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Report No.: 8003-355

**FINAL
SITE INSPECTION REPORT
NORTH BLOOMFIELD
LIMA, LIVINGSTON COUNTY, NEW YORK**

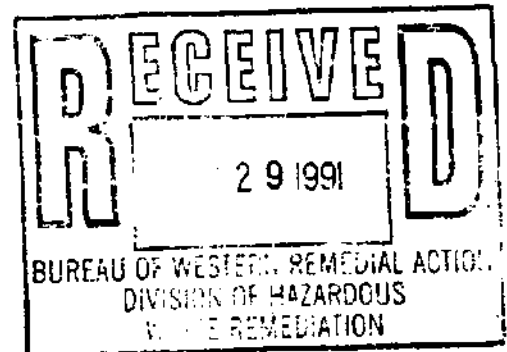
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Report



Site Assessment

Enaro-O Machine Products
Division of Kaddis Manufacturing Corp.
North Bloomfield, New York

May 1991



O'BRIEN & GERE



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

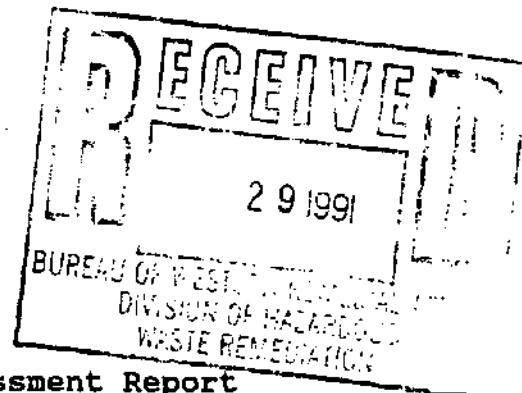
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JACOB K. JAVITS FEDERAL BUILDING
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MAY 28 1991

EXPRESS MAIL

Mr. David Chiusano
NYSDEC
50 Wolf Road
Albany, New York 12233-7010



Re: North Bloomfield Draft Site Assessment Report

Dear David:

Enclosed for your review is an unbound copy of the North Bloomfield Draft Site Assessment Report. If you have any questions please feel free to contact me at (212) 264-9588.

Sincerely yours,

Mark Granger, Project Manager
Eastern NY/Caribbean Section II

REPORT

SITE ASSESSMENT

**ENARC-O MACHINE PRODUCTS
DIVISION OF KADDIS MANUFACTURING CORPORATION
NORTH BLOOMFIELD, NEW YORK**

MAY 1991

**O'BRIEN & GERE ENGINEERS, INC.
5000 BRITTONFIELD PARKWAY
SYRACUSE, NEW YORK 13221**

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SECTION 1 - INTRODUCTION

1.01 Background

Kaddis Manufacturing Corporation (Kaddis) owns and operates a metal machining facility, Enarc-O Machine Products (Enarc-O), located at 1175 Bragg Street, community of North Bloomfield, Town of Lima, Livingston County, New York (Figure 1). This facility is situated approximately one mile southeast of the village of Honeoye Falls and about 400 feet west and south of Honeoye Creek, at an approximate elevation of 722 feet above mean sea level (MSL). The site encompasses an area slightly larger than six acres in size.

In 1985, sampling and analysis of several residential wells in the area surrounding the Enarc-O property and an on-site supply well was conducted by the New York State Department of Health (NYSDOH), the New York State Department of Environmental Conservation (NYSDEC), and the Livingston County Department of Health (LCDOH). The results of these analyses revealed detectable concentrations of chlorinated solvents, including 1,1,1-trichloroethane (TCA) and trichloroethylene (TCE), in the ground water beneath the Enarc-O facility and some of the neighboring properties.

As a result of the discovery of volatile organic compounds (VOCs) in the ground water, the United States Environmental Protection Agency (USEPA) Region II, in July 1987, requested that Enarc-O develop a site assessment work plan to evaluate the general hydrogeologic characteristics and, in particular, the ground water quality on the property. Specifically, the USEPA identified areas on the Enarc-O property which were to be targeted for investigation. A proposed work plan was

subsequently prepared and was submitted to the USEPA in August 1987. Comments on the August 1987 work plan were received from the USEPA on October 22, 1987 and on February 1, 1988. These comments were incorporated into a revised work plan which was resubmitted in March 1988. Comments pertaining to the revised work plan were received from the USEPA on June 30, 1988. These comments were addressed in a letter to the USEPA dated July 21, 1988. On February 2, 1989, the USEPA comments were received and subsequently were incorporated in another work plan revision dated March 1989. This work plan was accepted by the USEPA on July 31, 1989 and was appended to an Administrative Order on Consent between the USEPA and Kaddis (Index No. II-CERCLA-90204) which became effective on September 28, 1989.

1.02 Project Objective and Scope

The primary objective of the site assessment completed at the Enarc-O facility was to evaluate whether the source of VOCs observed in the residential and ground water supply wells in the area was located on the Enarc-O property.

To meet the above objectives, the following tasks were completed per the approved work plan.

Task 1	Background Information Review
Task 2	Fracture Trace Analysis and Geophysical Survey
Task 3	Interim Technical Memorandum
Task 4	Soil Sampling and Analysis
Task 5	Ground Water Monitoring Well Installations

Task 6 *Ground Water Sampling and Analysis*

Task 7 *Data Interpretation and Report Preparation.*

Tasks 1 and 2 (Background Information Review and Fracture Trace Analysis and Geophysical Survey) were completed in 1990 and summarized in the Interim Technical Memorandum (ITM) (Task 3) dated October 1990. The information collected through the completion of Tasks 1 and 2 was utilized to refine those efforts completed as Task 4 (Soil Sampling and Analysis), Task 5 (Ground Water Monitoring Well Installations), Task 6 (Ground Water Sampling and Analysis), and Task 7 (Data Interpretation and Report Preparation). This site assessment report represents the fulfillment of Task 7 and includes information collected during the completion of Tasks 1 through 6.

SECTION 2 - SITE INVESTIGATION

2.01 Task 1 - Background Information Review

To identify potential sources of VOCs and to develop an understanding of the regional and local hydrogeology, available information pertaining to the site history, residential wells, and regional and local geology and hydrogeology was assembled and reviewed. Included in this review were documents regarding Enarc-O's solvent use and handling, as well as publicly available reports and papers pertaining to the local geology and hydrogeology. A summary of the reports, papers, and maps used for this work effort is included in the reference list at the end of this report.

2.02 Task 2 - Fracture Trace Analysis and Geophysical Survey

2.02.01 Fracture Trace Analysis

As ground water flow in bedrock systems is generally confined to fractures, a fracture trace analysis was conducted to evaluate, if possible, the location and pattern of fractures in the study area. The purpose of this analysis was to develop information which may be of aid in selecting locations for ground water monitoring well placement.

Subsurface features such as fractures cannot be directly observed on photographs. However, linear surficial features directly influenced by fractures, such as stream channels and linear geomorphic features, can be mapped and typically reflect the underlying bedrock fracture patterns.

Stereoscopic aerial photographs dated June 21, 1938, August 27, 1954, June 26, 1963, October 24, 1975, and May 5, 1982 were reviewed for fracture

patterns. Additionally, topographic and drainage patterns were studied on the USGS 7.5 minute topographic map of the Honeoye Falls quadrangle (1951). This was completed to confirm the patterns observed on the photographs, and to reveal fracture traces which may have been obscured on the aerial photographs by vegetation or cultural features.

On both the aerial photographs and the USGS topographic map, an area with a radius of several miles centered around the Enarc-O property was selected for study. Linear features were defined and their orientations measured. These data have been graphically illustrated in rose diagrams presented in Appendix A, Figures A-1 through A-6. Additionally, a composite rose diagram which summarizes all of the aerial photographic data is presented as Figure A-7.

To confirm the orientation of these lineations, a field reconnaissance was conducted which evaluated the orientation of the joint fractures within the bedrock. This reconnaissance was limited to within the channel of Honeoye Creek where bedrock was exposed.

2.02.02 Geophysical Survey

A surficial geophysical survey was conducted on the Enarc-O property to evaluate general bedrock topography, depth to ground water, and fracture traces. This involved completing an electromagnetic (terrain conductivity) survey.

A Geonics model EM-34-3 was utilized to perform horizontal terrain conductivity profiles. Two coil spacings, 10 meters and 20 meters, were used

to allow signal penetration to approximate depths of 7.5 meters and 15 meters, respectively, using the horizontal dipole mode of operation. A third coil spacing, 40 meters, which would allow signal penetration to approximately 30 meters, was attempted, but was unsuccessful as electromagnetic interference due to background and cultural effects resulted in erratic instrument readings.

The EM-34 survey was conducted along three lines which varied in length from 460 feet to 700 feet. The locations of the geophysical survey traverses are illustrated on Figure B-1. The locations of the survey lines were related to permanent on-site features and their bearings noted to allow them to be accurately relocated. Lines A-A' and C-C' were oriented perpendicular to the trend of the primary fracture pattern as identified by the fracture trace analysis. Line B-B' was orientated perpendicular to the trend of the secondary fracture pattern. The reading stations along each traverse were separated by 20 feet. The data collected during the geophysical survey are included in Appendix B.

2.03 Task 4 - Soil Sampling and Analysis

Ten soil borings were completed at the site for the purpose of collecting soil samples for analysis. The locations of these borings were selected at Enarc-O based on previous plant activities, former tank locations, and findings of Tasks 1 and 2 which were previously completed by O'Brien & Gere. Specifically, the boring locations are illustrated on Figure 2 and were selected as follows:

- B-1 Located near the former gasoline underground storage tank (UST) on the south side of the production building.
- B-2 Located in the vicinity of the former solvent UST on the east side of the production building. A loss due to an overflow was reported to have occurred at this location in 1985.
- B-3 Located in the vicinity of the former waste oil storage tank on the east side of the production building;
- B-4 Located adjacent to the loading dock on the east side of the building;
- B-5A through 5E Located within the parking lot where there was concern that waste oil had been used to control dust.
- B-6 Located in the vicinity of the drum staging area located on the southwest side of the storage building.

The locations of these borings were selected in the field with concurrence of the on-site USEPA representative.

The borings were completed using conventional hollow-stem auger drilling methods to the bedrock surface, which was encountered between 10 and 16 feet below grade. Soils samples were collected continuously by driving a split-barrel sampler ahead of the hollow stem augers in accordance with ASTM Method 1586-84. Drilling logs which include detailed descriptions of the soils encountered are presented in Appendix C.

Drilling equipment was decontaminated between completion of each boring using a steam cleaner. The sampling barrels were decontaminated after collection

of each sample with a non-phosphate detergent wash followed by a distilled water rinse, a methanol rinse, a hexane rinse, and a final distilled water rinse. Water generated during the decontamination procedure was placed in 55-gallon drums and staged on-site for later disposal.

Each collected sample was divided between a 4 ounce pre-cleaned glass jar for potential laboratory analysis and a 6 ounce, foil-sealed jar utilized for headspace readings. Soil samples were then warmed to room temperature and screened for volatile organics using a Model P101 HNu photoionization detector (PID). The two soil samples with the highest readings at each boring location were submitted to the laboratory for volatile organic analysis using USEPA Methods 8010 and 8020. If headspace readings were negligible or equal, the sample for analysis was selected based on visual inspection. In addition to the VOC analysis, soil samples collected from boring B-1 were also analyzed for lead. All samples submitted for laboratory analysis were agreed upon by OBG and EPA on-site representatives.

Soil samples were split with on-site EPA representatives as requested. On those occasions, an insufficient volume of sample would remain for the collection of an O'Brien & Gere sample for analysis and the headspace sample. In these situations, the headspace sample was not collected and the laboratory sample was submitted for duplication of the EPA analysis.

Soils generated during completion of the borings were placed in drums that were labeled and staged on-site. Following completion, the boreholes were backfilled with a bentonite-cement grout.

In addition to the soils, a water sample was collected from the State Pollution Discharge Elimination System (SPDES) permitted non-contact cooling water drain

line. This sample was collected from the trap located in the vicinity of the production building and analyzed for volatile organics in accordance with USEPA Methods 502.1 and 503.1.

2.04 Task 5 - Ground Water Monitoring Well Installations

A total of six monitoring wells were installed between December 3 and 12, 1990 for the purpose of evaluating the general flow potential and quality of ground water at the site. Locations of these monitoring wells are illustrated on Figure 2. While the proposed well locations were presented in the ITM, actual well locations were selected in the field with consideration given to fracture trace projection of the larger joint fractures evident in Honeoye Creek in addition to aerial and subsurface utilities. The only significant change from the locations presented in the ITM was well MW-4, which had to be moved approximately 50 ft southeast of the proposed location due to the presence of power lines, the water line and an irregular surface topography. All well locations were agreed upon in the field by representatives of O'Brien & Gere and the USEPA.

As presented in the ITM, the monitoring wells were installed into the first encountered ground water. As water was encountered in the overburden in only one of the borings, all monitoring wells were installed into bedrock. The bedrock wells were of open-hole construction and completed by drilling a minimum of 0.5 ft into bedrock with 6-inch inside diameter hollow stem augers and sealing off any ground water present in the overburden by grouting in a 4-inch outside diameter, schedule 80 PVC casing. After allowing the cement to set, the bedrock was cored using a 3-inch outside diameter, diamond bit core barrel in accordance with ASTM Method

D-2113. The well was advanced a minimum of 10 feet below the first encountered ground water. Completed well depths were established from approximately 30 to 35 feet below grade. Locking protective steel casings with matching keys were also installed. Well construction information is presented on the well logs included in Appendix C. Soils and water generated during completion of the monitoring wells were placed in drums that were labeled and staged on-site for later disposal.

Following completion, the wells were developed to remove any fine-grained material that may have settled in the well during completion. Water generated during this procedure was placed in a 55-gallon drum, labeled and staged on-site.

Drilling equipment was decontaminated between completion of each monitoring wells using a steam cleaner. Water generated during this procedure was placed in drums and staged on-site for later disposal.

Following installation, the locations and elevations of the top of casing and ground surface at all well locations were established through completion of an engineering survey. All elevations and locations were tied to an arbitrary datum which was established on-site. Elevation data for the monitoring wells are presented on Table 1.

Ground water elevations were measured at each monitoring well location on four occasions: December 13, 1991; December 27, 1990; January 7, 1991; and February 25, 1991. Ground water elevation data are presented on Table 1. Ground water flow potential maps constructed from the data collected December 13, 1990 and February 25, 1991 are included as Figures 3 and 4, respectively.

The wells were developed in accordance with the protocols presented in the ITM. Water generated during the development procedure was contained in secured

drums which were labeled and staged on-site. The development procedure consisting of evacuation of the wells using a stainless steel bailer. A minimum of three well volumes of water was removed from those wells with limited recharge capabilities. A minimum of ten well volumes were removed from those wells which generated greater volumes of water. All wells exhibited relatively sediment-free water after development.

Upon completion of the ground water monitoring wells, in situ hydraulic conductivity tests were performed to assess the horizontal hydraulic conductivity of the bedrock encountered in the well. Tests were conducted on December 13 and 28, 1990. These tests were conducted by removing water or introducing a slug of inert material to lower or raise the water level in the well. Specifically, water levels in wells with relatively low hydraulic conductivities were lowered by bailing. The water level was then measured using an electric well probe until the water level had recovered approximately two-thirds of the initial water level change from static water level. For wells with higher hydraulic conductivity, a slug of inert material was inserted into the well to raise the water level. The water level recovery to static water level was then monitored using a pressure transducer/data logging system. The collected data were analyzed using Hvorslev's Method to estimate the average hydraulic conductivity of the formation. Results of the in situ hydraulic conductivity tests are shown in Appendix D. The values determined using these methods are in agreement with representative values for fractured and unfractured limestone (Freeze and Cherry, 1979).

2.05 Task 6 - Ground Water Sampling And Analysis

To assess ground water quality, samples were collected from all newly installed wells on two occasions. The first set of samples was collected on January 7 and 8, 1991. The second set of samples was collected on February 25 and 26, 1991. All sampling was observed by USEPA representatives who were provided with duplicates of the samples collected.

Ground water samples at each well location were collected using a decontaminated stainless steel bailer attached to a new, dedicated polypropylene rope. Prior to collection of the samples, a plastic drop cloth was placed around each well to prevent contamination of sampling equipment. A minimum of three well volumes of water was removed from those wells with sufficient recharge. For those wells which bailed dry, the wells were allowed to recharge prior to collection of the samples. Bailers were decontaminated between samples by washing with a non-phosphate detergent, followed by a distilled water rinse, methanol rinse, hexane rinse and final distilled water rinse. Water removed from wells was contained in secured drums. Field measurements of water level, pH, specific conductance and temperature were collected and are included on the field logs presented in Appendix E.

Samples and appropriate quality assurance/quality control samples were placed in appropriate containers and placed in a cooler for transport to OBG Laboratories, Inc. Samples were delivered to the laboratory on the day of collection. Chain-of-custody documentation was initiated in the field during collection of the sample and maintained throughout transport of the sample to the laboratory. The samples were analyzed for volatile organics in accordance with USEPA Methods 502.1 and 503.1.

SECTION 3 - SITE CONDITIONS

3.01 Site History

In December 1985, the USEPA submitted a Request for Information Under 42 U.S.C. 9604 and 42 U.S.C. 6927. A response to this Request for Information was submitted by Enarc-O on January 20, 1986. The following discussion of the facility history was obtained from this document.

The area surrounding the Enarc-O facility is predominantly residential. However, the area to the west of the site is agricultural. A small, active auto repair shop is located adjacent and to the south of the Enarc-O property. This shop has reportedly been operating since approximately the mid 1960's. The former residence of Mr. Wesley P. Crane, founder and previous owner and operator of Enarc-O, is adjacent and to the east of the Enarc-O facility. Enarc-O was started in the basement of this residence in 1954. In 1955, the operations moved into a double garage on Mr. Crane's property. In 1960, the operations moved onto the current Enarc-O Machine Products, Inc. property.

Organic solvent use at the Enarc-O facility was limited to a vapor degreasing process which was used to clean oil residues off of newly machined parts. This vapor degreasing process was a contained, closed loop system which circulated cleaning fluids, and allowed these fluids to be continually reused. TCE was used in this system from 1960 until 1980. Between 1980 and 1985, TCA was used in this process. Since 1985, Stoddard Solvent (Kensol 30) has been used. No chlorinated solvents have been in use at the facility since 1985. No reported loss of solvents has ever occurred from this system.

On June 18, 1985, a small spill of TCA (approximately 5 gallons) occurred near the facility's above ground solvent storage tank as a result of overfilling the tank by an employee of a solvent supply company. The location of this tank is presented on Figure 2. Plant personnel immediately notified the NYSDEC of the solvent loss and the NYSDEC subsequently sent a representative to the spill site. Upon recommendation of the NYSDEC representative, the soils affected by the solvent spill were excavated to a depth of two feet, and were spread out in the southeast corner of the parking area to allow volatilization to occur. The soils were periodically raked by Enarc-O personnel to enhance the volatilization rate. Shortly thereafter, Enarc-O removed the solvent storage tank and discontinued use of chlorinated solvents.

In 1985, subsequent to the release, NYSDOH, NYSDEC, and LCDOH conducted analyses of ground water samples collected from the Enarc-O supply well and 35 area residential wells. Analytical results revealed detectable concentrations of VOCs, primarily TCA and TCE, in the Enarc-O well and 21 of the 35 residential wells. A summary of the analytical data from the residential wells is included in Appendix F. The Enarc-O well contained the highest detectable concentration of TCA. The Enarc-O samples were reportedly collected directly from the well using a bailer without prior purging of the well. Samples collected at individual residences were collected from spigots.

As a result of the detection of VOCs in the ground water in the area, bottled water was subsequently supplied to those residences whose wells showed detectable concentrations. Bottled water was continued until 1988, when a public potable water system was installed to serve the residences.

3.02 Regional Geology

The site is located in the Erie-Ontario Lowland region of the Central Lowlands physiographic province (Muller, 1965). The geomorphology of this region is characterized by features of glacial activity such as moraines, drumlins, and kettles (Fairchild, 1926).

The unconsolidated sediments overlying the bedrock within the region are the result of Pleistocene glacial activity or recent stream activities and include deposits resulting from glacial, glaciofluvial, glaciolacustrine and fluvial processes. Thicknesses of these sediments range from a few feet to approximately one hundred feet.

Bedrock within this region consists of fine-grained sedimentary rocks of Paleozoic age. These limestones and shales were deposited in the warm, shallow intercontinental sea with varying amounts of terrigenous input from the highland areas to the east. Bedrock in the region is for the most part undeformed. It has a very gentle regional dip of approximately 1 to 2 degrees to the south with more resistant layers responsible for the two major escarpments that trend generally east-west within this region. In the vicinity of the Enarc-O site, no faults or fold structures are present and no metamorphism of the Paleozoic strata occurred (Fisher et.al., 1971; Isachsen and McKendree, 1977).

The upper bedrock unit in the site area is the Middle Devonian-aged Onondaga Limestone (Rickard and Fisher, 1970). Bedrock occurs at an approximate elevation of 700 feet MSL (Grossman and Yarger, 1953) and is known to be approximately 100 feet thick in the area. Regular joint patterns typically occur in this unit and were confirmed locally by field reconnaissance.

Beneath the Onondaga Limestone lies the Middle Devonian Bertie Formation. This stratigraphic unit consists of interbedded dolostone, shale, and shaly dolostone. The Bertie Formation is estimated to be approximately 80 feet thick.

Drainage within the region is generally to the north into Lake Ontario via one of the north flowing rivers or streams that cut the east-west trending escarpments.

3.03 Site Geology

3.03.01 Unconsolidated Deposits

The drilling logs (Appendix C) indicate that the overburden materials at the site consist of glacially derived sediments ranging from clay to boulder size components. These materials range in thickness from 10 to 18 feet. The data suggest that the thickest overburden is located on the western to southwestern side of the site. Generally, overburden is comprised of three layers.

The surficial layer is predominantly sand with varying amounts of gravel, silt and clay. Thickness of this surficial deposit ranges from 2 feet to 8 feet. No laminae were observed in the surficial unit, indicating a possible ablation or flow origin.

An overcompact, clayey silt with occasional pebbles underlies the surficial deposit. This layer ranges in thickness from 6 feet to 14 feet and extends to bedrock in some locations. Parallel laminae were observed in the clayey silt unit and isolated pebbles, most likely transported by icebergs, are evidence of a glaciolacustrine origin. The long (A) axes of rod-shaped pebbles were typically vertical, suggesting detachment and fall through a water

column following release from an iceberg. The overcompact nature of the underlying unit, laminae deformation, fractures and high proportion of precipitate-filled fractures indicate that this intermediate unit may have survived being overridden by a glacier.

The basal grey unit varies in thickness to 1 foot and was not present at all locations. This unit generally consists of a clayey sandy gravel with most of the gravel composed of bedrock clasts.

3.03.02 Bedrock Geology

Bedrock was encountered at the site between 10 feet and 18 feet below grade and is exposed along the banks and bed of Honeoye Creek located approximately 200 feet east of the site.

The results of the fracture trace analysis are presented in the form of rose diagrams which are included in Appendix A. The information obtained from review of the aerial photographs (Figures A-2 through A-7) indicates two major sets of lineations. A primary lineation pattern trends from N 20 to 60 degrees W. A secondary, conjugate set of linear features strikes from N 40 to 50 degrees E. No linear features were observed to be crossing the Enarc-O property. The primary set of lineations was also identified during review of the USGS topographic map (Figure A-1). However, the orientation is less defined than those observed on the aerial photographs. The USGS map does not reveal the secondary set of lineations.

Field reconnaissance revealed that the joint fractures within the Onondaga Limestone are exposed in Honeoye Creek and appear to control

the stepped nature of the stream channel. The strike of these fractures is between N 57 and 75 degrees E. This orientation generally falls within the range for the secondary set of lineations identified in the aerial photographs. The Honeoye Creek channel, which is nearly perpendicular to these joints, is consistent in orientation with the primary lineation strike discussed above.

The primary set of linear features is also consistent with a major linear topographic feature defined by Isachsen and McKendree (1977). This feature was defined by utilizing topographic maps, Landsat ERTS imagery, and Skylab or U-2 photographs. The feature strikes approximately N 15 degrees W (parallel to the flow of Honeoye Creek), is three miles in length, and is located about one mile east of North Bloomfield.

Figure 5 presents a contour map of the bedrock surface as constructed using the drilling data. As illustrated on this figure, the bedrock surface generally slopes to the west on the property with the highest bedrock elevation occurring in the vicinity of well MW-3. The bedrock elevation within Honeoye Creek is also generally lower than the bedrock elevation observed on the eastern side of the site, which suggests that the bedrock surfaces also slopes downward to the northeast.

The well and boring logs, presented in Appendix C, reveal that bedrock is a fine grained, grey limestone with a low to moderate amount of chert. A thin (less than 0.1 ft thick) layer of green/grey bentonite was encountered in three of the borings. These characteristics indicate bedrock at the site is most likely the Nedrow member of the Onondaga Formation. Core samples contained vertical and horizontal fractures, minor dissolution cavities,

stylolites, secondary deposits of quartz, calcite and gypsum, and fossils. Dissolution cavities ranged to 0.5 ft in extent and generally contained a secondary mineral or clay. Smaller cavities associated with fractures were also encountered. Fossils present included brachiopod valves, crinoids, corals, mollusks, bryozoans, and arthropods. Many of the fossils and fractures were silica replaced.

3.04 Site Hydrogeology

Ground water was not encountered in the overburden at the site, but was found within the upper zone of the underlying bedrock. The surficial deposits, particularly the glaciolacustrine clay and silt unit, may limit ground water recharge through percolation. Ground water flow through clayey, unsorted deposits is generally controlled by fractures (Grisak et. al., 1975). Vertical fractures, often times with a thin layer of precipitate indicating water transport, were observed throughout the site.

The first encountered ground water at the site occurs between 4 and 12 feet below the bedrock surface. The ground water elevation data (Figures 3 and 4) indicate that the Honeoye Creek stream channel is higher in elevation than the ground water, which suggests that the creek was losing water to the ground water system at the time the data were collected. Whether or not this is a temporal condition cannot be evaluated from the data.

Figures 3 and 4 present the ground water flow potential in the bedrock aquifer on December 13, 1990 and February 25, 1991, respectively. These figures suggest that the ground water flow potential in the site area appears to be generally towards

the north-northwest. It should be noted, however, that the aquifer is comprised of fractured bedrock. Consequently, the ground water elevations measured in the monitoring wells are the result of an average hydraulic potential of those fractures penetrated by the individual wells. The actual flow path of the ground water will be dictated by the orientation and interconnection of the fractures in addition to the hydraulic potentials within these fractures. Of note is the fact that the ground water elevations measured in well MW-3 appear to be anomalously high as compared to the water levels within the other monitoring wells on the site. For this reason, the data from MW-3 were not used in preparing the flow maps. This is likely a representation of the differing hydraulic potentials within individual fractures in the bedrock aquifer.

Aquifer systems of this nature can be significantly influenced by precipitation events if the system is readily connected to the stream channel via fractures. This type of connection can result in significant changes in the ground water flow direction within the bedrock over relatively short periods of time. In an effort to evaluate the relationship between the creek and ground water on the site, stage information for Honeoye Creek was obtained from the USGS for a gaging station located approximately 1.5 miles north of the site. These data are included on Table 1. Review of the data suggests that the water levels in wells MW-2, MW-3 and MW-4 increase as the creek stage increases. The water level in MW-5 appears to also respond, however, to a lesser degree.

Ground water flow through limestone predominately occurs along vertical and horizontal fractures (Freeze and Cherry, 1979). Results of insitu permeability tests indicate that wells placed in fractured rock exhibit conductivities much greater than

unfractured rock. Three of the six wells installed on-site are believed to have intersected fractures. Voids, increased number of horizontal fractures, and/or bentonite units were encountered during coring operations at MW-1, MW-2, and MW-5. Hydraulic conductivities were determined to be 2.8×10^{-3} cm/sec, 6.7×10^{-2} cm/sec and 2.9×10^{-2} cm/sec, respectively. Analyses of rock quality designation (RQD) data from retrieved cores (Appendix C) does not suggest direct correlation with the amount of fractures. This may be due to the high proportion of chert which tends to decrease rock quality as it fractures during coring.

Core samples from wells MW-3, MW-4, and MW-6 exhibited a lesser amount of fractures relative to the other three wells on site. No bentonite or dissolution cavities were encountered. Hydraulic conductivities for the wells were determined to be 3.6×10^{-5} , 3.3×10^{-5} cm/sec, and 1.1×10^{-5} cm/sec, respectively.

SECTION 4 - ANALYTICAL RESULTS

4.01 Data Validation

As specified in the ITM, analytical data collected during this investigation were validated in accordance with quality control requirements established in the specified analytical methods and the QAPP. The results of this validation process are summarized in Appendix G. In general, the data were deemed useable for qualitative and quantitative purposes.

4.02 Soil Boring and Drain Sample Analytical Results

Soil sample analytical results are presented in Table 2. A summary of the TCE and TCA concentrations in each of the soil samples is also illustrated on Figure 6. These data reveal that volatile organics are present in the soils in some of the areas sampled during this assessment. The predominant VOCs observed were chlorinated solvents including TCE, TCA, tetrachloroethylene (PCE) and 1,2-dichloroethylene (1,2-DCE). Additionally, the petroleum hydrocarbon compounds toluene and xylene were observed in boring B-1.

The presence of PCE in the soils may be the result of low levels of PCE present in the industrial-grade solvents typically used for degreasing processes in industry. Substances such as 1,2-DCE, 1,1-dichloroethane and 1,1-dichloroethylene are likely degradation products of the principle solvents TCA and TCE.

Boring B-1 is located in the vicinity of the former gasoline storage tank. The soils at 4 to 6 feet below grade in this boring contained toluene and xylenes at concentrations of 210 ppb and 4700 ppb, respectively. The deeper sample, however,

did not contain detectable levels of toluene or xylene which suggests that these substances have not migrated to the bedrock. Lead was not detected in the soils in this area.

Borings B-2, B-3, and B-4 are located on the eastern side of the plant where solvent storage has historically occurred. The soils in the vicinity of these borings were found to contain detectable levels of halogenated volatile organics, predominantly TCE, TCA and 1,2-dichloroethylene (total). The concentrations of these compounds ranged from 13 ppb to 1400 ppb. The highest concentrations were observed in the 0- to 2-ft sample collected from boring B-3. This boring is located in the vicinity of the former waste oil storage tank (Figures 2 and 6). VOC concentrations appear to decrease with depth, which suggests that the VOCs may have originated at or near the ground surface, possibly as a result of filling or emptying of the waste oil tank. Elevated levels have been observed at the base of borings B-2 and B-4, which suggests that volatile organics have migrated vertically in this area and therefore, may be actively contributing to the volatile organics observed in the on-site ground water monitoring wells.

Volatile organics were not detected in any of the soil samples collected from the borings installed within the parking lot area (B-5A through B-5E) or B-6 which was installed adjacent to the storage building.

The analytical results of the drain sample are included on Table 3. These data reveal that VOCs are not present in the water within the SPDES-permitted drain line.

4.03 Ground Water Analytical Results

The ground water quality data are summarized on Table 3. As with the soils data, VOCs observed in the ground water include TCE and TCA together with degradation products such as 1,2-DCE, 1,1-dichloroethane and 1,1-dichloroethylene. Figures 7 and 8 present the concentrations of TCA and TCE observed at each well location during the January and February sampling events, respectively.

In general, the ground water quality data reveals the presence of volatile organics in all of the wells with concentrations in MW-1 and MW-6 being at or near detection levels. In wells MW-2, MW-3, MW-4, and MW-5, concentrations of TCE ranged from 60 ppb in MW-4 to 5800 ppb in MW-3. TCA concentrations in these wells ranged from 8 ppb in MW-5 to 470 ppb in MW-3, with the concentrations in MW-2 reported as less than 100 ppb. In general, the highest levels were observed in well MW-3 which is located immediately north of the production building, followed by MW-2 which is located southeast of the storage building. As illustrated on Figures 7 and 8, the distribution of volatile organics in the aquifer, particularly the elevated concentrations observed in well MW-2, is not consistent with the ground water flow direction (Figures 3 and 4) or the soils data (Figure 6) collected as part of this study.

SECTION 5 - SUMMARY AND FOLLOW-UP WORK EFFORTS

5.01 Summary

The following site information was obtained during the site assessment activities.

1. The overburden material at the site ranges in thickness from 10 to 18 feet and is comprised of three distinct units: a surficial sandy deposit with varying amounts of clay, gravel and silt; a clayey silt with occasional pebbles; and a basal clayey material with fragments of the underlying bedrock.
2. Bedrock at the site is the Onondaga Formation which is a fine grained, grey limestone with chert deposits.
3. The primary joint fractures in the bedrock trend N 20 to 60 degrees west with a secondary lineation trend of N 40 to 50 degrees W. The secondary lineations appear to control the stepped nature of the Honeoye Creek channel.
4. Ground water was not encountered within the overburden material on the site, but rather occurred between 4 and 12 feet below the bedrock surface.
5. The ground water flow potential within the bedrock appears to be towards the north to northwest with an anomalously high water level observed in MW-3.

HC

6. The ground water elevation data suggest that Honeoye Creek was losing water to the bedrock on the occasions when ground water elevation data were collected.
7. The data collected from the soil borings in the vicinity of B-2, B-3 and B-4 indicate that soils in this area may be contributing to the volatile organics observed in the ground water in the on-site monitoring wells.
8. VOCs were present in the on-site monitoring wells, with the highest concentrations observed in wells MW-2 and MW-3. The distribution and concentrations of VOCs observed in the on-site monitoring wells suggest that multiple sources may be present in the vicinity of the site.

5.02 Follow-Up Work Efforts

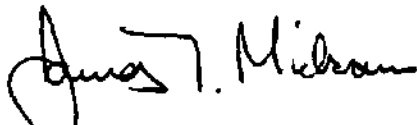
It is not possible at this time to assess the location of the source of the volatile organics observed in the ground water system. In light of this fact, the following tasks are recommended to augment the existing data.

1. Soil Borings - Soil borings should be completed in the vicinity of existing soil borings B-2, B-3 and B-4 to supplement the existing data and allow for a more detailed assessment of the extent of soil contamination and a preliminary evaluation of remedial options. Additionally, soil borings should be completed in the vicinity of well MW-2 to assess the source of the elevated levels of volatile organics observed in the ground water collected from this well.
2. Supply Well Inspection - To further evaluate the extent of the volatile organics in the ground water system, it is recommended that the

Enarc-O supply well and selected residential wells be inspected. The work tasks associated with this effort include temperature and hole caliper logging to further address the fracture patterns within these wells. Selected intervals within these wells would then be isolated for the collection of ground water samples for analysis. This will allow for additional evaluation as to the migration of volatile organics within the aquifer.

Respectfully submitted,

O'BRIEN & GERE ENGINEERS, INC.



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References

REFERENCES

- Acres International Corporation. June 23, 1988, Technical Review of Existing Data, North Bloomfield Ground Water Contamination Site, Lima, New York - Final Report.
- Fairchild, H.L. (1926), *The Dansville Valley and Drainage History of Western New York*; Rochester Academy of Science, vol. 6.
- Fisher, D.W., Y.W. Isachsen, and L.V. Rickard (1971), *Generalized Tectonic - Metamorphic Map of New York*; New York State Museum and Science Service Map and Chart Series no. 15.
- Freeze, R.A. and J.A. Cherry, Groundwater; Prentice-Hall, Inc., Englewood Cliffs, N.J.; 604 pp.
- Grossman, I.G. and L.B. Yarger (1953), *Water Resources of the Rochester Area, New York*; U.S. Department of the Interior Geological Survey Circular 246.
- Isachsen, Y.W. and W.G. McKendree (1977), *Preliminary Brittle Structure Map of New York*; New York State Museum Map and Chart Series no. 31D.
- Miller, T.S. (1987), *Unconsolidated Aquifers in Upstate New York - Finger Lakes Sheet*; U.S. Department of the Interior - Geological Survey Water Resources Investigations Report 87-4122.
- Muller, E.H. (1965), *Quaternary of New York in: The Quaternary of the United States*; Princeton University Press, Princeton, New Jersey, p. 99-112.
- Muller, E.H. and D.H. Cadwell (1986), *Surficial Geologic Map of New York - Finger Lakes Sheet*; University of the State of New York, New York State Museum and New York State Geological Survey Map and Chart Series no. 40.
- Rickard, L.V. and D.W. Fisher (1970), *Geologic Map of New York - Finger Lakes Sheet*; New York State Museum and Science Service Map and Chart Series no. 15.
- Soil Survey of Livingston County, New York (1956); U.S. Department of Agriculture, Soil Conservation Service, p. 99-112.

Tables



O'BRIEN & GERE

Table 1
Ground Water Elevation and Streamflow Data
Enerco-O Machine Products
North Bloomfield, New York

WELL NO.	GROUND ELEV. (FT)	TOP OF CASING ELEV. (FT)	BEDROCK ELEV. (FT)	BOTTOM OF WELL ELEV. (FT)	GROUND WATER ELEVATIONS (FT)				
					12/13/90	12/27/90	1/7/91	2/25/91	3/28/91
1	296.5	297.86	278.5	263.21	274.56	274.28	273.96	272.95	273.32
2	300.1	301.95	285.9	265.24	274.20	274.93	274.97	275.07	276.25
3	298.6	300.48	286.4	266.09	274.70	274.70	278.68	278.65	278.85
4	293.8	295.92	281.6	261.75	273.01	271.07	272.24	273.14	274.92
5	295.6	297.50	284.3	264.91	274.02	274.50	274.52	274.71	275.72
6	298.6	300.04	280.3	263.25	272.94	272.05	271.98	272.13	272.58
STREAM FLOW * (CFS)	-----	-----	-----	-----	110.60	251.60	286.30	NA	NA

~ Depth TO WATER

1 21.94

2 25.9 (23.94)

3 19.75

4 18.88

5 19.88

6 25.66

~ Depth TO Rock

18

14.2

12.2

12.2

11.3

18.3

Depth of well

33.29

34.86

32.51

32.05

30.69

35.35

NOTES: Elevations determined with respect to on-site datum.

CFS - Cubic Feet per Second

* - Average flow for 5 day period around
ground water elevation date

NA - Data Not Available

Table 2
Soil Sample Analytical Data
Enarc-O Machine Products
North Bloomfield, New York

COMPOUND	B-1 4-6'	B-1 6-8'	B-1 RINSEATE	B-2 6-8'	B-2 10-11'	B-3 0-2'	B-3 4-6'	B-3 6-8'	B-3 RINSEATE	B-4 6-8'	B-4 8-10'
1,1-DICHLOROETHANE	<120	<110	<1	<11	<12	<12	<11	<11	<1	<11	16
1,1-DICHLOROETHYLENE	<120	<110	<1	<11	<12	76	<11	<11	<1	<11	<12
1,2-DICHLOROETHYLENE (TOTAL)*	<120	<110	<1	<11	200	480	150	24	<1	<11	900
TETRACHLOROETHENE	<120	<110	<1	<11	30	490	<11	24	<1	<11	<12
TOLUENE	210	<110	<1	<11	<12	29	<11	<11	<1	<11	<12
1,1,1-TRICHLOROETHANE	<120	<110	<1	<11	<12	860	<11	<11	<1	<11	41
TRICHLOROETHYLENE	<120	<110	<1	<11	1200	1700	74	81	<1	13	1400
XYLENES (TOTAL)	4700	<340	<3	<34	<36	<35	<34	<34	<3	<33	<36

COMPOUND	B-5A 4-6'	B-5A 12-14'	B-5B 0-2'	B-5B 2-4'	B-5C 6-8'	B-5C 14-16'	B-5D 0-2'	B-5D 10-12'	B-5E 0-2'	B-5E 12-14'	B-6 4-6'	B-6 6-8'
1,1-DICHLOROETHANE	<11	<11	<12	<12	<11	<12	<12	<11	<11	<11	<11	<12
1,1-DICHLOROETHYLENE	<11	<11	<12	<12	<11	<12	<12	<11	<11	<11	<11	<12
1,2-DICHLOROETHYLENE (TOTAL)*	<11	<11	<12	<12	<11	<12	<12	<11	<11	<11	<11	<12
TETRACHLOROETHENE	<11	<11	<12	<12	<11	<12	<12	<11	<11	<11	<11	<12
TOLUENE	<11	<11	<12	<12	<11	<12	<12	<11	<11	<11	<11	<12
1,1,1-TRICHLOROETHANE	<11	<11	<12	<12	<11	<12	<12	<11	<11	<11	<11	<12
TRICHLOROETHYLENE	<11	<11	<12	<12	<11	<12	<12	<11	<11	<11	<11	<12
XYLENES (TOTAL)	<34	<33	<35	<35	<34	<36	<35	<34	<34	<34	<34	<36

NOTES: Analyses complete using USEPA Method 8010/8020.

Analyses completed by OBG Laboratories.

Soil boring results in ug/kg dry weight (ppb).

Rinseate blanks in ug/l (ppb).

Other compounds per USEPA Method 8010/8020 were not detected.

* - Trans-1,2-dichloroethene and cis-1,2-dichloroethene coelute.

Quantification was completed using a Trans-1,2-dichloroethene response factor.

Table 3
Ground Water and Drain Sample Analytical Data
Enarc-O Machine Products
North Bloomfield, New York

WELL	DATE	TRICHLORO- ETHENE	1,1,1- TRICHLORO- ETHANE	1,2-DICHLORO- ETHYLENE (Total *)	TETRACHLORO- ETHYLENE	TETRACHLORO- METHANE
MW-1	1/7/91	3	<1	<1	<1	1
	2/25/91	4	<1	<1	<1	<1
MW-2	1/7/91	3900	<100	<100	<100	<100
	2/25/91	3400	<100	<100	<100	<100
MW-3	1/7/91	5800	470	<100	<100	<100
	2/25/91	5300	420	<100	<100	<100
MW-4	1/7/91	60	11	14	<1	<1
	2/25/91	69	17	16	2	<1
MW-5	1/7/91	240	12	160	<1	<1
	2/25/91	310	8	100	<1	<1
MW-6	1/7/91	1	<1	<1	<1	<3
	2/25/91	<1	<1	<1	<1	<1
DRAIN	1/7/91	<1	<1	<1	<1	<1

NOTES: Results reported in ug/l (ppb).

Analyses completed using USEPA Method 502.1/503.1

Analyses completed by OBG Laboratories, Inc.

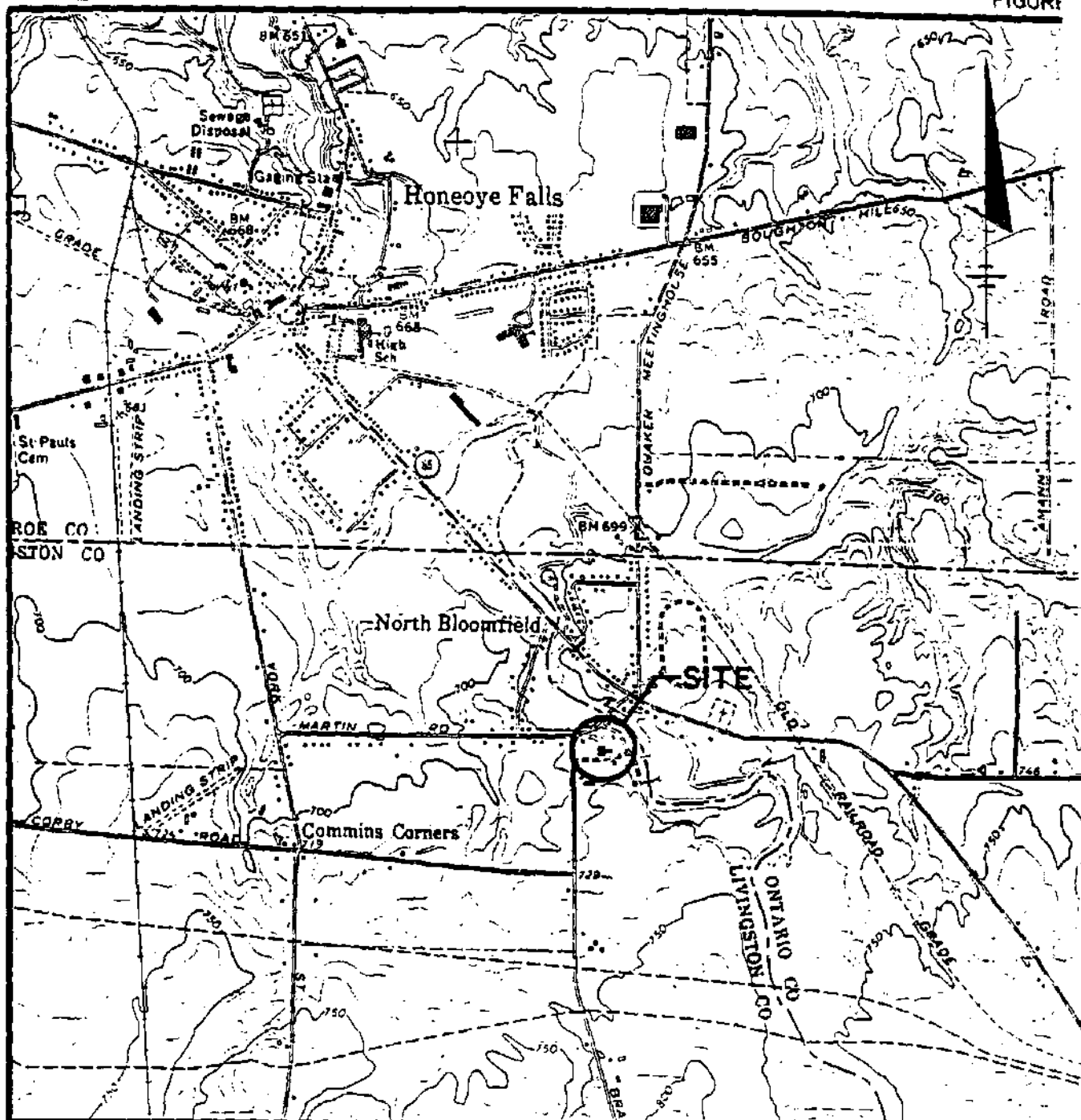
Other compounds per USEPA Method 502/503 were not detected.

* - Trans-1,2-dichloroethene and cis-1,2-dichloroethene
coelute. Quantification was completed using a
trans-1,2-dichloroethene response factor.

Figures



O'BRIEN & GERE



KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK

SITE LOCATION MAP



SCALE IN FEET

ADAPTED FROM HONEOYE FALLS, NEW YORK 7.5 MIN. U.S.G.S. QUADRANGLE (1971)

FIGURE 2
ENARC-O MACHINE PRODUCTS
NORTH BLOOMFIELD, NEW YORK

LEGEND

- ◆ MONITORING WELL LOCATION
- ▲ SOIL BORING LOCATION
- SUPPLY WELL LOCATION
- - - APPROXIMATE LOCATION OF PROPERTY LINE
- - - CREEK

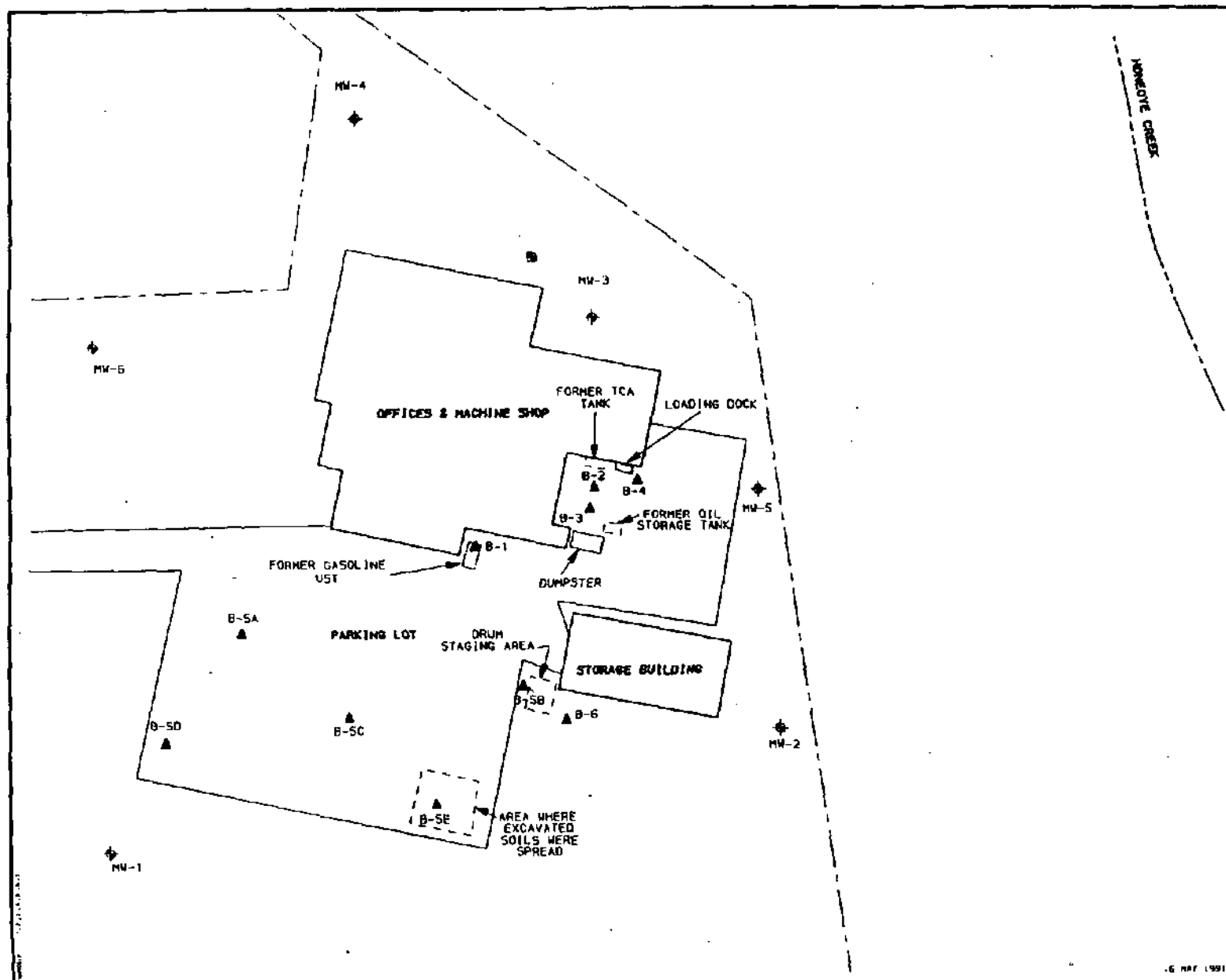
SITE MAP



7387.006.730

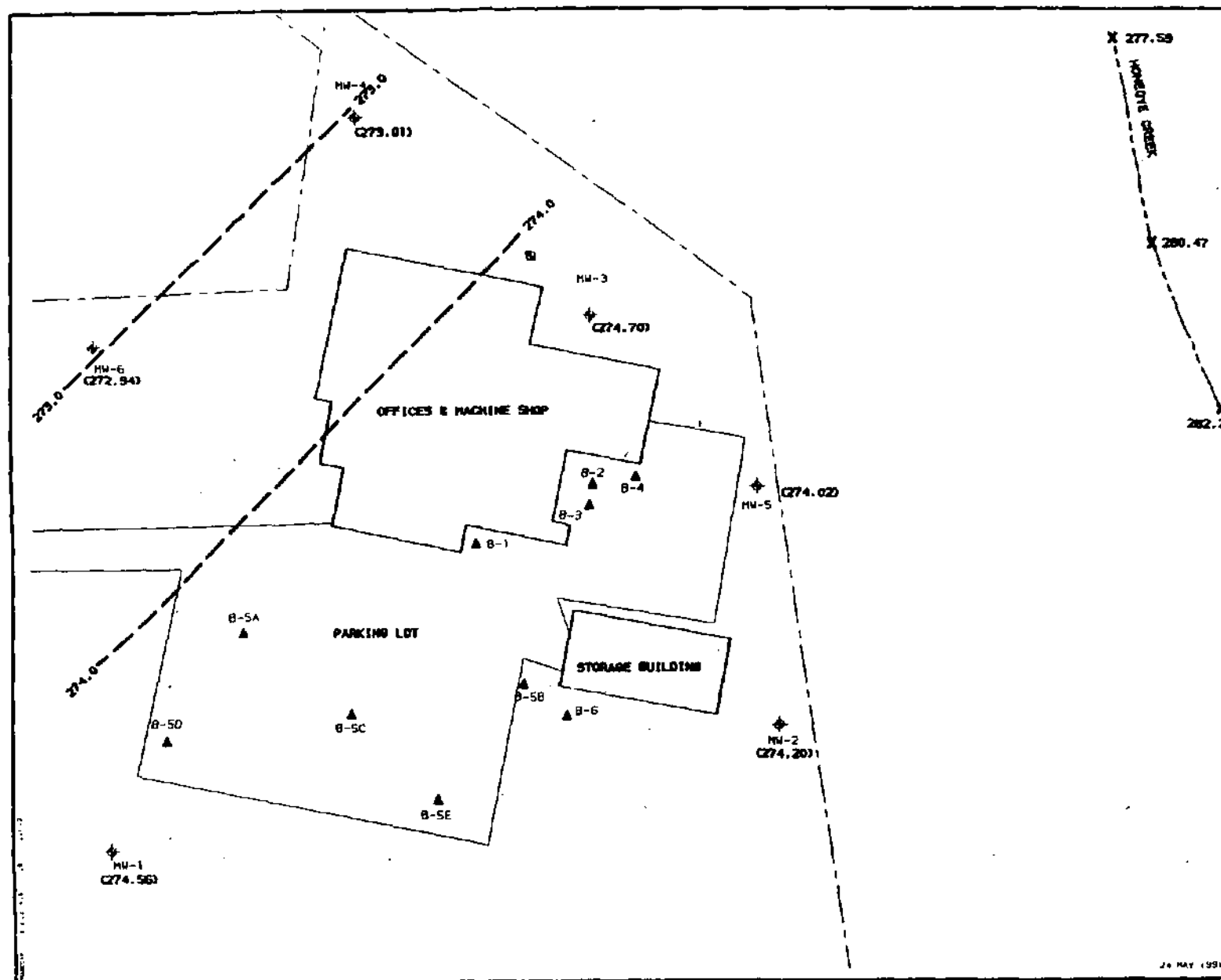
E O'BRIEN & GORE
ENGINEERS, INC.

16 MAY 1991



14

FIGURE 3
ENARC-O MACHINE PRODUCTS
NORTH BLOOMFIELD, NEW YORK



LEGEND

- ◆ MONITOR-PI WELL LOCATION
- ▲ SOIL BORING LOCATION
- ⊗ SUPPLY WELL LOCATION
- - - APPROXIMATE LOCATION OF PROPERTY LINE
- - - CREEK
- X CREEK ELEVATION
- 274.0 GROUND WATER ELEVATION
- - - GROUND WATER ELEVATION CONTOUR

POTENTIOMETRIC SURFACE MAP
DECEMBER 13, 1990



2387.006.730



24 MAY 1991

yh

4h

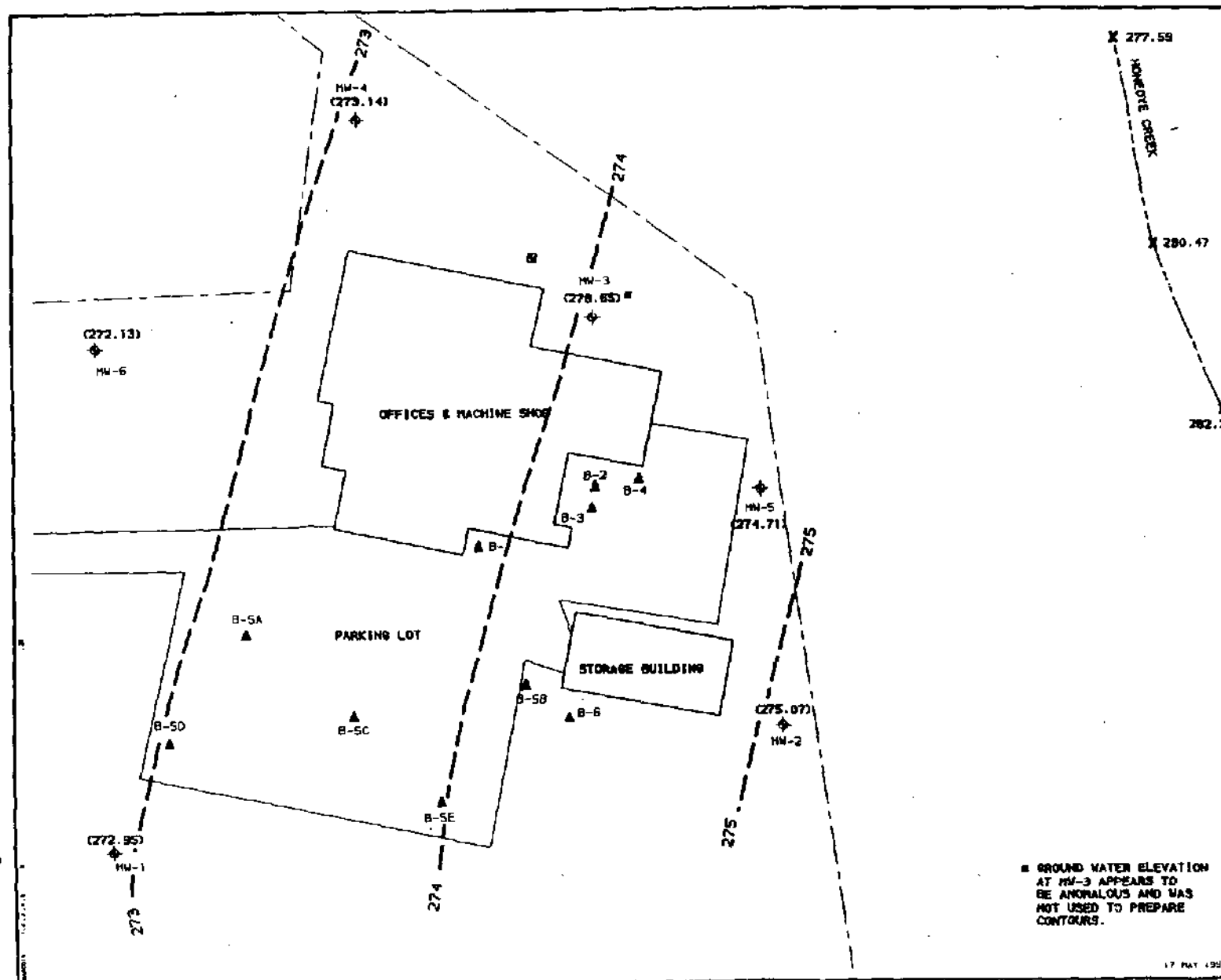


FIGURE 4
ENARC-0 MACHINE PRODUCTS
NORTH BLOOMFIELD, NEW YORK



LEGEND

- ◆ MONITORING WELL LOCATION
- ▲ STILL BORING LOCATION
- SUPPLY WELL LOCATION
- - - APPROXIMATE LOCATION OF PROPERTY LINE
- - - CREEK
- X CREEK ELEVATION
- X GROUND WATER ELEVATION
- - - GROUND WATER ELEVATION CONTOUR

POTENTIOMETRIC SURFACE MAP
FEBRUARY 25, 1991

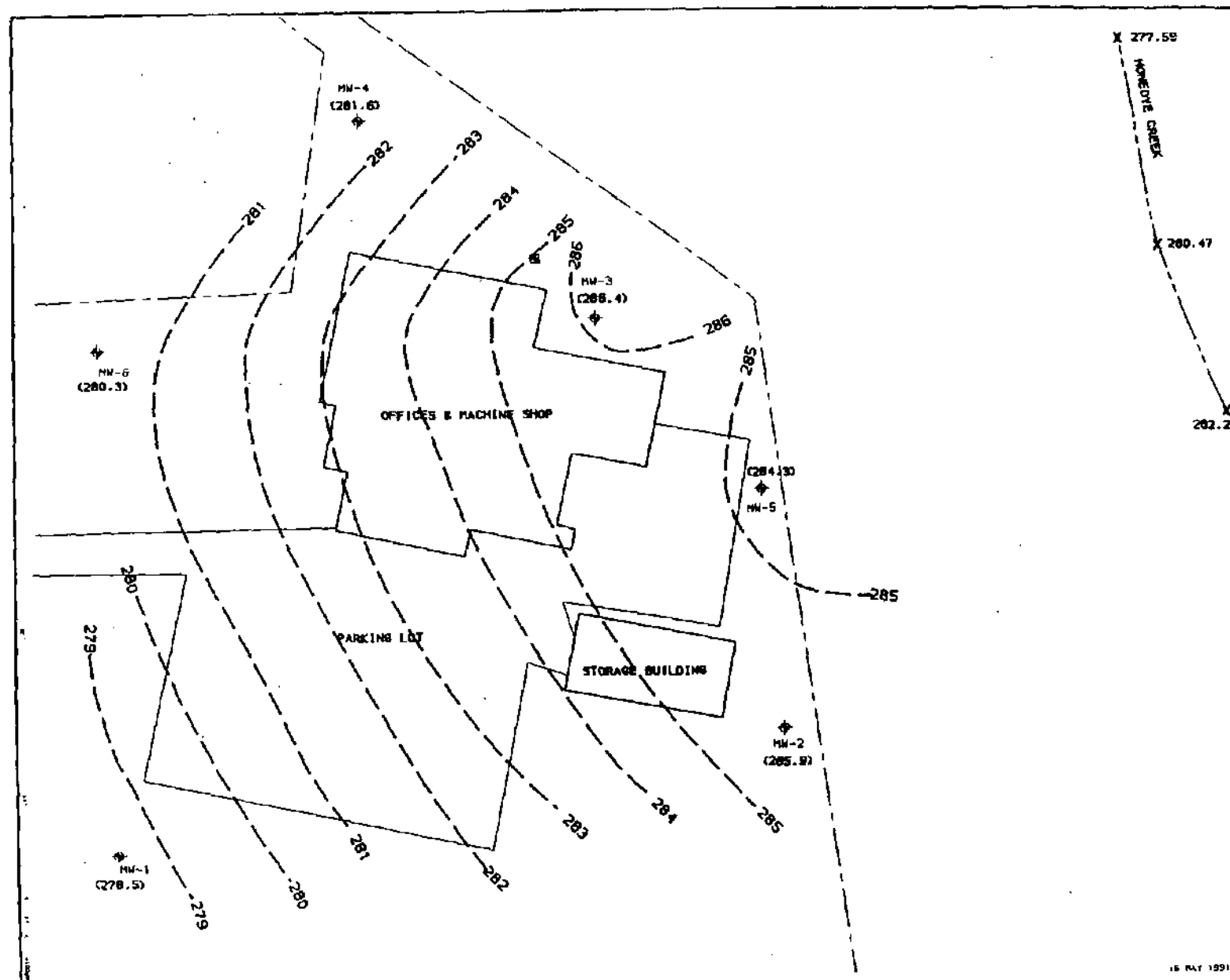


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17 MAY 1991

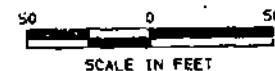
FIGURE 5
ENARC-O MACHINE PRODUCTS
NORTH BLOOMFIELD, NEW YORK



LEGEND

- ★ MONITORING WELL LOCATION
- SUPPLY WELL LOCATION
- - - APPROXIMATE LOCATION OF PROPERTY LINE
- - - CREEK
- X CREEK ELEVATION
- - - BEDROCK SURFACE CONTOUR
- (284.3) BEDROCK ELEVATION

BEDROCK SURFACE
CONTOUR MAP



2387.006.730

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ENGINEERS, INC.

15 MAY 1991

44

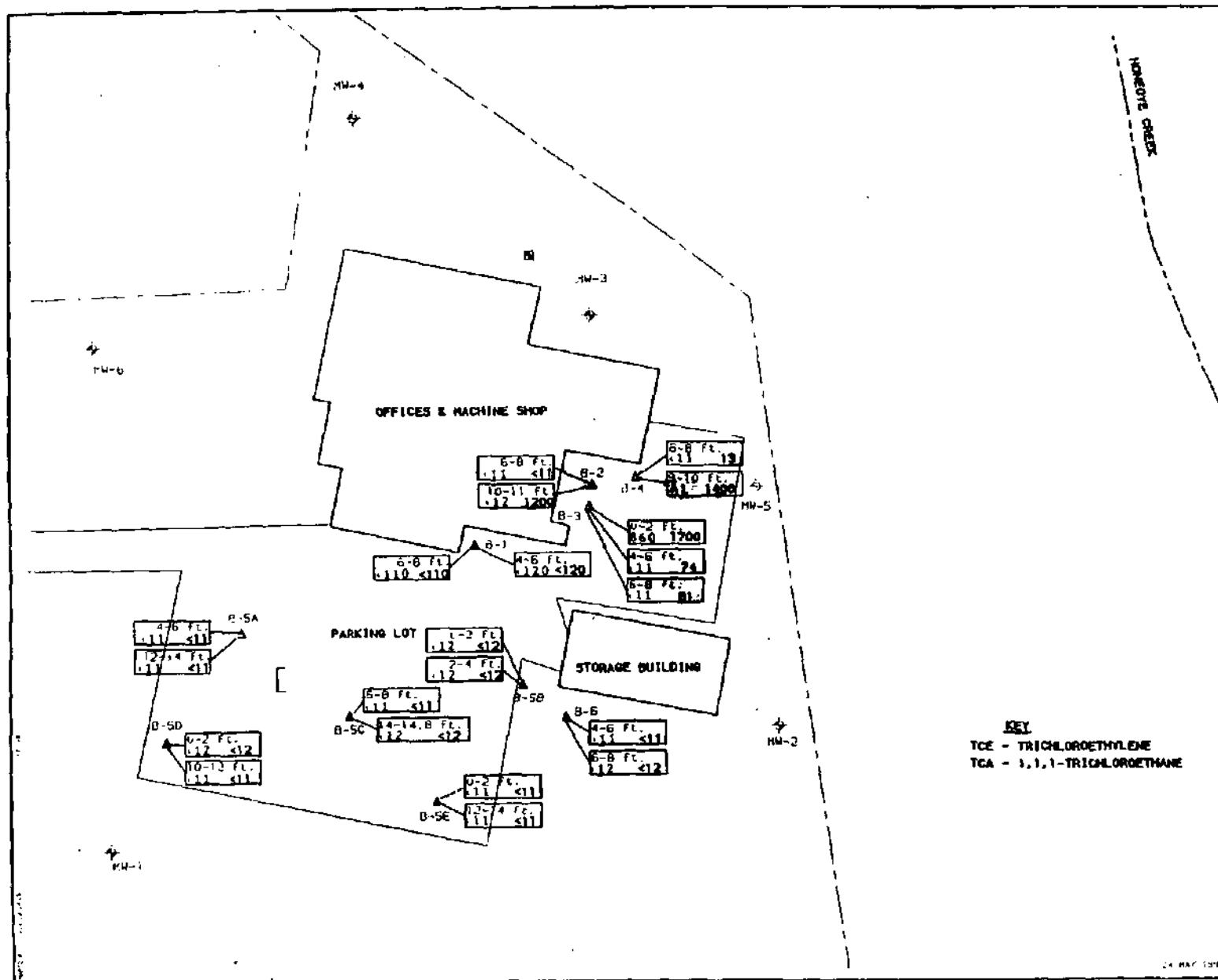


FIGURE 6
ENARC-O MACHINE PRODUCTS
NORTH BLOOMFIELD, NEW YORK

LEGEND

- MONITORING WELL LOCATION
- ▲ SOIL BORING LOCATION
- ⊕ SUPPLY WELL LOCATION
- - - APPROXIMATE LOCATION OF PROPERTY LINE
- - - CREEK

DEPTH	TCE
0-8	11
10-11	120

KEY
TCE - TRICHLOROETHYLENE
TCA - 1,1,1-TRICHLOROETHANE

SOIL SAMPLE ANALYTICAL DATA

NOTE: CONCENTRATION IN ug/kg
DRY WEIGHT.



