.

Originally, RC DOH sampled thirteen private water supply wells within ¼-mile southeast of the Site (Wells Avenue, Sheridan Avenue, Sherman Avenue, Sheridan Avenue, and N. Route 303 area) between December 5, 2000 and December 27, 2000. Two of the wells sampled (19 Wells Avenue and 29 Wells Avenue) exhibited results that exceeded NYS DEC groundwater standards and NYS DOH drinking water standards for TCE and Freon-113. The groundwater sample collected from the 29 Wells Avenue address also violated the NYS DEC groundwater standard for PCE (12 μg/L). The NYS DOH drinking water standard for Freon-113 (5 μg/L) was exceeded at 10 of the 13 locations where groundwater samples were collected. In order to respond to public health concerns, RC DOH sampled approximately 27 additional private water wells to determine the extent of groundwater impacts. These water wells were sampled by RC DOH personnel between January 5, 2001 and February 21, 2001. The NYS DOH drinking water standard for Freon-113 (5 μg/L) was exceeded at 4 of the 27 locations (1 Wells Ave., 18 Wells Ave., 32 Wells Ave., and 22 Sheridan Ave.). The only other groundwater violation was an exceedance for MTBE (19 μg/L) at the Lake Road property. Four additional private water supply wells were sampled by the RC DOH in August 2001.

According to representatives from the RC DOH and United Water Company, the potable water main was extended by May 2001 and all residents with impacted private wells (except a couple [111 N. Rt. 303 and 117 N. Rt. 303] along N. Route 303) were connected to the public water supply by September 2001. Public water was also subsequently made available to these two exceptions in December 2002. The 111 N. Rt. 303 property is currently connected, however, it is not known if the other property at 117 N. Rt. 303 has completed the connection to the United Water System. It should be noted that this property has a treatment system in place for VOCs.

Earth Tech contends that there is a likely upgradient off-site source for the observed groundwater contamination at the Site and vicinity (see Table 12 and information provided in Appendix B, Water Well Survey). VOC contaminants observed at the Site are likely conveyed via the local hydraulic gradient, which has been demonstrated to be east to west at the Site, and are primarily directed by the configuration of the bedrock surface, the bedding angle of the upper bedrock, and/or groundwater flow along secondary porosity features such as joints, fractures, and solution cavities. The primary VOC contaminants (Freon-113 and TCE) noted at the Site were greatest at the mid-eastern perimeter (upgradient portion) of the Site and lowest along southwestern areas of the Site (Figures 14 and 15). The migration of the primary VOC contaminants observed in the vicinity may be controlled by two prominent north to south linear features, which were observed both to the east and west of the Site (refer back to Section 4.2.3, Structural Geologic Setting). The linear features may represent fractures and preferential flow zones for groundwater in the region. Results from the RC DOH sampling indicate the affected area being ¼-mile southeast of the Site. However, due to the different sampling dates and variability in the well construction depth of affected water supply wells, it may be misleading to contour the Freon-113 and TCE concentrations in groundwater. Based on the conceptual groundwater flow regime described in Section 5.2, the VOCs are expected to migrate with the regional groundwater gradient, and ultimately discharge to Congers Lake, which is believed to represent the discharge point for groundwater in the upper bedrock zone.

7.0 QUALITATIVE BASELINE HUMAN HEALTH RISK ASSESSMENT

7.1 OBJECTIVES AND PROCEDURES

This Qualitative Baseline Human Health Risk Assessment has been prepared to determine whether the Wilsonart Site may pose a risk to human health based on the data collected as part of the SI. It is based on an evaluation of identified contamination, the presence of potential existing human receptors, potential pathways for exposure of contaminants to the potential human receptors, and established risk-based environmental criteria.

This Qualitative Baseline Human Health Risk Assessment is limited to the identified environmental conditions found at the Site. No quantitative estimates of potential human health risks are presented. Rather, potential health risks were based upon the detected concentrations, potential human exposure routes, and risk-based environmental criteria established at the state and federal level.

The scope of work for this Qualitative Baseline Human Health Risk Assessment included:

X An evaluation of historical, chemical, hydrologic, hydrogeologic, demographic, and other information;

X Identification of chemicals in environmental media which are likely to contribute significantly to potential human health risks;

X Identification and characterization of completed exposure pathways by the evaluation of impacted environmental media, current on Site and surrounding land use, human exposure (contact) points, and chemical intake routes;

X Presentation and discussion of regulatory standards and criteria at the state and federal level; and

X A qualitative evaluation of potential health risks.

The conclusions and recommendations are based on a careful evaluation of this information in order to determine the potential risks to human health posed by the Site.

7.2 IDENTIFICATION OF CONTAMINATION

The purpose of the SI was to characterize and identify the nature, extent, and migration of contaminants in soil and groundwater on the Site in the vicinity of the leach field, impacted monitoring well MW-3, and to determine if a residual source of significant groundwater impact exists on Site. During the SI, soil and groundwater samples were collected from a number of locations between October 2000 and March 30, 2001. The SI sampling analytical results are presented in Section 6 of this report and are summarized briefly below.

7.2.1 Subsurface Soil

As discussed in Section 6 and presented in Table 5, subsurface soil samples were collected in October 2000 from four test pits adjacent to and/or through the leach field (north of Site building) and three soil boring locations advanced upgradient and downgradient of impacted monitoring well MW-3. Ten subsurface soil samples were submitted for laboratory analysis of EPA Method 8260 VOCs.

The results of the laboratory analysis of the subsurface soil samples indicated the presence of two VOCs, which were determined to be laboratory artifacts. The detected VOCs in subsurface soils were not included for further consideration in this Qualitative Baseline Human Health Risk Assessment because they were believed to be laboratory artifacts.

7.2.2 Groundwater

As discussed in Section 6 of this SI report, groundwater samples were collected in November 2000 and March 2001 from six existing monitoring wells and three newly installed monitoring wells. These monitoring wells included one shallow overburden well (MW-4) and eight upper bedrock wells (MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, MW-8, and MW-9). The groundwater samples were analyzed for VOCs, Freons, and tentatively identified compounds. As presented in Table 6 (November 2000 sampling results) and Table 7 (March 2001 sampling results) of this SI, laboratory analysis of the groundwater samples collected during the primary and supplemental stages of the SI indicated that there were no VOCs in shallow overburden groundwater. Since no VOCs were detected in the shallow overburden hydrogeologic unit, this media was not included for further consideration in this Qualitative Baseline Human Health Risk Assessment.

Five VOCs (Freon-113, TCE, 1,1,1-TCA, 1,1-dichloroethane, and 1,1-dichloroethene were detected in the upper bedrock hydrogeologic unit at concentrations above the laboratory detection limits. Taking into account sample results from all monitoring wells from both rounds, three VOCs were detected in the upper bedrock at concentrations above the NYS DEC groundwater standard. The VOCs that were detected above groundwater standards included Freon-113 (wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8), TCE (wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8), and 1,1,1-TCA (wells MW-3, MW-8, and MW-9). Since VOCs were detected in the upper bedrock hydrogeologic unit, this media was included for further consideration in this Qualitative Baseline Human Health Risk Assessment.

No investigation of conditions beneath the upper bedrock zone was conducted under the presumption that if the Site were the source of the groundwater impacts, the most likely zones to be impacted would be the shallow overburden and upper bedrock.

7.3 POTENTIAL HUMAN RECEPTORS/EXPOSURE PATHWAYS

The purpose of an exposure assessment is to identify pathways through which people can be exposed to contaminants in environmental media. The exposure assessment utilizes the current environmental conditions at the Site in determining potential exposure scenarios. The analysis assumes that the concentrations of chemicals in environmental media has stabilized and will not change significantly over time. As outlined in the U.S. Environmental Protection Agency's Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A) (EPA/540/1-89/002, December 1989), an exposure pathway generally consists of four elements:

- A source and mechanism of chemical release;
- A retention and transport medium (media);
- A point of potential human contact with the impacted media; and
- An exposure route at the contact point (dermal, inhalation, and ingestion)

In order for an exposure pathway to be complete, all four of the above elements must be met. The source itself (e.g., soil containing chemicals) may be an exposure point, or an impacted medium may be a contaminant source for other media (e.g., impacted soil could be a source for groundwater contamination). Considering the chemical/physical properties of the chemicals detected on the Site, the adjoining property uses/characteristics, and the impacted environmental media, the potential human exposure pathways include:

- Groundwater
- Subsurface Soils
- Surface Water/Sediment
- Ambient Air
- Indoor Air

In general, the depth to groundwater ranges from approximately 5 to 10 feet below grade. As described in Section 5, overburden groundwater beneath the Site is presumed to flow radially to the west from a bedrock-controlled ridge, which marks the eastern property boundary and toward a north-south oriented ditch, which constitutes the western Site boundary. The ditch drains to the north to Toms Brook approximately 0.7 mile to the north-northwest of the Site (refer to Section 5). The Toms Brook flows to the southwest and discharges to the northeasternmost portion of the DeForest Lake Reservoir approximately 0.8 mile northwest of the Site. There are no known private water supply wells in the 100 feet between the Site and the ditches comprising the Toms Brook tributary system.

Review of groundwater contours (October 21, 1998, October 16, 2000, November 17, 2000, December 7, 2000, and March 30, 2001) indicate that groundwater in the upper bedrock hydrogeologic unit flows locally in a radial manner to the west and/or southwest. Regionally, hydrogeologic analysis indicates that groundwater flow in the upper bedrock moves along linear features from areas of high hydraulic head to areas of low hydraulic head. Review of aerial photographs suggest that north to south oriented features such as noted along the western Site boundary) are the dominant flow paths with the east to west (as documented on Site), northeast to southwest, and northwest to southeast flow paths being less prominent. Therefore, it is believed that Site groundwater ultimately discharges to Congers Lake, which is approximately 0.7 mile south of the Site.

Based on the characteristics of the Site and surrounding areas as described previously, potential human receptors/exposure pathways are summarized as follows.

7.3.1 Potential Soil Receptors/Exposure Pathways

The subsurface soil samples collected during the SI did not indicate the presence of VOCs in subsurface soils located adjacent to the leach field or upgradient and downgradient of impacted monitoring well MW-3. The fact that these soils were not impacted precludes current exposures by direct or indirect contact.

7.3.2 Potential Surface Water and Sediment Receptors/Exposure Pathways

No surface water was observed on Site. Since subsurface soils and shallow overburden groundwater did not indicate the presence of VOCs it is expected that any discharge to ditches that feed Toms Brook, located approximately 0.7 mile to the north-northwest of the Site, would not represent a pathway to contaminate surface water and sediment. The suspected exposure pathways associated with surface water and sediment can be eliminated based on site characterization information that shows these media are not contaminated. As such, it is not necessary to further define the pathway (i.e., there is no need to discuss exposure frequency or receptor populations).

7.3.3 Potential Groundwater Receptors/Exposure Pathways

The geologic units present at the Site (Section 4.2) comprise three hydrogeologic units. Two of these include a shallow unconsolidated sediments (overburden) groundwater flow zone and an upper bedrock groundwater flow zone. The third hydrogeologic unit is comprised of glacial till. This unit likely serves as a semi-confining layer to vertical groundwater flow between the two groundwater flow zones. Groundwater in the shallow overburden beneath the Site, which is not impacted, flows to the west toward a ditch. Impacted groundwater in the upper bedrock flows locally in a radial manner to the west and/or southwest until it is captured by the dominant north to south flow patterns in the region.

The presence of these contaminants indicates that the impacted area is much larger than the Wilsonart Site. The RC DOH identified several private water wells (bedrock) to the south, and downgradient, of the Site that contained TCE, Freon-113, Freon-11, 1,1,1-TCA, PCE, and MTBE. Freon-11, PCE, and MTBE were not detected in groundwater samples collected from on-site bedrock wells. Several of the residents along Wells Avenue, Sheridan Avenue, Southward Street, and Burnside Avenue that were not hooked up to the local public water supply system (United Water Company) revealed levels of Freon-113 and occasionally TCE and PCE above Maximum Contaminant Levels (MCLs), which represents the highest level of a contaminant that is allowed in drinking water. RC DOH immediately notified all affected residents that their water had contaminants at concentrations exceeding MCLs, and recommended that they discontinue use of the water. RC DOH distributed bottled water (supplied by Wilsonart International, Inc.) to those residents until they could establish a connection to public water. To RC DOH's knowledge, all homes that were identified as having water with contaminants exceeding MCLs have been connected to the public water supply.

In addition, Restaurant X, which is not hooked up to the local public water supply system, and had concentrations very close to the MCL, has installed a treatment system as a temporary measure. Negotiations are also underway between the Town of Clarkstown and the local water company to get the water main extended up Route 303 to serve Restaurant X and other residents in the area.

Although considered highly unlikely because of the availability of a public water supply, the potential exists for individuals to install a private bedrock well on the Site in the future. Although such a well would likely be installed deeper in bedrock, where it would be less likely to be impacted by drought conditions or surficial contamination, it has been conservatively assumed that such a well could be installed. Therefore, potential on-site future residents or future workers may be exposed to impacted well water during drinking and/or general uses (resulting from dermal contact and inhalation of volatiles).

Since the depth to groundwater ranges from approximately 0 feet to 27 feet below grade and all monitoring wells are locked/bolted closed to prevent unauthorized access, the most likely potential human receptors who may come in direct contact (incidental ingestion and dermal contact) with shallow groundwater beneath the Site are environmental professionals and contractors conducting work at the Site. However, exposures of environmental professionals and contractors to groundwater are/will be precluded by the use of personal protective equipment as necessary in accordance with site-specific health and safety plans.

Since depth to bedrock is fairly shallow in parts of the Site (approximately 0 to 25 feet below grade), it is possible that water-bearing zones in the upper bedrock may be encountered during future subsurface excavation activities at the Site.

Potential direct contact with groundwater by future construction/utility worker scenario does not represent a completed exposure pathway. This is based on the fact that sub-grade utilities are generally not installed into the groundwater table. It is unlikely that future construction activities would purposely involve excavating to depths below the groundwater table, and workers would be using personal protective equipment in accordance with health and safety protocols.

7.3.4 Potential Ambient Air Receptors/Exposure Pathways

The suspected exposure pathways associated with contaminated soil and its potential affects on ambient air quality can be eliminated. This conclusion is based on factors involving the sources and transport/migration of contamination (i.e., the groundwater contamination is at appreciable depth and there is a significant dilution effect encountered once VOCs in soil gas are released into the atmosphere).

7.3.5 Potential Indoor Air Receptors/Exposure Pathways

As no soil or groundwater samples were collected from beneath the former Wilsonart building, the potential for impacts to air quality within the Site building from the intrusion of contaminated soil gas cannot be supported by the available data. However, the potential for impacts to indoor air quality on-site are very remote given that the total concentrations of VOCs detected in on-site groundwater (shallow bedrock hydrogeologic unit) are less than one part per million (i.e., the levels detected would present marginal impacts to the surrounding gas medium). In addition, the local geology is not conducive to soil gas transport/migration, and the on-site building does not possess a basement. Therefore, it is suggested that any suspected or possible exposure pathways involving contaminated soil gas at the Site building be eliminated.

7.4 QUALITATIVE RISK ANALYSIS

A qualitative risk analysis is a qualitative assessment of the toxic properties of a chemical in relation to a population's likelihood of exposure. The ultimate goal is to evaluate the possibility that exposed human populations may be adversely affected and to characterize the nature of the effects they may experience. Risk is broadly defined by the following relationship:

$$\text{Risk} = \text{Hazard} \times \text{Exposure}$$

Of primary importance in these analyses is the potential for exposure to the media of concern at the Site. The reason being that while a hazardous chemical may exist on a site, without an exposure there can be no risk to health. An evaluation of potential human exposures to the chemicals in site environmental media indicate that there are a number of exposure pathways of potential concern (refer to Section 7.3). In an effort to evaluate which exposure pathways and Site contaminants present the greatest potential risks to human health, a comparison of the detected chemical constituents to relevant and applicable human health risk-based regulatory criteria may be performed.

