REPORT ON FEASIBILITY STUDY
ENARC-O MACHINE PRODUCTS
LIMA, NEW YORK
NYSDEC REGISTRY NO. 8-26-011

by

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EXECUTIVE SUMMARY

Haley and Aldrich has performed a feasibility study (FS) for site remediation at the Enarc-O Machine Products facility in Lima, New York. This study has been performed in accordance with an order-on-consent between Kaddis Manufacturing and the New York State Department of Environmental Conservation.

The study evaluated potential remedial schemes for applicability to the site conditions as determined by the remedial investigation (RI) performed at the site. Contaminants of concern consisting of chlorinated compounds are present in soils in a relatively limited source area beneath, and immediately adjacent to the existing building. Groundwater is contaminated beneath this source area; a contaminant plume historically extended off the property but has significantly attenuated and now is generally confined to the limits of the Enarc-O property.

A health risk assessment performed for the site indicated that existing contaminant levels and the identified potential exposure pathways, do not create unacceptable risks to humans. As such, health risk did not drive the process of selecting remediation actions. Cleanup criteria for the contaminated media at the site are provided by NYSDEC guidance documents containing Standards, Criteria and Guidance values.

Remedial response actions evaluated as part of this FS included No Action (with associated monitoring), Control/Isolation, Excavation and Disposal, In-situ and Ex-situ Treatment, and Separation and Treatment. Based on the evaluation, the No Action and In-situ/Ex-situ alternatives for soil, and Separation and Treatment for groundwater, were found to be inappropriate responses. The remaining response actions were found to be most applicable to the site conditions. The specific technologies within these response action categories identified as being the most likely to be effective in obtaining the remedial goals for the site are:

- No Action, with associated monitoring, for groundwater;
- Excavation and disposal of shallow, contaminated courtyard area soil as solid waste;
- Separation/treatment of contaminants via wind-powered low vacuum vapor extraction from soils remaining in place; and
- Control/Isolation via a low-permeability cap for soil remaining in place.

Based on the site conditions, and the findings of this FS, a combination of these specific technologies is proposed as the response that would produce optimum results, since each alternative by itself might not produce significant results.

The separation of contaminants from affected soil would consist of low-vacuum vapor extraction from wells installed beneath the building and perforated piping beneath the courtyard after excavation and disposal of shallow soils as non-hazardous solid waste. Investigations to date have indicated positive improvement of groundwater quality with time, even in the absence of any previous remedial measures in the source area, and where infiltration of precipitation has continued to infiltrate the subsurface. The actions proposed herein will represent positive and effective steps in reducing contaminant mass in the source area, as well as reduce significantly the potential for additional contaminant migration.

TABLE OF CONTENTS

III. DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

TABLES
FIGURES

APPENDICES

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

1-01. Purpose and Organization of Report

This report presents the results of the Feasibility Study (FS) at the Enarc-O Machine Products facility site in Lima, New York. The FS was undertaken on behalf of Kaddis Manufacturing Corporation (Kaddis), the owner of the facility, for NYSDEC Registry Site No. 8-26-011, in accordance with Order-on-Consent No. B8-0112-91-04 between Kaddis and the New York State Department of Environmental Conservation (NYSDEC).

This FS report has been prepared in conformance with the United States Environmental Protection Agency (USEPA) guidance document dated October 1988 (EPA RI/FS Guidance), and using criteria of the NYSDEC's 15 May 1990 Technical and Administrative Guidance Memorandum (TAGM No. 4030)(1,2)[*]. The organization of this FS report is described as follows.

Section 1 contains a summary of the results of the Remedial Investigation (RI) and an overview of the FS.

Section 2 describes the identification and screening of general response actions. The identification and screening of general response actions, based on the RI data, includes the following activities:

- develop remedial action objectives which specify site compounds and media of interest, and potential exposure pathways. Objectives are based on compound-specific cleanup criteria provided by NYSDEC;
- develop general response actions for each medium that may be taken to satisfy the remedial action objectives;
- identify volumes and areas of media to which general response actions might be applied.

Section 3 describes the screening criteria for alternatives;

Section 4 presents an identification of specific alternatives within the response actions that are retained from Section 2, and a detailed analysis of the alternatives with respect to the following criteria:

- Overall protection of human health and the environment;
- Compliance with SCGs (New York Standards, Criteria and Guidelines);
- Long- and short-term effectiveness;

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[*] Numbers in parentheses refer to references cited at the end of this report text.

- Implementability;

- Reduction of toxicity, mobility, or volume of site compounds; and

- Cost.

Section 5 summarizes the findings and conclusions of the FS.

1-02. Background Information

This section presents a summary of Haley & Aldrich's remedial investigation report for the site (3).

A. Site Description and History

The site is a 6± acre property located at 1175 Bragg Street in Lima, New York, in the northeastern portion of Livingston County as shown on Figure 1. The site is approximately one mile southeast of the Village of Honeoye Falls. The Enarc-O facility is a one-story slab-on-grade building, located in the northern half of the site. The site is bounded on the north by residential property, on the east by residential property and Honeoye Creek and on the south and west by farmland and residential property. Immediately south of and adjacent to the Enarc-O property is a small automobile repair/bodywork shop, Crane's Collision, which has reportedly been operating since the mid 1960s. The present Enarc-O Machine Products location has been operating since 1960. A site plan is presented on Figure 2.

Solvent use at the site has been limited to a vapor degreasing process which removed oil residues from newly-machined parts. This is a contained process that recirculates the cleaning fluids. No loss has been reported to have occurred from this system. Trichloroethene (TCE) was used in this process until 1980, and 1,1,1-trichloroethane (1,1,1-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. The Kensol 30 is stored in 55-gallon drums in the storage building and transported into the main building as needed by forklift.

Former and current degreasing operations have been performed on the south side of the east wing of the main building (Figure 3). One degreaser is located on a metal grate over a concrete vault which is depressed approximately 2 ft.± below slab grade.

An underground storage tank (UST) containing gasoline was previously 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 soil analytical results from subsurface soils, petroleum-related contaminants were detected in low, estimated concentrations.

Used cutting oil was previously stored in an above-ground tank on the east side of the production building (Figure 3). This tank was also removed in July 1986.

A solvent storage tank was previously located on the east side of the production building in the courtyard area (Figure 2). On June 18, 1985 approximately 5 gallons of 1,1,1-TCA reportedly 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 spread out in the parking area, allowing volatile organic compounds (VOCs) to volatilize. Enarc-O removed the solvent storage tank in July 1986 and discontinued chlorinated solvent usage. Subsequent investigation was performed leading up to and including a formal remedial investigation (RI), performed in accordance with an Order on Consent with NYSDEC.

Based on the results of the remedial investigation, the apparent source area is assumed to be beneath the floor slab in the vicinity of the former degreaser and in the courtyard south of the degreaser area.

Prior to 1988, public water supply service did not extend into the study area and Enarc-O's water supply was obtained from a private well, 180 feet deep, located on the property. Enarc-O terminated usage of the water supply well as its source of water in 1988. Area residents on Martin Road west of Honeoye Creek, as well as Ideson Road and Bragg Street also relied on domestic private wells for their water.

B. Nature and Extent of Contamination

The remedial investigation encompassed both the apparent source area in the courtyard and additional areas outside this source area. Soil vapor sampling was performed inside and outside the facility, soil and bedrock test borings drilled, and groundwater monitoring wells installed across the site. In addition, former offsite private water supply wells were sampled on more than one occasion. Previous investigations by others were also performed, including soil test borings and well installation.

Soil

Contaminants in source area soils are generally concentrated in a limited area in the vicinity of the former degreaser and storage tank, and are not present at significant concentrations at distances generally greater than 50 feet from this location. VOCs in soil vapor were detected at levels indicative of a source area at shallow depths within the building near the degreaser and just outside the south building wall in the courtyard. In the courtyard area, TCE and other VOCs are present in an irregular pattern with respect to depth and distance from the degreaser location. The data indicated the source area does not encompass the entire courtyard area.

Subsurface soil vapor was collected outside in the source area and inside the Enarc-O building adjacent to the courtyard area. Vapor samples collected from the probe locations were analyzed for VOCs onsite using a portable Photovac 10S70 gas chromatograph. TCE, 1,1,1-TCA, 1,1-DCE and 1,2-DCE were the major soil vapor constituents detected. Other compounds detected at significantly lower concentrations included PCE, vinyl chloride, toluene and xylenes.

Soil vapor locations outside the building in the courtyard area and inside the building in the area of the former degreaser contained the highest levels of contamination in soil vapor. Maximum VOCs values of 345 ppm and 387 ppm in soil vapor samples were detected inside the building and outside the building near the former TCA tank, respectively.

Soil contamination away from the source area is limited to low part per million concentrations in the area of the former gasoline UST along the south side of the building and very low part per million concentrations around the storage building and around the perimeter of the courtyard. These levels indicate that the source area within the courtyard is the only area of concern.

Groundwater

For all onsite shallow bedrock monitoring wells, RI groundwater sampling was conducted for four quarterly events, beginning in July 1994. In all sampling events, the principal compound detected was TCE, with lesser levels of 1,1,1-TCA, cis-1,2-DCE and lesser amounts of PCE. Minor amounts of 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), vinyl chloride and chloroform were also detected, with pre-RI (1991) sampling events also detecting trace levels of 1,1,2,2-TCA and carbon tetrachloride. Table 1 summarizes groundwater sampling results.

A comparison of the last four sampling events with the 1991 groundwater sample VOC concentrations (for wells MW-1 through MW-6 only) indicates contaminant levels have decreased significantly in several of the wells (MW-2 through MW-4) or have decreased from already low levels to non-detect (non-estimated values only) in MW-1 and MW-6. Only one well, MW-5, did not show a substantial decrease. Refer to Figure 2 for well locations.

Groundwater VOC concentrations are highest in well MW-201D in the courtyard near the source area. VOC levels in wells MW-1 and MW-6 are substantially lower than the other onsite monitoring wells, and have been at or below drinking water standards for all sampling events since installation in 1990. Wells MW-2, MW-3, MW-5 and MW-201D have had the highest VOC concentrations. In general, most of the wells have exhibited an overall decrease in total VOCs since the 1991 sampling events (with some seasonal variation). Total VOC levels in MW-5 have increased somewhat since 1991.

Groundwater sampling and analyses of 38 residential water supply wells by others in 1985 indicated the presence of VOC contamination in 21 of the residential wells and the Enarc-O supply well. Haley & Aldrich resampled and analyzed 11 residential wells and the Enarc-O supply well in April 1995. Seven of these residential wells and the Enarc-O well were sampled again in August 1995 to allow seasonal comparison of data. The sump in the basement of one residence near Enarc-O was also sampled during this event, for comparison to previous analyses performed by NYSDOH.

April 1995 was the first RI sampling event for the offsite former residential water supply wells, and included 11 residential wells and the Enarc-O supply well. Each well was sampled at two depths, with the exception of the Enarc-O supply well and the well at 7880 Martin Road. A third, deep sample was obtained in these two wells because of their greater depth.

The groundwater analytical data from the April 1995 sampling event indicated that VOC concentrations in nearly all of the offsite wells decreased significantly since the 1985 sampling events, and in some cases no VOCs were detected. VOC concentrations in six of the twelve wells sampled were below New York State drinking water standards, generally in wells furthest from the Enarc-O site. VOCs also dropped significantly in the wells nearer the Enarc-O site, although selected compounds were detected at levels above NYS drinking water standards. Compound concentrations in the residential wells did not exhibit a discernable pattern with regard to vertical distribution, and in most cases the shallow and deep samples exhibited similar concentrations. The samples from the Enarc-O well indicated the greatest compound concentrations near the apparent source area to be near the water table.

The August 1995 sampling event (6 residential wells nearer the Enarc-O site) entailed sampling at depths (elevations) where the highest concentrations were seen during the April 1995 sampling event. The analytical results from the offsite wells revealed little or no change from the April 1995 sampling results. All detected VOCs were present at levels below the detection limit, thus the values were estimated. There were no non-estimated VOCs detected at levels at or above New York State Drinking Water Standards. The former Enarc-O supply well, also sampled in August, showed an increase in the TCE concentration over previous analyses. All other compounds detected for this well were low, estimated values.

Data from the two 1995 offsite sampling events reveals concentrations that are generally at or below New York State drinking water standards, for non-estimated VOC concentrations. When these data are compared to the 1991 groundwater sampling event, significant diminishment of groundwater VOCs is apparent. This means that continued significant migration of VOCs from the apparent Enarc-O source area is not occurring.

C. Contaminant Fate and Transport

The environmental persistence and properties of site compounds of concern, and potential migration routes are factors which determine the distribution of site chemicals of concern in the subsurface. The ability of an organic chemical to move in the subsurface is a function of both the chemical properties of the compounds and the mechanical properties of the chemical-subsurface-environment system.

Site contaminants released into the soil are attracted to and sorbed onto soil, but may migrate some distance downward depending on its properties listed above. The site contaminants have migrated to the water table, and have further migrated with groundwater flow.

Groundwater flow rates at the Enarc-O site were estimated to be in the range of 0.1 to 9.4 x 10^5 feet per year. The groundwater plume migration limits were generally limited to the area beyond the north of Ideson Road (approximately 1500 feet). Based on the latest offsite well groundwater sampling analyses it is evident that the apparent source area is no longer supplying significant amounts of chemical contaminants to groundwater migrating offsite; contamination concentrations offsite are generally at or near acceptable drinking water levels.

D. Baseline Risk Assessment

A baseline Health Risk Assessment was performed for the Remedial Investigation of the Enarc-O Machine Products site by evaluating the compounds detected as present, the media in which they were detected, the range of concentrations detected in those media, and potential exposure routes by which humans may be exposed to these compounds. USEPA Risk Assessment guidance dictates that compounds known to be associated with site activities be included in the risk assessment, as well as other detected compounds that may be associated with anthropogenic point and non-point sources. Therefore, health risk characterization for this evaluates both chemical compounds that may have been associated with activities at
Enarc-O, as well as from compounds that may have been from other anthropogenic sources.

The potential Reasonable Maximum Exposure (RME) scenarios for the study reported in the RI were inhalation of ambient air by on-site workers, ingestion of site soils by on-site workers, inhalation of soil particulates by on-site workers, and dermal contact with groundwater by off-site residents. The results of the assessment indicate that noncarcinogenic risks for each RME scenario were less than 1, the USEPA threshold for determination of non-carcinogenic risk, with Hazard Indices ranging from 1.2×10^{-2} to 1.5×10^{-5}. Carcinogenic risk estimates were calculated to be 1.7×10^{-7} for on-site worker inhalation of ambient air. Risk values for on-site worker ingestion of soil and on-site worker inhalation of soil particles were 3.5×10^{-8} and 7.2×10^{-8}, respectively, and for resident dermal contact with off-site groundwater the risk was 2.0×10^{-9}. All these carcinogenic risk estimates fall below the USEPA 10^{-4} to 10^{-6} range of acceptable risk.

II. PRELIMINARY SCREENING OF TECHNOLOGIES

2-01. Introduction

The FS process is based on available data and information, as contained in the RI report, dated 9 January 1996 (3), and submittals to NYSDEC dated 28 April 1994, 10 October 1994 and 3 February 1995 (4,5,6).

The Feasibility Study (FS) is performed in three phases: 1) the identification and screening of general response actions, during which phase remedial action objectives and general response actions are developed; 2) the preliminary screening of alternatives; and 3) a detailed analysis of the alternatives. This section addresses the first phase, including remedial action objectives, which were established to protect human health and the environment. Remedial action objectives specify site compounds and media of concern, potential exposure pathways, and compound-specific preliminary cleanup criteria provided by the State for each impacted medium at the site, all based on results of the RI and subsequent submittals.

Following the discussion of remedial action objectives, this section describes the development of general response actions for each medium and the volume or area of each medium to which general response actions may be applied.

2-02. Remedial Action Objectives

A. Contaminants and Media of Concern and Allowable Exposures

Contaminants and Media of Concern

Compounds of concern have been detected at the Enarc-O site in groundwater and soil. The overall objectives of remediating this site are to protect human health and the environment. The specific objectives to comply with this overall goal are to reduce the contaminant levels in the source area soils to preclude or minimize further supply of contaminants to groundwater. This is done by identifying the compounds exceeding NYSDEC Standards, Criteria and Guidelines (SCGs) in each medium, then evaluating remedial alternatives to address the compounds in the affected media. The applicable SCGs for soil and groundwater, prepared by NYSDEC, are TAGM 4046, and TOGS 1.1.1, respectively (7,8).

The general area which contains the contaminated soil addressed in this FS report is shown on Figure 3. The apparent source area is confined to the courtyard area immediately adjacent to the facility, and an area beneath the existing building, as shown on the plan. Soils in this area have been demonstrated to contain concentrations of compounds above SCGs as documented in the RI.

The RI determined the impact on soil to be limited to the following VOCs:

- 1,1-DCE
- 1,2-DCE
- TCE
- 1,1,1-TCA
- PCE

The following VOCs, detected in offsite groundwater, were determined to be compounds of concern:

- 1,1-DCE
- 1,2-DCE
- TCE

This FS addresses remedial methods for soil and groundwater contaminant concentrations in the source area which exceed NYSDEC SCGs.

Allowable Exposures

The risk assessment evaluated the risks associated with soil and groundwater contamination detected at the site. The Reasonable Maximum Exposure (RME) scenarios considered included migration pathways of soil contaminants to adult workers onsite through soil ingestion, vapor inhalation or soil particulate inhalation, and offsite through groundwater exposure. Current and future use of the site and study area were assumed to be consistent with current use. The RME scenarios were established using default exposure factors for adult residents/workers. Risk assessment-based allowable exposure concentrations for site contaminants of concern were established using USEPA risk assessment guidance (RAG) procedures. The NYSDOH threshold of less than one instance in a million was used as the limit of acceptable carcinogenic risk.

The following table summarized the potential exposure scenarios, the acceptable risk range, as identified by USEPA, and the calculated risks:

Scenario	**USEPA Acceptable Risk Range**	**Hazard Index/ Calculated Risk Estimate**
Non-Carcinogenic Risk:	< 1	1.2×10^{-2} to 1.5×10^{-5}
Carcinogenic Risk:		
1. Onsite Worker Ambient Air Inhalation	1×10^{-4} - 1×10^{-6}	1.7×10^{-7}
2. On-Site Worker Ingestion of Surface Soils	"	3.5×10^{-8}
3. Soil Particulate Inhalation by Onsite Workers	"	7.2×10^{-8}
4. Off-site Resident Groundwater Exposure	"	2.0×10^{-9}

As shown by the above table, none of the exposure scenarios evaluated indicate potential exposure incidences above the acceptable risk guidelines set forth by USEPA. Accordingly, risk is not a criterion that will drive the selection of site remedial actions.

B. Development of Remediation Goals

The goal of site remediation will be to reduce levels of the contaminants of concern in the source area to currently acceptable Standards, Criteria and Guidelines (SCGs) as defined by NYSDEC. These goals are numerical in nature and serve as quantitative targets for remediation. The established SCGs for use in this FS include:

- For soils: NYSDEC TAGM 4046 "Determination of Soil Cleanup Objectives and Cleanup Levels", HWR-94-4046, 24 January 1994; and
- For groundwater: NYSDEC TOGS 1.1.1 - "Ambient Water Quality Standards and Guidance Values", 15 November 1991;

Table 1 contains the calculated soil cleanup goals for the contaminants of concern using NYSDEC TAGM 4046. Table 2 contains the referenced SCGs for groundwater referenced from TOGS 1.1.1. Exceedences of the TAGM/TOGS cleanup goals in the source area were documented by the remedial investigation.

Remedial Action Objectives (RAOs) are qualitative targets, and for the site are as follows:

- Reduce, eliminate or control, to the extent practicable, the contamination present within the soils on site;
- reduce, eliminate or control, to the extent practicable, the potential for migration of contaminants to groundwater beneath the site source area;
- mitigate the impacts of contaminated groundwater to the environment;
- provide for attainment of SCGs for groundwater quality, to the extent possible; and
- eliminate the potential for direct human or animal contact with the contaminated soils on site.
- The project risk assessment determined there appears to be no unacceptable health risk due to the presence of contaminants in soil or groundwater at the site for reasonable maximum exposure scenarios. Further, public water is supplied to the site and off- site residences and off-site groundwater has declined to generally within SCGs. Therefore the first three objectives are considered as primary drives in the screening and selection of alternatives while the last two do not drive selection.

2-03. PRELIMINARY SCREENING OF REMEDIAL ALTERNATIVES

General response actions are actions that may be applicable to remediation of this site, selected on the basis of the RI findings. This section discusses those response actions considered as remedial alternatives for the Enarc-O site.

Based upon evaluation of RI data, the general response actions considered in this FS for the Enarc-O site include (listed by medium):

- Sediment:

  Not affected at the site, therefore eliminated from further consideration.

- Soil:

  1) No action;
  2) On-site control/isolation without treatment;
  3) Excavation and off-site disposal without treatment;
  4) In-situ treatment; and
  5) Separation and treatment.

- Groundwater:

  1) No action; and
  2) Separation and treatment

The remedial alternatives are evaluated in this section (i.e. initially screened) on the basis of their ability to meet the following two general criteria:

- Effectiveness - This criterion focuses on the degree to which an alternative reduces toxicity, mobility, or volume through treatment, minimizes residual risks and affords long-term protection (referring to the period after the remedial action is in place and effective), and complies with SCGs. It also considers short-term impacts (during the construction and implementation period) and how quickly the action achieves protection.

- Implementability - This criterion focuses on the technical and administrative feasibility of implementing the alternative. Technical feasibility refers to the ability to construct, operate, maintain, replace, and monitor into the future necessary process units as well as the availability of necessary equipment and technical specialists. Administrative feasibility includes compliance with applicable rules, regulations, and statutes; the ability to obtain approvals from other offices and agencies; and the availability of treatment, storage, and disposal services (if applicable).

These criteria are considered in greater detail, along with other criteria in the detailed analysis contained in Section IV. Following is a discussion of the general response actions considered as remedial alternatives in this FS, from the standpoint of general effectiveness and implementability.

A. No Action (Soil and Groundwater)

To the extent it is both possible and appropriate, the no-action alternative is required by EPA RI/FS guidance to be evaluated as part of the FS. The no-action alternative does not provide treatment to prevent contaminant migration of compounds along identified migration pathways from source areas.

This response essentially evaluates whether there would be any threat to public health, welfare or the environment if no action is taken. It provides the baseline against which other responses can be compared. This response may be selected if natural environmental mechanisms will result in degradation or immobilization of the site compound concentrations within a reasonable amount of time, or if risks shown are acceptable by EPA standards.

The No Action alternative at this site may be considered to be an effective remedy for groundwater, since continued contaminant migration to groundwater does not appear to exacerbate the groundwater plume, and baseline risk is not above USEPA thresholds. Under natural conditions at the Enarc-O site, the VOC concentrations in the groundwater are expected to continue diminishing over time due to natural degradation and attenuation; however, this process would be enhanced if source area soils were to undergo removal or in-situ remediation, thereby reducing the contaminant mass available to migrate to groundwater. Accordingly, other response actions for soil beyond the no action alternative are evaluated.

- ☐ Effectiveness: The effectiveness of this option is limited with regard to soil, since natural processes would not effectively reduce contaminant concentration in a reasonable amount of time. Since groundwater contaminant concentrations have been shown to be reducing naturally with time, No Action could be considered an effective alternative for groundwater.

- ☐ Implementability: No Action would rate high with regard to implementability since only monitoring is required.

B. <u>On-site Control/Isolation Without Treatment (Soils)</u>

On-site control and isolation of soil without treatment would involve separating affected soils from human contact or other site media using physical barriers.

- ☐ Effectiveness: This would rate well from an effectiveness standpoint, in that a significant percentage of the source area soils are already covered by the site's manufacturing building. The courtyard area is the only uncovered portion.

- ☐ Implementability: This option would rate high for the portion of the source-area in the courtyard, which could be covered with a low-permeability cap.