2387.06.730



24 MAY 1987

45

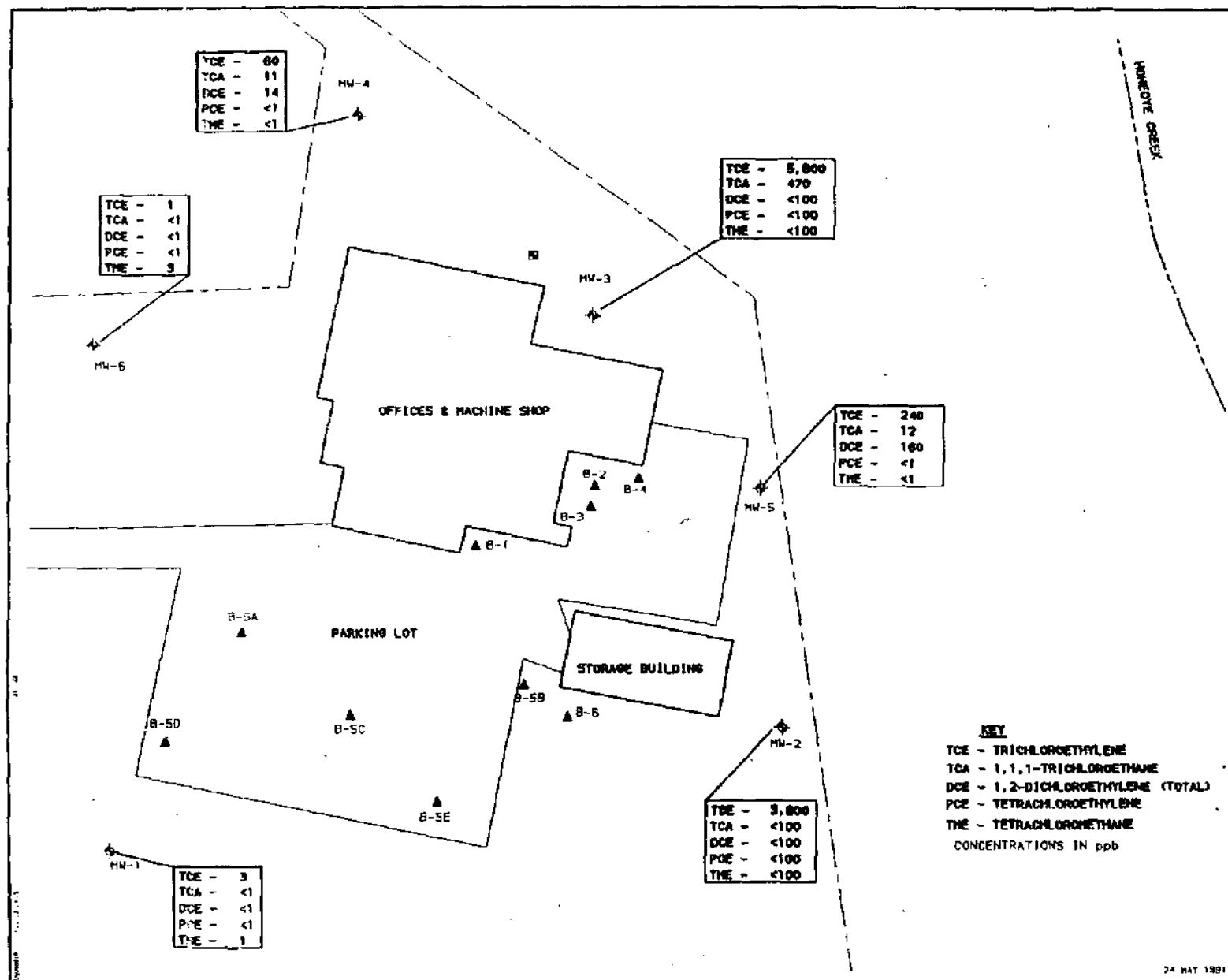


FIGURE 7
ENARC-0 MACHINE PRODUCTS
NORTH BLOOMFIELD, NEW YORK

LEGEND

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- SUPPLY WELL LOCATION
- APPROXIMATE LOCATION OF PROPERTY LINE
- CREEK

GROUND WATER
QUALITY MAP
JANUARY 7 & 8, 1991

50 0 50
SCALE IN FEET

2387.008.730

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SPS, INC.

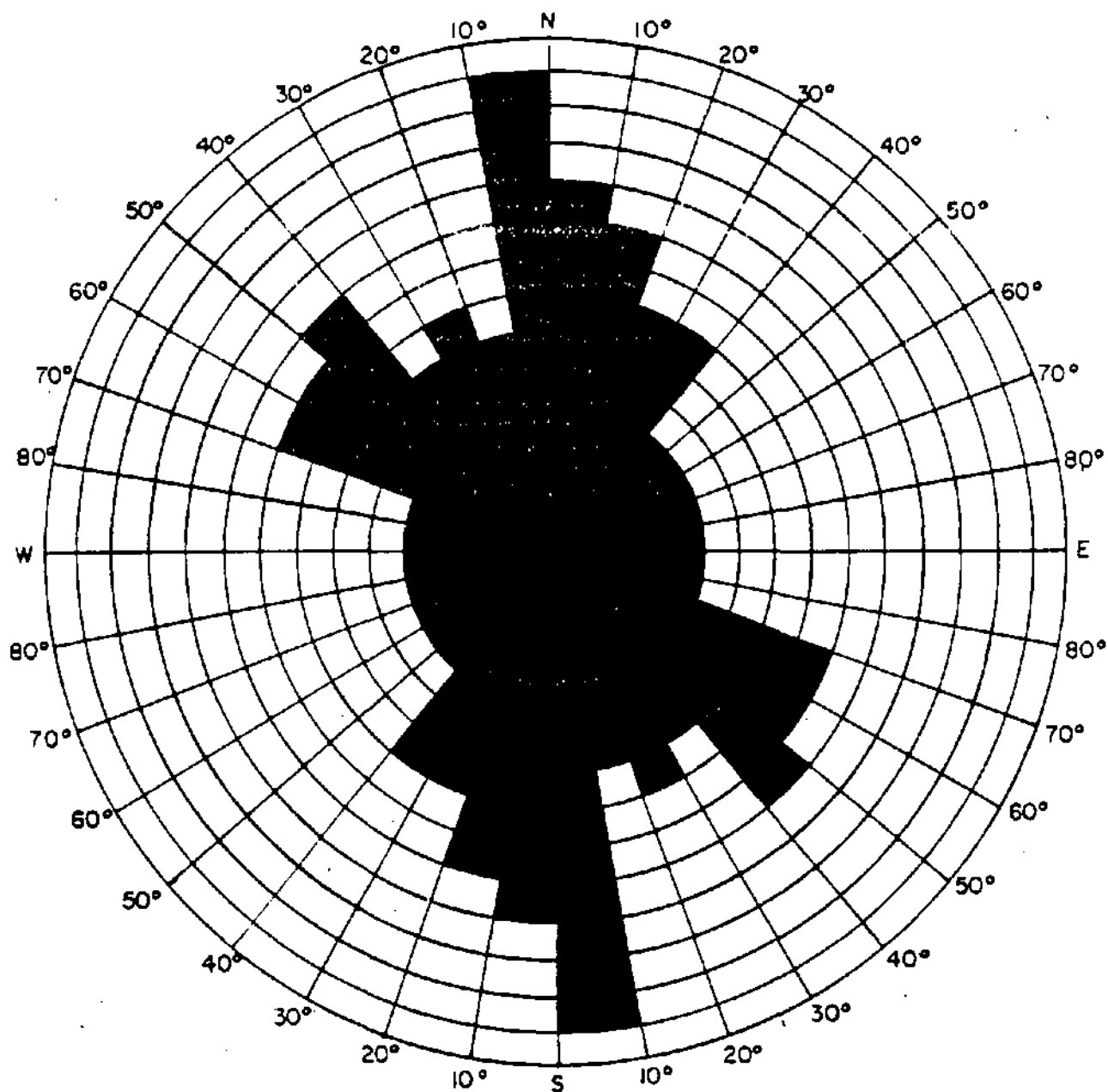
24 MAY 1991

Appendices

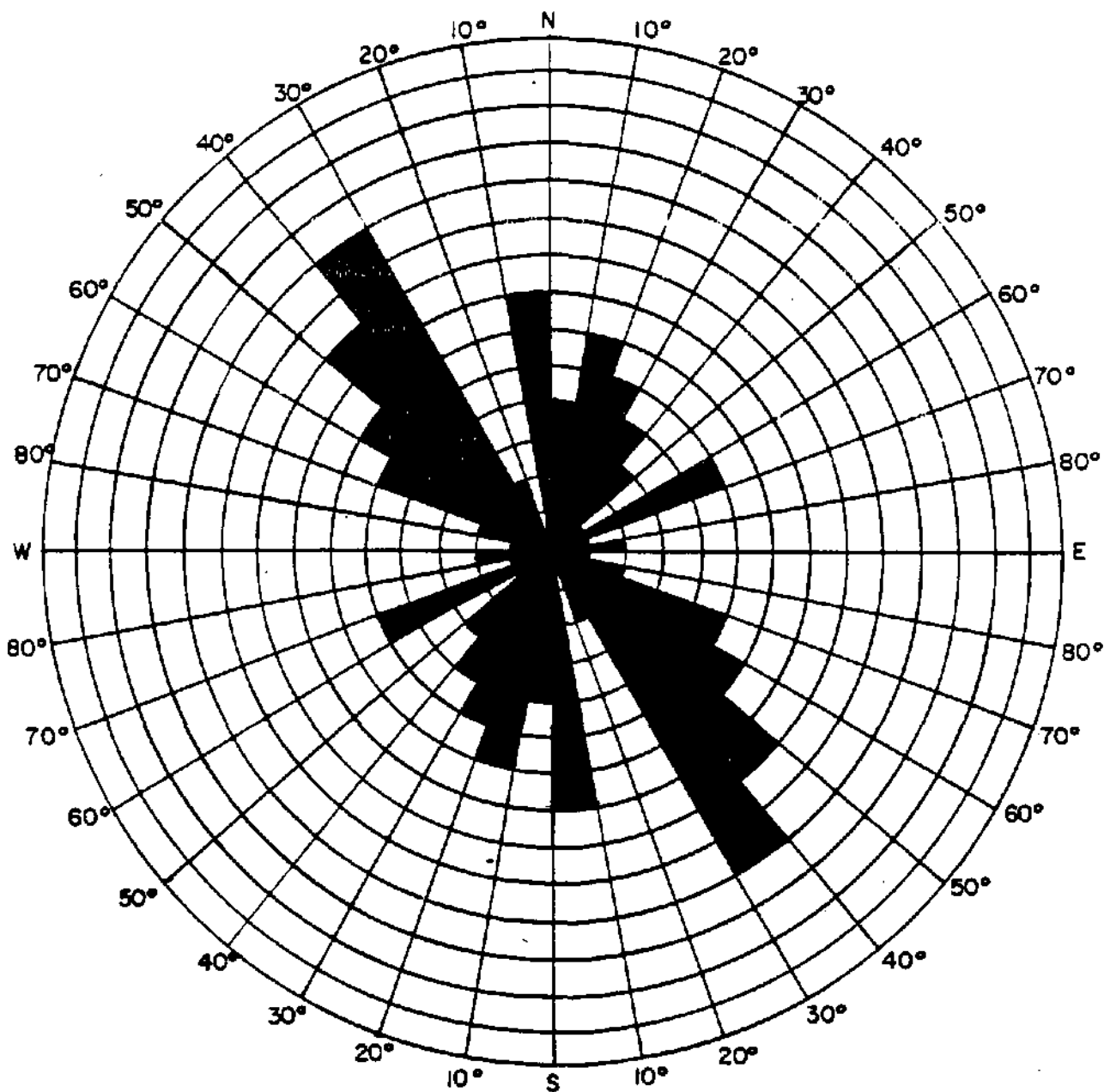


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APPENDIX A
FRACTURE TRACE ANALYSIS DATA



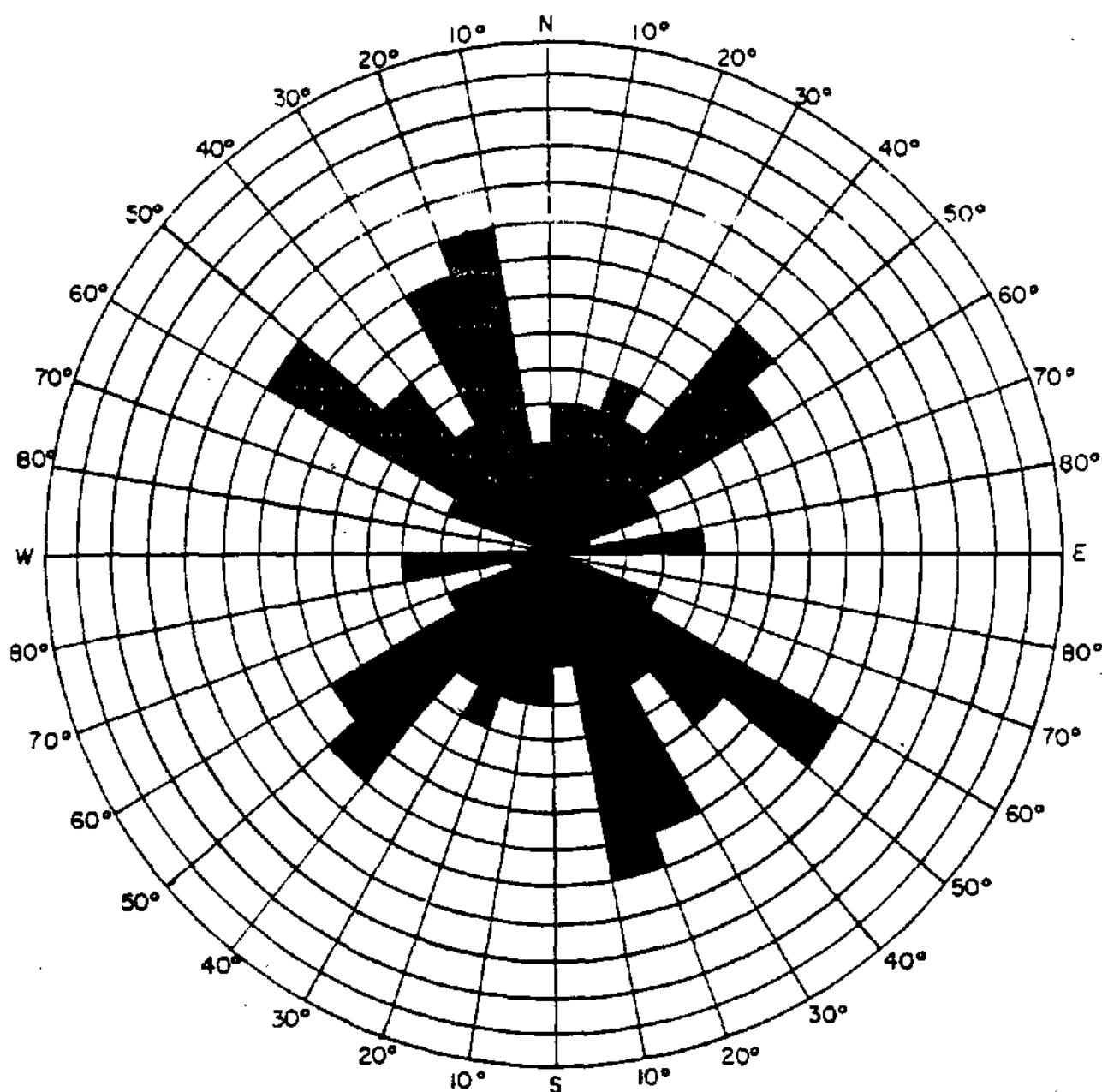
FRACTURE TRACE ANALYSIS
TOPOGRAPHIC MAP
KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK



FRACTURE TRACE ANALYSIS
AIR PHOTO JUNE 21, 1938
KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK

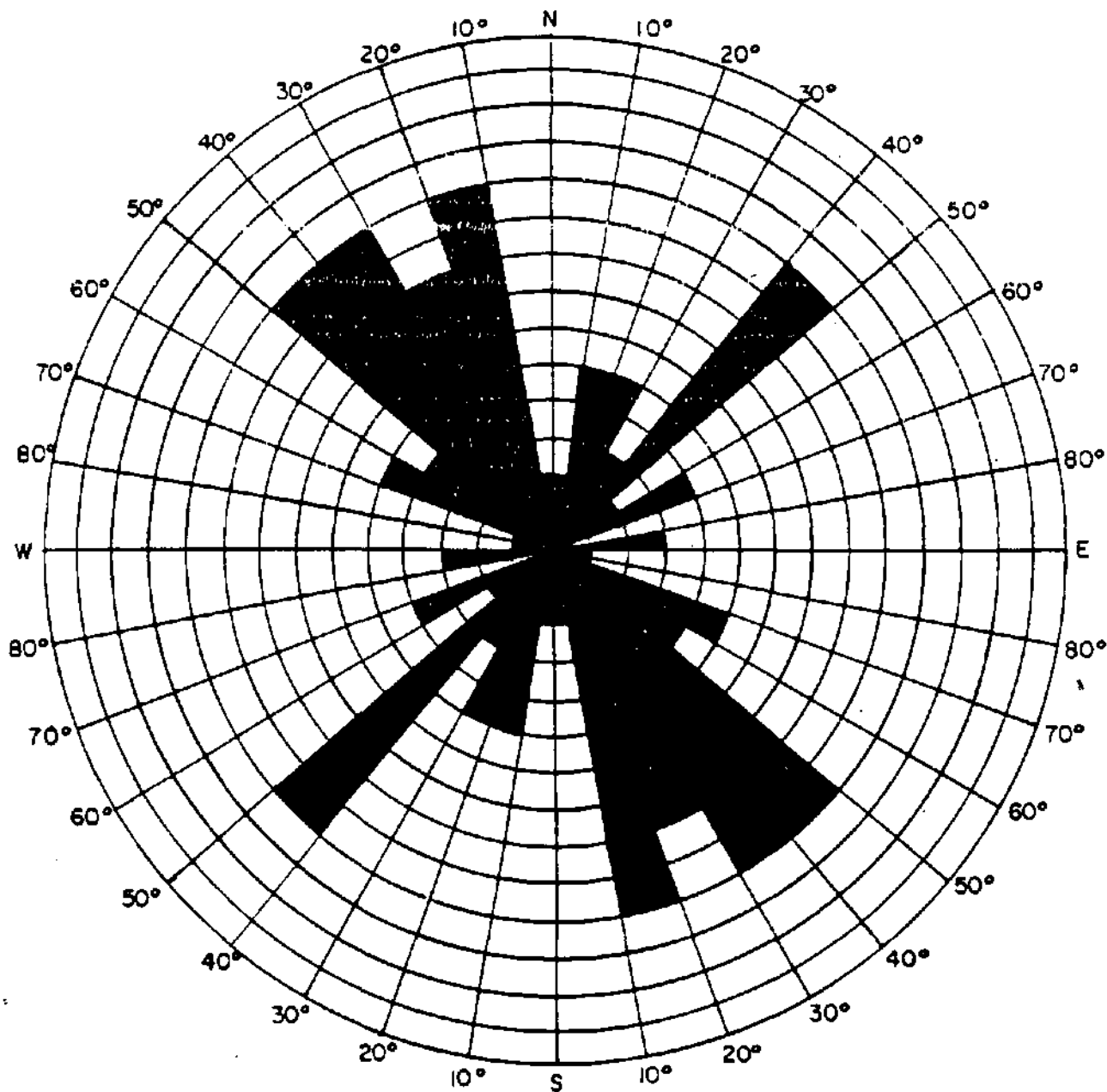
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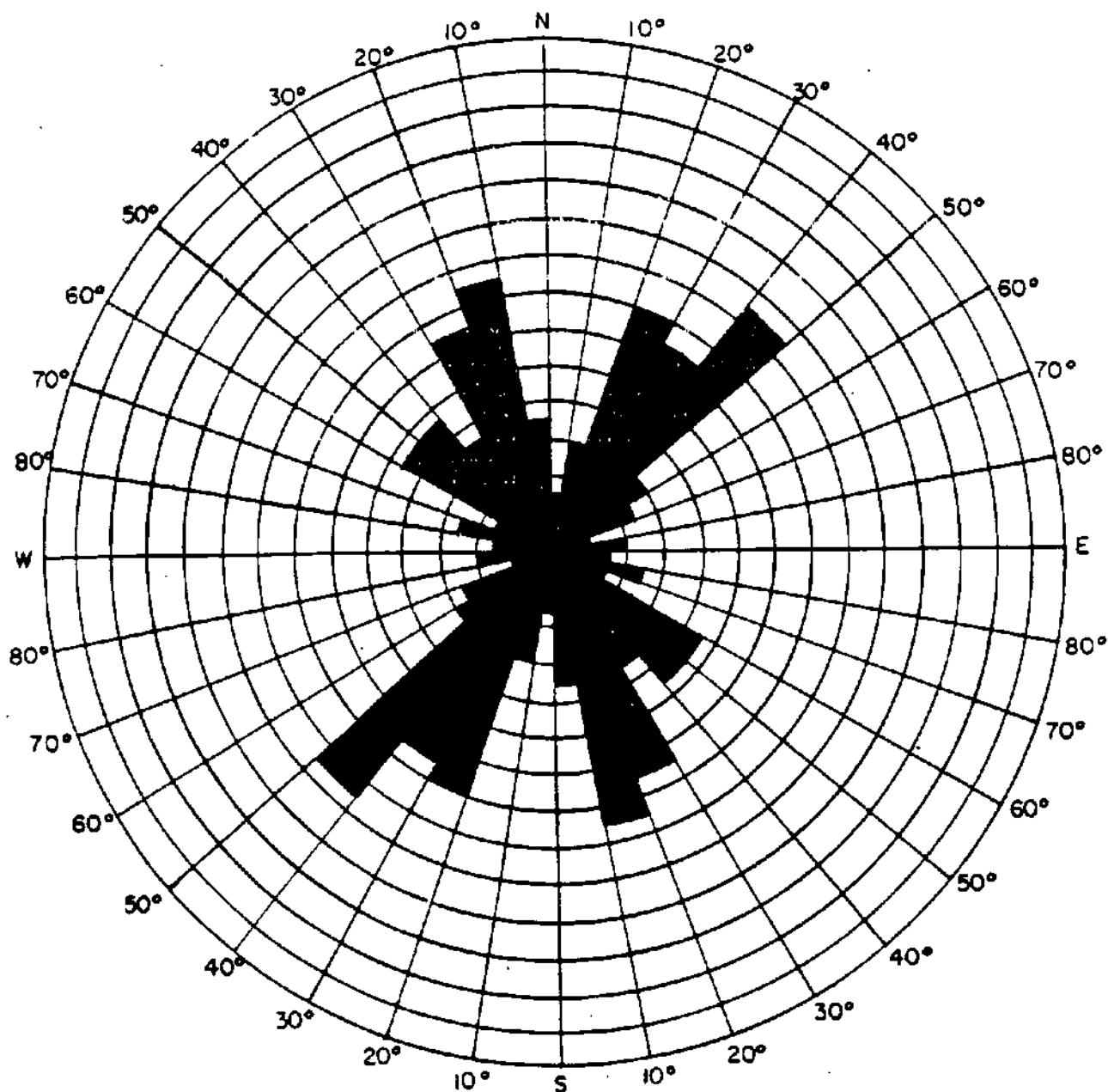
FRACTURE TRACE ANALYSIS
AIR PHOTO AUGUST 27, 1954
KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFELD, NEW YORK

51



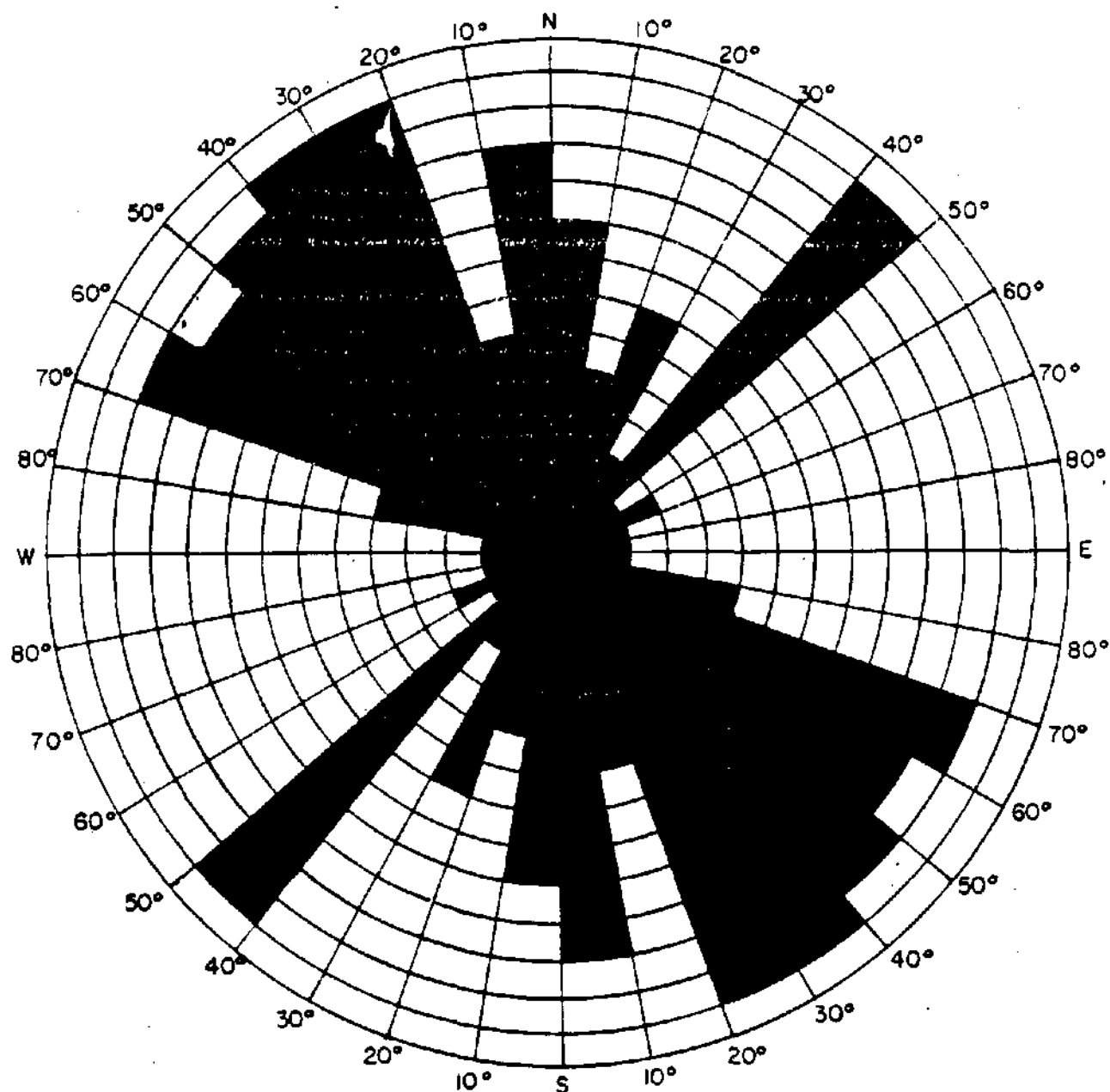
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KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK

S2



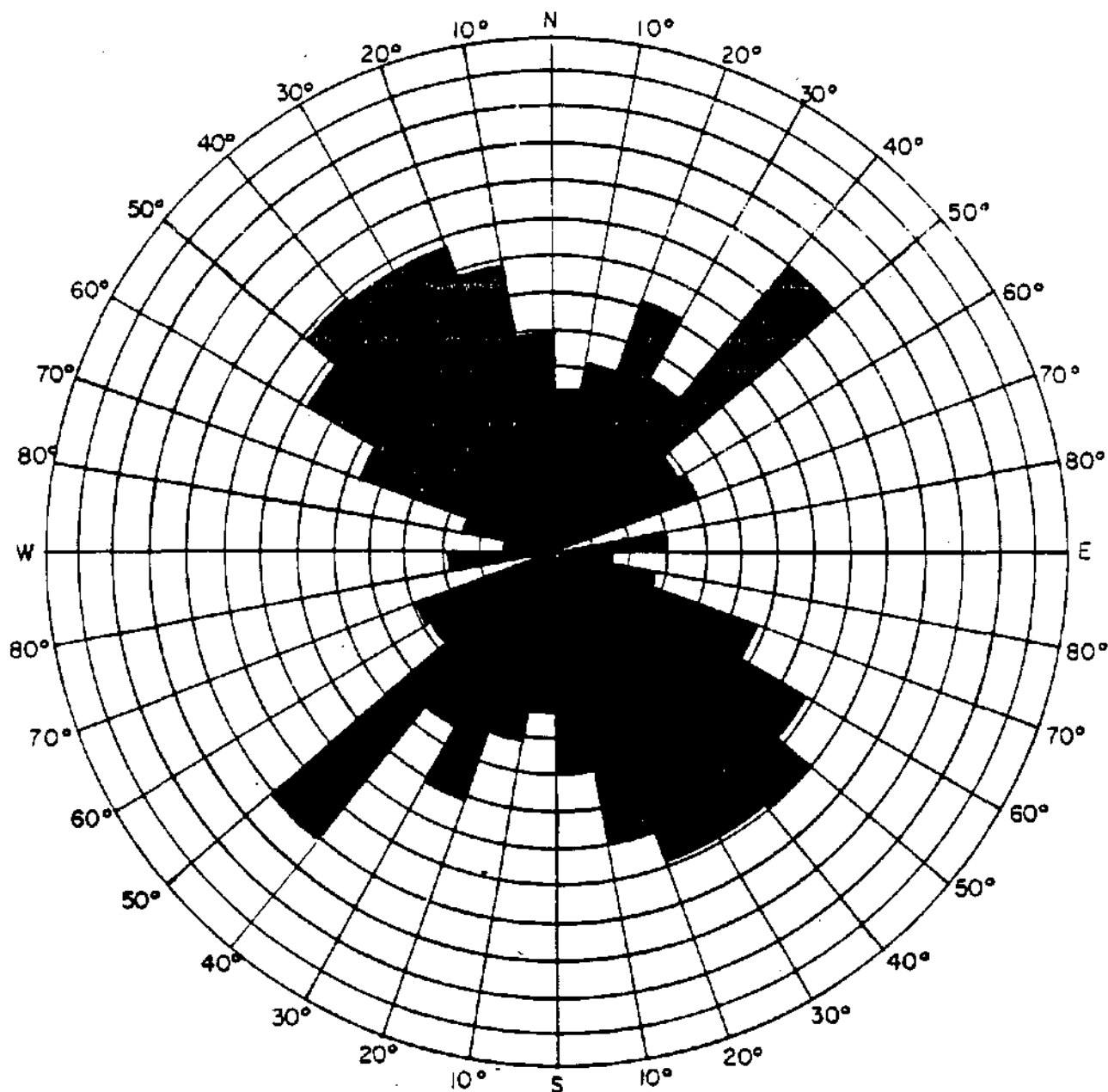
FRACTURE TRACE ANALYSIS
AIR PHOTO OCTOBER 24, 1975
KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK

S3



FRACTURE TRACE ANALYSIS
AIR PHOTO MAY 5, 1982
KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK

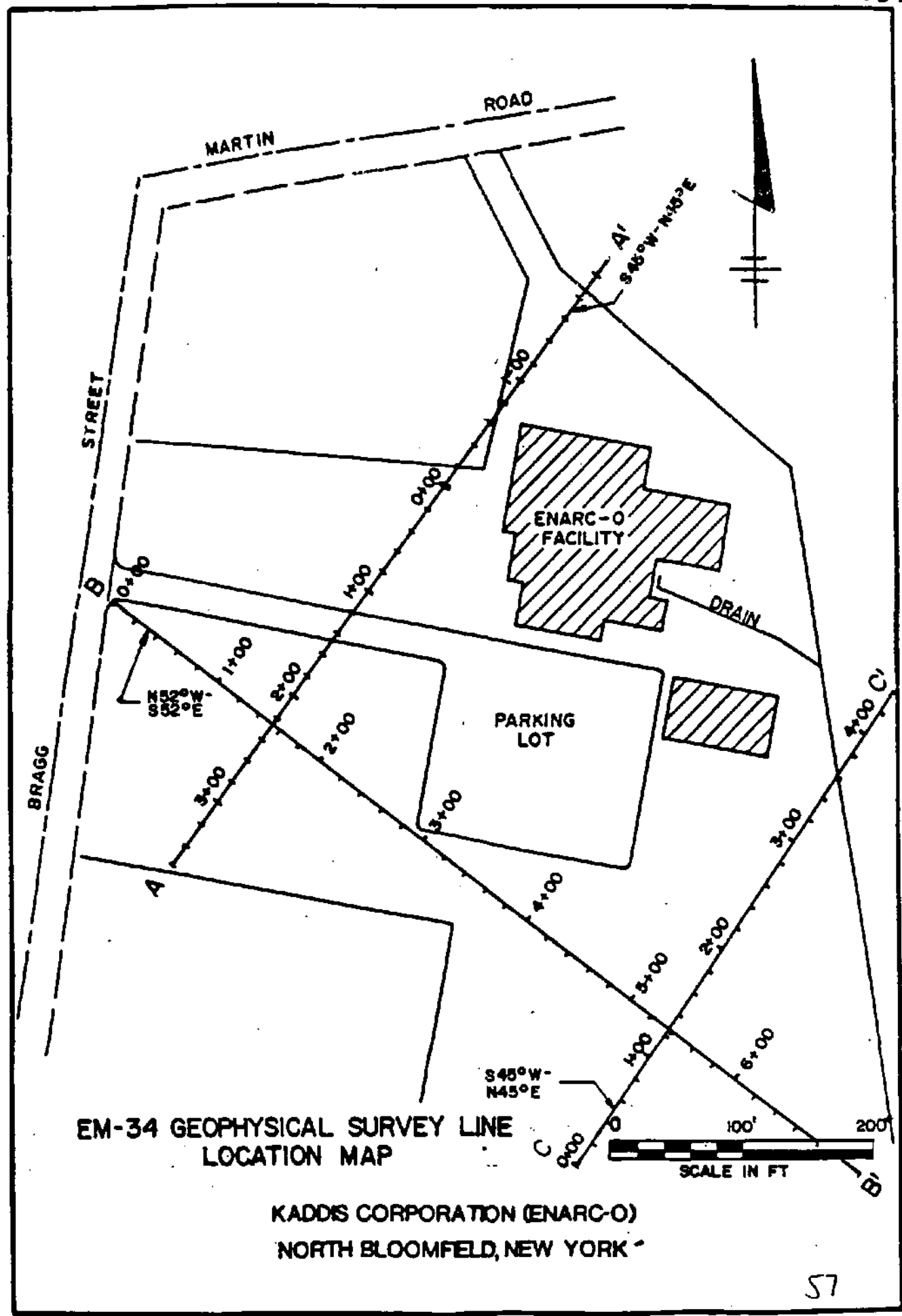
54



FRACTURE TRACE ANALYSIS
AIR PHOTOS (CUMULATIVE)
KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK

SS

APPENDIX B
GEOPHYSICAL SURVEY DATA



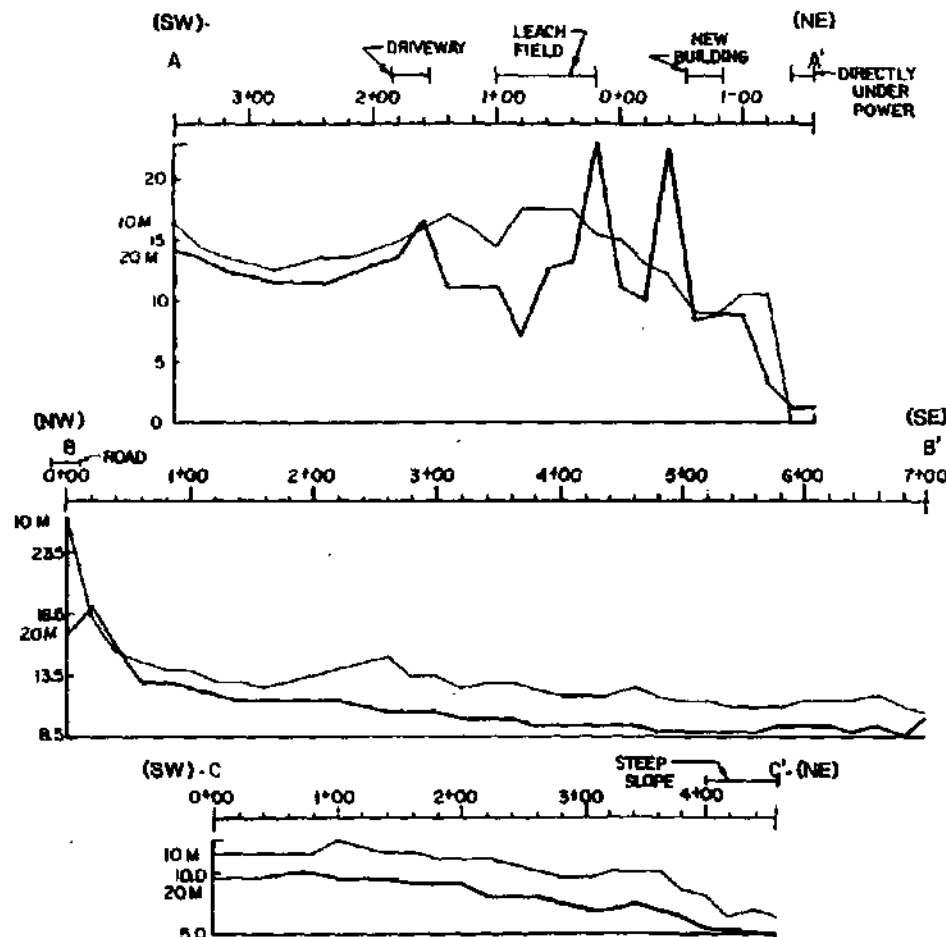
EM-34 GEOPHYSICAL SURVEY LINE
LOCATION MAP

KADDIS CORPORATION (ENARC-O)
NORTH BLOOMFIELD, NEW YORK

FIGURE 8-2

KADIS CORPORATION (ENARC-0)
NORTH BLOOMFIELD, NEW YORK

EM-34 GEOPHYSICAL SURVEY
VERTICAL PROFILES



LEGEND

- 10M COIL SPACINGS
- - - 20M COIL SPACINGS

NOTE:
VERTICAL SCALE IN mmhos/m

HORIZONTAL SCALE
0 100 200
SCALE IN FEET

APPENDIX C
BORING AND WELL LOGS

C. BRIEN & GENE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. MB-1 Sheet 1 of 2				
Project Location: Horseys Falls, New York					SAMPLER		Ground Water Depth	Date			
Client: Enarco Machine					Type: Split Spoon Manner: 140 lbs.		Depth	Date			
Boring Co.: Barrett-Holiff, Inc. Foreman: Alan Buck CRG Geologist: Paul Gottler					Boring Location: South West corner of site Ground Elevation: Datum: Started: 12/4/90		Ended: 12/4/90				
Depth	Sample				Sample Description	Stratigraphic Change General Description	Equipment Installed	Field Testing			
	No	Depth	Blows / 6"	Penetr./ Recovery				"N" Value	pH	Sp Cond	ORP
0	1	0-2'	1-1-0-4	2'/1.1'	9	Moist sand to 0.3'					
						Moist, dark gray and brown SSB with organics, grading to damp, sandy gravel with silt and clay, brown and tan SSB, some brown clay, coarse to very fine granitic gravel and limestone					
2	2	2-4'	4-0-20-21	2'/1.2'	28	Damp, red brown CLAY, with silt, minor gravel and little medium to fine orange sand, white gray precipitate in fractures, parallel laminations					
4	3	4-6'	10-10-35-40	2'/1.2'	53	As above with many fractures, very fine to medium gravel, parallel laminations approximately 30 cm. apart					
6	4	6-8'	24-25-50/0.4'	2'/1.5'	—	As above, with coarse limestone gravel, fractures filled with CaCO ₃ and FeO, light brown-tan precipitate					11
8	5	8-10'	12-45-50/0.3'	2'/1.7'	—	Damp, as above, with increasing FeO precipitate, also (Wd) black precipitate to 9.5'					11
						Damp, light brown-brown SSB distinct					
10	6	10-12'	15-23-33-38	2'/1.5'	36	Damp, brown-brown red CLAY and SILT, minor gravel. Black and FeO yellow-orange precipitate (Black precipitate in vertical fractures)					
12	7	12-14'	5-10-18-23	2'/1.4'	28	Damp, as above, parallel laminations, yellowish precipitate to 13.6'					
						Moist-sat, gray SILT with minor clay, minor gravel, parallel laminations					11
14	8	14-16'	10-25-40-35	2'/1.7'	65	Wet, as above, large limestone pebbles to 14.7'					
						Damp, brown-red brown, CLAY and SILT with minor gravel and sand to 15.8'					
						Wet gray gravel with sand, silt and clay to 16.3'					
Casing set at 16.5'											

(RM).KJF

O'BRIEN & REE ENGINEERS, INC.						TEST BORING LOG		Report of Boring No. RB-1 Sheet 2 of 2			
Project Location: Honesdale Falls						Type: Core Barrel		Ground Meter Depth		Date	
Client: Emery-O Machine Products, Inc.						Number: Fall		File No.:			
Boring Co.: Ferratt-Holiff, Inc.						Boring Location: SW corner of site		Ground Elevation:		Date: Started: 12/4/90	
Foreman: Mark Beck						Date: Started: 12/4/90		0730		Ended: 12/4/90	
CNS Geologist: Paul Bottler											
Depth	Sample					Sample Description	Stratigraphic Change General Description	Equipment Installed	Field Testing		Remarks
	No	Depth	Blows /6"	Penetration Recovery	"P" Value				pH	So. Cond.	
		18.5 to 23.5	5.0/4.9			Gray-dark gray Limestone					
18.5		RSD-975				Naturally occurring horizontal fractures					
19.2						Flow deposits	19.4'				
21.9						Dark gray-black Chert	22.1'				
						Limestone as above					
22.3						Flow deposits	22.5'				
22.5						Gray-light gray CLAY and SILT					
22.6	22.5 to 23.5	5.0/4.9				Limestone as above					
23.1		RSD-975				Natural horizontal fractures					
24.5						Solution cavity	24.9'				
27.0						Gray-light gray CLAY and SILT	27.1'				
27.1						Limestone as above					
29.8	29.5 to 31.5	5.0/5.0				Dark gray-green Chert	30.1'				
30.1		RSD-928				Limestone as above					
30.4						Gray, light gray CLAY, trace silt					
30.5						Limestone as above					
31.5						Gray-light gray CLAY, trace silt					
31.6						Limestone as above					
32.1						Gray-green Chert	32.3'				
34.0						Bottom of boring at 34.0 ft.	34.0'				
						Fossils throughout include: Brachiopods Crinoids Bryozoans Molluscs (silica replaced)					
						Flow deposits are gray-light gray limestone but contain flow features.					

RSD = Rock Quality Density
Average RSD = 96%

O'BRIEN & GERE ENGINEERS, INC.						TEST BORING LOG		Report of Boring No. MB-2 Sheet 1 of 2			
Project Location: Horseys Falls, New York						Type: Solid Spoon Number: 140 lbs.		Ground Water Depth Depth		Date	
Client: Enertec Machine						Fall: 30 inches		File No.:			
Boring Co.: Perrett-Moff, Inc. Foreman: Mark Beck CBE Geologist: Paul Böttler						Boring Location: Ground Elevation: Date: Started: 12/7/90		Ended: 12/7/90			
Depth	Sample					Sample Description	Stratigraphic Change General Description	Equipment Installed	Field Testing		
	No.	Depth	Bin No.	Penetr./Recovery	SP Value				Sp	Comp	Moist
0	1	0-2'	1-1-8-4	2' / 1'	3	Moist sand to 0.4'					
						Moist, brown-red brown sand to fine sand and red clay, parallel laminations, organic and roots to 1.1'					
2	2	2-4'	2-4-9-11	2' / 1.6'	13	Moist, brown-red brown clay and silt with fine to medium well rounded gravel to 2.8'					
						Moist sand with gravel to 2.5'					
						As above, parallel laminations, fine pebbles, increasing silt					
4	3	4-6'	3-10-	2' / 1'	40	Damp, as above, 10 axis pebbles vertical and horizontal, light brown and white-gray precipitate					
			22-26								
6	4	6-8'	15-50/0.4	2' / 0.6'	—	Damp to dry, as above (Fine pebbles & axis horizontal, medium pebbles & axis vertical)					
8	5	8-10'	16-35-	2' / 1.3'	80	Damp, as above with dark red and rust-orange FeO stain in vertical and horizontal fractures to 9.7' (Sand with pebbles)					
			45-55								
10	6	10-12'	18-29-	2' / 1.1'	62	Damp to dry, as above with increased gravel, less clay, slightly lighter color to base					
			33-42								
12	7	12-14'	13-14-	2' / 1.6'	27	Damp, brown clay with trace silt and gravel to 13.4'					
			13-53			Damp, appears massive, gray-brown gray mud with gravel					
						Dry, gray LIMESTONE bedrock					
						Augered 4" into rock					
14						Casing set at 14.7 ft.	14.5'				

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O'BRIEN & BERE ENGINEERS, INC.					TEST BORTAR LOG		Report of Boring No. MB-2 Sheet 2 of 2			
Project Location: Hamsaya Falls					COMPLET		Ground Water Depth Data			
Client: Lincoln Machine Products, Inc.					Type: Core Barrel		File No.:			
Boring Co.: Perrett-Wolff, Inc.					Boring Location:		Boring Location:			
Foreman: Mark Bach					Ground Elevation:		Ground Elevation:			
OBG Geologist: Paul Guttler					Dates: Started: 12/10/90		Dates: Started: 12/10/90			
					0953		Ended: 12/10/90			
Depth	Sample				Sample Description	Stratigraphic Change General Description	Equipment Installed	Field Testing		
	No.	Depth	Blow / 6"	Density/ Recovery				Sp. Cond.	pH	Temp
		14.7 to 16.5	3.6/3.6		Gray-light gray Limestone					
14.8			RQD=55%		White-gray Chert with FeO stain	14.5'				
14.9					Limestone as above	16.5'				
15.3					Fracture approximately 20 degrees off horizontal	15.7'				
17.7					Highly fractured Limestone and Chert	18.2'				
		18.5 to 22.8	4.2/4.0							
18.5			RQD=75%		White-gray Chert with FeO stain	18.5'				
18.6					Limestone as above	22.9'				
		22.8 to 27.8	3.0/4.6							
22.9			RQD=75%		Dark gray-light gray Chert	23.2'				
23.2					Gray Bentonite layer	23.3'				
23.3					Limestone as above	27.8'				
					Horizontal fracture	@ 23.5'				
					As above	@ 23.6'				
					As above	@ 24.1'				
					As above	@ 24.3'				
27.8					Gray-light gray Chert	28.1'				
28.1					Limestone as above	32.0'				
		29.0 to 32.2	3.2/3.2		Horizontal fracture	@ 29.0'				
			RQD=65%		As above	@ 29.5'				
					As above	@ 30.1'				
					As above	@ 30.7'				
32.0					Gray-dark gray Chert	32.1'				
32.1					Limestone as above	36.0'				
		32.2 to 36.0	3.8/3.8		Horizontal fracture	@ 32.3'				
			RQD=75%		As above	@ 32.7'				
					As above	@ 34.5'				
					As above	@ 34.7'				
					As above	@ 34.8'				
34.9					Vertical fracture	35.1'				

RQD = Rock Quality Density
Average RQD = 75%
Fossils as per MB-1

Bottom of boring at 36.0 ft.

MB-2.c

O'BRIEN & GENE ENGINEERS, INC.						TEST BORING LOG		Report of Boring No. MB-3 Sheet 1 of 2			
Project Location: Horseys Falls, New York						SAMPLER Type: Split Spoon Number: 140 lbs.		Ground Meter Depth		Data Date	
Client: Enarco Machine						Falls: 30 inches		File No.:			
Boring Co.: Perrett-Mallory, Inc. Foreman: Mark Bach CDS Geologist: Paul Guttler						Boring Location: Ground Elevation: Boring Started: 12/5/90		Ends: 12/6/90			
Depth	Sample					Sample Description	Stratum Change Number Description	Equipment Installed	Field	Testing	Notes
	No.	Depth	Slows /6"	Penetration Recovery	"N" Value						
0	1	0-2'	2-4-3-3	2'/1.1'	7	Damp sand to 0.4'					
						Notes: brown-light brown, coarse to fine SAND, fine, with rounded gravel, some clay, little silt, parallel laminations					
2	2	2-4'	2-2-4-6	2'/0.7'	6	Damp, as above, large red sandstone pebble to 2.7'					
						Damp, red-red brown CLAY and SILT with minor gravel					
4	3	4-6'	7-13-23-25	2'/1.1'	35	Damp, as above with FeO staining in fractures (90° horizontal), medium to very fine gravel (all axis vertical on east pebbles)					
6	4	6-8'	21-27-30/0.4'	2'/1.1'	—	Damp, clayey silt with minor gravel. Fractures are common, random alignment of pebbles					
8	5	8-10'	10-25-38-47	2'/1.1'	63	Damp, as above, trace of fine gravel coarse sand, increasing silt					
10	6	10-12'	10-19-33-38	2'/1'	52	Damp, as above with gravel, very faintly laminated					
12	7	12-14'	28-30/0.1	2'/0.2'	—	Dry gneissic boulder/pebble Casing set at 12.5 ft.					
14											

1992.1.17

O'BRIEN & GENE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. MB-3 Sheet 2 of 2			
Project Location: Honeya Falls					Type: Rock Cover		Ground Water Depth	Date		
Client: Charco Machine Products, Inc.					Name: Falls		File No.:	Date		
Boring Co.: Permett-Mallory, Inc. Foreman: Mark Beck OBS Geologist: Paul Gattler					Boring Location: NE side of site Ground Elevation: Bottom Marked: 12/5/90		Ended: 12/12/90			
Depth	Sample				Sample Description	Stratigraphic Change General Description	Equipment Installed	Field Testing		
	No.	Depth	Blind / ft	Penetr./ Recovery				Sp Cond	PH	W
12.6	12.7	to 16.0	2.2/2.1		Gray-dark gray Limestone					
12.7			RQD=65%		Gray-light gray CLAY, trace silt	12.8'				
	13.0	to 16.0	1.0/1.0		Limestone as above					
13.1			RQD=33%		Flow deposit					
13.2					Light gray-gray green Chert	12.5'				
13.3					Limestone as above	14.1'				
13.8					Flow deposit	13.9'				
14.1					Dark gray-black Chert	14.3'				
14.3					Limestone as above					
	16.0	to 21.0	5.0/5.0							
16.1			RQD=67%		Dark gray-black Chert	16.3'				
16.3					Limestone as above	16.3'				
18.3					Light gray-gray CLAY, trace silt	18.4'				
18.4					Limestone as above					
19.1					Light gray-gray CLAY, trace silt	19.2'				
20.6					Limestone as above	20.7'				
	21.0	to 25.0	5.0/5.0							
22.1			RQD=80%		Vertical fracture	22.4'				
23.0					Dark gray-black Chert	23.2'				
					Limestone as above					
24.1	25.0	to 28.0	2.0/2.0		Natural horizontal fracture					
24.8			RQD=0%		As above					
24.9					Natural vertical fracture at 45 degrees	25.1'				
25.1					Gray-gray green Chert	25.2'				
25.2	28.0	to 33.1	5.1/5.0		Limestone as above	33.1'				
28.1			RQD=65%		Vertical fracture	28.3'				
28.1					Horizontal fracture	29.3'				
33.1						33.1'				
Bottom of boring at 33.1 ft.										

RQD = Rock Quality Density
Average RQD = 65%
Fossils as per MW-1

O'BRIEN & GENE ENGINEERS, INC.				TEST BORING LOG		Report of Boring No. AB-4 Sheet 1 of 2				
Project Location: Honeoye Falls, New York				SAMPLER Type: Split Spoon Number: 140 lbs.		Ground Water Depth	Date			
Client: Enertec Machines				Fall: 30 inches		File No.:	Date			
Boring Co.: Barrett-Moffitt, Inc. Foreman: Mark Beck DBS Geologist: Paul Gottler				Boring Location: North West portion of site Ground Elevation: Dates Started: 12/10/90		Ended: 12/10/90				
Depth	Sample			Sample Description	Stratigraphic Change Interval Describe	Equipment Installed	Field Testing pH	Soil Cond	Testing ASTM	Remarks
	No.	Depth	Blows /ft							
0	1	0-2'	1-2-2-3	2' / 0.7'	4	Soil to 0.4'				
						Dark, dark brown red SANDY SILT, with minor gravel, red brown clay with well rounded gravel, some coarse to fine sand, faint parallel laminations				
2	2	2-4'	3-2-2-3	2' / 0.6'	4	Dark, as above with increasing clay towards bottom				
4	3	4-6'	2-12-	2' / 1.1'	30	Dark, brown-red brown CLAY and SILT with rounded to angular pebbles, dark red FeO staining in vertical and horizontal fractures, massive appearance				
			18-22							
6	4	6-8'	40-50/0.4	2' / 0.7'	—	Dark, as above with white/gray and dark red precipitate in vertical and horizontal fractures, increasing silt, very faintly laminated approximately 60/cm				
8	5	8-10'	23-37-	2' / 1.6'	42	Dark, as above with laminations were obvious, moist sand and clay pods at 8.5' and 9.6' (rafted?)				
			35-46							
10	6	10-12'	10-15-		—	Dark, as above with sand pods (rafted?) (Pebbles @ size ~ 45° to 11.0') Moist, gray CLAY with limestone chips, FeO orange rust stain in fracture				
			60/0.3'							
						Augered into limestone bedrock 0.5 ft.				
12						Casing set at 12.6 ft.	12.6'			
14										

1004, R/JF

O'BRIEN & BENE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. MB-5 Sheet 1 of 2				
Project Location: Horseeye Falls, New York					SAMPLER		Ground Water Depth	Date			
Client: Enertec Machines					Type: Split Spoon Number: 140 lbs.		Depth	Date			
Boring Co.: Perrett-Moff, Inc. Foreman: Mark Beck CDE Geologist: Paul Guttler					Boring Location: Ground Elevation: Date Started: 12/5/90		Ends:				
Depth	Sample				Sample Description	Stratigraphic Change General Description	Equipment Installed	Field Testing			
	No.	Depth	Blows / 5"	Penetration/Recovery				Value	pH	So Cond	HM
0	1	0-2'	3-6-12-14	2" / 1.4"	18	Deep sand with fine gravel to 0.4'	0.8'				(1)
						Moist, brown-dark brown SAND and GRAVEL to 0.8', light brown-red brown silt with gravel, trace very fine sand and clay, parallel laminations					
2	2	2-4'	18-37-	2" / 1.1"	---	Deep, as above, well rounded to angular, fine, faceted, gravel, increasing sand, FeO in most horizontal fractures					(1)
			50/0.3'								
4	3	4-6'	21-50/0.4	2" / 0.9"	---	Deep, as above with fewer and finer gravel to 5.2'					
						Met coarse to medium SAND to 5.3'					
						Deep, red-brown CLAY and SILT trace gravel					
6	4	6-8'	47-37-	2" / 1.1"	59	Deep, brown-light brown moderately sorted, coarse to medium SAND with gravel, parallel laminations to 7.5'					
			22-34			Deep, red-brown CLAY with SILT and GRAVEL, parallel laminations					
8	5	8-10'	11-31-	2" / 1.2"	---	Deep, as above with MgO dark red in fractures to 9.3'					
			50/0.3'			Sharp contact					
						Moist gray-green gray distinct 80% gravel, 10% sand, 10% medium limestone pebbles, gray-dark gray					
10		10-11.1	19-37-	2" / 0.7"	---	Moist, as above with large limestone pebbles, weathered rock at 11'	11.1'				
			50/0.1								
						Casing set at 11.1 ft.					

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O'BRIEN & GENE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. M-5 Sheet 2 of 2		
Project Location: Horseshoe Falls					SAMPLER		Ground Water	Depth	Date
Client: Enerco Machine Products, Inc.					Type: Core Barrel	Fall:	File No.:	Depth	Date
Boring Co.: Barrett-Wolff, Inc. Foreman: Herb Beck OGE Geologist: Paul Gottler					Boring Location: Ground Elevation: Date Started: 12/8/90		Ended: 12/11/90		
Depth	Sample				Sample Description	Stratigraphic Change General Description	Equipment Installed	Field Testing	
	No	Depth	Blows / 6"	Penetration / Recovery				Sp	Cond
11.7	11.7	to 13.0	1.3/1.0		Gray-light gray Limestone				
11.9			RQD=0%		Horizontal fracture				
12.1					As above				
12.5	13.0	to 16.7	3.7/1.0		As above				
12.9			RQD=30%		Gray-dark gray Chert	13.0'			
13.0					Limestone as above	13.4'			
13.4	16.7	to 21.7	5.0/4.9		Gray-dark gray Chert	13.5'			
13.5			RQD=75%		Limestone as above	13.7'			
13.7					Gray-dark gray Chert	13.8'			
13.8					Limestone as above	14.8'			
14.8					Gray Clay with trace silt	14.9'			
14.9					Limestone as above	16.7'			
	21.7	to 25.2	4.5/4.5		Flow deposit	@ 15.5'			
			RQD=100%		As above	@ 15.8'			
					As above	@ 16.0'			
16.7					Gray-dark gray Chert	16.9'			
16.9	25.2	to 30.8	4.6/4.6		Limestone as above	21.7'			
			RQD=66%		Natural horizontal fracture	@ 17.1'			
					As above	@ 18.3'			
					Bryozoan colony	@ 21.0'			
21.7					Gray-dark gray Chert	21.8'			
21.8					Limestone as above	22.7'			
22.7					Gray Clay with trace silt	22.8'			
22.8					Limestone as above	23.7'			
23.7					Gray-dark gray Chert in cavity	24.0'			
24.0					Limestone as above				
25.8					Vertical fracture	25.2'			
25.2					Gray-dark gray Chert	25.6'			
25.6					Limestone as above	30.8'			
					Horizontal fracture	@ 26.9'			
					As above	@ 30.1'			

RQD = Rock Quality Density
Average RQD = 55%
Fossils as per M-1

Bottom of boring at 30.8 ft.

M&S, Inc.

O'BRIEN & GENE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. BU-6 Page 1 of 2				
Project Location: Horseys Falls, New York					SAMPLER		Ground Water Depth				
Client: Enerco Machines					Type: Split Spoon Hammer: 140 lbs.		Depth				
Boring Co.: Parrott-Moff, Inc. Foreman: Mark Beck OBS Geologist: Paul Sottler					Boring Location: Ground Elevation: Date Started: 12/4/90		File No.: Date: End:				
Depth	Sample				Sample Description	Stratum Change General Description	Equipment Installed	Field Testing			
	No	Depth	Blow /ft	Penetration / Recovery				Mo Value	pH	So Cond	WU
0	1	0-2'	2-2-2-4	2' / 1.2'	4	Deep sand to 0.4'					
						Moist, brown-light brown medium to fine SAND and SILT with minor clay, some gray to brown clay					
2	2	2-4'	4-8-13-19	2' / 1'	23	Moist to wet SAND and SILT with minor clay, as above					
4	3	4-6'	11-19-	2' / 1.3'	44	Moist, as above to 4.3'					
			25-27			Damp, red brown CLAY and SILT with medium to fine, well rounded, faceted and striated pebbles, increasing silt at bottom					
6	4	6-8'	17-26-	2' / 1.2'	61	Damp, as above to 6.4'					
			37-38			Damp, brown CLAY and SILT with MnO and FeO precipitate, more massive looking, fracture horizontal and vertical (precipitate filled)					
8	5	8-10'	11-20-	2' / 1.4'	57	Sand, brown-red brown, trace gravel					
			37-48			FeO yellow-red, MnO black, some sand					
10	6	10-12'	7-20-	2' / 1'	54	Damp, as above, (FeO only), massive					
			34-40								
12	7	12-12.9'	3-7-	2' / 0.3'	—	Dry, gray CLAY with sand and gravel, trace silt, limestone, gneissic gravel, brown sand					
			50/0.4'								
13	8	13-14'				Gneissic, amphibolite boulder					
14	9	14-17'		2' / 1.6'		Damp, red brown CLAY with trace gravel, massive to 16.6'					
						Moist, gray CLAY with sand, some silt, trace gravel					
		17-18.2'		2' / 0.9'		As above					

Casing set at 18.7 ft.

JMS:KJF

O'BRIEN & BONE ENGINEERS, INC.				TEST BORING LOG		Report of Boring No. MB-6 Sheet 2 of 2				
Project Location: Honeye Falls				SAMPLER		Ground Water	Depth	Date		
Client: Enware-D Machine Products, Inc.				Type: Core Barrel		File No.:		Date		
Boring Co.: Parrett-Molff, Inc.				Boring Location:		Ground Elevation:		Date:		
Foreman: Mark Beck				Dates: Started:		12/5/90		Ended: 12/		
GEO Geologist: Paul Gattler						1243				
Depth	Sample				Sample Description	Stratum Change General Description	Equipment Installed	Field Testing		
	No.	Depth	Blows /ft	Penetr/ Recovery				"H" Value	pH	So Cond
18.7		18.7 to 23.7	5.0/4.9		Gray-light gray Limestone					
		RQD=66%								
21.0					Gray-green gray Chert	21.1'				
21.4					Limestone as above					
					Natural horizontal fracture					
22.4					Gray Clay with trace silt	22.5'				
		23.7 to 28.7	5.0/4.8							
23.8					Gray-light gray Chert	24.0'				
24.0					Limestone as above with vertical fracture	24.3'				
24.3					Gray-light gray Chert	24.4'				
24.4					Limestone as above					
		28.7 to 33.7	5.0/4.9							
27.3					Vertical fracture	27.6'				
27.7					Gray-light gray Clay	27.8'				
27.8					Limestone as above	29.2'				
29.2					Gray-dark gray Chert	29.3'				
29.3					Limestone as above	32.7'				
32.7					Gray-dark gray Chert	32.9'				
		33.7 to 36.7	3.0/2.2		Limestone as above					
		RQD=62%								
33.1					Vertical fracture	33.5'				
33.7					As above	34.9'				
34.9					Gray-light gray Clay with trace silt	35.0'				
35.0					Gray-dark gray Chert	35.7'				
35.7					Limestone as above	36.7'				
36.7					Bottom of boring at 36.7 ft.					
RQD = Rock Quality Density Average RQD = 71% Fossils as per MB-1										

MB-6.cnt

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O'BRIEN & GENE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. B-2 Sheet 1 of 1		
Project Location: Honeye Falls					Type: Split Spoon Hammers: 140 lbs.		Ground Water Depth Depth		Date
Client: Enerco Machines					Fall: 30°		File No.:		Date
Boring Co.: Barrett-Moff, Inc. Foreman: Mark Bach ODS Geologist: Paul Götter					Boring Location: At former solvent tank site Ground Elevations: Dates: Started: 11/29/90		Ended: 11/29/90		
Depth	Sample				Sample Description	Stratigraphic Change General Description	Equipment Installed	Field pH	Testing Soil Conc.
	No.	Depth	Blows /ft	Penetration Recovery					
0	1	0-2'	2-7-8-11	2 1/1.1'	15	Wet, brown SPUD, some clay and silt to 0.7'			
						Wet, black tar to 1.1'			120.
						Wet, brown GRAVEL with sand and silt, trace trace clay to 1.5' Moist, brownish red CLAY and SILT with fine gravel, parallel lami- nations, white-gray (CaCO ₃) precipitate in fractures			280.
2	2	2-4'	12-26-	2 1/1.1'	54	Same as above, increasing silt, medium to fine, round to angular gravel, light brown precipitate			
			28-42						
4	3	4-6'	17-30-	2 1/1.1'	---	Same, as above (with A axis probes verti- cal) and narrow red black FeO in fractures (precipitate)			300.
			50/0.4'						
6	4	6-8'	12-28-40-	2 1/1.1'	---	Same, as above to 5.2'			450.
			50/0.4'			Same, reddish brown CLAY with some silt, fine very fine gravel to 5.6'			
						Same, brownish red SILT and CLAY with gravel			
8	5	8-10'	12-12-	2 1/1.1'	30	Same, as above with very few gravel, (((10% gravel all very fine)), increased clay at bottom of spoon			420.
			18-24						
10	6	10-10.8	15-50-	2 1/0.8'	---	Same, as above to 10.5'			600.
			50/0.3'			Wet, gray diamictite			
						Bottom of boring 10.8 ft.	10.8'		

B4. NJF

J. BARTON & GENE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. 8-4 Sheet 1 of 1			
Project Location: Honeoye Falls					SAMPLER Type: Split Spoon Manner: 140 lbs. Falls: 30"		Ground Water	Depth	Date	
Client: Enarco Machines							File No.:	Depth	Date	
Boring Co.: Perrett-Wolff, Inc. Foreman: Mark Beck CNS Geologist: Paul Götter					Boring Location: At loading dock Ground Elevation: Dates Started: 11/29/90		Ended: 11/29/90			
Depth	Sample				Sample Description	Stratum Change General Description	Equipment Installed	Field Testing pH	So Cond	Testing 400
	No.	Depth	Blows /ft	Penetr/ Recovery						
0	1	0-2'	12-0-	2' / 1.1'	10	10.5'				36.
			11-13		Dry GRAVEL to 0.7' Dry GRAVEL with clay to 1.2' Damp, reddish brown CLAY and SILT with coarse to very fine gravel laminated					
2	2	2-4'	23-28-	2' / 1'	—					
			30/0.4'		Damp, as above, increasing silt grading to fine sand, FeO in fractures, yellow sand throughout					
4	3	4-6'	20-30/0.4	2' / 0.8'	—					
					Damp, SILT, some small rounded, coarse to very fine gravel, little sand, medium light brown-brown color					
6	4	6-8'	28-28-	2' / 1.4'	69					
			41-35		Damp to dry SANDY GRAVEL with silt and clay (gravel 5-axis horizontal), some parallel lamination increasing silt on bottom of spoon to 7.6'. Damp SILT with clay and gravel, dark brown to brown (parallel laminations)					
8	5	8-10'	12-14-	2' / 1.5'	40					
			26-26		Damp, as above with fine gravel grades to increasing clay, color grades to reddish brown to 9.7' Damp, sandy gravel with little silt, trace clay					
10	5	10-10.5	9-50/0'	2' / 0.5'	—					
					Damp, as above to 10.1' Damp CLAY and SILT with gravel, dark brown to brown laminations to 10.4' Damp, gray gravel with sand, little silt, trace clay					
					Bottom of boring 10.5 ft.					