7.4.1 Soil Risk Analysis

A comparison of the detected concentrations of VOCs detected in the subsurface soils to the NYS DEC's Recommended Soil Cleanup Objectives (TAGM 4046) is discussed in Section 6 and is presented in Table 5. This comparison indicated that none of the detected VOCs exceeded the respective NYS DEC TAGM #4046 Recommended Soil Cleanup Objectives, designed to be protective of typical residential exposures to impacted soils and for the protection of groundwater quality. Based on this analysis, the presence of these VOCs (which are laboratory artifacts) is not expected to pose a risk to human health.

7.4.2 Surface Water and Sediment Risk Analysis

Since no surface water was observed on site and VOCs were not detected in subsurface soils or shallow groundwater beneath the (refer to Section 2 and 6), the potential does not exist for direct contact with VOCs. Because of these conditions, it is unlikely for VOCs from the Site to be present in the surface water or sediment in ditches feeding Toms Brook at concentrations that would pose a significant health risk from direct contact. Given this, and considering the likely limited human exposure due to infrequent use as outlined in Section 6.3.3, direct contact with ditches feeding Toms Brook surface water and sediment is unlikely to pose a risk to human health due to potential Site shallow overburden groundwater discharges.

7.4.3 Groundwater Risk Analysis

As discussed previously in Section 7.3.3, no current potential receptors to contaminated groundwater are present since the Site and surrounding area are serviced by a municipal water supply. Although unlikely, due to the availability of a public water supply, it is possible that a private water supply well could be installed on the Site in the future. Therefore, potential future receptors to contaminated groundwater are considered to include potential future Site residents or site workers who install and utilize private groundwater wells for drinking or other uses. A conservative approach was taken by further assuming that all on-site monitoring wells are considered in this Qualitative Baseline Human Health Risk Assessment to be potential future human exposure points.

As discussed in Section 6 and presented in Tables 6 and 7, groundwater sampling conducted during the SI indicates that the VOCs that were detected above groundwater standards included Freon-113 (wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8), TCE (wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8), and 1,1,1-TCA (wells MW-3, MW-8, and MW-9). As a result, future ingestion and use of groundwater may result in an unacceptable risk to future Site residents and workers due to the presence of these VOCs if a private water well were installed on-site. It should be mentioned that a municipal water supply is available, making it extremely unlikely that a private water supply well would be installed on the Site.

There are additional residences served by private water supply wells that had detections of Freon and/or TCE at concentrations below the MCL. Until the source is located and remediated, the contaminant plume will likely continue to migrate southward (regional groundwater flow direction), eventually impacting additional private wells. Concentrations in some wells that are still in use could rise above the MCL.

7.4.4 Indoor Air Risk Analysis

Since VOCs are present in bedrock groundwater beneath the Site, the slight potential exists for indoor air to be impacted from vapors migrating through the vadose zone into an on-site building (or future homes if the Site were to be redeveloped for residential purposes). However, results from a previous soil gas survey of the Site (Earth Tech, 1998) and concentrations detected in Site groundwater, are generally low (total VOC levels of less than 1 ppm). Also, the soil overlying the groundwater at the Site was observed to be dense and compact in nature, which would serve to restrict the upward migration of soil gas vapors. Based on these conditions, the indoor air pathway is unlikely to pose a significant risk to human health resulting from the presence of VOCs in the upper bedrock groundwater unit.

8.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

8.1 SUMMARY AND CONCLUSIONS

The performance of the SI at the former Wilsonart International, Inc. distribution facility (Site), was adequate to fulfill the objectives outlined in Section 1.2. The data obtained was used to characterize geologic and hydrogeologic conditions at the Site, define the nature and extent of soil and groundwater impacts at the Site, and to determine the potential for human exposure to contaminants at the Site and the potential for such exposures to pose a human health risk. The results of the SI, as described in detail in the preceding sections, are summarized as follows:

- The geology at the Site consists of approximately 15 to 25 feet of unconsolidated sediments of glacial and post-glacial origin overlying Triassic age sedimentary bedrock (Brunswick Formation). The unconsolidated deposits consist primarily of glacial till, overlain by alluvium and fill soil (primarily reworked native sediments). The glacial till deposit is generally dense and compact in nature and is comprised of a fairly well graded (poorly sorted) distribution of clay, silt, sand and gravel. Soil boring data indicates that the glacial till becomes more dense and compact, and contains a relatively higher percentage of silt and/or clay below a depth of approximately 20 feet just above bedrock.

- Based on boreholes drilled during the primary stage of the SI, the bedrock beneath Site consists of a moderately cemented, highly fractured red to red-brown fine-grained sandstone and/or siltstone with a low bedding angle (less than 5°). The depth to bedrock ranged from 4.2 feet to approximately 25 feet below grade at the Site. In general, the top of bedrock surface slopes from north to south and east to west at the Site.

- Two prominent north to south map/photo lineaments were observed both to the east and west of the Site. The feature to the west of the Site, which is aligned with the railroad tracks, is one of the most well defined lineaments in the study area. Two east to west oriented lineaments that were visible to the north and south of the Site are very weakly defined. The linear features identified in the Site area may represent potential fracture zones that may affect groundwater flow directions in the area.

- The geologic units present at the Site comprise three hydrogeologic units. Two of these are potential water-bearing zones in the shallow overburden and in the upper bedrock. The third hydrogeologic unit is an aquitard comprised of the glacial till that likely serves as a semi-confining layer between the two water-bearing zones. Groundwater in the shallow overburden beneath the Site, which is not impacted, flows to the west toward a ditch which feeds Toms Brook, located immediately west and northwest of the adjoining active railroad line that serves as the western and northwestern Site boundary. Groundwater in the upper bedrock, which is impacted flows locally in a radial manner to the west and/or southwest until it is captured by the dominant north to south flow patterns in the region. It is presumed that the groundwater in the upper bedrock ultimately discharges into Congers Lake.

- Based on hydraulic conductivity test results, groundwater flow is more readily transmitted in the upper bedrock than in the shallow overburden. Hydraulic conductivity (K) values for the shallow overburden hydrogeologic unit ranged from 5.83E-05 cm/sec (0.17 feet/day) to 9.51E-05 cm/sec (0.27 feet/day) while K values for the upper bedrock groundwater (using Hvorslev method results only) ranged from 1.06E-04 cm/sec (0.30 feet/day) to 5.84E-03 (15.56 feet/day).

- Groundwater flow direction in the overburden is to the west with a radial habit.

- Groundwater flow direction in the upper bedrock is to the west-southwest across the Site. The average water table gradient across the Site is estimated to be 0.025 ft/ft and the horizontal groundwater flow rate in the upper bedrock zone is estimated to be approximately 208 feet per year.

- The vertical hydraulic gradient between the overburden and upper bedrock flow zone was calculated for the one location at the Site where well couplets exist (MW-4 / MW-9). It is concluded that a downward groundwater flow component from the overburden groundwater flow zone onto the upper bedrock groundwater flow zone exists in portions of the Site.

- According to the DUSRs, the subsurface soil and groundwater analytical results are usable, and no significant data validation issues were identified.

- The analytical results of the SI subsurface soil samples collected in the vicinity of the leach field, mid-eastern Site boundary (upgradient of impacted monitoring well MW-3) and mid-western Site boundary (downgradient of impacted monitoring well MW-3) indicated the presence of two VOCs (chloroform and methylene chloride) at low concentrations that are believed to be laboratory artifacts. All VOCs detected were well below applicable NYS DEC TAGM #4046 Recommended Soil Cleanup Objectives.

- No evidence of subsurface soil contamination exists adjacent to the leach field located in the northern section of the Site. The analytical results indicate that concentrations of VOCs are not significant in subsurface soil in the vicinity of the leach field or other portions of the Site. It also appears based on the data, that a significant potential source of residual groundwater impact is not present in the soil in this area. Subsurface soil in the area of the leach field, mid-western Site boundary, and mid-eastern and upgradient Site boundary does not represent a source of Freon-113 or chlorinated VOCs.

- Concentrations of VOCs at the Site are generally consistent with conditions during the last three years of monitoring at the Site (October 1998 to March 2001).

- No VOCs were detected in MW-4. The data indicates that groundwater in the overburden hydrogeologic unit at well MW-4 is not impacted by Freon-113, TCE, or 1,1,1-TCA.

- Taking into account groundwater sample results from all wells from both stages of the SI, five VOCs were detected in the upper bedrock hydrogeologic unit at concentrations above the laboratory detection limits.

- The SI groundwater analytical results from monitoring well MW-6 indicates that concentrations of VOCs (Freon-113 and TCE) in slight exceedance of groundwater standards extend beyond the northwestern Site boundary, and onto the neighboring property. In addition, the SI groundwater analytical results from monitoring well MW-9 indicates that concentrations of 1,1,1-TCA slightly exceed groundwater standards beyond the mid-western Site boundary, and onto the neighboring property. Based on the conceptual groundwater flow regime for the Site, the VOCs are expected to migrate with the upper bedrock groundwater gradient, and ultimately discharge to Congers Lake, located approximately 0.8 mile south of the Site boundary.

- Significant levels of Freon-113 and TCE were observed in groundwater from upper bedrock monitoring wells MW-5, MW-7, and MW-8, which are upgradient of well MW-3. Upgradient background groundwater data (wells MW-5, MW-7, and MW-8) indicate that the on site presence of Freon-113, TCE, and 1,1,1-TCA is related to an off-site source.

- Data from monitoring wells MW-7 and MW-8 indicate that groundwater quality approximately 100 to 150 feet upgradient of impacted monitoring well MW-3 exhibits the presence of Freon-113 and TCE levels in groundwater along the eastern Site boundary. Depth-discrete groundwater sampling indicates that monitoring well MW-8 exhibits appreciably higher concentrations of Freon-113 and TCE than groundwater from monitoring well MW-3. Although the highest concentration of contaminants were detected at on site well MW-3 during the November 2000 groundwater sampling event, dilution effects may have affected the analytical results of the upper bedrock water bearing zone at well MW-8 during this sampling event.

- It is likely that an upgradient off-site source is present for the observed groundwater impacts at the Site and vicinity.

- Based on the Qualitative Baseline Human Health Risk Assessment, potential current exposures to site groundwater and indoor air and potential current and future exposures to Site soils, Toms Brook surface water and sediment, and ambient air are not expected to pose a significant risk to human health. If a private water supply well is installed on the Site in the future, use of Site groundwater as a water supply may pose a human health risk to future Site residents or future Site workers (due to the presence of VOCs). This scenario is considered extremely unlikely given the current connection to municipal water (United Water Company) for the Site and surrounding area.

8.2 RECOMMENDATIONS

Based on the findings of the SI, the following recommendations have been formulated:

- Wilsonart has completed the requirements for the Brenner Drive Site (Site#V-00322-3). Wilsonart has agreed to perform the subsurface investigation, as per the voluntary cleanup agreement, to satisfy our obligations with the voluntary cleanup program. The investigation results support the conclusion that the observed groundwater contamination is most likely related to an off-site upgradient source. Therefore, Wilsonart requests that the NYS DEC issue a release or "covenant to not sue" determination.

- Based on Earth Tech's review, should the NYS DEC, NYS DOH, and/or RC DOH want to investigate potential source locations for the observed contaminants at the Site, the targeted search area should include vacant lands and existing and former commercial and/or industrial sites and properties to the north, northeast, and east of the former Wilsonart Site. Given the observed groundwater flow patterns, the following upgradient, off-site parcels are located in areas that may serve as a potential source(s) for observed contaminants in the upper bedrock hydrogeologic unit at the Site and surrounding area. They are:

    1. 200 North Route 303 (former Materials Research Corporation site/SONY, 0.25 mile east and upgradient/crossgradient of Site);
    2. 225 North Route 303 (Interelectronics Corporation, 0.35 mile northeast and upgradient of Wilsonart Site);
    3. 75, 77, and 215 Brenner Drive (Halsey Drug / PAR Pharmaceutical Corp., ~ 0.1 mile north and northeast, and upgradient of, Wilsonart Site)
    4. 110 Brenner Drive;
    5. 200 Brenner Drive (Well Bread Loaf, Inc., 0.2 mile northeast and upgradient of Wilsonart Site);
    6. 250-252 Brenner Drive (Hitachi Seiki, USA, Inc., which is 0.2 mile east and upgradient/crossgradient of Site);

7. 100 Wells Avenue (Warde Electric Contracting, Inc., ~0.2 mile mile northeast and upgradient of Wilsonart Site);
8. 90 / 120 Wells Avenue (Lester Associates, Inc. (0.23 mile south-southeast and upgradient/crossgradient of Site);
9. 125 Wells Avenue;
10. 150 Wells Avenue (ANKA Tool & Die);
11. 151 Wells Avenue (Wizard Comics);
12. former Safety Kleen Corp. Site (0.3 mile west-southwest of Site); and
13. a small dump area identified in woods of 215 Brenner Drive parcel just north of Brenner Drive and east of 77 Brenner Drive Parcel).

Monitoring wells should be installed in these suspect source areas to evaluate overburden and upper bedrock groundwater flow directions and off-site groundwater quality to provide more definitive data on the possible source of Freons, TCE, and other VOCs at the Site in private water wells to the south and southeast of the Site;

- A synoptic round of groundwater elevation measurements and groundwater samples should be collected from both the overburden and upper bedrock hydrogeologic units at upgradient, off-site and on site locations in the study area. These groundwater (overburden and upper bedrock) samples should be collected from wells installed to the north, northeast, and east of the Site and should be analyzed for Freons, volatile organics, and tentatively identified compounds to determine the source of Freons and VOCs observed in the bedrock hydrogeologic unit at the Site and surrounding area; and

- Measures should be implemented to prevent future installation of water supply wells at the Site. This may include institutional controls such as deed restrictions that groundwater should not be used for potable or non-potable purposes at the Site. In addition, Wilsonart mandates that the current occupant adhere to "Good Construction Practices" should be practiced on-site to minimize accidental exposure to bedrock groundwater-related contaminants.