C. <u>Excavation and Off-site Disposal Without Treatment (Soils)</u>

This alternative would involve removing soils by excavation from the identified source areas and disposing of the materials at an off-site facility permitted to handle such wastes. Based on the volume of affected soil on the Enarc-O site, and its relative contaminant concentrations, this option warrants further detailed evaluation. As with other potential response actions, it may be best utilized in conjunction with other measures, since excavation of the deeper source-area soils would not be feasible. The only soils accessible for excavation would be in the courtyard, to a depth of approximately 4 ft., based on the assumed depth of the building foundation.

☐ Effectiveness: the effectiveness of this alternative rates high since it represents an immediate reduction volume of the source-area contaminant mass; it also represents a permanent remedy.

☐ Implementability: This option represents an easily implementable action; excavation, hauling and disposal do not require a high degree of technical or administrative detail. Disposal options need evaluation with regard to characterization of the waste soil as hazardous or non-hazardous waste.

D. In-Situ or Ex-Situ Treatment (Soils)

In-situ treatment involves treating soil in place using a variety of techniques. Techniques evaluated for this site include:

1) bioremediation - this involves providing the proper chemical nutrients and microbes to allow biological degradation of contaminant compounds into non-toxic byproducts. It requires a specific balance of chemical conditions to be effective.

2) bioventing - this employs the injection of fresh air (oxygen) into contaminated soils to allow aerobic biodegradation, or other gases (e.g. methane) to promote anaerobic biodegradation of contaminants by existing microbes in soils;

3) surfactant flushing - liquid surfactants can be applied to affected soils to facilitate removal of adsorbed-phase contaminants. The contaminated surfactant mixture is then removed and treated.

4) oxidation - chemical oxidants such as hydrogen peroxide can be added to soil or groundwater that breaks down contaminants into non- or less-toxic compounds.

5) thermal desorption (ex-situ) - this method involves excavation of affected soils, placement in a kiln or similar device that essentially "bakes" the contaminants out of the soil. The remediated soil can then be returned to the excavation.

☐ Effectiveness: Most of these technologies have been demonstrated to be effective under the proper site conditions. The Enarc-O site would need to be evaluated in detail with regard to each type of remedy to determine its suitability. Each has the potential of reducing toxicity, mobility and volume to a degree, and would represent permanent solutions for at least a portion of the source area.

- ☐ Implementability: These remedial actions vary greatly in terms of implementability. Each has its own set of requirements in terms of technical and administrative feasibility. Most have more complex equipment and technical requirements than the other remedial actions discussed in this section.

E. Separation and Treatment (Soil and Groundwater)

Soil: Using this alternative, contaminants are separated and removed from the subsurface soil and/or groundwater and treated using chemical, physical or biological means. Separation and treatment for VOCs in soil generally entails removal of soil vapor from source-area soils, thereby reducing the contaminant concentrations in the soil mass. Given the fact that a portion of the source-area contaminant mass is located in an area of restricted access beneath the building, separation represents a potentially viable action for at least a portion of the soil mass.

Groundwater: Recovery and treatment of groundwater was evaluated. As discussed above, contaminant distribution in groundwater is limited primarily to bedrock beneath the source area. Recent and historical sampling of onsite and offsite groundwater indicate the contaminant levels have diminished through natural attenuation to levels at or below the applicable groundwater standards, except in, or very near to the source area. In addition, the risk assessment demonstrated the absence of human health risk based on the contaminant levels present, and the fact that groundwater is no longer used as a supply for drinking water in the study area. A municipal water connection was implemented several years ago as an initial response action.

- ☐ Effectiveness: Groundwater pumping as a remedial technology has been shown in several recent studies to be very limited in effectiveness in fractured-bedrock hydrogeologic settings. This is discussed further in the detailed analysis in Section IV.

- ☐ Implementability: Removal of groundwater from the source area would likely require a relatively large-scale pump and treat system, based on the apparent high bedrock permeabilities. Thus, significant effort would be expended, where no reduction in apparent risk is required, to reduce groundwater contamination to within SCGs, where a permanent alternate water supply has already been installed as a response action.

2-04. Estimated Media Volumes

The approximate volumes of source area soil requiring remediation is estimated to be 2,000 tons assuming a unit weight for the soil of 125 lbs. per cubic foot. This volume is broken down into components based on the various elements of the source area as follows (these volumes are based on a depth to rock of 10.5 ft. in the courtyard or 13.5 ft. inside the building):

Courtyard shallow soils (potentially removable):

30 x 50 ft. = 1500 sq. ft.
assume 4 ft. deep excavation = 6,000 cubic ft. x 125 lb/ cu. ft. = **375± tons.**

Courtyard deep soils (left in place):

1500 sq. ft. x 6.5 ft. thick = 9,750 cubic ft. x 125 lb/cu. ft. = **600± tons.**

Soils beneath building (left in place):

30 ft. by 40 ft. = 1200 sq. ft. x 13.5 feet deep = 16,200 cu. ft. = **1,000± tons.**

Approximate total: 1,975 tons
(say 2,000 tons)

III. DETAILED ANALYSIS OF ALTERNATIVES

3-01. Introduction

Section II initially evaluated the feasibility and effectiveness of various remedial options for the site based on the overall goals of the program and general site characteristics. This section presents a more detailed analysis of the specific remedies presented above. As discussed previously, the overall goals for remediation are to reduce, control or eliminate contaminants from the source area. Since the risk assessment performed as part of the RI determined the presence of contamination does not present a risk to human health, the specific goal of remediation is to bring contaminants in the source area soils to levels in accordance with Applicable or Relevant and Appropriate Requirements (ARARs). For New York State, the ARARs are considered to be the Standards, Criteria and Guidance (SCGs) developed by NYSDEC. For site soils and groundwater, the SCGs are TAGM 4046 and TOGS 1.1.1, respectively.

The remedial alternatives identified in previous sections as being viable options are further evaluated in this section, on the basis of their ability to meet the following seven criteria, in accordance with TAGM 4030:

1. Effectiveness and short-term impacts of the remedy;
2. long-term effectiveness and permanence of the remedy;
3. remedial action implementability;
4. compliance with applicable and relevant New York State SCGs;
5. protection of human health and the environment;
6. reduction of contaminant toxicity, mobility; and volume; and
7. implementation cost.

The following section discusses the identified options in light of these criteria.

3-01. Detailed Analysis

A. <u>No Action</u>

Description:

<u>*Groundwater:*</u> As discussed above, the No Action alternative appears to be appropriate for groundwater. This is based on: 1) the lack of risk to human health demonstrated by the risk assessment; 2) the natural decrease in contaminant levels to at or below standards set forth in TOGS 1.1.1, except in the source area; and 3) the relative ineffectiveness associated with groundwater pumping and treatment.

- *Effectiveness, short-term and long-term impacts:*

  No Action would be relatively effective in the long run. Short-term impacts would not be significant, since no action has been performed in the several-year period since the contamination was released.

- *Implementability:* No Action is a relatively easily-implemented option, involving only sampling and monitoring.

  - The No Action alternative for groundwater would include a period of monitoring groundwater conditions to determine the extent to which soil remediation further improves groundwater, and to determine that conditions do not change so as to cause unacceptable risk to human health.

  The monitoring would consist of semi-annual sampling of the on-site monitoring wells and two offsite former residential wells (7880 Martin Rd. and 1167 Bragg St.) and the sump at 7883 Martin Road. The wells and sump would be analyzed for VOCs of concern using EPA method 8260, as has been done in past sampling events, or method 8010. The results of the monitoring would be summarized, along with the soil monitoring results, in a semi-annual report submitted to NYSDEC. After three years of monitoring, the results would be reviewed with NYSDEC to evaluate progress and determine the need or lack of need for additional monitoring.

- *compliance with SCGs:* No Action would generally comply with SCGs for offsite groundwater, since offsite groundwater contaminant levels are essentially at the guidance value concentrations currently. Onsite concentrations are not within SCGs; however no risk to human health exists, and groundwater is not currently used for drinking water.

- *protection of human health and the environment:* Since it has been determined no risk currently exists, this is not a significant concern.

- *reduction of toxicity, mobility and volume:* No Action would allow natural attenuation processes to continue to reduce the toxicity and volume of contaminants. Mobility will not be reduced by this option.

- *cost:* The No Action alternative is a relatively low-cost measure in relation to other remedies, since it involves only monitoring.

<u>*Soil:*</u> The No Action alternative for soil would entail monitoring of soil contaminant levels in the source area. This monitoring would determine the degree to which natural reduction of the contaminant compounds would be occurring due to natural processes, such as volatilization and biodegradation.

- *Effectiveness, short-term and long-term impacts:*

The degree to which this alternative could provide effective reduction of the contaminant mass is not well known. Some degree of natural breakdown of contaminant compounds is likely to occur; however, the rate of destruction could not be accurately predicted. Breakdown or loss of chlorinated compounds is driven by: 1) the degree of natural air movement and volatilization; 2) the amount of organic matter contained in the soil; 3) the presence of the proper organisms; and 4) and the available supply of oxygen or other microbe-respirable gases. Unless these parameters are present in the proper degrees and combination, biodegradation is likely not sufficient to produce timely or effective remediation.

- *Implementability:* The implementability for this option rates high, since only monitoring is required.
- *compliance with SCGs:* This option does not comply with SCGs, since soil contaminant concentrations in portions of the source area are above the applicable guidance values.
- *protection of human health and the environment:* The risk assessment demonstrated a lack of health risk. This option would not provide protection of the environment unless coupled with other remedies.
- *reduction of toxicity, mobility and volume:* The natural attenuation processes occurring at the site have already demonstrated the volume of contaminants and the concentration, therefore toxicity, are decreasing. Mobility should not reduce with time.
- *cost:* The No Action alternative represents a low cost effective measure, in that monitoring is all that is required. The monitoring would be performed to determine that unacceptable risk is not occurring due to a change in site conditions.

The soil monitoring would involve periodic sampling and analysis in accordance with any of the remedial alternatives discussed below. A periodic sampling program consistent with the National Contingency Plan, involving soil sampling and analysis on a five-year schedule, would be appropriate for a No Action alternative.

B. On-site Control/Isolation Without Treatment

Description: The soils located beneath the existing building are currently isolated by virtue of being covered by the floor slab and foundation wall. The soils in the courtyard area could also be isolated by installing a low-permeability cover of asphalt or other material that would prevent: 1) further infiltration of surface water and run-on; 2) human contact with soils; and 3) generation of contaminated soil dust that could potentially be ingested by site workers.

In addition to the low-permeability cap, additional measures could be taken to further reduce infiltration. An existing roof drain currently diverts roof rainwater to the courtyard area, increasing the volume of infiltrating surface water and therefore potential contaminant transport. Elimination of this run-on could be performed by reconfiguring roof drain piping. This would be a permanent, partial remedy that would have immediate benefit.

If future expansion of the existing facility were warranted, it could involve structure expansion to the courtyard area. Such construction would not preclude the control/isolation response action, and would potentially be a more effective barrier to infiltration than a cap. Construction of an occupied space may necessitate installation of measures to prevent VOC vapors from entering the structure. This could include such measures as a vapor barrier and/or sub-slab venting.

Evaluation:

- *Effectiveness, short-term and long-term impacts*:

  - Capping or covering would have little or no effect on the community during implementation.

  - It would have little environmental impact, with the exception of excavation of minor amounts of shallow soil for foundations if building expansion were performed.

  - Implementation time would be limited.

  - Offsite disposal of limited amounts of excavated soil could be required.

  - It could be a permanent installation.

  - Waste would remain after the remedial action, but in a more isolated condition than at the present.

  - It would represent a reliable and low-maintenance control.

  - By itself, this option would not adequately address the presence of contaminants in soil, but would help prevent future migration to groundwater.

- *Implementability*:

  Due to its relatively simple and effective nature, installation of a low-permeability cap at ground surface rates high with regard to all implementability criteria.

  Without installing impermeable walls or barriers adjacent to the mass of contaminated soil, the source soils would not be completely isolated from surrounding, "clean" soils. Thus some migration of contaminants with moving groundwater could still occur; however groundwater in the source area seems to be limited to perched water in the courtyard. The volume of perched water would diminish upon placement of a low-permeability cap, and further migration of contaminants would also diminish. Thus installation of slurry walls or other vertically-oriented barriers to prevent horizontal movement is not warranted.

- *compliance with SCGs:* This option would not necessarily provide for compliance with SCGs, because it would not reduce contaminant concentrations in soil; it would, however reduce the migration of contaminants from soil to groundwater.

- *protection of human health and the environment:* This is not of significant concern due to the lack of risk; however, a courtyard cap would provide additional prevention to potential contact with contaminated soils.

- *reduction of toxicity, mobility and volume:* This measure would reduce the mobility of contaminants of concern by reducing infiltration. Toxicity and volume would not be affected.

- *cost:* The cost of this alternative is relatively low when compared to other more technically-involved remedial actions. The low-permeability cover would likely consist of asphalt pavement.

C. Excavation and Offsite Disposal Without Treatment

Description: Excavation of at least some of the source-area soils appears to represent a viable remedial alternative. As described in Section II, approximately 375 tons of potentially-affected soil could be removed from the courtyard area, in an excavation 4± ft. deep. The 4-ft. depth limit is based on the presumed depth of the existing building footings. Excavating deeper than these footings could potentially cause structural instability or damage due to settlement.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

  \- Effects on the community during implementation would be minimal. Monitoring of the work area and surrounding areas for VOC vapors would be performed during excavation. Transport of the waste soils over public highways would be required, however NYSDEC and Department of Transportation (DOT) regulations provide controls for such transport, which would be performed by a licensed waste hauler.

  \- Environmental impacts to the site would be positive, as this represents an immediate reduction in the source-area contaminant mass. It is also a permanent measure.

- Some waste would remain on site, since excavation would be limited to the upper four feet of soil, as discussed above. The remaining waste soil left in place may require additional remedial action.

- Implementation time would be minimal, and additional effort beyond the act of removal would not be needed.

- *Implementability:*

- this is a relatively simple and reliable method with a low level of technical involvement.

- Scheduling and time to implement is not prohibitive.

- Additional remedial actions would be required, for soils remaining in place, but would be reduced in scope as a result of this action.

- Excavation and disposal could be done in accordance with applicable regulations. Since the waste soil contains VOCs, a determination was required from NYSDEC with regard to the waste being potentially classified as either hazardous or solid waste. NYSDEC TAGM 3028, dated 30 November 1992 (11) allows for waste soil with relatively low levels of normally hazardous VOC compounds to be handled and disposed as solid waste.

- Haley & Aldrich has worked with NYSDEC Division of Solid and Hazardous Materials to determine the levels of VOCs in the site's source area soils that could be excavated and disposed. An investigation of the source areas was performed in accordance with the requirements of TAGM 3028, to obtain soil contaminant concentrations. A copy of our report to NYSDEC summarizing the findings and requesting approval for disposal of the soil as solid waste, is included in Appendix B.

TAGM 3028 provides guidance values for VOC levels in soil proposed for disposal. Four composite soil samples from the courtyard area were analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) analyses for VOC presence. One of the samples contained two VOCs (PERC and TCE) at levels slightly above the TAGM guidance values; however it was determined that the volume of soil containing elevated levels of contaminants was relatively small with regard to the total volume of soil to be disposed. Therefore the average concentration for the total volume of soil would be within the TAGM 3028 criteria.

Based on these results, NYSDEC has provided written approval to dispose of the soil as a solid waste at a permitted disposal facility. A copy of the approval letter, dated 6 January 1997, is also included in Appendix B.

As discussed above for the control/isolation measures, implementation of this measure would mesh well with potential construction in the courtyard area, if construction/expansion were desired by the owner. Construction-related excavation would be done in accordance with appropriate requirements for handling and disposing the soil included in TAGM 3028 and applicable solid waste regulations, and removal would allow conventional foundations to be used for the construction.

- *compliance with SCGs:* This remedial action provides for partial compliance with applicable SCGs, in that contaminated soil is being removed and replaced with non-contaminated soil. However, the soil left in place beneath the building, that currently exceeds TAGM 4046, would not be affected.

- *protection of human health and the environment:* The health risk assessment determined the form and concentration of contaminants don't represent risk so this option provides limited additional benefit in this regard. This remedial action would be protective of the environment because leaching of contaminants would be minimized or eliminated.

- *reduction of toxicity, mobility and volume:* Reduction of volume and mobility of contaminants would be accomplished by this remedial action;

- *cost:* The estimated cost of disposal as a solid waste is such that it represents a cost-effective measure, based on the estimated volumes to be removed.

D. In-Situ and Ex-Situ Treatment

1. *Bioremediation (In-situ)*

Description: Bioremediation involves treating contaminated soil by providing physical and chemical conditions that allow naturally-occurring or artificially- introduced microorganisms to multiply and transform contaminant compounds into non-toxic by-products. This is accomplished through enzymatic digestion of contaminant compounds. If sufficient quantities of naturally-occurring microbes are not present, a population of microbes must be introduced to the affected zone of soil. In addition, nutrients for the microbes, electron receptors, and air or other microbe-respirable gases must be supplied and maintained for aerobic or anaerobic breakdown of the compounds of concern to proceed. Optimum moisture content and temperature must also be maintained. The microorganisms utilized can include bacteria and/or fungi.

Delivering the microbes and or nutrients to the affected soils is usually done in an aqueous phase, through the use of infiltration galleries, injection wells, or other means of delivery. A closed system is developed whereby the aqueous mixture is injected or otherwise delivered, and infiltrates through the affected soil. The solution is then recovered by extraction wells or other means and is often continuously recirculated through the system. Careful monitoring is required to adjust levels of the nutrients and other additives to optimize the rate of contaminant destruction.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

  - Biologic breakdown of chlorinated compounds has been performed at field scale only in recent years. Further, dechlorination breakdown can, under certain conditions, create "daughter" products more toxic than parent materials (e.g. vinyl chloride created by the breakdown of tetrachloroethene). Therefore, this technology may be insufficiently mature to consider for this site.

  - This technology rates well with regard to community protection during implementation, environmental impacts, and permanence.

- *Implementability:*

  - It rates lower with regard to time to implement. In order to design an effective program, a demonstration of the effectiveness of bioremediation would be required. This would involve bench- and/or pilot-scale tests to determine which, if any, microbes would be effective in breaking down the contaminants of concern under the conditions present at the site. These tests would take a greater amount of time and effort than previous options considered, and the effectiveness of the method is not guaranteed.

- This option rates low with regard to the ability to construct. The configuration of the source area at the Enarc-O facility is not conducive to effectively delivering the required elements to the affected soils. Much of the affected area is not accessible due to being located beneath the building. In addition, the limited space in the courtyard would put restrictions on configuration of injection and/or extraction well systems. Constructing a system whereby an aqueous solution could be properly distributed to all of the affected area, and recovered without loss to the underlying bedrock would be difficult.

- Bioremediation rates high with regard to compliance with applicable regulations. No regulatory impediments to implementing bioremediation are known to exist. In addition, coordination with other agencies is not an issue.

- *compliance with SCGs:* Bioremediation would provide for compliance with SCGs if sufficient reduction of contaminant concentrations was achieved.
- *protection of human health and the environment:* The risk assessment demonstrated a lack of unacceptable health risk; however, this option provides for additional protection on the environment.
- *reduction of toxicity, mobility and volume:* This option would provide for a reduction of toxicity and volume, but not necessarily mobility.
- *cost:* The cost-effectiveness is deemed to rate low for bioremediation. This is due to the high estimated cost of performing bench- and/or pilot-scale tests, and the complexity of the system that would be required to deliver the microbes and associated materials to the affected soils. In addition, the degree of maintenance and monitoring required to implement this option is high.

2. <u>Bioventing</u> *(In-Situ)*

Description: Bioventing is a form of bioremediation that involves providing a slow supply of microbe-respirable gases to contaminated soils to enhance the naturally-occurring breakdown of compounds of concern by existing microorganisms. This method is designed for use in unsaturated zone soils. In addition to providing gases to the subsurface, it is generally coupled with the extraction of vapor to form a "loop" system that maintains air flow.

As with bioremediation, it has generally been applied with greatest success to petroleum-affected soils. Use of bioventing in settings with chlorinated VOCs often results in removal of the most volatile compounds from the subsurface in vapor form, which then requires treatment at the surface, much like a vapor extraction system.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

- This method rates low with regard to protection of site personnel during implementation. This is primarily due to the potential for escape of fugitive emissions, due to the positive pressure put on soil vapor in the area of contamination. Since the affected soils are located immediately beneath and adjacent to an occupied facility, the potential for exposure of on site workers to contaminants in vapor form exists. Further, chlorinated compound biologic breakdown pathways are initially anaerobic, which is commonly facilitated by ingestion of methane. Careful control of such gases needs to be factored into design of a biovent system.

- Bioventing also rates low with regard to adequacy and reliability. This is due to the nature of the soils at the site. The source area has a variable mixture of granular fill soils and fine grained, dense glacial till. The fine-grained nature of the majority of the source area soils makes distribution of the injected air difficult. Such conditions are likely to result in the injected air traveling primarily to and through the shallow sand fill soils, while leaving the finer-grained till soils relatively unaffected.

- Bioventing is deemed to rate relatively high with regard to permanence.

- *Implementability:*

  -Bioventing is deemed to rate moderately with regard to constructability, given the site conditions. A bioventing system should be configured to deliver sufficient gas throughout the contaminant mass. This would require a series of closely-spaced wells in the courtyard as well as angled wells extending beneath the building.

  - This technology would not likely present significant potential schedule delays due to technical problems.

  - Use of bioventing would probably not require additional remedial technologies, since it would theoretically be performed in a manner that would affect the entire source area.

  -Coordination with agencies other than NYSDEC would not be required, although a permit from NYSDEC Division of Air would likely be required if the system were configured in a way that allowed air emissions.

- *compliance with SCGs:* Bioventing would only allow for compliance with SCGs if sufficient reduction in contaminant mass in the source area were achieved.

- *protection of human health and the environment:* The risk assessment demonstrated a lack of unacceptable risk to human health; however, bioventing represents a potential increase in risk due to the potential for fugitive emissions from injection of air into the subsurface.

- *reduction of toxicity, mobility and volume:* This remedial action would presumably provide for a reduction in the volume of contaminants; however the toxicity and mobility would not necessarily be affected.

- *cost:* Bioventing would incur significant costs due to requirements for subsurface piping or wells and air circulation equipment.

3. Surfactant Flushing (In-situ)

Description: This remedial technology, often referred to as "soil washing" involves applying liquid surfactants to contaminated soils. The surfactant solution reduces the forces that can immobilize contaminant compounds, facilitating recovery and treatment. Aqueous solutions employed in this method can contain a mixture of surfactants, polymers and salts. The liquid is generally delivered to the affected soils through the use of injection wells, and recovered through extraction methods after passing through the contaminated zone and liberating trapped contaminants.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

  -As with bioventing, this method does not appear to be likely to be able to accomplish the remedial goal, due to the inability to properly distribute the surfactant solution throughout the contaminant mass. The dense, fine-grained glacial till, coupled with the heterogeneous distribution and nature of the fill soils would impede homogenous distribution of surfactants.

  -This method has the potential for harmful environmental impacts as well. Obtaining complete recovery of the introduced surfactant solution would probably not be achievable, since complete isolation of the source-area soils would not be feasible. Thus the potential for downward migration of the contaminated surfactant solution into the underlying bedrock exists. The presence of surfactants in the source area bedrock zone could potentially mobilize adsorbed or other trapped groundwater contaminants that might otherwise be relatively immobile; this in turn might cause significant vertical or lateral migration of contamination away from the source area.

- *Implementability:* The technical feasibility of this action rates relatively low. In general, ideal site conditions are needed to effectively implement surfactant flushing and maintain control of the remediation. The Enarc-O site has significant limitations with regard to site conditions, since much of the soil is located beneath the building.

- *compliance with SCGs:* This technology would presumably allow for compliance with TAGM 4046 for soils but would not necessarily be effective in reducing groundwater contaminant levels.

- *protection of human health and the environment:* The risk assessment demonstrated a lack of unacceptable health risk; this technology would not present additional potential risk, with the exception of increasing migration of soil contaminants to groundwater.