84. HJF

[illegible]

O'Brien & Gere ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. 2-50 Sheet 1 of 1			
Project Location: Honeye Falls					SAMPLER Type: Split Spoon Manner: 140 lbs. Fall: 20"		Ground Water Depth Depth		Date	
Client: Enertec Machines							File No.:		Date	
Boring Co.: Parsons-Moffitt, Inc. Foreman: Mark Bach BMS Geologist: Paul Sottler					Boring Location: NE corner of parking lot Ground Elevation: Dates Started: 11/28/90 Ended: 11/28/90					
Depth	Sample				Stratum Description	Stratum Change General Description	Equipment Installed	Field Testing		
	No.	Depth	Blow /6"	Penetr/ Recovery				W Value	pH	So Cond
0	1	0-2'	9-6-5-6	2' / 0.9"	11	Parking lot gravel to 0.7' Deep, brown red gravel, with some sand, little medium red sandstone gravel				0.7
	2	2-4'	7-6-12-16	2' / 1.3"	20	Deep, CLAY, some silt with reddish brown gravel, mostly fine, gray limestone precipitate in fractures				0.4
	3	4-6'	8-12-	2' / 1.1"	32	Deep, as above with FeO precipitate at 5.7' large gravel at 5.5'				0.6
5			20-26							
	4	6-8'	12-19-	2' / 1.2"	43	Deep, as above, with no laminations, massive, fine gravel, increasing silt, brownish red fractures FeO filled				1.0
	5	8-10'	23-25-32	2' / 0.9"	52	Deep, as above, with fine sand increasing silt and drier				0.7
10	6	10-12'	14-22-	2' / 1.6"	48	Deep to dry, brownish red SILT with clay, some gravel throughout, some fine light brown sand, parallel laminations, limestone and metamorphic pebbles				0.4
	7	12-14'	12-19-	2' / 1.5"	79	Deep to dry, brown to dark brown-red CLAY and SILT with fine angular to round gravel massive				0.2
	8	14-15'	10-30	2' / 1"		Deep, as above to 14.7' Very moist to wet, gray-green gray gravel with sand, little silt, trace clay, with angular to sub-angular gravel, gray and green clay and silt, some sand				0.2
15						Bottom of boring 15.0 ft.	15.0'			

[illegible]

MORRIS & BERE ENGINEERS, INC.					TEST BORING LOG		Report of Boring No. B-50 Sheet 1 of 1			
Project Location: Horseshoe Falls					SAMPLER		Ground Water Depth		Date	
Client: Enarco Machines					Type: Split Spoon Number: 140 lbs.		Depth		Date	
Boring Co.: Penne-Holiff, Inc. Foreman: Mark Beck DSG Geologist: Paul Bottom					Boring Location: SW corner of parking lot Ground Elevation: Datum: Starmer 11/27/90		Ending: 11/27/90			
Depth	Sample				Sample Description	Stratum Change Interval Description	Equipment Installed	Field Testing		
	No.	Depth	Blows / 15"	Penetration / Recovery				Moist. Value	Sp. Cond.	Moist.
0	1	0-2'	10-6-6-5	2" / 1.1'	14	Dry gravel to 1.7' Dry, medium stiff, red clay and silt with gravel, trace sand				2.0
	2	2-4'	4-5-11-13	2" / 1.1'	16	Same as above to 2.6' Moist, red CLAY and SILT, massive to 3.5' Damp, round-sub-rounded, medium to fine GRAVEL, reddish brown clay				1.5
	3	4-6'	8-11-	2" / 1.3'	26	Moist, as above Moist, sand lamination to 4.7' Weathered green/white rock/clay to 5.5' Moist, sandy diastict to 6.0'				0.4
5			15-27			Same as above to 6.3' Moist, diastict 50%, gravel to 6.5' Moist SAND and CLAY, massive				1.0
	4	6-8'	11-16-	2" / 1.3'	—	Moist, diastict as above with gravel to 8.1' Moist, diastict laminated, no sand, fine, angular-rounded gravel, red clay, laminations, faint, beds deformed				0.5
			50/0.4"							
	5	8-10'	16-27-	2" / 1.6'	64					
			37-40							
10	6	10-12'	11-20-	2" / 1.6'	52	Dry laminations, PEBBLY red red-brown CLAY with black silt laminations, some fine to medium angular-rounded gravel				2.2
			35-37							
	7	12-14'		2" / 1.6'		Damp, as above				0.7
	8	14-16'	8-20-	2" / 1.8'	—	Damp, as above with large gravel to 14.5' Damp, CLAY with red red-brown silt, trace fine sand, massive, mottled to 15.2' Damp, gray diastict, angular gravel, gray-gray brown clay				1.1
15			50/0.4"							
						Bottom of boring 15.4 ft.	15.4'			

O'BRIEN & GENE ENGINEERS, INC.		TEST BORING LOG		Report of Boring No. B-GE Sheet 1 of 1	
Project Location: Mingo Falls		SAMPLER		Ground Water Depth	Date
Client: Enarc-o Machines		Type: Split Spoon Weight: 140 lbs.		Depth	Date
Boring Co.: Perrett-Wolff, Inc.		Fall: 30°		File No.:	
Foreman: Mark Beck		Boring Location: SE Corner of Parking Lot			
CIS Geologist: Paul Gottler		Ground Elevation:			
		Dates: Started: 11/28/90		Ended: 11/28/90	

Depth	Sample				Sample Description	Stratigraphic Change Interval Description	Equipment Installed	Field Testing		Notes
	No	Depth	Blows /6"	Penetr/ Recovery				"N" Value	Mo	
0	1	0-2'	4-4-4-6	2' / 0.1'	8	Gravel				0.6
	2	2-4'	10-10-	2' / 1.2'	24	Deep, brown-red brown coarse to fine GRAVEL with brown sand, trace silt and red-brown coarse to fine brown sand, 10% sand, some clay (ablation fill?)				0.5
	3	4-6'	15-20-	2' / 1.2'	33	Same to 5.1 ft.				0.4
	5		33-42			Deep CLAY and SILT with gravel, parallel laminations and deformed lamination "30/cm, white to tan precipitate in vertical fractures gravel R axis vertical				0.4
	4	6-8'	17-25-	2' / 1.7'	63	Same to 6.6 ft.				0.4
			40-47			Same with FeO in fractures				
	5	8-10'	28-24-	2' / 0.4'	---	Same				0.5
			30/0.4'							
10	6	10-12'	12-24-	2' / 1.4'	66	Same with pebbles gravel				0.2
			42-48							
	7	12-14'	24-42-	2' / 1.2'	82	Same with little gravel to 12.7 ft.				0.3
			40-36			Same, increasing well rounded gravel and sand				
	8	14-16'	4-50 -	2' / 1'	---	Same with less, finer gravel, more massive and more red to 14.8 ft.				0.4
15						Moist gray limestone GRAVEL with sand, trace gray-green clay and silt				
						Bottom of boring 15.5 ft.	15.5'			

KEE:JST

UPHOLD & BERE ENGINEERS, INC.				TEST BORING LOG				Report of Logging No. D-6 Sheet 1 of 1			
Project Location: Honeye Falls				SAMPLER Type: Split Spoon Number: 140 lbs.				Ground Water Depth Depth		Date Date	
Client: Enarco Machines				Falls: 20"				File No.:			
Boring Co.: Barrett-Moffitt, Inc. Foreman: Mark Back CNS Geologist: Paul Goltner				Boring Location: SW Corner of Storage Shed Ground Elevations: Dates Started: 11/26/90				Ended: 11/26/90			
Depth	Sample				Sample Description	Stratum Change General Description	Equipment Installed	Field Testing			
	No.	Depth	Bloom /% ^a	Percent Recovery				"m" Value	pH	Sa Cond	HABU
0	1	0-2'	1-(1)-1	2'/1.1'	2	Sod to 0.4' Rounded to sub-round GRAVEL with dark gray medium to fine SAND, little brown-red silt, trace clay					57.3
	2	2-4'	1-(1)-1	2'/0.2'	2	Low recovery, wet fine gravel					61.1
	3	4-6'	7-17-	2'/1.6'	37	Sand, wet to 4.6 ft. Dry, medium dense, red CLAY with trace silt, massive, deformed to 5.8 ft. Dry fine SAND and CLAY lenses, laminated with fine gravel					80.1
5	4	6-8'	10-19-	2'/1.1'	50	Moist, medium dense, dissection medium to fine gravel, gray sub-round limestone SAND, red brown clay, massive					82.5
	5	8-10'	9-19-	2'/2'	51	Sand, dry, overcompact nature, gravel not aligned					68.3
	6	10-11.5'	33-47-53	2'/1.5'		Sand, with large dark gray limestone GRAVEL still overcompact, gravel some aligned and flat laying					65.0
	7	12-14'	12-16-	2'/0	59	Hard, sample from borehole fall in, gravel at spoon tip					59.7
	8	14-16'	24-47-	2'/1.6'		Sand to 16.4 ft. Wet, gray GRAVEL with sand, minor silt and clay					66.2
15		50/0.2'				Bottom of boring 15.6 ft.	15.6'				

APPENDIX D
IN SITU HYDRAULIC CONDUCTIVITY TEST DATA

PROJECT: ENARC-0
WELL NUMBER: MW-1
DATE: 12/13/90

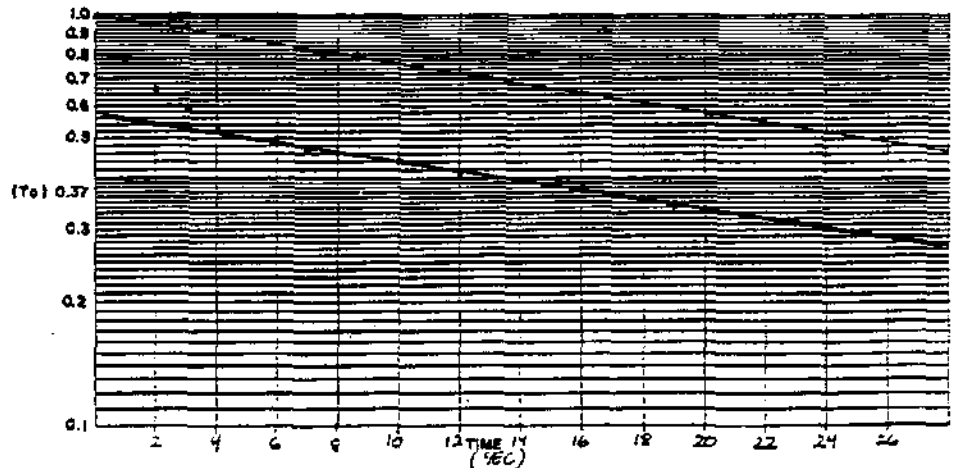
EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTLE
DATUM FOR H: Transducer

METHOD USED: ENVIROLABS

STATIC HEAD (H) = 6.01 ft
PIPE RADIUS (r) = 0.13 ft
SCREEN RADIUS (R) = 0.13 ft
SCREEN LENGTH (L) = 11.35 ft
INITIAL HEAD (H₀) = 5.69 ft
T₀ (from graph) = 0.6 min
36 sec
WELL TOT. DEPTH = 34.65 ft BTOT
HYDRAULIC CONDUCTIVITY

TIME (SEC.)	h	H-h H-H ₀
0	5.69	1.00
1	5.76	0.78
2	5.80	0.66
3	5.82	0.59
4	5.84	0.53
6	5.85	0.50
7	5.86	0.47
10	5.87	0.44
12	5.88	0.41
16	5.89	0.38
19	5.90	0.34
23	5.91	0.31
29	5.92	0.28
45	5.94	0.22

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \begin{matrix} 9.2E-05 \text{ ft/sec} \\ 2.8E-03 \text{ cm/sec} \end{matrix}$$



PROJECT: ENARC-O
WELL NUMBER: MW-2
DATE: 12/13/90

EVACUATION METHOD: NONE
PERSONNEL: PAUL GOTTIER
DATUM FOR H: Transducer

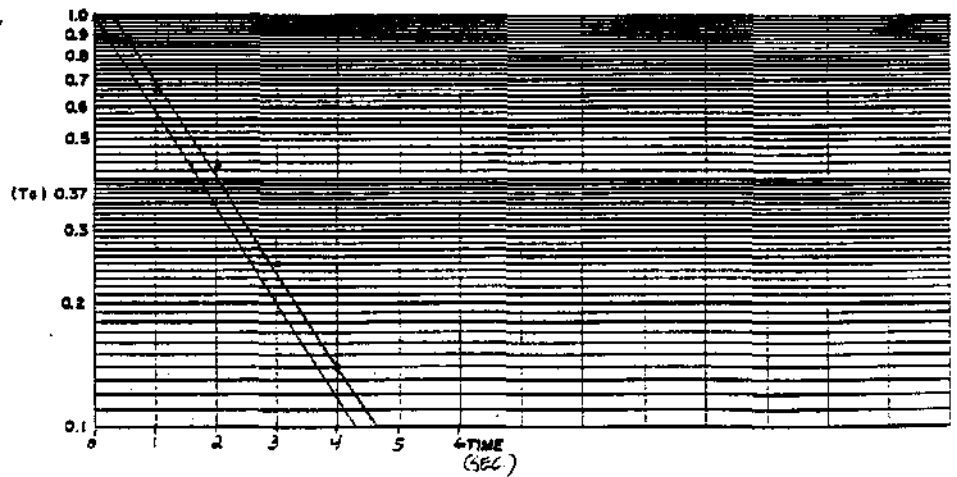
METHOD USED: ENVIROLABS

	TIME (SEC.)	h	$\frac{H-h}{H-H_0}$
STATIC HEAD (H) =	7.65 ft		
PIPE RADIUS (r) =	0.13 ft	0	1.00
SCREEN RADIUS (R) =	0.13 ft	1	0.66
SCREEN LENGTH (L) =	9.01 ft	2	0.43
INITIAL HEAD (H ₀) =	7.09 ft	3	0.25
To (from graph) =	0.03 min 1.8 sec	4	0.14
		5	0.07
		6	0.05
		13	0.04
		18	0.02
		40	0.00

WELL TOT. DEPTH = 36.71 ft

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \begin{matrix} 2.2E-03 \text{ ft/sec} \\ 6.7E-02 \text{ cm/sec} \end{matrix}$$



PROJECT: ENARC-O MACHINES
WELL NUMBER: MW-3
DATE: 12/28/90

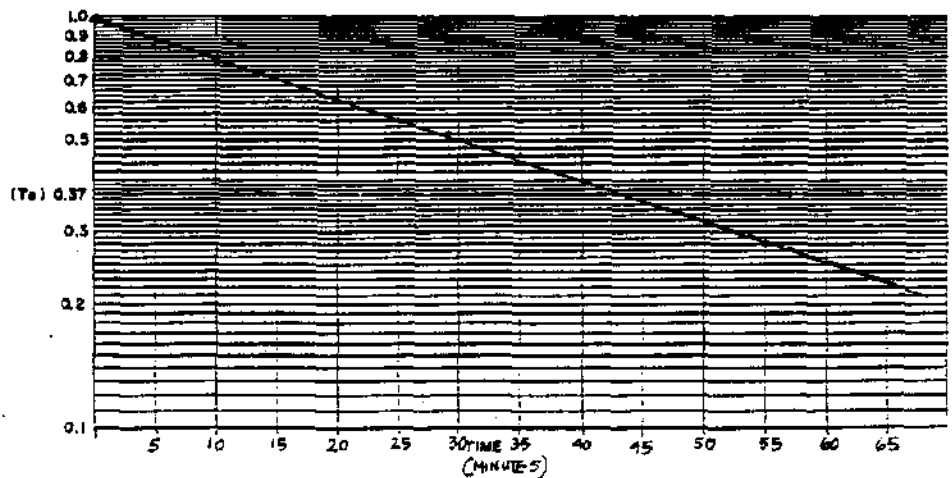
EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTIER
DATUM FOR H: Well Bottom (BTCC)

METHOD USED: ENVIROLABS

STATIC HEAD (H) =	12.63 ft	TIME (MIN.)	DEPTH TO WATER	h	$\frac{H-h}{H-H_0}$
PIPE RADIUS (r) =	0.13 ft	0	25.30	9.09	1.00
SCREEN RADIUS (R) =	0.13 ft	0.17	25.29	9.10	1.00
SCREEN LENGTH (L) =	12.63 ft	0.50	25.12	9.27	0.95
INITIAL HEAD (H ₀) =	9.09 ft	1	25.12	9.27	0.95
To (from graph) =	43 min	2	25.05	9.34	0.91
	2580 sec	3	24.95	9.44	0.90
		5	24.82	9.57	0.86
		10	24.45	9.94	0.76
		29	23.61	10.78	0.52
		55	22.75	11.64	0.28
		110	21.79	12.60	0.01
WELL TOT. DEPTH =	34.39 ft (BTCC)				

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \begin{matrix} 1.2E-06 \text{ ft/sec} \\ 3.6E-05 \text{ cm/sec} \end{matrix}$$



PROJECT: ENARC-O MACHINES
 WELL NUMBER: MW-4
 DATE: 12/28/90

EVACUATION METHOD: BAILER
 PERSONNEL: PAUL GOTTIER
 DATUM FOR H: Well Bottom

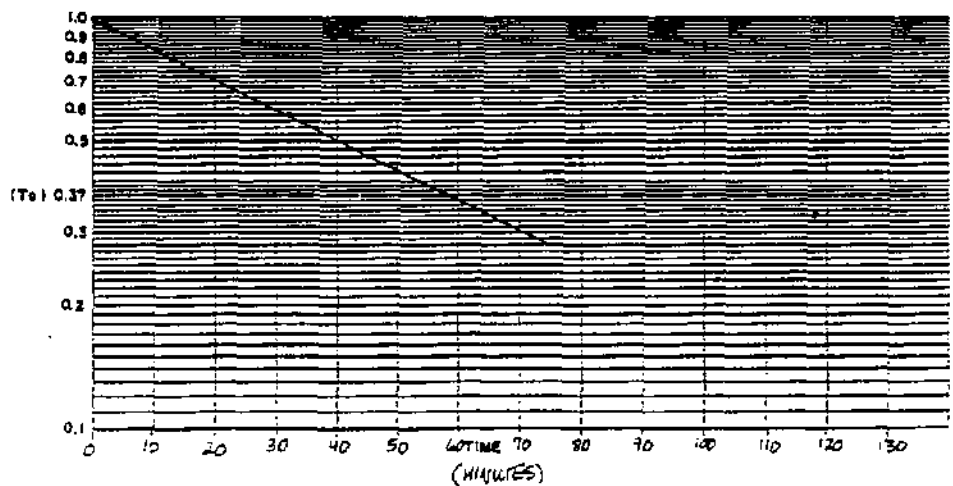
METHOD USED: BAILER

		TIME (MIN.)	DEPTH TO WATER	h	$\frac{H-h}{H-H_0}$
STATIC HEAD (H) =	9.84 ft				
PIPE RADIUS (r) =	0.13 ft	0	26.54	7.63	1.00
SCREEN RADIUS (R) =	0.13 ft	0.5	26.48	7.69	0.97
SCREEN LENGTH (L) =	9.84 ft	2	26.46	7.71	0.96
		3	26.40	7.77	0.94
INITIAL HEAD (H ₀) =	7.63 ft	7	26.31	7.86	0.90
		13	26.07	8.10	0.79
		32	25.62	8.55	0.58
		118	25.05	9.12	0.33
To (from graph) =	58 min 3480 sec	150	24.41	9.76	0.04

WELL TOT. DEPTH = 34.17 ft (BTOT)

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \begin{matrix} 1.12 \times 10^{-6} \text{ ft/sec} \\ 3.32 \times 10^{-5} \text{ cm/sec} \end{matrix}$$



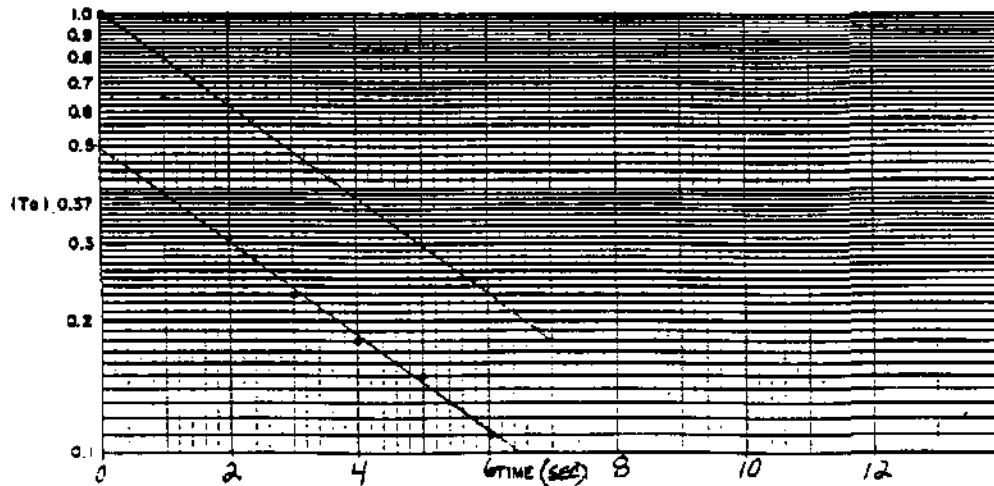
PROJECT: ENARC-O MACHINES
 WELL NUMBER: MW-5
 DATE: 12/13/90
 METHOD USED: ENVIROLABS

EVACUATION METHOD: NONE
 PERSONNEL: PAUL GOTTIER
 DATUM FOR H: Transducer

	TIME (SEC.)	h	$\frac{H-h}{H-H_0}$
STATIC HEAD (H) = 7.10 ft	0	6.48	1.00
PIPE RADIUS (r) = 0.13 ft	1	6.70	0.65
SCREEN RADIUS (R) = 0.13 ft	2	6.91	0.31
SCREEN LENGTH (L) = 9.11 ft	3	6.96	0.23
INITIAL HEAD (H ₀) = 6.48 ft	4	6.99	0.18
To (from graph) = 0.07 min	5	7.01	0.15
4.2 sec	6	7.03	0.11
	7	7.04	0.10
WELL TOT. DEPTH = 32.59 ft	8	7.06	0.06
	9	7.07	0.05
	10	7.08	0.03
	11	7.09	0.02
	13	7.10	0.00

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \begin{matrix} 9.4E-04 \text{ ft/sec} \\ 2.9E-02 \text{ cm/sec} \end{matrix}$$



PROJECT: ENARC-O MACHINES
WELL NUMBER: MW-6
DATE: 12/28/90

EVACUATION METHOD: BAILER
PERSONNEL: PAUL GOTTIER
DATUM USED FOR CALCULATIONS:
TOP OF CASING

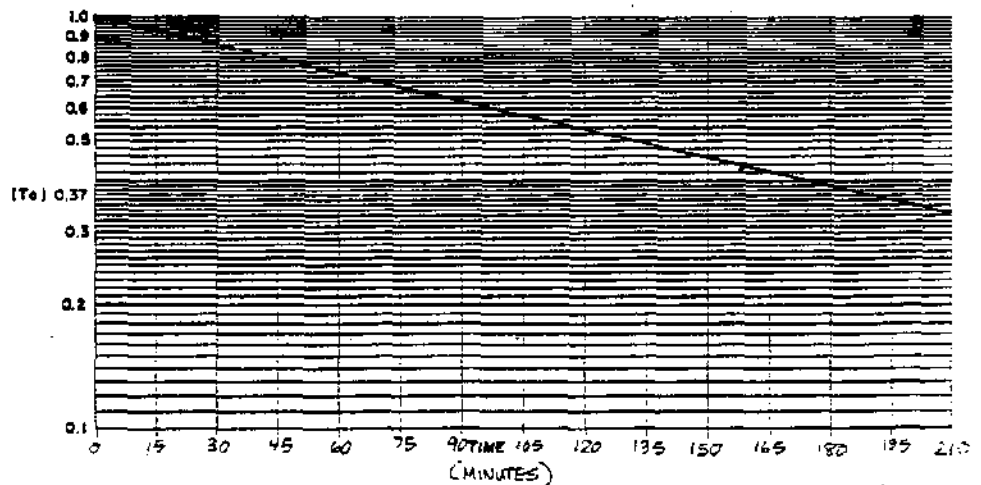
METHOD USED: ENVIROLABS

RETAINING WALL: ENVELOPES		TIME (MIN.)	DEPTH TO WATER	h	H-h H-H ₀
STATIC HEAD (H) =	8.80 ft				
PIPE RADIUS (r) =	0.13 ft	0	31.17	5.62	1.00
		0.5	31.11	5.68	0.98
SCREEN RADIUS (R)=	0.13 ft	1	31.08	5.71	0.97
		2	31.07	5.72	0.97
SCREEN LENGTH (L)=	8.80 ft	5	31.04	5.75	0.96
		18	30.84	5.95	0.90
INITIAL HEAD (H ₀)=	5.62 ft	60	30.30	6.49	0.73
		108	29.80	6.99	0.57
To (from graph) =	190 min	158	29.36	7.43	0.43
	11400 sec	235	28.89	7.90	0.28

WELL TOT. DEPTH = 36.79 ft

HYDRAULIC CONDUCTIVITY

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{1.6E-07 \text{ ft/sec}}{1.1E-05 \text{ cm/sec}}$$



APPENDIX E
GROUND WATER SAMPLING FIELD LOGS

C JND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-1
 Sampled By Chawn Odell Date 1/7/90 Time 1525
 Weather Cold - Clear Sampled with Bailor X Pump _____

A. WATER TABLE:

Well depth: _____ ft. Well elevation: _____ ft.
 (below top of casing) 34.65 (top of casing) _____
 Depth to water table: _____ ft. Water table elevation: _____ ft.
 (below top of casing) 23.90
 Length of water column (LWC) 10.75 ft.
 Volume of water in well:

2" diameter wells = $0.465 \times (LWC) = 2.74$ gallons 8.22 gal
 4" diameter wells = $0.653 \times (LWC) =$ _____ gallons
 6" diameter wells = $1.469 \times (LWC) =$ _____ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor NONE Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 9 gallons.
 Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color GRAY Odor NONE Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 840

F. pH 7.4

G. TEMPERATURE 94

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample location ENARCO Well No. MW-2
 Sampled By Chuan Odell Date 1/9/90 Time 1325
 Weather Cold-Clear Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: 36.71 ft. Well elevation: ft.
 (below top of casing) (top of casing)
 Depth to water table: 26.98 ft. Water table elevation: ft.
 (below top of casing)
 Length of water column (LWC) 10.7 ft.
 Volume of water in well:
 2" diameter wells = $0.265 \times \text{LWC} = 2.73$ gallons
 4" diameter wells = $0.653 \times \text{LWC} = 6.82$ gallons
 6" diameter wells = $1.459 \times \text{LWC} = 15.50$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor Slight Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 9 gallons.
 Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Milky Odor Slight Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 440

F. PH 8.4

G. TEMPERATURE 9°C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. M6-3
 Sampled By Chawn O'Dell Date 1/9/01 Time 1615
 Weather Cold-clear Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: (below top of casing) 34.39 ft. Well elevation: (top of casing) ft.
 Depth to water table: (below top of casing) 21.80 ft. Water table elevation: ft.
 Length of water column (LWC) 12.59 ft.
 Volume of water in well:

2" diameter wells = $0.2547 \times (\text{LWC}) = 3.20$ gallons 29.0 gal
 4" diameter wells = $0.653 \times (\text{LWC}) =$ gallons
 6" diameter wells = $1.459 \times (\text{LWC}) =$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor Moderate Turbidity Low
 Was an oil film or layer apparent? No

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 5 gallons.
 Did well go dry? Yes

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Milky Odor Moderate Turbidity High
 Was an oil film or layer apparent? No

E. CONDUCTIVITY 910

F. pH 7.8

G. TEMPERATURE 9°C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-4
 Sampled By Chawn Odell Date 1/8/80 Time 1250
 Weather Cold-clear Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: 34.17 ft. Well elevation: ft.
 (below top of casing) (top of casing)
 Depth to water table: 23.68 ft. Water table elevation: ft.
 (below top of casing)
 Length of water column (LWC) 10.49 ft.

Volume of water in well: .2549

2" diameter wells = $0.105 \times (\text{LWC}) = \underline{2.67}$ gallons 13 8/10
 4" diameter wells = $0.653 \times (\text{LWC}) = \underline{\hspace{1cm}}$ gallons
 6" diameter wells = $1.469 \times (\text{LWC}) = \underline{\hspace{1cm}}$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor NONE Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 4.5 gallons.
 Did well go dry? Yes

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Milky Odor None Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 550

F. pH 7.7

G. TEMPERATURE 90C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-5
 Sampled By Chawn O'Dell Date 1/2/92 Time 11:25
 Weather 12H-Clear Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: 32.59 ft. Well elevation: ft.
 (below top of casing) (top of casing)
 Depth to water table: 22.98 ft. Water table elevation: ft.
 (below top of casing)
 Length of water column (LWC) 9.61 ft.
 Volume of water in well:

^{2.57}
 2" diameter wells = $0.263 \times (\text{LWC}) = 2.46$ gallons
 4" diameter wells = $0.553 \times (\text{LWC}) = 5.38$ gallons
 6" diameter wells = $1.469 \times (\text{LWC}) = 13.73$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor Slight Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 8 gallons.
 Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Milky Odor Slight Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 440

F. pH 8.4

G. TEMPERATURE 9°C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. ML-6
 Sampled By Chawn Odell Date 1/7/92 Time 1400
 Weather Cold-clear Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: (below top of casing) 36.79 ft. Well elevation: (top of casing) ft.
 Depth to water table: (below top of casing) 28.06 ft. Water table elevation: ft.
 Length of water column (LWC) 8.73 ft.
 Volume of water in well: .2547

2" diameter wells = 0.163 x (LWC) = 2.22 gallons ^{2 = 6.66 ga}
 4" diameter wells = 0.653 x (LWC) = gallons
 6" diameter wells = 1.469 x (LWC) = gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor NO Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 3.5 gallons.
 Did well go dry? Yes

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color milky Odor NO Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 570

F. pH 7.7

G. TEMPERATURE 9°C

H. WELL SAMPLING NOTES:



O'BRIEN & GERE
ENGINEERS, INC.

Job No. 2387.006530
Sheet 1 of 1

Office: SPRACV9E
Address: SPRACV9E P.O.
Phone: (315) 437-6100

CHAIN OF CUSTODY

CLIENT: <u>ENARCO</u>			COLLECTED BY: <u>Chawn P. O'Dell</u>			
LOCATION: <u>NORTH BLOOMFIELD</u>			(Signature)			
SAMPLE DESCRIPTION	Date	Time	Sample Matrix ¹	Sample Type ²	No. of Containers	ANALYSIS REQUESTED
MW-6	1/24	1430	Water	grab	2	502.1/502.1
MW-1	1/24	1525				
MW-3	1/24	1615				
MW-5	1/24	1125				
Equipment Wash	1/24	1215				
DRAIN Sample	1/24	1235				
MW-4	1/24	1250				
MW-2	1/24	1325				
D.V.D.	1/24				1	
TRIP Blank						

¹ Matrix = water, wastewater, air, sludge, sediment, etc.
² Type = grab, composite

Relinquished by: <u>Chawn P. O'Dell</u>	Date	Time	Received by: <u>Chawn P. O'Dell</u>	Date	Time
of: <u>O'Brien & Gere Eng. Inc.</u>	1/24	1555	of: <u>ABC</u>	1/24	1555
Relinquished by: _____	Date	Time	Received by: _____	Date	Time
of: _____			of: _____		
Relinquished by: _____	Date	Time	Received by: _____	Date	Time
of: _____			of: _____		
Use this space if shipped via carrier (e.g., Fed Ex)	Date	Time	Carrier Name: _____	Date	Time
Relinquished by: _____					
of: _____					
Relinquished by: _____	Date	Time	Received by: _____	Date	Time
of: _____			of: _____		

48/rwp/C

September 17, 1990

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-1
 Sampled By John P. DODD Date 2/25/81 Time 12-15
 Weather CRAZY-CAST Sampled with Bailer X Pump _____

A. WATER TABLE:

Well depth: _____ ft. Well elevation: _____ ft.
 (below top of casing) 34.65 (top of casing) _____
 Depth to water table: _____ ft. Water table elevation: _____ ft.
 (below top of casing) 21.91
 Length of water column (LWC) 9.74 ft.

Volume of water in well:

2" diameter wells = $0.163 \times \text{LWC}$ = 2.549 gallons
 4" diameter wells = $0.653 \times \text{LWC}$ = 2.43 gallons
 6" diameter wells = $1.459 \times \text{LWC}$ = _____ gallons
 Total = 7.44 gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor None Turbidity Low
 Was an oil film or layer apparent? No

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 8 gallons.
 Did well go dry? No

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Gray - Cloudy Odor None Turbidity High
 Was an oil film or layer apparent? No

E. CONDUCTIVITY 850

F. pH 8.3

G. TEMPERATURE 10°C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-2
 Sampled By Chas. R. DODD Date 2/26/91 Time 1220
 Weather Cold - Cloudy Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: _____ ft. Well elevation: _____ ft.
 (below top of casing) 36.71 (top of casing) _____
 Depth to water table: _____ ft. Water table elevation: _____ ft.
 (below top of casing) 26.33
 Length of water column (LWC) 10.38 ft.
 Volume of water in well: 2.549
 2" diameter wells = 0.163 x (LWC) = 2.5 gallons ^{13.75 gal}
 4" diameter wells = 0.653 x (LWC) = _____ gallons
 6" diameter wells = 1.469 x (LWC) = _____ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor Slight Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 8 gallons.
 Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Milky Odor Slight Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 510

F. pH 8.1

G. TEMPERATURE 9°C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. M.W.-3
 Sampled By Choua R. DODD Date 2/25/71 Time 14:15/0
 Weather CRA - 5 A.M. - 11 A.M. Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: 34.39 ft. Well elevation: ft.
 (below top of casing) (top of casing)

Depth to water table: 21.83 ft. Water table elevation: ft.
 (below top of casing)

Length of water column (LWC) 12.56 ft.

Volume of water in well: 25.47

2" diameter wells = $0.183 \times (\text{LWC}) = \underline{3.20}$ gallons ^{13.41 ft.}
 4" diameter wells = $0.653 \times (\text{LWC}) = \underline{ }$ gallons
 6" diameter wells = $1.469 \times (\text{LWC}) = \underline{ }$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor # slight Turbidity Low
 Was an oil film or layer apparent? No

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 4.5 gallons.
 Did well go dry? Yes

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Gray (Cloudy) Odor Moderate Turbidity High
 Was an oil film or layer apparent? No

E. CONDUCTIVITY 900

F. pH 7.5

G. TEMPERATURE 7°C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-4
 Sampled By Cham R. D. Bell Date 2/25/91 Time 1440
 Weather CPA - overcast Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: (below top of casing) 34.17 ft. Well elevation: (top of casing) ft.
 Depth to water table: (below top of casing) 22.73 ft. Water table elevation: ft.
 Length of water column (LWC) 11.39 ft.

Volume of water in well:

2" diameter wells = $0.163 \times (\text{LWC}) = \underline{2.90}$ gallons
 4" diameter wells = $0.653 \times (\text{LWC}) = \underline{\quad\quad}$ gallons
 6" diameter wells = $1.469 \times (\text{LWC}) = \underline{\quad\quad}$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor NONE Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 5.5 gallons.
 Did well go dry? No

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Gray Odor None Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 570

F. pH 7.5

G. TEMPERATURE 7°C

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-5
 Sampled By Cham P. Doll Date 2/26/71 Time 1200
 Weather Cloudy Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: (below top of casing) 32.59 ft. Well elevation: (top of casing) ft.
 Depth to water table: (below top of casing) 22.79 ft. Water table elevation: ft.
 Length of water column (LWC) 930 ft.
 Volume of water in well: 2547
 2" diameter wells = $0.105 \times (\text{LWC}) = 2.5$ gallons +3 = 2.5 gal
 4" diameter wells = $0.653 \times (\text{LWC}) =$ gallons
 6" diameter wells = $1.469 \times (\text{LWC}) =$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor Slight Turbidity Low
 Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 8 gallons.
 Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color m. /ky Odor Slight Turbidity High
 Was an oil film or layer apparent? NO

E. CONDUCTIVITY 490

F. pH 6.8

G. TEMPERATURE 9°C

H. WELL SAMPLING NOTES:

G' "UND WATER SAMPLING FIELD LOG

Sample Location ENARCO Well No. MW-6
 Sampled By Chas. P. Dell Date 2/25/71 Time 14:27
 Weather Cr. - overcast Sampled with Bailer X Pump

A. WATER TABLE:

Well depth: (below top of casing) 36.79 ft. Well elevation: (top of casing) ft.

Depth to water table: (below top of casing) 27.71 ft. Water table elevation: ft.

Length of water column (LWC) 3.95 ft.

Volume of water in well:

2" diameter wells = $0.105 \times (\text{LWC}) = 2.26$ gallons 3.673
 4" diameter wells = $0.653 \times (\text{LWC}) = \underline{\hspace{1cm}}$ gallons
 6" diameter wells = $1.469 \times (\text{LWC}) = \underline{\hspace{1cm}}$ gallons

B. PHYSICAL APPEARANCE AT START:

Color Colorless Odor None Turbidity Low
 Was an oil film or layer apparent? No

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling ~3 gallons.
 Did well go dry? Yes

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color Milky Odor No Turbidity High
 Was an oil film or layer apparent? No

E. CONDUCTIVITY 580

F. pH 7.2

G. TEMPERATURE 9°C

H. WELL SAMPLING NOTES:

CHAIN OF CUSTODY RECORD



SURVEY: ENARCO SAMPLED BY: Cham P. O'Dell
 LOCATION: Northblountfield ORGANIZATION: O'Brien & Gere Eng'g

STATION NUMBER	SAMPLE LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX	COMP OR CRAB	NO. OF CONTAINERS	ANALYSIS REQUIRED
	MW-1	6/25/91	1245	water	grab	3	502.1/503.1
	MW-6	6/25/91	1420	water	grab	3	
	MW-4	6/25/91	1440	water	grab	3	
	Equipment blank	6/25/91	1450	water	grab	3	
	MW-3	6/25/91	1510	water	grab	3	
	MW-5	6/25/91	1200	water	grab	3	
	MW-2	6/25/91	1220	water	grab	3	
	Dup (MW-2)	6/25/91	1220	water	grab	3	✓

Requested By: <u>Cham P. O'Dell</u>	DATE: <u>6/25/91</u>	TIME: <u>1520</u>	Received By: <u>[Signature]</u>	DATE: <u>6/25/91</u>	TIME: <u>1520</u>
Requested By: <u>[Signature]</u>	DATE: <u>6/25/91</u>	TIME: <u>1520</u>	Received By: <u>[Signature]</u>	DATE: <u>6/25/91</u>	TIME: <u>1520</u>
Requested By: <u>[Signature]</u>	DATE: <u>6/25/91</u>	TIME: <u>1520</u>	Received By: <u>[Signature]</u>	DATE: <u>6/25/91</u>	TIME: <u>1520</u>

COMMENTS:

METHOD OF SHIPMENT:

O'Brien & Gere Laboratories, Inc. an O'Brien & Gere Limited Company
 5000 Brittonfield Parkway / Suite 300 / PO Box 4842 / Syracuse, NY 13221 / (315) 437-0200

180ERE

180ERE, Inc.

CHAIN OF CUSTODY RECORD

SAMPLERS: Signature

Paul F. Galt

DATE	TIME	SAMPLE TYPE		SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
		Matrix	Substrate			
11/29	1220	X			1	Hold
		X			1	Hold
		X			2	8010/8020 field
		X			3	8010/8020
		X			1	
		X			1	
		X			1	
11/29	1440	X			3	8010/8020 field

Received by: Signature

Date/Time

11/30/1650

Received by: Signature

Date/Time

Received by: Signature

Date/Time

Received by Mobile Laboratory for field analysis: Signature

Date/Time

Date/Time

Received for Laboratory by:

Date/Time

180ERE, Inc. Limited Company

180ERE, MD 20785-1327 FAX 180ERE 4757



O'BRIEN & GERE

O'Brien & Gere Engineers, Inc.

CHAIN OF CUSTODY RECORD

SURVEY				SAMPLERS:				
Enarc-0				<i>Paul F. Lott</i>				
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE		SEC. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
				Moisture	Core / Soil			
B-3	0-2 ft	11/28	1535	X			1	Held
	2-4 ft			X			1	Held
	4-6 ft			X			1	8010/8020
	6-8 ft			X			1	8010/8020
	8-10 ft			X			1	Held
	10-104 ft			X			1	Held
	rinse water blank	11/29	0700				3	8010/8020
Relinquished by: <i>Paul F. Lott</i>				Received by: <i>Paul F. Lott</i>				Date/Time: 11/30/1650
Relinquished by: <i>Paul F. Lott</i>				Received by: <i>Paul F. Lott</i>				Date/Time:
Relinquished by: <i>Paul F. Lott</i>				Received by: <i>Paul F. Lott</i>				Date/Time:
Relinquished by: <i>Paul F. Lott</i>				Received by Mobile Laboratory for field analysis: <i>Paul F. Lott</i>				Date/Time:
Dispatched by: <i>Paul F. Lott</i>		Date/Time:	Received for Laboratory by: <i>Paul F. Lott</i>		Date/Time:	12/1/16		
Method of Shipment:								

O'Brien & Gere Engineers, Inc. is an O'Brien & Gere Limited Company.
 2201 Corporate Dr. / Suite 1120 / Landover, MD 20785 / (301) 731-5622 / FAX (301) 577-4737
 and offices in major U.S. cities



O'Brien & Gere Engineers, Inc.

CHAIN OF CUSTODY RECORD

O'Brien & Gere Engineers, Inc. is an O'Brien & Gere Limited Company.
800 Corporate Dr. Suite 1000 Landover, MD 20785 (301) 721-5600 FAX (301) 577-4757
and offices in many U.S. cities



O'BRIEN & GERE

O'Brien & Gere Engineers, Inc.

CHAIN OF CUSTODY RECORD

SURVEY				SAMPLERS: <i>Signature</i>				
Engrc - 0				<i>Paul F. Butler</i>				
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE		SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
				Material	For			
				Core	Gravel			
B-5B	0-2 ft NE corner parking lot	11/28	1100	X			1	8010/8020
	2-4 ft "			X			1	8010/8020
	4-6 ft "			X			1	Hold
	6-8 ft "			X			1	
	8-10 ft "			X			1	
	10-12 ft "			X			1	
	12-14 ft "			X			1	
	14-15.2 ft "			X			1	
Relinquished by: <i>Signature</i>				Received by: <i>Signature</i>				Date/Time
<i>Paul F. Butler</i>								11/30/16 50
Relinquished by: <i>Signature</i>				Received by: <i>Signature</i>				Date/Time
Relinquished by: <i>Signature</i>				Received by: <i>Signature</i>				Date/Time
Relinquished by: <i>Signature</i>				Received by Mobile Laboratory for field analysis: <i>Signature</i>				Date/Time
Dispatched by: <i>Signature</i>			Date/Time	Received for Laboratory by:			Date/Time	
Method of Shipment:								

O'Brien & Gere Engineers, Inc. is an O'Brien & Gere Limited Company.
 801 Corporate Drive, Suite 1100, Landover, MD 20765-1100 FAX (301) 574-4737
 and offices in and out of U.S. cities



O'Brien & Gere Engineers, Inc.

CHAIN OF CUSTODY RECORD

O'Brien & Gere Engineers, Inc. an O'Brien & Gere Limited Company,
800 Corporate Drive, Suite 100, Landover, MD 20785 (301) 721-5600 FAX (301) 577-4737
10700295 0-730-015-0105

Sheet 1 of 1

Office: _____
Address: _____
Phone: _____

CHAIN OF CUSTODY

[illegible]

1. Matrix = water, wastewater, air, sludge, sediment, etc.
2. Type = grab composite

Requester by: <u>Paul F. Götter</u>		Date	Time	Received by: <u>James Barker</u>		Date	Time
at: <u>Division 76 OBG</u>		<u>11/16</u>	<u>1720</u>	at: <u>OBG Lab</u>		<u>11/16/80</u>	<u>0830</u>
Requester by: _____		Date	Time	Received by: _____		Date	Time
at: _____				at: _____			
Requester by: _____		Date	Time	Received by: _____		Date	Time
at: _____				at: _____			
Use this space if shipped via courier (e.g., Fed Ex)		Date	Time	Courier Name: _____		Date	Time
Requester by: _____				_____			
at: _____				_____ *Insert delivery/courier number or Class of Courier			
Requester by: _____		Date	Time	Received by: _____		Date	Time
at: _____				at: _____			



Sheet 1 of 1

Phone: _____

CHAIN OF CUSTODY

[illegible]

2 Type = grain composite

Requisitioned by: <u>Paul F. Götter</u>	Date	Time	Received by: <u>Chas Barker</u>	Date	Time
at: <u>Division 36 OAG</u>	<u>11/26</u>	<u>1720</u>	at: <u>03626hs</u>	<u>11/26/58</u>	<u>0920</u>
Requisitioned by: _____	Date	Time	Received by: _____	Date	Time
at: _____			at: _____		
Requisitioned by: _____	Date	Time	Received by: _____	Date	Time
at: _____			at: _____		
Use this space if shipment was obtained (e.g., Post Pay) Requisitioned by: _____	Date	Time	Consignee Name: _____	Date	Time
at: _____			Special delivery (consignee return to Office of Consignee)		
Requisitioned by: _____	Date	Time	Received by: _____	Date	Time
at: _____			at: _____		

O'BRIEN G GERE

O'Brien & Gere Engineers, Inc.

CHAIN OF CUSTODY RECORD

[illegible]

O'Brien & Gere Engineers, Inc. an O'Brien & Gere Limited Company
800 Corporate Dr. Suite 1120 Landover, MD 20785-1120 FAX (301) 577-4737
and offices in major U.S. cities



Sheet / of /

Office: SYRACUSE
Address: SYRACUSE, N.Y.
Phone: (315) 437-6100

CHAIN OF CUSTODY

[illegible]¹ Matrix = water, wastewater, air, sludge, sediments, etc.

² Type = prob, competitive

Released by: <u>Cham RUDell</u>	Date	Time	Received by: <u>Chris Barnes</u>	Date	Time
of: <u>OBrien & Gen Eng. Inc.</u>	<u>1/8/90</u>	<u>1555</u>	of: <u>130 Abb.</u>	<u>1/8/90</u>	<u>1555</u>
Released by: _____	Date	Time	Received by: _____	Date	Time
of: _____			of: _____		
Released by: _____	Date	Time	Received by: _____	Date	Time
of: _____			of: _____		
Use this space if shipped via courier (e.g., Fed Ex)	Date	Time	Courier Name: _____	Date	Time
Released by: _____					
of: _____			*Attach delivery/courier receipt to Chain of Custody		
Released by: _____	Date	Time	Received by: _____	Date	Time
of: _____			of: _____		

date/wpc

~~September 17, 1999:~~

CHAIN OF CUSTODY RECORD



SURVEY: ENARCO

SAMPLED BY: *Charm P. O'Dell*LOCATION: *Northblomfield*ORGANIZATION: *O'Brien & Gere Eng'g*

STATION NUMBER	SAMPLE LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX	COMP. OR GRAB	NO. OF CONTAINERS	ANALYSIS REQUIRED
	MW-1	4/15/91	1245	water grab		3	502.1/503.1
	MW-6	4/15/91	1420	water grab		3	
	MW-4	4/15/91	1440	water grab		3	
	Equipment blank	4/15/91	1450	water grab		3	
	MW-3	4/15/91	1510	water grab		3	
	MW-5	4/15/91	1200	water grab		3	
	MW-2	4/15/91	1220	water grab		3	
	Dup (MW-2)	4/15/91	1220	water grab		3	

Requested by: <i>Charm P. O'Dell</i>	DATE: <i>4/15/91</i>	TIME: <i>1520</i>	Received by: <i>[Signature]</i>	DATE: <i>4/15/91</i>	TIME: <i>1520</i>
Requested by:	DATE:	TIME:	Received by:	DATE:	TIME:
Requested by:	DATE:	TIME:	Received by: <i>Bill Barland</i>	DATE: <i>7/26/91</i>	TIME: <i>1520</i>

COMMENTS:

METHOD OF SHIPMENT:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
 5000 Brightonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

APPENDIX F
RESIDENTIAL WELL QUALITY DATA

TABLE 1

ANALYTICAL RESULTS
Supply Well SamplesErnst-O Machine Products
North Bloomfield, New York

Name	Street	No.	Sample Date	161109 TCE	161209 T-1,2 DCE	123609 1,1,1-TCA	130809 1,2-DCA
Bonnette	Martin Rd.	7859	7/1/85	20	4	<1	<1
Bush	Martin Rd.	7787	8/7/85	<1	<1	<1	<1
Caveller	Martin Rd.	7865	7/1/85	22	2	1	<1
Chambers	Ideson Rd.	1091	9/26/85	0	0	0	0
Colavito	Ideson Rd.	1090	8/7/85	2	<1	<1	<1
Cooper	Ideson Rd.	1121	7/26/85	24	8	1	<1
Ernst-O	Bragg St.	1175	7/1/85	8	4	22	<1
Endicott	Ideson Rd.	1108	8/7/85	<1	<1	<1	<1
Fessler	Martin Rd.	7783	9/26/85	0	0	0	0
Freedman	Ideson Rd.	1147	7/26/85	49	8	1	<1
Garvey, Robert	Martin Rd.	7883	6/19/85	290	75	8	<10
Garvey, Robert	Martin Rd.	7883	7/1/85	318	89	5	2
George, V.	Ontario St.	1856	8/7/85	<1	<1	<1	<1
Shostlow	Martin Rd.	7806	9/26/85	0	0	0	0
Hart	Ideson Rd.	1111	7/26/85	19	5	1	<1
Machina	Martin Rd.	7852	7/1/85	80	4	1	<1
Moran	Bragg St.	1382	7/26/85	<1	<1	<1	<1
Johnson	Ideson Rd.	1127	7/26/85	19	3	<1	<1
Johnson	Martin Rd.	7820	7/26/85	31	4	<1	<1
Neley	Ideson Rd.	1116	8/7/85	8	1	<1	<1
Montagne	Ontario St.	239	8/7/85	<1	<1	<1	<1
Miller	Ideson Rd.	1081	7/26/85	<1	<1	<1	<1
Miller	Martin Rd.	7744	10/31/85	0	0	0	0
Maverett	Martin Rd.	7829	10/31/85	2	0	0	0
O'Brien	Martin Rd.	7801	10/31/85	0	0	0	0
Reno	Ideson Rd.	1146	8/7/85	46	8	2	<1
Rogers, Larry	Martin Rd.	7880	6/19/85	260	75	<10	<10
Rogers, Larry	Martin Rd.	7880	7/1/85	197	43	2	2
Sackett, L.	Ideson Rd.	1140	8/7/85	29	5	1	<1
Saunders, E.	Martin Rd.	7838	8/7/85	22	4	<1	<1
Seltzer	Bean Hill Rd.	9444	7/26/85	<1	<1	<1	<1
Shelton	Ideson Rd.	1154	8/7/85	<5	<5	<5	<5
Slade	Martin Rd.	7796	9/26/85	0	0	0	0
Smith	Bragg St.	1147	6/19/85	77	23	1	2
Smith	Bragg St.	1147	7/1/85	98	17	1	<1
Stinson	Ontario St.	155	9/26/85	0	0	0	0
Suager, C.	Martin Rd.	7750	8/7/85	<1	<1	<1	<1
Tompson	Ideson Rd.	1155	8/7/85	11	3	2	<1
Tondryk, Edward	Bragg St.	1191	6/19/85	4	<2	<2	<2
Tondryk, Edward	Bragg St.	1191	7/1/85	5	<1	<1	<1
Vellekoop, Harry	Martin Rd.	7886	6/19/85	110	61	8	<10
Vellekoop, Harry	Martin Rd.	7886	7/1/85	92	16	8	<1
Vogner	Ontario St.	1897	7/26/85	<1	<1	<1	<1
Teers, Ronald	Martin Rd.	7873	7/1/85	72	19	1	<1

NOTE: Samples collected and analyzed by USEPA.

All results reported in parts per billion (PPB)

TCE - Trichloroethylene

T-1,2-DCE - Trans-1, 2-Dichloroethene

1,1,1-TCA - 1, 1, 1-Trichloroethane

1,2-DCA - 1,2-Dichloroethane

APPENDIX G
DATA VALIDATION REPORT

TECHNICAL MEMORANDUM

DATA VALIDATION

**HARTER, SECREST AND EMERY
ENARC-O MACHINE PRODUCTS
HONEYOYE FALLS, NEW YORK**

MAY 1991

**O'BRIEN & GERE ENGINEERS, INC.
5000 BRITTONFIELD PARKWAY
SYRACUSE, NEW YORK 13221**

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SECTION 1 - INTRODUCTION

1.01 Introduction

The following validation report addresses data quality for samples collected from the Enarc-O Machine Products site, Honeoye Falls, New York for Harter, Secrest and Emory. Three rounds of samples were collected by O'Brien & Gere Engineers, Inc. of Syracuse, New York. Laboratory analyses performed by OBG Laboratories, Inc. of Syracuse, New York are presented in laboratory reports, dated November 1990, January 1991, and February 1991. The first round of samples consisted of twenty soil samples collected from November 27 to November 29. The second round of samples consisted of seven groundwater samples and one drain water sample collected on January 7 and 8, 1991. The third round of samples consisted of seven groundwater samples collected on February 25 and 26, 1991.

1.02 General Considerations

Validation is a process of determining the suitability of a measurement system for providing useful analytical data. Although the term is frequently used in discussing methodologies, it applies to all aspects of the system and especially to samples, their measurement, and the actual data output. Accordingly, this report outlines excursions from the applicable quality control requirements outlined in the following documents:

Quality Assurance Project Plan (QAPP) for the Enarc-O Machine Products Division of Kaddis Manufacturing Corporation, North Bloomfield, New York, O'Brien & Gere Engineers, Inc., October 1990.

US EPA Laboratory Data Validation - Functional Guidelines for Evaluation of Organic/Inorganic Analyses, US EPA February 1988 and June 1988, respectively.

Test Methods for Evaluating Solid Wastes, SW-846 Third Edition US EPA, November 1986.

The Determination of Halogenated Chemicals in Water by Purge and Trap Methods, Method 502.1, US EPA, EMSL, April 1981, Revision 2.01989.

The Analysis of Aromatic Chemicals in Water by the Purge and Trap Method, Method 503.1, US EPA, EMSL, April 1981, Revision 2.01989.

The following four sections of this document address distinct aspects of the validation process. Section 2 lists the analytical methodology employed in sample analysis. Section 3 lists the data quality assurance/quality control (QA/QC) protocols used to validate the sample data. Specific QA/QC excursions are discussed in Section 4. Finally, usability with respect to the intended purposes of the data are discussed in Section 5.

SECTION 2 - ANALYTICAL METHODS

2.01 November 1990

Twenty soil samples collected from November 27 to November 29, 1990 were analyzed for volatile organics, lead, and percent solids utilizing the listed US EPA methods.

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>
Volatile Halogenated Organics	8010 (1)
Volatile Aromatic Organics	8020 (1)
Lead	6010 (1)
Metals Preparation	3050 (1)
Percent Solids	209F (2)

ANALYTICAL METHODS

- 1) Test Methods for Evaluate Solid Wastes, SW-846 Third Edition, US EPA November 1986.
 - 2) Standard Methods for the Examination of Water and Wastewater 16th Edition, 1985.
-

Analytical results for the first round of samples collected from the Enarc-O Machine Products site are presented in Attachment 1. Letters found immediately to the right of individual sample results serve to qualify the sample data. The following qualifiers have been used in the validation.

- U Indicates that the compound was analyzed for, but was not detected.
- The sample quantitation limit is presented and adjusted for dilution and percent moisture. This qualifier is used to signify that the detection limit of an analyte was raised due to blank contamination.

- J Indicates that the result should be considered approximate. This qualifier is used when the data validation procedure identifies a deficiency in the data generation process.
- UJ Indicates that the detection limit for the analyte in this sample should be considered approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process.
- R Indicates that the previously reported detection limit or sample result has been rejected due to a major deficiency in the data generation procedure. The data should not be used for any qualitative or quantitative purposes.

2.02 January 1991

Seven groundwater samples and one drain water sample, collected on January 7 and 8, 1991, were analyzed for volatile organics utilizing the listed US EPA methods:

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>
Volatile Halogenated Organics	502.1 (1)
Volatile Aromatic Organics	503.1 (2)
<u>ANALYTICAL METHODS</u>	
1)	<u>The Determination of Halogenated Chemicals in Water by Purge and Trap Methods, Method 502.1, US EPA, EMSL, April 1981, Revision 2.0 1989.</u>
2)	<u>The Analysis of Aromatic Chemicals in Water by the Purge and Trap Method, Method 503.1, US EPA, EMSL, April 1981, Revision 2.0 1989</u>

Analytical results for the samples collected for the second round of samples are presented in Attachment 2. The qualifiers used for these sample results are as described in Section 2.01.

2.03 February 1991

Seven groundwater samples, collected on February 25 and 26, 1991 were analyzed for volatile organics utilizing the US EPA methods outlined in Section 2.02. Analytical results for the samples collected for this round of samples are presented in Attachment 3. The qualifiers used for these sample results are as described in Section 2.01.

SECTION 3 - DATA VALIDATION PROTOCOLS

The following are method specific OA/QC protocols used in the validation of sample data from the Enarc-O Machine Products Site. Data quality was evaluated using control limits established in the analytical methods and in the Quality Assurance Project Plan (QAPP).

3.01 December 1990

3.01.1 Volatile Analysis

Volatile halogenated and aromatic organic analyses were performed on twenty soil samples according to protocols outlined in Test Methods for Evaluating Solid Wastes, SW-846 Third Edition, US EPA, November 1986. QA/QC criteria established in US EPA methods 8010 and 8020 and the QAPP were used to validate the sample results. The following QA/QC parameters were evaluated in this data validation:

1. Documentation Completeness
2. Holding Times
3. Calibration
 - a. Initial Calibration Verification
 - b. Continuing Calibration Verification
4. Blank Analysis
5. Matrix Spike/Matrix Spike Duplicate Analysis
6. Field Duplicate Analysis
7. Reference Standard Analysis

8. Surrogate Recovery
9. Compound Identification and Quantitation
10. Percent Solids Determination and Content
11. System Performance
12. Overall Data Assessment

3.01.2 Trace Metal Analysis

Lead analysis was performed on one soil sample and one rinseate sample according to protocols outlined in Test Methods for Evaluating Solid Wastes, SW-846 Third Edition, US EPA, November 1986. QA/QC criteria established in US EPA method 6010 and the QAPP were used to validate the sample results. The following QA/QC parameters were evaluated in this data validation:

1. Documentation Completeness
2. Holding Times
3. Calibration
 - a. Initial Calibration Verification
 - b. Continuing Calibration Verification
4. Blank Analysis
5. Matrix Spike Analysis
6. Laboratory Duplicate Analysis
7. Field Duplicate Analysis
8. Reference Standard Analysis
9. Percent Solids Determination and Content

10. Compound Identification and Quantitation
11. Overall Data Assessment

3.02 January 1991

Volatile halogenated and aromatic analyses were performed on eight water samples according to protocols outlined in US EPA methods 502.1 and 503.1. QA/QC criteria established in the analytical methods and the QAPP were used to validate the sample results. The following QA/QC parameters were evaluated in this data validation:

1. Documentation Completeness
2. Holding Times
3. Initial and Continuing Calibration
4. Matrix Spike/Matrix Spike Duplicate Analysis
5. Field Duplicate Analysis
6. Laboratory Fortified Blank Sample Analysis
7. Compound Identification and Quantitation
8. System Performance
9. Overall Data Assessment

3.03 February 1991

Volatile halogenated and aromatic analyses and data validation were performed on seven groundwater samples as specified in Section 3.02.

SECTION 4 - DATA QUALITY EVALUATION

4.01 November 1990

Twenty soil samples were collected for this round of samples. The laboratory case narrative noted that six of the samples received on December 4, 1990 contained detectable concentrations of dichloromethane. This compound was also detected in the reagent blank analyzed in association with these samples. The laboratory stated that these positive dichloromethane results are believed to be caused by laboratory contamination. For actions regarding laboratory reagent blank contamination, refer to Section 4.01.1 (Blank Analysis).

Laboratory case files and chain of custodies were reviewed. Trip blanks and field duplicate samples were not submitted for analysis as specified in the QAPP. Therefore, evaluations of transportation and shipping effects on volatile compound analyses (US EPA Methods 8010 and 8020) and precision of sampling methods were not performed. The laboratory noted minor discrepancies between sample appearances and chain of custody sample descriptions. They also noted sample label discrepancies. These discrepancies did not effect the quality of sample data.

4.01.1 Volatile Analysis

Volatile analyses were performed on twenty soil samples according to protocols outlined in US EPA methods 8010 and 8020. Sample results were validated according to QA/QC criteria outlined in the analytical methods and the QAPP. The following QA/QC parameters met criteria: Documentation

Completeness, Holding Times, Matrix Spike/Matrix Spike Duplicate Analysis, Surrogate Recovery, and Compound Identification.

Initial Calibration - Five point calibration curves were completed for the detected volatile compounds with the exception of tetrachloroethene for US EPA 8010 analysis and total xylenes for US EPA 8020 analysis. One point calibration was performed for tetrachloroethene and total xylenes. US EPA methods 8010 and 8020 require five point initial calibration. Therefore, detected sample results were approximated for tetrachloroethene and total xylenes.

Continuing Calibration Verification- Continuing calibration standards were analyzed at the required frequency. Concentrations were calculated from continuing calibrations responses for those compounds detected in samples. These calculated concentrations were compared with actual standard concentrations. When the calculated concentration varied by more than 10% from the actual concentration, the laboratory recalculated the calibration factor for the affected compounds using the continuing calibration standard. According to US EPA methods 8010 and 8020, when continuing calibration criteria is exceeded, new calibration curves must be generated for the affected compounds. Continuing calibration criteria were exceeded for the following compounds: toluene, 1,1, 1-trichloroethane and trichloroethene on 12/6/90, 12/7/90, and 12/11/90; and 1,2-dichloroethene on 12/11/91. New calibration curves were not generated for these compounds on the affected analysis dates. Therefore, detected sample results were approximated for toluene in samples L4966, and L4969; 1,1,1-trichloroethane in samples L4969, and L4974;

trichloroethene in samples L4969, L4970, L4971, L4973, L4974, and L5938; and 1,2-dichloroethene in sample L5938.

Blank Analysis Reagent blanks and rinse blanks were analyzed at the required frequency. Dichloromethane was detected in reagent blanks analyzed on 12/7/90. An action level was calculated five times the highest concentration of dichloromethane detected in the reagent blanks. Aqueous blank values were converted to soil values by incorporating sample weights and percent solid determinations. Based on this action level, detection limits were raised for dichloromethane in samples L4977, and L4980 to L4983 since these sample results may partially or wholly reflect blank contamination.

Field Duplicate Analysis - Field duplicate samples were not collected. Therefore an assessment of the sampling method could not be performed.

Reference Standard Analysis- Reference standards were analyzed at the required frequency. Percent recovery criteria of 70%- 130%, specified in the QAPP, were exceeded for trichloroethene on 12/7/90. Qualification of sample data was not necessary, since trichloroethene was not detected in samples analyzed on 12/7/90.

Compound Identification and Quantitation- Volatile compounds were identified by comparison of retention times to known calibration standards analyzed on the same analysis day. Based on review of the raw data, compound identification was performed correctly. Compound quantitation was performed by the external standard method. The average calibration factor from the initial calibration curve was used to quantitate those compounds that met continuing calibration criteria. Calibration factors calculated from the

continuing calibration standards were used by the laboratory for quantitation when initial calibration curves were not generated and when continuing calibration criteria were not met. US EPA methods 8010 and 8020 require compound quantitation to be performed utilizing the average calibration factor or the calculated calibration curve from the analysis of five standards. The laboratory did not perform quantitation according to method requirements for the following compounds: tetrachloroethene, total xylenes, toluene, 1,1,1-trichloroethane and trichloroethene on 12/6,12/7, and 12/11/90; and 1,2-dichloroethene on 12/11/91. Therefore, detected sample results were approximated for toluene in samples L4966, and L4969; 1,1,1-trichloroethane in samples 14969, and 14974; trichloroethene in samples L4969, L4970, L4971, L4973, L4974, and L4938; 1,2-dichloroethene in sample L5938; total xylenes in sample L4966; and tetrachloroethene in samples L4969, L4971, and L5398.

System Performance - A majority of the chromatograms exhibited peak tailing. Overall baseline stability, peak resolution and peak shape were good. Tailing did not effect sample identification or quantitation.

Overall Data Assessment- Continuing calibration verification and compound quantitation were not performed according to protocols outlined in US EPA methods 8010 and 8020 for several of the detected compounds. Based on a review of the raw data and quality control sample analyses, it was determined that data quality was not adversely affected by the laboratory's method of quantitation and continuing calibration verification. Therefore, sample results have been determined to be useable for qualitative and quantitative purposes. Detected sample results were approximated for toluene

in samples L4966, and L4969; 1,1,1-trichloroethane in samples L4969, and L4974; trichloroethene in samples L4969, L4970, L4971, L4973, L4974, and L5938; and 1,2-dichloroethene in sample L5938. Approximation was based on excursions from compound quantitation protocols and continuing calibration verification analysis. Detected sample results were also approximated for total xylenes in sample L4966; and tetrachloroethene in samples L4969, L4971, and L5398 due to deficiencies from initial calibration criteria and compound quantitation.

4.01.2 Trace Metal Analysis

One soil sample and one rinseate blank sample were analyzed for total lead. Sample results were validated according to QA/QC criteria established in US EPA method 6010 and the QAPP. The following QA/QC parameters met criteria: Documentation Completeness, Holding Times, Calibration, Blank Analysis, Matrix Spike Analysis, Laboratory Duplicate Analysis, Reference Standard Analysis and Compound Quantitation.

Field Duplicate Analysis - Field duplicate samples were not collected. Therefore an assessment of precision regarding sampling methods could not be performed.

Overall Data Assessment - The laboratory performed lead analyses and QA/QC procedures according to protocols outlined in the analytical methods and the QAPP. Therefore, the sample results for lead have been determined to be usable without qualification.

4.02 January 1991

Seven groundwater samples and one drain water sample were collected during this round of sampling. Volatile analyses were performed according to protocols outlined in US EPA methods 502.1 and 503.1. Sample results were validated according to QA/QC criteria established in the analytical methods and the QAPP. The following QA/QC parameters met criteria: Documentation Completeness, Holding Times, Calibration, Blank Analysis, Field Duplicate Analysis, System Performance. The laboratory case narrative noted that sample L6720 (drain) initially chosen for the matrix spike/matrix spike duplicate (MS/MSD) analyses had low spike recoveries and elevated relative percent differences (RPDs). The MS/MSD for this sample could not be reanalyzed, due to insufficient sample volume. Subsequently, sample L6719 (MW-6) was chosen for MS/MSD analyses.

Calibration- Five point calibration curves were present for the detected compounds. Relative standard deviation criteria of <10% were met when the average calibration factor was utilized for compound quantitation. Continuing calibration standards were analyzed each analysis day and met verification criteria for US EPA method 503.1 analyses. Continuing calibration standards analyzed for US EPA method 502.1 analyses were used by the laboratory to quantitate new calibration factors. This method of one point calibration is acceptable for US EPA 502.1 analysis, if the sample response is within $\pm 20\%$ of the calibration standard response. A majority of the detected compounds analyzed for US EPA 502.1 did not meet this criteria and were therefore approximated. The sample results that required approximation are summarized in the section 4.02 (Compound Identification and Quantitation).

Matrix Spike/Matrix Spike Duplicate Analysis - Percent recovery and RPD criteria specified in the QAPP were met for detected compounds, with the exception of m-xylene for MS/MSD sample L6720 (drain). This sample could not be reanalyzed due to insufficient sample quantity. Qualification of sample data was not necessary, since the additional sample chosen for MS/MSD [L6719(MW-6)] analysis met criteria and m-xylene was not detected in the samples.

Laboratory Fortified Blank Analysis - Laboratory fortified blank samples were analyzed at the required frequency. Percent recoveries, ranging from 81% to 118% met recovery criteria of 75%-125% specified in the QAPP. Trichloroethene, which was detected in the majority of samples for US EPA 503.1 analysis, was not present in the laboratory fortified blank samples analyzed for US EPA 503.1 analysis. Since continuing calibration criteria was met for US EPA 503.1 analysis of trichloroethene, qualification of sample data was not necessary.

Field Duplicate Analysis - Sample L6721 was a field duplicate sample of L6716 (MW-3). Duplicate criteria of <20% relative percent difference between field duplicate samples were met for the detected compounds.

Compound Identification and Quantitation- Compounds were identified by comparison of retention times to known calibration standards analyzed on the same analysis day as the sample. Based on a review of the raw data, compound identification was performed correctly. The laboratory noted on the sample result tables that separation between trans and cis 1,2-dichloroethene was not possible. Therefore, the sample result for trans-1,2-dichloroethene should be considered as the concentration of total 1,2-dichloroethene present. Compound quantitation for US EPA method 503.1 was performed utilizing the average calibration factor calculated from the

initial calibration curve. This method of quantitation was acceptable for US EPA 503.1 analyses since calibration criteria were met. Compound quantitation for US EPA method 502.1 was performed utilizing a calibration factor calculated from continuing calibration standards. This method of quantitation is acceptable for US EPA 502.1 analyses, if sample responses are within 20% of calibration standard response. Detected sample results were approximated for US EPA 502.1 compounds which did not meet this criteria. The affected compounds and samples included: 1,1,1-trichloroethane in samples L6716 to L6718, and L5721; trichloroethene in samples L5714 to L5719, and L5721; carbon tetrachloride in samples L6714 and L6719; trans 1,2-dichloroethene in samples L6717 and L6718; and chloroform and bromodichloromethane in sample L6720.