9.0 REFERENCES

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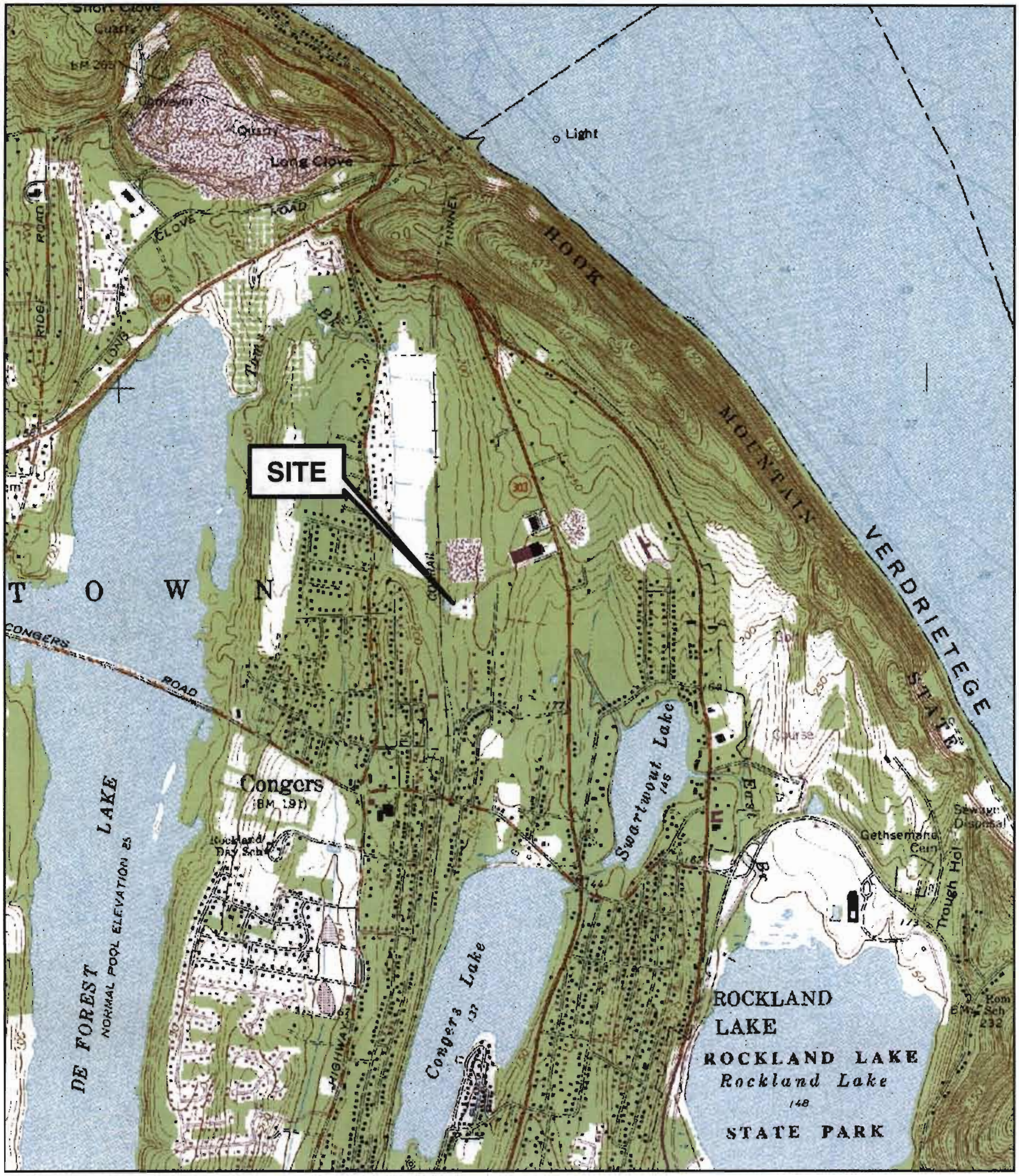

N

0 2,000

Scale in Feet

Source:
NYSDOT 7.5 min. Quadrangle; Haverstraw, NY.

Figure 1

Site Location Map

WILSONART INTERNATIONAL
Congers, New York

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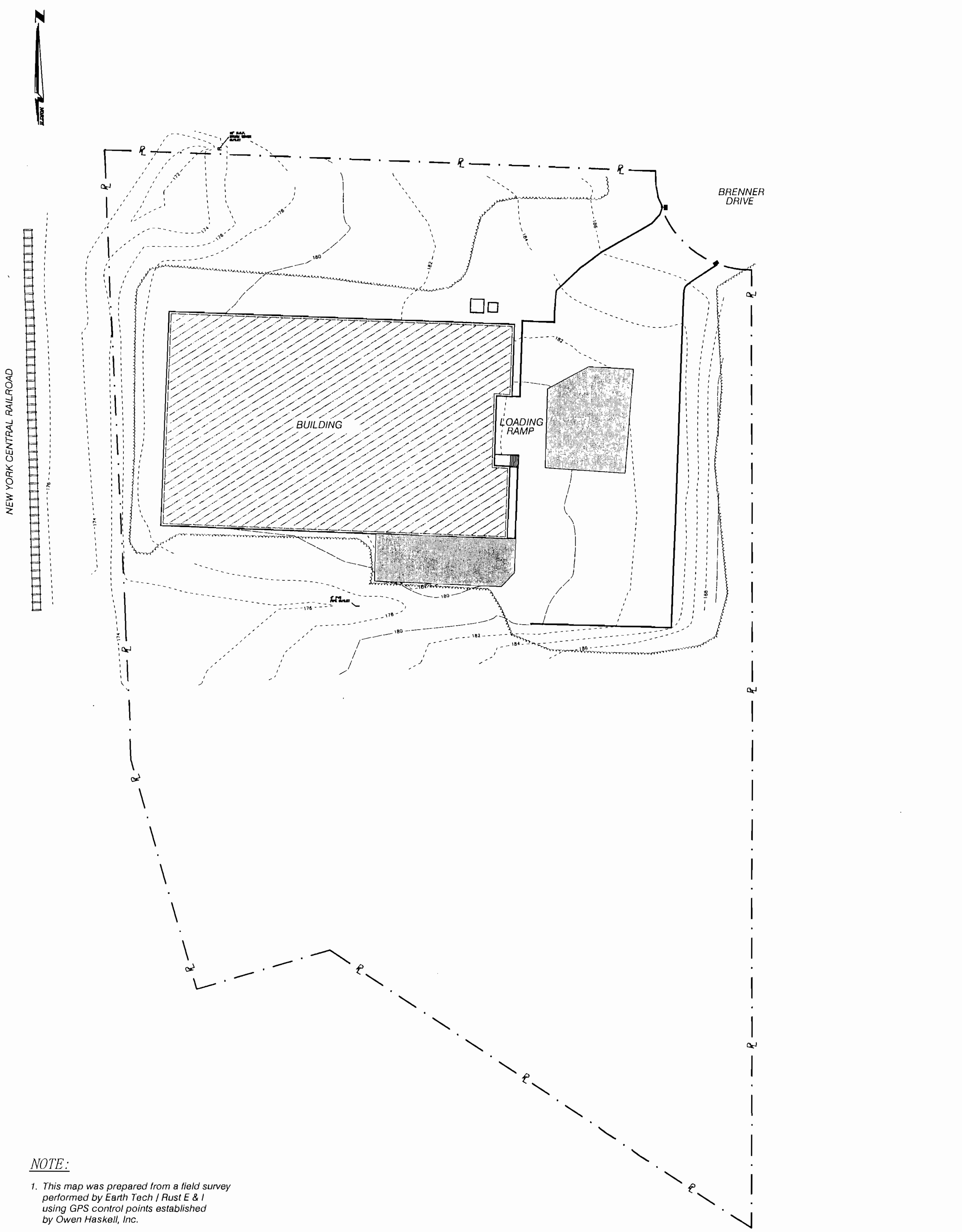

NOTE:

1. This map was prepared from a field survey performed by Earth Tech / Rust E & I using GPS control points established by Owen Haskell, Inc.
2. The horizontal positions are reported in feet; NAD 1983 State Plane of New York East.
3. The elevations are reported in feet; NGVD 1929 vertical datum.
4. Existing ground surface contour interval: 2 feet.
5. Property boundary shown is approximate. Its use is intended for engineering purposes only.

0 30 60 120

SCALE IN FEET

LEGEND

—— ℞ —— APPROXIMATE PROPERTY BOUNDARY

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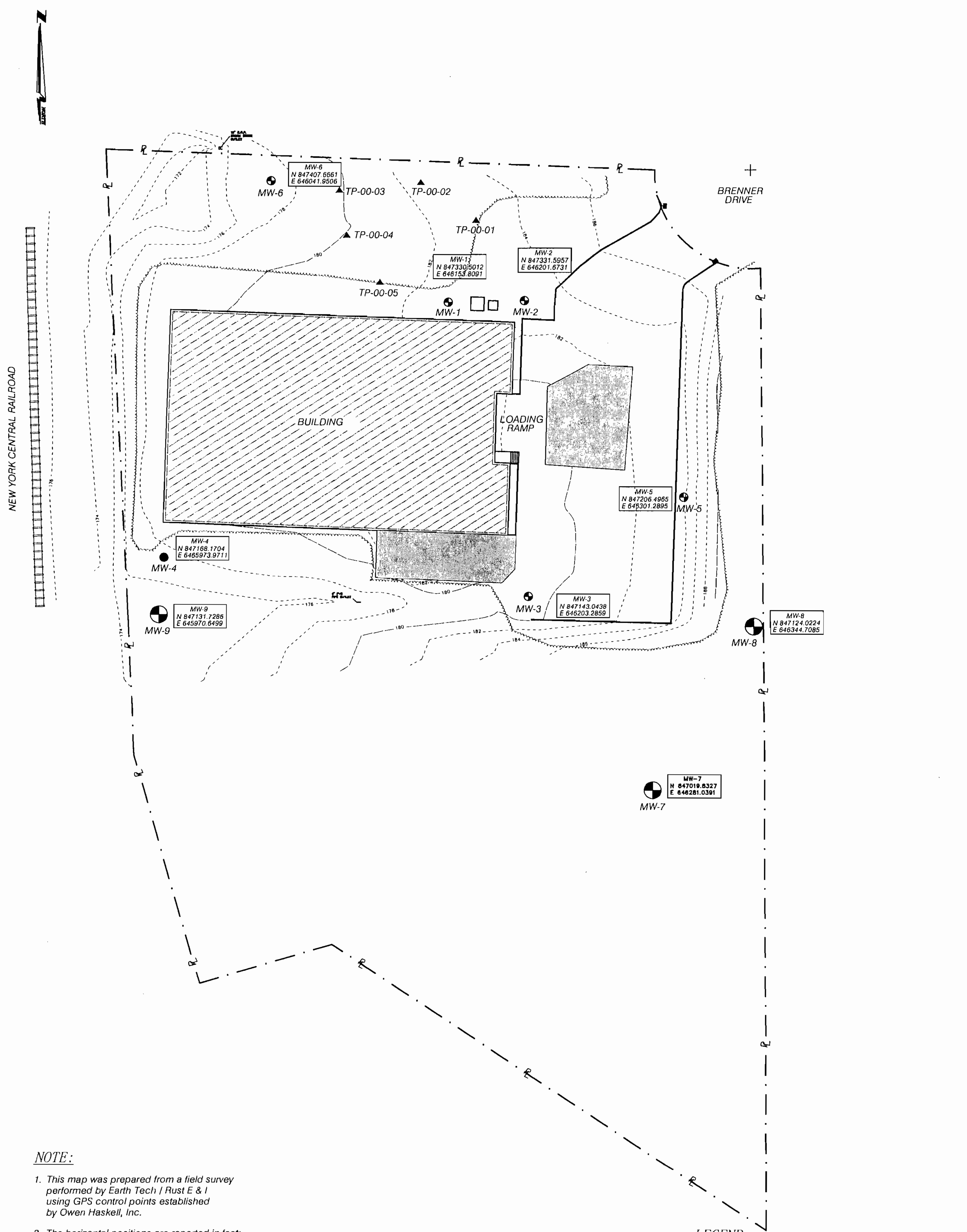
CONGERS, NEW YORK

July 2001 43015

FIGURE 2

SITE MAP

L:\WORK\43015\CADD\Figure-3.dwg PLOT DATE: July 2001



NOTE:

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3. The elevations are reported in feet; NGVD 1929 vertical datum.
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5. Property boundary shown is approximate. Its use is intended for engineering purposes only.

0 30 60 120

SCALE IN FEET

LEGEND

—℄—	APPROXIMATE PROPERTY BOUNDARY
MW-4	EXISTING OVERBURDEN MONITORING WELL LOCATION (1998)
MW-1	EXISTING BEDROCK MONITORING WELL LOCATION (1997 AND 1998)
MW-7	BEDROCK MONITORING WELL LOCATION (2000)
TP-00-03	TEST PIT LOCATION (2000)

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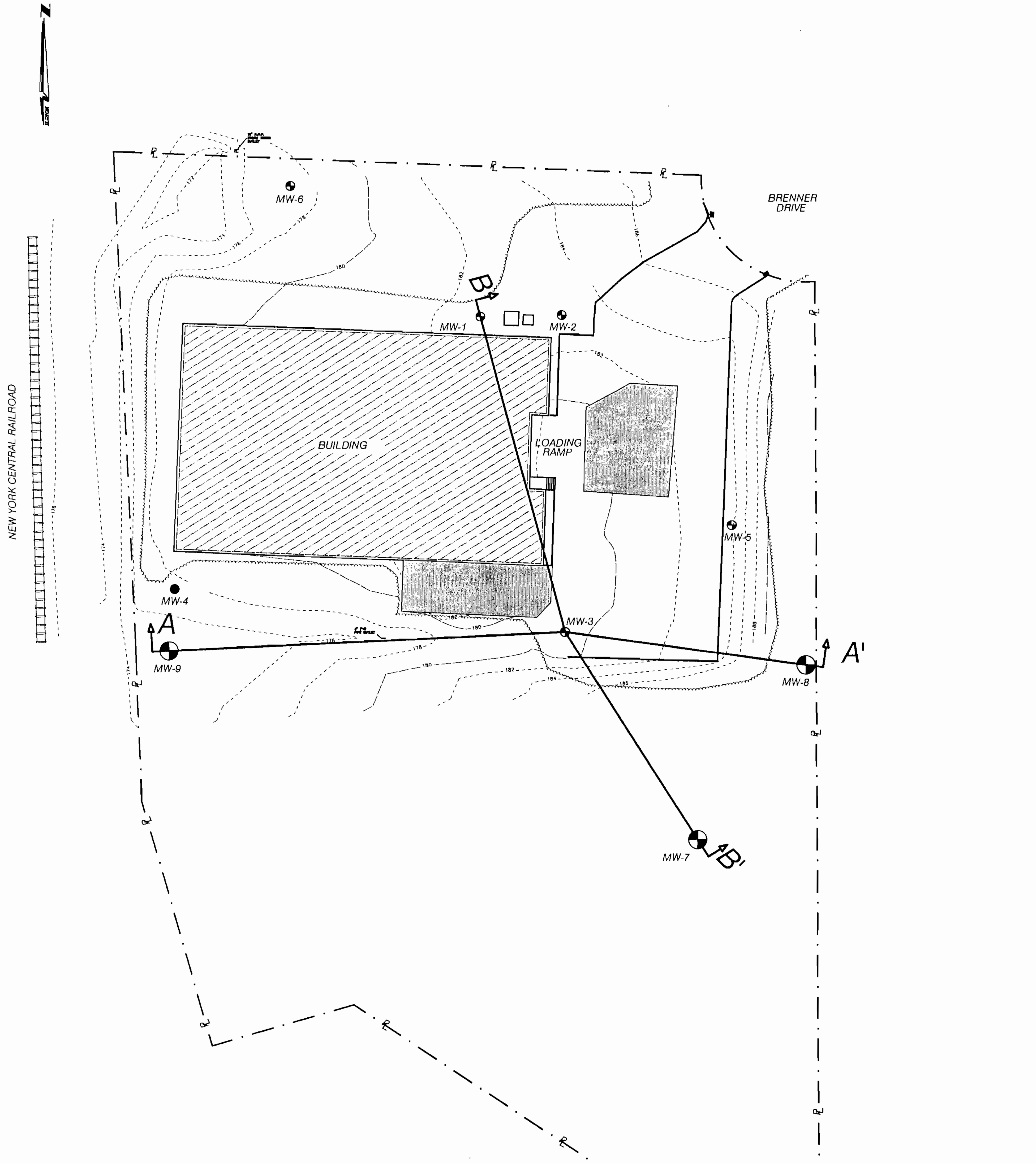
FIGURE 3
SITE MAP
WITH ENVIRONMENTAL MONITORING POINT LOCATIONS



NOTE:

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2. The horizontal positions are reported in feet; NAD 1983 State Plane of New York East.
3. The elevations are reported in feet; NGVD 1929 vertical datum.
4. Existing ground surface contour interval: 2 feet.
5. Property boundary shown is approximate. Its use is intended for engineering purposes only.