- *reduction of toxicity, mobility and volume:* This action would reduce the volume of contaminants but would likely increase the mobility of the contaminant mass.

- *cost:* The potential costs associated with this remedial action are not known.

4. __Oxidation__ (In-situ)

Description: Oxidation of contaminated soils involves introduction of chemical constituents into the affected area that allows a chemical breakdown of contaminants of concern. Oxidation of chlorinated VOCs is most often accomplished with the use of hydrogen peroxide, which can convert VOCs to carbon dioxide and water. As with previous technologies discussed herein, this application would require a method to bring a solution of the chemical treatment in contact with the affected soils.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

  - The introduction of this chemical treatment would require the use of injection wells to deliver the treatment solution to the affected areas. One advantage this method has over other technologies involving injection of fluids is that the solution does not require recovery and treatment after the VOCs have been broken down; this is because the byproducts of the chemical reaction are non-toxic compounds. However, since complete isolation of the source area soils cannot reasonably be achieved because of the site configuration, this method also presents the potential for unwanted downward migration of VOC-containing fluid. This again presents the potential for mobilization of contaminants that would not be recoverable.

- *Implementability:* The implementability issues for this remedial action are similar to those for surfactant flushing; this is because the mechanism is similar: addition of a solution to the soils in place.

- *compliance with SCGs:* This technology would presumably allow for compliance with TAGM 4046 for soils but would not be effective in reducing groundwater contaminant levels.

- *protection of human health and the environment*: The risk assessment demonstrated a lack of unacceptable health risk; this technology would not present additional potential risk, with the possible exception of increasing migration of soil contaminants to groundwater.

- *reduction of toxicity, mobility and volume:* This action would reduce the volume of contaminants but could potentially increase the mobility of a portion of the contaminant mass.

- *cost:* The potential costs associated with this remedial action are not known.

5. *__Thermal Desorption__ (Ex-situ)*

Description: Thermal desorption is the process of removing contaminants from an environmental media (usually soil), through usage of "low" temperature heating. This technique is performed as an ex-situ process, where the soil is excavated, mechanically sorted and treated, and placed in a large-scale kiln. Contaminant compounds are first liberated from the soil, then destroyed by thermal oxidation. This process differs from incineration in that the soil is not destroyed, because the operating temperatures are lower; the soil can be returned to the excavation upon completion of the process.

Thermal desorption has primarily been used for remediation of non-hazardous petroleum compounds; however it has been applied to hazardous VOC-contaminated media in some cases. Non-petroleum processing typically requires much higher temperatures than petroleum waste to destroy contaminants without creating more hazardous air emissions.

- *Effectiveness, short-term and long-term impacts:*

  - This remedial technique presents reasonable protection of the community during implementation; provided adequate emission controls are employed;

  - Significant environmental impacts of this technique are not anticipated, since the contaminants are essentially destroyed by the close-loop kiln system.

  - time for implementation of this action would be relatively short;

  - the reliability is estimated to be high.

  - this method would be permanent, although it would only apply to those soils that could be excavated.

- *Implementability:*

  -Thermal desorption rates moderately from a constructability standpoint. It requires a site with approximately 1/2-acre of available space to allow proper handling, mechanical sorting and stockpiling of contaminated and treated soil. The process requires significant energy, and water is required to cool processed mixtures.

  - there are very few firms located geographically close to the site that are permitted to handle non-petroleum soils; the majority of the contractors experienced in thermal desorption typically handle petroleum waste and do not have experience or authorization to process hazardous wastes. In addition, the relatively small quantity of soil requiring remediation at the site is much less than the quantities that would justify utilizing this technology, which employs significantly large amounts of equipment and energy.

- The majority of the source area soils are located beneath the manufacturing building and are not accessible for this type of ex-situ remediation.

-Coordination with other agencies might be required, to obtain a permit to handle the waste, if deemed hazardous. In addition, an air discharge permit may be required by NYSDEC as part of the treatment process;

- *compliance with SCGs:* This technology rates high with regard to compliance with TAGM 4046 for soil. Treated soil would be remediated to an essentially "clean" state; however, only those soils accessible for excavation would be treated. Since groundwater is not involved in thermal desorption, no compliance would be obtained by this process.

- *protection of human health and the environment:* The risk assessment demonstrated a lack of unacceptable health risk; this technology would not present additional potential risk.

- *reduction of toxicity, mobility and volume:* This remedial action would provide a reduction in the toxicity, mobility and volume of contaminants and contaminated soil.

- *cost:* The cost-effectiveness is deemed to be fairly low for this remedial action. This is because the units available for this technology are generally large-scale and constructed to handle very large quantities of material. As discussed in Section 2-04, only approximately 375 tons of soil can be excavated from the source area due to facility constraints. This quantity is generally not sufficient to economically justify the significant mobilization fees associated with the required equipment.

E. Separation and Treatment -*Soil*

Description: Separation of contaminants from unsaturated soil is generally accomplished through soil vapor extraction which is generally performed in one of two modes: 1) high-vacuum extraction using vacuum blowers to apply moderate to high vacuum to the vadose zone soils, to achieve a high VOC extraction rate; or 2) low vacuum, which doesn't produce VOC yield as rapid as high-vacuum extraction, but can be effective and have low maintenance over the long term. This type of system can employ electric motor or wind-powered (WP) turbines to produce a vacuum on soil.

The extracted vapor is generally treated at the surface using granular activated carbon (GAC) or other methods which strip the extracted vapor of VOCs. The treated vapor is discharged to the air.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

  - This technology rates high with regard to protection of the community during implementation;

  - the time required to implement this technology is not excessive; the amount of equipment required is relatively limited. The limiting factor would be installation of angled wells beneath the building (further discussed below).

  - this method represents a permanent action;

  - lifetime of this action depends on the degree of vacuum applied to the soil, and the rate at which the source area soils will yield the contaminant load. The lifetime of such a system is typically measured in years, but the actual time cannot be determined.

  - assuming a vapor extraction system can access the affected source-area soils, little or no waste would remain at the conclusion of the remedial action.

  - The effectiveness of blower-powered vapor extraction was tested in the field at the Enarc-O site. A pilot test was performed on existing overburden monitoring well MW-201S, a four-inch diameter well located in the courtyard (Figure 3). The pilot test employed a 1-horsepower Rotron blower. The test was run for approximately 4 hours and produced a relatively low maximum vapor flow rate of approximately 4 cubic feet per minute (cfm). TCE represented most of the contaminant mass in the vapor samples, with lesser amounts of 1,1,1-TCA, tetrachloroethene (PCE) and cis-1,2-dichloroethene (1,2-DCE). Mass removal rates ranged up to 0.3 lbs. per day of total VOCs. Shield points were installed at varying distances from the well to measure vacuum in soils and evaluate the zone of influence for the blower; however, due to saturated conditions in the shallow soils in the courtyard at the time of the test, the shield points did not yield vapor samples or vacuum readings.

- *Implementability:*

  - This remedial action rates high with regard to constructability. It requires a means to access affected soils; this is generally accomplished through the use of extraction wells or trenches, either of which could be installed at the site. The contaminated soil beneath the building could be accessed via angled extraction wells, installed through the foundation wall to a depth at or near the top of bedrock to optimize access to the contaminant mass in soil. The courtyard soils could be accessed via vertical extraction wells extending to the top of bedrock, or trenched, horizontal, slotted pipe.

  - Vapor extraction has been demonstrated to be a reliable method in a wide variety of environmental settings;

- Additional remedial actions might be required in conjunction with this method; e.g. a low-permeability cap to reduce the amount of courtyard water infiltration, and increase the available void space for extraction.

- potential schedule delays are unlikely with this technology;

- vapor extraction does conform with applicable regulations. A permit may be required from NYSDEC for air discharge depending on the rate of mass yield emitted to the atmosphere. No other regulatory agencies are anticipated to be involved in implementation of this action.

- vapor extraction equipment is readily available and does not require a high degree of special equipment or expertise.

- As discussed above, vapor extraction can be implemented using varying degrees of vacuum. A low-vacuum system would utilize subsurface elements similar to a blower-powered (BP) system, except that extraction would be accomplished by a wind-driven turbine that would provide a low vacuum on the wells and piping.

- Since inception of the response to the contaminant release at the site, an alternate source of drinking water has been provided to the area, the 1,1,1- TCA tank has been removed, and several phases of investigation and sampling have been performed. Since these actions, the overall groundwater quality has increased through natural processes. Excavation of courtyard soils, especially if combined with capping of the courtyard, would remove the primary portion of the source area soils that contributes to contamination in groundwater. This is because the courtyard has been subject to infiltration and roof run-on, which has allowed contaminant leaching and downward migration. For the source area soils left in place, a wind-powered vapor extraction system would provide a viable means of further reducing potential contaminant migration in a setting that has already been demonstrated to have shown marked improvement without the presence of a mechanism for VOC removal.

- Although a WP system would not accomplish contaminant separation at a rate comparable to a BP system, it would provide for ongoing reduction in the contaminant mass at a fraction of the cost of a higher-vacuum system. The rates of vapor, and therefore contaminant extraction would likely be at levels low enough that exceedence of air discharge permit levels defined by the SCGs would not occur, therefore vapor treatment would not be required. Discharge of the vapor would be through a stack or stacks extending above the roofline of the building. The degree of vapor discharge monitoring would be significantly less than a BP system would require. Operation and maintenance efforts for a low-vacuum system would also be relatively minor.

- *compliance with SCGs:* This remedial action would allow for compliance with TAGM 4046 for soils.

- *protection of human health and the environment:* The site risk assessment determined the lack of unacceptable risk for source area soils; vapor extraction would serve to reduce risk even further. A high-vacuum system would employ a treatment process to remove VOCs from vapor before discharge; a low-vacuum, wind-powered system would not likely involve sufficient airflow volume to exceed Air Guide 1 thresholds.

- *reduction of toxicity, mobility and volume:* Vapor extraction would allow for reduction in the volume of the contaminant mass. Mobility and toxicity would not be significantly affected.

- *cost:* A BP system require significant amounts of energy to operate, and also includes process elements that represent significant costs. A WP system would provide beneficial effects on the contaminated soil at a fraction of the cost of a BP system.

F. Separation and Treatment - *Groundwater*

Description: This option involves physically removing groundwater from the subsurface via extraction wells or other means, treating the water to remove contaminants, discharging treated water, and disposing or treating the contaminant removal media used in the process.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

  In a USEPA-sponsored study (9), although it was found to be somewhat useful in plume containment and providing for slow contaminant mass reduction, pump-and-treat remediation was demonstrated to provide only an initial reduction in concentration. It is not able to provide aquifer restoration.

  It has also been shown that in bedrock formations, most or all of the contaminant mass in the immiscible phase is transferred into the dissolved and adsorbed phases in the fine-grained, low-permeability matrix of the geologic formation. Once this occurs, separation technologies are not sufficiently effective in removing the contaminants, due to very slow rates of dissolution from the matrix (10).

- *Implementability:*

  - A pump-and-treat system would generally be designed and constructed using "of-the-shelf" equipment, i.e. it would not represent a significant technical impediment.

  - Recovery well installation has inherent limitations in that discontinuities (joints) in the rock that will yield sufficient groundwater flow may not be intersected by a well. If such discontinuities are intersected, the aquifer beneath the site appears to have relatively high permeability and yield potential, which would require a large-scale pumping system to sustain sufficient extraction rates to remove appreciable contaminant mass.

- In addition, much of the affected portion of the aquifer source area lies beneath the manufacturing facility, making access to the highest contaminant concentrations in groundwater difficult and more costly.

- Pumped water would require treatment to remove contaminants prior to discharge. The treatment media would require periodic regeneration or disposal.

- *compliance with SCGs:* this criteria would not apply for offsite groundwater, since contaminant concentrations are essentially at or below the applicable SCGs. Onsite compliance would be difficult to achieve for the reasons discussed under effectiveness.
- *protection of human health and the environment:* no risk currently exists, so limited additional benefit would be realized by pumping, and only as long as pumping persists.
- *reduction of toxicity, mobility and volume:* A reduction of contaminant mobility would be achieved, only as long as pumping persisted.
- *cost:* The relative costs of a pump-and-treat system would be high due primarily to the need for the large capacity and long-term lifespan of the system.

G. Remedial Action Combination: Control/Isolation, Excavation/Disposal, and Separation/Treatment

Description: The favorable remedial action alternatives discussed above each have merit as individual actions; however, in most cases they do not represent sufficient action when considered alone. Accordingly, several of the actions could be implemented synergistically in combination with the others. The alternatives presented would each provide a degree of positive influence on site conditions, and therefore contribute to the overall goal of contaminant reduction. When considered together, they provide an effective, implementable, and cost-effective approach to achieving the program's goals.

The combination proposed includes: 1) excavation/disposal (as solid waste) of courtyard soils; 2) control/isolation by covering the courtyard with a low-permeability cap; and 3) separation/treatment using vapor extraction for soils left in place.

Evaluation:

- *Effectiveness, short-term and long-term impacts:*

- This combination of actions would provide for protection of the community during implementation;

- No significant environmental impacts would occur during implementation;

-The overall time require to implement would be relatively short;

- The technologies included in this combination have all been demonstrated to be reliable in achieving remediation;

- Relatively rapid, partial remediation could be accomplished via the offsite soil disposal at a landfill;

- The installed remedial systems (vapor extraction and low-permeability cover) represent) long-term, if not permanent actions; and

-It is anticipated that little or no waste would remain after completion of the remediation;

- *Implementability:*

  - The elements of this combination alternative are generally not technically challenging, and rate high with respect to constructability;

  - No additional remedial actions should be required to achieve the goals of the program;

  - All of the elements involved comply with applicable regulations;

  - No coordination with agencies other than NYSDEC and possibly NYSDOH appear to be required for this combination of actions;

  - The technologies required, i.e. excavation/disposal, angled well/pipe installation and low-permeability cover are readily available and generally do not require expertise of limited availability.

- *compliance with SCGs:* This combination would still allow for compliance with SCGS as described above for the individual remedies.

- *protection of human health and the environment:* This remedial combination would provide protection of human health and the environment in the same manner the individual remedies do.

- *reduction of toxicity, mobility and volume:* this combination would provide reduction of mobility and volume of contaminants, but would not affect the toxicity.

- *cost:* The relative cost of this combination of actions is less than many of the remedial actions discussed in this report. Moreover, this combination appears to represent the most cost-effective measure considered. Significant improvement in site conditions are anticipated, while not involving undue technical or administrative limitations that would drive up costs.

3-03. Comparative Analysis

A. Introduction

The previous section presented details regarding each of several potential remedial actions for the site. The following discussion compares these actions in a relative sense and draws conclusions regarding which actions appear technically and administratively feasible individually or in combination. In addition, the economic factors of a technology or combination must be weighed against the potential benefit, so as to arrive at a cost-effective method for the remediation. The estimated costs for the preferred alternatives presented are presented individually in Appendix A, and summarized in Table 3.

B. Discussion

The remedial investigation performed for the site provided data that indicate offsite groundwater conditions have dramatically improved due to natural attenuation. Although source-area groundwater contaminant levels are still above applicable SCGs, it does not appear the contamination is migrating offsite to a significant degree. In addition, unacceptable human health risk is not present as a result of contaminants in groundwater. These factors, coupled with the knowledge that removal and treatment technologies are not effective for fractured bedrock (see section 3-01), lead to a recommendation of the No Action alternative for groundwater. The focus of the FS analysis should be on the source area soils, with the intent of controlling and reducing the contaminant mass available to migrate to groundwater in the source area.

No Action includes an assigned period of groundwater monitoring to evaluate continued absence of risk. Monitoring of groundwater quality would also be warranted to demonstrate the extent to which soil remedial action further improves groundwater conditions.

The No Action alternative does not appear to be appropriate for soil, primarily since it does not provide for compliance with SCGS with regard to soil contamination. In addition, it does not provide for measures to reduce or eliminate further migration of contaminants to groundwater beneath the source area. Accordingly, it has been eliminated from consideration.

The detailed discussions in Section 3-01 for the in-situ options (D-1 through D-5) indicated the general lack of effectiveness coupled with a low degree of cost-effectiveness for these methods. The configuration of the source area soils and general lack of access to much of the contaminant mass also present impediments to effectively utilizing these technologies. Accordingly, in-situ and ex-situ treatment methods have been eliminated from further consideration.

The Control/Isolation option has been shown to provide a quick and positive benefit to groundwater conditions by significantly reducing further migration, via infiltration, of contaminants to groundwater. It is a technologically simple and relatively low-cost alternative that will work well in conjunction with other actions as discussed herein.

The Excavation/Disposal option for accessible courtyard area soils is also a relatively low-technology and cost-effective method by which to impart immediate positive benefit to source-area soils. It also allows compliance with applicable SCGS, based on the written permission received from NYSDEC to dispose of the soils as solid waste. This disposal method also makes it a cost-effective solution.

The Separation/Treatment option for groundwater has been shown not to be an effective method for bedrock groundwater, as discussed previously. Accordingly, this option is eliminated for groundwater. Separation does appear, however to be a viable option for soils in the source area. Vapor extraction has been shown to be effective for VOC removal in soils at numerous sites. Based on the data from the remedial investigation and a vapor extraction test performed at the site, a wind-powered turbine system for vapor removal appears to be the most reasonable and cost-effective method for vapor extraction. Conceptual evaluation indicates such a system could employ up to four wind turbines connected to angled extraction wells beneath the building and horizontal, slotted pipe sections buried in the courtyard. Details of the design are included below in Section 3-04.

The remedial action option that combines various actions presented in this FS report (Section 3-01, item G) appears to be the most beneficial action plan for the site. It provides a combination of methodologies that will achieve the RAOs for the site while generally satisfying the criteria by which the various methods have been evaluated. The combination also represents cost-effective methodologies that can be implemented without undue technical or administrative impediments.

A proposed sequence of these combined remedial actions is summarized below:

a) Divert roof drainage away from courtyard area;

b) Finalize approval documentation for disposal of courtyard soils at a permitted landfill;

c) Arrange and execute excavation and disposal of courtyard soils;

d) Install angled vapor extraction wells through building foundation wall;

e) Install horizontal vapor extraction piping in courtyard area;

f) Install vapor barrier over still-excavated courtyard area;

g) Return courtyard to previous grade with clean backfill soil;

h) Connect vapor extraction wells and piping to exhaust piping and turbines;

i) Cover courtyard with pavement or other low-permeability cap material; and

j) Initiate monitoring program.

3-04. Wind-powered Vapor Extraction System Details

The conceptual remedial soil vapor extraction (SVE) design would entail installation of two angled wells through the building foundation wall and two alignments of horizontal slotted screen pipe within the bottom of the excavation created by courtyard soil removal. These wells would be manifolded together and connected to riser pipes which extend above the roof line with wind-driven turbine ventilators attached to each. All wells and piping are to be 4-in. PVC with all appropriate fittings.

The turbine type selected has an 8-in. throat and a rated exhaust capacity of 256 cubic feet per minute (cfm) at a wind speed of 4 mph. Similar applications of this type of vacuum system in petroleum release remediation have been successful.

The conceptual design of the vacuum extraction system would employ multiple turbines, each on a vertical section connected to either a well or buried horizontal pipe run. Each ventilator would carry the same rated exhaust capacity of 256 cfm.

To monitor ongoing operation of the SVE and the mass of contaminants removed, measurement of vapor effluent contaminant concentrations would be performed on a monthly and semi-annual basis. Vapor samples would be screened in the field monthly using a PID. In addition, vapor samples would be analyzed semi-annually for VOCs of concern using gas-chromatograph methods. Results of the monitoring would be summarized in a semi-annual report, along with the groundwater analytical results, as discussed below. These results would be submitted to NYSDEC for review of progress.

IV. SUMMARY AND CONCLUSIONS

This report presents the results of a feasibility study for remediation of the Enarc-O Machine Products site in Lima, New York. Soil is contaminated in a relatively limited source area beneath, and immediately adjacent to the existing building. Groundwater is contaminated beneath this source area, and otherwise in a plume that appears to have historically extended off the property; as of performance of the remedial investigation, the offsite contamination had attenuated and is generally confined to the limits of the Enarc-O property. The contaminants of concern are a limited suite of chlorinated hydrocarbons, principal among them being trichloroethene, 1,1,1-trichloroethane, and tetrachloroethene. Details on the nature and extent of contaminant presence were summarized in a separate Remedial Investigation (RI) report, dated 19 January 1996, and submitted to NYSDEC.

Cleanup criteria for the contaminated media at the site are provided by NYSDEC guidance documents containing Standards, Criteria and Guidance values (SCGS), namely TAGM 4046 for soil cleanup and TOGS 1.1.1 for groundwater standards. In addition to these specific SCGS, the potential for risk to human health has been evaluated in accordance with findings of the RI. The contaminant levels present at the site, and the identified potential exposure pathways do not create unacceptable risks to humans, thus unacceptable risk does not drive the process of selecting remediation actions.

The General Response Actions identified for potential remediation of this site included: no action, and contaminant separation/treatment for groundwater; and no action, control/isolation, excavation and offsite disposal, and in-situ/ex-situ treatment for soil.

These General Response Actions were evaluated in light of the factors and criteria included in the NYSDEC and USEPA guidance documents for performing feasibility studies. As a result of the evaluation, the no action and in-situ/ex-situ treatment alternatives for soil, and the separation/treatment alternative for groundwater, were eliminated. The General Response Actions shown to be feasible for remediation of site media, and the specific technologies evaluated for each response action, are summarized as follows:

Media	General Response Action	Technology
Soil	1) Excavation and offsite disposal	1) Disposal as solid waste at a permitted landfill.
	2) Separation/treatment	2a) Blower-powered vapor extraction 2b) Wind-powered vapor extraction
	3) Control/isolation	3) Cap courtyard with low-permeability cover
Groundwater	1) No Action	1) Periodic monitoring program

This feasibility study concludes that wind-powered vapor extraction is preferable to blower-powered extraction, thus BP extraction is not recommended. Investigations to date have demonstrated that even without a mechanism in place to remove VOCs in the source area, natural processes have reduced contaminant levels in groundwater. The addition of a wind-powered vapor extraction system, especially in concert with other remedial actions, provides a means of allowing further reduction in the contaminant mass.

This study also concludes the remaining alternatives, while individually somewhat effective in addressing the presence of contamination, would best be implemented in combination. These combined actions represent effective and implementable measures for the physical and chemical conditions present on the site. A monitoring program for both soil and groundwater is proposed to evaluate the performance of the remedial measures in light of the remedial project goals.

The recommended combination of alternatives includes:

☐ Excavation and offsite disposal of approximately 375 tons of accessible, affected soil from the courtyard to a permitted, non-hazardous solid waste management facility.

☐ Installation of a soil vapor extraction piping and well network beneath the excavated area and existing building, and connection of this network to vertical wind-powered turbine exhaust units.

☐ Backfill of the courtyard area, diversion of roof drain run-on and capping with a low-permeability asphalt cap. If feasible to the site owner, building expansion construction over the courtyard would be an acceptable and potentially preferable alternative to asphalt capping.

☐ Implement a SVE and groundwater monitoring program, including semi-annual sample collection and analysis to monitor progress.

This combination is recommended for inclusion into a Proposed Remedial Action Plan (PRAP) to be prepared by NYSDEC, made available for public comment, and ultimately included in the Record of Decision (ROD) for the Enarc-O site.

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☐ Backfill of the courtyard area, diversion of roof drain run-on and capping with a low-permeability asphalt cap. If feasible to the site owner, building expansion construction over the courtyard would be an acceptable and potentially preferable alternative to asphalt capping.

☐ Implement a SVE and groundwater monitoring program, including semi-annual sample collection and analysis to monitor progress.

This combination is recommended for inclusion into a Proposed Remedial Action Plan (PRAP) to be prepared by NYSDEC, made available for public comment, and ultimately included in the Record of Decision (ROD) for the Enarc-O site.