Overall Data Assessment - Overall, the laboratory performed volatile analyses and QA/QC protocols according to the analytical methods and the QAPP. Therefore, the sample results have been determined to be useable for qualitative and quantitative purposes. Deficiencies in US EPA 502.1 sample quantitation protocols resulted in the approximation of sample results for 1,1,1-trichloroethane in samples L6716 to L6718, and L6721; trichloroethene in samples L6714 to L6719, and L6721; carbon tetrachloride in samples L6714 and L6719; trans 1,2-dichloroethene in samples L6717 and L6718; and chloroform and bromodichloromethane in sample L6720. In addition, the concentration of trans-1,2-dichloroethene should be considered the concentration of total 1,2-dichloroethene present in the samples, since separation between the cis and trans isomer could not be achieved.

4.03 February 1991

Seven groundwater samples were collected during this round of sampling which occurred on February 25 and 26, 1991. Volatile analyses were performed according to protocols outlined in US EPA methods 502.1 and 503.1. Sample results were validated according to QA/QC criteria established in the analytical methods and the QAPP. The following QA/QC parameters met criteria: Documentation Completeness, Holding Times, Calibration, Field Duplicate Analysis, and System Performance.

Calibration - Five point calibration curves were present for the detected compounds. Relative standard deviation criteria of $< 10\%$ was met when the average calibration factor was utilized for compound quantitation. Continuing calibration standards were analyzed each analysis day and met verification criteria for US EPA method 503.1 analyses. Continuing calibration standards analyzed for US EPA method 502.1 analyses were used by the laboratory to quantitate new calibration of one point calibration is acceptable for US EPA 502.1 analysis if the sample response is within $\pm 20\%$ of the standard response. A majority of the detected 502.1 compounds did not meet this criteria and were therefore approximated. Sample results requiring approximation are summarized in the section 4.03 (Compound Identification and Quantitation).

Blank Analysis - Method, equipment and trip blanks were analyzed at the required frequency. Chloroform, bromodichloromethane, and a compound that was identified as either dibromochloromethane, 1, 1,2-trichloroethane, or trans- 1,3-dichloropropene were detected in the equipment blank sample, L9183. Qualification

of sample data was not necessary, since these compounds were not detected in the samples.

Laboratory Fortified Blank Analysis - Laboratory fortified blank samples were analyzed at the required frequency. Percent recoveries, ranging from 83% to 108% met recovery criteria of 75%-125% specified in the QAPP. Trichloroethene, which was detected in the majority of the samples, was not present in the laboratory fortified blank samples for US EPA 503.1 analyses. Since continuing calibration criteria were met for US EPA 503.1 analyses of trichloroethene, qualification of sample data for US EPA 503.1 analyses was not necessary.

Field Duplicate Analysis - Sample L9178 was a field duplicate sample of L9177 (MW-2). Duplicate criteria of <20% relative percent difference between field duplicate samples were met for the detected compounds.

Compound Identification and Quantitation - Compounds were identified by comparison of retention times to known calibration standards analyzed on the same analysis day as the samples. Based on a review of the raw data, compound identification was performed correctly. The laboratory noted on the sample result tables that separation between trans and cis 1,2-dichloroethene was not possible. Therefore, the sample result for trans 1,2-dichloroethene should be considered as the minimum concentration of total 1,2-dichloroethene present. Separation and quantification of dibromochloromethane, 1,1,2-trichloroethane and trans-1,3-dichloropropene in equipment blank sample L9183 was also not possible for US EPA 502.1 analysis. The laboratory noted on the sample result forms that one of these compounds was detected at approximately 1 ug/L in the blank sample. Since these compounds were not detected in the samples, qualification of sample data was not necessary.

Compound quantitation for US EPA method 503.1 was performed utilizing the average calibration factor calculated from the initial calibration curve. This method of quantitation was acceptable for US EPA 503.1 analyses since calibration criteria were met. Compound quantitation for US EPA method 502.1 was performed utilizing the calibration factor calculated from the continuing calibration standards. This method of quantitation is acceptable for US EPA 502.1 analyses, if sample responses are within 20% of calibration standard response. Detected sample results were approximated for US EPA 502.1 compounds that did not meet this criteria. The affected compounds and samples included: tetrachloroethene in sample L9180; trichloroethene in samples L9176, L9177, L9179, L9180, and L9181; 1,1,1-trichloroethane in samples L9179, and L9181; trans 1,2-dichloroethene in sample L9181; and chloroform and bromodichloromethane in sample L9183.

Overall Data Assessment - Overall, the laboratory performed volatile analyses and QA/QC procedures according to the relevant analytical methods and the QAPP. Therefore, the sample results have been determined to be useable for qualitative and quantitative purposes. Deficiencies from US EPA 502.1 sample quantitation protocols resulted in the approximation of sample results for tetrachloroethene in sample L9180; trichloroethene in samples L9176, L9177, L9179, L9180, and L9181; 1,1,1-trichloroethane in samples L9179, and L9181; trans 1,2-dichloroethene in sample L9181; and chloroform and bromodichloromethane in sample L9183. In addition, sample results for trans-1,2-dichloroethene should be considered as the concentration of total 1,2-dichloroethene present, since separation between the trans and cis isomers could not be achieved.

SECTION 5 - CONCLUSIONS AND DATA USEABILITY

The analytical data generated in connection with this investigation have been evaluated based on data quality objectives established in the Quality Assurance Project Plan (QAPP). Consequently, the data generation process was designed to develop an analytical data base of sufficient quality to be used in various decision making processes. In order to evaluate data quality, standard procedures for sample collection and handling, sample analysis and data presentation were developed and applied to the data generation process. The US EPA and NYSDEC, through the Contract Laboratory Program (CLP), have developed a set of quality control criteria. These quality control criteria were used to develop quality control criteria for non-CLP analyses. In conjunction with these procedures, control limits established in the analytical methods and the QAPP were used to evaluate data quality. Excursions from the quality control criteria resulted in either rejection or approximation of the affected results. Rejected data are considered to be unusable for either quantitative or qualitative purposes. Approximation of a data point indicates uncertainty in the reported concentration of the chemical, but not its assigned identity. The conservative assumptions used in the development of conclusions based on the analytical data assure that approximated analytical data adheres to the project data quality objectives. This approach to the use of the analytical data is consistent with the guidance presented in the US EPA Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A), 540/1-89/002, December 1989.

This section discusses the Enarc-O Machine Products Site analytical data in terms of its usability for site characterization, preparation of the site risk assessment and an evaluation of Interim Remedial Measures. Overall, 100% of the sample data have been determined to be useable for qualitative and quantitative purposes.

5.01 September 1990

Twenty soil samples were collected during this round of sampling which occurred from November 27 to November 29, 1990. The samples were analyzed for halogenated and aromatic volatile compounds by US EPA methods 8010 and 8020. One sample and rinseate blank were analyzed for total lead by US EPA method 6010. Sample results were validated using QA/QC criteria outlined in the analytical methods and the QAPP. Overall, the laboratory performed analysis and QA/QC procedures according to protocols outlined in the analytical methods and the QAPP. Therefore, sample results have been determined to be useable for qualitative and quantitative purposes. Detected sample results were approximated for toluene in samples 14966, and 14969; 1,1,1-trichloroethane in samples 14969, and 14974; trichloroethene in samples 14969, 14970, 14971, 14973, 14974, and 1,5938; and 1,2-dichloroethane in sample 1,5938 based on excursions from continuing calibration verification analysis and compound quantitation. Detected sample results were also approximated for tetrachloroethene in samples 14969, 14971 and 1,5938 and for total xylenes in sample 14966 due to deficiencies from initial calibration criteria and compound quantitation. Lead sample results are usable without qualification.

5.02 January 1991

Seven groundwater samples and one drain water sample were collected during this round of sampling which occurred on January 7 and 8, 1991. The samples were analyzed for halogenated and aromatic volatile compounds utilizing US EPA methods 502.1 and 503.1, respectively. Sample results were validated based on QA/QC protocols established in the analytical methods and the QAPP. Overall, the laboratory performed sample analysis and QA/QC procedures according to protocols outlined in the analytical methods and the QAPP. Therefore, the sample results have been determined to be useable for qualitative and quantitative purposes. Deficiencies from US EPA method 502.1 quantitation protocols resulted in the approximation of sample results for 1,1,1-trichloroethane in samples L6716 to L6718, and L6721; trichloroethene in samples L6714 to L6719, and L6721; carbon tetrachloride in samples L6714 and L6719; trans 1,2-dichloroethene in samples L6717 and L6718; and chloroform and bromodichloromethane in sample L6720.

5.03 February 1991

Seven groundwater samples were collected during this round of sampling which occurred on February 25 and 26, 1991. The samples were analyzed for halogenated and aromatic volatile compounds utilizing US EPA methods 502.1 and 503.1, respectively. Sample results were validated based on QA/QC protocols established in the analytical methods and the QAPP. Overall, the laboratory performed sample analyses and QA/QC procedures according to protocols outlined in the analytical methods and the QAPP. Therefore, the sample results have been determined to be useable for qualitative and quantitative purposes. Deficiencies from

Attachments

ATTACHMENT 1

NOVEMBER 1990 VALIDATED SAMPLE RESULTS



LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Hancock Falls, NY

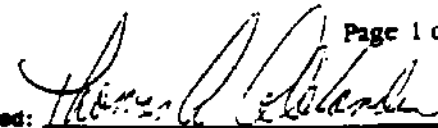
MATRIX: Soils

DATE COLLECTED 11-26-90 DATE RECEIVED 11-27-90 DATE ANALYZED 12-3-90

DESCRIPTION:	B-6 4'-6'	B-6 6'-8'			
SAMPLE NO.:	L4380	L4381			
Benzene	<11.	<12.			
Benzyl chloride	<110.	<120.			
Bis (2-chloroethoxy) methane	<5700.	<6000.			
Bromobenzene	<57.	<60.			
Bromodichloromethane	<11.	<12.			
Bromotorm	<110.	<120.			
Bromomethane	<110.	<120.			
Carbon tetrachloride	<11.	<12.			
- Chlorobenzene	↓	↓			
Chloroethane	↓	↓			
2-Chloroethylvinyl ether	<110.	<120.			
Chloroform	<11.	<12.			
1-Chlorohexane	<110.	<120.			
Chloromethane	<110.	<120.			
Chloromethylmethyl ether	<1100.	<1200.			
2-Chlorotoluene	<57.	<60.			
4-Chlorotoluene	<57.	<60.			
Dibromochloromethane	<11.	<12.			
Dibromomethane	<110.	<120.			
1,2-Dichlorobenzene	<57.	<60.			
1,3-Dichlorobenzene	↓	↓			
1,4-Dichlorobenzene	↓	↓			
Dichlorodifluoromethane	<110.	<120.			

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Authorized: 



LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

MATRIX: Soils

DATE COLLECTED 11-26-90 DATE RECEIVED 11-27-90 DATE ANALYZED 12-3-90

DESCRIPTION:	B-6 4'-6'	B-6 6'-8'			
SAMPLE NO.:	L4380	L4381			
1,1-Dichloroethane	<11.	<12.			
1,2-Dichloroethane					
1,1-Dichloroethylene					
1,2-Dichloroethylene (total)					
Dichloromethane					
1,2-Dichloropropane					
cis-1,3-Dichloropropylene					
trans-1,3-Dichloropropylene					
Ethylbenzene					
1,1,2,2-Tetrachloroethane					
1,1,1,2-Tetrachloroethane					
Tetrachloroethylene					
Toluene					
1,1,1-Trichloroethane					
1,1,2-Trichloroethane					
Trichloroethylene					
Trichlorofluoromethane					
1,2,3-Trichloropropane					
Vinyl chloride					
Xylene (total)	<34.	<36.			

Comments:

Methodology: USEPA SW-846, November 1988, 3rd Edition

Certification No.: 10155

Units: $\mu\text{g/kg dry weight}$ 146

Authorized: Thomas A. O'Brien Page 2 of 2



Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERYJOB NO. 2387.006.517DESCRIPTION Enatic-O Machine Products, Horsehoe Falls, NYMATRIX: Soil, WaterDATE COLLECTED 11-28,29-90DATE RECEIVED 12-4-90DATE ANALYZED 12-6,7-90

DESCRIPTION:	B-1 4'-6'	B-1 6'-8'	B-1 Rinseate Blank	B-3 0'-2'	B-3 4'-6'	B-3 6'-8'
SAMPLE NO.:	L4966*	L4967*	L4968**	L4969*	L4970*	L4971*
Benzene	<120.	<110.	<1.	<12.	<11.	<11.
Benzyl chloride	<1200.	<1100.	<10.	<120.	<110.	<110.
Bis (2-chloroethoxy) methane	<58,000.	<57,000.	<500.	<5800.	<5600.	<5700.
Bromobenzene	<580.	<570.	<5.	<58.	<56.	<57.
Bromodichloromethane	<120.	<110.	<1.	<12.	<11.	<11.
Bromoform	<1200.	<1100.	<10.	<120.	<110.	<110.
Bromomethane	<1200.	<1100.	<10.	<120.	<110.	<110.
Carbon tetrachloride	<120.	<110.	<1.	<12.	<11.	<11.
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<1200.	<1100.	<10.	<120.	<110.	<110.
Chloroform	<120.	<110.	<1.	<12.	<11.	<11.
1-Chlorohexane	<1200.	<1100.	<10.	<120.	<110.	<110.
Chloromethane	<1200.	<1100.	<10.	<120.	<110.	<110.
Chloromethylmethyl ether	<12,000.	<11,000.	<100.	<1200.	<1100.	<1100.
2-Chlorotoluene	<580.	<570.	<5.	<58.	<56.	<57.
4-Chlorotoluene	<580.	<570.	<5.	<58.	<56.	<57.
Dibromochloromethane	<120.	<110.	<1.	<120.	<11.	<11.
Dibromomethane	<1200.	<1100.	<10.	<120.	<110.	<110.
1,2-Dichlorobenzene	<580.	<570.	<5.	<58.	<56.	<57.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<1200.	<1100.	<10.	<120.	<110.	<110.

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Authorized:

Date: January 18, 1991

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LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERYJOB NO. 2387.006.517DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NYMATRIX: Soil, WaterDATE COLLECTED 11-28,29-90DATE RECEIVED 12-4-90DATE ANALYZED 12-6,7-90

DESCRIPTION:

SAMPLE NO.:

	B-1 4'-6'	B-1 6'-8'	B-1 Rinseate Blank	B-3 0'-2'	B-3 4'-6'	B-3 6'-8'
	L4966*	L4967*	L4968**	L4969*	L4970*	L4971*
1,1-Dichloroethane	<120.	<110.	<1.	<12.	<11.	<11.
1,2-Dichloroethane	↓	↓	↓	<12.	↓	↓
1,1-Dichloroethylene	↓	↓	↓	76.	↓	↓
1,2-Dichloroethylene (total)	↓	↓	↓	480.	150.	24.
Dichloromethane	↓	↓	↓	<12.	<11.	<11.
1,2-Dichloropropane	↓	↓	↓	<120.	↓	↓
cis-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
trans-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
Ethylbenzene	↓	↓	↓	<12.	↓	↓
1,1,2,2-Tetrachloroethane	↓	↓	↓	↓	↓	↓
1,1,1,2-Tetrachloroethane	↓	↓	↓	↓	↓	↓
Tetrachloroethylene	↓	↓	↓	490.J	↓	24.J
Toluene	210.J	↓	↓	29.J	↓	<11.
1,1,1-Trichloroethane	<120.	↓	↓	860.J	↓	↓
1,1,2-Trichloroethane	↓	↓	↓	<120.	↓	↓
Trichloroethylene	↓	↓	↓	1700.J	74.J	81.J
Trichlorofluoromethane	↓	↓	↓	<12.	<11.	<11.
1,2,3-Trichloropropane	↓	↓	↓	↓	↓	↓
Vinyl chloride	↓	↓	↓	↓	↓	↓
Xylene (total)	4700.J	<340.	<3.	<35.	<34.	<34..

Comments:

Methodology: USEPA SW-846, November 1986, 3rd Edition

Certification No.: 10155

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Units: *µg/kg dry weight

**µg/l

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Authorized:

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Volatile Organics

Method 8010/8020

CLIENT HARTER, SECREST & EMERYJOB NO. 2387.006.517DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NYMATRIX: Soil, WaterDATE COLLECTED 11-27,28,29-90 DATE RECEIVED 12-4-90DATE ANALYZED 12-6,7-90

DESCRIPTION:	B-3 Rinseate Blank	B-4 6'-8'	B-4 8'-10'	B-5A 4'-6'	B-5A 12'-14'	B-5B 0'-2'
SAMPLE NO.:	L4972*	L4973**	L4974**	L4975**	L4976**	L4977**
Benzene	<1.	<11.	<12.	<11.	<11.	<12.
Benzyl chloride	<10.	<110.	<120.	<110.	<110.	<120.
Bis (2-chloroethoxy) methane	<500.	<5400.	<6000.	<5700.	<5600.	<5900.
Bromobenzene	<5.	<54.	<60.	<57.	<56.	<59.
Bromodichloromethane	<1.	<11.	<12.	<11.	<11.	<12.
Bromoform	<10.	<110.	<120.	<110.	<110.	<120.
Bromomethane	<10.	<110.	<120.	<110.	<110.	<120.
Carbon tetrachloride	<1.	<11.	<12.	<11.	<11.	<12.
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<10.	<110.	<120.	<110.	<110.	<120.
Chloroform	<1.	<11.	<12.	<11.	<11.	<12.
1-Chlorohexane	<10.	<110.	<120.	<110.	<110.	<120.
Chloromethane	<10.	<110.	<120.	<110.	<110.	<120.
Chloromethylmethyl ether	<100.	<1100.	<1200.	<1100.	<1100.	<1200.
2-Chlorotoluene	<5.	<54.	<60.	<57.	<56.	<59.
4-Chlorotoluene	<5.	<54.	<60.	<57.	<56.	<59.
Dibromochloromethane	<1.	<11.	<120.	<11.	<11.	<12.
Dibromomethane	<10.	<110.	<120.	<110.	<110.	<120.
1,2-Dichlorobenzene	<5.	<54.	<60.	<57.	<56.	<59.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10.	<110.	<120.	<110.	<110.	<120.

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Authorized:

Date: January 18, 1991



LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.006.517

DESCRIPTION Emarc-C Machine Products, Honeoye Falls, NY

MATRIX: Soil, Water

DATE COLLECTED 11-27,28,29-90

DATE RECEIVED 12-4-90

DATE ANALYZED 12-6,7-90

DESCRIPTION:	B-3 Rinseate Blank	B-4 6'-8'	B-4 8'-10'	B-5A 4'-6'	B-5A 12'-14'	B-5B 0'-2'
SAMPLE NO.:	L4972*	L4973**	L4974**	L4975**	L4976**	L4977**
1,1-Dichloroethane	<1.	<11.	16.	<11.	<11.	<12.
1,2-Dichloroethane			<12.			
1,1-Dichloroethylene			<12.			
1,2-Dichloroethylene (total)			900.			
Dichloromethane			<12.			12.6**
1,2-Dichloropropane			<120.			<12.
cis-1,3-Dichloropropylene						
trans-1,3-Dichloropropylene						
Ethylbenzene			<12.			
1,1,2,2-Tetrachloroethane						
1,1,1,2-Tetrachloroethane						
Tetrachloroethylene						
Toluene						
1,1,1-Trichloroethane			41.J			
1,1,2-Trichloroethane			<120.			
Trichloroethylene		13.J	1400.J			
Trichlorofluoromethane		<11.	<12.			
1,2,3-Trichloropropane						
Vinyl chloride						
Xylene (total)	<3.	<33.	<36.	<34.	<33.	<35.

Comments: ***Laboratory Contaminant

Methodology: USEPA SW-846, November 1986, 3rd Edition

Certification No.: 10155

Units: *µg/l
**µg/kg dry weight

Authorized: *Thomas J. O'Brien*
Date: January 18, 1991



LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

MATRIX: Soil

DATE COLLECTED 11-27-28-90

DATE RECEIVED 12-4-90

DATE ANALYZED 12-7-90

DESCRIPTION:	B-5B 2'-4'	B-5C 6'-8'	B-5C 14'-16'	B-5D 0'-2'	B-5D 10'-12'	B-5E 12'-14'
SAMPLE NO.:	L4978	L4979	L4980	L4981	L4982	L4983
Benzene	<12.	<11.	<12.	<12.	<11.	<11.
Benzyl chloride	<120.	<110.	<120.	<120.	<110.	<110.
Bis (2-chloroethoxy) methane	<5900.	<5600.	<6000.	<5800.	<5700.	<5700.
Bromobenzene	<59.	<56.	<60.	<58.	<57.	<57.
Bromodichloromethane	<12.	<11.	<12.	<12.	<11.	<11.
Bromoform	<120.	<110.	<120.	<120.	<110.	<110.
Bromomethane	<120.	<110.	<120.	<120.	<110.	<110.
Carbon tetrachloride	<12.	<11.	<12.	<12.	<11.	<11.
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<120.	<110.	<120.	<120.	<110.	<110.
Chloroform	<12.	<11.	<12.	<12.	<11.	<11.
1-Chlorohexane	<120.	<110.	<120.	<120.	<110.	<110.
Chloromethane	<120.	<110.	<120.	<120.	<110.	<110.
Chloromethylmethyl ether	<1200.	<1100.	<1200.	<1200.	<1100.	<1100.
2-Chlorotoluene	<59.	<56.	<60.	<58.	<57.	<57.
4-Chlorotoluene	<59.	<56.	<60.	<58.	<57.	<57.
Dibromochloromethane	<12.	<11.	<12.	<12.	<11.	<11.
Dibromomethane	<120.	<110.	<120.	<120.	<110.	<110.
1,2-Dichlorobenzene	<59.	<56.	<60.	<58.	<57.	<57.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<120.	<110.	<120.	<120.	<110.	<110.

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Authorized: *[Signature]*

Date: January 18, 1991



Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.17
DESCRIPTION Enarc-O Machine Products, Honesoye Falls, NY
MATRIX: Soil
DATE COLLECTED 11-27, 28-90 DATE RECEIVED 12-4-90 DATE ANALYZED 12-7-90

DESCRIPTION:	B-5B 2'-4'	B-5C 6'-8'	B-5C 14'-16'	B-5D 0'-2'	B-5D 10'-12'	B-5E 12'-14'
SAMPLE NO.:	L4978	L4979	L4980	L4981	L4982	L4983
1,1-Dichloroethane	<12.	<11.	<12.	<12.	<11.	<11.
1,2-Dichloroethane						
1,1-Dichloroethylene						
1,2-Dichloroethylene (total)						
Dichloromethane			24U*	22U*	14U*	14U*
1,2-Dichloropropane			<12.	<12.	<11.	<11.
cis-1,3-Dichloropropylene						
trans-1,3-Dichloropropylene						
Ethylbenzene						
1,1,2,2-Tetrachloroethane						
1,1,1,2-Tetrachloroethane						
Tetrachloroethylene						
Toluene						
1,1,1-Trichloroethane						
1,1,2-Trichloroethane						
Trichloroethylene						
Trichlorofluoromethane						
1,2,3-Trichloropropane						
Vinyl chloride						
Xylene (total)	<35.	<34.	<36.	<35.	<34.	<34.

Comments: *Laboratory Contaminant

Methodology: USEPA, SW-846, November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight 152

Page 2 of 2

Authorized: *Thomas H. Pichler*



LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MATRIX: Soil
DATE COLLECTED 11-29-90 DATE RECEIVED 12-7-90 DATE ANALYZED 12-11-90

DESCRIPTION:	B-2 6'-8'	B-2 10'-10.8'			
SAMPLE NO.:	L5397	L5398			
Benzene	<11.	<12.			
Benzyl chloride	<110.	<120.			
Bis (2-chloroethoxy) methane	<5600.	<6000.			
Bromobenzene	<56.	<60.			
Bromodichloromethane	<11.	<12.			
Bromoform	<110.	<120.			
Bromomethane	<110.	<120.			
Carbon tetrachloride	<11.	<12.			
Chlorobenzene	↓	↓			
Chloroethane	↓	↓			
2-Chloroethylvinyl ether	<110.	<120.			
Chloroform	<11.	<12.			
1-Chlorohexane	<110.	<120.			
Chloromethane	<110.	<120.			
Chloromethylmethyl ether	<1100.	<1200.			
2-Chlorotoluene	<56.	<60.			
4-Chlorotoluene	<56.	<60.			
Dibromochloromethane	<11.	<120.			
Dibromomethane	<110.	<120.			
1,2-Dichlorobenzene	<56.	<60.			
1,3-Dichlorobenzene	↓	↓			
1,4-Dichlorobenzene	↓	↓			
Dichlorodifluoromethane	<110.	<120.			

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LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

MATRIX: Soil

DATE COLLECTED 11-29-90 DATE RECEIVED 12-7-90 DATE ANALYZED 12-11-90

DESCRIPTION:	B-2 6'-8'	B-2 10'-10.8'			
SAMPLE NO.:	L5397	L5398			
1,1-Dichloroethane	<11.	<12.			
1,2-Dichloroethane					
1,1-Dichloroethylene		↓			
1,2-Dichloroethylene (total)		200. J			
Dichloromethane		<12.			
1,2-Dichloropropane		<120.			
cis-1,3-Dichloropropylene		↓			
trans-1,3-Dichloropropylene					
Ethylbenzene		<12.			
1,1,2,2-Tetrachloroethane		↓			
1,1,1,2-Tetrachloroethane					
Tetrachloroethylene		30. J			
Toluene		<12.			
1,1,1-Trichloroethane		<12.			
1,1,2-Trichloroethane		<120.			
Trichloroethylene		1200. J			
Trichlorofluoromethane		<12.			
1,2,3-Trichloropropane		↓			
Vinyl chloride		↓			
Xylene (total)	<34.	<36.			

Comments:

Methodology: USEPA SW-846, November 1990, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

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Authorized:

Date: January 18, 1991



Laboratory Report

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.005.517
DESCRIPTION Enarc-O Machine Products, McNeoye Falls, NY
MATRIX: Soil, Water
DATE COLLECTED 11-29-90 DATE RECEIVED 12-4-90

	Sample #	TOTAL LEAD
B-1, 4'-6'*	L4966	14.
B-1, Rinseate Blank**	L4968	<0.05

Comments:

Certification No.: 10155 155

Units: *mg/kg dry weight
**mg/l

Authorized: *Thomas A. O'Brien*

Date: January 18, 1991



Laboratory Report

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Emarc-O Machine Products, Honeoye Falls, NY
MATRIX: Soils
DATE COLLECTED 11-26-90 DATE RECEIVED 11-27-90

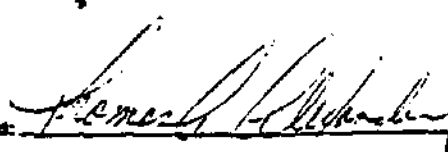
	Sample #	PERCENT TOTAL SOLIDS			
B-6, 4'-6'	L4380	87.			
B-6, 6'-8'	L4381	84.			

Comments:

Certification No.: 10155

Units: \$

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Authorized: 

Date: January 18, 1991



Laboratory Report

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Honeo Falls, NY
MATRIX: Soil, Water
DATE COLLECTED 11-29-90 DATE RECEIVED 12-4-90

	Sample #	PERCENT TOTAL SOLIDS
B-1, 4'-6'	L4966	86.
B-1, 6'-8'	L4967	87.
B-1, Rinseate Blank	L4968	-
B-3, 0'-2'	L4969	86.
B-3, 4'-6'	L4970	89.
B-3, 6'-8'	L4971	88.
B-3, Rinseate Blank	L4972	-
B-4, 6'-8'	L4973	92.
B-4, 8'-10'	L4974	83.
B-5A, 4'-6'	L4975	88.
B-5A, 12'-14'	L4976	90.
B-5B, 0'-2'	L4977	85.
B-5B, 2'-4'	L4978	85.
B-5C, 6'-8'	L4979	89.
B-5C, 14'-16'	L4980	84.
B-5C, 0'-2'	L4981	86.
B-5C, 10'-12'	L4982	87.
B-5E, 12'-14'	L4983	87.

Comments:

Certification No.: 10155

Units: \$

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Authorized:

Thomas C. O'Brien

Date: January 18, 1991



Laboratory Report

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY MATRIX: Soil
DATE COLLECTED 11-29-90 DATE RECEIVED 12-7-90

B-2, 6'-8'
B-2, 10'-10.8'

Sample #	PERCENT TOTAL SOLIDS

L5397	89.
L5398	83.

Comments:

Certification No.: 10155

Units: %

Authorized: *Thomas A. Albano*

Date: January 18, 1991

ATTACHMENT 2

JANUARY 1991 VALIDATED SAMPLE RESULTS



Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERYJOB NO. 2387.003.S17DESCRIPTION Enarc-O Machine Products, Honeye Falls, NY

MW-1

MATRIX: WaterSAMPLE NO. L6714 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-11-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	<1.
Dichlorodifluoromethane		Trichloroethene	3. J
Vinyl chloride	<1.	1,3-Dichloropropane	<1.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene		1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride	1. J	4-Chlorotoluene	
Bromodichloromethane	<1.	1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *Thomas G. Lick*

Date: February 11, 1991

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OBG LABORATORIES, INC.

Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517

DESCRIPTION Enarc-O Machine Products, Honeye Falls, NY

MW-1

MATRIX: Water

SAMPLE NO. L6714 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14,15-91

	ppb		ppb
Benzene	<1.	4-Chlorotoluene	<1.
Trichloroethene	3.	Bromobenzene	
Toluene	<1.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/800/4-88/039

Certification No.: 10155

Authorized: *Thomas C. McElender*

Date: February 11, 1991

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Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-2 MATRIX: Water
SAMPLE NO. L6715 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

ppb		ppb	
Chloromethane	<1000	1,1-Dichloropropene	<100.
Bromomethane		cis-1,3-Dichloropropene	<100.
Dichlorodifluoromethane		Trichloroethene	3500. J
Vinyl chloride	<100.	1,3-Dichloropropene	<100.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethane		1,2-Dibromoethane	<1000.
Bromochloromethane		Bromoform	<1000.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<100.
trans-1,2-Dichloroethane		1,2,3-Trichloropropane	
cis-1,2-Dichloroethane		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<1000.	Bromobenzene	<500.
1,1,1-Trichloroethane	<100.	2-Chlorotoluene	
Carbon tetrachloride		4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *Thomas J. Williams*

Date: February 11, 1991



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-2 MATRIX: Water
SAMPLE NO. L6715 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

	ppb		ppb
Benzene	<100.	4-Chlorotoluene	<100.
Trichloroethene	3900.	Bromobenzene	
Toluene	<100.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<500.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

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Authorized: *Theresa L. Linder*

Date: February 11, 1991



Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-3 MATRIX: Water
SAMPLE NO. L6716 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

	ppb		ppb
Chloromethane	<1000.	1,1-Dichloropropene	<100.
Bromomethane		cis-1,3-Dichloropropene	<100.
Dichlorodifluoromethane		Trichloroethene	5800. J
Vinyl chloride	<100.	1,3-Dichloropropene	<100.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethane		1,2-Dibromomethane	<1000.
Bromochloromethane		Bromoform	<1000.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<100.
trans-1,2-Dichloroethane		1,2,3-Trichloropropane	
cis-1,2-Dichloroethane		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<1000.	Bromobenzene	<500.
1,1,1-Trichloroethane	470. J	2-Chlorotoluene	
Carbon tetrachloride	<100.	4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *[Signature]*

Date: February 11, 1991



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-3 MATRIX: Water
SAMPLE NO. 16716 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

	ppb		ppb
Benzene	<200.	4-Chlorotoluene	<200.
Trichloroethene	5600.	Bromobenzene	
Toluene	<200.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<1000.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *Thomas J. Albano*

Date: February 11, 1991

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LABORATORIES, INC.

Volatile Organics
Method 502CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517DESCRIPTION Enarc-O Machine Products, Honesoye Falls, NYMW-4 MATRIX: WaterSAMPLE NO. L6717 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	<1.
Dichlorodifluoromethane		Trichloroethene	46. J
Vinyl chloride	<1.	1,3-Dichloropropene	<1.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene	14. J	1,2,3-Trichloropropane	
cis-1,2-Dichloroethene	*	1,1,2,2-Tetrachloroethane	
Chloroform	<1.	Tetrachloroethene	
1,2-Dichloroethane	<1.	Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	11. J	2-Chlorotoluene	
Carbon tetrachloride	<1.	4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

*Trans-1,2-Dichloroethene and cis-1,2-Dichloroethene coelute using EPA Method 502.1. The response at this retention time was quantitated using a trans-1,2-Dichloroethene response factor.

Authorized: 

Date: February 11, 1991



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.003.517

DESCRIPTION Enarc-O Machine Products, Honeye Falls, NY

MW-4

MATRIX: Water

SAMPLE NO. L6717 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14, 15-91

	ppb		ppb
Benzene	<2.	4-Chlorotoluene	<2.
Trichloroethene	60.	Bromobenzene	
Toluene	<2.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<10.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

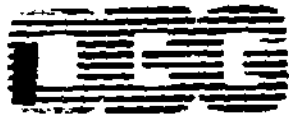
Methodology: EPA/800/4-88/039

Certification No.: 10155

Authorized: 

Date: February 11, 1991

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LABORATORIES, INC.

Volatile Organics
Method 502CLIENT HARTER, SECREST & EMERYJOB NO. 2387.003.517DESCRIPTION Engr-C-0 Machine Products, Honeoye Falls, NY

MW-5

MATRIX: WaterSAMPLE NO. L6718 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-11-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<10.
Bromomethane		cis-1,3-Dichloropropene	<10.
Dichlorodifluoromethane		Trichloroethene	220. J
Vinyl chloride	<1.	1,3-Dichloropropane	<10.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	
Bromochloromethane		Bromoform	
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene	160. J	1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform	<10.	Tetrachloroethene	
1,2-Dichloroethane	<1.	Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	12. J	2-Chlorotoluene	
Carbon tetrachloride	<1.	4-Chlorotoluene	
Bromodichloromethane	<1.	1,3-Dichlorobenzene	
1,2-Dichloropropane	<10.	1,2-Dichlorobenzene	
2,2-Dichloropropane	<10.	1,4-Dichlorobenzene	

Comments:

Methodology: EPA/800/4-68/039

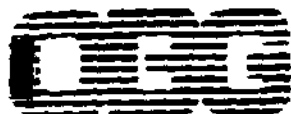
Certification No.: 10155

*Trans-1,2-Dichloroethene and cis-1,2-Dichloroethene coelute using EPA Method 502.1. The response at this retention time was quantitated using a trans-1,2-Dichloroethene response factor.

Authorized: 

Date: February 11, 1991

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OBG LABORATORIES, INC.

Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.003.517

DESCRIPTION Boarc-O Machine Products, Honeoye Falls, NY

MW-5

MATRIX: Water

SAMPLE NO. 16718

DATE COLLECTED 1-8-91

DATE REC'D. 1-8-91

DATE ANALYZED 1-15-91

	ppb		ppb
Benzene	<10	4-Chlorotoluene	<10
Trichloroethene	240	Bromobenzene	
Toluene	<10	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<50
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/800/4-88/039

Certification No.: 10155

Authorized: *Thomas A. Wilk*

Date: February 11, 1991

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Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-6 MATRIX: Water
SAMPLE NO. 16719 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-11-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	<1.
Dichlorodifluoromethane		Trichloroethene	1. J
Vinyl chloride	<1.	1,3-Dichloropropene	<1.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromomethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene		1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride	3. J	4-Chlorotoluene	
Bromodichloromethane	<1.	1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/038

Certification No.: 10155

Authorized: 

Date: February 11, 1991

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Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honeye Falls, NY
MW-6 MATRIX: Water
SAMPLE NO. 16719 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-15-91

	ppb		ppb
Benzene	<1	4-Chlorotoluene	<1
Trichloroethene		Bromobenzene	
Toluene		sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/038

Certification No.: 10155

Authorized: *Thomas A. O'Brien*

Date: February 11, 1991

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Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
Drain MATRIX: Water
SAMPLE NO. L6720 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-11-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	
Dichlorodifluoromethane		Trichloroethene	
Vinyl chloride	<1.	1,3-Dichloropropene	
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene		1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform	14. J	Tetrachloroethane	
1,2-Dichloroethane	<1.	Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride	<1.	4-Chlorotoluene	
Bromodichloromethane	3. J	1,3-Dichlorobenzene	
1,2-Dichloropropane	<1.	1,2-Dichlorobenzene	
2,2-Dichloropropane	<1.	1,4-Dichlorobenzene	

Comments:

Methodology: EPA/800/4-88/039

Certification No.: 10155

Authorized: 

Date: February 11, 1991

Volatile Organics Method 503



LABORATORIES, INC.

CLIENT HARTER, SECREST & EMERY JOB NO. 2387 003 517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

Drain

MATRIX: Water

SAMPLE NO. 16720 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

	ppb		ppb
Benzene	<1	4-Chlorotoluene	<1
Trichloroethane		Bromobenzene	
Toluene		sec-Butylbenzene	
Tetrachloroethane		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *Thomas J. O'Brien*

Date: February 11, 1991

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ATORIES, INC.

Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387 003 517
 DESCRIPTION Enarc-O Machine Products, Honeyva Falls, NY
Duplicate MATRIX: Water
 SAMPLE NO. L6721 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

ppb	ppb
Chloromethane	<1000
Bromomethane	
Dichlorodifluoromethane	
Vinyl chloride	<100
Chloroethane	
Methylene chloride	
Trichlorofluoromethane	
1,1-Dichloroethane	
Bromochloromethane	
Dichloroethane	
trans-1,2-Dichloroethane	
cis-1,2-Dichloroethane	
Chloroform	
1,2-Dichloroethane	
Dibromomethane	<1000
1,1,1-Trichloroethane	460. J
Carbon tetrachloride	<100
Bromodichloromethane	
1,2-Dichloropropane	
2,2-Dichloropropane	
1,1-Dichloropropene	<100
cis-1,3-Dichloropropene	<100
Trichloroethene	5300. J
1,3-Dichloropropane	<100
Dibromochloromethane	
1,1,2-Trichloroethane	
trans-1,3-Dichloropropene	
1,2-Dibromoethane	<1000
Bromoform	<1000
1,1,1,2-Tetrachloroethane	<100
1,2,3-Trichloropropane	
1,1,2,2-Tetrachloroethane	
Tetrachloroethene	
Chlorobenzene	
Bromobenzene	<500
2-Chlorotoluene	
4-Chlorotoluene	
1,3-Dichlorobenzene	
1,2-Dichlorobenzene	
1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *[Signature]*

Date: February 11, 1991



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.003.517

DESCRIPTION Enarc-O Machine Products, Horsevye Falls, NY

Duplicate

MATRIX: Water

SAMPLE NO. 16721 DATE COLLECTED 1-7-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

	ppb		ppb
Benzene	<200.	4-Chlorotoluene	<200.
Trichloroethene	6200.	Bromobenzene	
Toluene	<200.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<1000.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *Thomas J. O'Brien*

Date: February 11, 1991

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001



Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Honesdale Falls, NY
Equipment Blank MATRIX: Water
SAMPLE NO. L6722 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-14-91

ppb		ppb	
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	
Dichlorodifluoromethane		Trichloroethene	
Vinyl chloride	<1.	1,3-Dichloropropene	
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethane		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethane		1,2,3-Trichloropropene	
cis-1,2-Dichloroethane		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride		4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *Thomas A. O'Brien*

Date: February 11, 1991



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Snare-O Machine Products, Honeoye Falls, NY
Equipment Blank MATRIX: Water
SAMPLE NO. L6722 DATE COLLECTED 1-8-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-15-91

	ppb		ppb
Benzene	<1	4-Chlorotoluene	<1
Trichloroethene		Bromobenzene	
Toluene		sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/800/4-88/039

Certification No.: 10155



Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387 003 517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
QC Trip Blank MATRIX: Water
SAMPLE NO. L6723 DATE COLLECTED 12-18-90 DATE REC'D. 1-8-91 DATE ANALYZED 1-11-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	
Dichlorodifluoromethane		Trichloroethene	
Vinyl chloride	<1.	1,3-Dichloropropane	
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene		1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride		4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.003.517
DESCRIPTION Enarc-O Machine Products, Horseys Falls, NY
QC Trip Blank MATRIX: Water
SAMPLE NO. L6723 DATE COLLECTED 12-18-91 DATE REC'D. 1-8-91 DATE ANALYZED 1-15-91

	ppb		ppb
Benzene	<1.	4-Chlorotoluene	<1.
Trichloroethene		Bromobenzene	
Toluene		sec-Butylbenzene	
Tetrachloroethene		1,2,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/800/4-88/009

Certification No.: 10155

Authorized: *Thomas G. Sciarra*

Date: February 11, 1991

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ATTACHMENT 3

FEBRUARY 1991 VALIDATED SAMPLE RESULTS



Volatile Organics Method 502

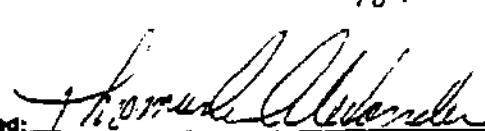
CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-1 MATRIX: Water
SAMPLE NO. L9176 DATE COLLECTED 2-25-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	<1.
Dichlorodifluoromethane		Trichloroethene	4. J
Vinyl chloride	<1.	1,3-Dichloropropane	<1.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethane		1,2-Dibromoethane	<10.
Bromochloromethane		Bromotorm	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene		1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride		4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: 

Date: March 28, 1991 0003

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OBG LABORATORIES, INC.

Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
 DESCRIPTION Enarc-O Machine Products, Horseeye Falls, NY MATRIX: Water
 MW-1
 SAMPLE NO. L9176 DATE COLLECTED 2-25-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

	ppb		ppb
Benzene	<1.	4-Chlorotoluene	<1.
Trichloroethane	4.	Bromobenzene	
Toluene	<1.	sec-Butylbenzene	
Tetrachloroethane		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

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Authorized: *Howard A. Warden*

Date: March 28, 1991 0004



OBG LABORATORIES, INC.

Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeye Falls, NY

MW-2

MATRIX: Water

SAMPLE NO. L9177 DATE COLLECTED 2-26-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

ppb

ppb

Chloromethane

<1000.

1,1-Dichloropropene

<100.

Bromomethane

cis-1,3-Dichloropropene

<100.

Dichlorodifluoromethane

Trichloroethene

3100. J

Vinyl chloride

<100.

1,3-Dichloropropene

<100.

Chloroethane

Dibromochloromethane

Methylene chloride

1,1,2-Trichloroethane

Trichlorofluoromethane

trans-1,3-Dichloropropene

1,1-Dichloroethene

1,2-Dibromoethane

<1000.

Bromochloromethane

Bromoform

<1000.

1,1-Dichloroethane

1,1,1,2-Tetrachloroethane

<100.

trans-1,2-Dichloroethene

1,2,3-Trichloropropane

cis-1,2-Dichloroethene

1,1,2,2-Tetrachloroethane

Chloroform

Tetrachloroethene

1,2-Dichloroethane

Chlorobenzene

Dibromomethane

<1000.

Bromobenzene

<500.

1,1,1-Trichloroethane

<100.

2-Chlorotoluene

Carbon tetrachloride

4-Chlorotoluene

Bromodichloromethane

1,3-Dichlorobenzene

1,2-Dichloropropane

1,2-Dichlorobenzene

2,2-Dichloropropane

1,4-Dichlorobenzene

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: *Thomas J. Warden*

Date: March 28, 1991 0005

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OBG LABORATORIES, INC.

Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

MW-2

MATRIX: Water

SAMPLE NO. L9177

DATE COLLECTED 2-26-91

DATE REC'D. 2-26-91

DATE ANALYZED 3-5-91

Benzene

<100.

4-Chlorotoluene

<100.

Trichloroethene

3400.

Bromobenzene

Toluene

<100.

sec-Butylbenzene

Tetrachloroethene

1,3,5-Trimethylbenzene

Ethylbenzene

4-Isopropyltoluene

p-Xylene

1,2,4-Trimethylbenzene

Chlorobenzene

1,4-Dichlorobenzene

m-Xylene

1,3-Dichlorobenzene

o-Xylene

N-Butylbenzene

Isopropylbenzene

1,2-Dichlorobenzene

Styrene

Hexachlorobutadiene

N-Propylbenzene

1,2,4-Trichlorobenzene

tert-Butylbenzene

Naphthalene

2-Chlorotoluene

1,2,3-Trichlorobenzene

Comments:

Methodology: EPA/600/4-86/039

Certification No.: 10155

184

Authorized: *Thomas J. McFarland*

Date: March 28, 1991 0006



Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Edarc-O Machine Products, Honeoye Falls, NY
MW-2 Duplicate MATRIX: Water
SAMPLE NO. L9178 DATE COLLECTED 2-26-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

	ppb		ppb
Chloromethane	<1000.	1,1-Dichloropropene	<100.
Bromomethane		cis-1,3-Dichloropropene	<100.
Dichlorodifluoromethane		Trichloroethene	2800.
Vinyl chloride	<100.	1,3-Dichloropropane	<100.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	<1000.
Bromochloromethane		Bromotom	<1000.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<100.
trans-1,2-Dichloroethene		1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chlorotom		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<1000.	Bromobenzene	<500.
1,1,1-Trichloroethane	<100.	2-Chlorotoluene	
Carbon tetrachloride		4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: 

Date: March 28, 1991 0007

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Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Horseys Falls, NY
MW-2 Duplicate MATRIX: Water
SAMPLE NO. L9178 DATE COLLECTED 2-26-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-5-91

	ppb		ppb
Benzene	<100.	4-Chlorotoluene	<100.
Trichloroethene	3300.	Bromobenzene	
Toluene	<100.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<500.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/C39

Certification No.: 10155

Authorized: 

Date: March 28, 1991 0008

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Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY

JCE NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

MATRIX: Water

MW-3

SAMPLE NO. L9179

DATE COLLECTED 2-25-91

DATE REC'D. 2-26-91

DATE ANALYZED 3-4-91

	ppb		ppb
Chloromethane	<1000.	1,1-Dichloropropene	<100.
Bromomethane		cis-1,3-Dichloropropene	<100.
Dichlorodifluoromethane		Trichloroethene	4000. J
Vinyl chloride	<100.	1,3-Dichloropropane	<100.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethane		1,2-Dibromoethane	<1000.
Bromochloromethane		Bromoform	<1000.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<100.
trans-1,2-Dichloroethane		1,2,3-Trichloropropane	
cis-1,2-Dichloroethane		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<1000.	Bromobenzene	<500.
1,1,1-Trichloroethane	420. J	2-Chlorotoluene	
Carbon tetrachloride	<100.	4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Methodology: EPA/600/4-88/039

Certification No.: 10155

Comments:

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Authorized: [Signature]

Date: March 28, 1991



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-3 MATRIX: Water
SAMPLE NO. L9179 DATE COLLECTED 2-25-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-5-91

	ppb		ppb
Benzene	<200.	4-Chlorotoluene	<200.
Trichloroethene	5300.	Bromobenzene	
Toluene	<200.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<1000.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

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Authorized: *Thomas L. Shepard*

Date: March 28, 1991 0010



LABORATORIES, INC.

Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY

JOB NO. 2387.006.517

DESCRIPTION ENGRO-D Machine Products, Honeoye Falls, NY

MW-4

MATRIX: Water

SAMPLE NO. L9180 DATE COLLECTED 2-25-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	<1.
Dichlorodifluoromethane		Trichloroethene	63. J
Vinyl chloride	<1.	1,3-Dichloropropane	<1.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethane		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene	16.	1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform	<1.	Tetrachloroethene	2. J
1,2-Dichloroethane	<1.	Chlorobenzene	<1.
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	17.	2-Chlorotoluene	
Carbon tetrachloride	<1.	4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/800/4-88/039

Certification No.: 10155

* Trans-1,2-dichloroethene and cis-1,2-dichloroethene coelute using EPA Method 502.1. The response at this retention time was quantitated using a trans-1,2-dichloroethene response factor.

Authorized: Thomas L. O'Brien

Date: March 28, 1991 0011



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.106.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
MW-4 MATRIX: Water
SAMPLE NO. L9180 DATE COLLECTED 2-25-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-5-91

	ppb		ppb
Benzene	<2.	4-Chlorotoluene	<2.
Trichloroethene	69.	Bromobenzene	
Toluene	<2.	sec-Butylbenzene	
Tetrachloroethene	2.	1,3,5-Trimethylbenzene	
Ethylbenzene	<2.	4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<10.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-86/039

Certification No.: 10155

Authorized:

Date: March 28, 1991

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0012



LABORATORIES, INC.

Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
 DESCRIPTION Enarc-O Machine Products, Honeye Falls, NJ
 MW-5 MATRIX: Water
 SAMPLE NO. L9181 DATE COLLECTED 2-26-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

ppb

ppb

Chloromethane	<10.	1,1-Dichloropropene	<10.
Bromomethane		cis-1,3-Dichloropropene	<10.
Dichlorodifluoromethane		Trichloroethene	190. J
Vinyl chloride	<1.	1,3-Dichloropropene	<10.
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	
Bromochloromethane		Bromotom	
1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene	100. J	1,2,3-Trichloropropane	
cis-1,2-Dichloroethene	*	1,1,2,2-Tetrachloroethane	
Chloroform	<10.	Tetrachloroethene	
1,2-Dichloroethane	<1.	Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	8. J	2-Chlorotoluene	
Carbon tetrachloride	<1.	4-Chlorotoluene	
Bromodichloromethane	<1.	1,3-Dichlorobenzene	
1,2-Dichloropropane	<10.	1,2-Dichlorobenzene	
2,2-Dichloropropane	<10.	1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

* Trans-1,2-dichloroethene and cis-1,2-dichloroethene coelute using EPA Method 502.1. The response at this retention time was quantitated using a trans-1,2-dichloroethene response factor.

Authorized: *Thomas W. Wainwright*

Date: March 28, 1991 0012



LABORATORIES, INC.

Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

MW-5

MATRIX: Water

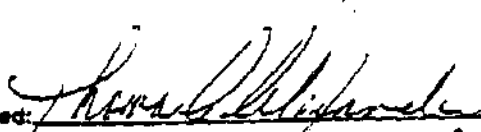
SAMPLE NO. L9181 DATE COLLECTED 2-26-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-5-91

	ppb		ppb
Benzene	<10.	4-Chlorotoluene	<10.
Trichloroethene	310.	Bromobenzene	
Toluene	<10.	sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<50.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/800/4-88/039

Certification No.: 10155

Authorized: 

Date: March 28, 1991 0014

192



OBG LABORATORIES, INC.

Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517

DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY

MW-6

MATRIX: Water

SAMPLE NO. L9182 DATE COLLECTED 2-25-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

	ppb		ppb
Chloromethane	<10.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	
Dichlorodifluoromethane		Trichloroethene	
Vinyl chloride	<1.	1,3-Dichloropropane	
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethane		1,2,3-Trichloropropane	
cis-1,2-Dichloroethane		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride		4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/800/4-88/039

Certification No.: 10155

Authorized: 

Date: March 28, 1991 0015

193

Volatile Organics **Method 503**

ORATORIS, INC.

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
 DESCRIPTION Enarc-C Machine Products, Honeoye Falls, NY
Equipment Blank MATRIX: Water
 SAMPLE NO. L9183 DATE COLLECTED 2-25-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-5-91

	ppb		ppb
Benzene	<1.	4-Chlorotoluene	<1.
Trichloroethene		Bromobenzene	
Toluene		sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Comments:

Methodology: EPA/600/4-88/039

Certification No.: 10155

Authorized: 

Date: March 28, 1991 0018

194



OBG LABORATORIES, INC.

Volatile Organics Method 502

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY
QC Trip Blank MATRIX: Water
SAMPLE NO. 19184 DATE COLLECTED 2-22-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-4-91

	ppb		ppb
Chloromethane	<1.	1,1-Dichloropropene	<1.
Bromomethane		cis-1,3-Dichloropropene	
Dichlorodifluoromethane		Trichloroethene	
Vinyl chloride	<1.	1,3-Dichloropropane	
Chloroethane		Dibromochloromethane	
Methylene chloride		1,1,2-Trichloroethane	
Trichlorofluoromethane		trans-1,3-Dichloropropene	
1,1-Dichloroethene		1,2-Dibromoethane	<10.
Bromochloromethane		Bromoform	<10.
1,1-Dichloroethane		1,1,1,2-Tetrachloroethane	<1.
trans-1,2-Dichloroethene		1,2,3-Trichloropropane	
cis-1,2-Dichloroethene		1,1,2,2-Tetrachloroethane	
Chloroform		Tetrachloroethene	
1,2-Dichloroethane		Chlorobenzene	
Dibromomethane	<10.	Bromobenzene	<5.
1,1,1-Trichloroethane	<1.	2-Chlorotoluene	
Carbon tetrachloride		4-Chlorotoluene	
Bromodichloromethane		1,3-Dichlorobenzene	
1,2-Dichloropropane		1,2-Dichlorobenzene	
2,2-Dichloropropane		1,4-Dichlorobenzene	

Comments:

Methodology: EPA/600/4-85/039

Certification No.: 10155

Authorized: 

Date: March 28, 1991

195

0019



Volatile Organics Method 503

CLIENT HARTER, SECREST & EMERY JOB NO. 2387.006.517
DESCRIPTION Enarc-O Machine Products, Honeoye Falls, NY MATRIX: Water
QC Trip Blank
SAMPLE NO. L9184 DATE COLLECTED 2-22-91 DATE REC'D. 2-26-91 DATE ANALYZED 3-5-91

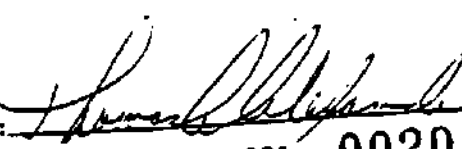
	ppb		ppb
Benzene	<1.	4-Chlorotoluene	<1.
Trichloroethene		Bromobenzene	
Toluene		sec-Butylbenzene	
Tetrachloroethene		1,3,5-Trimethylbenzene	
Ethylbenzene		4-Isopropyltoluene	
p-Xylene		1,2,4-Trimethylbenzene	
Chlorobenzene		1,4-Dichlorobenzene	
m-Xylene		1,3-Dichlorobenzene	
o-Xylene		N-Butylbenzene	
Isopropylbenzene		1,2-Dichlorobenzene	
Styrene		Hexachlorobutadiene	
N-Propylbenzene		1,2,4-Trichlorobenzene	<5.
tert-Butylbenzene		Naphthalene	
2-Chlorotoluene		1,2,3-Trichlorobenzene	

Methodology: EPA/600/4-88/039

Certification No.: 10155

Comments:

196

Authorized: 

Date: March 28, 1991

0020

REFERENCE NO. 30

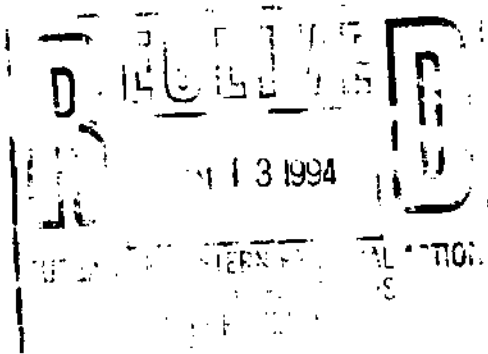
**FINAL
REMEDIAL INVESTIGATION WORK PLAN
ENARC-O MACHINE PRODUCTS, INC.
NYSDEC REGISTRY SITE NO. 8-26-011
LIMA, NEW YORK**

Prepared for:

Kaddis Manufacturing Corp.
1100 Beahan Road
Rochester, New York

By:

H&A of New York
189 N. Water Street
Rochester, New York



File No. 70372-40
December 1993



30 December 1993
File No. 70372-40

Geotechnical Engineers &
Environmental Consultants

Kaddis Manufacturing Corp.
P.O. Box 92985
1100 Beahan Road
Rochester, New York 14692-9085

Attention: Ronald Iannucci, President

Subject: Final RI Work Plan
Enarc-O Machine Products Corp.
Lima, New York

Gentlemen:

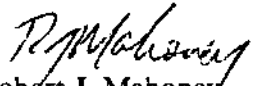
We are pleased to submit this Final Work Plan describing performance of a Remedial Investigation of the above-referenced site. This document is based on the Conceptual Work Plan dated 23 October 1992 prepared by H&A of New York as well as NYSDEC comment letters dated 7 December 1992, 9 April 1993, 9 August 1993, and 20 October 1993. Letters by H&A and meetings were used to develop responses which were agreed to by NYSDEC and subsequently incorporated in this Final Plan.

The work plan text describes site background and tasks associated with RI performance. Work plan appendices contain supporting information and related documents including the Quality Assurance Project Plan (QAPP), Health and Safety Plan (HSP), and the Citizen Participation Plan (CPP) for this site.

Copies of the Final Work Plan have been submitted to the State (NYSDEC, NYSDOH) and County (LCHD) offices requested by David Chiusano's letter of 24 December 1992.

Please contact us if you have any questions. Thank you for the opportunity to assist you with this project.

Sincerely yours,
H&A OF NEW YORK


Robert J. Mahoney
Senior Env. Geologist


Vincent B. Dick
Vice President

RJM:VBD:gmc/workplan.wp
xc: D. Chiusano, NYSDEC (7 copies)
G. Bailey, NYSDEC-DEE (1 copy)
J. Craft, NYSDEC (1 copy)
D. Napier, NYSDOH (1 copy)
R. Van Houten, LCHD (1 copy)

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I. INTRODUCTION

This Remediation Investigation/Feasibility Study (RI/FS) Work Plan applies to the Enarc-O Machine Products Corporation Property located in Lima, New York (see Figure 1 - Project Locus). The work plan has been prepared in conformance with USEPA "Guidance for Conducting Environmental Investigations and Feasibility Studies under CERCLA." The intent of the work plan is to describe proposed phases of site investigation, and to describe criteria to be used to evaluate remedial activities for the property.

Work under this plan will be performed by Kaddis Manufacturing Corporation (owner of Enarc-O) under an Order-on-Consent with the New York State Department of Environmental Conservation (NYSDEC).

This document provides a summary of relevant existing site information regarding the presence of hazardous substances detected on site and in the surrounding area; describes work and quality assurance procedures necessary to characterize the apparent nature and extent of these compounds in environmental media at and around the site; and identifies procedures to be used for feasible alternatives evaluation, including potential Interim Remedial Measures (IRM) which may be necessary to reduce or eliminate risks determined to result from site compounds.

1.1 SITE LOCATION AND SETTING

Enarc-O Machine Products, Inc. is located on a 6+ acre parcel of land located at 1175 Bragg Street in the Town of Lima, Livingston County, New York. Enarc-O Machine Products, Inc. (Enarc-O) is a precision metal machining facility, occupying two buildings on the Enarc-O property (see Figure 2 - Site Plan). One of the Enarc-O buildings is used for office space, manufacturing, and shipping. The main portion of this building was constructed in approximately 1960, with additions constructed in 1964, and 1969 (see Figure 2). The main building is of concrete block construction and is one story in height with the exception of the manufacturing shop area added in 1969. The second building is a single story storage facility located southwest of the main building. The storage facility was constructed approximately in 1964 (see Figure 2).

The Enarc-O facility property is comprised of lawn, paved driveway and gravel-covered parking lot areas.

The Enarc-O property is bordered by rural residential, agricultural, and commercial property. The property is bordered on the north by a residential area along Martin Road and a residential neighborhood north of Martin Road; on the east by lawn of the Crane residence and Honeoye Creek; on the south by an autobody shop and agricultural fields; and on the west by scattered residences on Bragg Street and agricultural fields to the west of Bragg Street.

1.2 PROJECT PURPOSE AND OBJECTIVES

Overall, the intent of the RI/FS is to identify the nature and extent of hazardous substances which may have been released from the Enarc-O facility, determine baseline risks associated with possible exposure to these substances, and to evaluate possible interim and/or ultimate remedial measures that may be needed to reduce or eliminate these risks.

Specific objectives addressed in this document include:

- Determine the nature and extent of hazardous substances (specifically chlorinated volatile organic compounds) at the site.
- Identify potential migration routes of these substances.
- Identify potential exposure routes through which the human, fish, or wildlife populations may be exposed.
- Estimate exposure concentrations that may exist under current or foreseeable future conditions for the exposed populations, and estimate the possible risks associated with those exposures.
- Identify potential interim remedial measures (IRMs) or other remedial measures which should be addressed in a feasibility study to determine remedial measures to be performed on the property.

As is recommended by USEPA guidance (document cited above) this RI/FS work plan includes a project description, site location, status, and a summary of previous investigations and site history. Further, as recommended, this document identifies project organization and responsibilities (Section III); Project objectives and tasks to meet those objectives (Sections I and IV); and a Quality Assurance Project Plan and Health & Safety Plan (both attached as appendices).



II. SITE HISTORY AND PREVIOUS INVESTIGATIONS

2.1 Site History

The following site history text is summarized from previous documents submitted by O'Brien and Gere and H&A of New York. Also, H&A gives specific responses to comments made by the NYSDEC in their letters regarding this site, dated 2 July 1992 and 7 December 1992. Footnotes identify the sections that directly address NYSDEC comments: ¹ denotes the 2 July 1992 letter and ² the 7 December letter.

Enarc-O Machine Products, Inc. is a machining facility located in the Town of Lima, Livingston County, New York, Figure 1. The facility is approximately one mile southeast of the Village of Honeoye Falls and 400 feet west and south of Honeoye Creek. Enarc-O, owned by Kaddis Corporation, is a manufacturer of swiss screw-machine products.

There are two structures present on site, a production building and a smaller storage building, Figure 2. The area surrounding the facility is predominantly residential, with agricultural lands to the south and west. An auto repair shop is located to the south of the site and reportedly has been operating since the mid 1960s. Located to the east of the property is the former residence of Mr. Wesley P. Crane, founder and previous owner of Enarc-O. Mr. Crane reportedly began manufacturing operations in the basement of his residence in 1954 before moving to a double garage on his property in 1955. The operations were then moved from this garage to the current Enarc-O Machine Products, Inc. property in 1960.

Site manufacturing activities include machining and shaping of small metal parts, followed by a deburring process. The latter process combines water, abrasive and various catalyst compounds in a tumbler to remove discolorations and metal burrs. Material Safety Data Sheets (MSDS) for the catalyst compounds are attached (Appendix D) ¹.

Past manufacturing activities reportedly occurred on site in a former "acid room". This area was used for a passivation process; an acid etch used to remove free-iron radicals from the surface of newly machined stainless steel parts. All fluids were contained in the process and it reportedly used no solvents. This etch is no longer performed on site and none of the compounds used in this procedure have been detected in site investigations. H&A has interviewed Enarc-O representatives, but has been unable to determine the former location of the acid room ¹.

Solvent use on site has been limited to a vapor degreasing process which removed oil residues from newly machined parts. This entirely contained process re-circulates the cleaning fluids. No reported loss has occurred from this system. Trichloroethene (TCE) was used in this process until 1980, and 1,1,1-trichloroethane (TCA) between 1980 and 1985. Since 1985, no chlorinated solvents have been used on site. Stoddard Solvent (Kensol 30) is presently used to degrease machined parts.

Former and current degreasing operations have been performed on the south side of the east wing of the main building on site (see Figures 7 and 8). One of the degreasers is located on a metal grate over a concrete vault which is depressed approximately 2 +/- ft. below slab grade. This specific location has been referred to in past project correspondence as an "open pit" ¹.

An underground storage tank containing gasoline was located on the south side of the production building, Figure 2. This tank was removed, cut up and disposed of in July 1986. According to associated analytical results, it was not necessary to remove excavated soil from the site.

Waste cutting oil generated on site was stored in an above ground tank on the east side of the production building (see Figure 2). This tank was also removed in July 1986.

A solvent storage tank was located on the east side of the production building, Figure 2. On June 18, 1985 a small amount (approximately 5 gallons) of TCA spilled as the tank was being filled by a solvent-supply company employee. This was immediately reported to the NYSDEC who sent a representative to the site. Upon the recommendation of the NYSDEC representative, the soil in the spill vicinity was excavated to a depth of approximately two feet. The soil was then spread out in the parking area, allowing any solvent to volatilize. Enarc-O removed the solvent storage tank in July 1986 and discontinued chlorinated solvent usage.

2.2 Previous Investigations

Subsequent to the above spill, the New York State Department of Health (NYSDOH), NYSDEC and Livingston County Department of Health (LCDOH) collected groundwater samples from a Enarc-O supply well and 35 residential wells. The analytical results indicated the presence of detectable concentrations of volatile organic compounds (VOCs) including TCE, TCA and/or related breakdown products in the Enarc-O well and 21 of 35 residential wells. As a result, access to public water was provided in 1988 to replace the individual well supplies.

In 1987 USEPA requested that Kaddis develop a site assessment work plan to evaluate groundwater conditions in the vicinity of the site. In 1989 a work plan was approved and an Administrative Order-on-Consent between Kaddis and USEPA was signed. The results of the subsequent investigation, initiated in 1989, were presented in a May 1991 report by O'Brien & Gere. Based on the findings of the investigation, NYSDEC requested that Kaddis prepare a Remedial Investigation/Feasibility Study (RI/FS) work plan to further evaluate and address site conditions.

An RI work plan scoping document was prepared and submitted to NYSDEC by O'Brien & Gere in May 1992. The NYSDEC's subsequent comment letter of 2 July 1992 raised several questions regarding the proposed activities and overall direction of the investigation and requested several modifications.

At the request of Kaddis, H&A reviewed and evaluated the existing site information and previously submitted documents. The results of this review were submitted to Kaddis along with a Conceptual Remedial Investigation Work Plan in a letter dated 23 October 1992. Also submitted were revised interpretations of site top of rock surface and groundwater flow conditions (Figures 3 through 5 of this document).

Samples collected from the facility's effluent outfall 001 on August 24, 1988 indicated detectable concentrations of several volatile compounds (1,2-dichloroethene, chloroform, TCE, and bromodichloromethane). At the time of sampling, the Enarc-O facility was still on their private water source, the supply well. The on site well supplied process water for the facility which exited via the outfall. The compounds detected in the outfall had been previously detected in the supply well or are breakdown products of detected compounds ¹.

Results of previous investigations are reproduced in Appendix N of this work plan.

III. PROJECT MANAGEMENT

This section describes responsibilities and procedures which will be used to effectively manage the project. Specific description is provided for personnel organization and responsibility of staff who will be working on the project; anticipated arrangements for site access and permits; anticipated arrangements for subcontracted services; and community relations.

3.1 PERSONNEL ORGANIZATION AND RESPONSIBILITY

H&A of New York will perform the site investigation using a team of hydrogeologists, geologists, environmental scientists and geotechnical engineers experienced in environmental site characterization. The team will consist of an Associate-In-Charge, a Project Task and Field Manager, Quality Assurance Officer, a Health and Safety Representative, and various Task Leaders and field staff. An outline of the project organization and key personnel responsibilities is presented below and shown on Figure 6.

Associate-In-Charge: The H&A Associate-In-Charge, Vincent B. Dick, will have ultimate authority and responsibility for H&A of New York's investigation. He will provide overall supervision of the project to ensure that schedule and budget commitments are met and that the technical work is directed to meeting the project objectives. He will be involved in directing the project team reviewing the results of the study. Mr. Dick's duties will include:

- Meeting project objectives within an established budget and schedule.
- Administering all contractual agreements.
- Assuring that the appropriate staffing level and technical expertise are provided.
- Reviewing deliverables prior to issue.

Project Task and Field Manager: The Project Task and Field Manager, Robert J. Mahoney, is responsible for the management of all work plan task completion. Mr. Mahoney is responsible for the following:

- Coordinate and inform Enarc-O of work status/progress and results.
- Preparing and organizing project work.
- Selecting team personnel and briefing them on specific assignments.
- Coordinating with the task leaders to complete the work planned.
- Completing final reports.
- Establishing safety and equipment requirements that are to be met, reviewing these with the Health and Safety Representatives and monitoring compliance with those requirements.