0 30 60 120

SCALE IN FEET

LEGEND

ℙ	APPROXIMATE PROPERTY BOUNDARY
MW-4	EXISTING OVERBURDEN MONITORING WELL LOCATION (1998)
MW-1	EXISTING BEDROCK MONITORING WELL LOCATION (1997 AND 1998)
MW-7	BEDROCK MONITORING WELL LOCATION (2000)

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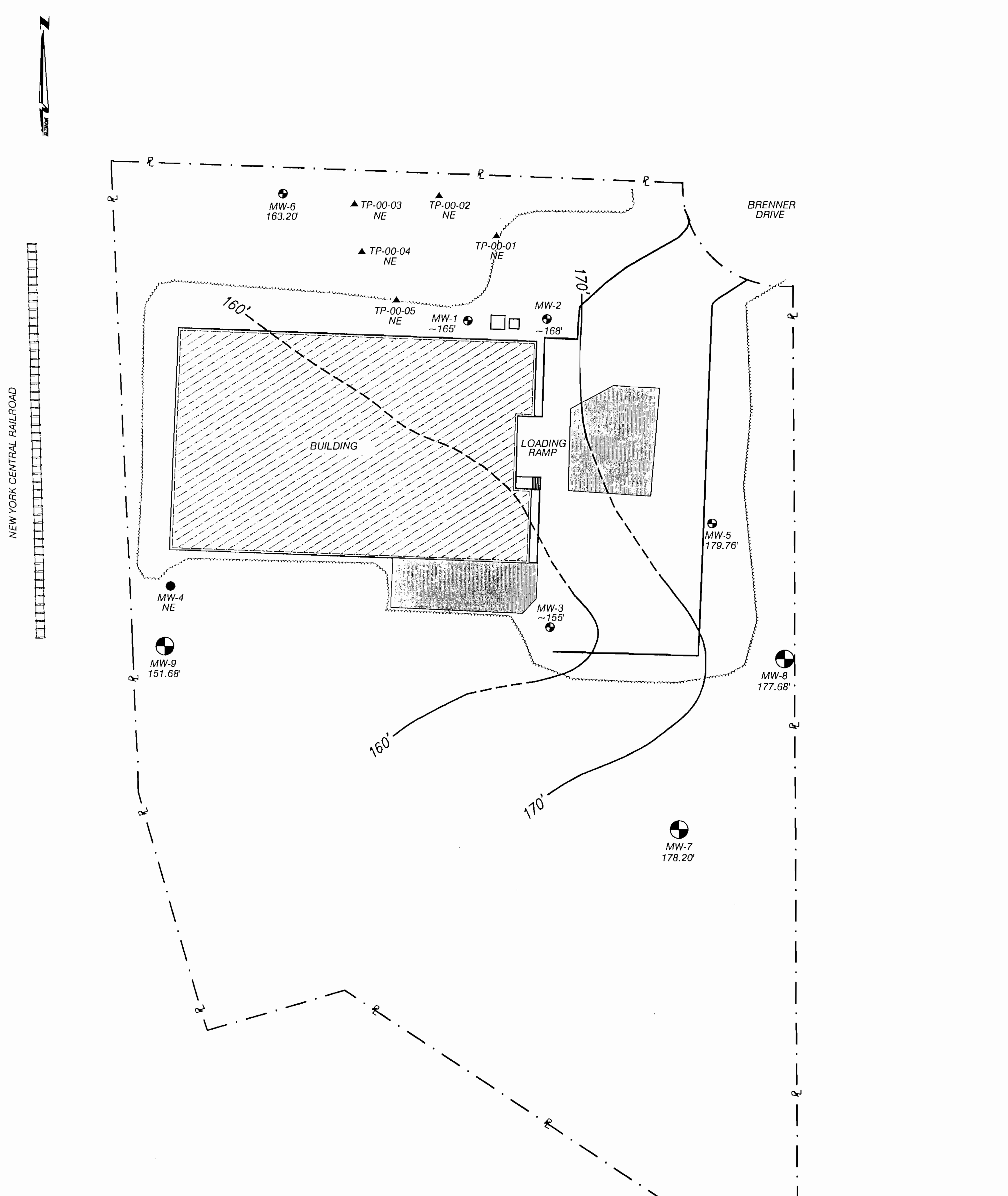
July 2001 43015

FIGURE 4

SITE MAP

WITH LOCATION OF GEOLOGIC CROSS SECTIONS

L:\WORK\43015\CADD\Figure-5.dwg PLOT DATE: July 2001



LEGEND

- ℄ — APPROXIMATE PROPERTY BOUNDARY
- MW-4 NE — EXISTING OVERBURDEN MONITORING WELL LOCATION (1998), WITH CORRESPONDING BEDROCK SURFACE ELEVATION
- MW-1 ~165' — EXISTING BEDROCK MONITORING WELL LOCATION (1997 AND 1998), WITH CORRESPONDING BEDROCK SURFACE ELEVATION
- MW-7 178.20' — BEDROCK MONITORING WELL LOCATION (2000), WITH CORRESPONDING BEDROCK SURFACE ELEVATION
- TP-00-03 NE — TEST PIT LOCATION (2000)
- NE — NOT ENCOUNTERED
- ~ — APPROXIMATED

NOTE:

1. This map was prepared from a field survey performed by Earth Tech / Rust E & I using GPS control points established by Owen Haskell, Inc.
2. The horizontal positions are reported in feet; NAD 1983 State Plane of New York East.
3. The elevations are reported in feet; NGVD 1929 vertical datum.
4. Existing ground surface contour interval: 2 feet.
5. Property boundary shown is approximate. Its use is intended for engineering purposes only.

0 30 60 120

SCALE IN FEET

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July 2001 43015

FIGURE 5

BEDROCK SURFACE ELEVATION CONTOUR MAP

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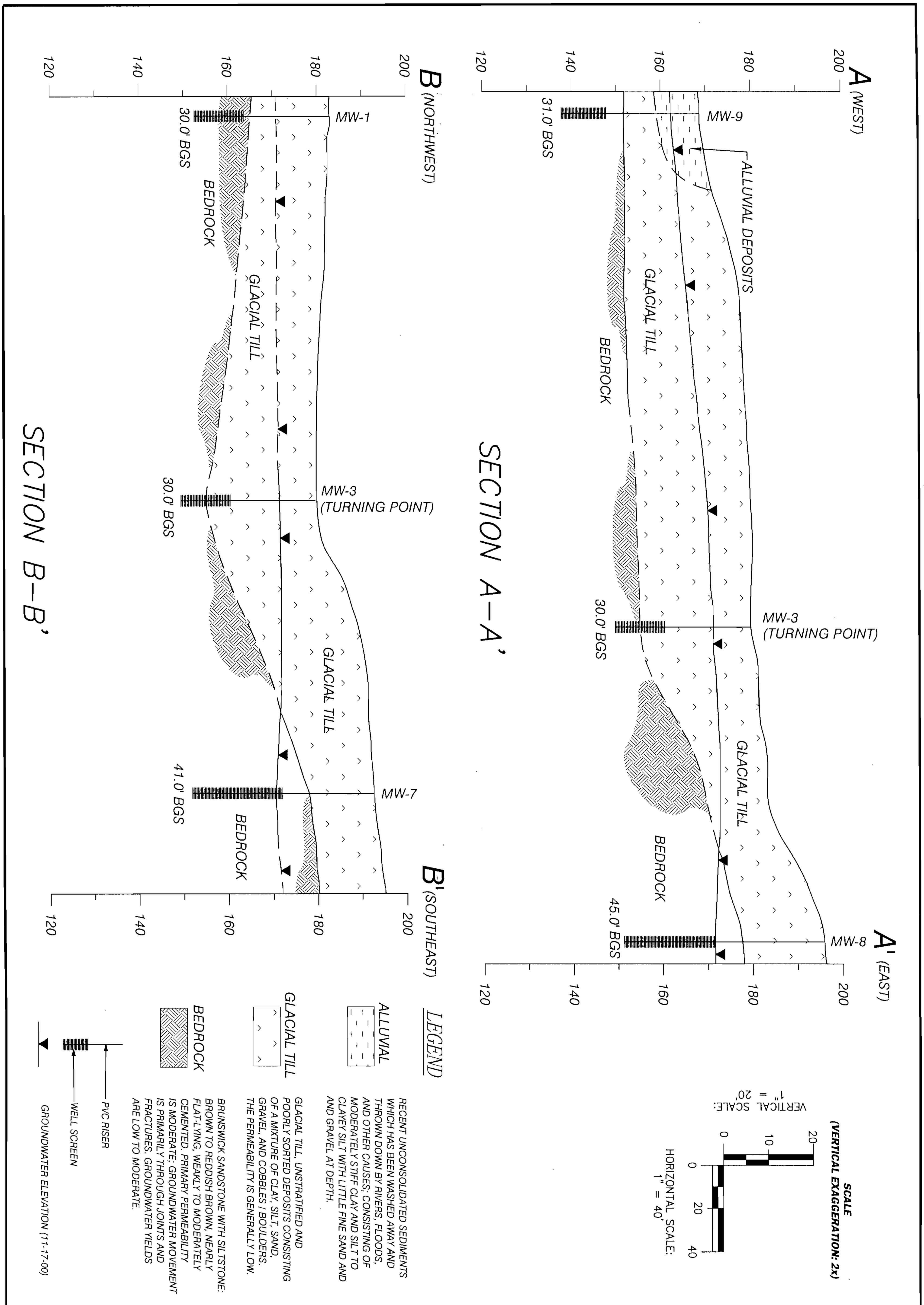

EARTH TECH A tyco INTERNATIONAL LTD. COMPANY	WILSONART INTERNATIONAL CONGERS, NEW YORK July 2001 43015	FIGURE 6 GEOLOGIC CROSS SECTIONS (A–A' and B–B')

L:\WROK\43015\CADD\Figure-7.dwg PLOT DATE: 12/02

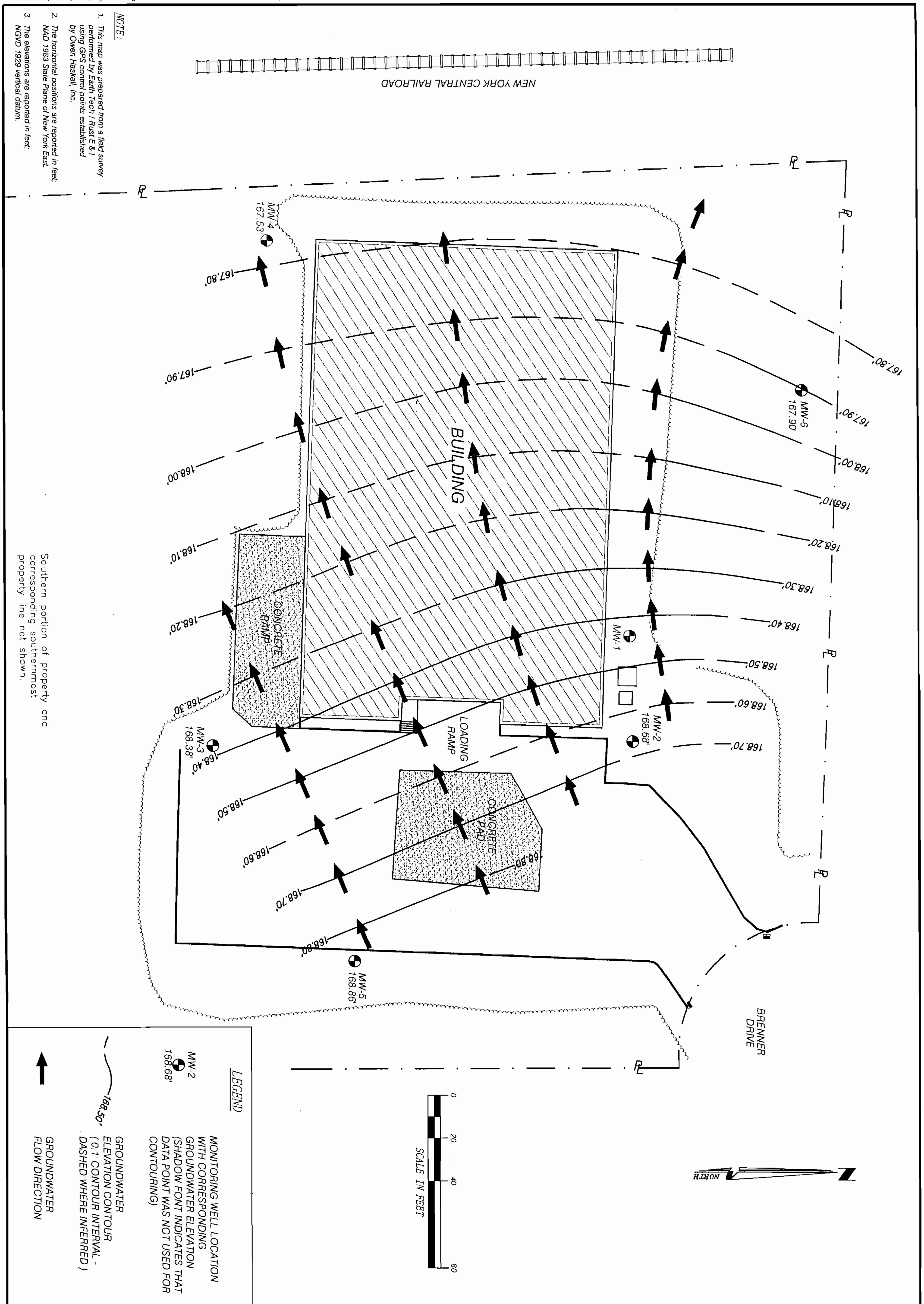

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FIGURE 7

GROUNDWATER CONTOUR MAP

(OCTOBER 21, 1998)

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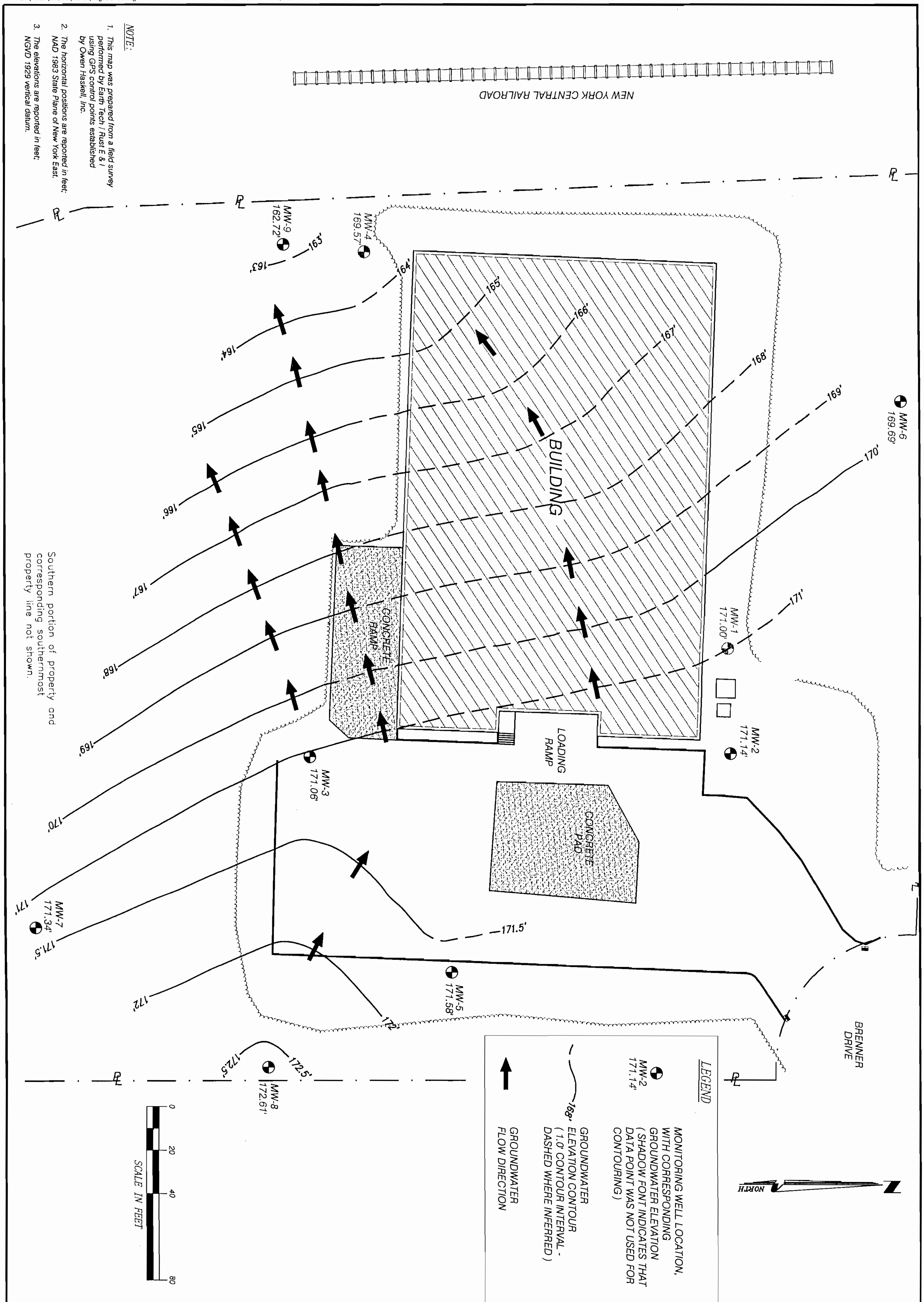