V. CERTIFICATION

The feasibility study reported herein was conducted to fulfill the requirements of the Order on Consent Number B8-0112-91-04,dated 22 March 1994. It has been conducted in accordance with generally accepted environmental consulting practices, including the references cited in this report. The potential remedial alternatives for the Enarc-O Machine Products site have been identified and evaluated using the guidance of the EPA document "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," dated October 1988, and with the NYSDEC "TAGM for the Selection of Remedial Actions at Inactive Hazardous Waste Sites," dated 15 May 1990. The conclusions stated are based solely on the work and sources of information described herein.

HALEY & ALDRICH OF NEW YORK

Stanley E. Walker, P.E.
Vice President

STANLEY EDSON WALKER
No. 056181-1

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rjm:wp6doc\70372-046\fsrev3.wpf

Tables

TABLE 1
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
ENARC-O MACHINE PRODUCTS, INC.
LIMA, NEW YORK

OFF-SITE

ADDRESS	RESIDENT	SAMPLED FROM	DATE	DETECTED COMPOUNDS - CONCENTRATION IN PARTS PER BILLION (PPB)																			TOTAL VOCs
				TCE	1,1,1-TCA	cis-1,2 -DCE	trans-1,2-DCE	1,2-DCA	1,1-DCE	1,1-DCA	MeCl2	PCE	CHLORO-FORM	BDCM	1,1,2,2-TCA	CARB-TET.	ACET.	BENZ.	CHL.-BENZ.	TOL.	VC	MEK	
MARTIN RD.																							
7820	JOHNSON	WELL	7/24/85	31	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	35
7820	JOHNSON	WELL-L	4/12/95	4J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
7820	JOHNSON	WELL-U	4/12/95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
7852	HOPKINS	WELL	7/1/85	80	1	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	85
7852	HOPKINS	WELL-L	4/12/95	7J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
7852	HOPKINS	WELL-U	4/12/95	7J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
7852	HOPKINS	WELL	8/23/95	1J	–	–	–	–	–	–	–	–	2J	–	–	–	9J	–	–	–	–	–	0
7873	YEARS, R.	WELL	7/1/85	72	1	19	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	92
7873	YEARS, R.	WELL-L	4/13/95	9J	–	3J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
7873	YEARS, R.	WELL-U	4/13/95	4J	–	5J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
7873	YEARS, R.	WELL	8/23/95	6J	–	2J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
7880	ROGERS, L.	WELL	7/1/85	197	2	43	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	244
7880	HANSON	WELL-L	4/13/95	13	–	10	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	23
7880	HANSON	WELL-M	4/13/95	12	–	10	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	22
7880	HANSON	WELL-U	4/13/95	6J	–	16	–	–	–	–	–	–	2J	–	–	–	–	–	–	–	–	–	16
7880	HANSON	WELL	8/23/95	6J	–	8J	–	–	–	–	–	–	–	–	–	–	5J	–	–	–	–	8J	0
7883	GARVEY	SUMP	8/23/95	19	–	4J	–	–	–	–	–	–	2J	–	–	–	6J	–	–	–	–	–	
BRAGG ST.																							
1167	SMITH	WELL	7/1/85	98	1	17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	116
1167	WILDMAN	WELL-L	4/13/95	13	–	3J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	13
1167	WILDMAN	WELL-U	4/13/95	6J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1167	WILDMAN	WELL	8/23/95	9J	–	2J	–	–	–	–	–	–	1J	–	–	–	2J	–	–	–	–	–	0
1167	WILDMAN	WELL (DUP)	8/23/95	–	–	2J	–	–	–	–	–	–	1J	–	–	–	–	–	–	–	–	–	0
1191	TONDRYK	WELL	7/1/85	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
1191	TONDRYK	WELL-L	4/11/95	1J	–	–	–	–	–	–	–	–	–	–	–	–	–	2J	2J	2J	–	–	0
1191	TONDRYK	WELL-U	4/11/95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
IDESON RD.																							
1081	MILLER	WELL	7/24/85	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1081	MILLER	WELL-L	4/10/95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1081	MILLER	WELL-U	4/10/95	–	–	–	–	–	–	–	–	–	2J	–	–	–	–	–	–	–	–	–	0
1090	COLAVITO	WELL	8/7/85	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
1090	COLAVITO	WELL-L	4/10/95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1J	–	–	–	–	0
1090	COLAVITO	WELL-U	4/10/95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1116	MALOY	WELL	8/7/85	8	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9
1116	MALOY	WELL-L	4/11/95	–	–	–	–	–	–	–	–	–	–	–	–	–	82	–	–	–	–	–	82
1116	MALOY	WELL-U	4/11/95	–	–	–	–	–	–	–	–	–	3J	–	–	–	–	–	–	–	–	–	0
1121	COOPER	WELL	7/24/85	24	1	8	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	34
1121	COOPER	WELL-L	4/11/95	2J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1121	COOPER	WELL-U	4/11/95	2J	–	–	–	–	–	–	–	–	–	–	–	–	9J	–	–	–	–	–	0
1121	COOPER	WELL	8/23/95	–	–	–	–	–	–	–	–	–	–	–	–	–	3J	–	–	–	–	–	0
1146	REANO	WELL	8/7/85	46	2	8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	56
1146	REANO	WELL-L	4/12/95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1146	REANO	WELL-U	4/12/95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1146	REANO	WELL-U	8/23/95	3J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0

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LIMA, NEW YORK

ON-SITE

DATE	WELL ID	SAMPLED BY	DETECTED COMPOUNDS - CONCENTRATION IN PARTS PER BILLION (PPB)																				TOTAL VOCs
			TCE	1,1,1-TCA	cis-1,2-DCE	trans-1,2-DCE	1,2-DCA	1,1-DCE	1,1-DCA	MeCl2	PCE	CHLOROFORM	BDCM	1,1,2,2-TCA	CARB. TET.	ACET.	BENZ.	CHLOROBENZ.	TOL.	VC	MEK	
1/7/91	MW-1	O'Brien & Gere	3	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	4
1/7/91		CDM-FPC	4	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	5
2/25/91		O'Brien & Gere	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
2/25/91		CDM-FPC	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
07/14/94		Haley & Aldrich	2J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
11/02/94		Haley & Aldrich	3J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
4/14/95		Haley & Aldrich	2J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
8/23/95		Haley & Aldrich	2J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
1/8/91	MW-2	O'Brien & Gere	3900	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3900
2/26/91		O'Brien & Gere	3400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3400
07/14/94		Haley & Aldrich	1400	–	23J	–	–	–	–	–	–	–	–	–	–	25J	–	–	–	–	–	1400
11/02/94		Haley & Aldrich	500	6J	29	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	529
4/14/95		Haley & Aldrich	1600	19	12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1631
8/23/95		Haley & Aldrich	120	1J	27	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2J	147
1/7/91	MW-3	CDM-FPC	7900	990	130	–	1	28	27	–	150	2	–	–	–	–	–	–	–	–	–	9228
1/7/91		O'Brien & Gere	5800	470	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6270
2/25/91		CDM-FPC	3800	370	70	–	–	9	11	–	75	–	–	–	–	–	–	–	–	–	–	4335
2/25/91		O'Brien & Gere	5300	420	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5720
07/14/94		Haley & Aldrich	1100	130	30J	–	–	14J	–	–	17J	–	–	–	–	–	–	–	–	–	–	1230
11/02/94		Haley & Aldrich	3200	250	51J	–	–	–	–	13J	23J	–	–	–	–	–	–	–	–	–	–	3450
4/14/95		Haley & Aldrich	2500	190	98	–	2J	12	11	–	22	8J	–	–	–	–	–	–	–	–	–	2833
8/23/95		Haley & Aldrich	660	47	22	–	–	4J	4J	–	10	3J	–	–	–	–	–	–	–	–	–	739
8/23/95	(DILUTION)	Haley & Aldrich	510D	29DJ	21DJ	–	–	–	–	–	7DJ	–	–	–	–	15DJ	–	–	–	–	–	0
1/8/91	MW-4	O'Brien & Gere	60	11	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	85
2/25/91		O'Brien & Gere	69	17	16	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	104
07/14/94		Haley & Aldrich	10	28	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	38
11/02/94		Haley & Aldrich	15	15	–	–	–	–	–	2J	–	–	–	–	–	–	–	–	–	–	–	30
4/14/95		Haley & Aldrich	7J	4J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
8/23/95		Haley & Aldrich	10	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	24
1/8/91	MW-5	CDM-FPC	260	18	170	–	–	2	1	–	1	–	–	–	–	–	–	–	–	–	–	452
2/26/91		CDM-FPC	310	10	90	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	410
1/8/91		O'Brien & Gere	240	12	160	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	412
2/26/91		O'Brien & Gere	310	8	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	418
07/14/94		Haley & Aldrich	510	23J	58	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	568
11/02/94		Haley & Aldrich	1100	55	72	–	–	5J	–	–	9J	–	–	–	–	–	–	–	–	–	–	1227
4/14/95		Haley & Aldrich	400	15	63	–	–	–	–	–	4J	–	–	–	–	–	–	–	–	–	–	478
8/23/95		Haley & Aldrich	680E	43	67	–	–	7J	3J	–	7J	–	6J	–	–	2J	–	–	–	–	–	110
8/23/95	(DILUTION)	Haley & Aldrich	540D	23DJ	48DJ	–	–	–	–	–	–	–	–	–	–	16DJ	–	–	–	–	–	0
1/7/91	MW-6	O'Brien & Gere	1	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	4
2/25/91		O'Brien & Gere	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
07/14/94		Haley & Aldrich	3J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
11/02/94		Haley & Aldrich	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
4/14/95		Haley & Aldrich	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
8/23/95		Haley & Aldrich	–	–	–	–	–	–	–	–	–	–	–	–	–	2J	–	–	–	–	–	0
07/14/94	MW-201D	Haley & Aldrich	7400	390J	1100	–	–	–	–	–	160J	–	–	–	–	–	–	–	–	–	–	8500
11/02/94		Haley & Aldrich	4000	100J	830	–	–	–	–	–	61J	–	–	–	–	–	–	–	–	–	–	4830
4/14/95		Haley & Aldrich	3800	200J	680	–	11	10	34	–	130	–	–	–	–	14	–	–	–	6J	–	4679
8/23/95		Haley & Aldrich	7700	660	1500	–	–	–	–	–	140J	–	–	–	–	180J	–	–	–	–	–	9860
07/14/94	MW-202	Haley & Aldrich	15	–	11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	26
11/02/94		Haley & Aldrich	25	–	45	3J	–	–	–	–	–	–	–	–	–	–	–	–	–	7J	–	70
4/14/95		Haley & Aldrich	140	5J	8J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	140
8/23/95		Haley & Aldrich	120	4J	7J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	120
8/23/95	(DUPL.)	Haley & Aldrich	150	5J	9J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	150

TABLE 1
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
ENARC-O MACHINE PRODUCTS, INC.
LIMA, NEW YORK

ON-SITE (con't)

DATE	WELL ID	SAMPLED BY	DETECTED COMPOUNDS - CONCENTRATION IN PARTS PER BILLION (PPB)																			TOTAL VOCs
			TCE	1,1,1-TCA	cis-1,2 -DCE	trans-1,2-DCE	1,2-DCA	1,1-DCE	1,1-DCA	MeCl2	PCE	CHLORO-FORM	BDCM	1,1,2,2-TCA	CARB. TET.	ACET.	BENZ.	CHLORO-BENZ.	TOL.	VC	MEK	
3/22/85	SUPPLY	NYSDEC	1800	370	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2170
6/19/85	SUPPLY	NYSDEC	–	560	–	–	–	–	–	–	68	–	–	100	–	–	–	–	–	–	–	728
7/1/85	SUPPLY	LCDOH	8	22	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	34
4/14/95	SUPPLY-L	Haley & Aldrich	4J	–	7J	3J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
4/14/95	SUPPLY-M	Haley & Aldrich	6J	–	6J	2J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
4/14/95	SUPPLY-U	Haley & Aldrich	42	6J	2J	–	–	–	–	–	1J	–	–	–	–	–	–	–	–	–	–	42
8/23/95	SUPPLY	Haley & Aldrich	160	–	3J	–	–	2J	4J		4J	3J	–	–	–	–	–	–	–	–	–	160

NOTES:

1. "–' indicates analyte not detected or not analyzed for.
2. "J" indicated estimated value below practical quantitation limit (not included in total VOCs value).
3. TCE-trichloroethene; 1,1,1-TCA-trichloroethane; DCE-dichloroethene; DCA-dichloroethane; MeCL2-methylene chloride; PCE-tetrachloroethene; BDCM-bromodichloromethane; 1,1,2,2-TCA-tetrachloroethane; CARB.TET.-Carbon tetrachloride; Acet.-Acetone; Benz.-Benzene; Chloro-Benz.-Chlorobenzene; Tol.-Toluene; VC-Vinyl Chloride; MEK-methyl-ethyl-ketone.
4. Sampling entities: CDMFPC-CDM Federal Programs Corporation; NYSDEC-New York State Department of Environmental Conservation; LCDOH-Livingston County Department of Health.

TABLE 2
SOIL STANDARDS, CRITERIA AND GUIDELINES
ENARC-O MACHINE PRODUCTS, INC
LIMA, NEW YORK

Contaminant of Concern	KOC	foc (%)	Cs (mg/kg)	Correction Factor	Soil Quality Goal (mg/kg)
1,1 -DICHLOROETHENE	65	1	0.004	100	0.4
1,2 - DICHLOROETHENE	59	1	0.003	100	0.3
TRICHLOROETHENE	126	1	0.007	100	0.7
1,1,1-TRICHLOROETHANE	152	1	0.0076	100	0.76
TETRACHLOROETHENE	277	1	0.014	100	1.4

NOTES:

1. Allowable Soil Concentrations provided by Technical Administrative & Guidance Memorandum #4046, NYSDEC, 24 January 1994, Office of Hazardous Waste Remediation.
2. foc - Fraction of organic carbon provided by TAGM #4046.
3. KOC - Organic Carbon partitioning coefficient provided by TAGM #4046.
4. Cs - Allowable Soil Concentration = foc x KOC x Groundwater Standard (5.0 ppb)
5. Correction Factor provided by TAGM #4046.

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TABLE 3
GROUNDWATER STANDARDS, CRITERIA AND GUIDELINES
ENARC-O MACHINE PRODUCTS, INC
LIMA, NEW YORK

Contaminant of Concern	Groundwater Quality (GA Std) (ug/L)
1,1 -DICHLOROETHENE	5
VINYL CHLORIDE	2
1,2 - DICHLOROETHENE	5
TRICHLOROETHENE	5
1,1,1-TRICHLOROETHANE	5
TETRACHLOROETHENE	5

NOTES:

1. References: TOGS 1.1.1. "Ambient Water Quality Standards and Guidance Values", NYSDEC, November 1991.
2. GA - Groundwater Class for a Drinking Water Source.

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TABLE 4
SUMMARY OF ESTIMATED COSTS
ENARC-O MACHINE PRODUCTS, INC
LIMA, NEW YORK

General Response Action	Technology Alternative	Capital	Annual O&M	Net Present Worth (2)
A. No Action	Groundwater Monitoring	$0	$8,404	$68,775
B. Excavation & Disposal	Excavation and Disposal	$57,506	$8,404	$126,280
C. Separation & Treatment	Blower-Powered Vapor Extraction	$78,325	$40,580	$410,410
D. Separation & Treatment	Wind-Powered Vapor Extraction	$20,638	$10,208	$104,175
E. Control & Isolation	Cap/Cover Courtyard Area	$14,950	$8,404	$83,725
F. Combined B, D, & E	Combination	$96,506 (3)	$10,208	$180,043

NOTES:

1. See report text for discussion of response actions and technologies.
2. Net Present Worth assumes 5% inflation, 8% discount rate(value of money) for 10 years.
3. Note that capital costs of combined alternatives drops by $14,950 if construction of building takes place over the courtyard area, replacing asphalt paving as the cap.

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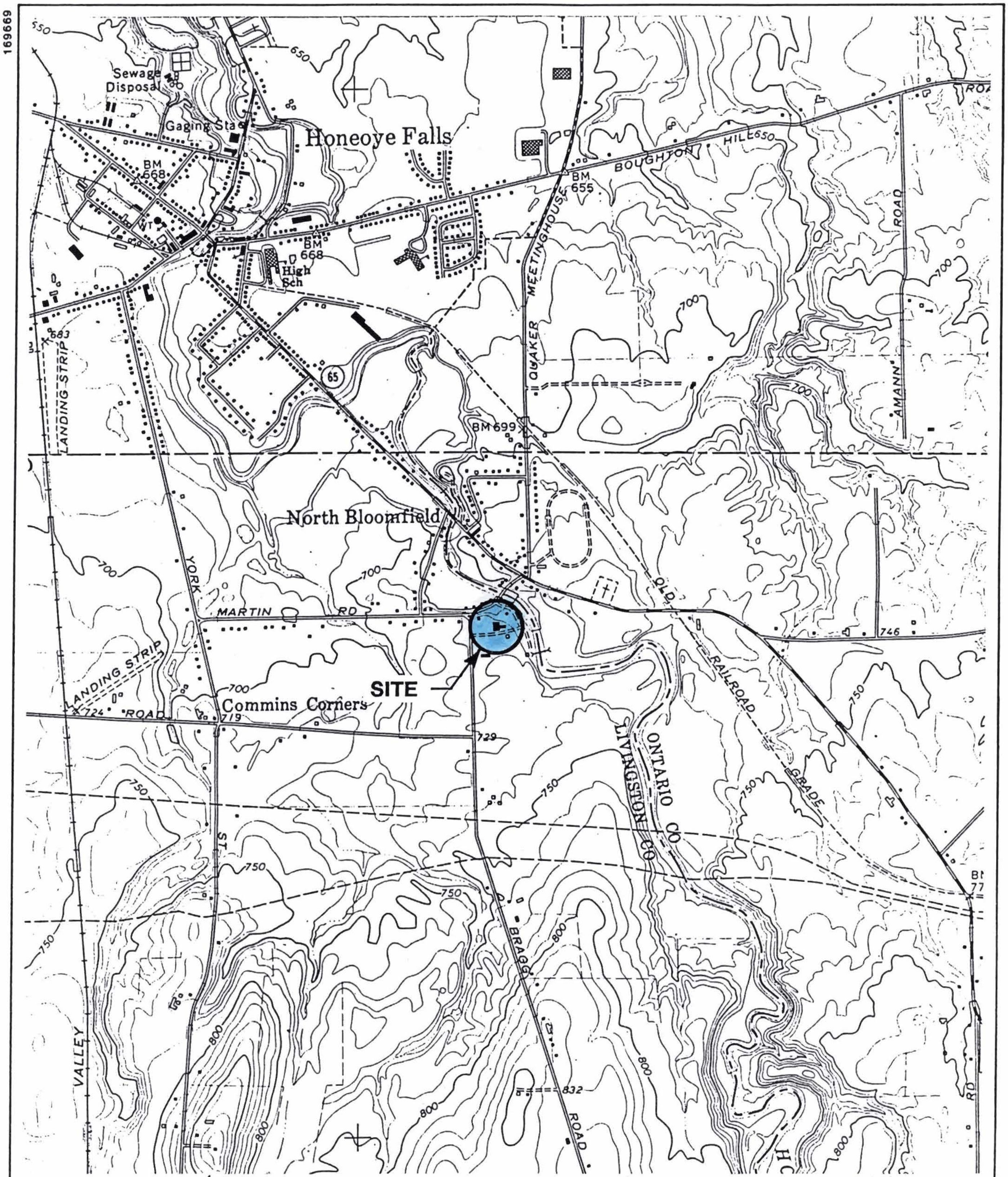
Figures



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

QUADRANGLE LOCATION

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

H & A OF NEW YORK

Geotechnical Engineers & Environmental Consultants

ENARC-O MACHINE PRODUCTS
LIMA, NEW YORK

PROJECT LOCUS

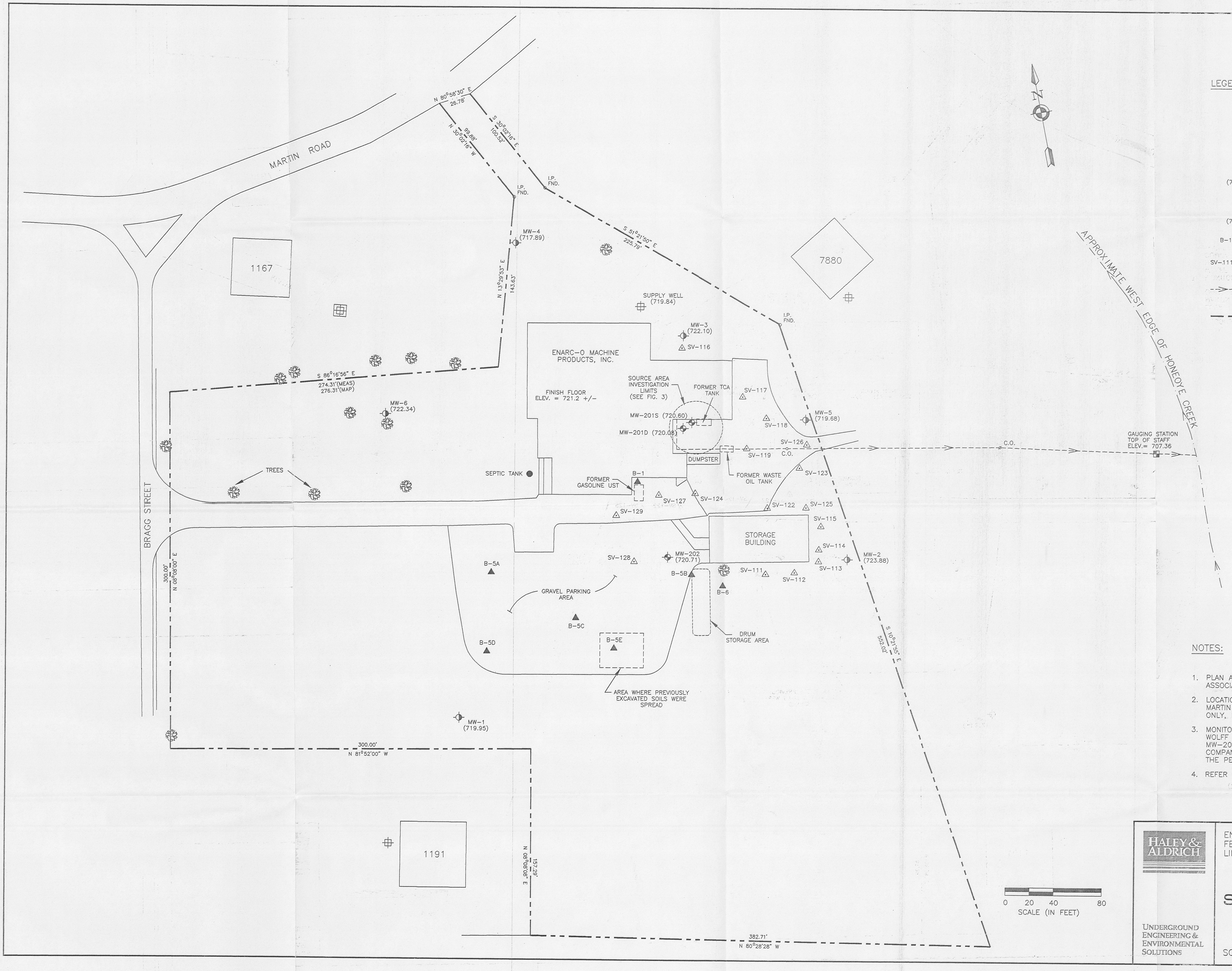
SCALE: 1 IN. = 2000 FT.