- Assisting in quality assurance efforts.

Quality Assurance Officer: Stanley E. Walker, P.E. will serve as the Quality Assurance Officer (QAO) for this project. His duties will include review of non-laboratory produced data for:

- Assuring the application and effectiveness of the Quality Assurance Project Plan by the analytical laboratory and the project staff.
- Conducting internal quality checks and performance audits of the investigation activities.
- Providing input to the Associate-In-Charge and Project Task and Field Manager as to corrective actions required resulting from the above-mentioned evaluations.

The QAO will be assisted in these activities by the Data Management Coordinator.

Data Management Coordinator: Management of all laboratory data generated during the investigation will be the responsibility of Denis Conley. Mr. Conley will be in charge of the following:

- Interfacing with the analytical laboratory to assign tests, receive and review results and resolve problems.
- Data validation.
- Overseeing laboratory data entry into a computer database.

Health and Safety Representative: Margaret M. Bonn will serve as the Health & Safety Representative for this project. Ms. Bonn and all H&A personnel who will work on this site have received at least the minimum required OSHA 29 CFR 1910.120 and associated training, and are included in H&A's medical monitoring program.

The Health and Safety Representative will be responsible for safety procedures and operations at the site, and preparation of the project Health and Safety Plan (HSP) including the following:

- Determining the level of personnel protection required for each field activity.
- Updating equipment or procedures based on new information gathered during the site investigation.
- Changing the levels of protection based on site observations.
- Monitoring compliance with the safety requirements. Stopping work as required to protect worker safety or where non-compliance with safety requirements is found.
- Determining and posting emergency telephone numbers (including poison control centers) and routes to medical facilities; arranging for emergency transportation to medical facilities.



- Informing personnel (other than team members) who want access to work areas of the potential hazardous of the site.
- Determining that each team member has been given the proper medical clearance by a qualified medical consultant and monitoring team members to determine compliance with applicable physical requirements as stipulated in the health and safety program.

Task Coordinator: Depending on the task, appropriately experienced personnel will be assigned as Task Coordinators for this project. Duties will consist primarily of facilitating communication and coordinating efforts between the project Task and Field manager and field personnel. Each coordinator will be responsible for ensuring the field procedures are carried out in accordance with this work plan. Any deviations from the work plan that becomes necessary, will be coordinated through the Task Coordinator. The Task Coordinator's duties will include:

- Maintaining flow of field work and data collection.
- Coordinating arrangements with field work subcontractors and owners, where property access has been arranged through Enarc-O.
- Assembling data for review, synthesis and reduction to useable report form.
- Assisting with report and document preparation.

3.2 ACCESS/PERMITS

Access to the project site will be arranged and controlled through Enarc-O Machine Products, Inc. Entrance to the site must be arranged through the Enarc-O facility manager, Bruce Whitmore. Criteria for access for specific work areas is contained in the Health & Safety Plan (Appendix B); in summary, personnel may only be admitted to investigative work areas upon demonstration of acceptable completion of health & safety training under 29 CFR 1910.120, participation in a medical monitoring program, and after review and agreement to follow the project health & safety plan.

Permits or authorization which may be required for performance of the work plan include:

- Utility clearance and stakeout for subsurface explorations.
- Access to selected individual residential properties for examination and potential sampling of residential wells. Such access will be arranged through Enarc-O and NYSDEC with the individual home owners.
- A temporary ("emergency") authorization for a surface water discharge will be required from NYSDECs Division of Water for performance of the pump test. Such arrangements will be made with the Region 8 office of NYSDEC in Avon, New York considering the pump test procedures described in Section 4.7.2.



Limited permits or authorization may be needed for performance of as yet unidentified activities under the IRM and Feasibility Study process. Insofar as specific investigative activities for these general tasks cannot be identified until the remedial investigation is near completion, specific indication of permits or authorizations that may be required cannot be made here. Once the need for such permits or authorizations become apparent they will be reviewed with Enarc-O and NYSDEC.

3.3 SUBCONTRACTING

Anticipated subcontracted services include a drilling subcontractor for subsurface explorations and well installations, and laboratory subcontractor for analytical services.

Several qualified drilling subcontractors capable of performing the exploration work described in this work plan are available in the site vicinity. The specific drilling subcontractor will be selected based on availability of subcontractor equipment, crews, and bid values at the time the services will be required.

An analytical laboratory will be subcontracted based on possession of certification under New York State's Environmental Laboratory Approval Program (ELAP), qualifications and ability to perform the required analyses, and ability of the laboratory to provide services under NYSDEC Analytical Services Protocol (ASP). H&A currently has standing contracts with several labs that are ELAP-certified and capable of performing analyses in accordance with NYSDEC's ASP protocols (e.g. RECRA Environmental, AQUATEC, General Testing Corp.). Upon approval of the work plan, the final analytical program will be submitted to bid by the ELAP/ASP labs to attempt obtaining reasonable, low-priced analytical costs for Enarc-O.

It is currently anticipated that the subcontracted services above will be subcontracted directly to Enarc-O. Contracts for primary subcontracted services (drilling, laboratory) will be arranged directly between Enarc-O and the particular subcontractor. This will avoid administrative costs which might otherwise be born by Enarc-O if such services were subcontracted to H&A of New York. Any technical requirements associated with the subcontracted services, such as but not limited to field direction for drillers, ordering bottle sets from the laboratory, or reviewing invoices for accuracy, will still be performed by H&A. However, the contractual arrangement is intended to be between Enarc-O and the subcontractor, and this results in cost savings to Enarc-O.

3.4 COMMUNITY RELATIONS

Community relations will be performed under the NYSDEC Citizen Participation Plan (see Appendix L). The majority of citizen participation activities described in that plan will be undertaken directly by NYSDEC with support services provided by NYSDOH, LCHD, and, on behalf of Enarc-O, by H&A of New York. The reader is directed to the NYSDEC Citizen Participation Plan for description of specific project contacts and community participation activities. Final copies of reports and information generated by H&A and submitted to NYSDEC will be placed in the document repository described in the Citizen Participation Plan and designated by NYSDEC. Documents and fact sheets generated by NYSDEC will also be placed in the repository by NYSDEC.



IV. PROJECT TASKS

This section presents the tasks to be performed during the Remedial Investigation. The tasks are generally presented in the order they were discussed in H&A's Conceptual Work Plan dated 23 October 1992. Additional tasks have been added based on NYSDEC's comment letter dated 7 December 1992.

4.1 RELATED DOCUMENT PREPARATION

USEPA guidance and NYCRR Part 375 require preparation of the following documents as part of a Remedial Investigation:

- Quality Assurance Project Plan (QAPP)
- Health and Safety Plan (HSP)
- Citizen Participation Plan (CPP)

A QAPP has been prepared and is included in Appendix A of this document.

The project HSP contained in Appendix B was prepared in accordance with 40 CFR 1910.120, and describes measures to be taken to provide for health and safety of site workers and the general public in the site vicinity.

The CPP has been prepared by NYSDEC Central Office with input from NYSDEC Region 8, NYSDOH, LCHD, Enarc-O and H&A. It is included in Appendix L.

4.2 COLLECTION OF WELL CONSTRUCTION DATA

Well construction information for the residential wells and the Enarc-O supply well will be collected and evaluated. H&A will contact Livingston County offices, local well drillers and homeowners to determine the type and detail of well records or logs available. Well construction data such as casing length, well depth, and open interval will be obtained where possible.

A NYSDEC questionnaire will also be used to collect information on residential wells. Information gathered from this questionnaire will be subsequently forwarded to H&A, Enarc-O, NYSDOH, and LCHD for review and evaluation. A copy of the survey form and the list of homes to which the survey will be sent are in Appendix M.

Actual residential wells which will be surveyed and sampled will depend on responses to the questionnaire. In this work plan budgeting has been made for approximately 12 of the residential wells to be included in sampling and other investigative efforts. From previous sampling, 21 of the 38 residential wells in the area had detectable VOCs. By allowing for 12 wells, it is anticipated that an adequate number of wells has been allowed to place monitoring points along the perimeter, as well as within the anticipated affected area. Again, the number 12 is currently an assumption that appears to meet technical needs and provides a basis for budgeting. NYSDEC, NYSDOH, and LCHD will be involved in the decision-making process of the actual wells which will be used.

Field inspection of each well will be performed to measure total well depth (if possible) and determine overall condition of well. Selected residential wells will also be surveyed during the resurvey activities to provide surveyed location, and riser and ground surface elevations (Section 4.3).

The above data will aid H&A in selecting the wells to be sampled (Section 4.3). The criteria H&A will examine include:

- o Results of previous analytical results. H&A will examine results of 1985 and subsequent sampling of wells in the site vicinity.
- o Determination of elevation of open interval. Analytical data from several different depths will provide information about groundwater quality variation with depth.
- o Location of residential well in relation to proposed source area, taking into account area groundwater flow directions.
- o Spatial distribution of selected wells. A representative distribution of wells to be sampled across the study area is needed.
- o General condition of well and possible effect upon sampling activities. Some wells may be inaccessible, capped, plugged, or contain pumps or other equipment that would inhibit sampling or potentially alter results.

Borehole logging of the wells may be performed on some of the residential wells. This will occur if well construction information is unavailable, or further evaluation of the monitoring zone is needed. If logging is necessary, H&A will submit a more detailed scope to Enarc-O and NYSDEC for review.

To the maximum extent possible, existing wells will be used for all investigative work. If a sufficient number of existing wells is not available, then alternate plans involving new off-site wells, or other existing wells, will be developed for review and agreement by Enarc-O, the involved regulatory agencies, and H&A.

4.3 RESURVEY AND PREPARATION OF BASE MAP

Limited ground surface elevation data exists for the Enarc-O site. Because site topography may affect local groundwater flow conditions, a more detailed survey of the site will be performed. In addition, a revised base map will be produced.

Ground surface, top of well casing, and Honeoye Creek streambed elevations will be measured by a licensed surveyor and tied into National Geodetic Vertical Datum (NGVD). All on site monitoring wells, the Enarc-O supply well and accessible residential wells (selected from 4.2 tasks above) will be surveyed. Additional ground surface elevations will be obtained at selected locations to aid in surface topography determination.

Features including property lines, buildings, and paved areas will be included on the base map prepared during this effort. Also, locations of the auto shop located to the south of the facility, and the former Crane residence will be included, as well. Locations for the off-site features (autobody shop and Crane property) will not be surveyed, but will be depicted as accurately as possible from available public record documents.

A staff gauge will be installed in Honeoye Creek to monitor stream level with respect to site groundwater levels, as discussed in Section 4.7.4. The staff gauge will be tied into NGVD datum during the site re-survey.

4.4 EXISTING WELL AND SEPTIC TANK SAMPLING

4.4.1 Previous Sampling Activities

In 1985, 35 residential wells and the Enarc-O supply well were sampled by the NYSDEC, NYSDOH and LCDOH. In January 1991, six monitoring wells were installed on Enarc-O property and subsequently sampled. The residential wells have not been sampled since 1985, and have been out of service since 1988 when public water was provided.

4.4.2 Selection of Residential Wells

Re-sampling of the on-site and selected off-site wells will provide a means of characterizing present groundwater quality conditions at and around the Enarc-O site. Significant changes in groundwater quality may have occurred since residential well use was discontinued and natural gradients have been re-established. Sampling of these wells will provide a representation of static (non-pumping) groundwater quality conditions.

After evaluating site vicinity well information, H&A will determine which residential wells are to be sampled. The criteria for selection are outlined in Section 4.2. H&A will submit the list of wells proposed for sampling, along with the selection rationale, to Enarc-O, NYSDEC, NYSDOH, and LCHD for review prior to sampling.

The need for further evaluation of groundwater quality in the residential area will be determined based upon the results of this groundwater sampling program. If the data indicates significant changes in residential area groundwater quality, the future residential monitoring locations may be reduced or expanded to provide sufficient data to identify possible site impacts.

4.4.3 Groundwater Sampling Procedures

Groundwater samples will be collected from the on-site monitoring wells and supply well, and selected residential wells. The samples will be collected, handled and preserved in accordance with the procedures and requirements detailed in Appendix E. Sample containers, preservatives and coolers will be provided by the contract laboratory, following requirements shown on Table 2. H&A will fill out a Groundwater Sampling

Record form (Appendix C) for each sampling location. A chain-of-custody form (Appendix C) will be completed after sample collection and will accompany samples to the laboratory.

The residential wells have been out of service since 1988, and their present condition is unknown. H&A will evaluate conditions that may affect sampling activities during the field reconnaissance activities of Section 4.2. H&A may have to arrange additional activities to permit sampling such as removing pumps from wells. If access to a well is significantly affected, sampling/purging devices and methods different from those described in Appendix E may be employed for that well. Such methods will be reviewed with NYSDEC and the other involved agencies before implementation.

4.4.4 Laboratory Analysis

Groundwater samples from each well sampled will be analyzed by NYSDEC Method 91-1 for those parameters listed in Table 3. Samples will be analyzed in accordance with the laboratory analytical methods from the New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP 1991).

Please note that the values listed in Table 3, page 2 are quantitation limits for ASP method 91-1, taken directly from the NYSDEC ASP document. These values are approximately 5 to 10 times the method detection limit for the analytical method, which means detection limits range from 1 to 5 ug/l. The method 91-1 procedure will be used to take advantage of a broader detection range than is possible with a lower detection limit method (ASP 91-4). If, on a second, third, or subsequent round of analysis, it is mutually agreed that a lower detection limit is desirable, then this decision will be made mutually among

Enarc-O, H&A, and the agencies. The revised, lower detection limit method would then be used on only those well(s) where it is appropriate.

4.4.5 Quality Assurance/Quality Control Samples

Trip blanks consisting of 40 ml borosilicate VOA vials filled with ASTM Type II or equivalent water will be supplied by the contract laboratory with each groundwater sample delivery group to be analyzed for volatile organic constituents.

A field duplicate sample will be collected at a frequency of one per ten samples (10% of sample population) for each analytical method and submitted to the contract laboratory. The field duplicate (also referred to as a blind duplicate) sample will be labeled in such a manner that the laboratory will not be able to determine the sample's origin. The sampling date for blind duplicate samples will be provided on the chain-of-custody documents so that the sample holding time can be monitored. The actual sampling locations will be noted on the Groundwater Sampling Record included with the final report.

4.4.6 Deliverables

Laboratory Analytical Data packages to be provided as part of the Enarc-O Remedial Investigation will include Superfund CLP Category Reporting and Deliverables as defined by NYSDEC ASP91 and EPA CLP SOW 3/90. If, after initial rounds of analysis, data development is sufficiently consistent that a simpler deliverable package (such as ASP Category A or B) is appropriate, request may be made, with agency concurrence, to change the reporting and deliverable procedure.

4.4.7 Septic Tank Sampling Procedures

The on-site septic tank will be sampled to determine if solvents were disposed through the septic system. H&A will obtain one sample of solids from the tank using a stainless steel sampling device. The sample will be analyzed for those parameters listed in Table 3. A backhoe may be needed to provide access to the tank. Tank opening will be arranged directly by Enarc-O at the time of sampling ².

4.4.8 Residential Soil Sampling

NYSDOH requested a minimum of four surface soil samples be obtained within the residential area at mutually-agreed locations for VOC analysis. Accordingly, a total of four samples will be obtained at locations determined by mutual selection (NYSDEC, NYSDOH, Enarc-O, and H&A). One of the samples will be at an agreed-upon background location; the remaining three will be at agreed-upon locations in the residential neighborhood. The samples will be analyzed for VOC compounds only. Please note that detection of VOC parent or daughter products, similar to those at the Enarc-O site, will need to be evaluated to determine that such compounds were not introduced by other activities within the neighborhoods.

4.4.9 Data Validation Procedures

Laboratory analytical data packages will be validated using guidance provided by the "Functional Guidelines for Evaluating Organic and Inorganic Analyses," USEPA 1988. Organic analyses will be reviewed for compliance with the NYSDEC ASP 91 reporting requirements for holding times, calibration frequency and procedures, surrogate and internal standard compound recoveries, method blank analyses and site-specific quality control/quality assurance sample analyses.

4.5 SOIL GAS SURVEY

Work for the Enarc-O Machine Remedial Investigation includes a soil-gas survey which will be performed in two phases. The purpose of the first phase will be to characterize the potential contaminant sources at the former outdoor 1,1,1-trichloroethane storage tank and interior degreaser unit areas presented in Figures 7 and 8. The second phase of the soil gas survey will be expanded outward from the contaminant source area to delineate the potential migration of site contaminants in the subsurface.



4.5.1 Source Area Soil-Gas Survey

Source area characterization will be conducted by extracting soil vapor at each location presented in Figure 8. Eight (8) sampling points will be accessed through the interior flooring around the degreaser unit and six sampling points will be established outside the building immediately adjacent to the degreaser unit. Each location will be spaced approximately 10-15 feet apart to establish an initial grid of approximately 900 square feet. Each interior sampling location will be established by drilling through the concrete floor slab with a Bosch Model 11709 27.5 lb. rotary-hammer.

Sampling points in the potential source area will be established using manually-emplaced soil probes using a weighted 40 inch long steel plunger bar and slide-hammer. A detailed soil gas sampling procedure is provided in Appendix F. The depth of the soil gas sampling points will be determined by ability to advance the 40 or 52 inch long steel plunger bars. Given that we are attempting to determine source areas of near surface releases, penetrating to a depth beneath the building slab below the degreaser sump pit is needed. Provided the sub-slab soils are not too dense, either the 40 inch or 52 inch plunger bar should be capable of advancing the hole to the desired target depth.

Soil-gas at each sampling point will be initially screened with a hand-held organic vapor monitoring instrument, Photovac Microtip photo-ionization detector or a Foxboro OVA flame ionization detector. Drager tubes will also be used during initial screening for specific compounds with low Permissible Exposure Limits (PELs) such as vinyl chloride.

Following the initial screen analysis, a tedlar bag sample of soil gas will be collected using the evacuated canister technique detailed in Appendix F. The total organic vapor readings will be recorded in a bound field logbook for health and safety monitoring and used to determine sample injection volumes for on-site gas chromatograph (GC) analyses.

The tedlar bag sample will be analyzed on-site within two hours of collection using a Photovac Model 10S50 portable gas chromatograph equipped with a 10.6 eV photoionization detector lamp for the target analytes listed on Table 4. If interference from non-target analytes (hydrocarbons) is noted, the tedlar bag sample will be transported to the H&A of New York in-house laboratory located in Rochester and will be re-analyzed within 24 hours using a benchtop Hewlett Packard Model 5890 Series II gas chromatograph equipped with a capillary column and flame ionization detector (FID). The HP 5890 GC capillary column and variable oven temperature program will be set up to resolve each target analyte.

Note that the detection limit for 1,1-DCA and 1,1,1-TCA (see Table 4) is limited by the ionization potential of these compounds on a FID detector in the portable GC. Confirmation of non-detects for these alkanes can be done for selected locations using the Hewlett-Packard GC with the FID detector. Therefore, a selected sub-population of samples, including some detects and non detects of these alkanes will be confirmed using the Hewlett-Packard GC.



Each of five sampling location which exhibit highest VOC concentrations will be completed as permanent shield-point monitors. The shield-point monitors will be constructed of an inert porous intake filter connected to high density polypropylene tubing. The shield-point monitor will be advanced to the bottom of the soil probe hole and covered with a sandpack, 1-ft. in length, and sealed by a cement/bentonite surface seal. The permanent shield-point monitors will be used to evaluate changes in soil-gas VOC concentrations over time at the selected locations.

Additional sampling points may be added upon mutual agreement of H&A and the NYSDEC on-site personnel. The criteria that will be used to determine addition of sampling points will include presence of obvious staining, chemical odor, and/or significantly elevated VOC readings.

It is possible for soil vapor points to reflect groundwater level if they penetrate the zone of saturation. However, previous explorations at this site have shown the permanent groundwater table to reside near or below the overburden bedrock interface. Since the soil vapor shield monitoring points will be several feet above this, we don't anticipate significant impact on shield point performance from the saturated zone. If high groundwater inhibits sampling, collection may have to be delayed until dryer weather allows sampling.

Based on soil vapor results, VOC analyses will be performed on five soil samples collected during the source area survey. Samples selected for laboratory submittal will be based on volatile screening readings at the time of sampling. Samples representing high, low, and medium VOC detections will be submitted to the lab in order to obtain a range of laboratory analysis relative to field screening results. Samples will be placed in 8 oz. teflon-lined lid wide-mouth jars for storage and transport to the analytical laboratory.

4.5.2 Delineation Soil Gas Survey

Based on the Source Area Soil Gas Investigation data, an expanded Delineation Soil Gas Survey will be conducted in order to delineate potential migration of site VOCs in the overburden. The delineation soil gas survey is designed to define the lateral and vertical extent of subsurface soil contamination at the former tank/degreasing area, and investigate one other suspected source location. Soil gas sampling locations are shown on Figure 7. As shown, the area of investigation will be concentrated within the area east of the facility building. Additionally, soil vapor survey points will be located adjacent to MW-2 and MW-3 to determine if the elevated chlorinated VOC concentrations detected previously in these two wells is attributable to localized shallow soil contamination or migration via groundwater. Soil vapor samples will be obtained from borings advanced using the Geoprobe, Hydropunch or an equivalent sampling system. Soil vapor samples will be collected at three-foot intervals by advancing a specially designed soil vapor probe ahead of the narrow hollow-stem augers into undisturbed soils. Additional soil vapor boring locations may be selected depending upon the results of the survey and with the agreement of NYSDEC, NYSDOH and LCHD.

Table 4 lists the target analytes for the survey. The same sampling and analysis program followed during the source area investigation will be used for the delineation phase. Initial soil probe holes will be screened with a hand held organic vapor analyzer. On-site analysis of extracted soil vapor will be analyzed within two hours of collection using a portable gas chromatograph. Off-site analyses when required will be performed within 24 hours of sample collection using a bench-top HP5890 Series II GC system.

A slightly modified soil vapor sample point emplacement procedure will be used for the points intended to be placed near the current MW-2 well location. In this area (see Figure 7), two of the five locations will be placed along the east side of the storage building; two locations will be located along the south side of the storage building near the southeast corner. All five locations will be sampled for soil vapor to a shallow depth (40 to 52 inches below current ground surface). The highest VOC detection from the five locations will then be converted to a deep probe soil vapor sample location, to be advanced and sampled to the top of bedrock as described above for other delineation sample points. In the event that VOCs are not detected in any one of the five shallow locations, then the middle location shown at the southeast corner of the building will be advanced and sampled to the top of rock as described above.

Quality Assurance procedures for both the on-site and off-site GC analysis are contained in Appendix A Quality Assurance Project Plan and/or the Soil Gas Standard Operating Procedure in Appendix F.

4.6 ADDITIONAL MONITORING WELL ACTIVITIES

Three new monitoring wells will be installed at the locations shown on Figures 7 and 8. The reasons for these well installations are as follows:

- To allow further definition of known and suspected source area soil, bedrock, and groundwater conditions.
- To allow additional groundwater sampling analysis.
- To allow for future soil vapor extraction in the TCA tank source area, should it be warranted.

4.6.1 Installation of Monitoring Wells

One overburden and one bedrock well will be installed in the source area near the location of the former TCA storage tank (Figures 7 and 8). A bedrock well will also be installed near the former drum storage area, located adjacent to the storage building, Figure 7.

The bedrock wells will be installed with open monitoring intervals in the upper-most water-bearing zone encountered in bedrock. This zone is typically at a depth of 4 to 12-ft. below top of rock, based on water levels observed in the existing on-site wells.

The overburden well will be installed to the top of bedrock to monitor overburden groundwater, if present. The Phase I investigation report indicated little or no overburden groundwater was encountered at the site. However, no monitoring wells were installed to confirm this. If no groundwater is encountered by the overburden well, it may be used for future vapor extraction. The need for such extraction will be evaluated following the soil gas survey described in Section 4.5. and as a potential Interim Remedial Measure (IRM - see Section 4.11). Seasonal groundwater elevation fluctuation will also be taken into account while evaluating whether to convert the overburden well to a vapor extraction well. NYSDEC will be involved in this decision. Please note that high vacuum vapor extraction options exist that can extract soil vapor as well as water, if it is present in the screened section.

Test borings will be advanced to the top of bedrock at each monitoring well location prior to well installation. Soil samples will be obtained continuously to allow detailed description of soils and to allow screening for volatile organic compounds. Since the two wells proposed for the TCA tank source area will be located within approximately 15 feet of each other, soil samples are planned to be obtained in only one of these test borings. Additional soil samples may be obtained at the discretion and mutual agreement of NYSDEC and H&A; criteria used to select additional samples will be presence of obvious staining, chemical odor, and/or significantly elevated VOC readings.

Details of the drilling, sampling and well installation methods are described in Appendix G. Schematic diagrams of well construction are shown in Figure 9.

Drilling-related wastes (soil, rock cuttings and drilling fluids) will be containerized on site in NYSDOT approved 55-gallon drums. These materials will be disposed of in accordance with procedures described in Appendix I. In addition, NYSDEC TAGMS for fugitive dust suppression and disposal of cuttings will be followed.

Well construction materials and drilling and sampling equipment will be decontaminated according to procedures described in Appendix H.

Upon completion of well installation, each well will be developed to establish sufficient hydraulic connection with the formation. Well development procedures are presented in Appendix G. An attempt will be made during development to remove a volume of water equal to that lost to the formation during drilling. Development will continue until the criteria described in Appendix G are met.

Hydrogeologic testing in the new wells is described in Section 4.7.

As indicated previously, to the maximum extent possible, existing wells will be used for all investigative work. If a sufficient number of existing wells is not available, then alternate plans involving new off-site wells, or other existing wells, will be developed for review and agreement by Enarc-O, the involved regulatory agencies, and H&A.

4.6.2 Sampling of Monitoring Wells

Upon completion of well drilling and development, groundwater samples will be collected from each new and previously installed monitoring well. Groundwater samples will be collected, handled and preserved in accordance with the procedures and requirements described in Appendix E. Groundwater sample containers, preservatives and sample coolers will be provided by the contract laboratory. Groundwater sampling data will be entered on a Groundwater Sampling Record form (Appendix C) for each sample collected. A chain-of-custody form (Appendix C) will be completed after sample collection and will accompany samples to the laboratory at the end of each day.

At this time, it is anticipated the previously installed monitoring wells (MW-1 through MW-6) will be sampled concurrently with the selected residential wells. It is possible there will be some lag time between sampling of the previous monitoring and residential wells and completion and sampling of the new wells. The project field work will be scheduled to keep this lag time to a minimum. The project schedule is discussed further in Section V shown on Figure 11.

4.6.3 Future Sampling Plan

Upon completion of the Remedial Investigation field work, all analytical data from monitoring and residential well sampling will be reviewed. The RI report will present conclusions regarding groundwater quality and flow. Based on these findings, recommendations will be provided for future groundwater sampling. Enarc-O, H&A and the involved agencies will mutually agree on future sampling plans prior to implementation.

At a minimum, all monitoring wells on the Enarc-O property will be sampled quarterly, beginning with the first quarter following completion of the RI report. In addition, selected off-site residential wells will be included in the quarterly sampling. These wells will be chosen based on the criteria used to choose the initial sampling discussed in Section 4.2. In addition, groundwater flow characteristics identified in the RI report will be considered, to determine which wells will provide data useful in plume characterization.

Sampling will continue to follow procedures discussed in Section 4.4 and Appendix E. Water levels will also be obtained during each sampling round for each of the monitoring and residential wells included in the program.

Laboratory analysis will continue to follow ASP protocol as described in Section 1 of the QAPP. H&A will tabulate and forward data to all parties on the project correspondence distribution list, as it is received. After wells have been sampled once using CLP reporting and deliverables, subsequent sampling rounds will be completed with category A or B sampling and deliverables.

4.7 HYDROGEOLOGIC TESTING

Hydrogeologic testing will be performed to more fully characterize the bedrock with regard to hydraulic conductivity. The testing will consist of water level measurements, rising head permeability testing, stream gauging and a pumping test. The following sections describe these activities.

4.7.1 Water Level Measurements

Water level measurements will be obtained periodically from all on-site monitoring wells, the Enarc-O facility supply well and selected off-site residential wells. The data will be used to construct groundwater contour plans describing groundwater flow both on-site and off-site.

Water level measurements will be measured according to procedures described in Appendix E, using electronic water level indicators. In addition, a pressure transducer system will be installed in a selected well or wells (with NYSDEC concurrence) to provide week-long measurements for comparison to stream level measurement in Honeoye Creek during the same period. This data will allow evaluation of the response of groundwater levels at the site to changes in stream level. Stream level measurement is discussed below in Section 4.7.4.

NYSDEC will have access to the monitoring wells to allow for measurements of groundwater elevations by its own staff. Prior to entering into Enarc-O property, the NYSDEC will give Enarc-O prior notification and obtain verbal approval.

An anticipated schedule for obtaining water levels in as follows:

<u>Time Interval</u>	<u>Well Group(s)</u>	<u>Frequency</u>
1. During Well evaluation Program	• Onsite monitoring wells • Enarc-O supply well • Offsite residential wells	• One measurement during sampling • One measurement during sampling • One measurement during sampling
2. During Drilling Program	• Onsite Wells • Selected offsite wells	• Daily • Weekly
3. During Sampling Program	• Newly installed onsite monitoring wells	• Once daily sampling
4. After Completion of RI	• All onsite wells • Selected offsite residential wells	• Quarterly • Quarterly

4.7.2 Rising Head Permeability Testing

Rising Head Permeability testing will be performed in all new and previously installed onsite monitoring wells. The previously installed wells will be retested to confirm results of the Phase I investigation. Rising head tests provide a measure of hydraulic conductivity of the formation across the monitoring interval of the well. These testing results will provide information on the distribution of hydraulic conductivity, and will be used in conjunction with pump test data and geologic information to describe groundwater flow at the site.

The rising head tests will be performed in accordance with methods described by Hvorslev (1951). A description of the methodology to be used is provided in Appendix J.

4.7.3 Pumping Test

Upon completing the rising head testing, H&A will perform a pump test in one on-site well. To the extent possible from the data generated, the pump test will provide additional information on both on-site and off-site groundwater flow characteristics including transmissivity, storativity, the apparent radius of influence, and permeability values and variation.

The pumping well will be chosen based on hydraulic conductivity results obtained from rising head tests. It is anticipated either the Enarc-O facility supply well or the proposed bedrock monitoring well for the TCA tank source area will be used for pumping. It is likely the Enarc-O supply well is substantially deeper than the site monitoring wells, and also will probably have a much greater yield. Pumping from this well will be more likely to create a response in the offsite residential wells, thereby yielding useful information regarding offsite flow. NYSDEC will be consulted for final approval on selection of the pumping well if it is other than the supply well. Details of the construction of the supply well will be obtained during the well evaluation program.

A detailed description of the pump test procedure is presented in Appendix K, with additional specific details for this site described below. The pump test will be conducted for approximately 48 hours. The anticipated pumping rate is also described below. During the test, water level measurements will be obtained at regular intervals in the pumping well, all onsite monitoring wells, and selected offsite residential wells. This well drawdown data will be recorded and used to determine the bedrock aquifer parameters described above and in Appendix K.

All groundwater discharge from the pump test will be containerized for subsequent characterization and proper disposal. Based on the anticipated volumes of discharge it is likely a tank truck will be required for at least temporary storage and batching prior to discharge. A temporary discharge authorization will be obtained through NYSDEC Region 8 Division of Water as described below.

H&A of New York and NYSDEC Region 8 Division of Water personnel agreed that the pump test would proceed through application and issuance of an Emergency Discharge Authorization. A pump test procedure was worked-out with NYSDEC that consists of the following steps:

- o H&A and Enarc-O will correspond directly with the Regional DEC office (Tom Pearson) for application and issuance of the Emergency Authorization.
- o The pump test will be structured overall similar to a "step test." Pumping for the first 24 hours of the test will be at a relatively low with water passed through granular activated carbon (GAC). Volatile organic compound concentrations will be determined by sample and analysis at the time of pump test start-up for water entering and exiting the GAC. The initial analysis will be by formal laboratory analysis with rapid turn-around. A split of the initial sample will also be screened (headspace screening) by portable GC to establish a correlating headspace value for volatile organic compound concentrations. Subsequent sampling will be performed at 12 hour intervals and will be GC screened only. The low rate of pumping will continue through the first 24 hours at which time a second sample for laboratory analysis will be obtained. If the level of volatile organic compounds (VOCs) in the extracted water remains the same or decreases, then the pump test rate may be stepped up. If the volatile organic compound level increases, then the test will be stopped to evaluate and agree with NYSDEC personnel whether the test can proceed with additional controls or modified procedures.
- o Assuming the VOC levels remain the same or decrease, the stepped-up pump rate will continue for an additional 24 to 48 hours at a rate to attempt stressing the aquifer. Periodic sampling and headspace screening will continue at a frequency of one sample every 12 hours.
- o In discussions with Mr. Pearson it was agreed that the Principal Organic Compound limit in TOGS 1.1.1 of 50 ppb would apply to water discharged from the GAC units to Honeoye Creek. The 50 ppb limit would apply to the sum concentration of all detected volatiles. Further, the 50 ppb would be treated as a daily average so that if an excursion above 50 ppb occurs the pumping rate may be modified or pumping ceased to obtain a daily average of 50 ppb.
- o Potential well yields, have been estimated to the extent possible, based on discussions with Enarc-O personnel. Current annual usage of water from the public water system (which should approximate average usage of the well when it was in use) ranges from 300,000-gallons per year to 500,000-gallons per year. This equates to a usage rate of 1.7 gpm to 2.9 gpm, based on an 8 hour work day. Enarc-O personnel indicated that a daily maximum use may range up to 4,000 to 5,000 gallons per day. This equates to a potential upper-end pumping rate of 8.3 to 10.4 gpm. Accordingly, the pump test will start out with an initial discharge rate which mimics the daily average based on Enarc-O's annual usage; that is, a pumping rate of approximately 2 to 3 gpm. If, after 24 hours of pumping, total volatile concentrations are less than the 50 ppb criteria, the

pumping rate will be increased as close to 10 gpm as possible to attempt stressing the aquifer, while at the same time attempting to stay within the discharge concentration criteria.

Data collection and reduction will otherwise be performed as described in Appendix K.

4.7.4 Staffing Gauge

Based on preliminary information, if appears groundwater levels at the site respond to fluctuations in the water levels in Honeoye Creek. To determine the relationship between stream and groundwater levels, H&A will obtain measurements of these parameters over specified time-periods.

To obtain accurate measurements of stream levels, a staffing gauge will be constructed (by Enarc-O) in the stream bed of Honeoye Creek at the approximate location shown on Figure 7. NYSDEC will be consulted for agreement on the actual field-selected staff location. The gauge will be capable of measuring water level to the nearest 0.1-ft. The gauge will consist of a stainless steel rod, approximately 1 to 2-in. diameter, with permanent markings in 0.1-ft. increments.

The gauge will be permanently mounted to the bed of the stream, in bedrock, using drilling and grouting or other appropriate techniques. It will be positioned, as possible, such that it will remain partially submerged even during anticipated low-water flow. A mark of known elevation will be fixed on the gauge at the time of the site-wide survey is performed. A schematic diagram of the gauge design is shown on Figure 10.

Measurements will be obtained for each day that field work is being performed on-site. In addition, for one-week periods during spring snowmelt (April/May) and early fall (September/October) a pressure transducer/datalogger system will be installed in selected on-site monitoring wells. Corresponding stream level measurements will be obtained daily during these one-week periods. The data will be used to construct computer-generated hydrographs that will allow direct comparison of stream vs. groundwater elevations changes with time.

4.8 POTENTIAL UTILITY MIGRATION PATHWAY EVALUATION

The source, extent, and possible remedial actions regarding the VOC contamination in water from a Martin Road basement sump must be evaluated as part of the RI.

Potential utility migration pathways which may affect off-site areas will initially be evaluated by review of selected documents and by viewing the residential area north of the Enarc-O facility. Potential utility migration pathways appear to primarily be limited to the water-main installed by USEPA. Documents related to the water-main installation consist of a USEPA contract report documenting the installation and a limited number of plans that may be available through Livingston County and the City of Rochester showing routes of the water main. These documents will be reviewed with respect to installation details (depth of installation, pipe

bedding, routes, and construction methods). These factors will be compared to available topographic maps for the area; the pipe routes will also be walked to view more subtle topographic trends.

Results of the review described above will next be compared to groundwater levels as evidenced in residential wells selected for monitoring within the neighborhood (see Section 4.4 of the work plan). Water-main routes that, as constructed, may constitute a preferential pathway for migration and that have been installed below the water table will then be subjected to additional appropriate evaluation. The scope of the additional evaluation will be developed based on the information available and as mutually agreed upon by NYSDEC, NYSDOH, Enarc-O and H&A.

Regarding the Martin Road residence, specifically, additional evaluation methods will include examination of the house foundation and water utility lines servicing the house. Depending upon the method of migration into the sump, plans to cut-off flow of VOC-containing water will then be developed for implementation by Enarc-O.

4.9 . ENVIRONMENTAL RISK ASSESSMENT

A habitat-based environmental assessment will be conducted in accordance with the NYSDEC document "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (June 1991). Based on existing site information, it is anticipated that the assessment will describe the existing environment (step 1); identify potential hazards to habitats and provide an assessment of potential risks from contaminants (step 2); evaluate anticipated remedial measures with respect to their effects on habitats affected by the contaminants (step 3); determine what elements may need to be included in remedial design where mitigation of fish and wildlife impacts is indicated (step 4); and identify monitoring requirements that may be necessary to evaluate the effectiveness of remedial measures under step 4 (step 5). Determination of the need for and level of effort of step 4 and step 5 activities will be made after steps 1 through 3 are completed. Steps 1 through 3 are therefore described below. NYSDEC will be consulted prior to and to assist with the determination whether to perform steps 4 and 5.

Step 1 - Description of Existing Environment

The existing ecology of the site and adjacent off-site areas which could be affected by site-related contaminants will be identified and described in a cover-type map. A discussion of natural resources associated with the site in terms of the vegetative cover type and their associated wildlife populations which are expected to be within the affected areas will be included. Significant habitats, regulated streams, and other resources of significance will be listed. The ecologist will concentrate field characterization activities on the site and on a 0.5-mile zone surrounding the site. Information on dominant vegetation species, cover types, associated wildlife, and the presence of significant habitats (as defined by NYSDEC) will be recorded. The ecologist will also complete a general reconnaissance level survey of fish, wildlife, and cover types, and significant habitat conditions within two miles of the site that are potentially affected by site compounds. The purpose of this survey will be to characterize the presence, location and uses of special resources within the zone. Habitat conditions and characteristics will be derived from existing information, photographs, reports, and maps obtained from the appropriate New

York State, Federal, Local agencies or other sources. Current aquatic habitat and fish population conditions of Honeoye Creek will be based on existing water quality and aquatic life survey data obtained from New York State Division of Fish and Wildlife and USEPA.

Step 2 - Resource Hazard Evaluation

Hydrogeologic information will be used to evaluate whether migration from the Enarc-O site may affect the identified habitats. Results of the sampling and analytical program performed under this work plan will be reviewed considering the chemical fate and transport potential of particular compounds. Potential environmental exposure concentrations for possible receptors will be identified. Evaluation of risks will be performed using hazard thresholds. Hazard thresholds are compound concentrations below which adverse effects are not expected to occur (i.e. acceptable concentrations). The assessment of ecological risk will be determined by comparing detected concentrations at potential receptor points to hazard threshold concentrations described in federal or state established standards, criteria, or guidance values (SCGs). In the absence of the values, hazard thresholds will be derived from the toxicological properties and environmental behavior characteristics of the specific compounds.

If pathways to specific habitats are determined to be absent or estimated receptor concentrations do not exceed hazard thresholds, no further evaluation will be performed.

Step 3 - Evaluate Remedial Measures

Where an exposure pathway and exceedance of hazard threshold has been identified for a particular habitat, potential remedial measures which may be necessary to reduce or eliminate the habitat impact will be identified. Evaluation of specific remedial measures will be performed along with other remedial measure evaluation under the feasibility study (Section 4.12).

4.10 HEALTH RISK ASSESSMENT

A baseline health risk assessment is used to identify potential pathways of exposure for humans, quantitatively estimate the exposures that could occur, and identify risks associated with such exposures. Risks derived from the baseline health risk assessment are used, along with other information, to determine whether remedial measures are needed at the site, and, if so, the quantitative risk estimates are considered in selecting appropriate remedial measures and identifying remedial action objectives.

The risk assessment will be performed in accordance with USEPA "Risk Assessment Guidance for Superfund - Volume 1, Human Health Evaluation Manual (Part A)", the "Superfund Public Health Evaluation Manual", and other selected references describing federal and state SCGs.

Performance of the baseline health risk assessment will be completed as follows:

- Potential chemical compounds of concern at the site will be identified. Identification of site related compounds will be based on site history, analyses of environmental media (soil vapor, groundwater, etc.) on site, and evaluation of the range of detected concentrations of such compounds.

- Potential exposure pathways will be identified. It is currently anticipated that these will particularly include a site soil contact route; a site vapor exposure route into limited-circulation building spaces; an on- and off-site groundwater exposure route; and potentially an off-site vapor exposure route, again to limited-circulation building spaces. Estimates of exposure point concentrations will be developed based on compounds present, their environmental fate and transport properties, concentrations detected, and rate and direction of flow.
- Potential adverse health effects that may be associated with the site chemicals of concern will be identified. Identification will be based on collection of toxicity information for the specific compounds of concern and media in which the potential exposure pathways are determined to exist.
- The toxicity and exposure assessments above will be integrated into a quantitative expression of risk. Risks will be based on current site and vicinity condition and use. Risk will also be evaluated in terms of a Reasonable Maximum Exposure (RME) scenario, based on reasonably anticipated site usage. Estimates of uncertainties embodied in the assessment will also be presented.

4.11 EVALUATION OF IRM/FS ALTERNATIVES

Based on results of the remedial investigation, an evaluation of remedial alternatives will be performed. Based upon investigations already performed at the site, it is anticipated that one or more Interim Remedial Measures (IRMs) or remedial actions developed through a focussed feasibility study may be able to quickly prevent, mitigate, or remedy environmental impacts and identified risks. Potential IRMs or remedial alternatives that could be performed in a focussed feasibility study, and that may be applicable to the site, may include the following:

- Source-area vapor extraction to reduce release of residual VOCs from site soils or high concentrations in groundwater.
- Migration control measures to mitigate migration toward off-site areas.

Therefore, initial FS efforts will be focused on identifying potential IRM or remedial activities under a Focussed Feasibility Study. In the event one or more activities appear warranted, a focussed feasibility study will be performed on the identified measures.

A full scale Feasibility Study (FS) will be undertaken only after evaluation of IRM or focussed feasibility study remedial activities, and to the extent such VOC measures are not able to address identified on- and off-site impact(s). If no activities are identified which may be implementable and risks are deemed to be present as a result of the RI, then a full-scale FS will be performed. FS activities will consist of the following:

- Identification of potential remedial technologies. Technologies will be based on data from the RI including contaminants of concern and media impacted.

- Technologies will be evaluated for site suitability. This pre-screening process will be based on remedy performance records; construction, operation and maintenance problems; applicability to site characteristics; and applicability of site remediation. NYSDEC TAGM 4030 will be used for guidance in this process.
- Suitable technologies will be assembled to alternative remedial measures. Individual or grouped alternatives will be assembled as necessary to address required remediation.
- Assembled remedial alternatives will be run through an initial screening and evaluated based on effectiveness, implementability, and costs. As recommended by USEPA Guidance, at least one containment alternative and the no-action alternative will be carried through the screening process to the detailed evaluation phase (see below).

Detailed evaluation of the remedial alternatives will be performed. The detailed analyses will include evaluation of effectiveness (including degree of protection and ability to eliminate or reduce volume, toxicity, and mobility). In addition, the following criteria will be used in the detailed evaluation process: short term effectiveness; long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; implementability; costs; compliance with applicable or relevant and appropriate requirements (ARARs); overall protection of human health in the environment; agency acceptance; and community acceptance. The factors to be considered in terms of cost include short-term costs, long-term costs, present worth, and replacement costs.

4.12 REMEDIAL INVESTIGATION REPORT

H&A will prepare a Remedial Investigation report upon completion of all previously discussed tasks. The report will summarize the investigation's findings and will include the following components:

- An executive summary briefly summarizing key findings and recommendations for further studies of remedial measures, as appropriate.
- A table of contents outlining the entire report including tables, figures, and appendices.
- A main text describing, in detail, 1) procedures, methods and equipment used to perform the field investigations; 2) conditions at the site based on explorations and testing; 3) conclusions regarding the nature and extent of contamination and risks posed by the contamination at the site; and 4) recommendations for further investigations or interim remediation, as appropriate.
- Tables summarizing data on monitoring, supply, and residential (as possible) well construction, environmental analyses, groundwater elevations and hydrogeologic testing.
- Figures illustrating site features, exploration locations and elevations, including both plan and cross-section views. Figures will also be prepared depicting groundwater flow and quality, based on exploration and analytical data. The figures will be computer-generated using CADD or Intergraph software.

- Appendices containing raw analytical, water level, and hydrogeologic testing data, logs of test borings and well installations, and calculations/tables/graphs, as necessary to support conclusions drawn by the report.

V. SCHEDULE

The anticipated schedule for completion of field activities and submittal of the reports described herein is shown on Figure 11. The estimated time frames shown on this figure may be subject to change due to NYSDEC or other participating agency approval time frame, and actual conditions (weather and subsurface) encountered in the field.

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TABLE 1

Enarc-O Machine Products
Remedial Investigation
Analytical Program

	Matrix	No. of Samples	Analysis Required
Offsite residential wells	Aqueous	*	91-1 (TCL)
Offsite residential yards	Soil	4	91-1 (TCL)
On-site monitoring well/supply wells	Aqueous	10	91-1 (TCL)
Source area survey	Vapor	16	VOCs (Table 4)
	Soil	5	91-1 (TCL)
Delineation survey	Vapor	**	VOCs (Table 4)
Trip blanks	Aqueous	6	91-1 (TCL)

Notes:

1. Method 91-1 NYSDEC Analytical Services Protocol
2. * - No. of samples to be determined during the well construction evaluation.
3. ** - No. of samples to be determined from the results of the source area investigation.
4. TCL - Target Compound List.
5. VOCs - Volatile Organic Compounds listed in Table 4.

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TABLE 2

Enarc-O Machine Products
Remedial Investigation
Preservation, Holding Times and Volume/Weight Requirements
NYSDEC ASP Rev. December 1991

<u>Parameter</u>	<u>Preservation</u>	<u>Holding Time*</u>	<u>Volume/Weight</u>
Aqueous Volatiles	4°C(+/-2°C) Store in dark	7 days until analysis	80 ml
Soil/Sediment Volatiles	4°C(+/-2°C) Until extraction and analysis	7 days until analysis	20 g**
Vapor Volatiles	---	48 hours	1 l

* From verified time of sample receipt (VTSR)

** Collected in glass 8-ounce jar with septum-sealed lid

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TABLE 3

Superfund Target Compound List (TCL) and
Contract Required Quantitation Limits (CRQL)

Quantitation Limits*					
Volatiles	CAS Number	Water ug/L	Low Soil ug/Kg	Med Soil ug/Kg	On Column (ng)
1. Chloromethane	74-87-3	10	10	1200	(50)
2. Bromomethane	74-83-9	10	10	1200	(50)
3. Vinyl Chloride	75-01-4	10	10	1200	(50)
4. Chloroethane	75-00-3	10	10	1200	(50)
5. Methylene Chloride	75-09-2	10	10	1200	(50)
6. Acetone	67-64-1	10	10	1200	(50)
7. Carbon Disulfide	75-15-0	10	10	1200	(50)
8. 1,1-Dichloroethylene	75-34-4	10	10	1200	(50)
9. 1,1-Dichloroethane	75-35-3	10	10	1200	(50)
10. 1,2-Dichloroethylene(total)	540-59-0	10	10	1200	(50)
11. Chloroform	67-66-3	10	10	1200	(50)
12. 1,2-Dichloroethane	107-06-2	10	10	1200	(50)
13. 2-Butanone	78-93-3	10	10	1200	(50)
14. 1,1,1-Trichloroethane	71-55-6	10	10	1200	(50)
15. Carbon Tetrachloride	56-23-5	10	10	1200	(50)
16. Bromodichloromethane	75-27-4	10	10	1200	(50)
17. 1,2-Dichloropropane	78-87-5	10	10	1200	(50)
18. cis-1,3-Dichloropropene	10061-01-5	10	10	1200	(50)
19. Trichloroethene	79-01-6	10	10	1200	(50)
20. Dibromochloromethane	124-48-1	10	10	1200	(50)
21. 1,1,2-Trichloroethane	79-00-5	10	10	1200	(50)
22. Benzene	71-43-2	10	10	1200	(50)

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Quantitation Limits*					
Volatiles	CAS Number	Water ug/L	Low Soil ug/Kg	Med Soil ug/Kg	On Column (ng)
22. Benzene	71-43-2	10	10	1200	(50)
23. trans-1,3-Dichloropropene	10061-02-6	10	10	1200	(50)
24. Bromoform	75-25-2	10	10	1200	(50)
25. 4-Methyl-2-pentanone	108-10-1	10	10	1200	(50)
26. 2-Hexanone	591-78-6	10	10	1200	(50)
27. Tetrachloroethene	127-18-4	10	10	1200	(50)
28. Toluene	108-88-3	10	10	1200	(50)
29. 1,1,2,2-Tetrachloroethane	79-34-5	10	10	1200	(50)
30. Chlorobenzene	108-90-7	10	10	1200	(50)
31. Ethyl Benzene	100-41-4	10	10	1200	(50)
32. Styrene	100-42-5	10	10	1200	(50)
33. Total Xylenes	1330-20-7	10	10	1200	(50)

1. "*"Quantitation Limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the protocol, will be higher.
2. Table from NYSDEC ASP document (12/91 Revised), Appendix C, Section V, Analytic list for Method 91-1

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TABLE 4
ENARC-O MACHINE PRODUCTS
SOIL GAS SURVEY
TARGET ANALYTE LIST

Compound Name	CAS Number	Water Sol. (mg/L)	Vapor Press. (mmHg)	Henry's Law Constant (atm-m ³ /mol)	Estimated Detection Limit (ppmV)
1,1-Dichloroethene	75-35-4	2.50E+03	5.91E+02	3.01E-02	1.36
1,1-Dichloroethane	75-34-3	5.06E+03	2.27E+02	5.87E-03	23.1
Ethylbenzene	100-41-4	1.61E+02	9.53E+00	8.44E-03	1.17
Toluene	108-88-3	5.35E+02	2.84E+01	5.94E-03	0.99
1,2-(ORTHO) Xylene	95-47-6	1.75E+02	6.60E+00	5.10E-03	0.95
1,3-(META) Xylene	108-38-3	1.46E+02	8.30E+00	7.68E-03	0.95
1,4-(PARA) Xylene	106-42-3	1.56E+02	8.70E+00	7.68E-03	0.95
Tetrachloroethene	127-18-4	1.50E+03	1.85E+01	1.49E-02	0.70
Trichloroethene	79-01-6	1.10E+03	6.90E+01	1.03E-02	0.30
1,1,1-Trichloroethane	71-55-6	3.47E+02	1.24E+02	8.00E-03	27.4
1,2-Dichloroethene (Trans)	156-60-5	6.30E+03	3.40E+02	6.72E-03	0.50
1,2-Dichloroethene (Cis)	156-59-2	3.50E+03	3.50E+03	2.08E+02	2.00
Vinyl Chloride	75-01-4	2.76E+03	2.67E+03	2.30E+03	1.00
Tetrachloromethane	56-23-5	8.05E+02	1.14E+02	3.04E+02	20.0
1,1,2,2-Tetrachloroethane	79-34-5	2.90E+03	5.00E+00	3.81E-04	20.0

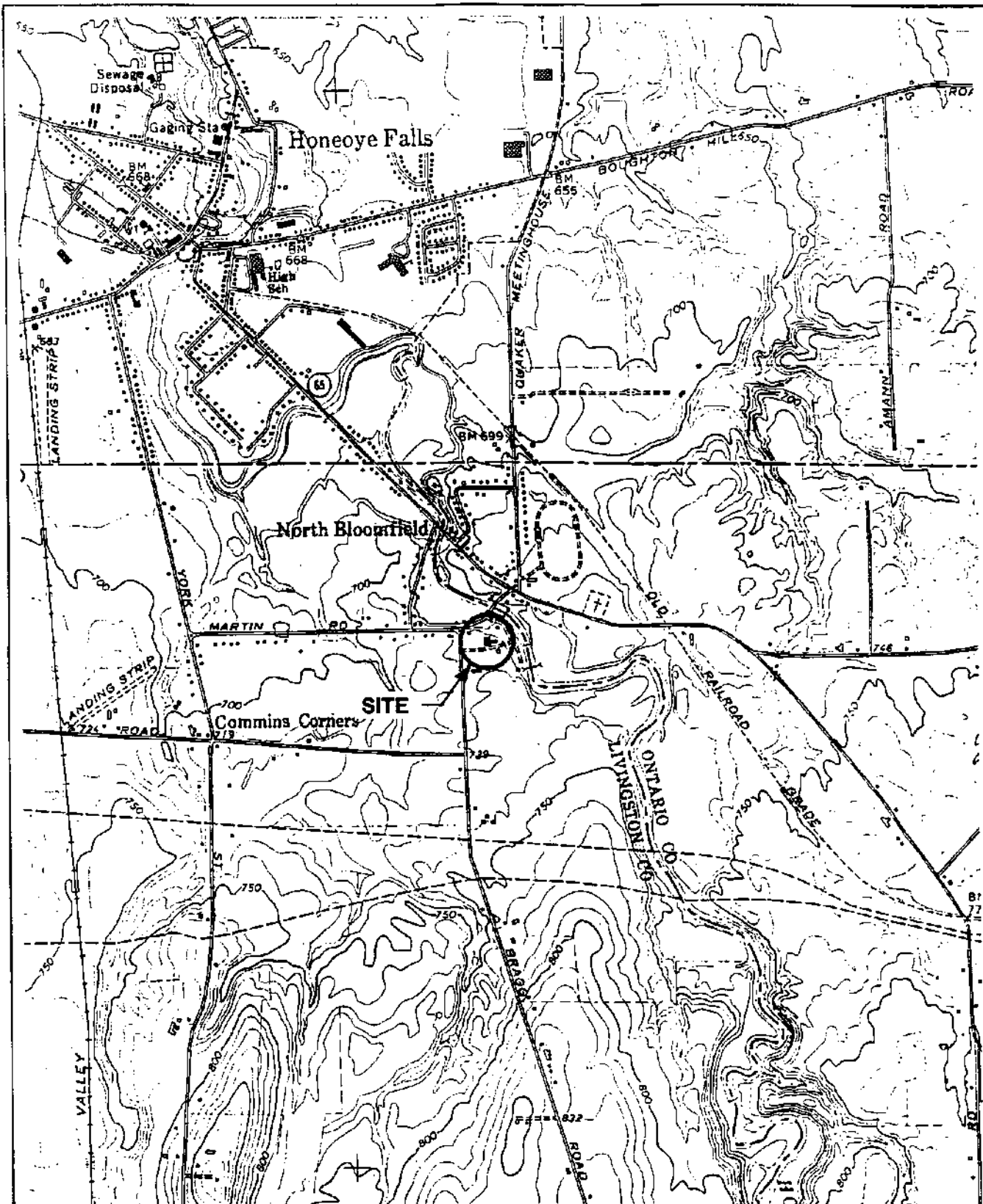
References:

- (1) Basics of Pump and Treat Ground-Water Remediation Technology
Mercer J.W. et al., USEPA 600-R-90/003 R.S. Kerr Env. Research Laboratory Ada, Oklahoma
- (2) Handbook of Environmental Fate and Exposure Data for Organic Chemicals
Howard, Philip H. et al., Syracuse Research Corporation Volumes I, II & III (1990)
- (3) Material Safety Data Sheets for each respective compound as provided by either ENARC-O Machine Products or the material manufacturer.
- (4) Handbook of Environmental Data on Organic Chemicals, 2nd Edition (1983)
Verschuuren, Karel et al., Dept. of Public Health and Tropical Hygiene, Agricultural University of Wageningen, The Netherlands.
- (5) Superfund Public Health Manual, USEPA 540/1-86/060
Office of Emergency and Remedial Response, Washington D.C. (1986)
- (6) N/A - Not currently available.
- (7) Vapor Pressure (mmHg) presented were calculated at 20-25 degrees Celsius.
- (8) Estimated detection limits calculated from compound response factors on the Photovac 10S70 10.6 eV detector assuming a 100 ul. injection. Actual detections limits may vary.
- (9) ppmV - parts per million by molar volume in air.

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163869



LATITUDE: 42° 56' 13"N LONGITUDE: 77° 34' 33"W



QUADRANGLE LOCATION

U.S.G.S. QUADRANGLE: HONEOYE FALLS, N.Y.

MAKEPEACE

H & A OF NEW YORK



Geotechnical Engineers & Environmental Consultants

ENARC-O MACHINE PRODUCTS
LIMA, NEW YORK

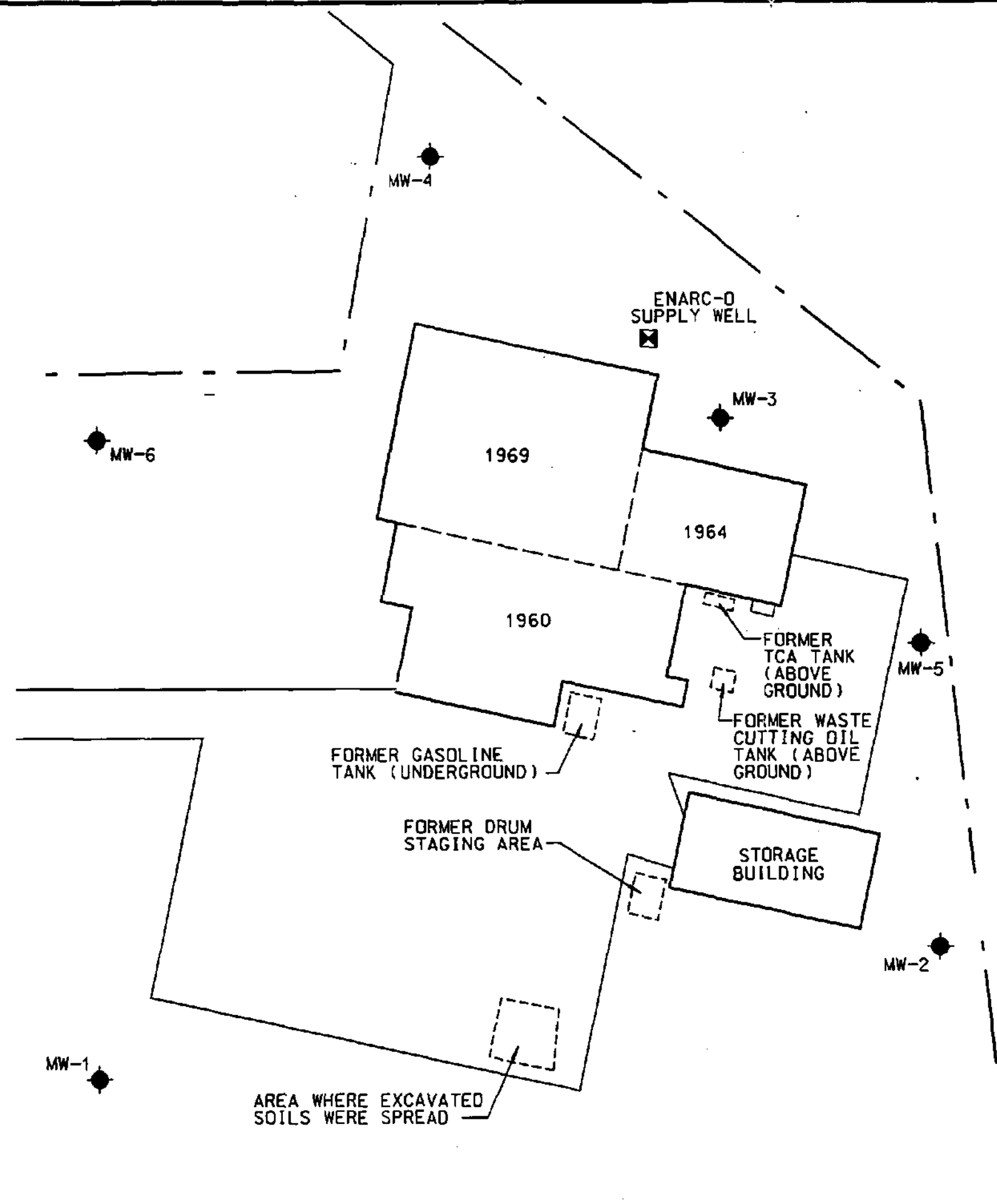
PROJECT LOCUS

SCALE: 1 IN. = 2000 FT.