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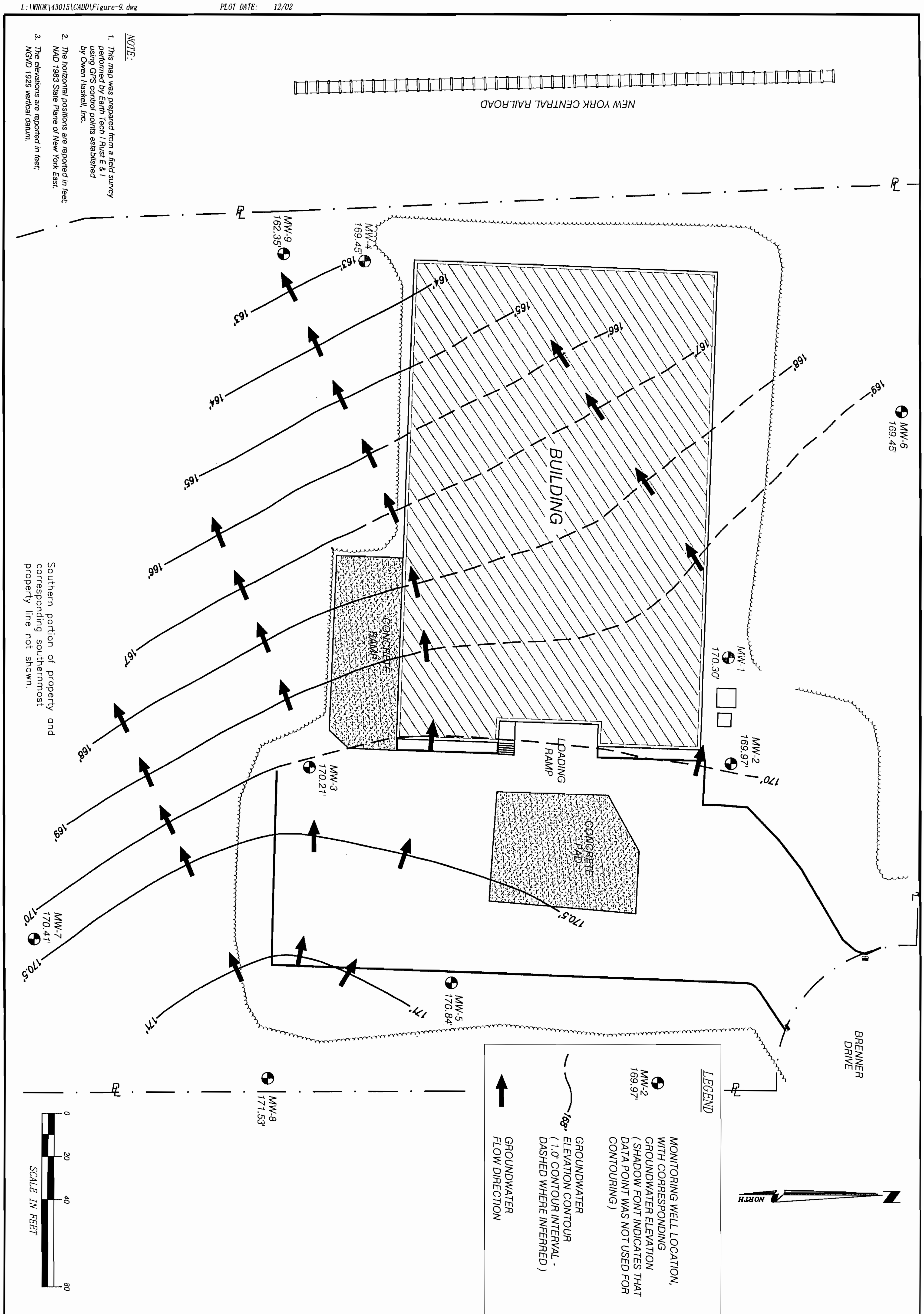
FIGURE 8
GROUNDWATER CONTOUR MAP
(OCTOBER 16, 2000)



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December 2002 43015

FIGURE 9
GROUNDWATER CONTOUR MAP
(NOVEMBER 17, 2000)

L:\WROK\43015\CADD\Figure-10.dwg PLOT DATE: 12/02

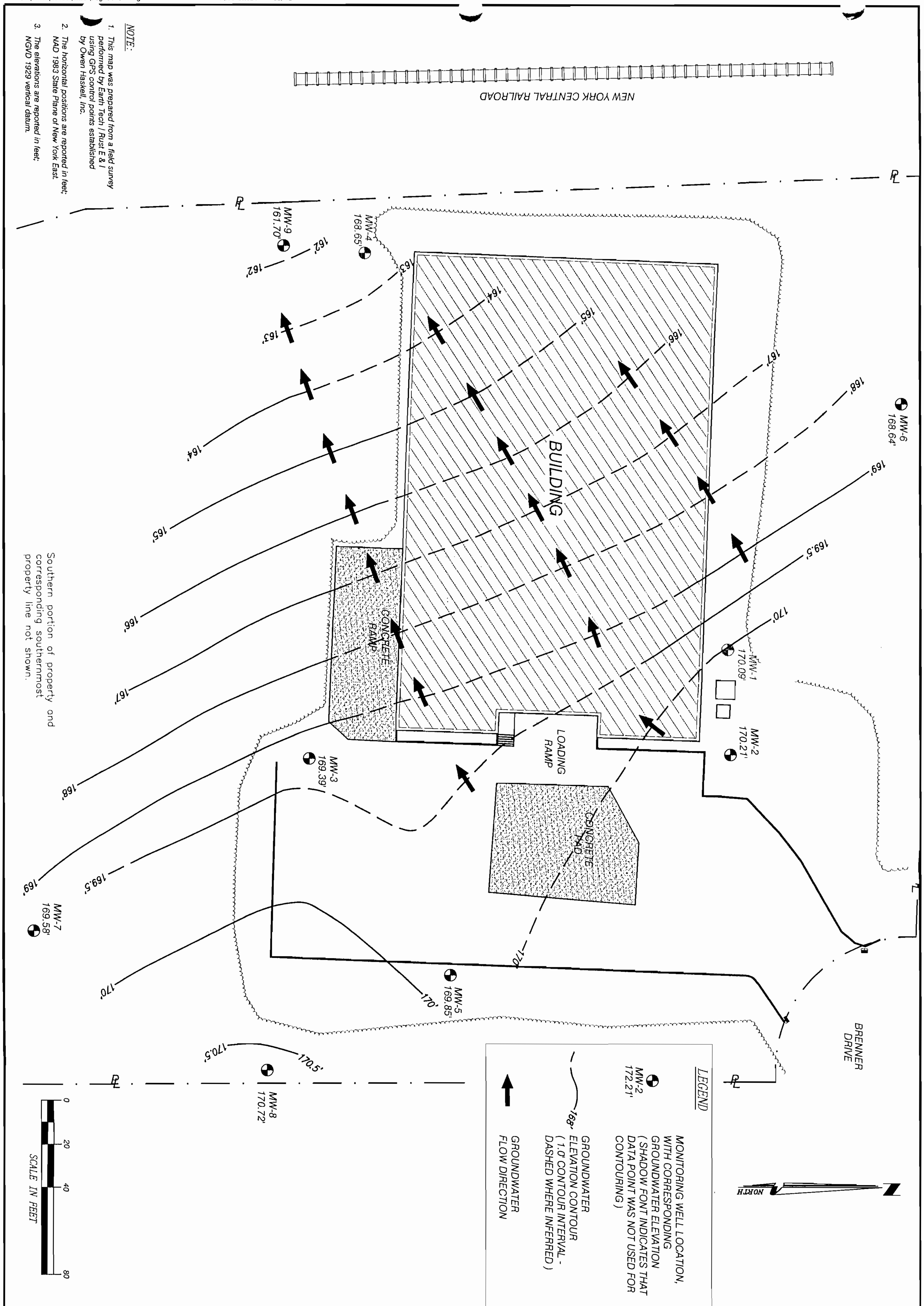

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FIGURE 10
GROUNDWATER CONTOUR MAP
(DECEMBER 7, 2000)

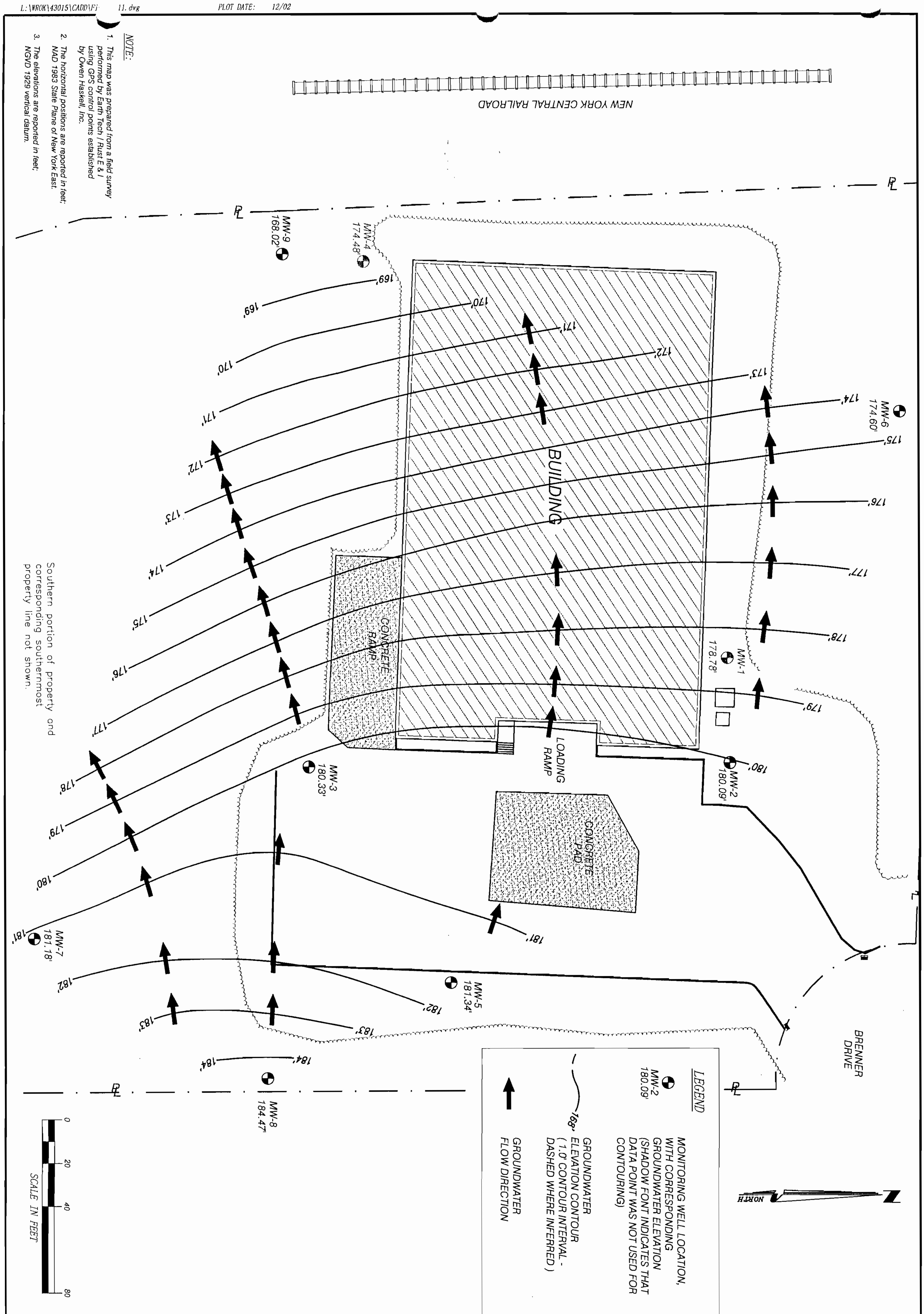

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FIGURE 11
GROUNDWATER CONTOUR MAP
(MARCH 30, 2001)