OCTOBER 1992

FILE NO. 70372-40

MAKEPEACE

FIGURE 1



LEGEND:

⊕	RESIDENTIAL WELL
▨	LOCATION OF STREAM STAFF GAUGE INSTALLED BY H&A OF NEW YORK
⊕ (720.60)	MONITORING WELL INSTALLED BY H&A OF NEW YORK, NUMBER IN PARENTHESES INDICATES TOP OF WELL CASING ELEVATION
⊕ (719.68)	MONITORING WELL INSTALLED BY OTHERS. NUMBER IN PARENTHESES INDICATES TOP OF CASING ELEVATION
B-1 ▲	SOIL BORING
SV-111 △	SOIL VAPOR SURVEY LOCATION BY H&A OF NEW YORK
--->---○-C.O.-	SPDES DISCHARGE LINE; C.O. INDICATES CLEAN-OUT LOCATION
— - - —	PROPERTY BOUNDARY

NOTES:

1. PLAN ADAPTED FROM SURVEY PERFORMED BY D.J. PARRONE ASSOCIATES COMPLETED ON 11 JUNE 1994.
2. LOCATIONS OF RESIDENCE AT 1167 BRAGG STREET, 7880 MARTIN RD., AND BRAGG/MARTIN RD. JUNCTION ARE APPROXIMATE ONLY, BASED ON AVAILABLE PLANIMETRIC INFORMATION..
3. MONITORING WELLS MW-1 THROUGH MW-6 INSTALLED BY PARRATT-WOLFF INC. DURING NOVEMBER-DECEMBER 1990. MONITORING WELLS MW-201S, 201D AND 202 INSTALLED BY NOTHNAGLE DRILLING COMPANY INC. UNDER H&A OF NEW YORK OBSERVATION DURING THE PERIOD 23 THROUGH 27 MAY 1994.
4. REFER TO TEXT FOR ADDITIONAL INFORMATION.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

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

SITE PLAN

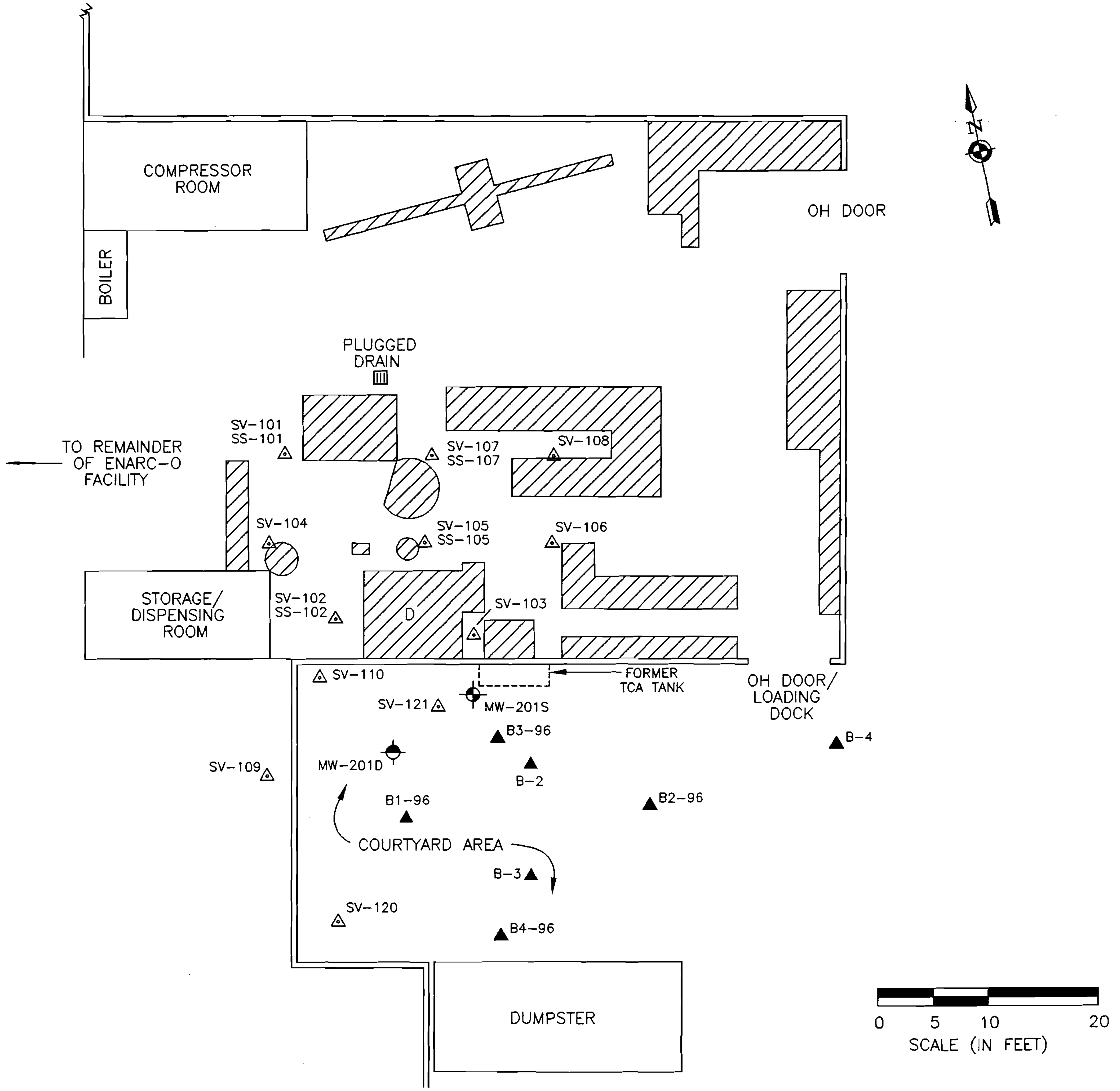
SCALE: AS SHOWN

MARCH 1997

FILENAME: 70372-046:RIS005D.DWG

FIGURE 2

70372-046



LEGEND:

SV-102 SS-102 △ APPROXIMATE LOCATION OF SOIL VAPOR SAMPLE (SV-102) AND SOIL SAMPLE (SS-102)

B2-96 ▲ APPROXIMATE LOCATION OF TEST BORING

▨ FLOOR AREA OBSTRUCTED BY EQUIPMENT, STORAGE OR OTHER, (DIMENSIONS APPROXIMATE). "D" DESIGNATES DEGREASER LOCATED IN CONCRETE PIT

MW-201S ⌖ OVERBURDEN MONITORING WELL

MW-201D ⌖ BEDROCK MONITORING WELL

NOTE:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE, BASED ON TAPE PLAN OF FACILITY.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

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

SOURCE AREA

SCALE: AS SHOWN

MARCH 1997

FILENAME: FSW003B.DWG

FIGURE 3

70372-046

Appendix A

REMEDIAL TECHNOLOGY: A. NO ACTION

WORKSHEET 1
ACTIVITIES/WORK ITEMS

1 Sample/Analyze groundwater semi-annually. Obtain samples from eight on-site wells, two off-site wells and one off-site residence basement sump.

2 Review/Validate analytical data.

3 Semi-annual report preparation.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

1. References: Groundwater - TOGS 1.1.1. "Ambient Water Quality Standards and Guidance Values", NYSDEC, November 1991.

REMEDIAL TECHNOLOGY: A. NO ACTION

WORKSHEET 2
UNIT COST ESTIMATES

ITEM	QUANTITY	UNIT	COST	CAPITAL	O&M
Water Sampling: (2x)					
Analysis	22	Sample	$140		$3,080
Collection	36	Mhour	$50		$1,800
Review/validate	4	Mhour	$90		$360
Semi-annual Report	2	Ea	1200		$2,400

Labor Subtotal:	$7,640
Engin./Design (0%):	$0
Contingency (10%):	$764
Total:	$8,404

Net Present Worth: (5% Inflation, 8% Discount Rate)

Five Year:	$36,805
Ten Year:	$68,775
Fifteen Year:	$96,544
Twenty Year:	$120,665

REMEDIAL TECHNOLOGY: B. EXCAVATION AND DISPOSAL AS AS SOLID WASTE

WORKSHEET 1
ACTIVITIES/WORK ITEMS

1 Mob/demob excavation equipment.

2 Excavate to a depth of four feet within Courtyard Area (225 cy/385 tons).

3 Load and haul (225 cy/ 15 cy per truck = 15 loads).

4 Dispose of soil as solid waste in permitted landfill.

5 Backfill, compact, and regrade excavation.

6 Sample/Analyze groundwater semi-annually. Obtain samples from eight on-site and two off-site wells and one off-site residence basement sump.

7 Review/Validate analytical data.

8 Semi-annual report preparation.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

1. Allowable Soil Concentrations provided by Technical Administrative & Guidance Memorandum #4046, NYSDEC, 24 January 1994, Division of Hazardous Waste Remediation.

2. Groundwater - TOGS 1.1.1. "Ambient Water Quality Standards and Guidance Values", NYSDEC, November 1991.

3. NYSDEC, Division of Solid Waste, 6 NYCRR Part 360, "Solid Waste Management Facilities", 9 October 1993.

4. NYSDEC, Division of Hazardous Substances Regulation, 6 NYCRR Part 371, "Identification and Listing of Hazardous Wastes", 31 January 1992.

5. "Contained-In Criteria For Environmental Media", Technical Administrative & Guidance Memorandum #3028, NYSDEC, 30 November 1992, Division of Hazardous Substances Regulation.

REMEDIAL TECHNOLOGY: B. EXCAVATION AND DISPOSAL AS SOLID WASTE

WORKSHEET 2
UNIT COST ESTIMATES

ITEM	QUANTITY	UNIT	COST	CAPITAL	O&M
Mob/demob	1	LS	$1,500	$1,500	
Excavate/Load/Transport	385	TON	$75	$28,875	
Disposal Fee	385	TON	$30	$11,550	
Backfill and Compaction	385	TON	$6	$2,310	
Water Sampling: (2x)					
Analysis	22	Sample	$140		$3,080
Collection	36	Mhour	$50		$1,800
Review/validate	4	Mhour	$90		$360
Semi-annual Report	2	Ea	1200		$2,400

	CAPITAL	O&M
Labor Subtotal:	$44,235	$7,640
Engin./Design (20%):	$8,847	$0
Contingency (10%):	$4,424	$764
Total:	$57,506	$8,404

Net Present Worth: (5% Inflation, 8% Discount Rate)

Five Year:	$94,311
Ten Year:	$126,280
Fifteen Year:	$154,049
Twenty Year:	$178,170

REMEDIAL TECHNOLOGY: C. BLOWER-POWERED SOIL VAPOR EXTRACTION

WORKSHEET 1
ACTIVITIES/WORK ITEMS

1 Mob/demob drilling equipment.

2 Install two 4" diameter vapor extraction wells in the courtyard area.

3 Install perforated piping in wells, solid piping to manifold, hookup piping to the blower and insulate.

4 Hookup one 5 hp vacuum blower to the installed wells, complete with carbon canisters, separator.

5 Install necessary electric and building modifications as needed.

6 Start-up remedial system with daily vapor phase monitoring for one week, weekly monitoring for one month.

7 Perform monthly vapor monitoring of effluent using portable PID detector. Obtain vapor samples from effluent and each well for analysis on a semi-annual basis.

8 Sample/Analyze groundwater semi-annually. Obtain samples from eight on-site and two off-site wells and one off-site residence basement sump.

9 Review/Validate analytical data.

10 Semi-annual report preparation.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs).

1. Allowable Soil Concentrations provided by Technical Administrative & Guidance Memorandum #4046, NYSDEC, 24 January 1994, Office of Hazardous Waste Remediation.

2. Groundwater - TOGS 1.1.1. "Ambient Water Quality Standards and Guidance Values", NYSDEC, November 1991.

3. NYSDEC, Division of Solid Waste, 6 NYCRR Part 360, "Solid Waste Management Facilities", 9 October 1993.

4. NYSDEC, Division of Hazardous Substances Regulation, 6 NYCRR Part 371, "Identification and Listing of Hazardous Wastes", 31 January 1992.

5. "Contained-In Criteria For Environmental Media", Technical Administrative & Guidance Memorandum #3028, NYSDEC, 30 November 1992, Division of Hazardous Substances Regulation.

6. Air - Draft Air Guide - 1, "Guidelines For the Control of Toxic Ambient Air Contaminants", NYSDEC, 1991, Division of Air Resources.

REMEDIAL TECHNOLOGY: C. BLOWER-POWERED SOIL VAPOR EXTRACTION

WORKSHEET 2
UNIT COST ESTIMATES

ITEM	QUANTITY	UNIT	COST	CAPITAL	O&M
Mob/demob	1	LS	$1,500	$1,500	
Well Installations (2)	2	EA	$2,500	$5,000	
Perforated and Manifold Piping	150	LF	$35	$5,250	
Vacuum Blower	1	EA	$4,000	$4,000	
Separator (modif. 55-gal. drum)	1	EA	$1,000	$1,000	
Pump & Misc. Equipment	1	LS	$2,000	$2,000	
Building and Electric Modification	1	LS	$10,000	$10,000	
Insulation	150	LF	$10	$1,500	
Water Treatment	2	EA	$750	$1,500	
Vapor Treatment	3	EA	$1,500	$4,500	
Pilot Testing	1	LS	$10,000	$10,000	
Permitting Allowance	1	EA	$4,000	$4,000	
Start-Up Allowance	1	LS	$10,000	$10,000	
Routine Maintenance	80	Mhour	$75		$6,000
Special Maintenance	40	Mhour	$75		$3,000
Carbon Regeneration	12	EA	$250		$3,000
Electrical Power	1	LS	$3,300		$3,300
Waste Disposal	12	EA	$50		$600
Vapor Sample:					
Analysis	25	Sample	$75		$1,875
Collection	80	Mhour	$50		$4,000
Review/validate	20	Mhour	$90		$1,800
Water Sampling: (2x)					
Analysis	22	Sample	$140		$3,080
Collection	36	Mhour	$50		$1,800
Review/validate	4	Mhour	$90		$360
Semi-annual Report	2	Ea	1200		$2,400

Labor Subtotal:	$60,250	$31,215
Engin./Design (20%):	$12,050	$6,243
Contingency (10%):	$6,025	$3,122
Total:	$78,325	$40,580

Net Present Worth: (5% Inflation, 8% Discount Rate)

Five Year: $256,042
Ten Year: $410,410
Fifteen Year: $544,496
Twenty Year: $660,965

REMEDIAL TECHNOLOGY: D. WIND-POWERED SOIL VAPOR EXTRACTION

WORKSHEET 1
ACTIVITIES/WORK ITEMS

1 Mob/demob excavation equipment.

2 Excavate four 50-ft trenches to a depth of four feet (replace soil in trenches after pipe installation).

3 Install two 4" diameter angled wells under existing building slab, to a depth as near bedrock as practicable.

4 Install perforated piping in trenches, manifold piping and passive roof ventilators (4).

5 Load and haul excess soil (15 cy).

6 Dispose of soil as solid waste in permitted landfill.

7 Backfill, compact, and regrade trenches.

8 Start-up remedial system with daily vapor phase monitoring for one week.

9 Perform monthly vapor monitoring of effluent using portable PID detector. Obtain vapor samples from effluent and each well for analysis on a semi-annual basis.

10 Sample/Analyze groundwater semi-annually. Obtain samples from eight on-site and two off-site wells and one off-site residence basement sump.

11 Review/Validate analytical data.

12 Semi-annual report preparation.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

1. Allowable Soil Concentrations provided by Technical Administrative & Guidance Memorandum #4046, NYSDEC, 24 January 1994, Division of Hazardous Waste Remediation.

2. Groundwater - TOGS 1.1.1. "Ambient Water Quality Standards and Guidance Values", NYSDEC, November 1991.

3. NYSDEC, Division of Solid Waste, 6 NYCRR Part 360, "Solid Waste Management Facilities", 9 October 1993.

4. NYSDEC, Division of Hazardous Substances Regulation, 6 NYCRR Part 371, "Identification and Listing of Hazardous Wastes", 31 January 1992.

5. "Contained-In Criteria For Environmental Media", Technical Administrative & Guidance Memorandum #3028, NYSDEC, 30 November 1992, Division of Hazardous Substances Regulation.

6. Air - Draft Air Guide - 1, "Guidelines For the Control of Toxic Ambient Air Contaminants", NYSDEC, 1991, Division of Air Resources.

REMEDIAL TECHNOLOGY: D. WIND-POWERED SOIL VAPOR EXTRACTION

WORKSHEET 2
UNIT COST ESTIMATES

ITEM	QUANTITY	UNIT	COST	CAPITAL	O&M
Mob/demob	1	LS	$1,500	$1,500	
Well Installations (2)	2	EA	$2,500	$5,000	
Excavate/Load/Transport	25	TON	$75	$1,875	
Disposal Fee	25	TON	$30	$750	
Perforated Piping	250	LF	$10	$2,500	
Manifold Piping	25	LF	$50	$1,250	
Passive Roof Ventilators	4	EA	$500	$2,000	
Start-up with Analytical	1	LS	$1,000	$1,000	
Vapor Sample:					
Monthly Reading	12	EA	$100		$1,200
Analysis	2	Sample	$75		$150
Collection	4	Mhour	$50		$200
Review/validate	1	Mhour	$90		$90
Water Sampling: (2x)					
Analysis	22	Sample	$140		$3,080
Collection	36	Mhour	$50		$1,800
Review/validate	4	Mhour	$90		$360
Semi-annual Report	2	Ea	1200		$2,400

	CAPITAL	O&M
Labor Subtotal:	$15,875	$9,280
Engin./Design (20%):	$3,175	$0
Contingency (10%):	$1,588	$928
Total:	$20,638	$10,208

Net Present Worth: (5% Inflation, 8% Discount Rate)

Five Year:	$65,343
Ten Year:	$104,175
Fifteen Year:	$137,905
Twenty Year:	$167,204

REMEDIAL TECHNOLOGY: E. CAP COURTYARD WITH LOW-PERMEABILITY COVER

WORKSHEET 1
ACTIVITIES/WORK ITEMS

1 Mob/demob paving equipment.

2 Place subgrade material.

3 Place asphalt cover.

4 Sample/Analyze groundwater semi-annually. Obtain samples from eight on-site and two off-site wells and one off-site residence basement sump.

5 Review/Validate analytical data.

6 Semi-annual report preparation.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

1. Allowable Soil Concentrations provided by Technical Administrative & Guidance Memorandum #4046, NYSDEC, 24 January 1994, Office of Hazardous Waste Remediation.

2. Groundwater - TOGS 1.1.1. "Ambient Water Quality Standards and Guidance Values", NYSDEC, November 1991.

REMEDIAL TECHNOLOGY: E. CAP COURTYARD WITH LOW-PERMEABILITY COVER

WORKSHEET 2
UNIT COST ESTIMATES

ITEM	QUANTITY	UNIT	COST	CAPITAL	O&M
Mob/demob	1	LS	$1,500	$1,500	
Backfill, Compact, Regrade As Needed	1500	SF	$5	$7,500	
Cap Area With Asphalt Cover	1500	SF	$8	$2,500	
Water Sampling: (2x)					
Analysis	22	Sample	$140		$3,080
Collection	36	Mhour	$50		$1,800
Review/validate	4	Mhour	$90		$360
Semi-annual Report	2	Ea	1200		$2,400
	Labor Subtotal:			$11,500	$7,640
	Engin./Design (20%):			$2,300	$0
	Contingency (10%):			$1,150	$764
	Total:			$14,950	$8,404

Net Present Worth: (5% Inflation, 8% Discount Rate)

Five Year:	$51,755
Ten Year:	$83,725
Fifteen Year:	$111,494
Twenty Year:	$135,615

REMEDIAL TECHNOLOGY: F. COMBINED TECHNOLOGIES

WORKSHEET 1
ACTIVITIES/WORK ITEMS

1 Mob/demob excavation equipment.

2 Excavate to a depth of four feet within Courtyard Area (225 cy/385 tons).

3 Load and haul (225 cy/ 15 cy per truck = 15 loads).

4 Dispose of soil as solid waste in permitted landfill.

5 Install two 4" diameter angled wells under existing building slab, to a depth as near bedrock as practicable.

6 Install perforated piping in trenches, manifold piping and passive roof ventilators (4).

7 Backfill, compact, and regrade courtyard

8 Mob/demob paving equipment.

9 Place subgrade material.

10 Place asphalt cover.

11 Start-up remedial system with daily vapor phase monitoring for one week.

12 Perform monthly vapor monitoring of effluent using portable PID detector.. Obtain vapor samples from effluent and each well for analysis on a semi-annual basis.

13 Sample/Analyze groundwater semi-annually. Obtain samples from eight on-site and two off-site wells and one off-site residence basement sump.

14 Review/Validate analytical data.

15 Semi-annual report preparation.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs).

1. Allowable Soil Concentrations provided by Technical Administrative & Guidance Memorandum #4046, NYSDEC, 24 January 1994, Office of Hazardous Waste Remediation.

2. Groundwater - TOGS 1.1.1. "Ambient Water Quality Standards and Guidance Values", NYSDEC, November 1991.

3. NYSDEC, Division of Solid Waste, 6 NYCRR Part 360, "Solid Waste Management Facilities", 9 October 1993.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) con't.

4. NYSDEC, Division of Hazardous Substances Regulation, 6 NYCRR Part 371, "Identification and Listing of Hazardous Wastes", 31 January 1992.

5. "Contained-In Criteria For Environmental Media", Technical Administrative & Guidance Memorandum #3028, NYSDEC, 30 November 1992, Division of Hazardous Substances Regulation.

6. Air - Draft Air Guide - 1, "Guidelines For the Control of Toxic Ambient Air Contaminants", NYSDEC, 1991, Division of Air Resources.

REMEDIAL TECHNOLOGY: F. COMBINED TECHNOLOGIES

WORKSHEET 2
UNIT COST ESTIMATES

ITEM	QUANTITY	UNIT	COST	CAPITAL	O&M
EXCAVATE/DISPOSE:					
Mob/demob	1	LS	$1,500	$1,500	
Excavate/Load/Transport	385	TON	$75	$28,875	
Disposal Fee	385	TON	$30	$11,550	
Backfill and Compaction	385	TON	$6	$2,310	
PASSIVE VAPOR EXTRACTION:					
Mob/demob	1	LS	$1,500	$1,500	
Perforated and Manifold Piping	150	LF	$35	$5,250	
Well Installations (2)	2	EA	$2,500	$5,000	
Perforated Piping	250	LF	$10	$2,500	
Manifold Piping	25	LF	$50	$1,250	
Passive Roof Ventilators	4	EA	$500	$2,000	
Start-up with Analytical	1	LS	$1,000	$1,000	
Vapor Sample:					
Monthly Reading	12	EA	$100		$1,200
Analysis	2	Sample	$75		$150
Collection	4	Mhour	$50		$200
Review/validate	1	Mhour	$90		$90
CAP COURTYARD:					
Mob/demob	1	LS	$1,500	$1,500	
Backfill, Compact, Regrade As Needed	1500	SF	$5	$7,500	
Cap Area With Asphalt Cover	1500	SF	$8 ?	$2,500	
GROUNDWATER MONITORING:					
Water Sampling: (2x)					
Analysis	22	Sample	$140		$3,080
Collection	36	Mhour	$50		$1,800
Review/validate	4	Mhour	$90		$360
Semi-annual Report	2	Ea	1200		$2,400
	Labor Subtotal:			$74,235	$9,280
	Engin./Design (20%):			$14,847	$0
	Contingency (10%):			$7,424	$928
	Total:			$96,506	$10,208

Net Present Worth: (5% Inflation, 8% Discount Rate)

Five Year: $141,211
Ten Year: $180,043
Fifteen Year: $213,773
Twenty Year: $243,072

Appendix B

REPORT ON TAGM 3028
SOIL SAMPLING AND RESULTS
ENARC-O MACHINE PRODUCTS, INC.
LIMA, NEW YORK
NYSDEC REGISTRY NO. 8-26-011

by

Haley & Aldrich, Inc.
Rochester, New York

for

Kaddis Manufacturing, Inc.
Rochester, New York

File No. 70372-046
December 1996

UNDERGROUND
ENGINEERING &
ENVIRONMENTAL
SOLUTIONS

Haley & Aldrich of New York
189 North Water Street
Rochester, NY 14604-1151
Tel: 716.232.7386
Fax: 716.232.6768
Email: ROC@HaleyAldrich.com

HALEY &
ALDRICH

12 December 1996
File No. 70372-046

New York State Department of
Environmental Conservation
Division of Solid & Hazardous Materials
50 Wolf Road
Albany, New York 12233-7010

Attention: Mr. Steve Kaminsky

Subject: Soil Sampling Results
Enarc-O Machine Products, Inc.
Lima, New York
NYSDEC Registry No. 8-26-011

Dear Mr. Kaminksy:

This letter report presents the results of recent soil sampling and analysis at the above-referenced site. A preliminary summary of the data and supporting information was transmitted to you via fax on 3 December 1996. As you are aware, Haley & Aldrich has performed this work for the purpose of demonstrating to NYSDEC that the soils targeted for excavation at Enarc-O, meet the "Contained-In" criteria that exempt it from management as hazardous waste, consistent with TAGM 3028.