FEBRUARY 1993

FIGURE 1

40



LEGEND:

● MONITORING WELL LOCATION

☒ SUPPLY WELL LOCATION

— — — — — APPROXIMATE LOCATION OF PROPERTY LINE

- - - - - CREEK

1969 APPROXIMATE CONSTRUCTION DATE OF BUILDING SECTION

NOTE:

1. ALL LOCATIONS APPROXIMATE. BASE PLAN PROVIDED BY ENARC-0.

0 25 50 100

SCALE (IN FEET)



H & A OF NEW YORK

Geotechnical Engineers & Environmental Consultants

ENARC-0 MACHINE PRODUCTS
LIMA, NEW YORK

SITE PLAN

SCALE: AS SHOWN

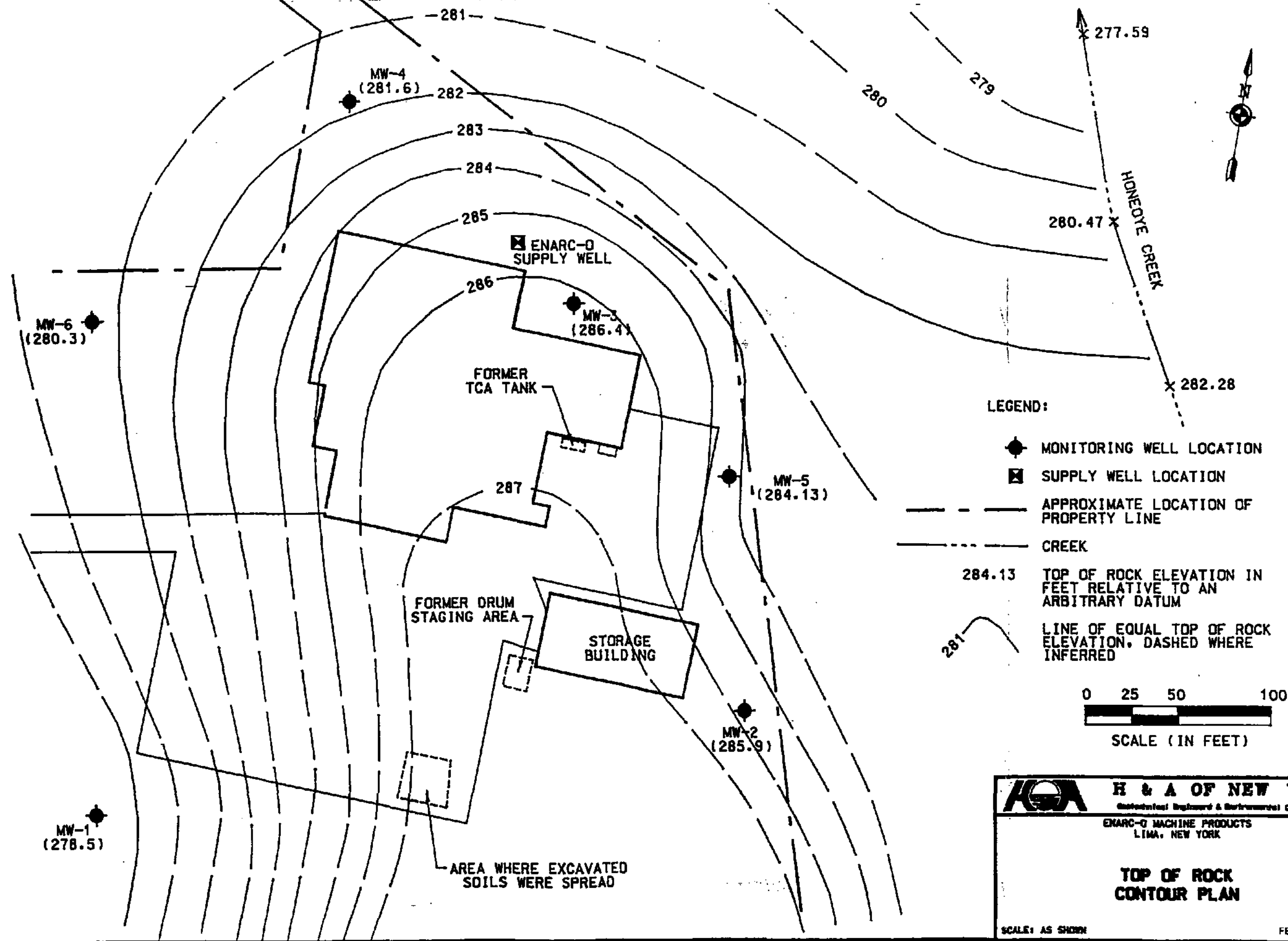
DECEMBER 1993

FILENAME: SITE.DGN

FIGURE 2

41

FILE NO. 70372-40



H & A OF NEW YORK
Geotechnical Engineers & Environmental Consultants
ENARC-0 MACHINE PRODUCTS
LIMA, NEW YORK

**TOP OF ROCK
CONTOUR PLAN**

SCALE: AS SHOWN

FEBRUARY 1993

FIGURE 3

42

FILE NO. 70372-40

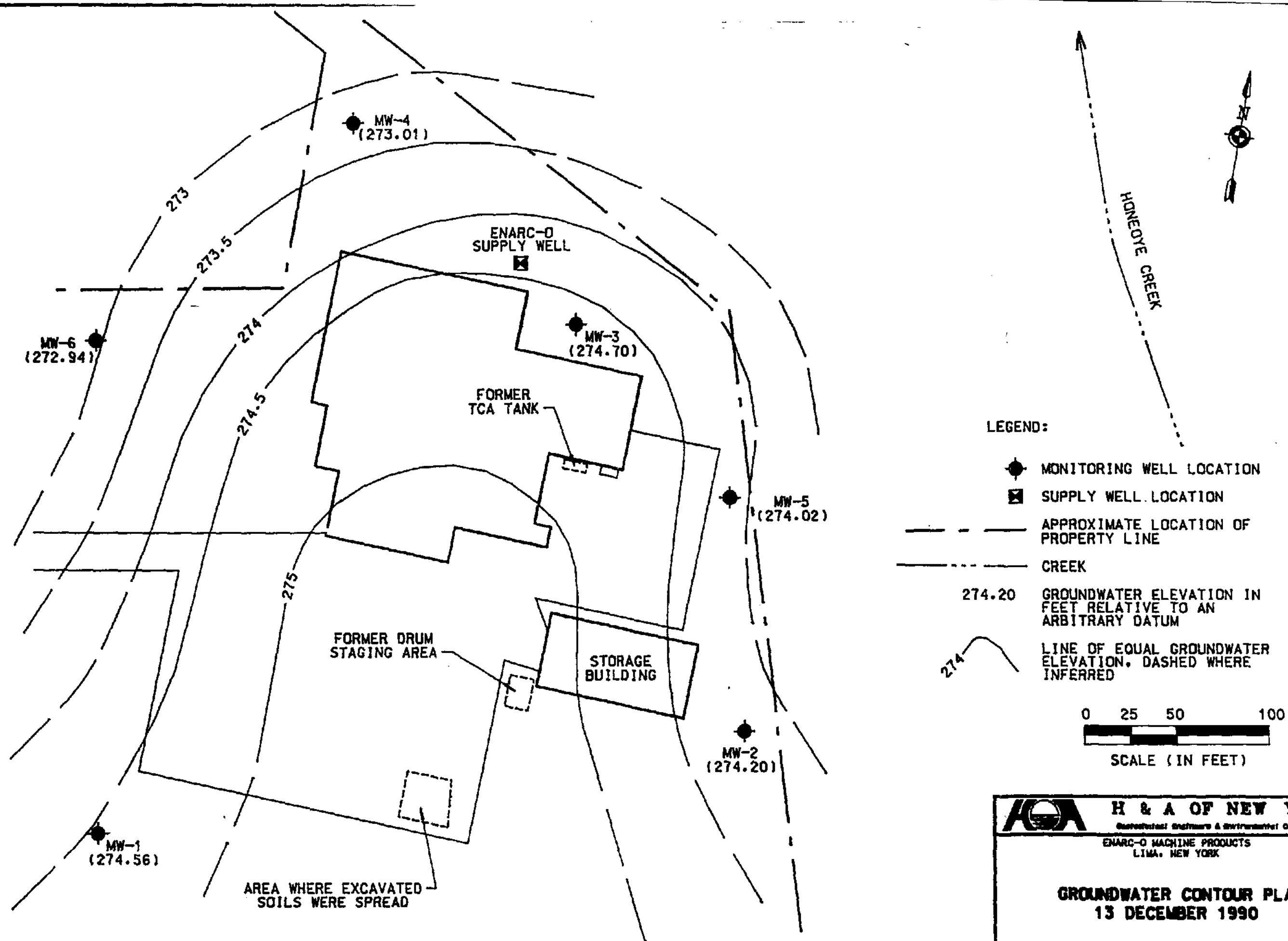
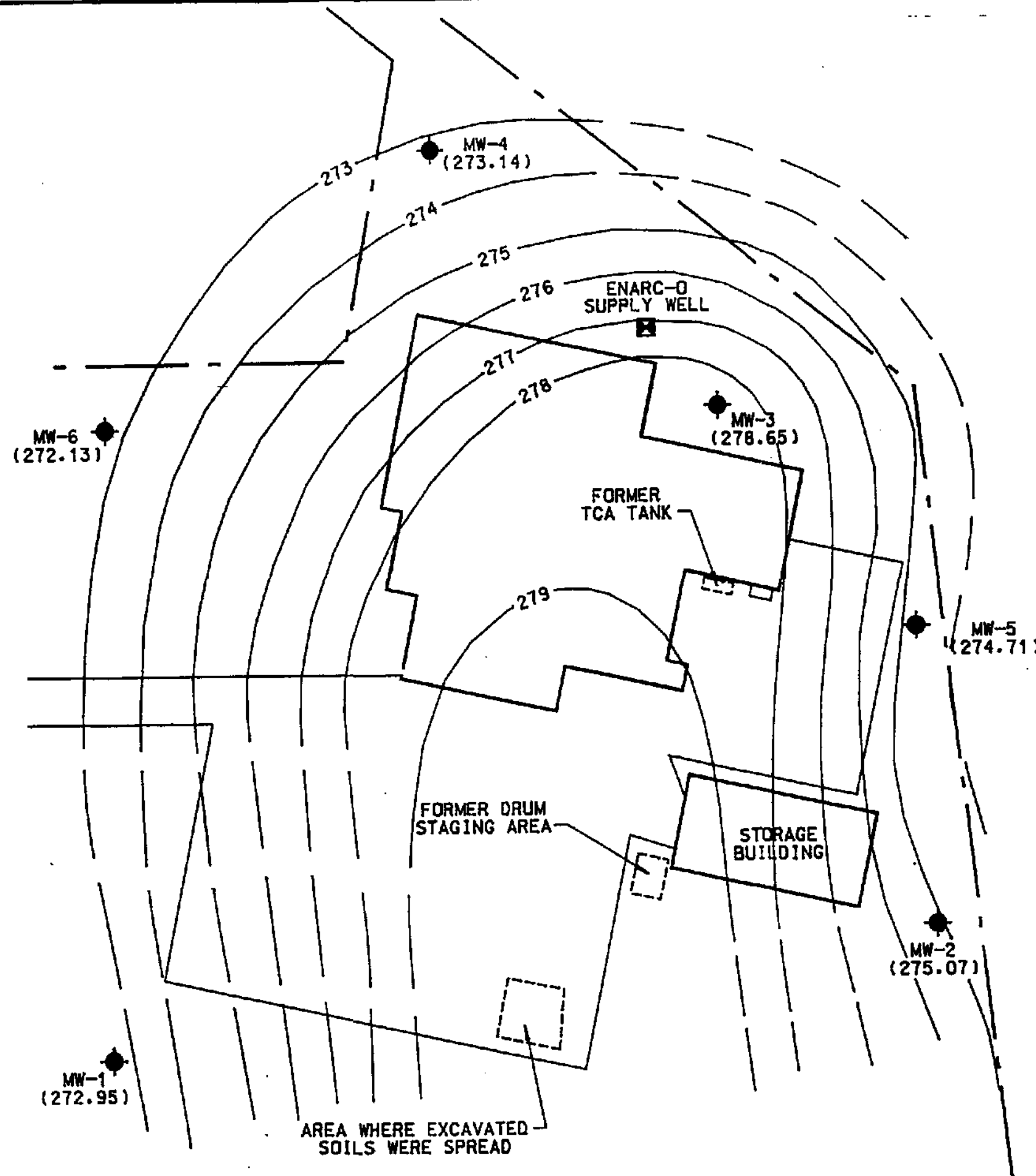


FIGURE 4

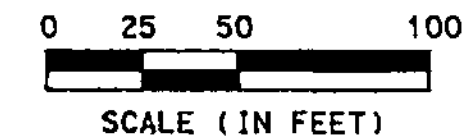
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FILE No. 70372-40



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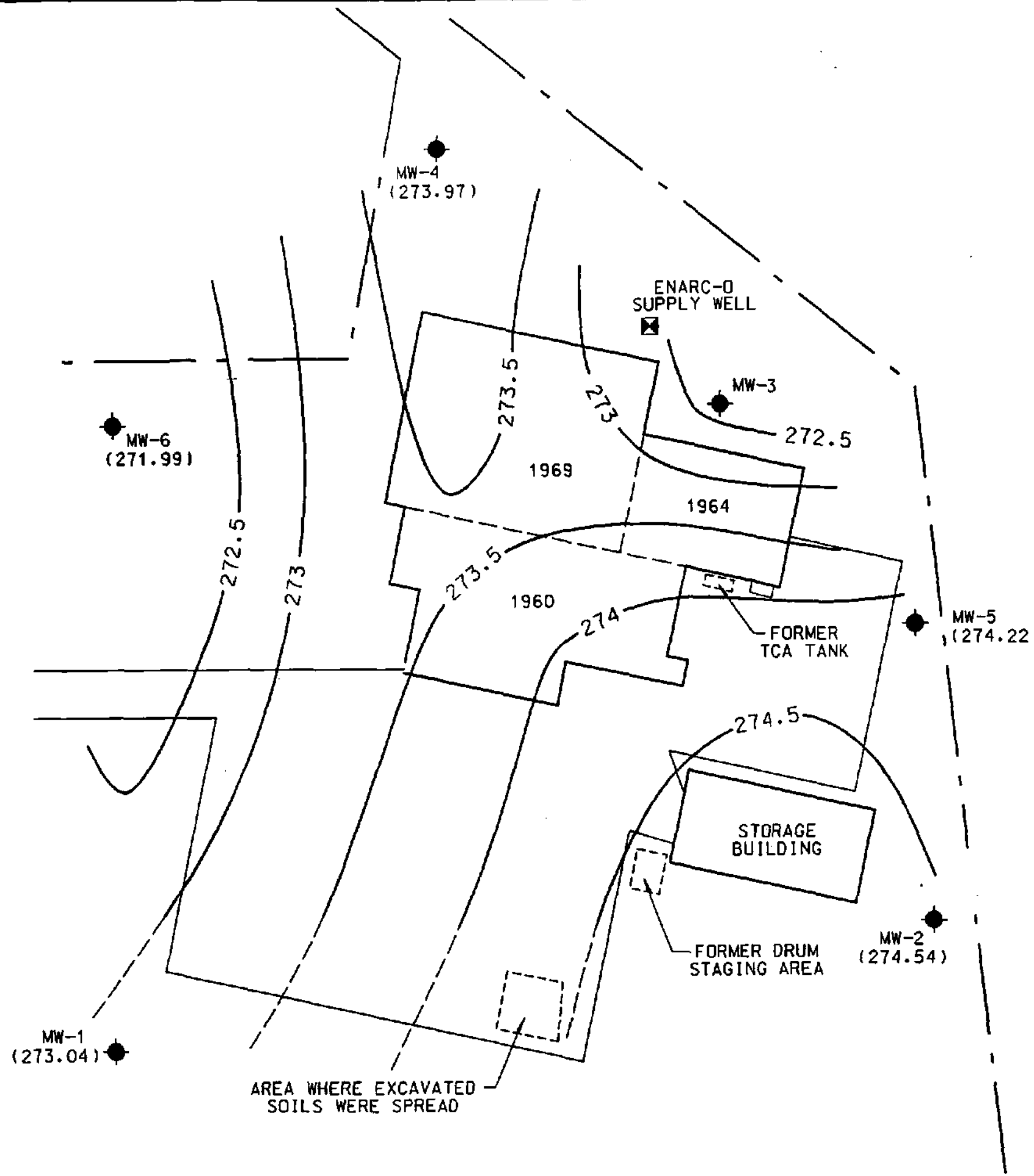
- MONITORING WELL LOCATION
- ⊠ SUPPLY WELL LOCATION
- - - - - APPROXIMATE LOCATION OF PROPERTY LINE
- - - - - CREEK
- 274.71 GROUNDWATER ELEVATION IN FEET RELATIVE TO AN ARBITRARY DATUM
- 274 LINE OF EQUAL GROUNDWATER ELEVATION, DASHED WHERE INFERRED



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Geotechnical Engineers & Environmental Consultants
ENARC-0 MACHINE PRODUCTS
LIMA, NEW YORK

GROUNDWATER CONTOUR PLAN
25 FEBRUARY 1991

SCALE: AS SHOWN
FEBRUARY 1993
FILENAME: 1991.DGN



LEGEND:

● MONITORING WELL LOCATION

⊠ SUPPLY WELL LOCATION

--- APPROXIMATE LOCATION OF PROPERTY LINE

--- CREEK

1969 APPROXIMATE CONSTRUCTION DATE OF BUILDING SECTION

0 25 50 100

SCALE (IN FEET)

H & A OF NEW YORK
Geotechnical Engineers & Environmental Consultants

ENARC-O MACHINE PRODUCTS
LIMA, NEW YORK

GROUNDWATER CONTOUR PLAN
29 MAY 1992

SCALE: AS SHOWN

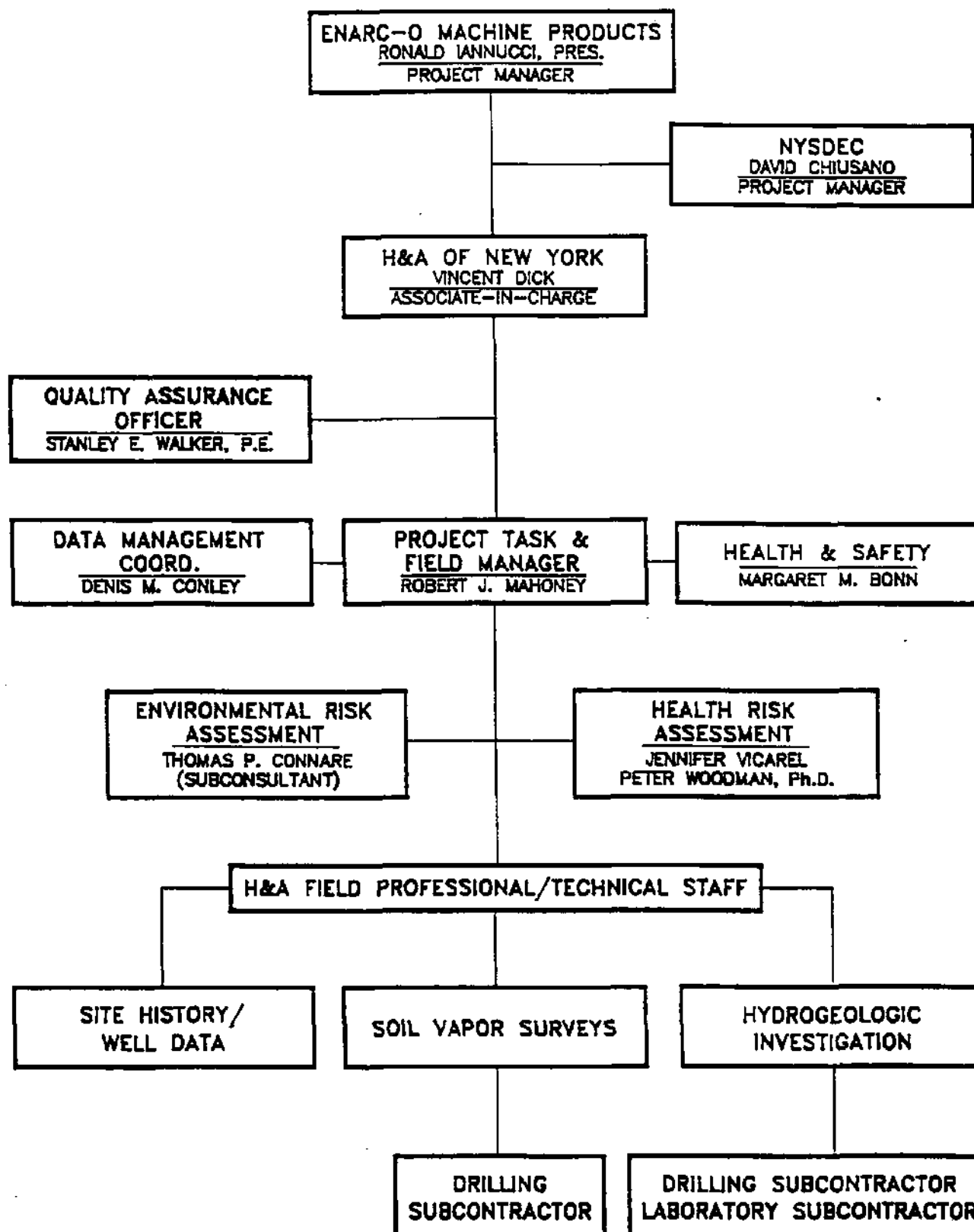
DECEMBER 1993

FILENAME: FIG05A.DGN

FIGURE 5A

45

PROJECT ORGANIZATION

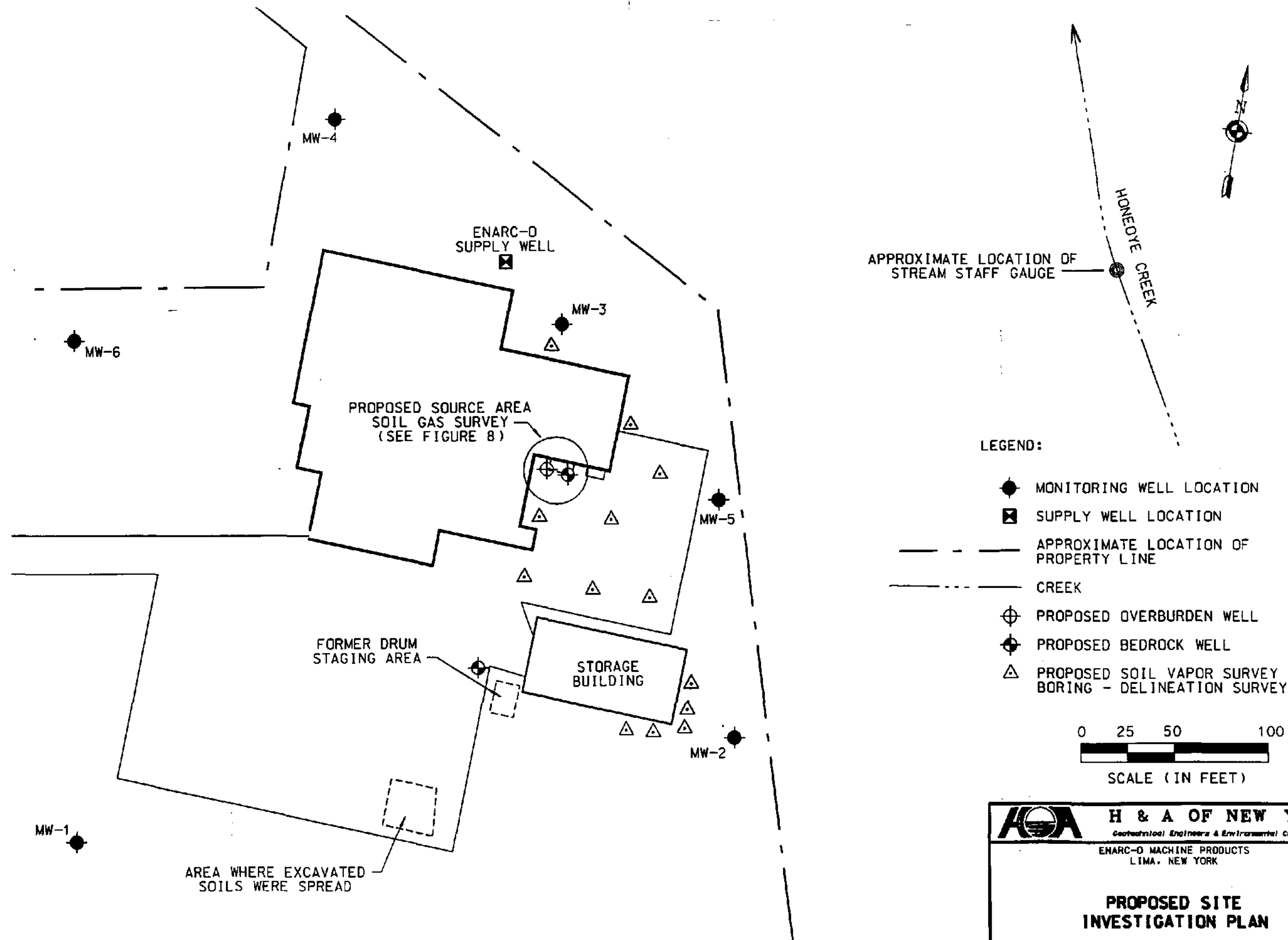


FILE NO. 70372-40

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FEBRUARY 1993

FIGURE 6



ACA **H & A OF NEW YORK**
Geotechnical Engineers & Environmental Consultants

ENARC-D MACHINE PRODUCTS
 LIMA, NEW YORK

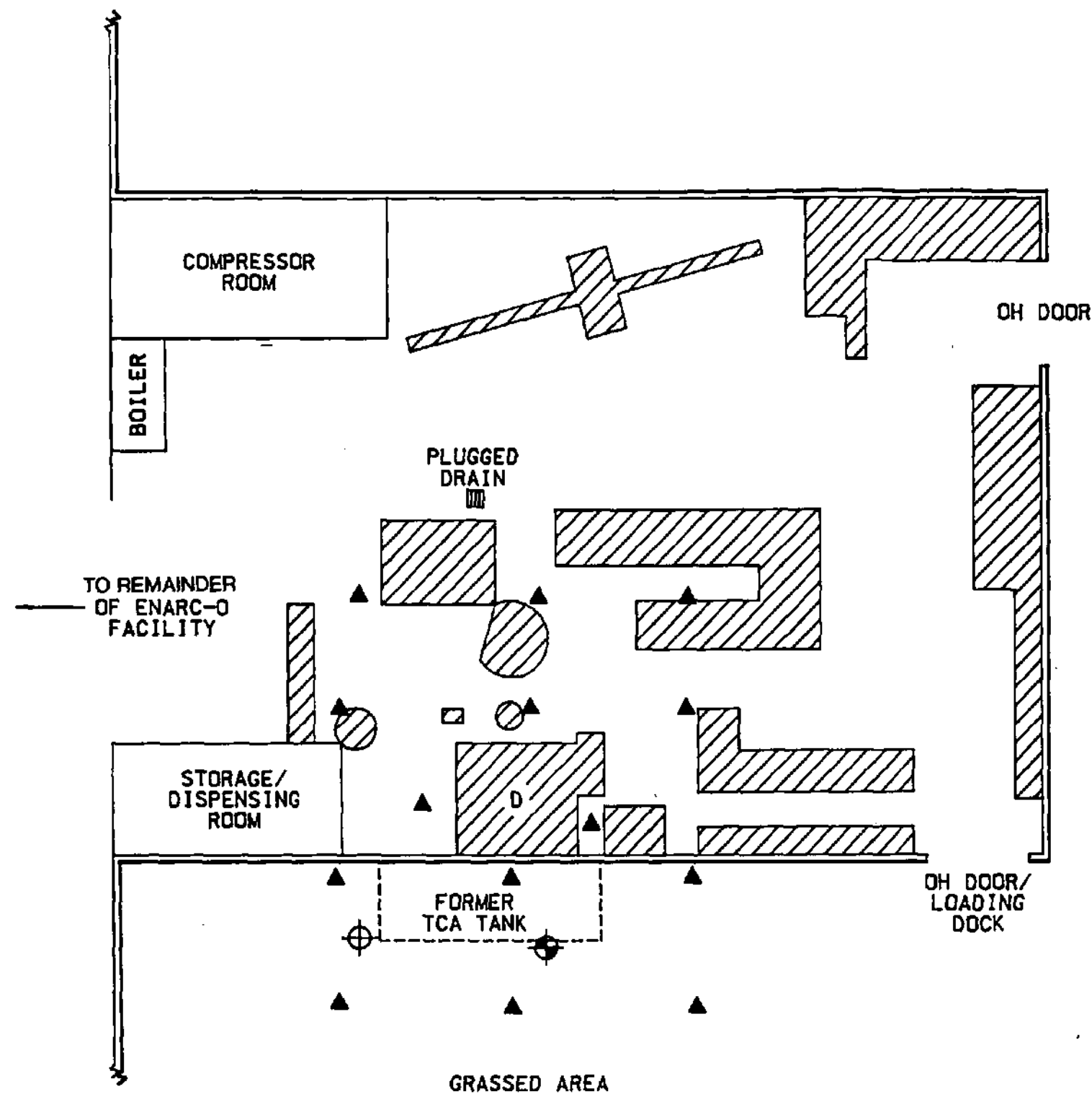
PROPOSED SITE INVESTIGATION PLAN

SCALE: AS SHOWN

FILENAME: FIG7.DGN

DECEMBER 1993

FIGURE 7



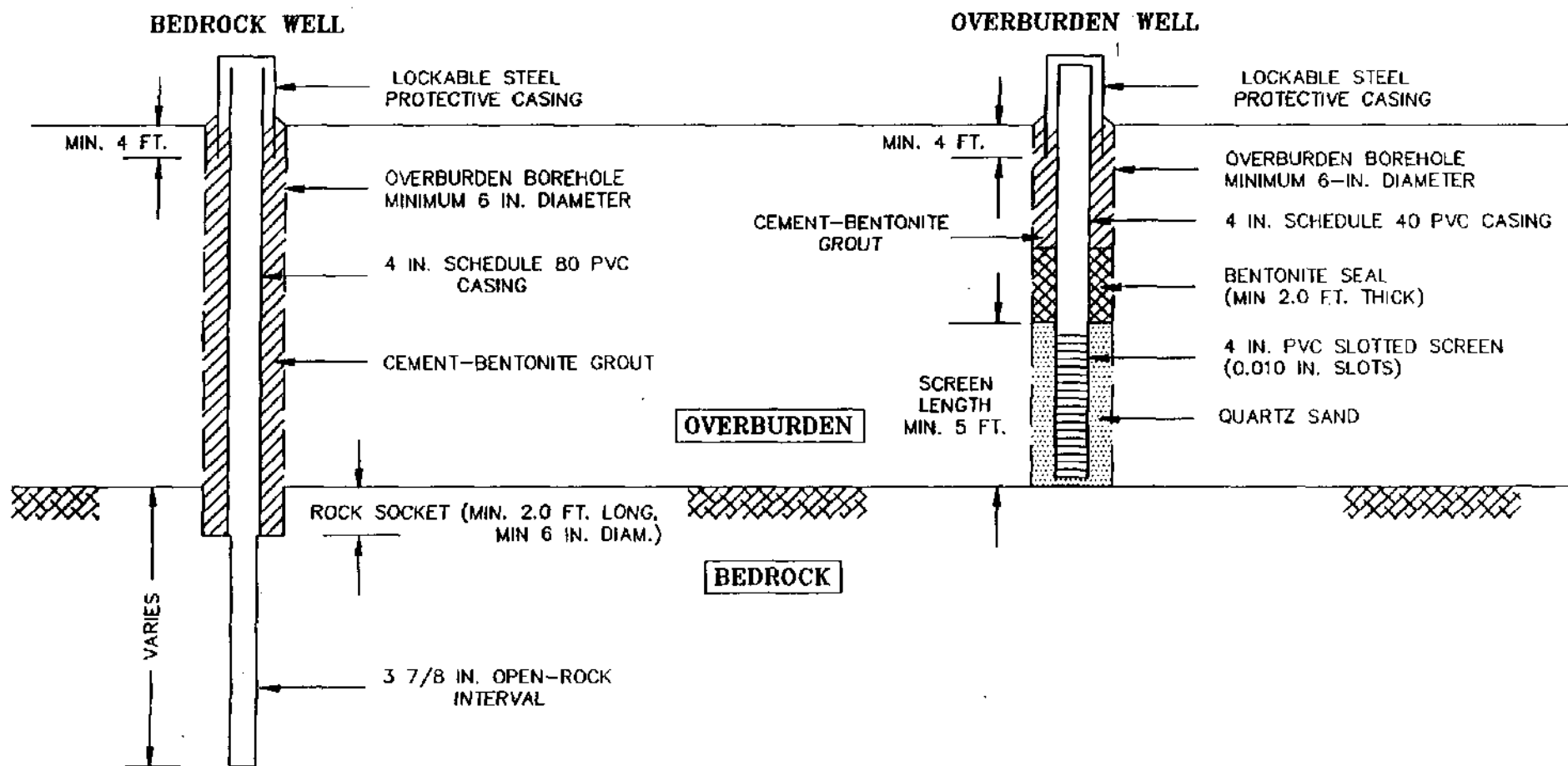
LEGEND:

- ▲ PROPOSED SOIL VAPOR SAMPLE LOCATIONS
-  FLOOR AREA OBSTRUCTED BY EQUIPMENT, STORAGE OR OTHER, (DIMENSIONS APPROXIMATE) "D" DESIGNATES DEGREASER LOCATED IN CONCRETE PIT
-  PROPOSED OVERBURDEN WELL
-  PROPOSED BEDROCK WELL

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE, BASED ON TAPE PLAN OF FACILITY.
2. POTENTIAL SOURCE AREA SAMPLE LOCATIONS SHOWN ONLY. SEE TEXT FOR ADDITIONAL INFORMATION AND SEE FIGURE 7 FOR OTHER PROPOSED INVESTIGATION LOCATIONS.

 H & A OF NEW YORK Geotechnical Engineers & Environmental Consultants
ENARC-O MACHINE PRODUCTS LIMA, NEW YORK
SOURCE AREA INVESTIGATION PLAN
SCALE: 1" = 10 FT
FILENAME: FIG8.DGN
FEBRUARY 1993



NOTES:

1. LENGTH OF OPEN ROCK INTERVALS TO BE DETERMINED IN THE FIELD.

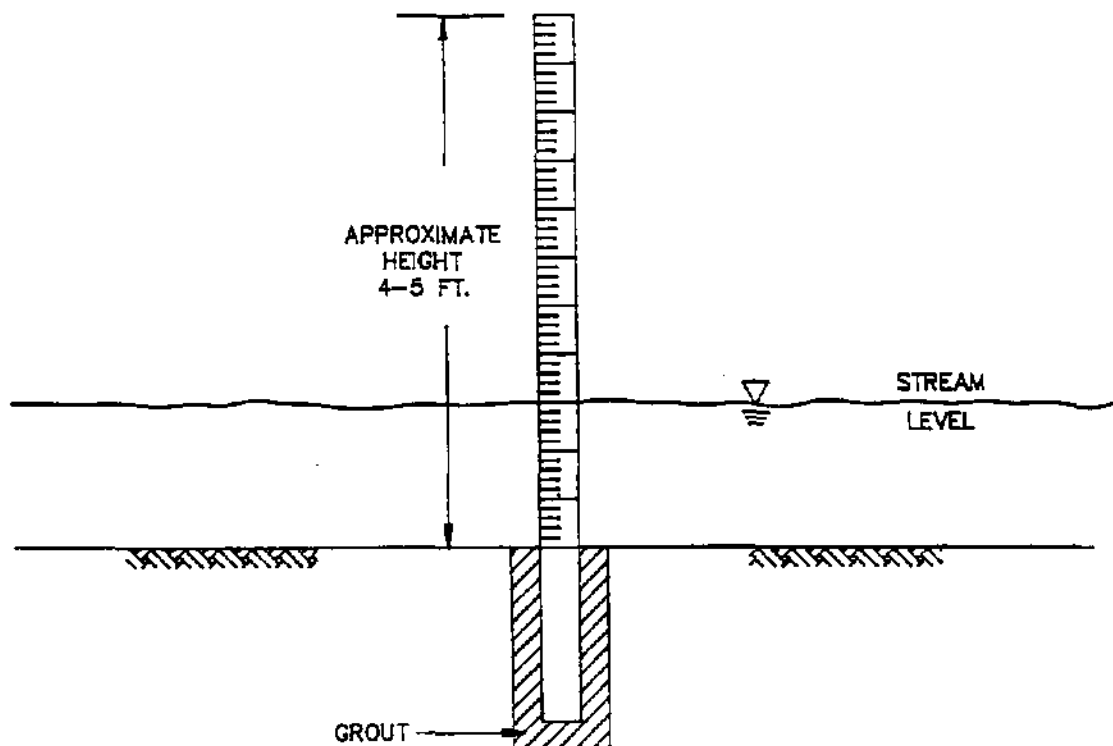
H & A OF NEW YORK
Geotechnical Engineers & Environmental Consultants

ENARC-O MACHINE PRODUCTS
LIMA, NEW YORK

MONITORING WELL CONSTRUCTION SCHEMATIC

NOT TO SCALE

DECEMBER 1993



NOTES:

1. STREAM STAFFING GAUGE TO BE 1-IN. DIAMETER STAINLESS STEEL, OR EQUIVALENT, MARKED IN 0.10-FT INCREMENTS, SUPPLIED AND INSTALLED BY ENARC-O.

FILE NO. 70372-40



H & A OF NEW YORK

Geotechnical Engineers & Environmental Consultants

ENARC-O MACHINE PRODUCTS
LIMA, NEW YORK

STREAM STAFF GAUGE

NOT TO SCALE

FEBRUARY 1993

FIGURE 10

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ENARC-O MACHINE PRODUCTS, INC.
LIMA, NEW YORK

REMEDIAL INVESTIGATION WORK PLAN
PROJECT SCHEDULE (4)

TASK (4)	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6	MONTH 7	MONTH 8	MONTH 9	MONTH 10	MONTH 11	MONTH 12
1. WORK PLAN APPROVAL/PUBLIC MTO. COMPLETION												
2. WELL DATA SURVEY												
3. RE-SURVEY, BASE MAP PREPARATION												
4. WELL SAMPLING/ANALYSIS ON/OFF-SITE												
5. SOIL GAS SURVEY												
6. MONITORING WELL INSTALLATION												
7. NEW WELLS SAMPLE/ANALYSIS												
8. HYDROGEOLOGIC TESTING*												
9. STREAM GAUGE INSTALL./MEASUREMENT*												
10. ENVIRON. & HEALTH RISK ASSESSMENTS												
11. DATA REDUCTION/VALIDATION												
12. RI REPORT PREP./SUBMITTAL												
13. AGENCY REVIEW/COMMENT/APPROVE												
14. IRM/FOCUSSED FS EVALUATION**												
15. AGENCY REVIEW/COMMENT/APPROVE (4)												
16. FULL FS PREP**												
17. AGENCY REVIEW/COMMENT												
18. FINAL FS/APPROVE (4)												
19. QUARTERLY SAMPLING/ANALYSIS*(1)												
20. RECORD OF DECISION (4)												

NYSDEC Notice-
to Proceed

NOTES

- QUARTERLY SAMPLING WILL CONTINUE THROUGH ONE YEAR (MONTH 12) AT WHICH TIME FUTURE SAMPLING WILL BE REEVALUATED.
- ** DENOTES ITEMS ON WHICH ENARC-O & NYSDEC INPUT WILL BE REQUIRED TO CONFIRM LOCATIONS AND PARAMETERS PRIOR TO WORK EFFORT.
- *** DENOTES FOCUSSED FS FOR INTERIM OR OTHER QUICKLY IMPLEMENTED REMEDIAL EFFORT IF APPROPRIATE
FULL FS PROCEEDS TO THE EXTENT IMPACTS NOT ADDRESSED BY TASK 14.
- TIME FRAMES AND SEQUENCE SUBJECT TO CHANGE BASED ON PUBLIC MEETING RESULTS, ACTUAL REVIEW/APPROVAL TIME FRAMES, AND WEATHER CONDITIONS FOR OUTDOOR WORK. PROCESS CONCLUDES WITH RECORD OF DECISION (ROD) WHICH REQUIRES 1 MONTHS FOLLOWING FOCUSSED OR FINAL FS APPROVAL.

FIGURE 11

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APPENDIX A

Quality Assurance Project Plan



APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

1.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

A quality assurance/quality control program is designed to produce data of the quality necessary to achieve project objectives and meet or exceed the minimum standard requirements for field and analytical methods. The QA/QC program will include:

- A mechanism for ongoing control and evaluation of data quality.
- A measure of data quality in terms of precision, accuracy, representativeness, completeness, and comparability.

The following is a general discussion of the criteria used to measure the quality at both field and laboratory analytical data. Field data collection and quality assurance will be the responsibility of H&A of New York and its subcontractors retained for field explorations (drillers, etc.). Laboratory data quality assurance as described herein will be the responsibility of the contract analytical laboratory retained for this project. The lab requirements described below are based on criteria that will be required contractually or are required based on NYSDEC ASP91 and EPA Superfund CLP protocol.

1.0.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions or is a quantitative measure of the variability of a group of measurements compared to their average value.

Precision is usually stated in terms of standard deviation but other estimates such as the relative percent difference (RPD) expressed as a percentage of the mean, range (maximum value minus minimum value), and a relative range are common.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is much easier to control and quantify than sampling precision. There are more historical data related to individual method performance and the "universe" is limited to the samples received within a laboratory. In contrast, sampling precision is unique to each site.

Sampling precision for this project will be determined by collecting and analyzing collocated (split) or field replicate samples and by creating and analyzing laboratory replicates from one or more of the field samples. The analytical results from the collocated or field replicate samples will provide data on sampling precision. Laboratory replicate analysis will provide data on laboratory precision. For the Preliminary Site Assessment collocated or replicate samples will be collected at a rate of 10% of the total number of samples obtained in a particular sampling effort.

1.0.2 Accuracy

Accuracy relates to the bias in a measurement system. Bias is the difference between the average value of observed measurements and the "true" value. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation and analytical techniques. For the Preliminary Site Assessment sampling accuracy will be assessed by evaluating the results of field/trip blanks. Field and trip blanks will be collected as appropriate for each sampling effort. Analytical accuracy will be assessed through the use of known QC samples and matrix spikes.

1.0.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, a parameter variation at a sampling point, or an environmental condition. Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling program. The representativeness criterion is best satisfied by making certain that sampling locations are selected properly and a sufficient number of samples are collected.

Representativeness will be addressed by describing sampling techniques and the rationale used to select sampling locations. Sampling locations may be biased (based on existing data, instrument surveys, observations, etc.) or unbiased (completely random or stratified-random approaches) depending on the situation. The rationale used to determine sampling locations will be explicitly explained.

For the former Preliminary Site Assessment nearly all sampling will be biased; that is, water samples and monitoring well placement will be dictated by apparent presence or absence of site specific target compounds. Specific sample technique descriptions, which allow consistency, repetitiveness and thus representativeness in sampling, are included in this work plan as described by the specific Work Tasks in this plan.

Representativeness may also be assessed by the use of collocated samples. By definition, collocated samples are collected so that they are equally representative of a given point in space and time. In this way, they provide both precision and representativeness information. As stated previously collocated samples will be collected at a rate of 10% of all samples collected.

1.0.4 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is essentially the same for all data uses: that a sufficient amount of valid data be generated.

1.0.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Sample data should be comparable with other measurement data for similar samples and sample conditions. This goal is achieved through using standard operating procedures to collect and analyze representative samples and the reporting of analytical results. The standard operating procedures for the various activities to be conducted during this investigation are contained within the attached appendices.

1.1 DOCUMENTATION AND CHAIN-OF-CUSTODY

1.1.1 Field Procedures

The quality of data can be greatly effected by sample collection activities. If the integrity of collected samples is for some reason in question, the data, regardless of its analytical quality will also be in question. Field sampling standard operating procedures will provide for the collection of samples representative of the matrix being investigated.

The following procedures will be used to maintain the integrity of the samples:

- Upon collection, samples will be placed in the proper containers. In general, samples collected for organic analysis will be placed in pre-cleaned glass containers and water samples collected for inorganic and field parameters analysis which will be placed in pre-cleaned plastic (polyethylene) bottles.
- Each sample will be assigned a unique sample I.D. number which will be placed on a sample label securely affixed to the containers. Other information to be placed on the sample label will include: the sample type, the sampler's name, date collected and preservation method. Information on the labels will be completed with a ballpoint or felt-tip waterproof pen.
- Samples will be properly and appropriately preserved by field personnel in order to minimize loss of the constituent(s) of interest due to physical, chemical or biological mechanisms.
- The appropriate sample volumes to be collected will be confirmed prior to initiation of the field program to ensure that method-or contract-required detection limits (or quantification limits) can be successfully obtained and that the required level of quality control relative to both precision and accuracy can be performed.
- A chain-of-custody form will be completed as each sample is collected. The completed forms will accompany the samples to the laboratory. The field personnel collecting the samples will be responsible for the custody of the samples until the samples are relinquished to the laboratory. Sample transfer will require the individuals relinquishing and receiving the samples to sign, date and note the time on the chain-of-custody form. An example of the chain-of-custody form to be used during this investigation is shown in Appendix C.

On-site headspace analysis of water, soil and soil vapor, if collected and required during the various field operations, will not require chain-of-custody records. However, information from these analyses will be recorded on one of H&A's standard field forms, and will include information identifying each headspace sample with the correlated laboratory sample split, if one is taken.

- Samples will be shipped or delivered in a timely fashion to the contract laboratory so that holding-times and/or analysis times as prescribed by the chosen methodology can be met. Samples will also be transported in containers (coolers) which will maintain the appropriate temperature for those analytical parameters for which such refrigeration is required in the defined preservation protocols.

Field personnel will be required to keep written records of field activities on applicable preprinted field forms or in a bound field notebook. These records will be written legibly in ink and will contain pertinent field data and observations. Entry errors or changes will be crossed out with a single line, dated and initialed by the person making the correction. Field forms and notebooks will be reviewed by the Quality Assurance Officer and Project Manager on a weekly basis.

1.1.2 Laboratory Procedures

The contract laboratory chain-of-custody procedures will be based upon the National Enforcement Investigation Center (NEIC) policies and procedures (EPA-330/9-78-001-R). A full-time sample custodian will be assigned the responsibility of sample control. It will be the responsibility of the sample custodian to receive all incoming samples. Once received, the custodian will: 1) document that each sample is received in good condition (i.e., unbroken, cooled, etc.), and that the associated paperwork, such as chain-of-custody forms have been completed; and 2) will sign the chain-of-custody forms (Figure 13). In special cases, the custodian will document from appropriate subsamples that chain-of-custody with proper preservation has been accomplished. The custodian will also document that sufficient sample volume has been received to complete the analytical program.

The sample custodian will then place the samples into secure limited access storage (refrigerated storage if required).

Consistent with the analyses requested on the chain-of-custody form, analyses by the contract laboratory's analysts will begin in accordance with the appropriate methodologies. Samples will be removed from secure storage only after internal chain-of-custody sign-out procedures have been followed.

Empty sample bottles, when the available volume has been consumed by the analysis, will be returned to secure and limited access storage. Upon completion of the entire analytical work effort, samples will be disposed of by the sample custodian. The length of time that samples are held will be at least thirty (30) days after reports have been submitted.

Disposal of remaining samples will be completed in compliance with RCRA and 6 NYCRR Part 373 regulations.

Empty sample bottles will be disposed of as non-hazardous solid waste consistent with sample exclusion and empty container provisions of RCRA. All liquid and solid samples for disposal will be reviewed by the contract laboratory's management prior to authorization for disposal. If the samples are hazardous by characteristic (reactive, corrosive, ignitable or toxic) or are a TSCA/PCB waste, appropriate controlled disposal will be performed. The contract laboratory will be a permitted generator of hazardous wastes and will have disposal contracts with all necessary types of subtitle-C TSDF facilities. Full documentation of each step of the disposal process, consistent with the requirements of RCRA will be monitored by the contract laboratory's Environmental Health and Safety Officer.

For other non-characteristically hazardous or non-TSCA materials, the contract laboratory will review the available analytical results for the samples in question and dependent on the presence of and/or concentration of hazardous constituents will either dispose of materials as hazardous wastes or exercise its options to dispose of the materials as non-hazardous waste based upon the laboratory samples exclusion provisions of RCRA.

1.2 FIELD INSTRUMENT CALIBRATION PROCEDURES

Several field instruments will be used for both on-site screening of samples and for health and safety air monitoring. On-site screening and off-site air monitoring for health and safety purposes will be accomplished using several different organic vapor detection devices (Foxboro OVA, Draeger tubes).

1.2.1 Organic Vapor Detection Instruments

Instruments including the Foxboro Organic Vapor Analyzer, HNu PI-101 photoionization organic vapor detector, (11.7 eV lamp) Photovac Microtip, and Draeger tubes may be used to monitor air quality during drilling and sampling procedures. General calibration procedures common to each instrument manufacturer's specifications will be followed (except for the Draeger tubes which do not require calibration).

1.2.2 Draeger Multi-Gas Detector System

The Draeger Multi-Gas detector system consists of two primary components, the gas detector pump and the Draeger indicator tubes. Each Draeger indicator tube kit contains specific operating procedures provided by the manufacturer. Operation of the Draeger Multi-Gas detector system will be performed with strict adherence to the manufacturer's gas indicator tube kit specifications.

Prior to each operation of the system, the gas detector pump will be inspected for:

- Leaks within the folds of the bellows

- Proper seating of the indicator tube within the pump head stopper.
- Expiration date of indicator tube to be used.

Satisfactory completion of the pre-operation inspection will be noted on the Field Sampling Record, along with the results of each field measurement.

1.2.3 pH/Conductivity/Temperature Measurements

A Corning Checkmate Field System will be utilized to determine pH, specific electrical conductance and temperature measurements in conjunction with water quality sample collection. The Corning system uses a micro-processor based meter which interfaces with separate probes for pH/temperature and specific electrical conductance determinations respectively.

Each probe will be calibrated immediately prior to each day's operation using NIST traceable reference materials. Calibration data including reference materials and dates of reference material preparation and expiration, and the percent of true value observed will be recorded on the Field Sampling Record.

If calibration verification standard recovery is determined to be outside acceptance criteria of $\pm 20\%$ of the standard true value, the specific probe will be reconditioned and recalibrated or replaced.

1.2.6 Field Gas Chromatograph

A monthly multipoint calibration check will be performed on the field gas chromatograph using certified standards and zero, ultra-high purity air placed in a 2L static dilution bottle. The standards will be prepared at concentrations in the range of expected field concentrations. A plot of known concentration versus instrument response for each standard will be prepared to check the linearity of instrument response. A linear regression analysis will be performed on the data. If the correlation coefficient is greater than 0.95, the instrument will be considered linear and ready for field use. If this criterion is not met, the instrument will be checked following the manufacturer's troubleshooting procedures until the problem is corrected. The linear calibration check will be performed again. The instrument will be considered field ready when the above criterion is met.

Prior to daily field operations, the instruments will be checked for electronic calibration and adjusted as necessary. Appropriate standards will be used for establishing instrument settings.

1.3 Laboratory Analytical Procedures

Analytical procedures to be utilized for laboratory analysis of environmental samples as part of the Remedial Investigation will be from the following documents:

- The New York State Department of Conservation "Analytical Services Protocol", December 1991.
- "Test Methods for Evaluating Solid Waste" SW-846, USEPA Office of Soils Waste and Emergency Response 3rd Edition, Update December 1987.
- U.S. Environmental Protection Agency Contract Laboratory Protocol, Statement of Work, March 1990, (CLP SOW 3/90) protocols for analysis of organic (target compound list) and inorganic (target analyte list) constituents.

Specific quality control criteria for each analytical procedure will be derived from NYSDEC ASP91, Volume #8, Exhibit E, Parts I-VII and XVII where applicable.

1.4 Internal Quality Control Checks

1.4.1 Laboratory Procedures

Procedures which contribute to maintenance of overall laboratory quality assurance and control include proper sampling techniques, appropriately cleaned sample bottles (either by the contract laboratory or purchased as "certified clean"), proper sample identification and logging, applicable sample preservation, storage and analysis within holding times, and use of controlled materials.

The quality control program utilized by the contract laboratory will be based upon recommendations contained in the EPA Handbook for Analytical Quality Control in Water and Waste water Laboratories (March 1979), 600/4-79-019.

Precision and accuracy charts will be maintained for specific parameters as described in the EPA handbook.

Consistent with general guidance from the EPA Handbook, control charts for internal standards and method surrogates will be maintained for each method to be performed as part of the analysis of each project sample.

Duplicate Samples

A duplicate analysis will be performed for every analytical batch or at a minimum of 10 percent of all project samples analyzed by the contract laboratory. The precision or reproducibility of the data generated will be monitored using a precision quality control chart.

The precision chart used to monitor laboratory precision will be based upon information presented in Section 6 of the EPA Handbook of Analytical Quality Control in Water and Waste water Laboratories (March 1979). 600 5-79-019.

The Upper Control Limit (UCL) will be calculated as follows:

$$\begin{aligned} \text{UCL} &= D_{JR} \\ &= 3.27 (0.006) \\ &= 0.0196 \end{aligned}$$

Where:

D_J = Shewart factor for ranges based upon duplicate analyses.
R = The mean range of multiple replicate determinations.

The critical R value (R_c) is the upper control limit rounded off to an operationally feasible number; i.e., the $R_c = 0.020$. This R_c or critical R value is the maximum allowable difference between replicate determinations on a single sample. The R value will be plotted every day analyses are performed and the points will be reviewed for trends. If an R value exceeds the R_c value, the data will be considered invalid and the cause for such performance will be investigated and corrected before analyses are resumed.

Matrix Spike Samples

A minimum of 10 percent of all project samples to be analyzed by the contract laboratory will be spiked with known amounts of the target compounds being analyzed. The amount of the compound recovered from the sample compared to the amount added will be expressed as a percent recovery. The percent recovery of an analyte is an indication of the accuracy of an analysis and will be expressed on an accuracy chart.

Percent recovery will be calculated for matrix spike and matrix spike duplicate analyses (MS/MSD).

$$\% \text{ Recovery} = \frac{\text{Spiked Sample} - \text{Background}}{\text{Known Value of Spike}} \times 100$$

The standard deviation of the MS/MSD recoveries will be calculated. The upper and lower warning limits will be set at plus and minus 2 standard deviation units. The upper and lower control limits will be set at plus and minus 3 standard deviations.

The acceptance criteria based upon this chart will be defined as follows:

The quality control value indicates acceptable analysis values when it falls between the lower warning limit (LWL) and the upper warning limit (UWL).

If the quality control value falls between the control limit and warning limit (UCL and UWL or LCL and LWL), the analysis should be scrutinized as possibly out-of-control. The sample results will still be acceptable at this point.

If the quality control value falls outside the control limits (UCL or LCL), this indicates an out-of-control situation. The analysis must be stopped until the reason for the problem has been identified and resolved. After it has been corrected, the problem will be documented in the procedure book, with the solution noted.

The contract laboratory will also include the analysis of Standard Reference Materials (SRM's) whenever possible. Standard reference materials will be supplied from independent manufacturer's and traceable to NIST materials with known concentrations of selected parameters. In cases where an independently supplied SRM is not available, one may be prepared by the contract laboratory.

1.4.2 Field Procedures

Field Blanks

Internal quality control checks include analysis of equipment blanks used to validate successful equipment cleaning activities.

Whenever possible, dedicated equipment will be employed to reduce the possibility of cross-contamination of samples.

Equipment used for organic sample collection will be cleaned prior to each usage of the equipment, according to the following procedure:

- Potable Water Rinse
- Alconox detergent (or equivalent) wash
- Potable water rinse
- Deionized water rinse

1.5 CALIBRATION PROCEDURES

The use of materials of known purity and/or quality will be utilized for the analysis of environmental samples as part of the Remedial Investigation. Field personnel and the contract laboratory will carefully monitor the use of all laboratory materials including solutions, standards and reagents through well-documented procedures.

All solid chemicals and acids/bases used by field personnel and the contract laboratory will be reagent grade or better. All gases will be High Purity or better. All standards or standard solutions will be obtained from the U.S. Environmental Protection Agency or from reliable Cooperative Research and Development Agreement (CRADA) certified commercial sources.

All Standard Reference Materials or Performance Evaluation Materials will be obtained from the National Institute of Standards and Technology (formerly National Bureau of Standards) or reliable CRADA certified commercial sources.

All materials including standards or standard solutions will be dated upon receipt, and will be identified by material name, lot number, purity or concentration, supplier, receipt/preparation date, recipient/preparer's name, expiration date and all other pertinent information.

Standards or standard solution concentrations will be validated prior to use. This validation may be re-standardization for acids or bases, response factor comparison, standard curve response, comparison to other standards made at a different time and/or by a different analyst. All standards and standard materials will be checked for signs of deterioration including unusual volume changes (solvent loss), discoloration, formation of precipitates or changes in analyte response. All standards and standard solutions will be properly stored and handled and will be labelled with all appropriate information including compound/solution name, concentration, solvent, expiration date, preparation date and initials of the preparer.

All solvent materials or materials used as a part of a given procedure will also be checked. Each new lot of solvent will be analyzed to insure the absence of interfering constituents.

Instruments will be calibrated in order to assure that method required criteria including sensitivity and detection limits can be met. Each instrument will be calibrated with standard solutions appropriate to the type of instrument and method being performed.

1.5.1 Gas Chromatograph/Mass Spectrometer/Data System

The mass spectrometer (MS) will be tuned prior to each analytical event and verified after twelve hours of continuous operation, using decafluorotriphenylphosphine (DFTPP) or bromofluorobenzene (BFB)(as appropriate) according to EPA procedures. The tuning results will be maintained on file.

Standard curves will be prepared based on the analysis of pure chemicals at known concentrations. At least three levels will be analyzed within the dynamic range of the analytical system.

For volatile organics, surrogates will be used to establish purge and trap efficiency. Quantitation will be accomplished via internal standardization techniques.

For semi-volatile organics, surrogates will be added to the raw sample to assess preparatory recoveries; internal standards will be added to all extracts and calibration solutions immediately before analysis for quantitation.

Surrogates and internal standards added to all samples and standards will be monitored daily for compliance with NYSDEC ASP91 requirements.

1.5.2 Gas Chromatographs

To verify detector sensitivity and chromatographic performance, calibration curves will be generated from the analysis of pure compounds at known concentrations covering the dynamic range within each analytical batch.

Detector response will be compared to a historical file for each compound or class of compounds to validate acceptable performance. If acceptable standard curves are not generated, corrective measures such as replacing glass injector linings, changing septa, changing columns, and "baking" columns and/or detectors will be employed until proper performance has been established.

1.6 TECHNICAL SYSTEM AUDITS

1.6.1 Field Procedures

Technical Systems audits for field sampling and analysis procedures will be conducted by a qualified H&A staff person who is familiar with the procedures being reviewed, but is not directly involved in the investigation. Systems audits will be conducted for groundwater and soil sampling and will occur at the beginning of each sampling task. An audit checklist will be prepared and used for each audit. It contains the items that pertain to the procedure under review such as well purging during the water quality sampling procedures. The checklists along with the auditor's observations and recommendations will be submitted to the QAO and Project Manager.

The following items will comprise the systems audit and will appear on the checklist:

- Field instrument calibration and appropriate documentation.
- Documentation of field log books and sampling data sheets.
- Potential contamination source minimization.
- Proper sample collection, storage, handling and transportation procedures.
- Compliance with chain-of-custody procedures.

1.6.2 Laboratory Procedures

Generally, for any and all measurement systems, the following chronological steps will be performed at one or more levels of the data generation process:

- sample receipt;
- sample logging, inventory, chain-of-custody;
- sample splitting and preservation (if required);

- sample storage;
- sample preparation (extraction and/or digestion);
- sample analysis (standard, QC and samples);
- data calculation;
- data reporting (internal);
- data review/QC logging;
- re-analysis (if and when required) and assessment;
- report preparation;
- report issuance/central file maintenance;
- data storage on magnetic tape
- sample archival and/or disposal.

Two specific analytical groups will be involved in the analytical protocols for this project. These groups will be GC and GC/MS. The specific means by which each group processes the data will be in general agreement with the steps listed above.

Linearity of the standard curve will be verified through regression analysis and final sample concentrations will be entered in a metals data logbook once quality control information, including the results of the SRM's, is deemed acceptable. These results will be transcribed into a final report form for final data/QC review and subsequent issuance.

Gas Chromatography (including separations laboratory)

The sample processing begins in the separations laboratory where a bound notebook will be maintained for the purpose of recording all pertinent information regarding the extraction and clean-up (if required) for the samples. This logbook will contain the following data:

- analyst
- extraction date
- job number
- sample I.D.
- extracted volume or weight of sample

- final concentration volume
- vial number (for extracts produced)
- analysis type (Base/Neutral, Acid Phase, Pesticide)
- glassware set

The above information will be required for either GC or GC/MS analyses. After samples have been prepared for analysis, the GC department will utilize a series of logs, reporting forms and computers to maintain the necessary data. The first will be a bound injection log which contains the following:

- analyst
- injection date
- job number
- sample I.D. vial number
- instrument run number
- method number (specific column and instrument conditions for the particular analyses)
- detector used

On the day that specific analyses will be performed, a minimum of three (3) point standard curve will be generated via both computer assisted raw data plotting and regression analyses, using the areas as integrated by the gas chromatograph. The integrations and the standard curves will be reviewed by the analyst for consistency and accuracy, and if found acceptable, the sample concentrations will be calculated using standardized internal report forms. These forms will also contain information relative to field blanks, method blanks and solvent blanks associated with the analysis. Information data required for these calculations will be acquired from both the separations and the injection logbooks.

All chromatographs, standards information, QA/QC results, copies of separations and injection logbook pages and other project specific information will be maintained in separate files and used for data calculation and final report preparation.

Gas Chromatography/Mass Spectrometry (GC/MS)

A bound injection log will be maintained for each GC/MS unit and contains the following information:

- analysis date/time

- analyst
- computer file number
- sample I.D. and extract vial number
- job number
- injected volume
- extracted volume
- final volume and dilution
- column number
- injection port temperature
- GC temperature program
- run time
- column pressure
- multiplier setting
- internal standard retention time and % recovery
- surrogate retention time and % recovery

On each day of analysis, a standard curve will be generated to determine calibration factors. Samples will be searched for the characteristic ions of each compound of interest (as listed in the method) and if the ion's retention time and ratio meet the established NYSDEC ASP91 criteria, the compound will be qualitatively identified. The analyte concentration will be calculated from the primary ion area. The same type of procedure will be used for the evaluation of field blanks, method blanks and solvent blanks.

The data will be reviewed relative to the appropriate quality control results for that analytical batch. Internal reporting forms will be used for precision and accuracy data from the GC/MS analysis of volatiles and/or base neutral, acid phenolic or pesticide/PCB determinations. Upon approval by the GC/MS group supervisor, the project sample analytical data will be transferred to the report preparation group for final review and report issuance.

1.7 PERFORMANCE AND SYSTEM AUDITS

By NEIC definition, an audit is a systematic check to determine the quality of operation of some function or activity. Audits are further defined as being of two basic types: performance and system audits.

A performance audit is one in which quantitative or qualitative data are independently obtained for comparison with routinely obtained data from a measurement system. Performance audits to be completed by the contract laboratory will incorporate a number of mechanisms including the analyses of performance evaluation samples, U.S. Environmental Protection Agency, NYSDOH, as well as the analysis of commercially available check samples and/or the EPA's quality assurance check sample program. Additionally, the contract laboratory QA Officer will submit blind performance evaluation samples to the laboratory on a semi-annual basis. The routine use of available and applicable SRM's also provides for a continuous performance audit.

System audits, as opposed to performance audits, are strictly qualitative and consist of an on-site review of a laboratory's quality assurance system and physical facilities for calibration and measurement. System audits are routinely performed by NYSDEC Bureau of Technical Services (BTS) personnel as an element of certification programs. Additionally, detailed internal audits will also be performed on a semi-annual basis by the contract laboratory Quality Assurance Officer.

At the conclusion of internal or external system audits, reports will be provided to the contract laboratory's operating divisions for appropriate comment and remedial/corrective action where necessary. Written response to internal as well as external audits will be required. Records of audits and corrective actions will be maintained by the Contract Laboratory QA Officer.

1.8 PREVENTATIVE MAINTENANCE

1.8.1 Field Procedures

The field equipment preventive maintenance program helps to ensure the effective completion of the sampling effort and is designed to minimize equipment down time. Program implementation is concentrated in three areas:

- Maintenance responsibilities.
- Maintenance schedules.
- Inventory of critical spare parts and equipment.

The maintenance responsibilities for field equipment will be assigned to the task leaders in charge of specific field operations. Field personnel will be responsible for daily field checks and calibrations and for reporting any problems with the equipment. The maintenance schedule will follow the manufacturer's recommendations. In addition, the field personnel will be responsible for determining that critical spare parts are included with the field equipment. An adequate inventory of spare parts will be maintained to

minimize down time. The inventory will primarily contain parts that are subject to frequent failure, have limited useful lifetimes and/or can't be obtained in a timely manner.

1.8.2 Laboratory Procedures

All analytical equipment at the contract laboratory will be covered by some type of maintenance contract. The degree and extent of outside (contracted) routine and/or preventative maintenance assistance will be a function of the complexity of the equipment, and the contract laboratory expertise relative to repair and/or maintenance of the instrumentation.

Annual preventative maintenance service visits will involve cleaning, adjusting, inspecting and testing procedures designed to deduce product failure and/or extend useful product life. Between visits, routine operator maintenance and cleaning will be performed according to manufacturer's specifications.

1.9 DATA ASSESSMENT PROCEDURES

1.9.2 Field Procedures

In order to maintain data quality, standard operating procedures for field procedures have been developed and are contained in the attached appendices.

Field-generated information such as permeability testing data, soil and rock conditions, logs and field analysis forms will be reviewed for validity. The reviewing will include field logbooks/forms, data entry and calculation checks.

1.9.2 Laboratory Procedures

Quality Assurance (QA) procedures are based on the specific methodology utilized for sample analysis. Each analytical procedure includes determination/maintenance of standard response and linearity, instrument tuning, internal standard responses, surrogate recoveries in blanks and samples, spike recoveries and replicate precision. Many of the QA criteria are method based and decisions as to corrective action in the form of re-analysis will be determined by the analyst. Surrogate, internal standard and spike recoveries will be plotted on control charts so that trends in data quality can also be monitored so that appropriate and timely corrective action can be taken.

The contract laboratory's quality assurance/quality control program will include the following:

- Precision, in terms of replicate percent difference (RPD), will be determined by replicate sample analysis at a frequency of one per sample set or one sample in ten (10%) whichever is greater or at the appropriate frequency as defined by the method. RPD is defined as the absolute difference of replicate measurements divided by the mean of these analyses normalized to percentage.

- Accuracy, in terms of percent recovery (recovery of known constituent additions or surrogate recoveries), will be determined by the analysis of spiked and unspiked samples. The objective is to spike with such a quantity as to raise the sample concentration to 75% of the working analytical range. For large on-going projects, it will often times be most advantageous to perform the spiking of a random sample after the initial analysis has been completed. Alternatively and specific to certain methods, matrix spike and matrix spike duplicates are used for expression of accuracy. Recovery data can be gathered in two (2) forms: relative recovery and absolute recovery. Relative recovery is based on a spike being added to project samples while absolute recovery is based upon the SRM's or spiking of laboratory water (matrix spike blank). The frequency of spiking for both absolute and/or relative recoveries will be one per sample set or one sample in ten (10%) whichever is greater. The selection of relative recovery or absolute recovery will be determined by the volume of sample available for analysis. Generally, if greater than ten samples have been received, a relative and an absolute recovery will be measured.
- With each set of project samples a method blank will be prepared and analyzed. If field blanks are received, this blank will be processed and reported as a project sample. Trip blanks, if received will also be analyzed, processed and reported as a project sample. Trip blanks will be prepared and analyzed with all sample collections for volatile organic analysis. Additionally, holding blanks for volatile analysis and solvent blanks will be prepared as required. Solvent blanks are analyzed based upon method blank results and/or changes in solvent suppliers/lots. Unprocessed solvent blanks will be continually analyzed on the GC and or GC/MS as a routine control measure for these instruments.
- Standard Reference Materials (SRM's) will be used for each analysis. Sources of SRM's include the U.S. Environmental Protection Agency, commercially available material from CRADA certified vendors and/or laboratory produced solutions. SRM's, when available and appropriate, will be processed and analyzed on a frequency of one per set of samples.
- Stock and working standard solutions and separate spiking solutions will be prepared from materials supplied by the U.S. Environmental Protection Agency or purchased from commercially available sources. Standard curves will be generated consistent with methodology. Standard curves will be produced once per day and/or verified by re-analysis of mid-range standards at least every tenth sample. Standard curves for conventional parameters (i.e. cyanide) will not be generated daily but will be verified on a daily basis. Standard curves will also be reviewed for consistency to help identify problems that could be associated with the applicable instruments and/or the standard solutions.

1.10 INVESTIGATIVE CORRECTIVE ACTION

1.10.1 Field Procedures

Corrective action is intended to correct problems that arise when sampling or measurement procedures and environmental data do not meet accepted performance

criteria. The Project Task & Field Manager, Task Coordinators, and Quality Assurance Officer will be responsible for ensuring the quality of the sampling procedures and environmental data and initiating corrective action when appropriate.

The corrective action procedures will be as follows:

- Identify/define the problem.
- Assign responsibility for investigating the problem.
- Investigate/determine the cause of the problem.
- Determine an appropriate corrective action to eliminate the problem.
- Implement the corrective action.
- Evaluate the effectiveness of the corrective action.
- Verify that the corrective action has eliminated the problem.

The above procedures will be implemented through the use of the Systems Audit as described previously or upon any team member becoming aware of the potential need for corrective action. Any member of the project may initiate corrective action procedures by reporting the nature of the suspected problem to the Project Manager or QAO. The Project Manager will begin corrective action by relating the problem to appropriate personnel. A corrective action alternative will be selected, implemented and verified through the use of technical audits.

1.10.2 Laboratory Procedures

Within a laboratory QA/QC program, a percentage of data will not meet all of the established criteria. The following paragraphs defines the corrective action decision process relative to possible non-compliant events within the contract laboratory QA/QC program.

- a) If precision, accuracy and SRM (if available) data are all within the established warning limits; proceed with final issuance of data report including all QA/QC results.
- b) If precision, accuracy and SRM (if available) are within control limits but one or all of these parameters exceed the warning limits, the source(s) of bias/error needs to be evaluated, but proceed with final issuance of data report including all QA/QC results.

Source of error/bias may be found in the following:

- calculation errors

- transcription errors
- sample matrix (i.e., high suspended solids in water sample, oily sediment, etc.)
- sample homogeneity
- level of contaminant measured (validity of the precision measurement is a factor of concentration)
- analyst error (warning control limits exceeded for one analyst more frequently than others)
- appropriateness of method(s) based upon sample type (wastewater as opposed to drinking water)

c) If precision, accuracy and/or SRM (if available) are out of control, one of the following approaches to the problem can be used:

- SRM out-of-control whether or not precision or accuracy are in control; method based errors are suggested and all data is suspect. If SRM is verified as out-of-control (i.e., standards are checked, etc.) all samples will be re-analyzed or data reported as out-of-control, if no additional sample available.
- SRM (if available) is in control but absolute recovery is out of control; method based error is suspected. If standards and spiking solutions are verified to be accurate as independent solutions, all data is suspect unless reprocessing and re-analysis of absolute recovery sample can be completed to prove only random error. If systematic error (constant out-of-control absolute recovery) is found, all samples will be re-analyzed after corrective action has been taken.
- SRM (if available), absolute recovery and precision are in control but relative recovery is out of control; matrix problems are likely. Proceed to issue data report with appropriate qualifications as to possible matrix effects.
- SRM (if available), absolute recovery and relative recovery are in control but precision is out-of-control; matrix problem likely in the form of sample heterogeneity. If sample appears homogeneous, the sample will be re-analyzed; if data is still out-of-control, data report will be issued with qualifications. If, on the other hand, data is in control, analyst error will be suspected. Each data point from the original sample set will be appropriately qualified.

- SRM and absolute recovery are under control but both relative recovery and precision are out-of-control; matrix effects, sample homogeneity problems and/or analyst error will be suspected. If re-analysis of a well-mixed homogeneous sample by different analyst(s) is still out-of-control, the data will be with a qualifier relative to matrix effects. If upon re-analysis relative recovery is within control limits but precision is still uncontrolled, the data report will be issued with advise of potential errors relative to heterogeneity of sample. If, in the last possible case, re-analysis indicates adequate precision but uncontrolled relative recovery, the final data report will be issued with advise of possible sample matrix effects on this data.

- d) Precision limits will be defined by a relative percent difference which, when exceeded, indicates unacceptable analytical performance. Accuracy limits will be expressed in percent recovery of spiked material. A recovery below or above the set criteria will indicate a need for corrective action.

If any analysis has been deemed "out-of-control" corrective action will be taken to insure continued data quality.

The following presents a number of corrective actions which may be employed, depending upon the particular situations.

- Calculations will be rechecked.
- Sampling handling, i.e., digestion, concentration and or extraction logs will be checked for discrepancies in sample handling.
- The target analyte concentration will be reviewed to determine if it has severely influenced the reliability of the precision or recovery calculations.
- The instrument and method performance will be verified by inspecting data on standard reference materials (SRMs) processed in the same data set.
- Quality control data on the other samples in the data set, including surrogate recovery, internal standards, etc., will be reviewed to determine if the problem was method related or sample related.
- If original sample is available, the sample will be assessed for homogeneity.
- If sample is unavailable and no explanation for poor quality control results can be determined, the Project Quality Assurance Officer will be notified and additional sample may be obtained. If additional sample is unavailable, the results will be issued with a qualification as to their accuracy.

1.11 QUALITY ASSURANCE (QA) REPORTS TO MANAGEMENT

Critically important to the successful implementation of the QA Plan is the reporting system which provides the means by which the program can be reviewed, problems identified and programmatic changes made to remediate or improve the plan.

Quality Assurance reports to management take a number of forms as follows:

- Audit reports, internal and external audits with responses
- Performance evaluation sample results: internal and external sources
- Daily QA/QC exception reports corrective actions
- QA charts

QA/QC corrective action reports will be prepared by the Contract laboratory QAO and presented to the contract laboratory management personnel so that performance criteria can be monitored for all analyses from each analytical department. The updated trend/QA charts prepared by the contract laboratory QA/QC personnel will also be distributed at least monthly and reviewed by various levels of the contract laboratory management as well as the Contract laboratory Officer.