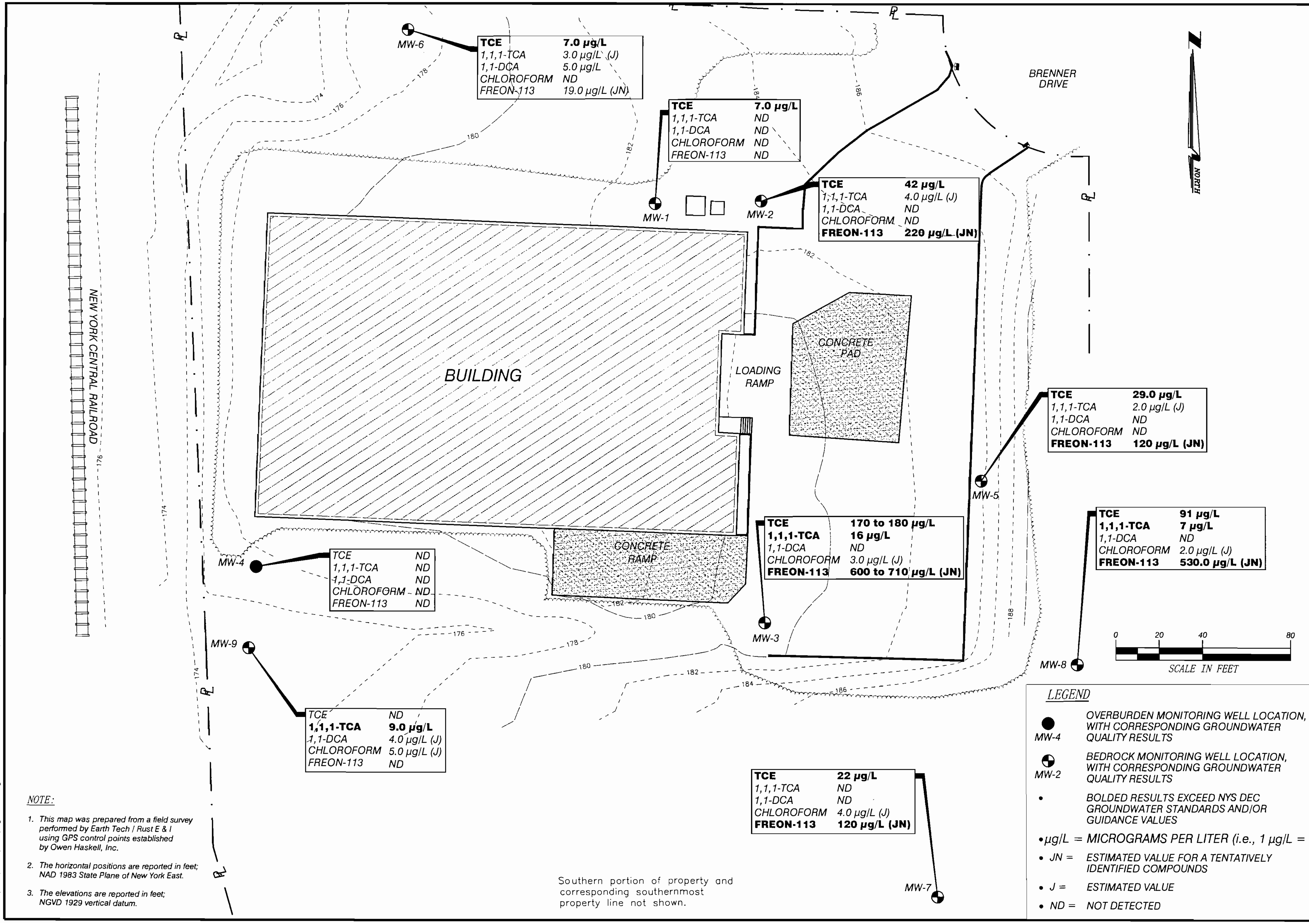

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FIGURE 12
SUMMARY OF GROUNDWATER QUALITY RESULTS (NOVEMBER 17, 2000)

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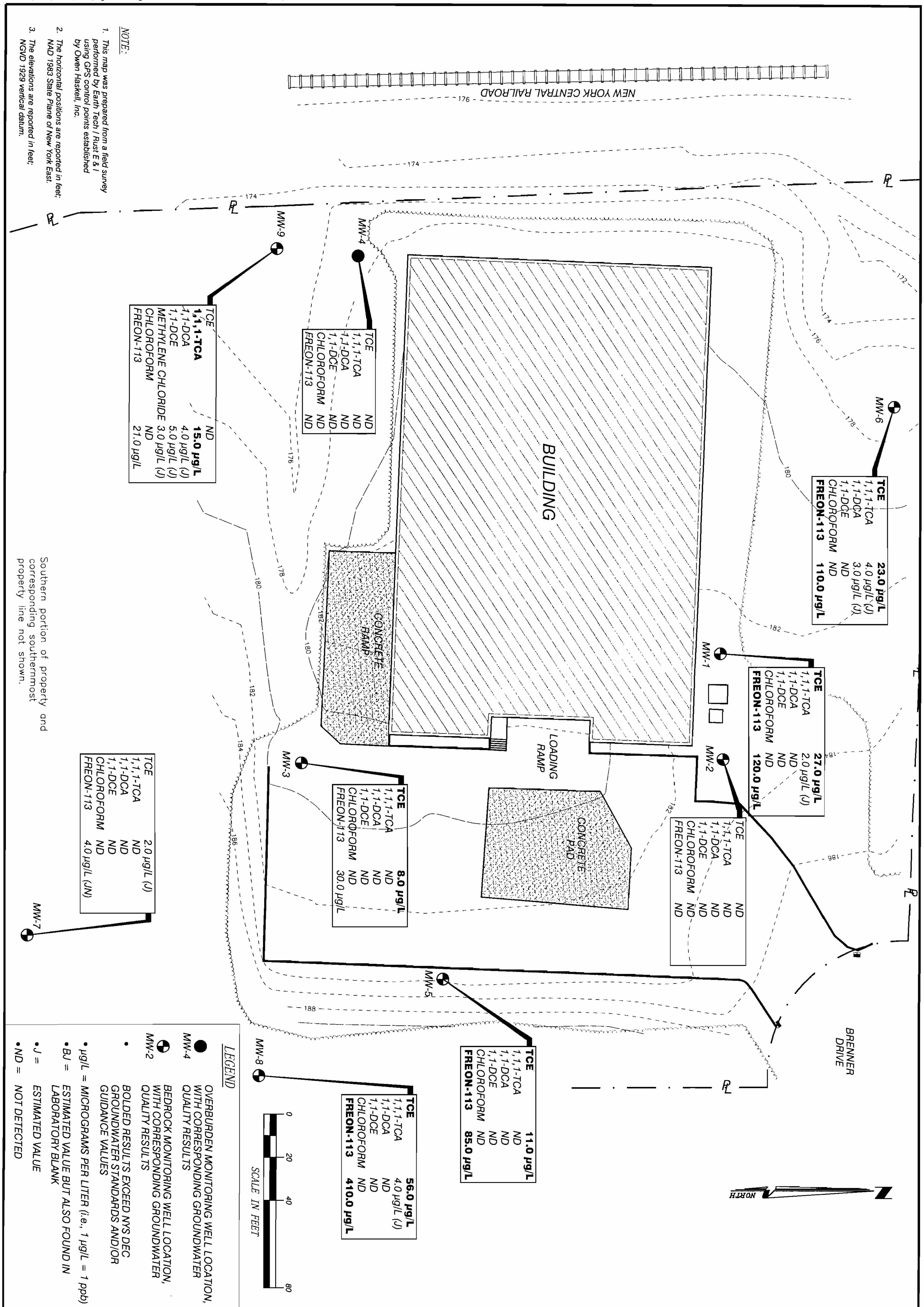

NOTE:

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2. The horizontal positions are reported in feet; NAD 1983 State Plane of New York East.
3. The elevations are reported in feet; NGVD 1929 vertical datum.

LEGEND

- MW-4 ● OVERBURDEN MONITORING WELL LOCATION, WITH CORRESPONDING GROUNDWATER QUALITY RESULTS
- MW-2 BEDROCK MONITORING WELL LOCATION, WITH CORRESPONDING GROUNDWATER QUALITY RESULTS
- BOLDED RESULTS EXCEED NYS DEC GROUNDWATER STANDARDS AND/OR GUIDANCE VALUES
- µg/L = MICROGRAMS PER LITER (i.e., 1 µg/L = 1 ppb)
- BJ = ESTIMATED VALUE BUT ALSO FOUND IN LABORATORY BLANK
- J = ESTIMATED VALUE
- ND = NOT DETECTED

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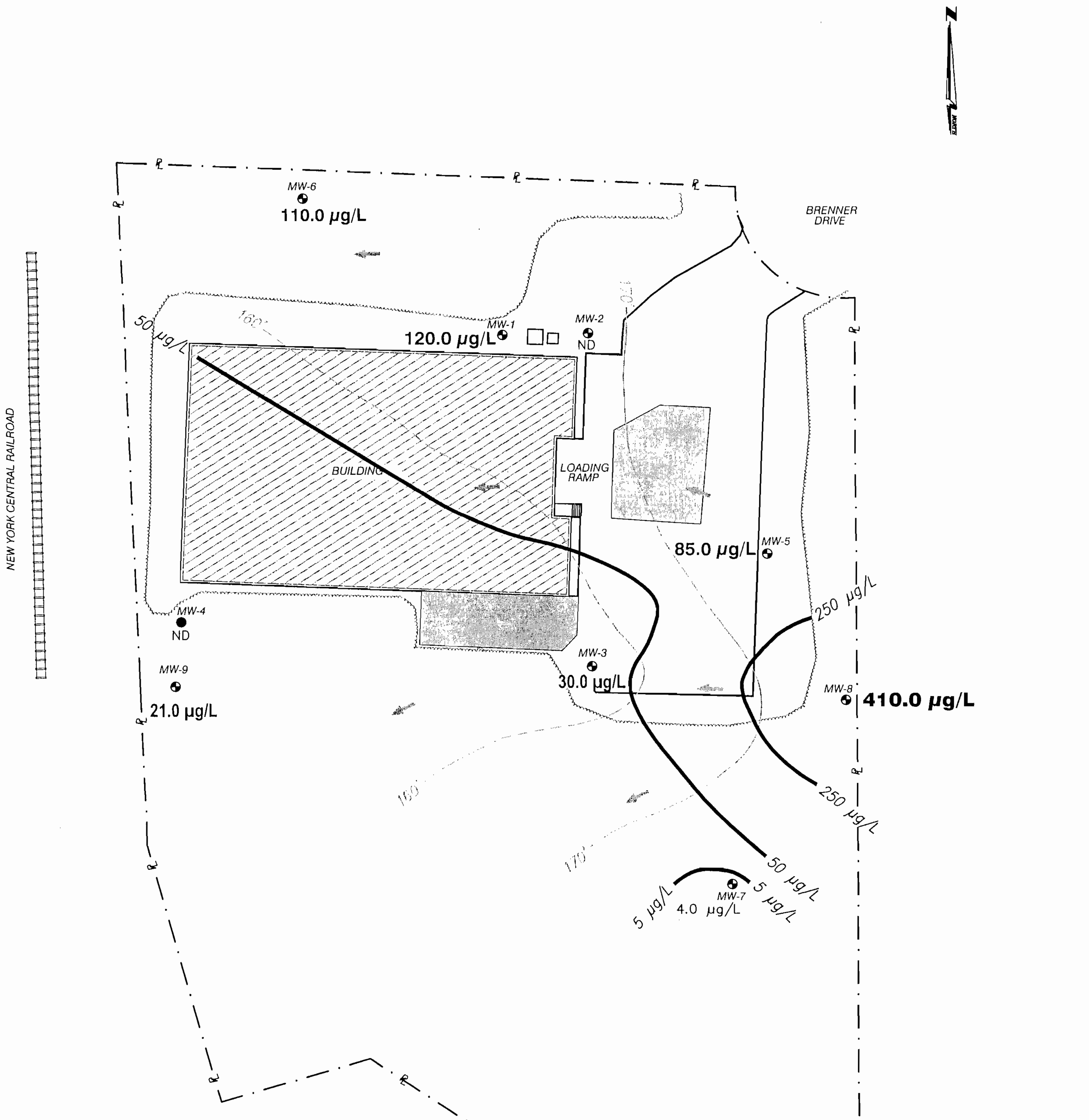
FIGURE 13
SUMMARY OF GROUNDWATER QUALITY RESULTS (MARCH 31, 2001)



LEGEND

MW-7 4.0 µg/L — BEDROCK MONITORING WELL LOCATION, WITH CORRESPONDING FREON-113 CONCENTRATION (March 31, 2001)

410.0 µg/L — BOLDED RESULTS EXCEED NYS DEC GROUNDWATER STANDARD AND/OR NYSDOH MAXIMUM CONTAMINANT LEVEL (5 µg/L)

5 µg/L — FREON-113 CONCENTRATION CONTOUR (Contour Intervals: 5 µg/L, 50 µg/L, and 250 µg/L)

µg/L = MICROGRAMS PER LITER (i.e., 1 µg/L = 1 ppb)

ND = NOT DETECTED

MW-4 ND — OVERBURDEN MONITORING WELL LOCATION, WITH CORRESPONDING FREON-113 CONCENTRATION (March 31, 2001)

170' — BEDROCK SURFACE ELEVATION CONTOUR (See Figure 5)

GROUNDWATER FLOW DIRECTION (See Figure 11)

NOTE:

1. This map was prepared from a field survey performed by Earth Tech / Rust E & I using GPS control points established by Owen Haskell, Inc.
2. The horizontal positions are reported in feet; NAD 1983 State Plane of New York East.
3. The elevations are reported in feet; NGVD 1929 vertical datum.
4. Property boundary shown is approximate. Its use is intended for engineering purposes only.

EARTH TECH A tyco INTERNATIONAL LTD. COMPANY	WILSONART INTERNATIONAL CONGERS, NEW YORK December 2002 43015	FIGURE 14 SUMMARY OF FREON-113 CONCENTRATIONS IN BEDROCK GROUNDWATER (March 31, 2001 Sampling Event)

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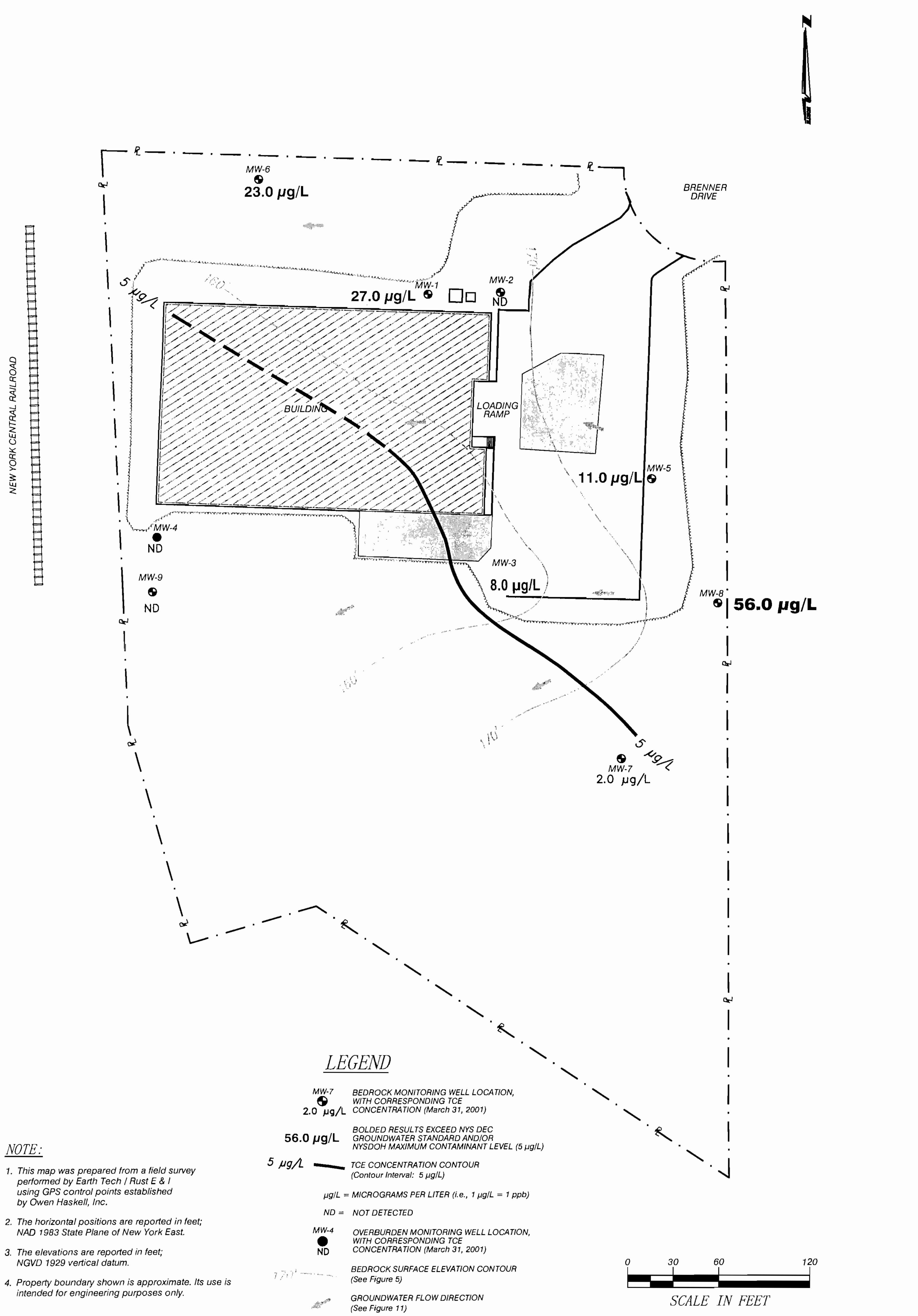

NOTE:

1. This map was prepared from a field survey performed by Earth Tech / Rust E & I using GPS control points established by Owen Haskell, Inc.
2. The horizontal positions are reported in feet; NAD 1983 State Plane of New York East.
3. The elevations are reported in feet; NGVD 1929 vertical datum.
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FIGURE 15
SUMMARY OF TCE CONCENTRATIONS IN BEDROCK GROUNDWATER
(March 31, 2001 Sampling Event)

Table 1

Soil Sample Headspace Screening Results and Analytical Laboratory Submittal Summary
Former Wilsonart International, Inc. Distribution Facility
Congers, Rockland County, New York

Depth (feet below grade)	VOC Headspace Screening Results (ppm)							
	Test Pits					Monitoring Wells		
	00-01	00-02	00-03	00-04	00-05	MW-7	MW-8	MW-9
0-2	3.7	3.0	7.0	3.2	4.5	5.8	4.2	9.3
2-4	**3.7**	3.2	**6.3/2.3/**4.9*	4.1	4.2	6.2	**4.7**	6.4
4-6	3.5/2.6	3.2	5.3/3.4	5.3/1.7 after 5.5'	**5.8**	8.6	4.2	5.8
6-8		3.2	4.2/4.9	**5.5** / 2 @ 7.5'	5.4 / 1.7 after 7'	**9.5**	4.0	7.2
8-10						**9.7**	4.1	7.7
10-12						---	4.1	7.4
12-14						**9.3**	**4.5**	6.7
14-16						10.8	1.3	**9.6**
16-18								**8.1**

Notes:

* = Headspace reading of leachfield stone = 4.9 ppm

Bold Soil sample from this interval was submitted to Adirondack Environmental Services for subsequent laboratory analysis (SW-846 Methods 8260).