Introduction

Haley & Aldrich has performed a remedial investigation (RI) at the site under the purview of NYSDEC's Hazardous Waste Remediation group. As a result of the RI, excavation of source area soils has been identified as a potential, and the likely preferred remedial measure to be evaluated as part of the subsequent Feasibility Study (FS). The feasibility of the excavation is dependent on being able to dispose of the soil as non-hazardous solid waste. Our investigation has been performed in accordance with the following:

- ☐ NYSDEC's "'Contained-In' Criteria For Environmental Media" Technical Administrative Guidance Memorandum (TAGM) 3028;
- ☐ Haley & Aldrich's Work Plan dated 9 September 1996;
- ☐ Haley & Aldrich's response to NYSDEC comments, dated 24 October 1996.

OFFICES
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Soil Sampling

Soil samples were obtained by performing four test borings in the Enarc-O facility courtyard, at the locations shown on Figure 1. The test borings, B1-96 through B4-96, were performed by Nothnagle Drilling Company, Inc. of Scottsville, New York on 31 October 1996, under Haley & Aldrich of New York observation. Soil samples were obtained in each boring using three 2-ft. long standard split spoon samplers. The samplers were driven consecutively from ground surface to a depth of 6 ft, slightly deeper than the intended depth of excavation in the courtyard. The spoon samplers were decontaminated after completing each test boring using an alconox wash, and tap and deionized water rinses.

As outlined in our response to NYSDEC comments on the Work Plan, composite samples were obtained, composited only among the split-spoons of each test boring. After driving and retrieving all three spoon samplers, the samplers were opened and the soil contents placed immediately in a clean, sealable dedicated plastic bag. The airspace in the bag was minimized, the bag sealed, and the soil mass mixed by "kneading" and blending the contents. Representative composite samples were then immediately taken from the soil mass and placed in glass jars. This procedure was repeated for each boring.

The samples were immediately placed in a cooler and chilled to approximately 4° C, and transported under standard chain-of-custody procedures to the laboratory for analysis (see next section).

Laboratory Analyses

As required by TAGM 3028, each soil sample was analyzed directly for both total concentration of hazardous constituents and leachate concentrations using the Toxicity Characteristic Leaching Procedure (TCLP), since the material is intended to be excavated and disposed offsite at a permitted solid waste management facility (SWMF). The soils were analyzed using EPA Method 8260 for volatile organic compounds (VOCs), including those constituents previously identified in courtyard soil sample analyses, as presented in the RI report.

Quality Assurance/Quality Control analyses consisted of Matrix Spike/Matrix Spike Duplicate analyses on the sample from test boring B4-96.

In addition to the VOC analyses performed to satisfy the TAGM 3028 requirements, selected analyses were performed to satisfy disposal characterization requirements of the proposed SWMF. These analyses included TCLP metals using EPA Method 6010/7470.

The TCLP VOC samples were diluted by a factor of 10 prior to analysis due to anticipated problems with the buffer solutions. The dilution resulted in a reporting limit of 50 ppb, which is above the groundwater action level of 5 ppb for the compounds of concern. In order to resolve the data to the reporting method detection limit (MDL), a review of the laboratory's Instrument Detection Limit Study (IDLS) and Total Ion Chromatograms (TICs) was performed. Based on this review, lower project-specific detection limits were obtained, as shown on the attached Table 1, that closely approximate the groundwater action levels. Copies of the IDLS and TICs are included in Appendix A.

Results and Discussion

Results of the VOC analyses are summarized in Table 1. Four compounds were detected. As shown on the table, none of the analytes in the "totals" analyses were detected above the TAGM 3028 Soil / Sediment Action Levels. With regard to the TCLP analyses, the extract from one soil sample, B3-96, contained two VOCs at levels above the Groundwater Action Level values. Tetrachloroethene (PERC) and Trichloroethene (TCE) were detected in this sample at 84 and 77 parts per billion (ppb), respectively. All other analytes were non-detect.

As discussed above, a dilution of the TCLP sample extracts resulted in some detection levels being above the TAGM Action Levels. Table 1 shows the individual compound detection limits. Although in some cases the project-specific detection limit is above the TAGM Action Level, the chromatograms (Appendix A) indicate no compounds were detected below these detection limits, in the concentration range that would normally yield estimated results ("J" values). Accordingly, the data indicate no significant presence of compounds of concern in the samples, with the exception of the two noted above (PERC and TCE).

When considering the proposed excavation it is important to note that the limited quantities of higher-contamination soils represented by boring B3-96 will be mixed with much larger volumes of soils with little or no contaminant presence. This mixture will result in an overall soil mass contaminant level that would be below the TAGM 3028 action levels. We understand you have already worked through averaging calculations to confirm this scenario.

The information provided to you previously by fax (boring location figures, cross section, and preliminary version of Table 1) are also included with this letter.

Approval for Disposal

Based on the data presented herein, Haley & Aldrich requests NYSDEC approve management of source-area soils as non-hazardous waste, consistent with NYSDEC's TAGM 3028. Such management will result in a cost-effective method that will significantly reduce source-area contaminant mass and will facilitate the FS remedial measure evaluation for the site.

If NYSDEC is in agreement, we respectfully request you issue a letter to Kaddis Manufacturing Corporation, the owner of the site, indicating your approval that the excavated soils be managed as non-hazardous for purposes of excavation and disposal of this material at a SWMF. The letter would be included in the FS report, and would also be provided to the SWMF as part of the disposal approval documentation.

It is our understanding the soil sampling and analysis described herein represent sufficient documentation for approval, and further investigation would not be required. If NYSDEC grants approval, we anticipate implementation of remediation in Spring or early Summer of 1997.

The FS report for the site is currently being prepared. In order to meet the deadlines for completion of the FS documents and implementation of remedial activity, we appreciate your prompt consideration of this matter.

If you need any additional information please do not hesitate to contact us.

Sincerely yours,
HALEY & ALDRICH of NEW YORK

Dennis M. Conley for
Robert J. Mahoney
Senior Environmental Geologist

Vincent B. Dick
Vice President

H:\WP6DOC\70372-46\RSOILKAM.WPF

Attachments:

Table 1:	Summary of Analytical Data
Figure 1:	Test Boring Location Plan
Appendix A:	Laboratory Analytical Report
Appendix B:	Subsurface Profile A-A' (Figure from Previous RI report)

cc: Mike Ryan, NYSDEC Albany
Dixon Rollins, NYSDEC Region 8
Ronald Iannucci, Sr., Kaddis Manufacturing Corp.
William H. Helferich, III, Harter Secrest & Emery

ENARC-O MACHINE PRODUCTS FS
LIMA, NEW YORK

TABLE 1
SUMMARY OF ANALYTICAL DATA
SOURCE AREA SOILS

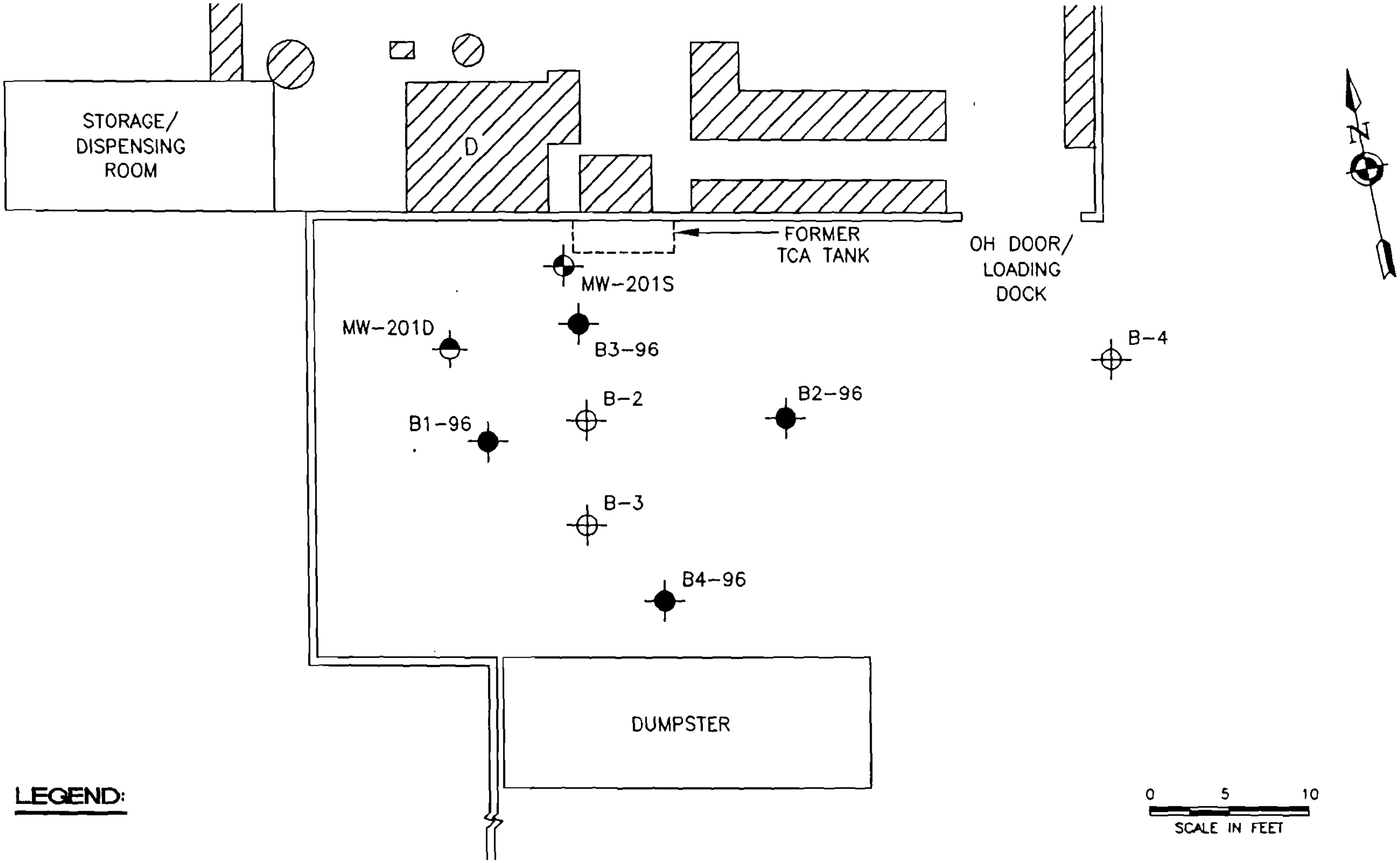
	"Totals" Analysis						TCLP Analysis					
ANALYTE	B1-96	B2-96	B3-96	B4-96	Detection Limit	TAGM 3028 Value	B1-96	B2-96	B3-96	B4-96	Detection Limit	TAGM 3028 Value
Dilution:	1	2.5	5	1			10	10	10	10		
cis-1,2-Dichloroethene	8.5	ND	ND	42	5	780,000	ND	ND	ND	ND	12.6	5
Tetrachloroethene	ND	ND	270	9.7	5	12,000	ND	ND	**84**	ND	7.8	5
1,1,1-Trichloroethane	6.6	ND	470	21	5	7,000,000*	ND	ND	ND	ND	6.2	5
Trichloroethene	14	ND	960	240	5	58,000	ND	ND	**77**	ND	18.4	5
TOTAL VOCs	29.1	0	1700	312.7			0	0	161	0		

NOTES:

1.) Samples obtained from source area on 31 October 1996.
2.) All results expressed in micrograms per kilogram(ppb).
3.) Shading indicates TAGM value exceeded.
4.) * - No ingestion criteria level; Stated value is from "Soil Sediment Action Level".

rjm:wks24\70372-46\fssoils.wk1

FILE No. 70372-046



LEGEND:

MW-201S	◒	OVERBURDEN MONITORING WELL
MW-201D	◓	BEDROCK MONITORING WELL
B1-96	●	RECENT TEST BORING BY HALEY & ALDRICH
B-1	⊕	PREVIOUS TEST BORING (1990) BY O'BRIEN & GERE ENGINEERS INC.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

ENARC-O MACHINE PRODUCTS, INC.
IRM/FS EVALUATION
LIMA, NEW YORK

TEST BORING LOCATION PLAN

SCALE AS SHOWN

DECEMBER 1996

FILENAME: LOCPLAN.DWG

FIGURE 1

Appendix A

Laboratory Data

Laboratory Data Report

70372-046

Columbia Analytical Services inc.

A FULL SERVICE ENVIRONMENTAL LABORATORY

November 22, 1996

Mr. Robert Mahoney
Haley and Aldrich
189 North Water Street
Rochester, NY 14604

PROJECT:70372-046
Submission #:9611000078

Dear Mr. Mahoney

Enclosed are the analytical results of the analyses requested. All data has been reviewed prior to report submission. Should you have any questions please contact me at (716) 454-6810.

Thank you for letting us provide this service.

Sincerely,

COLUMBIA ANALYTICAL SERVICES

Michael K. Perry

Michael Perry
Laboratory Director

Enc.

This package has been reviewed by Columbia Analytical Services' QA Department/Laboratory Director prior to report submittal. MKP 11/22/96

700 Exchange Street • Rochester, NY 14608 • Tele:(716)454-6810 • Fax:(716)454-6825
65 Ramapo Valley Rd. • Suite 16 • Mahwah, NJ 07430 • Tele:(201)512-3292 • Fax:(201)512-3362
12699 Roll Rd. • Akron, NY 14001 • Tele:(716)542-1264 • Fax:(716)542-3353

CASE NARRATIVE

COMPANY: Haley & Aldrich
Enarc-O Soil Borings
SUBMISSION #: 9611000078

H & A soil samples were collected on 10/31/96 and were received at CAS on 10/31/96 in good condition at a cooler temperature of approximately 4.6 C.

INORGANIC ANALYSIS

Four soil samples were analyzed for TCLP metals by methods 6010/7470 following a TCLP extraction by method 1311.

No analytical or QC problems were encountered with these analyses.

TCLP ORGANIC ANALYSIS

Four soil samples were analyzed for TCLP Volatiles by SW-846 method 8260 following a Zero headspace extraction.

The tuning criteria for BFB were all within QC limits.

The initial and continuing calibration criteria were met for all analytes.

All samples were extracted and analyzed within the specified holding times.

All surrogate standard recoveries were within QC limits.

Samples were analyzed at dilutions as part of the routine procedure for analyzing TCLP extracts.

No analytical or QC problems were encountered.

VOLATILE ORGANICS

Four soil samples were analyzed for TCL volatile organics by method 8260 from SW-846.

The tuning criteria for BFB were all within QC limits.

The initial and continuing calibration criteria were met for all analytes.

All surrogate recoveries were within QC acceptance limits.

The laboratory blank was free of contamination.

All samples were analyzed within the 14 day holding time as specified in the method.

The Matrix Spike/Matrix Spike duplicate recoveries performed on sample B4 for TCE could not be determined due to the level of TCE detected in the sample and were flagged with a "D". All other MS/MSD and Blank spike recoveries were within QC limits.

Sample B2 was analyzed at a 1/2.5 dilution due to late eluting non-target analytes. Sample B3 was analyzed at a 1/5 dilution to bring target analytes within the calibration range of the method.

No other analytical or QC problems were encountered with this analysis.

Columbia
Analytical
Services Inc.

Effective 04/01/96

CAS LIST OF QUALIFIERS

(The basis of this proposal are the EPA-CLP Qualifiers)

U - Indicates compound was analyzed for but was not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

J - Indicates an estimated value. For further explanation see case narrative / cover letter.

B - This flag is used when the analyte is found in the associated blank as well as in the sample.

E - This flag identifies compounds whose concentrations exceed the calibration range.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

N - Spiked sample recovery not within control limits.
(Flag the entire batch - Inorganic analysis only)

* - Duplicate analysis not within control limits.
(Flag the entire batch - Inorganic analysis only)

- Also used to qualify Organics QC data outside limits.

D - Spike diluted out.

S - Reported value determined by Method of Standard Additions. (MSA)

X - As specified in the case narrative.

CAS Lab ID # for State Certifications

NY ID # in Rochester: 10145
CT ID # in Rochester: PH0556
MA ID # in Rochester: M-NY032

NJ ID # in Rochester: 73004
RI ID # in Rochester: 158

COLUMBIA ANALYTICAL SERVICES

VOLATILE ORGANICS
METHOD 8260 TCL
Reported: 11/22/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B1

Date Sampled : 10/31/96 **Order #:** 113672 **Sample Matrix:** SOIL/SEDIMEN
Date Received: 10/31/96 **Submission #:** 9611000078 **Percent Solid:** 85.9

DATE ANALYZED : 11/14/96
ANALYTICAL DILUTION: 1.0

ANALYTE	PQL	RESULT	UNITS Dry Weight
ACETONE	20	23 U	UG/KG
BENZENE	5.0	5.8 U	UG/KG
BROMODICHLOROMETHANE	5.0	5.8 U	UG/KG
BROMOFORM	5.0	5.8 U	UG/KG
BROMOMETHANE	5.0	5.8 U	UG/KG
2-BUTANONE (MEK)	10	12 U	UG/KG
CARBON DISULFIDE	10	12 U	UG/KG
CARBON TETRACHLORIDE	5.0	5.8 U	UG/KG
CHLOROBENZENE	5.0	5.8 U	UG/KG
CHLOROETHANE	5.0	5.8 U	UG/KG
CHLOROFORM	5.0	5.8 U	UG/KG
CHLOROMETHANE	5.0	5.8 U	UG/KG
DIBROMOCHLOROMETHANE	5.0	5.8 U	UG/KG
1,1-DICHLOROETHANE	5.0	5.8 U	UG/KG
1,2-DICHLOROETHANE	5.0	5.8 U	UG/KG
1,1-DICHLOROETHENE	5.0	5.8 U	UG/KG
CIS-1,2-DICHLOROETHENE	5.0	8.5	UG/KG
TRANS-1,2-DICHLOROETHENE	5.0	5.8 U	UG/KG
1,2-DICHLOROPROPANE	5.0	5.8 U	UG/KG
CIS-1,3-DICHLOROPROPENE	5.0	5.8 U	UG/KG
TRANS-1,3-DICHLOROPROPENE	5.0	5.8 U	UG/KG
ETHYLBENZENE	5.0	5.8 U	UG/KG
2-HEXANONE	10	12 U	UG/KG
METHYLENE CHLORIDE	5.0	5.8 U	UG/KG
4-METHYL-2-PENTANONE (MIBK)	10	12 U	UG/KG
STYRENE	5.0	5.8 U	UG/KG
1,1,2,2-TETRACHLOROETHANE	5.0	5.8 U	UG/KG
TETRACHLOROETHENE	5.0	5.8 U	UG/KG
TOLUENE	5.0	5.8 U	UG/KG
1,1,1-TRICHLOROETHANE	5.0	6.6	UG/KG
1,1,2-TRICHLOROETHANE	5.0	5.8 U	UG/KG
TRICHLOROETHENE	5.0	14	UG/KG
VINYL CHLORIDE	5.0	5.8 U	UG/KG
O-XYLENE	5.0	5.8 U	UG/KG
M+P-XYLENE	5.0	5.8 U	UG/KG

SURROGATE RECOVERIES	QC LIMITS		
4-BROMOFLUOROBENZENE	(74 - 121 %)	113	%
TOLUENE-D8	(81 - 117 %)	108	%
DIBROMOFLUOROMETHANE	(80 - 120 %)	94	%

COLUMBIA ANALYTICAL SERVICES

VOLATILE ORGANICS
METHOD 8260 TCL
Reported: 11/22/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B2

Date Sampled : 10/31/96 **Order #:** 113675 **Sample Matrix:** SOIL/SEDIMEN
Date Received: 10/31/96 **Submission #:** 9611000078 **Percent Solid:** 87.6

ANALYTE	PQL	RESULT	UNITS
DATE ANALYZED : 11/14/96			
ANALYTICAL DILUTION: 2.5			Dry Weight
ACETONE	20	57 U	UG/KG
BENZENE	5.0	14 U	UG/KG
BROMODICHLOROMETHANE	5.0	14 U	UG/KG
BROMOFORM	5.0	14 U	UG/KG
BROMOMETHANE	5.0	14 U	UG/KG
2-BUTANONE (MEK)	10	29 U	UG/KG
CARBON DISULFIDE	10	29 U	UG/KG
CARBON TETRACHLORIDE	5.0	14 U	UG/KG
CHLOROBENZENE	5.0	14 U	UG/KG
CHLOROETHANE	5.0	14 U	UG/KG
CHLOROFORM	5.0	14 U	UG/KG
CHLOROMETHANE	5.0	14 U	UG/KG
DIBROMOCHLOROMETHANE	5.0	14 U	UG/KG
1,1-DICHLOROETHANE	5.0	14 U	UG/KG
1,2-DICHLOROETHANE	5.0	14 U	UG/KG
1,1-DICHLOROETHENE	5.0	14 U	UG/KG
CIS-1,2-DICHLOROETHENE	5.0	14 U	UG/KG
TRANS-1,2-DICHLOROETHENE	5.0	14 U	UG/KG
1,2-DICHLOROPROPANE	5.0	14 U	UG/KG
CIS-1,3-DICHLOROPROPENE	5.0	14 U	UG/KG
TRANS-1,3-DICHLOROPROPENE	5.0	14 U	UG/KG
ETHYLBENZENE	5.0	14 U	UG/KG
2-HEXANONE	10	29 U	UG/KG
METHYLENE CHLORIDE	5.0	14 U	UG/KG
4-METHYL-2-PENTANONE (MIBK)	10	29 U	UG/KG
STYRENE	5.0	14 U	UG/KG
1,1,2,2-TETRACHLOROETHANE	5.0	14 U	UG/KG
TETRACHLOROETHENE	5.0	14 U	UG/KG
TOLUENE	5.0	14 U	UG/KG
1,1,1-TRICHLOROETHANE	5.0	14 U	UG/KG
1,1,2-TRICHLOROETHANE	5.0	14 U	UG/KG
TRICHLOROETHENE	5.0	14 U	UG/KG
VINYL CHLORIDE	5.0	14 U	UG/KG
O-XYLENE	5.0	14 U	UG/KG
M+P-XYLENE	5.0	14 U	UG/KG

SURROGATE RECOVERIES	QC LIMITS		
4-BROMOFLUOROBENZENE	(74 - 121 %)	108	%
TOLUENE-D8	(81 - 117 %)	107	%
DIBROMOFLUOROMETHANE	(80 - 120 %)	95	%

COLUMBIA ANALYTICAL SERVICES

VOLATILE ORGANICS
METHOD 8260 TCL
Reported: 11/22/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B3

Date Sampled : 10/31/96 **Order #:** 113676 **Sample Matrix:** SOIL/SEDIMEN
Date Received: 10/31/96 **Submission #:** 9611000078 **Percent Solid:** 87.9