VBD:gmc
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APPENDIX B
Health & Safety Plan



ENVIRONMENTAL HEALTH AND SAFETY REQUIREMENTS

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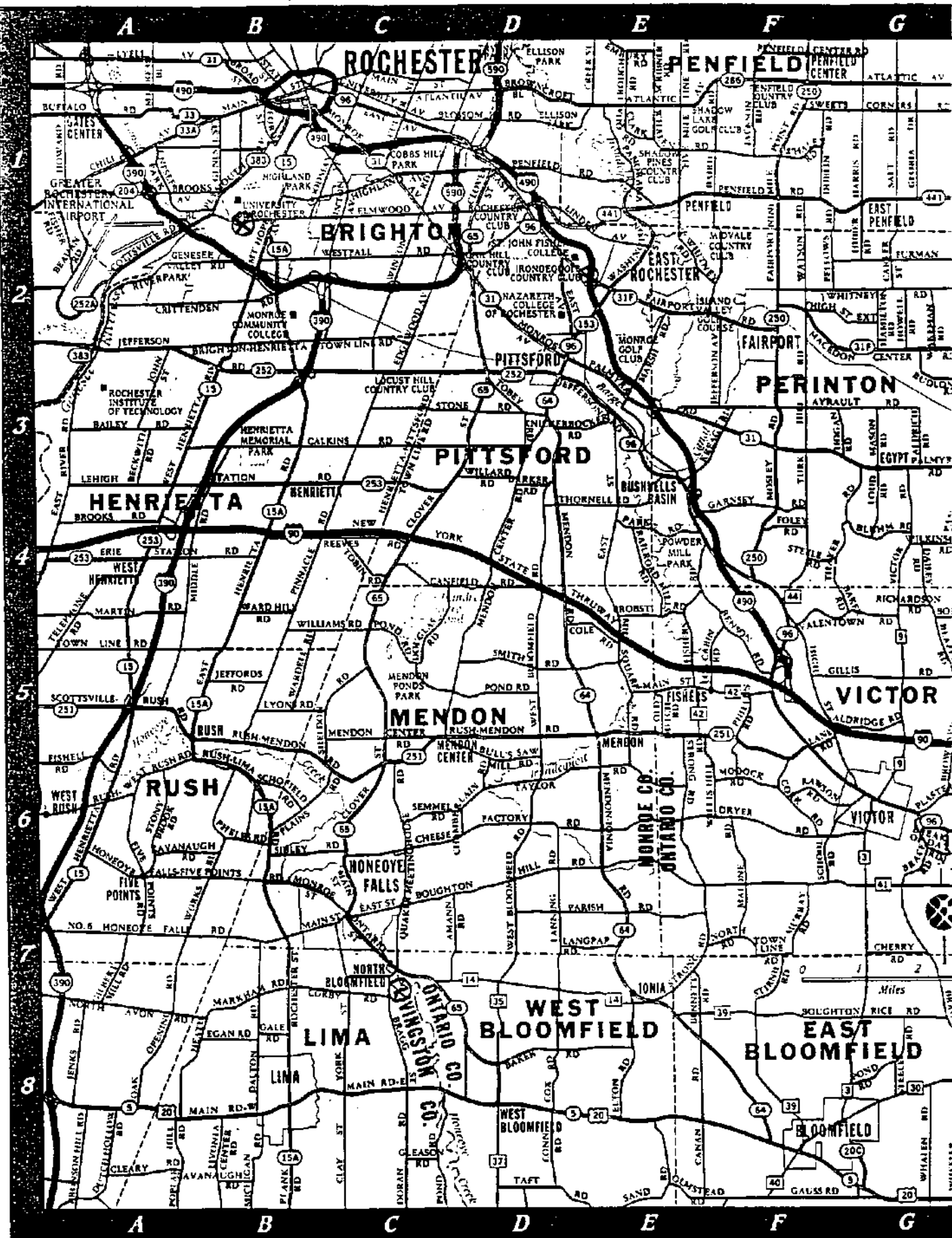
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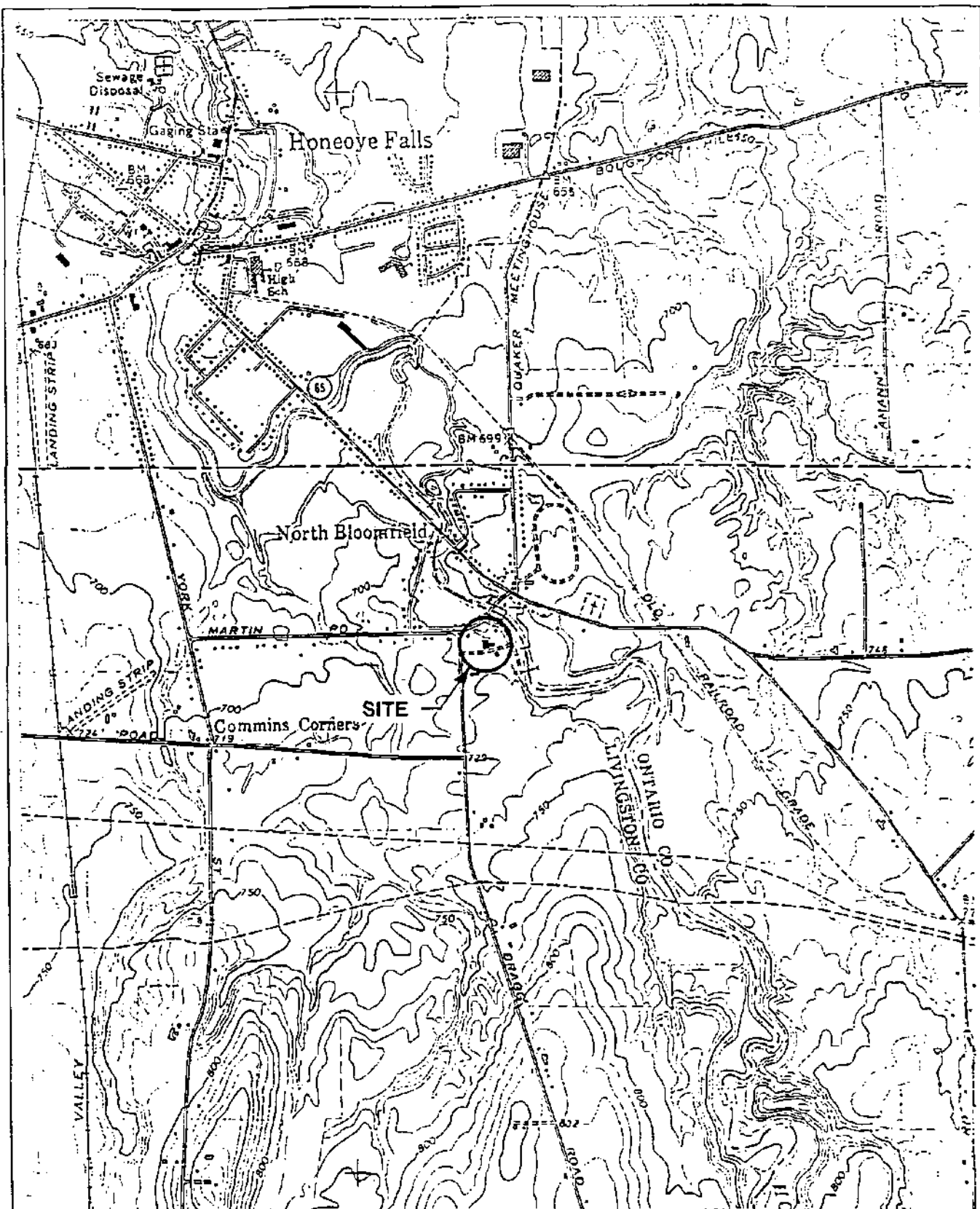
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EMERGENCY PHONE NUMBERS

Livingston County Emergency Services	911
Ambulance Service	911
Fire Department	911
Police Department	911
H&A of New York Project Manager Vincent Dick	232-7386
H&A of New York Health & Safety Representative Margaret Bonn	232-7386
Kaddis Manufacturing Products Project Manager Ronald Iannucci	464-9000
Enarc-O Machine Products Health & Safety Representative Bruce Whitmore	624-3070
Occupation Health Physician Dr. Kenneth Dodgeson Strong Memorial Hospital 601 Elmwood Avenue Rochester, New York	275-7795
CHEMTREC (CHEMICAL TRANSPORTATION EMERGENCY CENTER)	1-800-424-9300
Hospital - Strong Memorial Hospital 601 Elmwood Ave. Rochester, New York Emergency Dept. (map next page)	275-4511
Poison Control Strong Memorial Hospital	275-5151
New York State Department of Health David Napier	423-8071
Livingston County Health Department Ralph Van Houten	(1) 658-2866
New York State Department of Environmental Conservation Jim Craft - Region 8 Dave Chiusano - Albany Inactive Haz. Waste Site Remedial Program	226-2466 (518) 457-3373 (800) 342-9296

Route to Strong Memorial Hospital





LATITUDE: 42° 56' 13" N LONGITUDE: 77° 34' 33" W



QUADRANGLE LOCATION

U.S.G.S. QUADRANGLE: HONEOYE FALLS, N.Y.

MAKEPEACE

H & A OF NEW YORK



Geotechnical Engineers & Environmental Consultants

ENARC-O MACHINE PRODUCTS
LIMA, NEW YORK

PROJECT LOCUS

SCALE: 1 IN. = 2000 FT.

OCTOBER 1992

TASK MODIFICATIONS AND PLAN APPROVAL

LIST BELOW EACH MODIFICATION TO THIS PLAN AND DATE MODIFIED

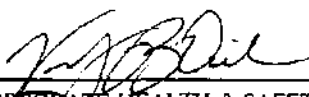
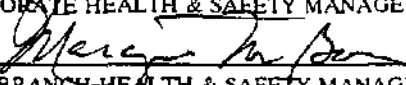
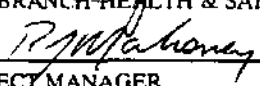
1.

2.

THE FOLLOWING SIGNATURES CONSTITUTE APPROVAL OF THIS HEALTH & SAFETY PLAN. THIS PLAN SHOULD NOT BE DEVIATED FROM WITHOUT PRIOR WRITTEN OR VERBAL APPROVAL.

THIS PLAN APPROVED BY:

REVISIONS:


CORPORATE HEALTH & SAFETY MANAGER

H&A BRANCH HEALTH & SAFETY MANAGER

PROJECT MANAGER

1/11/94
DATE
1/11/94
DATE
1/4/94
DATE

<u> </u>	<u> </u>
INITIAL/DATE	INITIAL/DATE
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INITIAL/DATE	INITIAL/DATE
<u> </u>	<u> </u>
INITIAL/DATE	INITIAL/DATE

HEALTH AND SAFETY BRIEFING:

I HAVE READ, UNDERSTOOD AND AGREE TO FOLLOW THIS HEALTH & SAFETY PLAN.

REVISIONS:

<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
NAME	SIGNATURE	DATE	INITIAL/DATE	INITIAL/DATE
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NAME	SIGNATURE	DATE	INITIAL/DATE	INITIAL/DATE

I. INTRODUCTION

This document presents the Enarc-O Machine Products Environmental Health and Safety Plan, to be followed by authorized contractors, H&A of New York, other persons engaged in field activities associated with environmental projects conducted at Enarc-O Machine Products. The scope of work covered by this Health and Safety Plan (HSP) includes, but is not limited to, such projects as: soil vapor sampling, groundwater investigations, soil characterization studies, excavation projects, soil and groundwater remediation, and tank closure and replacement operations.

The provisions of this HSP are mandatory for all personnel assigned to the activities described in the work plan for this project. The Health and Safety procedures contained in this document have been developed for the activities associated with this project and will be periodically reviewed and revised as necessary to keep them current and technically correct.

The requirements set forth in this HSP are minimum health and safety protocols and duties to be adhered to and enforced during environmental investigation activities described in the following sections.

Plan Organization

Occupational Safety and Health Administration (OSHA) regulations under 29 CFR 1910.120 require that a project specific health and safety plan be developed for RCRA and CERCLA related hazardous materials/waste investigations and activities. This plan has been developed to meet these requirements and related OSHA criteria such as, but not limited to, respiratory protection, eye and hearing protection, trenching/excavation safety and confined space entry. This plan includes hazard evaluation, engineering controls, administrative controls, personal protective equipment (PPE), monitoring procedures, decontamination procedures, and emergency response provisions to meet the OSHA requirements above.

The plan is organized into two parts. The first part (Section II) contains task-specific health and safety procedures. It is intended to be updated and revised as new tasks are added to the project or new information becomes available which modifies task-specific health & safety needs. The second part (Section III) describes general health and safety procedures and information that applies to all tasks. Personal exposure limits (PELs), odor thresholds and hazardous compound physical properties appear in Table 1. Monitoring instrument action levels and appropriate level of protection responses appear in Table 2. **EMERGENCY CONTACTS AND PHONE NUMBERS ARE LISTED IMMEDIATELY FOLLOWING THE TABLE OF CONTENTS.**

II. TASK SPECIFIC HEALTH & SAFETY PROCEDURES

2.1 MASTER TASK LIST

This section describes health & safety procedures specific to individual tasks associated with the project. Additional task description sheets shall be developed and added to this section as necessary.

A master list of the tasks included in this section is provided below.

Task Name

- 1 Soil gas survey inside facility and at outside locations
- 2 Installation of monitoring wells
- 3 Hydrogeologic testing, sampling of monitoring and resident's wells, and soil
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____
- 9 _____
- 10 _____
- 11 _____
- 12 _____
- 13 _____
- 14 _____
- 15 _____

2.2 TASK-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

☒ Initial

☐ Revision

Task Name(s)*: Soil gas survey

Task Description: Source area soil gas survey inside the building and immediately adjacent to the building. Hand-operated impact drill used to make holes through concrete. Sampling depths are 2 and 5 ft. Second phase of soil gas survey will define lateral and vertical extent of contamination. Soil vapor samples will be obtained from borings advanced using a hollow stem auger drilling rig.

Duration: 1 week

Media Affected: ☒ air ☒ soil ☐ surface water ☐ waste ☒ groundwater

Area Within Site Where Task(s) to be performed: Inside building near degreaser, adjacent to building near previous location of underground storage tank, an area east of the facility building and an area adjacent to MW2 and MW3.

2.2.1 HAZARD EVALUATION (check all that apply)

CHEMICAL HAZARDS:**

CHARACTERISTICS:

- ☐ FLAMMABLE/COMBUSTIBLE
- ☐ CORROSIVE
- ☐ REACTIVE
- ☒ TOXIC
- ☒ VOLATILE
- ☐ EXPLOSIVE
- ☐ RADIOACTIVE
- ☐ UNKNOWN
- ☐ OTHER _____

TYPE:

- ☐ SOLID/DUST
- ☐ LIQUID/MIST
- ☐ SLUDGE
- ☒ GAS/VAPOR/FUMES
- ☒ ORGANIC
- ☐ HEAVY METAL
- ☐ INORGANIC
- ☐ PESTICIDE
- ☐ PCB
- ☐ ACID
- ☐ BASE
- ☒ CARCINOGEN
- ☐ FUEL/PETROLEUM PRODUCT
- ☐ OTHER _____

PHYSICAL HAZARDS:

- ☐ ACTIVE CONSTRUCTION SITE
- ☐ CONFINED SPACE ENTRY
- ☐ ELECTRICAL EQUIPMENT
- ☐ EXCAVATION/TRENCHING
- ☒ UNDERGROUND UTILITIES
- ☐ OVERHEAD UTILITIES
- ☐ OPEN WATER
- ☒ TEMPERATURE EXTREMES
- ☒ NOISE
- ☐ ASBESTOS
- ☐ OTHER _____

2.2.2 PROTECTIVE AND CONTROL MEASURES

ENGINEERING CONTROLS:

- ☐ VENTILATE AREA
- ☐ DISCONNECT/CLEANOUT LINES
- ☐ SLOPE EXCAVATION
- ☐ SHORE EXCAVATION
- ☒ ELIMINATE IGNITION SOURCES
- ☒ TAPE OFF AREA
- ☐ POST WORK/WARNING SIGNS
- ☐ PLASTIC SHEETING IN AREA
- ☐ DESIGNATE NO SMOKING AREA
- ☐ ESCAPE LADDER
- ☒ UTILITY CLEARANCES OBTAINED (DIG SAFE CONTACTED)
- ☒ PRIVATE UTILITIES CLEARED
- ☐ LINES SHIELDED/DE-ENERGIZED
- ☐ LOCKED & TAGGED OUT
- ☐ LIFE JACKETS/BARRICADES NEAR WATER
- ☐ HEAT OR AIR CONDITIONING SOURCE FOR TEMPERATURE EXTREMES
- ☐ OTHER _____

LEVEL OF PROTECTION:

- ☒ MODIFIED D (HOW MODIFIED) chemical resistant gloves
- ☐ LEVEL D tyvek coverall, resp. avail.
- ☐ MODIFIED C (HOW MODIFIED) _____
- ☐ LEVEL C _____
- ☐ MODIFIED B (HOW MODIFIED) _____
- ☐ LEVEL B _____

PERSONAL PROTECTIVE EQUIPMENT:

- ☒ SAFETY GLASSES
- ☐ EYE/FACE SHIELD
- ☒ GLOVES (CIRCLE TYPES) INNER LATEX INNER COTTON, BUTYL, NEOPRENE, BUTYL, PVC/NITRILE, SILVER SHIELD, OTHER _____
- ☐ DUCT TAPE
- ☒ EAR PROTECTION (CIRCLE TYPE) EAR PLUGS, EAR PHONES
- ☒ BOOTS (CIRCLE TYPE) STEEL TOE, DISPOSABLE COVERS, LATEX, WADERS, OTHER _____
- ☒ TYVEK COVERALL
- ☐ SARANEX COVERALL
- ☐ HARD HAT
- ☒ RESPIRATOR (INDICATE TYPE OF CARTRIDGE) GMCH
- ☒ FIRE EXTINGUISHER
- ☒ FIRST AID KIT
- ☐ LOUD SIGNALING DEVICE (CIRCLE TYPE) AIR HORN, WHISTLE
- ☐ FLASHLIGHT
- ☐ SAFETY SHOWER/EYE WASH
- ☐ WALKIE-TALKIE
- ☐ OTHER: _____

2.2.3 ENVIRONMENTAL MONITORING

Equipment:

- ☐ HNU (CIRCLE ONE) 10.2 EV 11.7 EV
- ☐ PHOTOVAC MICROTOP (10.6 EV)
- ☒ OVA
- ☐ EXPLOSIMETER/O₂ METER
- ☐ RADIATION METER
- ☐ HYDROGEN CYANIDE METER
- ☒ PHOTOVAC GC
- ☒ DRAEGER TUBE Vinyl Chloride
- ☐ RESPIRABLE DUST MONITOR
- ☐ OTHER _____

Action Thresholds*

per table 2

per table 2

1 ppm

Level of Protection

D → C

D → C

D → C

Frequency

- ☒ BREATHING ZONE
- ☒ PERIMETER

every 15 min. - Drager tubes for initial exploration screening

every 2 hours at exclusion zone perimeter in downwind direction.

* List only those differing from or in addition to Table 2.

2.2.4 DECONTAMINATION EQUIPMENT AND PROCEDURES

DECONTAMINATION EQUIPMENT:

☒	TAP WATER
☐	DISTILLED WATER
☐	HEXANE
☐	METHANOL
☐	ACETONE
☒	ALCONOX
☒	BRUSHES
☒	PLASTIC SHEETING
☒	DISPOSAL BAGS
☐	WASH TUBS (HOW MANY) _____
☐	PAPER TOWELING
☒	STEAM CLEANER

SITE CONTROL/DECONTAMINATION PROCEDURES:

DISTINGUISHING FEATURES WHICH DELINEATE ZONES AND APPROXIMATE DIMENSIONS IN FEET:

EXCLUSION ZONE - 25 foot radius from work zone, delineated by red caution tape.

CONTAMINATION REDUCTION ZONE - 25 ft. radius from exclusion zone, mark with yellow caution tape.

SUPPORT ZONE -

DECONTAMINATION PROCEDURES WHICH ARE TO OCCUR IN:

EXCLUSION ZONE -

CONTAMINATION REDUCTION ZONE - Wash and/or decontaminate monitoring equipment, drilling equipment and PPE. Remove PPE and dispose in disposal bags.

SUPPORT ZONE -

2.2.5 EMERGENCY RESPONSE

If any organic concentrations greater than 5 ppm over background, attributed directly to drilling activities conducted at the Enarc-O site, are identified 200 feet downwind or half the distance to the nearest residential or commercial property, whichever is less, all drilling must be halted.

SEE EMERGENCY CONTACTS LISTED IMMEDIATELY FOLLOWING THE TABLE OF CONTENTS.

2.2 TASK-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

☒ Initial

☐ Revision

Task Name(s)*: Installation of Monitoring Wells

Task Description: Two bedrock and one overburden monitoring wells will be installed.

Duration: 1 week

Media Affected: ☒ air ☒ soil ☐ surface water ☐ waste ☒ groundwater

Area Within Site Where Task(s) to be performed: One bedrock well and the overburden will be installed in the vicinity of former TCA underground tank. The other bedrock well will be installed south of facility near the entrance to the storage building.

2.2.1 HAZARD EVALUATION (check all that apply)

CHEMICAL HAZARDS:**

CHARACTERISTICS:

- ☐ FLAMMABLE/COMBUSTIBLE
- ☐ CORROSIVE
- ☐ REACTIVE
- ☒ TOXIC
- ☒ VOLATILE
- ☐ EXPLOSIVE
- ☐ RADIOACTIVE
- ☐ UNKNOWN
- ☐ OTHER _____

TYPE:

- ☐ SOLID/DUST
- ☐ LIQUID/MIST
- ☐ SLUDGE
- ☒ GAS/VAPOR/FUMES
- ☒ ORGANIC
- ☐ HEAVY METAL
- ☐ INORGANIC
- ☐ PESTICIDE
- ☐ PCB
- ☐ ACID
- ☐ BASE
- ☒ CARCINOGEN
- ☐ FUEL/PETROLEUM PRODUCT
- ☐ OTHER _____

PHYSICAL HAZARDS:

- ☐ ACTIVE CONSTRUCTION SITE
- ☐ CONFINED SPACE ENTRY
- ☐ ELECTRICAL EQUIPMENT
- ☐ EXCAVATION/TRENCHING
- ☒ UNDERGROUND UTILITIES
- ☐ OVERHEAD UTILITIES
- ☐ OPEN WATER
- ☒ TEMPERATURE EXTREMES
- ☒ NOISE
- ☐ ASBESTOS
- ☐ OTHER _____

2.2.2 PROTECTIVE AND CONTROL MEASURES

ENGINEERING CONTROLS:

- ☐ VENTILATE AREA
- ☐ DISCONNECT/CLEANOUT LINES
- ☐ SLOPE EXCAVATION
- ☐ SHORE EXCAVATION
- ☒ ELIMINATE IGNITION SOURCES
- ☒ TAPE OFF AREA
- ☐ POST WORK/WARNING SIGNS
- ☐ PLASTIC SHEETING IN AREA
- ☐ DESIGNATE NO SMOKING AREA
- ☐ ESCAPE LADDER
- ☒ UTILITY CLEARANCES OBTAINED (DIG SAFE CONTACTED)
- ☒ PRIVATE UTILITIES CLEARED
- ☐ LINES SHIELDED/DE-ENERGIZED
- ☐ LOCKED & TAGGED OUT
- ☐ LIFE JACKETS/BARRICADES NEAR WATER
- ☐ HEAT OR AIR CONDITIONING SOURCE FOR TEMPERATURE EXTREMES
- ☐ OTHER _____

LEVEL OF PROTECTION:

- ☒ MODIFIED D (HOW MODIFIED) chemical resistant gloves
- ☐ LEVEL D tyvek coverall, resp. avail.
- ☐ MODIFIED C (HOW MODIFIED) _____
- ☐ LEVEL C
- ☐ MODIFIED B (HOW MODIFIED) _____
- ☐ LEVEL B

PERSONAL PROTECTIVE EQUIPMENT:

- ☒ SAFETY GLASSES
- ☐ EYE/FACE SHIELD
- ☒ GLOVES (CIRCLE TYPES) INNER
- ☐ LATEX INNER COTTON, BUTYL, NEOPRENE, BUTYL, PVC NITRILE, SILVER SHIELD, OTHER _____
- ☐ DUCT TAPE
- ☒ EAR PROTECTION (CIRCLE TYPE)
- ☐ EAR PLUGS, EAR PHONES
- ☒ BOOTS (CIRCLE TYPE) STEEL TOE, DISPOSABLE COVERS, LATEX, WADERS, OTHER _____
- ☒ TYVEK COVERALL
- ☐ SARANEX COVERALL
- ☐ HARD HAT
- ☒ RESPIRATOR (INDICATE TYPE OF CARTRIDGE) GMC-H
- ☒ FIRE EXTINGUISHER
- ☒ FIRST AID KIT
- ☐ LOUD SIGNALING DEVICE (CIRCLE TYPE) AIR HORN, WHISTLE
- ☐ FLASHLIGHT
- ☐ SAFETY SHOWER/EYE WASH
- ☐ WALKIE-TALKIE
- ☐ OTHER: _____

2.2.3 ENVIRONMENTAL MONITORING

Equipment:

- ☒ HNU (CIRCLE ONE) 10.2 EV 11.7 EV
- ☐ PHOTOVAC MICROTOP (10.6 EV)
- ☒ OVA
- ☐ EXPLOSIOMETER/O₂ METER
- ☐ RADIATION METER
- ☐ HYDROGEN CYANIDE METER
- ☐ PHOTOVAC GC
- ☒ DRAEGER TUBE Vinyl Chloride
- ☐ RESPIRABLE DUST MONITOR
- ☐ OTHER _____

Action Thresholds*

- per table 2
- per table 2
- per table 2
- per table 2
- per table 2
- per table 2
- per table 2
- per table 2
- per table 2
- per table 2

Level of Protection

- D → C
- D → C
- D → C
- D → C
- D → C
- D → C
- D → C
- D → C
- D → C
- D → C

Frequency

- ☒ BREATHING ZONE every 15 min. • Drager tubes for initial screening of exploration
- ☒ PERIMETER every 2 hours downwind at exclusion zone perimeter.

2.2.4 DECONTAMINATION EQUIPMENT AND PROCEDURES

DECONTAMINATION EQUIPMENT:

/	TAP WATER
—	DISTILLED WATER
—	HEXANE
—	METHANOL
—	ACETONE
/	ALCONOX
/	BRUSHES
/	PLASTIC SHEETING
/	DISPOSAL BAGS
—	WASH TUBS (HOW MANY) _____
—	PAPER TOWELING
/	STEAM CLEANER

SITE CONTROL/DECONTAMINATION PROCEDURES:

DISTINGUISHING FEATURES WHICH DELINEATE ZONES AND APPROXIMATE DIMENSIONS IN FEET:

EXCLUSION ZONE - 25 foot radius from work zone, delineated by red caution tape.

CONTAMINATION REDUCTION ZONE - 25 ft. radius from exclusion zone, mark with yellow caution tape.

SUPPORT ZONE -

DECONTAMINATION PROCEDURES WHICH ARE TO OCCUR IN:

EXCLUSION ZONE -

CONTAMINATION REDUCTION ZONE - Wash and/or decontaminate monitoring equipment, drilling equipment and PPE. Remove PPE and dispose in disposal bags.

SUPPORT ZONE -

2.2.5 EMERGENCY RESPONSE

If any organic concentrations greater than 5 ppm over background, attributed directly to drilling activities conducted at the Enarc-O site, are identified 200 feet downwind or half the distance to the nearest residential or commercial property, whichever is less, all drilling must be halted.

SEE EMERGENCY CONTACTS LISTED IMMEDIATELY FOLLOWING THE TABLE OF CONTENTS.

2.2 TASK-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

☒ Initial

☐ Revision

Task Name(s)*: Hydrogeologic testing, and sampling of monitoring and resident's wells, soil sampling.

Task Description: Perform hydrogeologic testing at newly and previously installed wells to include: rising head permeability testing, pumping tests, and measurement of water levels. Sample monitoring wells at the facility and selected residential wells for groundwater analysis.

Duration: 1/2 week

Media Affected: ☐ air ☐ soil ☐ surface water ☐ waste ☒ groundwater

Area Within Site Where Task(s) to be performed: New and existing monitoring wells, the facility supply well, and residential wells.

2.2.1 HAZARD EVALUATION (check all that apply)

CHEMICAL HAZARDS:**

CHARACTERISTICS:

- ☐ FLAMMABLE/COMBUSTIBLE
- ☐ CORROSIVE
- ☐ REACTIVE
- ☒ TOXIC
- ☒ VOLATILE
- ☐ EXPLOSIVE
- ☐ RADIOACTIVE
- ☐ UNKNOWN
- ☐ OTHER _____

TYPE:

- ☐ SOLID/DUST
- ☐ LIQUID/MIST
- ☐ SLUDGE
- ☒ GAS/VAPOR/FUMES
- ☒ ORGANIC
- ☐ HEAVY METAL
- ☐ INORGANIC
- ☐ PESTICIDE
- ☐ PCB
- ☐ ACID
- ☐ BASE
- ☒ CARCINOGEN
- ☐ FUEL/PETROLEUM PRODUCT
- ☐ OTHER _____

PHYSICAL HAZARDS:

- ☐ ACTIVE CONSTRUCTION SITE
- ☐ CONFINED SPACE ENTRY
- ☒ ELECTRICAL EQUIPMENT (1)
- ☐ EXCAVATION/TRENCHING
- ☐ UNDERGROUND UTILITIES
- ☐ OVERHEAD UTILITIES
- ☐ OPEN WATER
- ☒ TEMPERATURE EXTREMES
- ☐ NOISE
- ☐ ASBESTOS
- ☒ OTHER hazards at residential property (animals, tripping hazards)

(1) Where residential wells are equipped with submersible pumps.

2.2.2 PROTECTIVE AND CONTROL MEASURES

ENGINEERING CONTROLS:

- ☐ VENTILATE AREA
- ☐ DISCONNECT/CLEANOUT LINES
- ☐ SLOPE EXCAVATION
- ☐ SHORE EXCAVATION
- ☐ ELIMINATE IGNITION SOURCES
- ☐ TAPE OFF AREA
- ☐ POST WORK/WARNING SIGNS
- ☒ PLASTIC SHEETING IN AREA
- ☐ DESIGNATE NO SMOKING AREA
- ☐ ESCAPE LADDER
- ☐ UTILITY CLEARANCES OBTAINED (DIG SAFE CONTACTED)
- ☐ PRIVATE UTILITIES CLEARED
- ☐ LINES SHIELDED/DE-ENERGIZED
- ☐ LOCKED & TAGGED OUT
- ☐ LIFE JACKETS/BARRICADES NEAR WATER
- ☐ HEAT OR AIR CONDITIONING SOURCE FOR TEMPERATURE EXTREMES
- ☐ OTHER _____

LEVEL OF PROTECTION:

- ☒ MODIFIED D (HOW MODIFIED) chemical resistant gloves
- ☐ LEVEL D
- ☐ MODIFIED C (HOW MODIFIED) _____
- ☐ LEVEL C
- ☐ MODIFIED B (HOW MODIFIED) _____
- ☐ LEVEL B

PERSONAL PROTECTIVE EQUIPMENT:

- ☒ SAFETY GLASSES
- ☐ EYE/FACE SHIELD
- ☒ GLOVES (CIRCLE TYPE) INNER LATEX INNER COTTON, BUTYL, NEOPRENE, BUTYL, PVC NITRILE, SILVER SHIELD, OTHER _____
- ☐ DUCT TAPE
- ☐ EAR PROTECTION (CIRCLE TYPE) EAR PLUGS, EAR PHONES
- ☐ BOOTS (CIRCLE TYPE) STEEL TOE, DISPOSABLE COVERS, LATEX, WADERS, OTHER _____
- ☐ TYVEK COVERALL
- ☐ SARANEX COVERALL
- ☐ HARD HAT
- ☐ RESPIRATOR (INDICATE TYPE OF CARTRIDGE) GMCH
- ☐ FIRE EXTINGUISHER
- ☒ FIRST AID KIT
- ☐ LOUD SIGNALING DEVICE (CIRCLE TYPE) AIR HORN, WHISTLE
- ☐ FLASHLIGHT
- ☐ SAFETY SHOWER/EYE WASH
- ☐ WALKIE-TALKIE
- ☐ OTHER: _____

2.2.3 ENVIRONMENTAL MONITORING

Equipment:

- ☐ HNU (CIRCLE ONE) 10.2 EV 11.7 EV
- ☐ PHOTOVAC MIRCROTIP (10.6 EV)
- ☒ OVA
- ☐ EXPLOSIMETER/O₂ METER
- ☐ RADIATION METER
- ☐ HYDROGEN CYANIDE METER
- ☐ PHOTOVAC GC
- ☐ DRAEGER TUBE _____
- ☐ RESPIRABLE DUST MONITOR
- ☐ OTHER _____

Action Thresholds*

- _____
- _____
- per table 2
- _____
- _____
- _____
- _____
- _____
- _____

Level of Protection

- _____
- _____
- D - C
- _____
- _____
- _____
- _____
- _____
- _____

Frequency

- ☒ BREATHING ZONE
- ☐ PERIMETER

once at each well location.

2.2.4 DECONTAMINATION EQUIPMENT AND PROCEDURES

DECONTAMINATION EQUIPMENT:

/	TAP WATER
—	DISTILLED WATER
—	HEXANE
—	METHANOL
—	ACETONE
/	ALCONOX
—	BRUSHES
—	PLASTIC SHEETING
/	DISPOSAL BAGS
—	WASH TUBS (HOW MANY) _____
/	PAPER TOWELING
—	STEAM CLEANER

SITE CONTROL/DECONTAMINATION PROCEDURES:

DISTINGUISHING FEATURES WHICH DELINEATE ZONES AND APPROXIMATE DIMENSIONS IN FEET:

EXCLUSION ZONE - 25 foot radius from work zone, no markings on residential property.

CONTAMINATION REDUCTION ZONE - 25 ft. radius from exclusion zone, no markings on residential property.

SUPPORT ZONE -

DECONTAMINATION PROCEDURES WHICH ARE TO OCCUR IN:

EXCLUSION ZONE -

CONTAMINATION REDUCTION ZONE - Wash and/or decontaminate sampling equipment and gloves.

SUPPORT ZONE -

2.2.5 EMERGENCY RESPONSE

SEE EMERGENCY CONTACTS LISTED IMMEDIATELY FOLLOWING THE TABLE OF CONTENTS.

TABLE 2

MONITORING METHOD, ACTION LEVELS AND PROTECTIVE MEASURES

INSTRUMENT	HAZARD	ACTION LEVEL ⁽¹⁾	ACTION RESPONSE
Respirable Dust Monitor	Contaminant Particles	> 0.05 mg/m ³	Level C Protection
OVA, HNU ⁽²⁾ , Photovac Microtip	Organic Vapors	Background 3 ppm > background or lowest OSHA permissible exposure limit, whichever is lower, or as modified for this task (see Section 2.2.3) 50 ppm over background unless lower values required due to respirator protection factors	Level D Level C, site evacuation may be necessary for specific compounds (see Section 2.2.3) Level B ⁽³⁾
Explosimeter ⁽⁴⁾	Explosive Atmosphere	10% Scale Reading 10-15% Scale Reading > 15% Scale Reading	Proceed with work Monitor with extreme caution Evacuate site
O ₂ Meter ⁽⁵⁾	Oxygen Deficient Atmosphere	19.5% O ₂ 19.5% - 25% O ₂ < 19.5% O ₂ > 22% O ₂	Monitor with caution Continue with caution Evacuate site; oxygen deficient Evacuate site; fire hazard
Radiation Meter ⁽⁶⁾	Ionizing Radiation	0.1 Millirem/Hour ≥ 1 Millirem/Hour	If > 0.1, radiation sources may be present ⁽⁷⁾ Evacuate site; radiation hazard
Draeger Tube	Vapors/Gases	Species Dependent > 1 ppm Vinyl Chloride > 1 ppm benzene > 1 ppm 1,1-DCE	Consult manual for concentration/toxicity/detection data. Upgrade to Level C and evacuate. Upgrade to Level B if concentrations of compounds exceed thresholds shown at left.
GC	Organic Vapors	3 ppm > background or lowest OSHA permissible exposure limit, whichever is lower	On site monitoring or tedlar bag sample collection for laboratory analysis

Notes:

1. MONITOR BREATHING ZONE
2. CAN ALSO BE USED TO MONITOR SOME INORGANIC SPECIES.
3. POSITIVE PRESSURE DEMAND SELF CONTAINED BREATHING APPARATUS
4. LOWER EXPLOSIVE LIMIT (LEL) SCALE IS 0-100%. LEL FOR MOST GASSES IS 15%.
5. NORMAL ATMOSPHERIC OXYGEN CONCENTRATION AT SEA LEVEL IS ~ 20%.
6. BACKGROUND GAMMA RADIATION IS ~ 0.01 - 0.02 MILLIREMS/HOUR.
7. CONTACT H&A HEALTH AND SAFETY STAFF IMMEDIATELY.

III. GENERAL HEALTH & SAFETY PROCEDURES

3.1 ADMINISTRATIVE CONTROLS

3.1.1 Initial Health and Safety Training

Personnel will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility. H&A of New York employees, contractors, subcontractors, and consultants who have the potential to be exposed to contaminated materials or physical hazards must complete the training described in the following sections.

3.1.2 40-Hour Health and Safety Training

This basic course provides instruction on the nature of hazardous waste work, protective measures, proper use of personal protective equipment, recognition of signs and symptoms which might indicate exposure to hazardous substances, and decontamination procedures. It is required for all personnel working on-site, such as equipment operators, general laborers, electricians, plumbers, supervisors, management, etc. who may be potentially exposed to hazardous substances, health hazards, or safety hazards consistent with 29 CFR 1910.120. The course must be conducted by a qualified instructor in accordance with 29 CFR 1910.120.

3.1.3 8-hour Annual Refresher Training

Personnel with 40-hour health and safety training are required to attend an annual 8-hour refresher course to remain current in their training. This course must also be conducted by a qualified instructor in accordance with 29 CFR 1910.120.

3.1.4 8-Hour Supervisor Training

On-site management and supervisors directly responsible for or who supervise employees engaged in hazardous waste operations must have eight additional hours of Supervisor training in accordance with 29 CFR 1910.120. This course includes, but is not limited to, elements appropriate to supervising hazardous waste related projects (e.g., accident reporting/investigation, regulatory compliance, work practice observations, auditing, emergency response procedures, etc.).

3.1.5 Additional Training for Specific Projects

Contractors will ensure their personnel have received additional training on specific instrumentation, equipment, confined space entry, construction hazards, etc., as necessary to perform their duties. This specialized training will be provided to personnel before engaging in the specific work activities.

3.1.6 Documentation of Training

The Contractor/Consultant Project Manager will be responsible for maintaining and providing to Kaddis Manufacturing documentation of its employees' compliance with required training. H&A of New York will only allow properly trained and qualified personnel to perform work at the site.

3.2 MEDICAL SURVEILLANCE PROGRAM

3.2.1 Purpose

The Medical Surveillance Program is conducted to provide an initial baseline of the worker's health. Subsequent medical exams are used to monitor the worker's continued well being. The implementation of a medical surveillance program is the responsibility of the contractor/subcontractor employer.

3.2.2 Requirements

Medical surveillance is required by the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 (f): Hazardous Waste Site Operations and Emergency Response. The Contractor/Consultant's medical surveillance program must meet or exceed these regulatory requirements.

These regulatory requirements include the determination by a physician that the individual being examined is physically able to use respiratory protection and is able to perform the work defined within the specific job description. The capability of an individual to perform the specified work will be determined from examinations that may include:

- o Medical and occupational history, and past gastrointestinal, hematologic, renal, cardiovascular, reproductive, immunological, and neurological problems as well as a history of respiratory disease and personal smoking habits;
- o Physical examination, including blood pressure measurements;
- o Pulmonary function test (FVC and FEV1);
- o Chest x-ray;
- o ECG (Electrocardiogram);
- o Eye examination and visual acuity;
- o Audiometry;
- o Urinalysis; and
- o Blood chemistry: Hematology, serum analyses, heavy metals toxicology.

3.2.3 Periodic Monitoring

All personnel are required to have a physical examination within the 12 months prior to the beginning of their work on-site. This period may be shortened if the Contractor/Consultant Medical Consultant deems this appropriate. The physician performing the physical will insure the requirements of 29 CFR 1910.120(f) are fulfilled. Documentation attesting to current medical monitoring compliance must be maintained on-site by the Contractor/Consultant Safety Officer.

3.3 SITE CONTROLS

3.3.1 Work Site Access Control

Access to client property is dependent upon site-specific conditions under owner permission and will be controlled by the Enarc-O Project Manager. It will be the Contractor/Consultant Project Manager's responsibility to control access to a site by means of temporary barriers such as flagging tape or fencing. The barrier will be inspected daily for integrity and adequacy by the Contractor/Consultant Site Coordinator.

For sites requiring Level C to Level A PPE (personal protective equipment) the area of field operations will be subdivided into three distinct areas. The extent of these areas is task and location specific. Access to each zone will be controlled with fencing and/or plastic flagging tape. The three areas are defined as:

o Exclusion Zone

The exclusion zone is the area where the highest potential for exposure by dermal or inhalation routes exists. Personal protective equipment is required and a daily log will be kept of all personnel entering this zone. The exclusion zone will be marked off with barricades or barrier tape which will be placed a minimum of 50 feet from the active work area. This 50 foot minimum may be altered in the Task-Specific Health & Safety Requirements (Section II) depending upon actual site layout. During field operations this boundary may be expanded by the Contractor/Consultant Site Coordinator based upon observations and/or monitoring measurements. Whenever possible, all field work should be performed upwind from potential contaminant sources.

o Contamination Reduction Zone

The contamination reduction zone is the area immediately adjacent to the exclusion zone. The probability of dermal and inhalation exposure is lower than in the exclusion zone. Typically, contamination reduction zones include facilities for personnel or equipment decontamination. Personal protective equipment worn in the exclusion zone may not be worn outside the contamination reduction zone except during emergencies.

- o Support Zone

Support zones cover all areas outside the contamination reduction zone. Typically, the support area includes facilities for a lunch area, office spaces, and clean equipment and material storage. Protective clothing worn in the exclusion zone may not be worn in a support zone except in emergencies. Emergency contacts are listed immediately following the Table of Contents.

- 3.3.2 Visitors:

- o Visitors and subcontractors entering the site are subject to the same requirements as contractor and consultant personnel and will only be permitted in the immediate area of active operations (i.e., exclusion zone) after receiving written approval from the Contractor/Consultant Project Manager, and supplying a written agreement to comply with this HSP.
- o A visitors log will be kept by the Contractor/Consultant Site Coordinator or other designated person.
- o Visitor vehicles are restricted to support zones.

- 3.3.3 Unauthorized Personnel

All established procedures and actions are designed to prohibit unauthorized entry to the work sites. However, if security is violated, the following actions will be taken:

- o Unauthorized personnel found within any active site will be reported to the Contractor/Consultant Project Manager, Safety Officer, and Site Coordinator, Enarc-O Operations Safety Representative.
- o Unauthorized personnel found in the exclusion zone will be escorted through the contamination reduction zone and will be subject to all decontamination procedures established in the project-specific HSP.
- o Any unauthorized personnel entering an active site will be escorted from the facility by Enarc-O Security. No re-entry will be permitted.

- 3.4 ENGINEERING CONTROLS

Engineering controls will be the method of preference to control health and safety hazards. Examples of engineering controls are:

- o The use of excavation equipment to take samples from trenches;
- o The use of cover material (soil) to suppress vapor emissions;
- o The use of air conditioning in heavy equipment cabs to mitigate operator heat stress; and

- o The use of ventilation equipment to eliminate hazardous atmospheres from confined spaces.

Administrative controls and personal protective equipment will be used where engineering controls are not feasible or are inadequate. Administrative controls include the exclusion of unnecessary personnel from hazardous areas. It should be noted that scheduled job rotation is not an acceptable administrative control to reduce employee exposure to airborne chemicals.

The hazard control methods to be employed must be described in the task-specific health & safety requirements where they deviate from those described here. As a project progresses, changes to these methods may be necessary. All such changes will be documented as addenda to the task-specific health & safety procedures.

3.4.1 Standard Safe Work Practices

Standard safe work practices applicable to most site activities are listed below. Additional safe work practices unique to specific site tasks must be included in the task-specific health & safety requirements

1. All field personnel must inform the Contractor/Consultant Site Coordinator or designated representative before entering work areas so that their presence can be recorded.
2. Workers must utilize the "buddy system": at least two members of the field crew (including subcontractor personnel) must be in visual contact with each other on-site whenever work is to be performed. If this is not possible, two-way radios will be used.
3. Eating, drinking, chewing gum or tobacco, smoking, or any other activity that increases the probability of hand-to-mouth transfer of contaminated material will not be permitted at the work site.
4. All personal safety equipment and protective clothing will be worn in conformance with Section 3.7 of this HSP.
5. Disposable outer coveralls, boots and gloves will be secured at the wrists and legs, and there will be closure of the suit around the neck.
6. Individuals getting wet to the skin with chemically contaminated liquids must remove clothing and wash the affected area immediately at a location to be identified in the task-specific health & safety requirements. Clothes wet with such liquids, must be changed. Any skin contact with such liquids, whether considered safe or not, will be dealt with immediately and as completely as possible. Medical attention should be sought as necessary.
7. Hands must be washed before eating, drinking, smoking and before using toilets at the facilities provided.

8. Avoid contact with surfaces either suspected or known to be contaminated, such as puddles, mud, or other discolored surfaces. Store equipment on elevated or protected surfaces to reduce the potential of incidental contamination.
9. Only remove personal protective equipment in the contamination reduction zone per Section 3.3.1.
10. Place all disposable coveralls, gloves, and cartridges in appropriate receptacles at the end of every shift or sooner, as directed by the Contractor/Consultant Site Coordinator.
11. Inspect all non-disposable clothing (i.e. hard hat liner, work gloves, cotton overalls) for contamination in the contamination reduction zone. Any clothing found to be contaminated will be decontaminated or disposed of in a manner approved by the Contractor/Consultant Site Coordinator.
12. Report all injuries to the Contractor/Consultant Site Coordinator, Kaddis Project Manager, and Enarc-O Safety Representative. An accident report, or equivalent must be completed by the Contractor/Consultant Site Coordinator and submitted to the Enarc-O Operations Safety Representative or Project Manager for appropriate follow-up.
13. The presence or consumption of alcoholic beverages or illicit drugs on Enarc-O Machine Products property or during the work day is strictly forbidden.
14. Spillage or splashing of contaminated materials must be prevented. Spills must be contained and follow up calls made as appropriate for the release.
15. Be alert to unsafe conditions or acts and notify the Contractor/Consultant Site Coordinator.
16. Workers need to be familiar with the work area and surroundings, including:
 - o Wind direction in relation to the work area;
 - o Accessibility of associates, equipment, vehicles;
 - o Available communications;
 - o Hot zone (areas of known or suspected contamination);
 - o Site access;
 - o Nearest water sources.
17. The number of personnel and equipment in the exclusion zone must be kept to a minimum.
18. Wastes generated during work activities must be disposed of in accordance with state, federal, and local, regulations.

3.4.2 Safe Work Permits/Hot Work Permits

Safe Work Permits are to be obtained from the Enarc-O Operations Safety Representative before any work is done that involves:

- o Entering vessels, tanks, pits, trenches, manholes, or other confined spaces.
- o Exposure to toxic or infectious material or to abnormal temperatures or pressures when such exposures are outside the employee's daily routine.
- o Using explosives for blasting or demolition.
- o Using flammable or combustible coatings inside buildings. Application of combustible paints by brush or roller is excluded.
- o Excavating and trenching.
- o Working in elevated areas such as roofs.
- o Using temporary heating devices.
- o Working in designated safe work permit areas.

Hot Work Permits are to be obtained from the Enarc-O Safety Representative before any work is done that involves:

- o Operating gasoline powered vehicles or equipment inside buildings.
- o Cutting, welding, lead burning, tar kettles, or similar work involving open flames or very high temperatures. In explosion prone areas, this includes any potential source of ignition, such as electric hand tools.

3.4.3 Working in Confined Spaces

A confined space, as defined by OSHA, is any space having a limited means of egress which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere.

Confined spaces are also areas where occupants are rendered isolated from help in case of need. Confined spaces include, but are not limited to: Ovens, tanks, vessels, bins, boilers, ducts, sewers, pipe chases, manholes, underground utility vaults, tunnels, pipelines, excavations, and trenches.

If waste activities require entrance into a confined space, strict Health and Safety protocol must be followed. Prior to any confined space work activities, written authorization must be obtained (see Section 3.4.3.1).

3.4.3.1 Confined Space Entry

- o A Safe Work Permit will be issued by Enarc-O Machine Products prior to entry into the confined space. This permit must be completed including the signatures of the Contractor/Consultant Safety Officer and Enarc-O Operations Safety Representative.
- o Only authorized, trained personnel may enter a confined space.
- o Open flame devices will not be used to open frozen or otherwise shut manhole covers, hatches or doors. Hot water or steam will be used to remove ice and snow holding such openings closed.

3.4.3.2 Confined Space Ventilation

The confined space will be ventilated to prevent the accumulation of:

- o Flammable vapors above 10% of the Lower Explosive Limit.
- o Concentrations of combustible dust.
- o Toxic and other contaminants in the atmosphere above one half of the TLV.

3.4.3.3 Safety Concerns

A standby employee will be stationed outside the entrance to the confined space to observe or communicate with the employee at all times. Communications (visual, voice, or signal line) will be maintained between all individuals present. The standby employee will be trained and equipped to initiate rescue operation.

3.4.4 Utility Clearance

Utility clearance will be obtained by the Contractor/Consultant Project Manager from Enarc-O Facilities personnel and any local utilities such as N.Y Telephone, Rochester Gas & Electric, and the appropriate Town or Village authority before the start of any drilling or excavation conducted at the site.

- o Other local utility clearance can be obtained by calling the toll-free hotline Dig Up Alert at (800)962-7962 and record the "reference number" for possible future use.
- o All utilities in the work area should be staked at least two weeks prior to the start of work.
- o All activities must be explained in detail to the respective utility by the Contractor/Consultant Site Coordinator. For some activities, such as blasting, the utility may request to have a representative at the site to expedite emergency response.

3.5 DRILLING SAFETY

Drilling and sampling activities present several potential hazards. Minimizing these hazards requires strict adherence to safe operating procedures.

3.5.1 Drill Crews

Drillers will be responsible for the safe operation of the drill rig as well as their crew's adherence to the requirements of the project-specific HSP. The driller must ensure that all safety equipment is in proper condition and is properly used. The members of the drill crew will follow all instructions of the driller, wear all appropriate personal protective equipment, and be aware of the hazards and applicable control procedures.

3.5.2 Rig Inspection

Each day, prior to the start of work, the drill rig and associated equipment will be inspected by the driller. The following checks will be made:

- o Vehicle condition: Check proper operation of brakes, lights, steering mechanism, and horn.
- o Equipment storage: All equipment such as auger flights, split spoon samplers, hammers, hand tools, etc. will be properly stored in an appropriate location and will be secured before moving the rig.
- o Wire rope, Cat Line: All wire rope, cable and Cat Line will be inspected for signs of wear such as broken wires, a reduction in rope diameter, abrasion, or signs of rust. Worn, frayed, or otherwise damaged wire, rope or cable will be replaced.
- o Safety equipment: Each rig will have at least one fire extinguisher (Type B/C) and one First Aid Kit.

3.5.3 Rig Set-Up

Each drill rig will be properly blocked and levelled prior to raising the derrick. The rig will be moved only after the derrick has been lowered. The leveling jacks will not be raised until the derrick has been lowered.

Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that a differential settling of the rig does not occur. Wooden blocks, at least 12 by 12 inches and four to eight inches thick, are recommended and should be placed between the jack swivels and the ground. The emergency brake will be engaged and the wheels that are on the ground chocked.

Site drilling will comply with the following rules:

- o Before drilling, the Contractor/Consultant Site Coordinator will ensure an adequate safety zone around the drill rig and associated operations.
- o Before drilling, the existence of underground utilities in the work area will be determined and conspicuously marked (See Section 3.4.4).
- o If drilling is conducted in the vicinity of overhead power lines, proper distance will be maintained between the drill rig and the lines as per OSHA 29 CFR 1926, Subpart N. The proper distance or shielding technique will be stated in the project-specific HSP.

3.5.4 General Operating Procedures

The operator of the drill rig will only operate from the position of the controls. If the operator must leave this position, the transmission must be in neutral.

When working on the derrick platform, the drill crew should not guide drill rods or pipe into racks by taking hold of a moving line. Materials should not be stored or transported within the derrick. Pipe, drill rods, auger flights, hammers, and other drilling tools should be stored in racks and chained in place. During drilling, penetration hammers will be placed at a safe location on the ground.

3.5.5 Emergency Procedure for Electrical Contact

If a drill rig contacts an electrical line, it may or may not be insulated from the ground by its tires. Death or serious injury will result if a person touches the rig and the ground simultaneously.

- o Under most circumstances, the operator and other personnel on the seat of the vehicle should remain seated and not leave the vehicle. Do not move or touch any part, particularly a metallic part, of the vehicle or drill rig.
- o If it is determined that the rig should be vacated, all personnel should jump clear and as far as possible from the rig. Do not step off -- jump off, and do not hang on the vehicle or any part of the rig when jumping clear.
- o If you are on the ground, stay away from rig and do not let others get near the vehicle. Seek assistance immediately by calling the local emergency services contact. Emergency phone numbers are listed on page iii of this HSP.

3.6 EXCAVATION AND TRENCHING SAFETY

3.6.1 General Excavation and Trenching Safety

The following is a list of minimum requirements for trenching and excavating. Each excavation/trench/shoring project is different, therefore the Contractor/Consultant Project

Manager is responsible for evaluating site specific conditions and making appropriate provisions in the task-specific health and safety requirements (Section II) in conformance with 29 CFR 1926 Subpart P - Excavations.

- o Contact the proper utilities to obtain clearance. Prior to work, review the utilities in the area and be sure they have been staked properly (See Section 3.4.4). Before work begins, a Safe Work Permit must be obtained from Enarc-O Operations Safety Representative as per Section 3.4.2.
- o Be aware that trenches and excavations deeper than four feet are considered confined spaces and require additional safety precautions, such as shoring. If an excavation exceeds four feet in depth, contact the Enarc-O Operations Safety Representative to review the original Safe Work Permit and ensure that it is adequate.
- o The walls and faces of all excavations and trenches more than four feet deep, in which an employee is exposed to danger from moving ground, will be guarded by a shoring system, sloping of the ground, or some other equivalent means. The design of shoring systems must be done by a registered Professional Engineer as per 29 CFR 1926 Subpart P.
- o For excavations or trenches in which an employee may be required to enter, excavated or other material will be effectively stored and retained at least two feet or more from the edge of the excavation or trench.
- o Daily inspections of excavations will be made by the Contractor/Consultant Site Coordinator. If evidence of possible cave-ins or slides is apparent, all work in the excavation will cease until the necessary precautions have been taken to safeguard employees.
- o Trenches more than four feet deep will have ladders or steps located so as to require no more than 25 feet of lateral travel.
- o Hard hats and other personal protective equipment will be worn at all times during any type of excavating or trenching operation.
- o Determine soil composition (e.g., through soil sampling, soil maps, etc.) and other relevant site conditions, with special emphasis on conditions conducive to cave-ins.
- o Monitor the atmosphere in and around trenches on a regular basis to check for explosive, toxic or otherwise dangerous gases and vapors.

- o The Contractor/Consultant Project Manager will insure that all employees involved in the excavation activity have appropriate training in safe trenching practices, with emphasis on factors such as:
 - utility line identification
 - cave-in prevention measures
 - recognition of conditions which may cause cave-ins
 - means of egress from trench
- o Water will not be allowed to accumulate in any excavation. Utilize ditches, dikes, pumps, or other means to keep surface water out of trenches.
- o All open excavations must be well marked and barricaded.

3.6.2. Cave-In Hazards

The following conditions increase the likelihood of cave-in:

- o Soil materials composed of unconsolidated, uncompacted, and/or rounded particles (See 29 CFR 1926 Subpart P - Excavation Standard). Special care must be used when trenching in areas which have previously been excavated and backfilled.
- o Soils which have a high water content, or have been subjected to freeze-thaw or frost-heaving.
- o Loading of trench walls by adjacent equipment, supplies, structures, "back-dirt" piles, etc.
- o Vibration due to equipment operating near excavations.
- o Trench walls that are steeper than the angle of repose of the material composing the walls.
- o Deep trenches (i.e., high trench walls).

The following precautions should be used to prevent cave-ins in all trenches in excess of 4 ft. deep. These precautions should also be used in trenches less than 4 ft. deep whenever those site conditions just listed indicate the likelihood of a cave-in:

- o Sloping: Trench walls should be sloped to the correct angle of repose.
- o Shoring: Vertical trench walls (unless composed of solid rock) must be shored and braced, or restrained with movable trench boxes, to prevent cave-in. Shoring systems must be designed by a registered professional engineer and meet accepted engineering requirements.

3.7 PERSONAL PROTECTIVE EQUIPMENT

Protective clothing and respiratory protection help protect workers from chemical hazards. Although personal protective equipment is the least preferred method, it may be necessary if engineering controls and work practices are inadequate in preventing workers from coming in contact with potential hazards. Personal protective equipment (PPE) will be selected for the potential hazards anticipated and detailed in the task-specific health & safety requirements.

Personnel at the work site will have their own appropriate and properly fitted safety equipment and protective clothing. Safety equipment and protective clothing will be used as directed by the Contractor/Consultant Safety Officer. All such non-disposable equipment and clothing will be kept clean and maintained in proper condition. All PPE will be supplied by the contractors and their subcontractors. Enarc-O Machine Products will only provide PPE to Enarc-O employees. Personnel will be trained in the use of the required protective equipment and equipment will be properly fitted.

The levels of protection to be used on-site will be based on applicable OSHA and Environmental Protection Agency (EPA) regulations, Enarc-O requirements, environmental sampling data, site conditions, and other factors. It will be the responsibility of the Contractor/Consultant Safety Officer to select the most effective PPE based on the anticipated hazards of the task.

3.7.1 Levels of Protection

The following is a description of the specific requirements of various levels of PPE in conformance with EPA nomenclature.

3.7.1.1 Level A Protection

Level A provides the highest level of respiratory and skin protection. Based on site contaminants, historical sampling, and operational data, utilization of this level of protection is not anticipated. This level of protection is anticipated only in extreme situations beyond the scope of this document, (i.e., HazMat Response).

3.7.1.2 Level B Protection

Level B should be worn when the highest level of respiratory protection, but a lesser level of skin protection is required. It is the minimum level of protection required to conduct any initial field work. Once sampling data (soil, water, or air) has been collected and analyzed, the necessity of this level of protection may be re-evaluated.

Level B Personal Protective Equipment (not limited to the following):

- o Supplied-air respirator (MSHA/NIOSH approved):
 - A) Pressure-demand, self-contained breathing apparatus
 - or
 - B) Pressure-demand, airline respirator with escape bottle.

- o Chemical protective clothing: Chemically resistant to anticipated contaminants. (e.g. Saranex or polyethylene coated Tyvek, Chemrel, or Chem-Tuff).
- o Gloves (outer): Chemically resistant to anticipated contaminants.
- o Gloves (inner)
- o Boots (outer): Chemically resistant to anticipated contaminants.
- o Hard hat*
- o 2-Way radio communications* (intrinsically safe).
- o Joints between gloves, boots, and suit must be taped to ensure an adequate seal.

* The need for these items is dependent upon the work to be performed and will be chosen by the Contractor/Consultant Safety Officer.

3.7.1.3 Level C Protection

Level C protection with an air-purifying respirator should be worn routinely in an atmosphere only after the air contaminant(s) is (are) identified, concentrations measured and the criteria for wearing air-purifying respirator met. Generally, Level C provides the same level of skin protection as Level B, but a lesser degree of respiratory protection.

Level C Personal Protective Equipment:

- o Air-purifying respirators, full-face, (half-face with appropriate safety glasses or goggles when potential for liquid splashes is low), canister or cartridge equipped (MSHA/NIOSH approved).
- o Chemical protective clothing: Chemically resistant to anticipated contaminants, e.g. Saranex or polyethylene coated Tyvek, Chemrel, or Chem-Tuff.
- o Gloves (outer): Chemically resistant to anticipated contaminants.
- o Gloves (inner).
- o Boots (outer): Chemically resistant to anticipated contaminants.
- o Hard hat*
- o 2-Way radio communications* (intrinsically safe).

- o Joints between gloves, boots, and suit must be taped to ensure an adequate seal.

* The need for these items is dependent upon the work to be performed and will be chosen by the Contractor/Consultant Safety Officer.

Criteria for Selection of Level C:

Meeting all of the following criteria permits use of Level C protection:

- o Oxygen concentrations not less than 19.5% or no greater than 22% by volume.
- o Personnel inhalation exposure will be reduced by the respirator below the substance's Threshold Limit Value (TLV)/Permissible Exposure Limit (PEL) or XEL, whichever is lowest and the concentration is within the service limit of the canister/cartridge.
- o Atmospheric contaminant concentrations do not exceed IDLH levels, (See Table 1).
- o Atmospheric contaminants, splashes, or other direct contact will not adversely affect any body area left unprotected by chemically resistant clothing.
- o Job functions do not require self-contained breathing apparatus.
- o Atmospheric contaminant concentrations are not in excess of Level C action criteria, (See Table 2).

3.7.1.4 Level D Protection

Level D is the minimum level of protection to be used during any site activities and does not provide respiratory or skin protection.

Level D Personnel Protective Equipment:

- o Coveralls or work uniform.
- o Gloves*
- o Substantial leather chemical-resistant boots or shoes (steel toe and shank is highly recommended).
- o ANSI Z87 safety glasses.

Chemical splash goggles*.

- o Hard hat*.

- o Disposable/reusable footwear covers*

* The need for these items is dependent upon the work to be performed and will be chosen by the Contractor/Consultant Safety Officer.

Criteria For Selection of Level D:

Meeting any of these criteria allows use of Level D protection:

- o No contaminants are present.
- o Work functions preclude splashes, immersion, or potential for unexpected inhalation of any hazardous chemicals.

Level D protection is a minimum work uniform. It can be worn only in areas where the possibility of contact with contamination is minimal.

3.7.2 Personal Protective Equipment (PPE) Selection

PPE selection will be based on the task and the nature of hazards (type of contaminants, duration of exposure), engineering controls, and the work practices that are anticipated. The selected equipment will provide protection from the chemicals suspected to be present and which demonstrate the potential for skin exposure. The PPE chosen for each task will be specified in the task-specific health & safety requirements.

3.7.3 Changes in PPE

The Contractor/Consultant Safety Officer will make the decision to upgrade or downgrade the levels of protection. The decision will be primarily based on the results of the air monitoring performed during site activity.

3.8 AIR MONITORING FOR WORKER & COMMUNITY PROTECTION

3.8.1 Air Monitoring Scope

The Contractor/Consultant Site Coordinator will ensure periodic air monitoring is conducted during site operations. Should any monitoring indicate concentrations in excess of established action levels, the Contractor/Consultant Site Coordinator will notify Contractor/Consultant Safety Officer and will implement appropriate action to protect project personnel, Enarc-O employees, and the nearby community.

Periodic air monitoring for volatile compounds will be performed during the activities for which inhalation has been identified as a potential exposure route. These activities include, but are not limited to:

- o Drilling and soil sampling.
- o Excavation of contaminated soil for remediation.

- o Construction activities involving excavation in areas of known or potential soil or groundwater contamination.
- o Pump tests where organic vapors were detected during well installation or water samples.
- o Well sampling and hand bailing.

The Contractor/Consultant Site Coordinator should make use of both real time direct reading instruments and laboratory analysis of samples obtained by either grab, filter, sorbent, or wet contaminant collection techniques to measure chemical concentrations. Specific equipment is described in Section 3.8.4 of these Requirements.

3.8.2 Sample Locations

3.8.2.1 Personal Monitoring

Personal monitoring will take place at times proposed by the Contractor/Consultant Safety Officer or Site Coordinator and specified in the task-specific health & safety requirements. In scheduling personal monitoring, consideration will be given to collecting samples at times of maximum potential exposure. Samples will be collected in the employees' breathing zone (9 inch radius hemisphere centered at the nose and forward of the shoulders) utilizing direct reading instruments, flow controlled personal sampling pump, or diffusion type dosimeters.

Scheduled personal samples utilizing sampling pump/sorbent tubes or diffusion type dosimeters should be used to collect full-shift exposure data. If the active operations do not require a full shift work schedule, the sample should be collected for the duration of the active operations. Emphasis should be placed on sampling employees in the exclusion zone, however, employees involved in decontamination procedures will be sampled as well. Additional requirements for personal sampling will be specified in the task-specific health and safety requirements.

Non-scheduled personal samples will be collected as directed by the Contractor/Consultant Safety Officer.

3.8.2.2 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds will also be conducted on a regular basis (every 2 hours) at the downwind site perimeter (exclusion zone as described in Section 3.3.1). If total organic vapor concentrations attributable to excavation, drilling or other activities conducted at the site, exceed 5 ppm, work activity must be halted and monitoring continued. If organic vapor concentrations remain sustained at the perimeter, work activities will remain halted and air samples taken to determine the chemical species present. The air samples may be analyzed on-site with a portable GC. Work activities at the site will proceed only after the following conditions are met:

- o Sustained organic vapor levels at the perimeter fall below 1 ppm, or
- o The concentration of the organic compounds obtained from the air sampling are within their TLV's.

If organic vapor concentrations are above 25 ppm at the perimeter of the Exclusion Zone and are attributable to the borehole, excavation or other site work, work activities must shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure the vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the major vapor emission section below.

3.8.3 Major Vapor Emission

If any organic concentrations greater than 5 ppm over background, attributed directly to excavation or drilling activities conducted at the Enarc-O site, are identified 200 feet downwind from the survey site or half the distance to the nearest residential or commercial property, whichever is less, all excavation must be halted.

Efforts shall be undertaken to abate the breathing zone vapor concentrations such as capping the borehole or backfilling the excavation.

If, following the cessation of the excavation activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the Exclusion Zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

The Major Vapor Emissions Response Plan will be automatically placed into effect if organic vapor concentrations, attributed to excavation or drilling activities conducted at the Enarc-O site, exceed 10 ppm in the 20 foot zone for more than 30 minutes.

3.8.4 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

- a. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.
- b. Frequent air monitoring will be conducted at 30 minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.
- c. The NYSDEC and NYSDOH will be notified within the day the major vapor emission occurs.
- d. Site personnel will assist local police authorities as necessary to identify wind direction and potentially affected areas that may require excavation.

3.8.5 Sample Methods

3.8.5.1 Integrated Sampling

The Contractor/Consultant Safety Officer will determine if there is a project specific need for integrated sampling and include a detailed sampling plan in the task-specific health & safety requirements.

3.8.5.2 Real Time Sampling

Real time monitoring will be conducted with a photoionization detector equipped with an 11.7 eV lamp or a flame ionization detector as specified in the task-specific Health & Safety section (see Section 2.2.3). These instruments are capable of detecting the volatile organic chemical compounds identified in Table 1 to an approximate lower detection limit of 1 ppm. The OSHA TLV's for the compounds listed in Table 1 are at or above the detection limit of the proposed equipment. The rapid response of these instruments allows for quick determination of airborne concentrations and therefore, subsequent changes in the safety procedures can be implemented if needed (See Section 3.8.4). Refer to Section 2.2.3 for frequency of environmental monitoring.

3.8.6 Air Monitoring Equipment

3.8.6.1 Direct Reading Instruments

The instruments used for air monitoring activities may include, but are not limited to, those listed below. The Contractor/Consultant Safety Officer will make the decision as to which instruments must be on a project specific basis.

- o A flame ionization detector (FID) equal or superior to Foxboro organic vapor analyzer (OVA) Model 128.
- o A photoionization detector (PID) equal or superior to HNU 101. Due to the general contaminant mix at the site the 11.2 eV probe will be utilized during site investigations.
- o A combustible gas indicator/oxygen meter equal or superior to MSA Model 260 or 360.