Table 2

Summary of Geologic Information
Former Wilsonart International, Inc. Distribution Facility
Congers, Rockland County, New York

Well I.D.	Ground Surface Elevation (feet)	Depth to Base of Alluvium (feet) / [Elevation]	Depth to Base of Glacial Till (feet) / [Elevation]	Thickness of Glacial Till (feet)	Bedrock Surface Elevation (feet)
MW-1	182.55	NE	~18.0 / [~164.55]	~ 18.0	~ 165
MW-2	183.18	NE	~15.0 / [~168.18]	~ 15.0	~ 168
MW-3	179.43	NE	~24.5 / [~ 154.93]	~ 24.5	~ 155
MW-4	177.6	NE	21.70 / [155.90]	21.7	155.90
MW-5	183.96	NE	4.2 / [179.76]	4.2	179.76
MW-6	177.30	NE	14.10 / [163.20]	14.1	163.20
MW-7	192.70	NE	14.5 / [178.20]	14.5	178.20
MW-8	195.68	NE	18.0 / [177.68]	18.0	177.68
MW-9	168.68	9.67 / [159.01]	17.0 / [151.68]	7.33	151.68

Notes:

NE = Geologic unit was not encountered at this boring location.

Wells MW-1, MW-2, and MW-3 were drilled by EP&S in August 1998. Due to the poor quality of the logs, the geologic contacts are inferred.

Wells MW-4, MW-5, and MW-6 were drilled by Parratt Wolff, Inc. of East Syracuse, N.Y. (Rust, 10/1998).

Wells MW-7, MW-8, and MW-9 were drilled by Parratt Wolff, Inc. (Earth Tech, 10/2000).

Table 3

Summary of Well Construction with Groundwater Elevation Data
Former Wilsonart International, Inc. Distribution Facility
Congers, Rockland County, New York

Well I.D.	Measuring Point Elevation (feet)	Screened Interval (feet BGS)	Screened Elevation (feet)	Depth to Water (feet BMP)	(10/16/00) GW Elev. (feet)	Depth to Water (feet BMP)	(11/17/00) GW Elev. (feet)	Depth to Water (feet BMP)	(12/7/00) GW Elev. (feet)	Depth to Water (feet BMP)	(3/23/01) GW Elev. (feet)	Depth to Water (feet BMP)	(3/30/01) GW Elev. (feet)
MW-1	182.20	19.0 - 30.0	163.55 - 152.55	12.11	170.09	11.90	170.30	11.20	171.00	3.31	178.89	3.42	178.78
MW-2	182.54	19.0 - 30.0	164.18 - 153.18	12.33	170.21	12.57	169.97	11.40	171.14	2.42	180.12	2.45	180.09
MW-3	179.16	19.0 - 30.0	160.43 - 149.43	9.77	169.39	8.95	170.21	8.10	171.06	0.27	~179.43*	-1.17	~180.33*
MW-4	**179.35**	**8.12 - 18.12**	**171.56 - 161.56**	**10.70**	**168.65**	**9.90**	**169.45**	**9.78**	**169.57**	**4.91**	**174.44**	**4.87**	**174.48**
MW-5	183.74	19.80 - 29.80	164.16 - 154.16	13.89	169.85	12.90	170.84	12.16	171.58	2.72	181.02	2.40	181.34
MW-6	179.45	19.95 - 29.95	159.73 - 149.73	10.81	168.64	10.00	169.45	9.76	169.69	4.83	174.62	4.85	174.60
MW-7	194.76	20.90 - 40.90	171.80 - 151.80	25.18	169.58	24.35	170.41	23.42	171.34	13.68	181.08	13.58	181.18
MW-8	197.58	24.33 - 44.33	171.35 - 151.35	26.86	170.72	26.05	171.53	24.97	172.61	14.05	183.53	13.11	184.47
MW-9	170.30	20.93 - 30.93	147.75 - 137.75	8.60	161.70	7.95	162.35	7.58	162.72	2.35	167.95	2.28	168.02

Notes:

A benchmark elevation of 183.41 was established by Earth Tech on October 21, 1998 for the finish floor (paint mark on concrete steps). Monitoring wells MW-7, MW-8 and MW-9 were surveyed on December 7, 2000.

BGS = Below Ground Surface

BMP = Below Measuring Point (top of inner PVC)

MW-4 is an overburden monitoring well and should not be used to correlate groundwater elevations.

* Well MW-3 was observed to be flowing gently over curb box.

TABLE 4

SUMMARY OF IN-SITU HYDRAULIC CONDUCTIVITY TEST RESULTS
FORMER WILSONART INTERNATIONAL, INC. DISTRIBUTION FACILITY
CONGERS, NEW YORK

	Hvorslev Method		Bouwer & Rice Method	
Well Number	K (cm/sec)	K (ft/day)	K (cm/sec)	K (ft/day)
Shallow Overburden Results				
MW-4	9.51E-05	0.27	5.83E-05	0.17
Upper Bedrock Results				
MW-6	1.54E-03	4.37	1.12E-03	3.18
MW-7	2.17E-03	6.15	1.18E-03	3.35
MW-8	1.06E-04	0.30	7.54E-05	0.21
MW-9	5.84E-03	16.56	5.25E-03	14.88
Maximum Value	5.84E-03	16.56	5.25E-03	14.88
Minimum Value	1.06E-04	0.30	7.54E-05	0.21
Average	**2.41E-03**	**6.84**	**1.91E-03**	**5.40**
Geometric Mean	**1.20E-03**	**3.40**	**8.50E-04**	**2.41**

Notes:
K = Hydraulic conductivity (by bail test)

Table 5

Soil Analytical Results Summary - October 2000
Former Wilsonart, International, Inc. Distribution Facility
Congers, Rockland County, New York

ANALYTE	TP-00-01 (3.5')	TP-00-03 (3.5')	TP-00-04 (6-8')	TP-00-05 (4-6')	MW-7 (6-10')	NYSDEC RSCO (µg/kg)
Volatile Organic Compounds						
Methylene Chloride	11 UJ	11 UJ	15 UJ	30 UJ	31 UJ	100
Chloroform	11 U	11 U	11 U	4 J	5 J	300

Notes:

Listed analytes were potentially detected by analytical laboraotory instrumentation. All other paramters were not detected above the practical quantitation limit (PQL). No VOCs exceeded NYS DEC RSCO values.

1) All results are expressed in µg/kg (ppb).

2) Data has been validated.

3) NYSDEC RSCO = Division Technical and Administrative Guidance Memorandum 4046: Proposed Determination of Soil Cleanup Objectives and Cleanup Levels (1994).

4) J = Estimated value.

5) U = Not detected at or above the instrument detection limit; number before the "U" reflects the instrument detection limit.

6) NA = Not analyzed

--- = Not Available

Table 5 (Continued)

Soil Analytical Results Summary - October 2000
Former Wilsonart, International, Inc. Distribution Facility
Congers, Rockland County, New York

ANALYTE	MW-7 (12-12.5')	MW-8 (2-4')	MW-8 (12-14')	MW-9 (8-10')	MW-9 (14-18')	NYSDEC RSCO (µg/kg)
Volatile Organic Compounds						
Methylene Chloride	28 UJ	3 UJ	17 UJ	29 UJ	25 UJ	100
Chloroform	3 J	1 J	12 U	4 J	3 J	300

Notes:

Listed analytes were potentially detected by analytical laboraotory instrumentation. All other paramters were not detected above the practical quantitation limit (PQL). No VOCs exceeded NYS DEC RSCO values.

1) All results are expressed in µg/kg (ppb).

2) Data has been validated.

3) NYSDEC RSCO = Division Technical and Administrative Guidance Memorandum 4046: Proposed Determination of Soil Cleanup Objectives and Cleanup Levels (1994).

4) J = Estimated value.

5) U = Not detected at or above the instrument detection limit; number before the "U" reflects the instrument detection limit.

6) NA = Not analyzed

--- = Not Available

Table 6

Summary of Groundwater Quality Results (November 17, 2000)
Former Wilsonart International, Inc. Distribution Facility
Congers, Rockland County, New York

Compound	Groundwater Sample I.D.										NYSDEC Groundwater Standard or Guidance Value (µg/l)
	MW-1	**MW-2**	**MW-3**	**FD111700**	**MW-4**	**MW-5**	**MW-6**	**MW-7**	**MW-8**	**MW-9**	
Trichloroethene	**7**	**42**	**170**	**180**	ND	**29**	**7**	**22**	**91**	ND	5
1,1,1-Trichloroethane	ND	4 J	**16**	**16**	ND	2 J	3 J	ND	**7**	**9**	5
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	5	ND	ND	4 J	5
Chloroform	ND	ND	3 J	3 J	ND	ND	ND	4 J	2 J	5 J	5
FREON - 113	ND	**220 JN**	**600 JN**	**710 JN**	ND	**120 JN**	19 JN	**120 JN**	**530 JN**	ND	50

Notes:
Listed compounds are those that have been detected in groundwater.
All reported values are expressed in micrograms per Liter (µg/L).
Groundwater standards are NYS Ambient Water Quality Standards and Guidance Values (G) and Groundwater Effluent Limitations (June 1998).
Bolded values exceed regulatory standards or guidance values.
Practical Quantitation Limit for Trichloroethene, 1,1,1-Trichloroethane, 1,1-Dichloroethane, Chloroform, and FREON 113 is 5 µg/L.
FD111700 = Duplicate groundwater sample collected from monitoring well MW-3.
ND = Not Detected at or above Practical Quantitation Limit.
MW = Monitoring Well
J = The concentration listed is an estimated value.
JN = Indicates an estimated value and indicates presumptive evidence of a compound. The "N" flag is only used for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

Table 7

Summary of Groundwater Quality Results (March 30, 2001)
former Wilsonart International, Inc. Distribution Facility
Congers, Rockland County, New York

Compound	Groundwater Sample I.D.														NYSDEC Groundwater Standard or Guidance Value (µg/l)
	MW-1(2)	MW-2(2)	MW-3(1)	MW-3(2)	MW-3(3)	MW-4(2)	MW-5(2)	MW-6(2)	MW-7(2)	MW-8(1)*	MW-8(2)*	MW-8(3)*	FD033101*	MW-9(2)	
Trichloroethene	**27.0**	ND	**8.0**	**8.0**	**9.0**	ND	**11.0**	**23.0**	2.0 J	**55.0**	**56.0**	**61.0**	**52.0**	ND	5
1,1,1-Trichloroethane	2.0 J	ND	ND	ND	ND	ND	ND	4.0 J	ND	ND	4.0 J	**5.0 J**	ND	**15.0**	5
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	3.0 J	ND	ND	ND	ND	ND	4.0 J	5
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.0 J	5
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.0 J	5
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
FREON - 113	**120.0**	ND	46.0	30.0	46.0	ND	**85.0**	**110.0**	4.0 J	**510.0**	**410.0**	**520.0**	**410.0**	21.0	50

Notes:
Listed compounds are those that have been detected in groundwater.
All reported values are expressed in micrograms per Liter (µg/l).
Groundwater standards are NYS Ambient Water Quality Standards and Guidance Values (G) and Groundwater Effluent Limitations (June 1998).
Bolded values exceed regulatory standards or guidance values.
Practical Quantitation Limit for Trichloroethene, 1,1,1-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Methylene Chloride, Chloroform, and FREON - 113 is 5 µg/l.
FD033101 = Duplicate groundwater sample collected from monitoring well MW-8.
ND = Not Detected at or above Practical Quantitation Limit.
MW = Monitoring Well
J = The concentration listed is an estimated value.
BJ = The concentration listed is an estimated value; compound was also detected in method blank.
* = Report result is from a diluted sample analysis.

Table 8

Temperature Profiling Data (3/23/01)
Former Wilsonart International, Inc. Facility
Congers, New York
WELL: MW-3 (W.L. = +0.27')

feet BMP	Temperature (Celsius)	Conductivity (µmhos)	pH (s.u.)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
1-2	10.6	432	7.10	3.2	7.89
2-3	10.5	431	6.85	3.0	7.38
3-4	10.6	434	6.73	3.3	7.25
4-5	10.5	434	6.66	3.1	7.20
5-6	10.7	434	6.62	3.8	7.17
6-7	10.6	435	6.57	4.8	7.18
7-8	10.6	435	6.55	4.1	7.16
8-9	10.5	435	6.54	5.0	7.17
9-10	10.6	433	6.53	3.7	7.14
10-11	10.5	435	6.52	3.6	7.16
11-12	10.6	435	6.51	3.5	7.16
12-13	10.6	433	6.51	2.8	7.16
13-14	10.6	434	6.50	2.6	7.18
14-15	10.5	434	6.49	2.8	7.17
15-16	10.6	433	6.49	2.6	7.21
16-17	10.6	436	6.49	3.0	7.19
17-18	10.6	436	6.49	3.0	7.19
18-19	10.6	436	6.51	2.8	7.15
19-20	10.7	436	6.51	4.5	7.09
20-21	10.8	437	6.51	5.0	7.04
21-22	11.3	438	6.52	8.3	6.94
22-23	11.5	441	6.53	11.4	6.94
23-24	11.7	444	6.52	14.4	6.92
24-25	11.8	443	6.53	20.5	6.93
25-26	11.8	444	6.53	29.4	6.88
26-27	11.8	444	6.52	33.1	6.85
27-28	11.8	444	6.53	34.7	6.81
28-29	11.9	444	6.53	37.8	6.78
Bottom of Well	12.1	512	6.53	39.2	4.85

Notes:
Highlighted section denotes screened interval of upper bedrock monitoring well.
Average temperature above screened interval is generally 10.6 degrees Celsius while the temperature is markedly warmer in screened interval (typically 11.3 to 11.9). Average specific conductivity values for above screened interval and in screened interval are 434 µmhos and 442 µmhos, respectively. Average pH readings for above screened interval and in screened interval are 6.59 s.u and 6.52 s.u., respectively. Average turbidity readings for above screened interval and in screened interval are 3.37 NTU and 19.9 NTU, respectively. Average dissolved oxygen values for above screened interval and in screened interval are 7.23 mg/L and 6.9 mg/L, respectively.