DATE ANALYZED : 11/14/96
ANALYTICAL DILUTION: 5.0

ANALYTE	PQL	RESULT	UNITS
			Dry Weight
ACETONE	20	110 U	UG/KG
BENZENE	5.0	28 U	UG/KG
BROMODICHLOROMETHANE	5.0	28 U	UG/KG
BROMOFORM	5.0	28 U	UG/KG
BROMOMETHANE	5.0	28 U	UG/KG
2-BUTANONE (MEK)	10	57 U	UG/KG
CARBON DISULFIDE	10	57 U	UG/KG
CARBON TETRACHLORIDE	5.0	28 U	UG/KG
CHLOROBENZENE	5.0	28 U	UG/KG
CHLOROETHANE	5.0	28 U	UG/KG
CHLOROFORM	5.0	28 U	UG/KG
CHLOROMETHANE	5.0	28 U	UG/KG
DIBROMOCHLOROMETHANE	5.0	28 U	UG/KG
1,1-DICHLOROETHANE	5.0	28 U	UG/KG
1,2-DICHLOROETHANE	5.0	28 U	UG/KG
1,1-DICHLOROETHENE	5.0	28 U	UG/KG
CIS-1,2-DICHLOROETHENE	5.0	28 U	UG/KG
TRANS-1,2-DICHLOROETHENE	5.0	28 U	UG/KG
1,2-DICHLOROPROPANE	5.0	28 U	UG/KG
CIS-1,3-DICHLOROPROPENE	5.0	28 U	UG/KG
TRANS-1,3-DICHLOROPROPENE	5.0	28 U	UG/KG
ETHYLBENZENE	5.0	28 U	UG/KG
2-HEXANONE	10	57 U	UG/KG
METHYLENE CHLORIDE	5.0	28 U	UG/KG
4-METHYL-2-PENTANONE (MIBK)	10	57 U	UG/KG
STYRENE	5.0	28 U	UG/KG
1,1,2,2-TETRACHLOROETHANE	5.0	28 U	UG/KG
TETRACHLOROETHENE	5.0	270	UG/KG
TOLUENE	5.0	28 U	UG/KG
1,1,1-TRICHLOROETHANE	5.0	470	UG/KG
1,1,2-TRICHLOROETHANE	5.0	28 U	UG/KG
TRICHLOROETHENE	5.0	960	UG/KG
VINYL CHLORIDE	5.0	28 U	UG/KG
O-XYLENE	5.0	28 U	UG/KG
M+P-XYLENE	5.0	28 U	UG/KG

SURROGATE RECOVERIES	QC LIMITS		
4-BROMOFLUOROBENZENE	(74 - 121 %)	114	%
TOLUENE-D8	(81 - 117 %)	104	%
DIBROMOFLUOROMETHANE	(80 - 120 %)	92	%

VOLATILE ORGANICS
METHOD 8260 TCL
Reported: 11/22/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B4

Date Sampled : 10/31/96 **Order #:** 113677 **Sample Matrix:** SOIL/SEDIMEN
Date Received: 10/31/96 **Submission #:** 9611000078 **Percent Solid:** 86.6

ANALYTE	PQL	RESULT	UNITS
DATE ANALYZED : 11/14/96			
ANALYTICAL DILUTION: 1.0			Dry Weight
ACETONE	20	23 U	UG/KG
BENZENE	5.0	5.8 U	UG/KG
BROMODICHLOROMETHANE	5.0	5.8 U	UG/KG
BROMOFORM	5.0	5.8 U	UG/KG
BROMOMETHANE	5.0	5.8 U	UG/KG
2-BUTANONE (MEK)	10	12 U	UG/KG
CARBON DISULFIDE	10	12 U	UG/KG
CARBON TETRACHLORIDE	5.0	5.8 U	UG/KG
CHLOROBENZENE	5.0	5.8 U	UG/KG
CHLOROETHANE	5.0	5.8 U	UG/KG
CHLOROFORM	5.0	5.8 U	UG/KG
CHLOROMETHANE	5.0	5.8 U	UG/KG
DIBROMOCHLOROMETHANE	5.0	5.8 U	UG/KG
1,1-DICHLOROETHANE	5.0	5.8 U	UG/KG
1,2-DICHLOROETHANE	5.0	5.8 U	UG/KG
1,1-DICHLOROETHENE	5.0	5.8 U	UG/KG
CIS-1,2-DICHLOROETHENE	5.0	42	UG/KG
TRANS-1,2-DICHLOROETHENE	5.0	5.8 U	UG/KG
1,2-DICHLOROPROPANE	5.0	5.8 U	UG/KG
CIS-1,3-DICHLOROPROPENE	5.0	5.8 U	UG/KG
TRANS-1,3-DICHLOROPROPENE	5.0	5.8 U	UG/KG
ETHYLBENZENE	5.0	5.8 U	UG/KG
2-HEXANONE	10	12 U	UG/KG
METHYLENE CHLORIDE	5.0	5.8 U	UG/KG
4-METHYL-2-PENTANONE (MIBK)	10	12 U	UG/KG
STYRENE	5.0	5.8 U	UG/KG
1,1,2,2-TETRACHLOROETHANE	5.0	5.8 U	UG/KG
TETRACHLOROETHENE	5.0	9.7	UG/KG
TOLUENE	5.0	5.8 U	UG/KG
1,1,1-TRICHLOROETHANE	5.0	21	UG/KG
1,1,2-TRICHLOROETHANE	5.0	5.8 U	UG/KG
TRICHLOROETHENE	5.0	240	UG/KG
VINYL CHLORIDE	5.0	5.8 U	UG/KG
O-XYLENE	5.0	5.8 U	UG/KG
M+P-XYLENE	5.0	5.8 U	UG/KG

SURROGATE RECOVERIES	QC LIMITS		
4-BROMOFLUOROBENZENE	(74 - 121 %)	83	%
TOLUENE-D8	(81 - 117 %)	96	%
DIBROMOFLUOROMETHANE	(80 - 120 %)	106	%

COLUMBIA ANALYTICAL SERVICES

Reported: 11/22/96

Haley and Aldrich
Project Reference:70372-046
Client Sample ID :B1

Date Sampled :10/31/96	**Order #:**113678	**Sample Matrix:**SOIL/SEDIMENT
Date Received:10/31/96	**Submission #:**9611000078	

ANALYTE	PQL	RESULT	UNITS	DATE ANALYZED	ANALYTICAL DILUTION
ARSENIC	0.500	0.500 U	MG/L	11/08/96	1.0
BARIUM	1.00	1.00 U	MG/L	11/08/96	1.0
CADMIUM	0.100	0.100 U	MG/L	11/08/96	1.0
CHROMIUM	0.100	0.100 U	MG/L	11/08/96	1.0
LEAD	0.100	0.100 U	MG/L	11/08/96	1.0
MERCURY	0.000300	0.00300 U	MG/L	11/07/96	10.0
SELENIUM	0.500	0.500 U	MG/L	11/08/96	1.0
SILVER	0.100	0.100 U	MG/L	11/08/96	1.0

Data reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, No. 126, June 29, 1990.

VOLATILE ORGANICS
METHOD 8260 TCLP
Reported: 12/11/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B1

Date Sampled : 10/31/96	**Order #:** 113678	**Sample Matrix:** SOIL/SEDIMENT
Date Received: 10/31/96	**Submission #:** 9611000078	**Analytical Run** 13252

DATE ANALYZED : 11/11/96
ANALYTICAL DILUTION: 10.0

ANALYTE	PQL	RESULT	UNITS
BENZENE	0.62	6.2 U	UG/L
2-BUTANONE (MEK)	7.1	71 U	UG/L
CARBON TETRACHLORIDE	0.58	5.8 U	UG/L
CHLOROBENZENE	1.5	15 U	UG/L
CHLOROFORM	0.66	6.6 U	UG/L
1,2-DICHLOROETHANE	0.86	8.6 U	UG/L
1,1-DICHLOROETHENE	2.2	22 U	UG/L
TETRACHLOROETHENE	0.78	7.8 U	UG/L
TRICHLOROETHENE	1.8	18 U	UG/L
VINYL CHLORIDE	1.3	13 U	UG/L

SURROGATE RECOVERIES	QC LIMITS	RESULT	UNITS
BROMOFLUOROBENZENE	(86 - 115 %)	102	%
TOLUENE-D8	(88 - 110 %)	105	%
DIBROMOFLUOROMETHANE	(86 - 118 %)	105	%

Data Reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, NO 126, June 29, 1990.

COLUMBIA ANALYTICAL SERVICES

Reported: 11/22/96

Haley and Aldrich
Project Reference:70372-046
Client Sample ID :B2

Date Sampled :10/31/96 **Order #:**113679 **Sample Matrix:**SOIL/SEDIMENT
Date Received:10/31/96 **Submission #:**9611000078

ANALYTE	PQL	RESULT	UNITS	DATE ANALYZED	ANALYTICAL DILUTION
ARSENIC	0.500	0.500 U	MG/L	11/08/96	1.0
BARIUM	1.00	1.10	MG/L	11/08/96	1.0
CADMIUM	0.100	0.100 U	MG/L	11/08/96	1.0
CHROMIUM	0.100	0.100 U	MG/L	11/08/96	1.0
LEAD	0.100	0.100 U	MG/L	11/08/96	1.0
MERCURY	0.000300	0.00300 U	MG/L	11/07/96	10.0
SELENIUM	0.500	0.500 U	MG/L	11/08/96	1.0
SILVER	0.100	0.100 U	MG/L	11/08/96	1.0

Data reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, No. 126, June 29, 1990.

COLUMBIA ANALYTICAL SERVICES

VOLATILE ORGANICS
METHOD 8260 TCLP
Reported: 12/11/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B2

Date Sampled : 10/31/96 **Order #:** 113679 **Sample Matrix:** SOIL/SEDIMENT
Date Received: 10/31/96 **Submission #:** 9611000078 **Analytical Run** 13252

ANALYTE	PQL	RESULT	UNITS
DATE ANALYZED : 11/11/96			
ANALYTICAL DILUTION: 10.0			
BENZENE	0.62	6.2 U	UG/L
2-BUTANONE (MEK)	7.1	71 U	UG/L
CARBON TETRACHLORIDE	0.58	5.8 U	UG/L
CHLOROBENZENE	1.5	15 U	UG/L
CHLOROFORM	0.66	6.6 U	UG/L
1,2-DICHLOROETHANE	0.86	8.6 U	UG/L
1,1-DICHLOROETHENE	2.2	22 U	UG/L
TETRACHLOROETHENE	0.78	7.8 U	UG/L
TRICHLOROETHENE	1.8	18 U	UG/L
VINYL CHLORIDE	1.3	13 U	UG/L

SURROGATE RECOVERIES	QC LIMITS		
BROMOFLUOROBENZENE	(86 - 115 %)	89	%
TOLUENE-D8	(88 - 110 %)	98	%
DIBROMOFLUOROMETHANE	(86 - 118 %)	103	%

Data Reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, NO 126, June 29, 1990.

COLUMBIA ANALYTICAL SERVICES

Reported: 11/22/96

Haley and Aldrich
Project Reference:70372-046
Client Sample ID :B3

Date Sampled :10/31/96
Date Received:10/31/96

Order #:113680
Submission #:9611000078

Sample Matrix:SOIL/SEDIMENT

ANALYTE	PQL	RESULT	UNITS	DATE ANALYZED	ANALYTICAL DILUTION
ARSENIC	0.500	0.500 U	MG/L	11/08/96	1.0
BARIUM	1.00	1.00 U	MG/L	11/08/96	1.0
CADMIUM	0.100	0.100 U	MG/L	11/08/96	1.0
CHROMIUM	0.100	0.100 U	MG/L	11/08/96	1.0
LEAD	0.100	0.100 U	MG/L	11/08/96	1.0
MERCURY	0.000300	0.00300 U	MG/L	11/07/96	10.0
SELENIUM	0.500	0.500 U	MG/L	11/14/96	1.0
SILVER	0.100	0.100 U	MG/L	11/08/96	1.0

Data reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, No. 126, June 29, 1990.

COLUMBIA ANALYTICAL SERVICES

VOLATILE ORGANICS
METHOD 8260 TCLP
Reported: 12/11/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B3

Date Sampled : 10/31/96 **Order #:** 113680 **Sample Matrix:** SOIL/SEDIMENT
Date Received: 10/31/96 **Submission #:** 9611000078 **Analytical Run** 13252

DATE ANALYZED : 11/11/96
ANALYTICAL DILUTION: 10.0

ANALYTE	PQL	RESULT	UNITS
BENZENE	0.62	6.2 U	UG/L
2-BUTANONE (MEK)	7.1	71 U	UG/L
CARBON TETRACHLORIDE	0.58	5.8 U	UG/L
CHLOROBENZENE	1.5	15 U	UG/L
CHLOROFORM	0.66	6.6 U	UG/L
1,2-DICHLOROETHANE	0.86	8.6 U	UG/L
1,1-DICHLOROETHENE	2.2	22 U	UG/L
TETRACHLOROETHENE	0.78	84	UG/L
TRICHLOROETHENE	1.8	77	UG/L
VINYL CHLORIDE	1.3	13 U	UG/L

SURROGATE RECOVERIES	QC LIMITS		
BROMOFLUOROBENZENE	(86 - 115 %)	95	%
TOLUENE-D8	(88 - 110 %)	98	%
DIBROMOFLUOROMETHANE	(86 - 118 %)	105	%

Data Reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, NO 126, June 29, 1990.

VOLATILE ORGANICS
METHOD 8260 TCLP
Reported: 12/11/96

Haley and Aldrich
Project Reference: 70372-046
Client Sample ID : B4

Date Sampled : 10/31/96 **Order #:** 113681 **Sample Matrix:** SOIL/SEDIMENT
Date Received: 10/31/96 **Submission #:** 9611000078 **Analytical Run** 13252

ANALYTE	PQL	RESULT	UNITS
DATE ANALYZED : 11/11/96			
ANALYTICAL DILUTION: 10.0			
BENZENE	0.62	6.2 U	UG/L
2-BUTANONE (MEK)	7.1	71 U	UG/L
CARBON TETRACHLORIDE	0.58	5.8 U	UG/L
CHLOROBENZENE	1.5	15 U	UG/L
CHLOROFORM	0.66	6.6 U	UG/L
1,2-DICHLOROETHANE	0.86	8.6 U	UG/L
1,1-DICHLOROETHENE	2.2	22 U	UG/L
TETRACHLOROETHENE	0.78	7.8 U	UG/L
TRICHLOROETHENE	1.8	18 U	UG/L
VINYL CHLORIDE	1.3	13 U	UG/L

SURROGATE RECOVERIES	QC LIMITS		
BROMOFLUOROBENZENE	(86 - 115 %)	99	%
TOLUENE-D8	(88 - 110 %)	99	%
DIBROMOFLUOROMETHANE	(86 - 118 %)	103	%

Data Reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, NO 126, June 29, 1990.

COLUMBIA ANALYTICAL SERVICES

VOLATILE ORGANICS
METHOD 8260 TCL
Reported: 11/22/96

Project Reference:
Client Sample ID : METHOD BLANK

Date Sampled :
Order #: 117066
Sample Matrix: SOIL/SEDIMEN
Date Received:
Submission #:
Percent Solid: 100

DATE ANALYZED : 11/14/96
ANALYTICAL DILUTION: 1.0

ANALYTE	PQL	RESULT	UNITS
			Dry Weight
ACETONE	20	20 U	UG/KG
BENZENE	5.0	5.0 U	UG/KG
BROMODICHLOROMETHANE	5.0	5.0 U	UG/KG
BROMOFORM	5.0	5.0 U	UG/KG
BROMOMETHANE	5.0	5.0 U	UG/KG
2-BUTANONE (MEK)	10	10 U	UG/KG
CARBON DISULFIDE	10	10 U	UG/KG
CARBON TETRACHLORIDE	5.0	5.0 U	UG/KG
CHLOROBENZENE	5.0	5.0 U	UG/KG
CHLOROETHANE	5.0	5.0 U	UG/KG
CHLOROFORM	5.0	5.0 U	UG/KG
CHLOROMETHANE	5.0	5.0 U	UG/KG
DIBROMOCHLOROMETHANE	5.0	5.0 U	UG/KG
1,1-DICHLOROETHANE	5.0	5.0 U	UG/KG
1,2-DICHLOROETHANE	5.0	5.0 U	UG/KG
1,1-DICHLOROETHENE	5.0	5.0 U	UG/KG
CIS-1,2-DICHLOROETHENE	5.0	5.0 U	UG/KG
TRANS-1,2-DICHLOROETHENE	5.0	5.0 U	UG/KG
1,2-DICHLOROPROPANE	5.0	5.0 U	UG/KG
CIS-1,3-DICHLOROPROPENE	5.0	5.0 U	UG/KG
TRANS-1,3-DICHLOROPROPENE	5.0	5.0 U	UG/KG
ETHYLBENZENE	5.0	5.0 U	UG/KG
2-HEXANONE	10	10 U	UG/KG
METHYLENE CHLORIDE	5.0	5.0 U	UG/KG
4-METHYL-2-PENTANONE (MIBK)	10	10 U	UG/KG
STYRENE	5.0	5.0 U	UG/KG
1,1,2,2-TETRACHLOROETHANE	5.0	5.0 U	UG/KG
TETRACHLOROETHENE	5.0	5.0 U	UG/KG
TOLUENE	5.0	5.0 U	UG/KG
1,1,1-TRICHLOROETHANE	5.0	5.0 U	UG/KG
1,1,2-TRICHLOROETHANE	5.0	5.0 U	UG/KG
TRICHLOROETHENE	5.0	5.0 U	UG/KG
VINYL CHLORIDE	5.0	5.0 U	UG/KG
O-XYLENE	5.0	5.0 U	UG/KG
M+P-XYLENE	5.0	5.0 U	UG/KG

SURROGATE RECOVERIES	QC LIMITS		
4-BROMOFLUOROBENZENE	(74 - 121 %)	98	%
TOLUENE-D8	(81 - 117 %)	88	%
DIBROMOFLUOROMETHANE	(80 - 120 %)	101	%

VOLATILE ORGANICS
METHOD 8260 TCLP
Reported: 12/11/96

Project Reference:
Client Sample ID : METHOD BLANK

Date Sampled : **Order #:** 117059 **Sample Matrix:** SOIL/SEDIMEN
Date Received: **Submission #:** **Analytical Run** 13252

ANALYTE	PQL	RESULT	UNITS
DATE ANALYZED : 11/11/96			
ANALYTICAL DILUTION: 1.0			
BENZENE	0.62	0.62 U	UG/L
2-BUTANONE (MEK)	7.1	7.1 U	UG/L
CARBON TETRACHLORIDE	0.58	0.58 U	UG/L
CHLOROBENZENE	1.5	1.5 U	UG/L
CHLOROFORM	0.66	0.66 U	UG/L
1,2-DICHLOROETHANE	0.86	0.86 U	UG/L
1,1-DICHLOROETHENE	2.2	2.2 U	UG/L
TETRACHLOROETHENE	0.78	0.78 U	UG/L
TRICHLOROETHENE	1.8	1.8 U	UG/L
VINYL CHLORIDE	1.3	1.3 U	UG/L

SURROGATE RECOVERIES	QC LIMITS		
BROMOFLUOROBENZENE	(86 - 115 %)	105	%
TOLUENE-D8	(88 - 110 %)	108	%
DIBROMOFLUOROMETHANE	(86 - 118 %)	111	%

Data Reported following TCLP Toxicity Characteristics Leaching Procedure. Federal Register, Part 261, Vol. 55, NO 126, June 29, 1990.

QUALITY CONTROL SUMMARY   MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
SOIL/SEDIMENT

Spiked Order No. : 113677 Haley and Aldrich

Client ID: B4

Test: 8260 TCL

Analytical Units: UG/KG

Run Number : 13253

			MATRIX SPIKE		MATRIX SPIKE DUP.			QC LIMITS	
ANALYTE	SPIKE ADDED	SAMPLE CONCENT.	FOUND	% REC.	FOUND	% REC.	RPD	RPD	REC.
BENZENE	50	0	48.4	97	49.2	98	2	21	66 - 142
CHLOROBENZENE	50	0	37.5	75	39.8	80	7	21	60 - 133
1,1-DICHLOROETHENE	50	0	70.7	141	69.6	139	2	22	59 - 172
TOLUENE	50	0	35.9	72	40.1	80	11	21	59 - 139
TRICHLOROETHENE	50	210	553	D	431	D	24	24	62 - 137

VOLATILE ORGANICS
METHOD: 8260 TCL

LABORATORY REFERENCE SPIKE SUMMARY

REFERENCE ORDER #: 117068

ANALYTICAL RUN # : 13253

DATE ANALYZED : 11/14/96
ANALYTICAL DILUTION: 1.0

ANALYTE	TRUE VALUE	% RECOVERY	QC LIMITS
ACETONE	20	139	21 - 165
BENZENE	20	89	37 - 151
BROMODICHLOROMETHANE	20	81	35 - 155
BROMOFORM	20	64	45 - 169
BROMOMETHANE	20	86	10 - 242
2-BUTANONE (MEK)	20	104	25 - 162
CARBON DISULFIDE	20	113	45 - 148
CARBON TETRACHLORIDE	20	73	70 - 140
CHLOROBENZENE	20	67	37 - 160
CHLOROETHANE	20	118	53 - 149
CHLOROFORM	20	87	51 - 138
CHLOROMETHANE	20	106	10 - 273
DIBROMOCHLOROMETHANE	20	65	53 - 149
1,1-DICHLOROETHANE	20	107	59 - 155
1,2-DICHLOROETHANE	20	83	49 - 155
1,1-DICHLOROETHENE	20	132	10 - 234
CIS-1,2-DICHLOROETHENE	20	97	54 - 156
TRANS-1,2-DICHLOROETHENE	20	103	54 - 156
1,2-DICHLOROPROPANE	20	93	10 - 210
CIS-1,3-DICHLOROPROPENE	20	85	10 - 227
TRANS-1,3-DICHLOROPROPENE	20	88	17 - 183
ETHYLBENZENE	20	79	37 - 162
2-HEXANONE	20	86	22 - 155
METHYLENE CHLORIDE	20	116	10 - 221
4-METHYL-2-PENTANONE (MIBK)	20	94	46 - 157
STYRENE	40	80	66 - 144
1,1,2,2-TETRACHLOROETHANE	20	91	46 - 157
TETRACHLOROETHENE	20	65	64 - 148
TOLUENE	20	89	47 - 150
1,1,1-TRICHLOROETHANE	20	86	52 - 162
1,1,2-TRICHLOROETHANE	20	83	52 - 150
TRICHLOROETHENE	20	84	71 - 157
VINYL CHLORIDE	20	109	10 - 251
O-XYLENE	40	83	71 - 135
M+P-XYLENE	40	88	71 - 135

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 1 of 1 № 1168
Delivery Date:

Project Name: Erwr-O Soil Borings
H & A File No. 70372-046
H & A REP. M. Beikirch
WORK ORDER No.

Laboratory: CAS
Address: Exchange St
Rochester
Client Rep.: M. Parry

Project Manager: Bob Mahoney
Final Report Due Date:
Turnaround Time: STD days

Sample Information / Analysis Requested / Preservative

H & A Sample ID.	Laboratory ID.	Sample Date	Sample Time	Sample Depth	Sample Matrix	VOCs 8260	TCLP VOCs	TCLP Metals				TOTAL	HNO3 (N) pH < 2.0	HCl (C) pH < 2.0	H_2SO4 (S) pH < 2.0	NaOH/ZA (Z) pH > 10	4 C (T) pH 7.0
1. B1		10/31/96	1430	0-6'	SOIL	✓	✓	✓	113672	113678		2					X
2. B2		↓	1500	0-5'	SOIL	✓	✓	✓	113675	113679		2					X
3. B3			1600	0-5.5	SOIL	✓	✓	✓	113676	113680		2					X
4. B4			1630	0-6'	SOIL	✓	✓	✓	113677	113681		2					X
5. MS				0-6'	SOIL	✓						—					
6. MSD				0-6'	SOIL	✓						—					
7.																	
8.																	
9.																	
10.																	
11.																	
12.																	
13.																	
14.																	
15.																	

Sampler Comments/Site Observations

Sampled and Relinquished By: Michael Beikirch
Signature: Michael A Beikirch
Company Name: H+A
Date: 10/31/96 Time: 1750

Samples Received By: Tom Hastings
Signature: Tom Hastings
Company Name: CAS
Date: 10/31/96 Time: 17:50

Samples Relinquished By:
Signature:
Company Name:
Date: Time:

Samples Received By:
Signature:
Company Name:
Date: Time:

Samples Relinquished By:
Signature:
Company Name:
Date: Time:

Samples Received By:
Signature:
Company Name:
Date: Time:

Sample Conditions
Custody Seal: Intact:
Cooler Temp.: C
Any Broken Containers ?