Note: During environmental activities, the potential for creating a flammable atmosphere will be monitored, (e.g., prior to confined space entry, initial operations with atmospheres having the potential to exceed IDLH.) Please refer to Table 2 of this HSP for Action Levels.

Each instrument must be intrinsically safe where warranted. Each will be calibrated and maintained in accordance with the manufacturer's recommendations. Calibration records will be maintained in a daily field logbook.

3.8.6.2 Integrated Sampling Equipment/Techniques

Variable flow, belt mounted personal sampling pumps may be used in conjunction with the appropriate sample media to provide exposure estimates where real time analysis is inadequate. The following equipment/techniques may be used:

- o Diffusion or Permeation Type Dosimeters
- o Analysis of Sorbents

3.8.6.3 Specialized Monitoring Equipment and Analyses

Specialized sampling instruments and analyses (e.g., H₂S monitors, solid sorbents, sampling bags) will be used on project sites on an "as needed" basis as determined by the site conditions, sampling history at the site, and the type of work to be performed. The Contractor/Consultant Safety Officer will determine the need for specialized equipment or analyses on a project specific basis and include thorough descriptions of sampling plans/procedures and equipment operation and maintenance in the task-specific health & safety requirements.

3.8.6.4 Spare Monitoring Equipment

Appropriate spare monitoring equipment will be made available either on the Project Site or at a location in the project area, as determined by the Contractor/Consultant Safety Officer. The location of spare equipment will be included in the task-specific health & safety requirements. Field activities will be suspended if the properly calibrated field monitoring instrumentation is not available.

3.8.7 Record Keeping

A Field Logbook will be maintained by the Contractor/Consultant Site Coordinator. It will be updated daily. The entries will include:

- o Task description and date
- o Location of work site
- o Personnel involved:
 - Name
 - Function
 - Level of personal protection (any change in level of protection will be recorded at the time of implementation)
- o Health and Safety instrumentation calibration:
 - Instrument name (OVA, LEL, etc.)

- Serial number
 - Calibration information (i.e. calibration gas)
 - Instrument setting (OVA span set)
 - Time of calibration
- o Meteorological information
 - Type of day (sunny, cloudy, rain, etc.)
 - Wind speed and direction (estimate)
 - Temperature
 - o Events of the day in chronological order.
 - o Health and safety instrumentation readings
 - Breathing zone concentrations
 - Time
 - Sample concentration with corresponding identification number
 - o Any unusual occurrences, problems or observations
 - o Signature of writer

Field Logbook Health and Safety entries, data sheets, etc. will be reviewed by the Contractor/Consultant Safety Officer on a regular basis. Upon review, each log book will be signed to demonstrate that the data has been reviewed and approved.

3.8.8 Summary of Action Levels

Project action levels will be determined by the Contractor/Consultant Safety Officer based upon site conditions and information and will be presented in the task-specific health & safety requirements. The levels defined in Tables 1 and 2 of this HSP will serve as guidelines for project action levels.

3.9 HEAT AND COLD STRESS

3.9.1 Heat Stress

Heat stress occurs in several forms. By order of increasing severity, they are:

1. Heat Rash
2. Heat Cramps
3. Heat Exhaustion
4. Heat Stroke

The potential for a worker to develop heat stress is related to the ambient temperature, relative humidity, and the nature of the work being performed. The Contractor/Consultant Safety Officer must include project specific information on heat stress identification, care and prevention procedures in the task-specific health & safety requirements (Section II).

3.9.2 Cold Stress

Cold stress, as well as heat stress, occurs in different forms. By order of increasing severity, they are:

1. Trench Foot
2. Frostbite
3. Hypothermia

The potential for a worker to develop cold stress is related to the ambient temperature, wind chill, protective clothing, and the nature of the work being performed. The Contractor/Consultant Safety Officer must include project specific information on cold stress identification, care and prevention procedures in the task-specific health & safety requirements (Section II).

3.10 DECONTAMINATION

Personnel and equipment are subject to decontamination procedures when exiting the exclusion zone. No contaminated material will be removed from the exclusion zone without undergoing proper decontamination procedures.

3.10.1 Personnel Decontamination

No personal protective equipment will be removed from the exclusion zone without proper decontamination or placement in a disposal receptacle.

Specific personal decontamination procedures must be detailed in the task-specific health & safety requirements (Section II). The following are guidelines for developing personnel decontamination procedures contained in the task-specific health & safety requirements (Section II):

- A. Tools, etc. will be dropped off onto a plastic sheet in the exclusion zone for subsequent re-use or decontamination.
- B. The boot wash station will consist of two plastic or metal tubs, two garden sprayers, and a boot brush. One sprayer will contain a detergent water mixture, the other will contain clean water.
- C. The outer layer of disposable protective clothing will be removed by removing outer boots, outer gloves, hood, tape, etc., and placed in a receptacle for disposal. Clothing will be removed by "peeling" off while turning it inside-out. This will minimize contact with possible contamination on the outer surface.

3.10.3 Location of Decontamination Areas

Decontamination areas for project equipment and personnel will be designated by the Enarc-O Project Manager by the following guidelines:

- o Each decontamination area will be sited to have access to water and electrical (GFCI protected) supplies as necessary for the decontamination process.
- o Access to the decontamination area(s) will be limited and controlled.
- o The specific decontamination area(s) for each project will be clearly defined in the task-specific health & safety requirements.

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APPENDIX C

Field Forms





H & A OF NEW YORK
189 North Water Street
Rochester, New York 14604
(716) 232-7386

ANALYSIS REQUEST FORM
AND
CHAIN-OF-CUSTODY RECORD

Page _____ of _____ No 167
Delivery Date: _____

Project Name:	Laboratory:	Project Manager:
H & A File No. _____	Address:	Final Report Due Date:
H & A REP.		Turnaround Time: _____ days
WORK ORDER No.	Client Rep.:	

Sample Information						Analysis Requested						Preservative				
H & A Sample ID.	Laboratory ID.	Sample Date	Sample Time	Sample Depth	Sample Matrix							pH < 2.0			pH > 10	pH 7.0
											TOTAL	HNO3 (N)	HCl (C)	H ₂ SO4 (S)	NaOH/ZA (Z)	4 C (T)
1.																
2.																
3.																
4.																
5.																
6.																
7.																
8.																
9.																
10.																
11.																
12.																
13.																
14.																
15.																

Sampler Comments/Site Observations		Sample Conditions		Broken Containers		
		Custody Seal:	Intact:	List Type / Sample No.		
		Cooler Temp.:	C			
		Any Broken Containers?				
Preservation		No. Of Samples: (N) (C) (S) (Z) (T)				
		(List all pH measurements outside criteria in the Comments Section by H & A No. / Cont. / pres.)				
		Comments:				
Samples Relinquished By:		Samples Received By:				
Signature:		Signature:				
Company Name:		Company Name:				
Date: Time:		Date: Time:				
Samples Relinquished By:		Samples Received By:				
Signature:		Signature:				
Company Name:		Company Name:				
Date: Time:		Date: Time:				
Samples Relinquished By:		Samples Received By:				
Signature:		Signature:				
Company Name:		Company Name:				
Date: Time:		Date: Time:				

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H&A OF NEW YORK
Consulting Geotechnical Engineers
Geologists and Hydrogeologists

EXISTING MONITORING WELL EVALUATION FORM

Project:
Location:
Well Number:
Date Installed:
Field Rep:
Contractor:
Rig Type:
Formation Screened:

File Number:
Ground El. (NGVD):
Inner Casing El. (NGVD):
Outer Casing El. (NGVD):

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

DRILLING METHOD

Method:
Fluid:
Was Fluid Analyzed:
Sampling: Split Spoon:
Rock Core:
Types of Tests Performed on Samples:

CONSTRUCTION MATERIALS

Primary Casing:
Protective Casing:
Screen:
Casing/Screen Connections:
Were Materials Decontaminated Prior to Installation:

PROTECTOR, CASING AND SCREEN RECORD

Description	Diameter (in.)	Total Length (ft.)	Top (ft.)	Bottom (ft.)

WELL DEVELOPMENT

Method:
Development Time:

FIELD INSPECTION

FILTER PACK AND ANNULAR SPACE SEALS

DESCRIPTION	TOP (ft.)	BOTTOM (ft.)

Condition of Protective Casing:
Condition of Surface Seals:
Depth to Bottom of Well:
Depth to Water:

*DEPTH MEASURED FROM GROUND SURFACE.

RECOMMENDATIONS:

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H&A OF NEW YORK
189 N. WATER ST.
ROCHESTER, N.Y. 14604

GROUNDWATER SAMPLING RECORD

SAMPLE DATE
PAGE OF

FILE NO.	NR	CLIENT:	PROJECT NAME:					
WELL NO.								
DEPTH TO PRODUCT (FT)								
DEPTH TO WATER (FT)								
PRODUCT THICKNESS (FT)								
DEPTH OF WELL (FT)								
WELL DIAMETER (IN)								
WELL VOLUME (GAL)								
PURGING DEVICE								
CONTAINMENT DEVICE								
PUMP RATE (gpm)								
PURGE TIME (MIN)								
GALLONS PURGED								
SAMPLE TIME								
SAMPLING DEVICE								
PUMP DECON.								
BAILER DECON.								
FIELD PARAMETERS								
pH MEASUREMENT								
TURBIDITY (ntu)								
TEMPERATURE (C)								
CONDUCTIVITY (uS)								
DISSOLVED OXYGEN (mg/L)								
REDOX (eH)								
FIELD METER CALIBRATION						CALIBRATION BUFFERS		
pH METER	METER	SERIAL NO.	CAL. 4.0	CAL. 7.0	CAL. 10.0	EXP. DATE	LOT NO.	VENDOR
	CORNING	5874						
	CORNING	5889						
	SOILTEST	57-905						
	SOILTEST	57-904						
						CALIBRATION SOLUTION		
SPECIFIC CONDUCTANCE	SERIAL NO.	READING	TRUE VALUE	% RECOVERY	EXP. DATE	LOT NO.	VENDOR	
	CORNING	120018	12.88 mS					
	CORNING	120002	12.88 mS					
	EXTECH	1-85481/889	12.88 mS					
	EXTECH	2-85481/889	12.88 mS					
						CALIBRATION SOLUTION		
DISSOLVED OXYGEN	SERIAL NO.	CALIBRANT	TRUE VALUE	% RECOVERY	EXP. DATE	LOT NO.	VENDOR	
	CORNING	3812						
	CORNING	H082						
						CALIBRATION SOLUTION		
REDOX METER	SERIAL NO.	CALIBRANT	TRUE VALUE	% RECOVERY	EXP. DATE	LOT NO.	VENDOR	

COMMENTS:

SIGNATURE:

CONTAINMENT

1. DRUMS 2. TANK 3. TANKER TRUCK 4. SEWER DISCHARGE 5. NOT REQUIRED

DECON PROCEDURES

1. ALCONOX, POTABLE WATER, DI WATER

2. METHANOL, POTABLE WATER, ALCONOX, POTABLE WATER, DI WATER

3. STEAM CLEANING

4. NA - NOT APPLICABLE

5. NR - NOT REQUIRED

123dmclforms\gwatr.wks

120



BORING NO.

PROJECT	
CLIENT	
CONTRACTOR	

FILE NO.
SHEET NO. 1 of
LOCATION

ITEM

DRIVE
SAMPLER

CORE
BARREL

DRILLING EQUIPMENT & PROCEDURES

TYPE

INSIDE DIAMETER (IN)
HAMMER WEIGHT (LB)
HAMMER FALL (IN)

RIG TYPE
CASING TYPE
DRILLING FLUID
OTHER

SURFACE ELEV.
DATUM
START
FINISH
DRILLER
H & A REP

DEPTH
{ft}

SAMPLE
DI NO.

SPT (blows/6'-1 DRL RATE (min/ft)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

REC
fint
RQD
[%]

DEPTH
(ft)

WELL
TH | CONSTA.

DEPTH/
ELEV.
(ft)

VISUAL DESCRIPTION AND REMARKS

FIELD
C/A
(ppm)

[illegible]

WELL CONSTRUCTION DETAILS

WELL NO.:
COMPLETION DATE:
M.P. ELEVATION:
PROT. CASING:
WELL MATERIAL:
WELL DIAMETER:

SCREEN TYPE:
SLOT SIZE:
SCREEN INT.:
SEAL INT.:
OTHER:

SAMPLE IDENTIFICATION

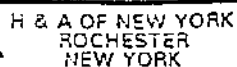
S		SPLIT SPOON
L		LINED SPLIT SPOON
T		SHELBY TUBE
P		PISTON SAMPLE
R		ROCK CORE

SUMMARY

OVERBURDEN (LIN FT)
ROCK CORED (LIN FT)
SAMPLES

BORING NO.

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BORING NO. _____
FILE NO. _____
SHEET NO. _____ of _____

[illegible]

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GROUNDWATER LEVEL MONITORING REPORT

GROUND/TOP OF CASING ELEVATION:

PAGE NO.

123

PROJECT: _____
LOCATION: _____
CLIENT: _____ FILE NO.: _____

H&A REP.:

DEPTHS MEASURED FROM:

DATE	DEPTH TO WATER(FT.)		DEPTH TO BOTTOM(FT.)		VOL. REMOVED	REMARKS, METHOD, ETC.
	BEFORE	AFTER	BEFORE	AFTER		

DEPTH TO WATER

REMARKS

FILE NO. _____

SHEET NO. _____ OF _____

N _____

ELEVATION DATUM:

DEPTH BELOW GRD. SURFACE _____ FT.

ELEVATION: _____

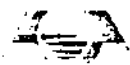
REFERENCE MEASURING POINT ELEVATION:

HSA FORM 120B MAR 78

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[illegible]

APPENDIX D
Material Safety Data Sheets



U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-13387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME Metal Parts Processing Company, Inc.		EMERGENCY TELEPHONE NO. 201-589-5314
ADDRESS (Number, Street, City, State, and ZIP Code) 165 Delancy Street, Newark, N.J. 07105		
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS Metpar #120	
CHEMICAL FAMILY	FORMULA	

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Unit)	ALLOYS AND METALLIC COATINGS	%	TLV (Unit)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS	NONE		FILLER METAL PLUS COATING OR CORE FLUX	NONE	
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Unit)
NONE		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H ₂ O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (— 1)	
SOLUBILITY IN WATER	good		
APPEARANCE AND ODOR	slight yellowish white—slight fatty smell		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (MMAP UNOS)	none	FLAMMABLE LIMITS	L ₁	U ₁
EXTINGUISHING MEDIA				
SPECIAL FIRE FIGHTING PROCEDURES				
UNUSUAL FIRE AND EXPLOSION HAZARDS	powdery			

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

EFFECTS OF OVEREXPOSURE

sneezing

EMERGENCY AND FIRST AID PROCEDURES

blow the nose

a dry powder

SECTION VI - REACTIVITY DATA

STABILITY

UNSTABLE

CONDITIONS TO AVOID

STABLE

X

INCOMPATIBILITY (Materials to avoid)

none

HAZARDOUS DECOMPOSITION PRODUCTS

soap

HAZARDOUS
POLYMERIZATION

MAY OCCUR

CONDITIONS TO AVOID

dropping to create dust

WILL NOT OCCUR

X

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

sweep

WASTE DISPOSAL METHOD

land fill

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

mask if dust is created

VENTILATION

LOCAL EXHAUST

sufficient

SPECIAL

MECHANICAL (General)

OTHER

PROTECTIVE GLOVES

not necessary in handling

EYE PROTECTION

from dust

OTHER PROTECTIVE EQUIPMENT

low alkali

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

dry storage

OTHER PRECAUTIONS

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Chemtrol 10% 3

MATERIAL SAFETY DATA SHEET

PRECISION FINISHING, INC.
BOX 272
SELLERSVILLE, PA 18960

EMERGENCY TELEPHONE NO.
(215) 257-6862.

SECTION 01 - IDENTIFICATION

Product Name: Chemtrol 10%
Product Type: Abrasive vibratory and tumbling compound
DOT Hazard Class: Not regulated

SECTION 02 - HAZARDOUS INGREDIENTS

<u>Chemical Name</u>	<u>CAS #</u>	<u>Hazard</u>
Silica 5-10%	7631-86-9	TLV = <u>10 mg/m³</u> % Respirable SiO ₂ +2

This product is dedusted and normally used in wet processing eliminating the hazard.

SECTION 03 - PHYSICAL DATA

Appearance and Odor:	Off white to light gray, odorless powder
pH:	1% solution = 9.3
Specific Gravity:	Not determined
Solubility in Water:	20%
Percent Volatile at 70° F:	0%

SECTION 04 - FIRE AND EXPLOSION HAZARD DATA

Flash Point: >212° F
Extinguishing Media: Carbon dioxide or chemical foam
Special Fire Fighting Procedures: Wear NIOSH approved self-contained breathing apparatus with a full face shield.
Unusual Fire and Explosion Hazards: May release oxides of carbon and nitrogen

SECTION 05 - HEALTH AND FIRST AID

ACUTE AND CHRONIC HEALTH EFFECTS AND EFFECTS OF OVEREXPOSURE:

Inhalation: (Dust) Will irritate mucous membranes, eyes, and respiratory tract. Exposure to dust in excess of TLV for extended periods may lead to silicosis.
Ingestion: Ingestion effects not known. Slightly toxic.
Skin: May irritate skin.
Eye: May irritate skin.

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EMERGENCY AND FIRST AID PROCEDURES:

Inhalation: Remove from exposure. Obtain medical assistance.

Ingestion: Obtain medical assistance.

Skin: Wash with copious water. Obtain medical attention if irritation persists.

Eye: Wash with copious water. Obtain medical attention if irritation persists.

SECTION 06 - CORROSIVITY AND REACTIVITY DATA

Stability: Stable

Incompatibility: Acids

Decomposition Products: Oxides of carbon and nitrogen

Polymerization: Will not occur.

SECTION 07 - STORAGE, HANDLING AND USE PROCEDURES

Normal Storage and Handling: Normal warehouse procedures

Normal Use: Normally used wet as 10% solution in vibratory and tumbling equipment. Normal use does not present respiratory or ingestion hazard.

Steps to be taken in case of leaks or spills: Sweep up material with normal protection for TLV.

Waste Disposal Method: Dispose of in accordance with applicable federal, state, and local laws.

SECTION 08 - PERSONAL PROTECTION INFORMATION

Respiratory Protection: In dusty conditions, use NIOSH approved dust respirator.

Ventilation: Under normal use, none required.

Protective Gloves: Rubber impervious type.

Eye Protection: Chemical splash goggles.

Personal Hygiene: Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet facilities. Promptly remove soiled clothing and wash thoroughly before reuse.

Measures to be taken during repair and maintenance of contaminated equipment that has been in contact with this material: See Sections 07 and 08.

SECTION 09 - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: See Sections 07 and 08.

FOR COMPANY USE

The information and recommendations set forth herein are taken from sources believed to be accurate as of the date hereof; however, Precision Finishing, Inc. makes no warranty with respect to the accuracy of the information or the suitability of the recommendations, and assumes no liability to any user thereof.

Prepared by: William S. Walker

Rev. 0

November 15, 1985

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nk 1011
BRASS Tumbler
Oakite 184
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U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

Disclosure or reproduction without
authorization of OAKITE
PRODUCTS, INC. is prohibited.

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME OAKITE PRODUCTS, INC.	EMERGENCY TELEPHONE NO. 201-464-6900
ADDRESS (Number, Street, City, State, and ZIP Code) 50 Valley Road, Berkeley Heights, New Jersey 07022	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS Oakite PM 184
CHEMICAL FAMILY Acid	FORMULA Proprietary

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Oxalic acid	5	1 mg/m ³
Sodium bisulfate	90	Not established

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	N/A	SPECIFIC GRAVITY (H ₂ O=1)	Bulk density 10.9 #/gal.
VAPOR PRESSURE (mm Hg.)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (____ #/hr)	N/A
SOLUBILITY IN WATER	Moderate	pH @ 1 to 4 oz/gal.	1.0 to 1.5
APPEARANCE AND ODOR Tan to dark brown powder; acrid odor.			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	None.	FLAMMABLE LIMITS	N/A	Lat	Ust
EXTINGUISHING MEDIA	Will not burn or support combustion.				
SPECIAL FIRE FIGHTING PROCEDURES	Firemen should wear standard protective clothing and use adequate respiratory protection.				
UNUSUAL FIRE AND EXPLOSION HAZARDS	Unknown.				

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**THE
FOLLOWING
DOCUMENTS
WERE OF
POOR QUALITY**

**IMAGE
DATA**

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

Mixture: unknown. See Section II.

EFFECTS OF OVEREXPOSURE

Direct contact with dry powder may cause burns of eyes and causes irritation of skin. Direct contact with solutions causes burns of eyes and skin. Inhalation of fumes may cause irritation of mucous membranes.

EMERGENCY AND FIRST AID PROCEDURES

Immediately flush skin or eyes with plenty of water for at least 15 minutes. For eyes, get medical attention. Remove contaminated clothing and shoes and wash before reuse. For inhalation, remove from exposure.

SECTION VI - REACTIVITY DATA

STABILITY

UNSTABLE

CONDITIONS TO AVOID

N/A

STABLE

X

INCOMPATIBILITY (Materials to avoid)

Alkaline materials, materials containing chlorine.

HAZARDOUS DECOMPOSITION PRODUCTS

When heated to decomposition, may yield oxides of sulfur and other fumes.

HAZARDOUS
POLYMERIZATION

MAY OCCUR

CONDITIONS TO AVOID

N/A

WILL NOT OCCUR

X

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Sweep up dry powder. In any case, flush area with plenty of water. Neutralize remaining traces with soda ash or lime and flush again.

WASTE DISPOSAL METHOD

Neutralize with alkaline material, dilute and discharge according to federal, state and local regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

N/A

VENTILATION

LOCAL EXHAUST

Provide adequate ventilation.

SPECIAL

MECHANICAL (General)

When used in a closed barrel, provide suitable venting to allow for gas release.

OTHER

PROTECTIVE GLOVES

Rubber

EYE PROTECTION

Safety goggles

OTHER PROTECTIVE EQUIPMENT

Apron and/or other suitable protective clothing; face shield if necessary.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling.

Avoid breathing fumes. Suitable for general indoor storage in a dry area. Keep

OTHER PRECAUTIONS

container closed when not in use.

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LISTED NYSE... OKT

PROPRIETARY CHEMICAL PRODUCTS FOR INDUSTRIAL CLEANING AND METAL TREATING

TWX 710-984-5459
TEL. (201) 484-6900

OAKITE PRODUCTS, INC.

GENERAL OFFICES: 50 VALLEY ROAD, BERKELEY HEIGHTS, N.J. 07922

December 5, 1984
ID #0165464

ENARC-O MACHINE PRODUCTS
P. O. Box 152
Honeoye Falls, NY 14472

ATTN: MR. GUY BALL

Gentlemen:

You recently requested various information as listed below:

Information Requested:

Telephone on 12/4/84

Item(s) Requested:

MATERIAL SAFETY DATA SHEET

For:

Oakite FM-184

We trust this information will meet with your requirements. Please contact us if we can be of further assistance.

Very truly yours,

OAKITE PRODUCTS, INC.

John H. Seitz

John H. Seitz, Manager
Safety & Regulatory Affairs

JHS:mk
CST:



S. Schaeffer

ANNIVERSARY... 1909-1984

ENCL:

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PRODUCT PROFILE

TECHNICAL DATA

OAKITE FM 184: Powdered acidic compound for barrel finishing, deburring and descaling steel, stainless steel, brass and copper

PRIMARY APPLICATION

Oakite FM 184 is a powdered acidic compound that will quickly and effectively do these four distinct barrel finishing jobs: (1) remove heat scale and discolorations from steel parts; (2) brighten brass or copper, with or without media; (3) deburr brass, copper, steel or stainless steel; (4) restore color to steel darkened by alkaline deburring treatment. And once it has done the job, Oakite FM 184 is easily rinsed away, leaves no film or residue. Inhibited to prevent excessive attack on metals, the fast-acting acidic compound has none of the disadvantages of raw acids.

CHEMICAL CHARACTERISTICS

chemical composition	mixture of organic and inorganic acids with an inhibitor
physical form	as received: tan to dark brown powder as used: light brown solution
odor	acid
bulk density	1200 g/l (10.0 lbs/gal)
hygroscopic tendency	none
foaming tendency	low
recommended diluent	water
maximum solubility	45 g/l at 21°C; 75 g/l at 77°C (6 oz/gal at 70°F; 10 oz/gal at 170°F)
behavior in hard water	no effect
rinsability	good
biodegradable surfactants	non-surfactant material
phosphate-free	yes
normal working concentrations	7.5 to 30 g/l (1 to 4 oz/gal) of water
normal working concentrations	room temperatures—10° to 38°C (50° to 100°F)
pH at working concentrations	1.0 to 1.5 at 21°C (70°F)
effect of working solutions on metal	rate of metal loss from 4-hour immersion in Oakite FM 184, 30 g/l (4 oz/gal) of water, 21°C (70°F), projected for one year is as follows:

<u>metal (alloy)</u>	<u>mm/yr</u>	<u>in/yr</u>
brass	0.05	0.002
stainless steel	0.05	0.002
steel	0.08	0.003
copper	0.08	0.003
aluminum	7.21	0.284
zinc	9.55	0.376
magnesium	12.70	0.500

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APPENDIX E

Procedure For Groundwater Quality Sampling



APPENDIX E

PROCEDURE FOR GROUNDWATER QUALITY SAMPLING

INTRODUCTION

This section provides detailed procedures to be followed during all groundwater sampling activities at the Enarc-O Machine Products, Inc. facility. These activities are divided into two groups to be performed at different times during the project:

- o Sampling of residential and existing monitoring wells, and site supply well.
- o Sampling of newly installed monitoring wells.

Sampling activities for both groups will take more than one day. During the first day of groundwater sampling certain pre-sampling activities will be performed.

PRE-SAMPLING ACTIVITIES

Well Maintenance Check

Prior to sampling, a routine inspection of the condition of the protective casing (if present) and surface seal will be performed. The protective casing will be inspected for the integrity of the locking cap and the surface seal. In addition each temporary groundwater sampling point will be checked for any other signs of damage or inadvertent entry. Observations of any irregularities will be noted on the groundwater sampling record (attached) as well as the temporary groundwater sampling point number, date and time. The residential wells will be evaluated during the field reconnaissance activities of Section 4.2.

Air Monitoring

In order to provide workers with the proper respiratory protection for sampling, air monitoring in the breathing zone and immediately over the well head will be performed immediately after the initial uncapping. Health and safety procedures that are appropriate to the ambient air conditions will be implemented. Readings for both the breathing zone and well head will be recorded on the groundwater sampling record. The Health and Safety Plan for this work (Appendix B) defines respiratory protection action levels, and a description of the proper air monitoring equipment.

Water Level Measurements

A complete round of water level measurements will be taken from wells in the two groups before sampling. If possible, the water levels will be taken during a single day and within the shortest possible time period.

The depth to groundwater will be measured with an electronic depth-indicating sounder. The probe will be lowered into the temporary groundwater sampling point until the meter indicates water is reached. The probe will be raised above the water level and slowly lowered again until water is indicated. The cable will be held against the side of the inner protective casing at the point designated for water level measurements and a depth reading taken.

This procedure will be followed three times or until a consistent value is obtained. The value will be recorded to the nearest 0.01 feet in the groundwater level monitoring report (attached). The probe will be raised to the surface and together with the amount of cable that was wetted in the temporary groundwater sampling point, will be decontaminated with an alconox wash and distilled water rinse.

WELL EVACUATION

1. The well will be purged by a combination of bailing and/or pumping. The dedicated bailer (disposable or teflon) will be attached to a polypropylene or nylon line and the well bailed until 3 well volumes are removed from the well, or until the well is dry.
2. The evacuated water will be directed to a 5-gallon carboy, 55-gallon drum or other appropriate container. Observations on the flow rate, rate of recovery and other pertinent observations will be recorded on the groundwater sampling record.
3. When well evacuation is complete, the pump (if used) will be withdrawn from the well and decontaminated.
4. Groundwater quality samples will be obtained after evacuation of the well. Samples will be taken within three hours of well evacuation if sufficient volume is present.
5. A polypropylene or nylon line will be attached to a dedicated bailer equipped with a bottom check ball. The bailer will be lowered to the middle of the open interval of the well or, if little water is in the well, to within one foot of the bottom of the well. Care will be taken in slowly lowering the bailer into the water so as not to agitate the water unnecessarily. The bailer will then be raised to the surface. The appropriate sample vials will be filled slowly to avoid sample aeration, and field parameter measurements conducted as described in a subsequent section. Bailers will be discarded (if disposable) or will be decontaminated (if teflon) after each use in accordance with the decontamination procedures described in this appendix.

FIELD MEASUREMENTS

A portion of the groundwater collected during the sampling procedures will be subjected to the field tests of pH, temperature, and specific electrical conductance. Tests for field parameters will be conducted after all sample containers have been filled. Groundwater for these tests will be collected in a glass container with a minimum volume of 125 milliliters.

Temperature will be taken first and measured with a thermometer to the nearest tenth of a degree and the value recorded on the groundwater sampling record. The thermometer will be rinsed with deionized water and stored in a plastic carrying case for transport to other sampling locations.

The specific electrical conductance will be measured using a conductivity probe. The probe will be placed in the sample, readings taken and then recorded on the groundwater sampling record. The probe will be decontaminated between samples with a deionized water rinse and placed in a field carrying case.

The pH will be measured with a pH meter that is calibrated daily with appropriate standards. The clean probe will be inserted into the sample container and the readings recorded on the groundwater sampling record to the nearest 0.1 pH unit. The probe will be rinsed with deionized water and inserted into its own carrying case.

EQUIPMENT DECONTAMINATION

All of the sampling equipment will be decontaminated between sampling events using the following procedure:

1. An initial Alconox or equivalent detergent wash.
2. Clean water rinse.
3. Distilled/deionized water rinse.
6. Air dry

Decontamination wastewaters will be containerized in 55-gallon drums.

DUPLICATE, TRIP AND FIELD BLANKS

Duplicate Samples

Duplicate samples will be collected at the same time and location as field samples and will be collected at a frequency of one per matrix/method per day or 10 percent of the total analyses. The samples will be used to assess precision including variability caused by the laboratory analysis and the sample collection procedure. Duplicates will be collected in immediate succession using identical sampling techniques, sample storage, transportation and analysis. Duplicates will be evenly split from the same bailer load and equally proportioned into each receptacle for the split duplicate. Sample containers will be labelled such that laboratory personnel are not aware that they are analyzing duplicate samples.

Equipment Blanks

Equipment blanks are intended to assess the potential introduction of contamination during sample collection, handling and analysis and will be obtained in a fashion that approximates sampling procedures used in the field. Distilled/deionized water will be poured into randomly selected decontaminated bailers and non-dedicated pumps that are used for monitoring well sampling and collected in appropriate containers. The samples will be handled and transported as all other groundwater samples. Field blanks will be collected at a frequency of 5 percent of the total samples or at least one per week or one per sample shipment.

Trip Blanks

Trip blanks are intended to assess the potential introduction of contamination during round trip sample handling and transport from the laboratory to the field. A trip blank sample will be obtained from the contract laboratory for each sampling event and will be stored in the sample collection cooler during the daily sampling activities. The trip blank will return to the laboratory with the groundwater samples. The trip blanks consist of distilled/deionized water placed in two 40 ml borosilicate glass vials. One trip blank will be analyzed for each sample shipment for volatiles analysis.

SAMPLE CONTAINERS, PRESERVATION METHODS, HOLDING TIME AND FILTERING

The types of containers, preservation methods and holding times for the various laboratory analyses are presented in Table 2. Holding times will be measured from verified time of sample receipt (VTSR) by the contract laboratory.

SAMPLE LABELS

Sample labels will be placed on all samples and will contain the following information:

- o Date and time of collection
- o Sample location
- o Sample number
- o Analysis to be performed
- o Sampler's name

GROUNDWATER SAMPLING RECORD

The Groundwater Sampling Record form Appendix C used during sampling procedures will include the following information:

- o Well number
- o Static water level (depth to water)
- o Depth to bottom of the well
- o Calculated well volume
- o Actual evacuation volume

- o Date and time
- o Analyses to be performed
- o Preservation method
- o Field meter calibration information
- o General remarks (weather conditions, etc.)
- o Sample temperature, pH and specific conductivity

All entries will be made in black indelible ink and will be written legibly. Entry errors will be crossed out with a single line, dated and initialed by the person making the correction. Groundwater sampling records will be reviewed by the Data Management Coordinator on a daily basis.

SAMPLE CUSTODY

A chain-of-custody form Appendix C will be completed after sample collection. The chain-of-custody forms will accompany the samples to the laboratory at the end of each day. A sample transfer will be completed when the sampling team relinquishes the samples to laboratory personnel by signing the chain-of-custody form.

VBD:gmc
70372-40\appene

APPENDIX F
Soil Gas Procedure



APPENDIX F

SOIL GAS PROCEDURE

Analysis of soil gas can be used to quickly detect volatile organic compounds (VOCs) present below the ground surface. Soil gas surveys typically involve advancing a hollow soil probe several feet below ground surface, withdrawing air from the soil pore-space, and analyzing the air samples by gas chromatography. The soil gas method provides rapid information relative to the location and relative intensity of VOCs present in the soil and/or groundwater at a site.

Sample Collection Technique

Two different probe systems can be used to obtain soil gas samples. A manual slide-hammer probe can be used for shallow soil gas sampling to depths of approximately 4 ft. An electric hammer-driven system can be used for advancing soil probes to depths of approximately 15 ft. depending on soil conditions. For sampling below concrete floor slabs or asphalt pavement, pilot holes are drilled to penetrate the surface slab using an electric rotary-hammer drill and an 18-in. long by 1-in. diameter carbide drill bit. The soil probe is then advanced through the pilot hole.

- The manually emplaced soil probe consists of a weighted 40 or 52-in. long steel plunger bar and 40 or 52-in. long, 0.37-in. O.D. hollow stainless steel sampling tubes. Each sampling tube has eight 1/8-in. diameter perforations in its lowermost six inches to allow intake of soil vapor. The steel plunger bar is advanced into the ground using a weighted slide-hammer to create a sample hole into which the sampling tube is inserted.
- The electric hammer-driven soil probe system consists of a Bosch Model 11209 electrically powered 27.5 lb. rotary-hammer, and a K-V Systems, Inc. soil probe. The K-V probe includes a steel drive head attachment, 3.0 ft. long by 7/8-in. O.D. hollow hardened chrome-steel tube sections, a detachable 6-in. long by 7/8-in. O.D. slotted intake section, and a solid conical tip. The probe sections are threaded together and driven with the rotary-hammer to specific depths in the soil.

Moist bentonite clay is packed around the soil probe at the ground surface to seal off the sample hole from any influx of atmosphere air during sample collection. Once emplaced, the soil probe is connected with 1/8-in. O.D. teflon tubing (dedicated for each hole) to a battery operated air pump, and the sample hole is purged of approximately 0.5 L of soil gas. A variable-area flowmeter is connected to the pump outlet to verify and measure the soil gas flow rate. Typical purge times are on the order of 30 seconds at pumping rates of approximately 1 to 2 L per minute. A total organic vapor reading is measured and recorded from the pump effluent using a Foxboro Organic Vapor Analyzer or an Hnu photoionizing organic vapor meter.

Soil gas sample collection is accomplished by connecting a labeled Tedlar airbag to the teflon tubing. The Tedlar bag is enclosed in an airtight canister and a hand pump is used to evacuate the canister thus drawing a vacuum. The vacuum pressure causes soil gas to flow into and inflate the Tedlar bag. Once the airbag is inflated, it is retrieved from the vacuum canister, the airbag

inlet valve is closed, and the airbag sample is transported to an on-site gas chromatograph (GC) for immediate analysis. This sampling method avoids possible sample cross-contamination by eliminating the air pump from the sampling loop.

Probe Decontamination

The soil vapor sampling probes area disassembled and cleaned between use at each sampling location as follows:

- washed with low phosphate detergent
- rinsed with potable water
- rinsed with dilute methanol
- rinsed with distilled water
- thoroughly dried

Sample Analysis

Samples are analyzed on a Hewlett-Packard 5890 Series II GC equipped with a 30 meter DB-5 megabore capillary column (0.53-mm I.D., 1.5-micrometer film thickness) and a flame ionization detector (FID).

Samples will be introduced into the GC by direct injection using a 250 ul Hamilton Gastight syringe with teflon Lever-lock needle attachments. Smaller volume fixed-needle gastight syringes may be used for samples containing high concentrations of VOCs, if required. Subsamples will be withdrawn from the septum valve on the Tedlar airbags using the gastight syringe and manually injected into the GC. Anticipated injection volumes will be on the order of 100 ul or smaller, depending on VOC concentrations encountered.

Reference standards for this investigation are presented in Table 4.

Other site specific compounds may also be included.

The vapor phase calibration gas will be prepared from reference grade chemicals in their pure liquid form. The calibrant standards are mixed by injecting microliter volumes of each neat chemical into a Tekmar 2.0 L static dilution bottle filled with ultra-pure carrier (UPC) grade air. Calibrant concentrations are then calculated in terms of micrograms per liter (ug/L) of compound in air and in terms of parts per million by molar volume (ppmv).

Instrument calibration is accomplished on a 3-point calibration curve for each of the target analytes. The GC operator makes small, intermediate, and large injections of the calibration mixture and stores each calibration level on the GC integrator. A point-to-point calibration fit is used for each of the compounds. Detector linearity is monitored by the response factors for each compound in terms of nanograms per peak area on each calibration level.

Calibration ranges for the target compounds are anticipated to be on the order of the values listed below, using 1,2-dichloroethane as an example.

	<u>CAL1</u>	<u>CAL2</u>	<u>CAL3</u>
Nanograms on-column	10	100	1000
ppmv	2.47	24.7	247

Compounds detected in the sample analyses are calculated and reported in both ug/L and in ppmv (molar volume) as referenced to the vapor-phase calibrant standard. Estimated detection limits for the target VOCs are anticipated to be approximately 1 ppmv (molar volume) on the FID.

A single-point calibration in the middle range of the calibration curve will be performed at least twice daily during the investigation to monitor compound retention times and detector response.

Blank Analysis

The sampling syringe is purged with UPC air between each sample injection. Blank injections of UPC air are analyzed after approximately 10% of the samples, and after samples with high levels of VOCs detected, to evaluate the possibility of residual carry over contamination of the sampling syringe.

Sample train blanks collected through a decontaminated soil probe in atmospheric air will be collected and analyzed at a rate of one per day during the site sampling. These blanks will be used to evaluate the effectiveness of the decontamination procedures and the possibility of sample cross-contamination from the sampling tubes.

Blank injections of ambient air using the field GC work station will be performed at each soil vapor sampling location to evaluate possible analytic interference by atmospheric VOCs in the Enarc-O Machine facility.

A Tedlar airbag blank will be analyzed for each manufacturing lot of Tedlar bags to evaluate any possible VOC interference due to the bag manufacturing process. The airbag blank will be performed by filling a new Tedlar bag with UPC air and analyzing a subsample of the airbag contents using the sample syringe.

Limitations of Soil Gas Method

Volatile organic compounds detected in sample chromatograms are identified by retention time matches with the known standards, subsequently compound concentrations are calculated based on peak areas. Actual compound identities may differ. For absolute identification, mass spectral confirmation is necessary, and would require submitting soil or soil gas samples for laboratory analysis.

The estimated detection limits for VOCs such as 1,2-dichloroethane are expected to be approximately 1 ppm expressed molar volume. However, the detection limits of specific compounds will vary on the field and laboratory GC systems with respect to their carbon content, ionization potential, flammability, vapor pressure, temperature, and the injection volume.

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APPENDIX G

Procedure For Test Boring and Monitoring Well Installation



APPENDIX G

PROCEDURE FOR TEST BORING AND MONITORING WELL INSTALLATION

Bedrock Well Installation

Test borings will be advanced in the overburden using minimum 4-1/4-in. I.D. hollow-stem augers. Split-spoon sampling will be performed according to ASTM procedure D 1586-84. Soil samples will be described by an experienced geologist. All data obtained during drilling will be recorded on a standard H&A of New York Test Boring Report, an example of which is included in Appendix C.

Field screening for volatile organic compounds will be performed for each sample. Upon opening the split spoon, the field geologist will screen the entire split spoon with an organic vapor detector such as an HNU, photovac Microtip, or Foxboro OVA. Readings obtained will be recorded on the Test Boring Report, along with information regarding visual or other indications of contaminants.

Upon encountering auger refusal on bedrock, the augers will be removed and a temporary 6-in. I.D. steel casing will be installed and seated on bedrock. A nominal 6-in. diameter hole will be advanced in at least two ft. into bedrock using rotary drilling methods. Alternatively, the augers may be advanced into bedrock one ft. if feasible, prior to installing the temporary casing.

Upon completion of drilling of the two-foot rock socket, a 4-in. I.D., Schedule 80 PVC well casing will be grouted into the bottom of the rock socket using procedures described below. The grout will be allowed to set for a minimum of 12-hours before resuming drilling activity.

Upon grout set-up, the borehole will be advanced in bedrock using rotary coring techniques. An NX-sized (2-4/8-in. I.D. 3-in. OD) double-tube core barrel will be advanced in ten-foot run lengths. Core samples will be described in detail by the field geologist on the Test Boring Report forms (Appendix C). Measurements of drill water lost during coring (if any) will also be recorded.

After each core run, the corehole will be bailed dry and allowed to set for a period of time to allow recharge to the borehole to occur. If recharge indicates a water-bearing zone has been encountered in sufficient thickness, drilling will cease. If little recharge occurs, coring and bailing will continue in ten-foot runs until a water and water-bearing zone is encountered. The well depth will be chosen to allow a minimum of ten feet of water in the finished well.

The surface completion for each well will consist of a lockable steel pipe, grouted a minimum of four feet below ground surface (Figure 9). The surface seal will be sloped to promote drainage away from the well.

Grouting Procedure

The bedrock monitoring well casings will be grouted using the Halliburton single-plug method. A quantity of grout equal to approximately 1.5 times the volume of the total annular space will be mixed. The grout mixture will be prepared by mixing five pounds of powdered bentonite, two pounds of calcium chloride, and one sack of Portland Cement per six gallons of water. The grout will be placed inside the casing with a drillable plug placed on top of the grout. Water pressure or drilling rods will be used to force the plug toward the bottom of the casing and subsequently the grout into the annular space. The plug will be forced to within approximately one foot of the bottom of the casing. If used, the rods will then be removed from the casing at which time the casing will be filled with clean water. A valve on the clean water line will be closed to maintain pressure on the plug and the grout will be allowed to stand for at least 12 hours before drilling may be resumed.

Overburden Well Installation

A test boring will be advanced at the overburden well location, using the same procedures described for bedrock well locations.

Upon auger refusal on bedrock, the augers will be removed and a temporary six inch I.D. steel casing will be installed to the top of rock. Alternatively, 6-1/4-inch I.D. augers may be used to advance the borehole to rock, at which point they will act as a temporary casing for well installation.

Approximately six inches of clean quartz sand will be placed to the bottom of the borehole. A four-inch I.D., Schedule 40, slotted (0.010-in. slots) PVC well screen with sufficient four-inch PVC riser pipe will be installed on top of the quartz sand. A quartz sand-pack will be installed completely around the well screen to a minimum distance of 1 ft. above the top of the screen. This sand-pack will in turn be overlain by a minimum of 2 ft. of hydrated bentonite, followed by a cement-bentonite grout mixture to ground surface.

The surface completion for the overburden well will be the same as that described for the bedrock monitoring wells.

Well Development

Upon the completion of a well, it will be allowed to sit a minimum of 12 hours for grout to set and then will be developed to provide optimum communication with the formation. Any combination of bailing, mechanical surging with a rubber surge block, and pumping using a submersible pump may be used for development. All development water will be contained as noted in Appendix I.

The amount of water removed during development will be recorded on the Monitoring Well Development form (attached). Development will include, if possible, removal of all drill water lost during installation. Development will be continued until development water is relatively free of sediment.

In addition, turbidity, pH, and conductivity measurements will be obtained during development. If possible, development will continue until the periodic measurement indicate a stabilization of these parameters and turbidity is 50 NTUs or less. Stabilization will be attempted, developing the well for up to two hours.

If the goals for well development as described are unable to be met in a period of 2 hours, the situation will be identified to the NYSDEC on-site representative. Since the intent of development is to establish communication with the formation, results from successive hydraulic conductivity tests can be used to check communication with the formation. Assuming the turbidity goal has not been met, two successive hydraulic conductivity tests will be performed and, if the results appear reasonable for the type of formation and agree within 10% of one another, the well is determined to be developed.

Equipment Decontamination

All drilling equipment which comes in contact with the subsurface materials including drilling bits, augers, casings and tools will be decontaminated prior to site entry and between each well location. Decontamination of this equipment will be accomplished using a brush to remove any large solid particles, followed by steam cleaning with clean water. The drilling and decontamination wastes will be containerized as specified in Appendix I. Well installation material such as screens and casing will also be steam cleaned in this manner prior to use.

Split-spoon samplers and any other hand-sampling equipment used for the collection of soil samples will be decontaminated at the drilling location with an alconox wash followed by clean and deionized water rinses.

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APPENDIX H
Equipment Decontamination Procedures



APPENDIX H

EQUIPMENT DECONTAMINATION PROCEDURES

DRILLING EQUIPMENT

All equipment which comes in contact with the subsurface materials including drilling bits, drilling rods, augers, drilling casing, pipe, and tools will be decontaminated prior to site entry and between each well or boring location. Decontamination of this equipment will be accomplished using a brush to remove any large solid particles, followed by steam-cleaning with clean water. The drilling rig will also be steam-cleaned prior to entry and prior to leaving the site. The cleaning will take place in a designated decontamination area. The decontamination area will consist, at a minimum, of a polyethylene-lined, bermed area large enough to collect steam-cleaning wash water and from which decontamination wastes can be pumped into 55-gallon drums, or other appropriate containers. Polyethylene lining will consist of a minimum of two or more layers of 6 mil polyethylene. The drilling and decontamination wastes will be handled and disposed according to procedures outlined in Appendix I of this document.

After cleaning, the equipment will be placed on racks specifically used for the temporary storage of clean equipment. The racks will be located adjacent to the drilling operation but far enough away that the equipment will not risk recontamination prior to use. Well installation material such as well screens and riser pipes will also be cleaned in this manner prior to use, if not previously cleaned and certified by the supplier.

SOIL/SEDIMENT SAMPLING EQUIPMENT

Equipment brought into actual contact with a laboratory sample (excluding sample containers) will be cleaned prior to starting and between each use. Split-spoon samplers, sediment samplers, field workers' gloves, soil knives, etc., used for the collection of soil samples will be decontaminated using phosphate-free detergent (i.e., alconox) and clean water followed by a deionized water rinse. This procedure eliminates the use of acid or solvent rinses in situations where gross contamination is not a problem (e.g., contaminated with separate phase product).

Decontamination liquids and related solid waste will be contained and disposed according to procedures outlined in Appendix I.

GROUNDWATER/SURFACE WATER SAMPLING EQUIPMENT

Groundwater sampling will be performed using dedicated disposable equipment and as such will not require decontamination. Equipment used to measure pH, conductivity and water levels will be decontaminated using a detergent wash followed by clean and deionized water rinses.

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APPENDIX I

Containing Drilling-and Sampling-Related Wastes

APPENDIX I

CONTAINING DRILLING-AND SAMPLING-RELATED WASTES

Drilling Fluids

The drilling recirculating fluid will be contained and disposed of after every ten feet of coring or drilling. This procedure is followed to minimize the potential for groundwater contamination by the drilling fluid as the borehole is advanced. The waste drilling fluid will be temporarily containerized in either 55-gallon drums or a tank truck. Fluids will be screened for the presence of VOCs using an organic vapor monitoring instrument.

Drilling Equipment Decontamination Wastes

The drilling and related equipment (augers, split spoons, drill rods, etc.) will be decontaminated on a temporary decontamination pad and the wastes containerized in 55-gallon drums or a tank truck. The temporary decontamination pad will be set up at a location that will not interfere with drilling activities or activities of Enarc-O employees. The decontamination wastes contained in the drums or tank truck will be screened for the presence of VOCs using an organic vapor monitoring instrument.

Soil Cuttings

The soil cuttings from the monitoring well installations will be containerized in 55-gallon drums. Drummed soil will be screened in the field for the presence of VOCs. Disposal recommendations will be developed based on screening results, results of the soil gas survey, and groundwater analyses. If the screening or analytical results indicate the potential presence of contaminants, further soil characterization and/or disposal by a licensed hazardous waste contractor may be performed. If sample screening, on-site soil gas analysis and laboratory analytical results indicate contaminants are not present, the soil will be disposed on site.

Personal Protective Clothing Waste

Waste personal protective clothing (tyvek suits, gloves, boots, etc.) worn during the drilling operations will be placed in plastic bags and disposed as solid waste in Enarc-Os on-site dumpster.

Well Development and Purge Water

Groundwater removed from monitoring wells during development, hydraulic conductivity testing and purging prior to sampling will be containerized in 55-gallon drums and stored at the Enarc-O facility until appropriate disposal at permitted facilities can be arranged. If analytical results indicate the potential presence of contaminants, further characterization and/or disposal by a licensed hazardous waste contractor may be performed. Alternatively, on site treatment of the water using carbon filtering to remove VOCs, or other appropriate methods may be performed.

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APPENDIX J

Procedure For Rising Head Tests



APPENDIX J

PROCEDURES FOR RISING HEAD TESTS

In order to determine the in-place hydraulic conductivity of the overburden and bedrock at the newly installed monitoring well locations, rising head tests will be performed. These tests involve lowering the water level in the monitoring wells and measuring the change in head with respect to time as the water level recovers. In wells which are slow to recover the water level will be bailed down and recovery measured manually. Wells which recover too quickly for this method will be tested by removing only one bailer of water and the recovery measured by means of a pressure transducer system.

The rising head tests for monitoring wells with rapid recovery rates will be conducted as follows:

- The static water level in the monitoring well to be tested will be measured and recorded.
- The pressure transducer will be placed in the monitoring well to a minimum depth of three feet below the static water level.
- Readings will be made using the data logger until three consecutive readings are the same (equilibrium conditions).
- The data logger will then be calibrated to read 0.00 feet at static conditions. Following the installation and calibration of the pressure transducer, a pre-cleaned bailer will be lowered into the well and placed just below the water surface.
- Water level measurements will again be made until the water level returns to static conditions following introduction of the bailer. If static conditions are not reached within 15 minutes following introduction of the bailer the well will be tested using the procedures described below for slow recovery wells.
- Once static conditions are re-established, the bailer will be rapidly removed from the water column, thus creating a rapid decline of the water level. Coincident with the withdrawal of the bailer, automatic logging of the water levels will be initiated using the data logger. It is a primary goal in a recovery test to "instantaneously" remove a volume of water that will result in a measurable head decline, the recovery of which (to static conditions) can be monitored over time. Such an instantaneous withdrawal results in recovery due to contributions of flow from the surrounding formation; this flow is controlled by the formation's hydraulic conductivity and not other factors such as storage effects.
- The water level measurements will continue until water levels recover to within a minimum of 10 percent of the original static level (90 percent recovery), or an elapsed time of one hour. If after one hour the water level has not recovered to the above criteria, the transducer may be removed and the monitoring well will be tested at a later date using the procedures described below for slow recovery wells.

- Data stored in the data loggers will be "dumped" either to a hard copy printout using a field printer or to a magnetic disk using a portable computer. If field printouts are used, each will be dated and signed by the field geologists.

For monitoring wells with slow recovery rates the following procedure will be used:

- The static water level will be measured and recorded.
- The monitoring well will be bailed by hand until the depth to water appears to stabilize, based on the depth of travel of the bailer rope (this measurement needs only to be approximated and is not critical to the test), or to the top of the open or screened interval in wells which are screened below the standing water level.
- The bailer will then be removed and water level measurements will be collected by hand, using an electronic water level indicator, at a frequency which will provide approximately 15 to 20 data points during recovery (to within 10 percent of the total drawdown), if feasible. Water level measurements will be recorded on the Hydraulic Conductivity Testing Report (attached).

A pre-cleaned bailer, one for each monitoring well, will be used in the rising head testing. All equipment which enters the monitoring wells, such as the transducers or water level probes, will be cleaned prior to reuse with a detergent wash followed by clean and deionized water rinses. All groundwater and rinse water generated by the rising head tests will be collected in appropriate containers and disposed according to the procedures outlined in Appendix I.

The data from both types of rising head tests will be reduced and evaluated as described below.

The following equation is used to calculate the in-situ hydraulic conductivity of the formation opposite the interval of the piezometer (Hvorslev, 1951):

$$k = d^3 \ln \left(\frac{2m L}{D} \right) \ln \frac{H_1}{H_2} \frac{1}{8 L (t_2 - t_1)}$$

Where:

K = hydraulic conductivity in ft/min

d = casing diameter (ft.)

L = intake length (ft.)

D = intake diameter (ft.)

t₁ = time 1 from semilog graph, in minutes

t₂ = time 2 from semilog graph, in minutes

H₁ = residual head (ft.) corresponding to t₁

H₂ = residual head (ft.) corresponding to t₂

m = square root of the ratio of horizontal to vertical permeability (an estimated value)

The above method of calculating hydraulic conductivity was developed by Hvorslev for the U.S. Army Corps of Engineers as a result of a comprehensive study of methods of in situ hydraulic conductivity estimation. The method is founded on the precept that whenever a hydrodynamic system is disturbed (e.g., piezometer installation, artificial withdrawal of water) water will flow from (or to, in the case of a surcharge) the system until equilibrium is again achieved. A time lag will exist between the disturbance and re-establishment of equilibrium. The magnitude of this time lag is inversely proportional to the hydraulic conductivity of the formation and varies with the size and type of well.

Hvorslev's research resulted in the definition of a series of shape factors for a variety of well construction details. The preceding equation for calculating hydraulic conductivity corresponds to a shape factor for a well with casing extending to an open hole in which the slug test is performed and where L/R is greater than eight. This shape factor was selected to match the piezometer/well construction in the study area.

In using this equation for calculating hydraulic conductivity, all of the input variables are clearly defined except for the h and t intervals. When doing recovery test data analysis, the head ratio and time are plotted on semi-logarithmic paper. An exponential relationship, or straight-line data plot, should result. Hvorslev suggested that data for the region of head ratios between 0.37 and 0.1 will be most representative. Accordingly, the straight line portion of the plot, within these limits, will be used in the calculation of hydraulic conductivity. In those cases where the data plot between these limits is found to be inconsistent or erratic, those points providing a best fit straight line will be used for the calculations.

References

Hvorslev, M.J., 1951, Time Lag and Soil Permeability in Groundwater Observations. United States Corps of Engineers, Waterways Experiment Station, Bulletin No. 36, April 1951.

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APPENDIX K
Pump Test Procedure



APPENDIX K

PUMP TEST PROCEDURE

INTRODUCTION

This Appendix provides a step by step procedure for conducting a pump test to determine aquifer characteristics including transmissivity, storativity and the apparent radius of influence. Please note that information regarding potential yield, pumping rates, and sampling and management of water are described specifically for this site in Section 4.7.2 of the work plan.

Pre-Test Procedures

1. Review the site hydrogeologic data and identify the wells to be monitored during the pump test. If possible, the monitoring well network used for the test should extend beyond the cone of depression estimated to be caused by the pumping well.
2. Review the well construction data to gather the following information on the pumping and monitoring wells:
 - Well Number
 - Location
 - Ground Elevation
 - Datum Elevation
 - Reference Measurement Point
 - Reference Measurement Point Elevation
 - Type of Pump
 - Capacity of Pump
 - Flow Measuring Device
 - Type of Well Screen
 - Opening Size
 - Bottom of Well Screen Elevation
 - Top of Well Screen Elevation
 - Screen Diameter
 - Hole Diameter
 - Test Number
 - Static Water Level

Record the data on the attached Pump Test Data Sheet.

3. Review the site Health and Safety Plan to determine the required personal protection and the type of air monitoring device(s) to be used during the test.

4. Determine the means of containing and disposing of the effluent derived from the pumping well. Estimate the expected yield based on the well's design and the pump capacity. If necessary, arrange to have sufficient tanks, drums or other containers in place to receive the effluent.
5. Measure the water levels in the pumping well and monitoring network over a period of 2 days before the test. Follow the procedures for water level measurement described in this document. Record the data on the Pump Test Data Sheet form.
6. If possible, the pump should be run for a short period of time to set the desired pumping rate. If a totalizing flow meter is to be used during the test, it should be installed in the discharge line. The water level should be allowed to re-stabilize.
7. Schedule the test during a period of time that stable, dry weather conditions are expected.

3.0 TEST PROCEDURES

1. Re-measure water levels in the pumping well and in the entire monitoring network just prior to the start of pumping. If possible, a stilling tube should be installed in the pumping well to negate the effects of turbulence caused by pumping. Record the date, time of measurement, and depth to water on the Pump Test Data Sheet form.
2. Initiate pumping at a steady rate, as previously determined. If a totalizing flow meter is used, record the initial meter reading before pumping, then measure the discharge over a 1-2 minute interval to determine the pumping rate, Q . Ambient air quality in proximity to the pumping well should be monitored with the appropriate detection device(s) specified in the Health and Safety Plan.
3. If electronic water level measurement probes are used, water levels in the pumping well and nearby monitoring wells will be measured according to the following schedule:

<u>Time Since Start of Pumping</u>	<u>Water Level Measurement Frequency</u>
0-10 minutes	2 minutes
10-60 minutes	5 minutes
1-4 hours	20 minutes
4-8 hours	40 minutes
8-24 hours	2 hours
24-48 hours	4 hours

If transducers and a data logger are used, the following measurement schedule will be programmed:

<u>Time Since Start of Pumping</u>	<u>Water Level Measurement Frequency</u>
0-10 minutes	15 seconds

10-60 minutes	30 seconds
1-4 hours	1 minute
4-8 hours	15 minutes
8-24 hours	30 minutes
24-48 hours	1 hour

4. Periodic measurements of the entire monitoring network should be continued for the remainder of the test every 4-6 hours.
5. The flow rate should be checked on an hourly basis.
6. The following data will be recorded for each well on the Pump Test Data Sheet Forms:
 - Date
 - Time
 - Elapsed Time Since Pumping Started
 - Pumping Rate
 - Depth to Water
 - Water Elevation
 - Drawdown
 - Personnel
 - Barometric pressure and weather changes
 - Other Pertinent Comments, as appropriate
7. Just prior to the end of cessation of pumping, a full round of measurements of the entire monitoring network should be performed. At the completion of this measurement, the final flow rate will be determined and recorded. If applicable, the totalized flow will be recorded.
8. Water level measurements will continue during the recovery period for a similar amount of time as elapsed during pumping or until recovery of 90% of the original water level is achieved in the pumping well. Observations will be made at the same frequency as performed for the pumping phase of the test described above under Item #3. The data will be recorded on the Pump Test Data Sheet form.
9. At the end of the test, all equipment will be decontaminated using procedures discussed in this document.

4.0 POST-TEST ANALYSIS

Drawdown vs. Elapsed Time will be plotted on both semi-log and log-log graph paper. The data will be analyzed using Theis, Jacob-Cooper or Hantush Methods, as appropriate. The pump test data will be used to determine formation transmissivity, storage coefficients and vertical permeabilities as well as the calculated radius of influence. It is anticipated, based on available information for this site, that the drawdown plot will first be examined for evidence of hydraulic barriers or recharge boundaries (see excerpts from Fetter 1988 attached). This data will also be

used to estimate confined or unconfined conditions to allow selection of appropriate analytical formulae (Theis, Jacob, Hantush, etc.). Calculations, supporting graphical, and/or tabular summaries of data will be included in the RI report as necessary to support conclusions.

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multiple-well system will result in a composite hydraulic gradient greater than that of an equivalent confined system in order to compensate for a reduced value of aquifer transmissivity.

In designing well-field layouts, it is necessary to take into account well interference. The level of the water in the well during pumping determines the length of pipe necessary to carry water to the surface. The characteristics of the well pump and the horsepower requirements of the motor also depend upon the depth to the pumping level. If wells are spaced too closely together, the amount of well interference could be excessive. Aligning wells parallel to a line source of recharge, such as a river, would result in less well interference than would a perpendicular configuration.

6.10 EFFECT OF HYDROGEOLOGIC BOUNDARIES

If a well is not located in an aquifer of infinite areal extent, as is the case with all real wells in real aquifers, the drawdown cone will extend until either the well is supplied by vertical recharge or a hydrogeologic boundary is reached. A hy-

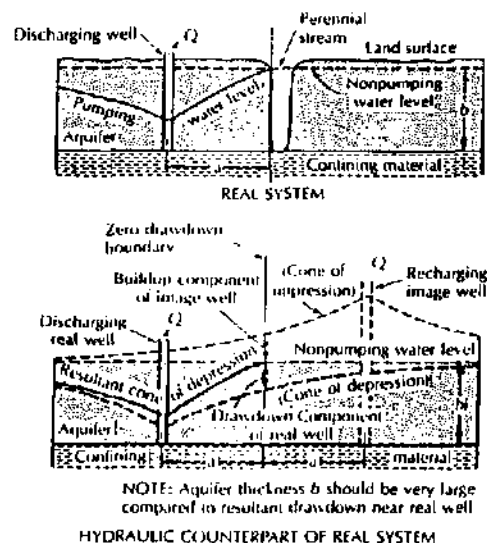


FIGURE 6.24 Idealized cross section of a well in an aquifer bounded on one side by a stream. Source: J. G. Ferris et al., U.S. Geological Survey Water-Supply Paper 1536-E, 1962.

drogeologic boundary could be the edge of the aquifer, a region of recharge to a fully confined artesian aquifer, or a source of recharge, such as a stream or lake.

Boundaries are considered to be either recharge or barrier boundaries. A recharge boundary is a region in which the aquifer is replenished. A barrier boundary is an edge of the aquifer, where it terminates, either by thinning or abutting a low-permeability formation, or has been eroded away.

Figure 6.24 shows a well bounded by a recharge boundary. The recharge boundary can be simulated by a recharging image well located an equivalent distance away from the recharge boundary but on the opposite side. Figure 6.25 indicates the presence of a barrier boundary. The barrier boundary is simulated by a discharging image well located an equivalent distance away from the boundary but on the opposite side. Boundaries have the most dramatic impact on the drawdown of a pumped well for the aquifer with no source of vertical recharge. As the well withdraws water only from storage in the aquifer, drawdown proceeds as a function of the logarithm of time.

Figure 6.26 shows a theoretical straight-line plot of drawdown as a function of time on semilogarithmic paper. The effect of a recharge boundary is to retard the rate of drawdown. Change in drawdown can become zero if the well

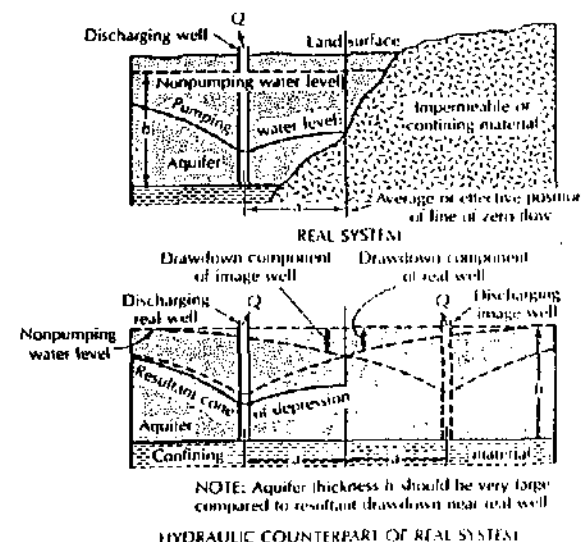


FIGURE 6.25 Idealized cross section of a well in an aquifer bounded on one side by an impermeable boundary. Source: J. G. Ferris et al., U.S. Geological Survey Water-Supply Paper 1536-E, 1962.

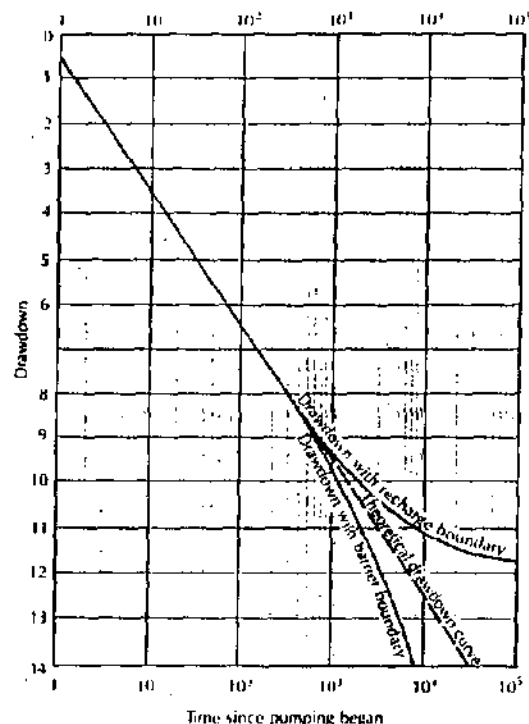


FIGURE 6.26 Impact of recharge and barrier boundaries on semilogarithmic drawdown-time curves.

comes to be supplied entirely with recharged water. The effect of a barrier to flow in some region of the aquifer is to accelerate the drawdown rate. The water level declines faster than the theoretical straight line.

6.11

PUMPING-TEST DESIGN

Adequate design and execution of a pumping test involves considerable planning and attention to detail. An understanding of fundamental well hydraulics is necessary, not only for the interpretation of data, but also for the experimental design by which valid and usable data are obtained. The purpose of the pumping test must be established first. Determining the yield of a new well involves sim-

ply pumping the well. This type of test, as it is generally conducted, yields only the scantiest information about the aquifer itself. With careful planning, the pumping-well test can yield data to compute the aquifer transmissivity. It can also indicate the general type of aquifer.

If a test well has been drilled prior to the installation of a production well, a reasonable conjecture can be made as to the probability the well will be unconfined, semiconfined, or confined. However, the presence or absence of recharge or barrier boundaries may not be known. Indeed, this is one of the reasons to perform a long-term pumping test. If one makes a semilogarithmic plot of drawdown versus time (e.g., Figure 6.26) one can inspect it to see if the pumping level of the well stabilizes. If this occurs, this means that there is a source of recharge, either vertically by leakage across a semiconfining layer or horizontally from a recharge boundary. If the water level falls faster than the theoretical drawdown curve, then the presence of a barrier boundary must be considered.

The amount of information gained from a pumping test expands greatly if one or more observation wells are involved in addition to the pumping well. Both transmissivity and storativity of the aquifer can be determined, as can the vertical hydraulic conductivity of any overlying semipervious layers. More eloquent tests can be used to determine the value of the vertical anisotropy of the formation. Radial anisotropy and recharge or barrier boundaries can also be detected.

6.11.1 SINGLE-WELL PUMPING TESTS

The basics of a single-well pumping test are also applicable to pumping tests involving multiple wells. The first step is to determine the location of the well to be drilled. This is best done on the basis of detailed exploration using geological, geophysical, and perhaps aerial photo techniques. However, the location of the well is often dictated by economic or engineering factors. If economic or engineering factors predominate, the hydrogeologist should determine if there is a reasonable chance of success based on the known hydrogeology of the site.

A test well may be bored as the first step, or the production well may be drilled immediately. The geologist should make a log of the geologic formations encountered. The water level in the drilled hole should be recorded as a function of the depth of the hole; however, this might not be possible if certain drilling techniques such as rotary and reverse rotary are used. Based on the test hole and selected borehole geophysical studies, the hydrogeologist can determine the depth and thickness of potential aquifer zones. An aquifer is selected, and a test or permanent well is installed. If at all feasible, the well should be open throughout the entire thickness of the aquifer. The physical dimensions of the well should be recorded, along with the depth, thickness, and type of aquifer. A description of the aquifer material should be included. An inventory of nearby wells should be made, and it should be determined whether any other