Table 9

Temperature Profiling Data (3/23/01)
Former Wilsonart International, Inc. Facility
Congers, New York
WELL: MW-5 (W.L. = 2.72')

feet BMP	Temperature (Celsius)	Conductivity (µmhos)	pH (s.u.)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
2-3	7.2	413	7.03	29.2	7.07
3-4	6.7	419	7.02	10.2	7.24
4-5	6.6	459	7.01	6.1	5.36
5-6	6.8	478	7.08	9.4	4.47
6-7	7.1	478	7.08	7.7	4.19
7-8	7.4	479	7.10	4.0	4.08
8-9	7.5	478	7.12	3.4	4.00
9-10	7.7	480	7.11	3.8	3.97
10-11	7.9	479	7.13	7.0	3.91
11-12	8.4	480	7.11	4.2	3.94
12-13	8.6	482	7.12	2.8	3.93
13-14	9.3	478	7.12	3.3	3.85
14-15	9.2	481	7.12	3.5	3.94
15-16	9.7	480	7.13	3.5	3.91
16-17	10.1	482	7.11	2.8	3.95
17-18	10.4	481	7.13	2.8	3.95
18-19	10.7	483	7.12	2.5	3.96
19-20	10.9	483	7.11	2.7	3.99
20-21	11.1	484	7.12	2.6	4.00
21-22	11.5	483	7.11	2.9	3.98
22-23	11.7	482	7.11	2.7	3.96
23-24	12.0	481	7.12	2.3	3.91
24-25	12.2	480	7.12	2.4	3.87
25-26	12.3	481	7.12	2.4	3.88
26-27	12.4	480	7.13	2.4	3.82
27-28	12.4	480	7.13	2.3	3.85
28-29	12.5	480	7.12	2.3	3.84
29-30	12.5	479	7.10	2.4	3.84
Bottom of Well	12.6	479	7.09	332	3.86

Notes:
Highlighted section denotes screened interval of upper bedrock monitoring well.
Average temperature above screened interval is 8.5 degrees Celsius while the temperature is markedly warmer in screened interval (average is 12.1). Average specific conductivity values for above screened interval and in screened interval are 471 µmhos and 481 µmhos, respectively. Average pH readings for above screened interval and in screened interval are 7.1 s.u and 7.1 s.u., respectively. Average turbidity readings for above screened interval and in screened interval are 6.1 NTU and 2.5 NTU, respectively. Average dissolved oxygen values for above screened interval and in screened interval are 4.4 mg/L and 3.9 mg/L, respectively.

Table 10

Temperature Profiling Data (3/23/01)
Former Wilsonart International, Inc. Facility
Congers, New York
WELL: MW-7 (W.L. = 13.68')

feet BMP	Temperature (Celsius)	Conductivity (μmhos)	pH (s.u.)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
13-14	7.6	410	5.82	88.2	11.48
14-15	8.3	413	6.23	1.0	7.90
15-16	8.6	415	6.45	0.7	7.05
16-17	8.7	415	6.63	0.7	6.83
17-18	9.1	414	6.75	0.6	6.70
18-19	9.3	415	6.88	0.6	6.70
19-20	9.7	414	6.93	0.5	6.69
20-21	9.8	414	6.97	0.5	6.64
21-22	10.1	414	7.01	0.5	6.69
22-23	10.4	414	7.05	0.4	6.68
23-24	10.5	414	7.13	0.4	6.67
24-25	10.9	415	7.17	0.6	6.67
25-26	10.9	414	7.22	0.4	6.72
26-27	11.1	413	7.22	0.3	6.76
27-28	11.1	414	7.23	0.4	6.75
28-29	11.1	414	7.26	0.3	6.77
29-30	11.2	414	7.26	0.3	6.77
30-31	11.2	415	7.26	0.2	6.75
31-32	11.3	415	7.28	0.3	6.75
32-33	11.2	415	7.31	0.6	6.69
33-34	11.2	415	7.31	0.5	6.40
34-35	11.3	416	7.31	0.8	5.51
35-36	11.3	416	7.32	0.8	6.08
36-37	11.3	418	7.32	0.2	5.44
37-38	11.3	420	7.33	0.5	4.28
38-39	11.3	424	7.33	3.1	4.59
39-40	11.3	427	7.33	0.4	5.10
40-41	11.3	426	7.33	0.4	5.05
41-42	11.3	430	7.34	8.7	5.01
42-43	11.3	436	7.34	55.3	4.96
Bottom of Well	11.3	445	7.35	63.9	4.81

Notes:
Highlighted section denotes screened interval of upper bedrock monitoring well.
Average temperature above screened interval is generally 9.2 degrees Celsius while the temperature is markedly warmer in screened interval (average is 11.2). Average specific conductivity values for above screened interval and in screened interval are 414 μmhos and 419 μmhos, respectively. Average pH readings for above screened interval and in screened interval are 6.7 s.u and 7.3 s.u., respectively. Average turbidity readings for above screened interval and in screened interval are 0.6 NTU and 1.0 NTU, respectively (excludes 13-14' due to sedimentation on probe). Average dissolved oxygen values for above screened interval and in screened interval are 7.3 mg/L and 6.0 mg/L, respectively.

Table 11

Temperature Profiling Data (3/23/01)
Former Wilsonart International, Inc. Facility
Congers, New York
WELL: MW-8 (W.L. = 14.05')

feet BMP	Temperature (Celsius)	Conductivity (µmhos)	pH (s.u.)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
14-15	8.7	410	5.82	11.6	9.03
15-16	9.6	413	6.23	10.4	8.24
16-17	10.0	415	6.45	10.2	7.34
17-18	10.2	415	6.63	10.1	7.07
18-19	10.6	414	6.75	10.5	6.90
19-20	10.5	415	6.88	10.5	6.97
20-21	10.6	414	6.93	8.6	6.79
21-22	10.9	414	6.97	10.5	6.70
22-23	11.1	414	7.01	11.3	6.60
23-24	11.0	414	7.05	11.6	6.58
24-25	11.3	414	7.13	15.4	6.46
25-26	11.3	415	7.17	14.0	6.43
26-27	11.5	414	7.22	15.1	6.38
27-28	11.7	413	7.22	17.0	6.32
28-29	12.0	414	7.23	32.2	6.08
29-30	12.2	414	7.26	42.0	6.06
30-31	12.3	414	7.26	43.3	5.91
31-32	12.4	415	7.26	46.9	5.92
32-33	12.4	415	7.28	59.0	5.96
33-34	12.5	415	7.31	54.5	5.90
34-35	12.4	415	7.31	49.4	5.91
35-36	12.5	416	7.31	55.4	5.92
36-37	12.5	416	7.32	48.7	5.93
37-38	12.6	418	7.32	64.4	5.94
38-39	12.6	420	7.33	55.9	5.93
39-40	12.6	424	7.33	55.1	5.95
40-41	12.6	427	7.33	67.3	5.97
41-42	12.6	426	7.33	69.8	5.97
42-43	12.7	435	7.34	69.1	6.02
43-44	12.7	436	7.33	66.7	6.07
44-45	12.7	437	7.34	55.4	6.05
45-46	12.7	439	7.34	46.0	6.06
46-47	12.7	446	7.34	33.9	6.07
Bottom of Well	12.7	441	7.33	489.0	6.07

Notes:
Highlighted section denotes screened interval of upper bedrock monitoring well.
Average temperature above screened interval is 10.5 degrees Celsius while the temperature is markedly warmer in screened interval (average is 12.4). Average specific conductivity values for above screened interval and in screened interval are 414 µmhos and 422 µmhos, respectively. Average pH readings for above screened interval and in screened interval are 6.8 s.u and 7.3 s.u., respectively. Average turbidity readings for above screened interval and in screened interval are 11.2 NTU and 49.9 NTU, respectively. Average dissolved oxygen values for above screened interval and in screened interval are 7.1 mg/L and 6.0 mg/L, respectively.

Table 12

Summary of Residential/Commercial Well Sampling by RCDOH
Congers, Rockland County, New York

Well I.D.	Address	Sample Date	FREON-113	TCE	FREON-11	THM-Chloroform	1,1,1-TCA	PCE	MTBE
Anka Tool & Die	150 Brenner Drive	2/14/2001	0.77	ND	ND	0.54	ND	ND	ND
Oneil	32 Wells Ave.	2/13/2001	[illegible]	ND	ND	0.31	ND	ND	ND
Egger	29 Wells Ave.	12/5/2000	***~200***	***14***	3.2	2.4	1.3	**12**	ND
Campanella	26 Wells Ave.	12/20/2000	[illegible]	0.98	ND	ND	ND	ND	ND
Ina Festa	19 Wells Ave.	12/27/2000	**84**	***8.2***	ND	1.1	0.74	ND	ND
Oliveri	18 Wells Ave.	2/14/2001	[illegible]	0.7	ND	4.8	ND	ND	ND
Nazarro	2 Wells Ave.	12/20/2000	[illegible]	3.8	ND	16	ND	ND	ND
Tedesco	1 Wells Ave.	1/17/2001	[illegible]	2	ND	8.4	ND	ND	ND
Horowitz	22 Sheridan Ave.	1/5/2001	[illegible]	2	ND	1.4	ND	ND	ND
Jaxel	23 Sheridan Ave.	12/21/2000	[illegible]	0.93	ND	0.53	ND	ND	ND
Regina	35 Sheridan Ave.	12/20/2000	[illegible]	1.1	ND	0.62	ND	ND	ND
Barrett	43 Sheridan Ave.	12/22/2000	[illegible]	3.1	ND	1.2	ND	ND	ND
Cole	40 Sheridan Ave.	2/8/2001	ND	ND	ND	ND	ND	ND	ND
Sharkey	70 Sheridan Ave.	1/17/2001	ND	0.63	ND	ND	ND	ND	ND
Secor	13 Sherman Ave.	12/27/2000	[illegible]	1.6	ND	8.8	ND	ND	5
Parker	27 Southward St.	12/21/2000	4.4	ND	ND	0.66	ND	ND	ND
Tobin	35 Southward St.	12/21/2000	[illegible]	1.5	ND	10	ND	ND	ND
Ricks Club Amer	Lake Road	2/21/2001	ND	ND	ND	ND	1.3	ND	**19**
Woods	50 Burnside Ave.	12/20/2000	[illegible]	1.6	ND	ND	ND	ND	ND
Shine	20 Hemlock Dr.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Delellis	16 Hilltop	12/27/2000	ND	ND	ND	ND	ND	ND	ND
Delellis	16 Hilltop	8/21/2001	ND	ND	ND	ND	ND	ND	ND

Notes:
Listed compounds are those that have been detected in groundwater.
All reported values are expressed in micrograms per Liter (µg/L).
Groundwater standards are NYS Ambient Water Quality Standards and Guidance Values (G) and Groundwater Effluent Limitations (June 1998).
Bolded values exceed NYSDEC groundwater standards or guidance values.
Italicized values exceed NYSDOH drinking water standards.
Practical Quantitation Limit for Chloroform, Trichloroethene, FREON-113, FREON-11, 1,1,1-Trichloroethane, PCE, and MTBE is 5 µg/L.
ND = Not Detected at or above Practical Quantitation Limit.
NYSDEC groundwater standard and NYSDOH drinking water standard for TCE, TCA, and PCE is 5 µg/L. NYSDEC groundwater guidance value for MTBE is 10 µg/L. NYSDEC groundwater standard for FREON-113 is 50 µg/L while the NYSDOH drinking water standard is 5 µg/L.
Result exceeds NYSDEC groundwater standards or guidance values.
Result exceeds NYSDOH drinking water standard but does not exceed NYSDEC groundwater standard.

Table 12 (Cont.)

Well I.D.	Address	Sample Date	FREON-113	TCE	FREON-11	THM-Chloroform	1,1,1-TCA	PCE	MTBE
Rosario	282 N. Rt. 303	2/12/2001	ND	ND	ND	ND	ND	ND	ND
Hicks	280 N. Rt. 303	2/12/2001	ND	ND	ND	ND	ND	ND	ND
InterElectronics	225 N. Rt. 303	2/1/2001	ND	ND	ND	ND	ND	ND	ND
Restaurant X	117 N. Rt. 303	12/13/2000	1.7	ND	ND	ND	0.5	ND	ND
Schaefer	111 N. Rt. 303	2/15/2001	0.75	ND	ND	ND	ND	ND	ND
Schaefer	111 N. Rt. 303	8/31/2001*	ND	ND	ND	ND	0.87	ND	ND
Smith	84 N. Rt. 303	8/14/2001	ND	ND	ND	0.55	ND	ND	ND
Dellolio	80 N. Rt. 303	8/14/2001	ND	ND	ND	0.68	ND	ND	ND
Araneo	78 N. Rt. 303	8/14/2001	ND	ND	ND	ND	ND	ND	ND
Laven	55 N. Rt. 303	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Leonakis	31 Liberty Ave.	2/8/2001	ND	ND	ND	ND	ND	ND	ND
Bianco	31 Endicott St.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Marin	33 Endicott St.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Mangan	25 N. Congers Ave.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Scheu	31 N. Congers Ave.	2/7/2001	ND	ND	ND	ND	ND	ND	ND
Ochs	58 N. Congers Ave.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Meredith	26 S. Congers Ave.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
O'Grady	32 S. Conger Ave	2/14/2001	ND	ND	ND	ND	ND	ND	4.6
Pollard	55 Old Haverstraw Rd.	2/7/2001	ND	ND	ND	ND	ND	ND	ND
Steiner-Sishock	123 Old Haverstraw Rd.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Asenico	43 N. Harrison Ave.	2/14/2001	ND	ND	ND	ND	ND	ND	ND
Leto	11 N. Grant Ave.	2/9/2001	ND	ND	ND	ND	ND	ND	ND

Notes:

Listed compounds are those that have been detected in groundwater.

All reported values are expressed in micrograms per Liter (µg/L).

Groundwater standards are NYS Ambient Water Quality Standards and Guidance Values (G) and Groundwater Effluent Limitations (June 1998).

Bolded values exceed NYSDEC groundwater standards or guidance values.

Italicized values exceed NYSDOH drinking water standards.

Practical Quantitation Limit for Chloroform, Trichloroethene, FREON-113, FREON-11, 1,1,1-Trichloroethane, PCE, and MTBE is 5 µg/L.

ND = Not Detected at or above Practical Quantitation Limit.

NYSDEC groundwater standard and NYSDOH drinking water standard for TCE, TCA, and PCE is 5 µg/L.

NYSDEC groundwater guidance value for MTBE is 10 µg/L.

NYSDEC groundwater standard for FREON-113 is 50 µg/L while the NYSDOH drinking water standard is 5 µg/L.

Result exceeds NYSDEC groundwater standards or guidance values.

Result exceeds NYSDOH drinking water standard but does not exceed NYSDEC groundwater standard.

* = Also had 0.55 µg/L of 1,1-DCA [NYSDEC groundwater standard and NYSDOH drinking water standard for 1,1-DCA is 5 µg/L].

All private water well owners with Freon-113 and TCE-impacted groundwater are connected to the public water supply system as of September 2001, except 111 N. Rt. 303 (which was connected in December 2002) and 117 N. Route 303 (which has a treatment system for VOCs).