Broken Containers
List Type / Sample No.

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:
All samples are composites from 0-6', Unless specified (depth).

11-78

Laboratory Instrument Detection Limit Study
and
Total Inionizing Chromatograms

Instrument Detection Limit Study
General Testing Corporation

Method: '91-1
Instrument: GCMS#5

Date: 02/96
Analyst: Tom Traver

Analyte	Amount Added (ug/L)	Trial #1	Trial #2	Trial #3	Trial #4	Mean (ug/L)	S	# of reps	N Mean MDL
Surr1,1,2-Diclethane-d4	10.00	9.59	9.22	9.69	9.77	9.57	0.24	4	1.10
SURR3,Toluene-d8	10.00	9.95	9.72	9.97	10.45	10.02	0.31	4	1.39
Surr2,BFB	10.00	9.44	9.74	11.00	10.21	10.10	0.68	4	3.09
Chloromethane	10.00	10.42	9.70	9.89	9.99	10.00	0.30	4	1.38
Vinyl Chloride	10.00	8.69	9.13	8.51	8.51	8.71	0.29	4	1.33
Chloroethane	10.00	7.89	8.74	8.47	7.03	8.03	0.76	4	3.43
Bromomethane	10.00	11.26	10.15	10.28	9.51	10.30	0.72	4	3.28
Acetone	10.00	6.53	4.50	4.77	5.61	5.35	0.92	4	4.16
1,1-Dichloroethene	10.00	9.99	10.18	10.15	9.15	9.87	0.49	4	2.20
Methylene Chloride	10.00	10.82	10.78	10.57	10.77	10.74	0.11	4	0.51
Carbon Disulfide	10.00	11.39	10.80	10.24	10.15	10.65	0.57	4	2.61
trans-1,2-Dichloroethene	10.00	10.60	10.13	10.00	9.38	10.03	0.50	4	2.28
1,1-Dichloroethane	10.00	11.32	10.83	10.59	10.69	10.86	0.32	4	1.47
2-Butanone	10.00	7.93	6.48	9.50	6.01	7.48	1.58	4	7.15
✓ cis-1,2-Dichloroethene	10.00	11.01	10.61	10.74	10.34	10.68	0.28	4	1.26 ✓
Chloroform	10.00	10.93	10.80	10.64	10.62	10.75	0.15	4	0.66
1,2-Dichloroethane	10.00	10.89	10.68	10.62	10.43	10.66	0.19	4	0.86
✓ 1,1,1-Trichloroethane	10.00	10.61	10.89	10.77	10.61	10.72	0.14	4	0.62 ✓
Carbon tetrachloride	10.00	10.16	10.04	10.23	9.94	10.09	0.13	4	0.58
Benzene	10.00	11.26	11.40	11.57	11.31	11.39	0.14	4	0.62
✓ Trichloroethene	10.00	10.63	10.85	11.56	10.86	10.98	0.40	4	1.84 ✓
1,2-Dichloropropane	10.00	11.76	11.58	11.70	11.57	11.65	0.09	4	0.42
Bromodichloromethane	10.00	10.60	10.83	10.83	11.09	10.84	0.20	4	0.91
cis-1,3-Dichloropropene	10.00	10.71	10.93	10.74	10.99	10.84	0.14	4	0.63
trans-1,3-Dichloropropene	10.00	10.50	11.30	11.02	11.61	11.11	0.47	4	2.14
1,1,2-Trichloroethane	10.00	10.80	11.86	11.81	12.68	11.79	0.77	4	3.49
Dibromochloromethane	10.00	10.56	10.65	10.64	10.90	10.69	0.15	4	0.67
Bromoform	10.00	10.70	10.41	10.40	10.75	10.57	0.19	4	0.84
4-Methyl-2-Pentanone	10.00	12.74	10.80	10.28	10.06	10.97	1.22	4	5.54
Toluene	10.00	10.80	10.34	10.58	10.56	10.57	0.19	4	0.85
2-Hexanone	10.00	10.69	8.11	7.59	11.54	9.48	1.93	4	8.76
✓ Tetrachloroethene	10.00	10.33	10.20	10.23	9.93	10.17	0.17	4	0.78 ✓
Chlorobenzene	10.00	11.24	11.45	11.99	11.45	11.53	0.32	4	1.46
Ethylbenzene	10.00	11.45	11.13	10.93	11.02	11.13	0.23	4	1.03
(m+p) Xylene	20.00	22.00	23.00	22.81	22.85	22.67	0.45	4	2.05
o-xylene	10.00	10.97	11.22	11.31	11.15	11.16	0.14	4	0.65
Styrene	10.00	10.62	10.81	10.91	11.11	10.86	0.20	4	0.93
1,1,2,2-Tetrachloroethane	10.00	12.01	11.98	11.47	12.62	12.02	0.47	4	2.14

CAS Rochester 700 Exchange Street Rochester, New York 14608

Columbia
Analytical
Services inc.

Date: 12/4/96

Number of pages including cover sheet: 10

To: Denis Conley
Haley + Aldrich

Phone:

Fax phone: #09

CC:

From: Michael Perry

Phone: (716) 454-6810

Fax phone: (716) 454-6825

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

(Please Note that our phone number and fax number are now different.

Phone: 716-454-6810, FAX 716-454-6825)

Quant/HC for the 4-TCLP samples + MDL Study

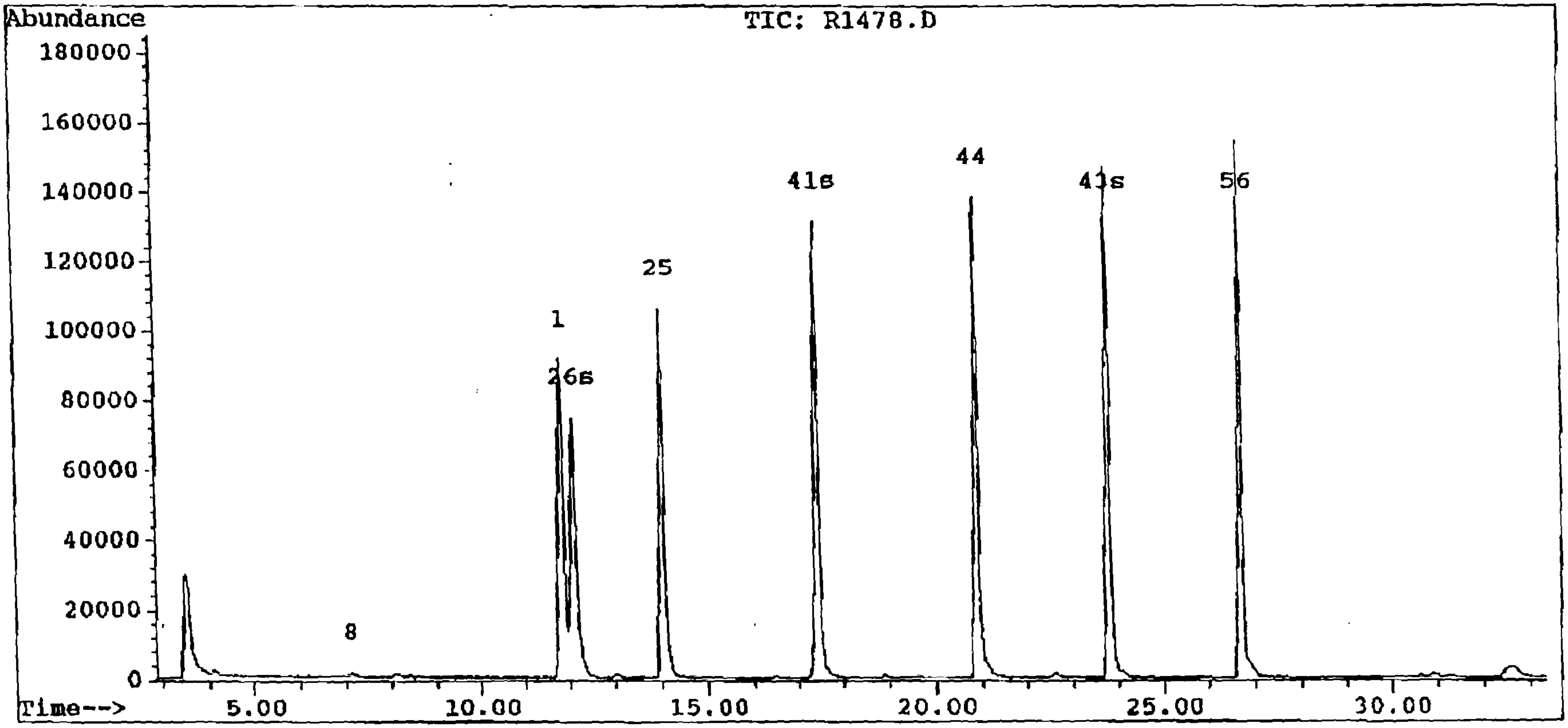
Thanks Mike

```
                            Quantitation Report

  Data File : C:\HPCHEM\1\DATA\R1478.D                        Vial: 1
  Acq On    : 11 Nov 96   1:15 pm                         Operator: TOMT
  Sample    : 113678 10                                   Inst    : 5971 - In
  Misc      : H&A 8260.TCLP                               Multiplr: 1.00
  Quant Time: Nov 11 13:49 1996

  Method        : C:\HPCHEM\1\METHODS\8260VOA.M
  Title         : 8260voa
  Last Update   : Mon Nov 11 09:41:54 1996
  Response via  : Single Level Calibration

 Internal Standards                  R.T.  QIon  Response  Conc Units Dev(Min)
 ------------------------------------------------------------------------------
   1) Pentafluorobenzene            11.82    99    173623   50.00 ppb      0.03
  25) 1,4-Difluorobenzene           14.00   114    315764   50.00 ppb      0.03
  44) d5-Chlorobenze                20.88   117    266247   50.00 ppb      0.06
  56) d4-1,4-Dichlorobenzene        26.67   152    134703   50.00 ppb      0.04

 System Monitoring Compounds                                        %Recovery
  26) surr4,Dibrflmethane           12.07   113    189871   52.35 ppb   104.70%
  41) surr3,Toluene-d8              17.40    98    321043   52.58 ppb   105.16%
  43) surr2,bfb                     23.76    95    193838   50.93 ppb   101.85%

 Target Compounds                                                      Qvalue
   8) Acetone                        7.11    43      7791   11.21 ppb  #     47
```

DL
11/20/96

```
 ------------------------------------------------------------------------------
 (#) = qualifier out of range (m) = manual integration
```

```
Data File : C:\HPCHEM\1\DATA\R1478.D                      Vial: 1
Acq On    : 11 Nov 96   1:15 pm                       Operator: TOMT
Sample    : 113678 10                                 Inst    : 5971 - In
Misc      : H&A 8260.TCLP                             Multiplr: 1.00
Quant Time: Nov 11 13:49 1996

Method        : C:\HPCHEM\1\METHODS\8260VOA.M
Title         : 8260voa
Last Update   : Mon Nov 11 09:41:54 1996
Response via  : Single Level Calibration
```



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                          Quantitation Report

  Data File : C:\HPCHEM\1\DATA\R1481.D                  Vial: 4
  Acq On    : 11 Nov 96   3:20 pm                   Operator: TOMT
  Sample    : 113679 10                             Inst    : 5971 - In
  Misc      : H&A 8260.TCLP                         Multiplr: 1.00
  Quant Time: Nov 11 15:54 1996

  Method       : C:\HPCHEM\1\METHODS\8260VOA.M
  Title        : 8260voa
  Last Update  : Mon Nov 11 09:41:54 1996
  Response via : Single Level Calibration

 Internal Standards                R.T.  QIon  Response  Conc Units Dev(Min)
 ---------------------------------------------------------------------------
   1) Pentafluorobenzene          11.83    99   198954   50.00 ppb     0.04
  25) 1,4-Difluorobenzene         14.01   114   344357   50.00 ppb     0.04
  44) d5-Chlorobenze              20.89   117   260414   50.00 ppb     0.08
  56) d4-1,4-Dichlorobenzene      26.69   152   128160   50.00 ppb     0.06

 System Monitoring Compounds                                      %Recovery
  26) surr4,Dibrflmethane         12.10   113   204029   51.58 ppb  103.17%
  41) surr3,Toluene-d8            17.40    98   326279   49.00 ppb   98.00%
  43) surr2,bfb                   23.79    95   184494   44.45 ppb   88.89%

 Target Compounds                                                    Qvalue
   8) Acetone                      7.14    43     6125    7.69 ppb  #    83
  12) Methylene Chloride           8.47    84     2712    1.22 ppb       82
```

11/20/96

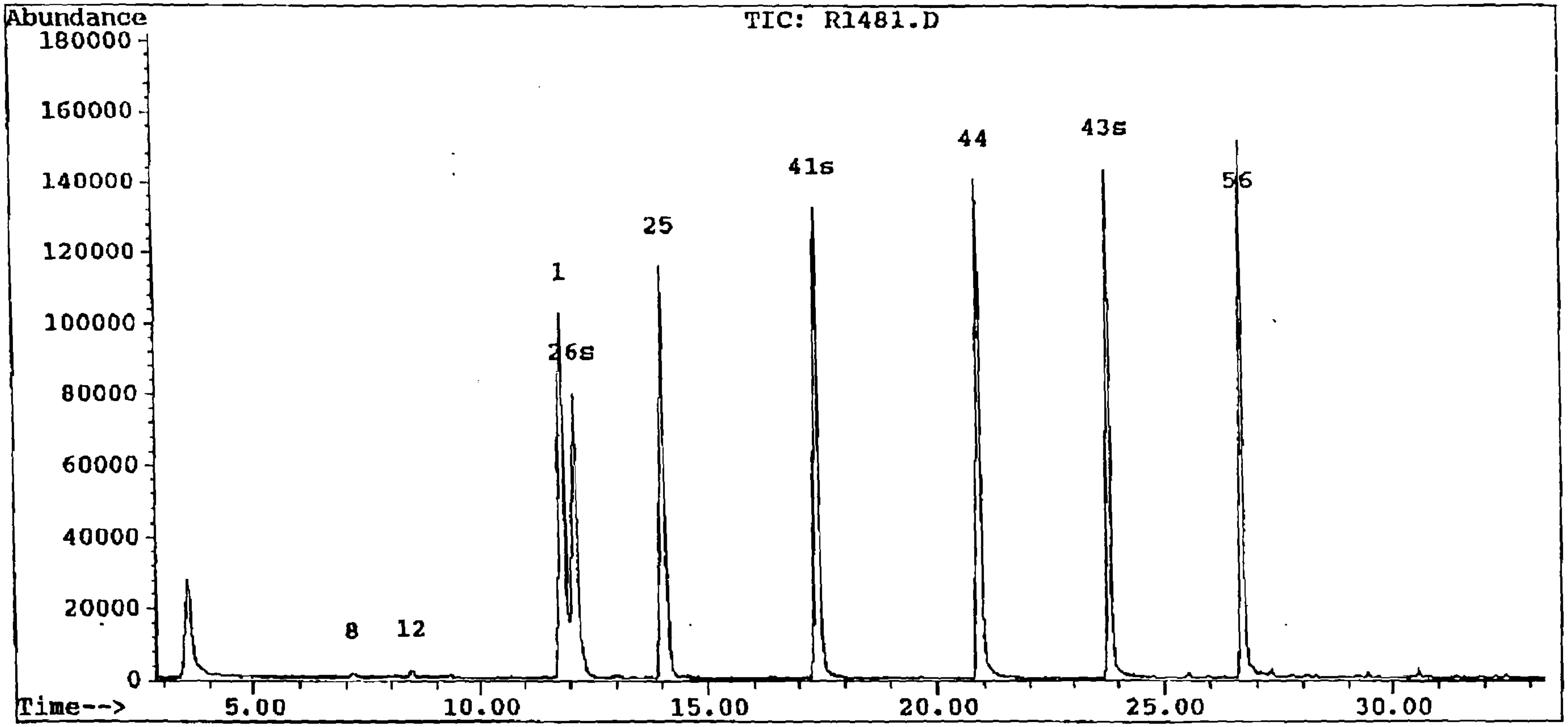
```
 ---------------------------------------------------------------------------
 (#) = qualifier out of range (m) = manual integration
```

Quantitation Report

Data File : C:\HPCHEM\1\DATA\R1481.D
Acq On : 11 Nov 96 3:20 pm
Sample : 113679 10
Misc : H&A 8260.TCLP
Quant Time: Nov 11 15:54 1996

Vial: 4
Operator: TOMT
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8260VOA.M
Title : 8260voa
Last Update : Mon Nov 11 09:41:54 1996
Response via : Single Level Calibration



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                         Quantitation Report

  Data File : C:\HPCHEM\1\DATA\R1482.D                      Vial: 5
  Acq On    : 11 Nov 96   4:02 pm                      Operator: TOMT
  Sample    : 113680 10                                Inst    : 5971 - In
  Misc      : H&A 8260.TCLP                            Multiplr: 1.00
  Quant Time: Nov 11 16:36 1996

  Method          : C:\HPCHEM\1\METHODS\8260VOA.M
  Title           : 8260voa
  Last Update     : Mon Nov 11 09:41:54 1996
  Response via    : Single Level Calibration

 Internal Standards                      R.T.  QIon  Response  Conc Units Dev(Min)
 ------------------------------------------------------------------------------
   1) Pentafluorobenzene                11.79   99   174410   50.00 ppb     0.00
  25) 1,4-Difluorobenzene               13.97  114   313594   50.00 ppb     0.00
  44) d5-Chlorobenze                    20.81  117   250333   50.00 ppb     0.00
  56) d4-1,4-Dichlorobenzene            26.65  152   122496   50.00 ppb     0.02

 System Monitoring Compounds                                            %Recovery
  26) surr4,Dibrflmethane               12.06  113   189580   52.63 ppb   105.26%
  41) surr3,Toluene-d8                  17.35   98   297978   49.14 ppb    98.28%
  43) surr2,bfb                         23.71   95   179187   47.40 ppb    94.81%

 Target Compounds                                                          Qvalue
   8) Acetone                            7.11   43     7784   11.15 ppb        94
  24) 1,1,1-Trichloroethane             12.49   97    13301    3.13 ppb        89
  31) Trichloroethene                   14.72   95    21394    7.72 ppb        98
  47) Tetrachloroethene                 19.03  166    27047    8.38 ppb        97
  48) Dibromochloromethane              19.05  129    21216  ~~4.86 ppb  #     11~~ QDEL
```

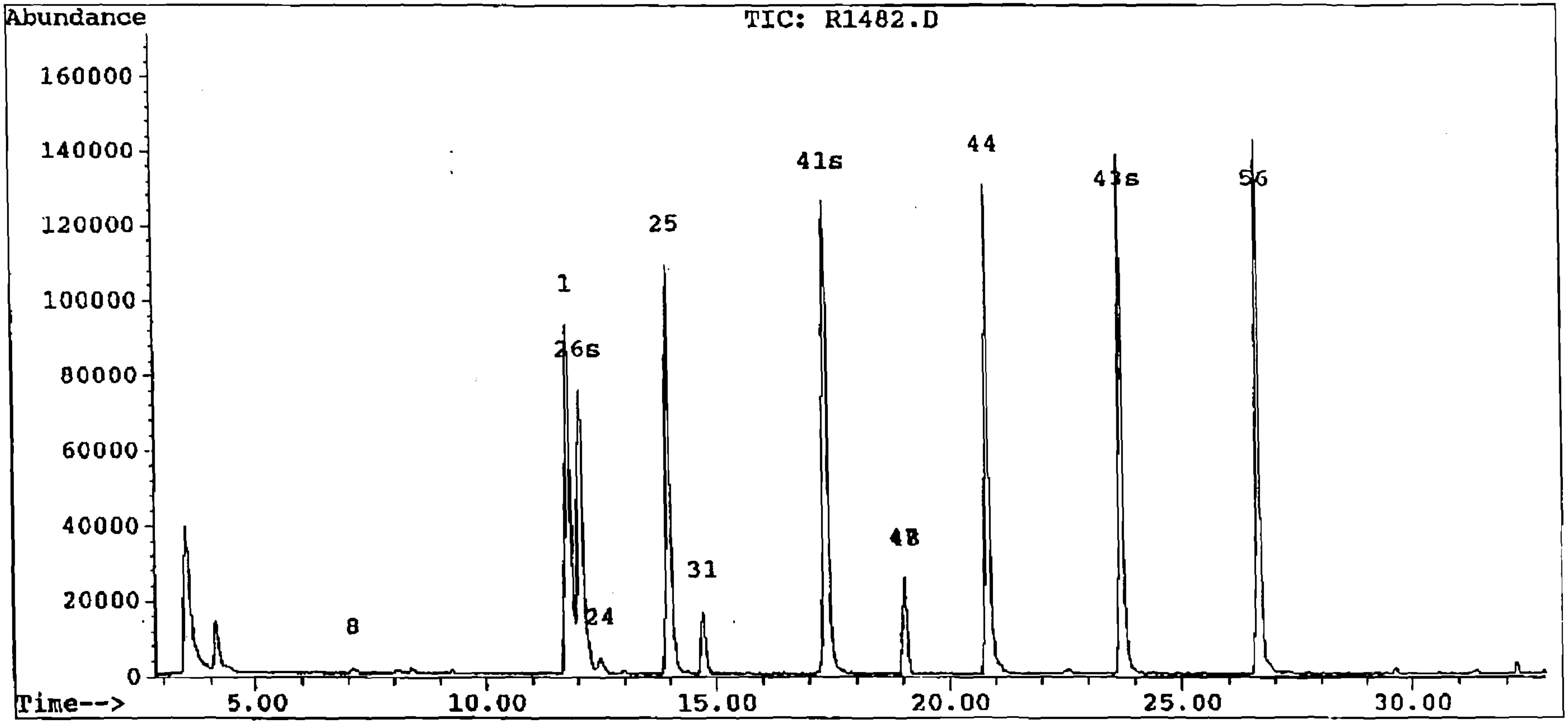
DL
11/20/96

Quantitation Report

Data File : C:\HPCHEM\1\DATA\R1482.D
Acq On : 11 Nov 96 4:02 pm
Sample : 113680 10
Misc : H&A 8260.TCLP
Quant Time: Nov 11 16:36 1996

Vial: 5
Operator: TOMT
Inst : 5971 - In
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\8260VOA.M
Title : 8260voa
Last Update : Mon Nov 11 09:41:54 1996
Response via : Single Level Calibration



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                            Quantitation Report

  Data File : C:\HPCHEM\1\DATA\R1483.D                          Vial: 6
  Acq On    : 11 Nov 96   4:43 pm                           Operator: TOMT
  Sample    : 113681 10                                     Inst     : 5971 - In
  Misc      : H&A 8260.TCLP                                 Multiplr: 1.00
  Quant Time: Nov 11 17:16 1996

  Method       : C:\HPCHEM\1\METHODS\8260VOA.M
  Title        : 8260voa
  Last Update  : Mon Nov 11 09:41:54 1996
  Response via : Single Level Calibration

 Internal Standards                   R.T.  QIon  Response  Conc Units Dev(Min)
 ------------------------------------------------------------------------------
   1) Pentafluorobenzene              11.81   99   158025    50.00 ppb     0.00
  25) 1,4-Difluorobenzene             13.98  114   308891    50.00 ppb     0.01
  44) d5-Chlorobenze                  20.83  117   252465    50.00 ppb     0.01
  56) d4-1,4-Dichlorobenzene          26.59  152   126275    50.00 ppb    -0.04

 System Monitoring Compounds                                          %Recovery
  26) surr4,Dibrflmethane             12.08  113   182231    51.36 ppb   102.72%
  41) surr3,Toluene-d8                17.37   98   296694    49.67 ppb    99.34%
  43) surr2,bfb                       23.69   95   184115    49.45 ppb    98.90%

 Target Compounds                                                        Qvalue
   8) Acetone                          7.13   43     5070     8.02 ppb  #    47
  31) Trichloroethene                 14.74   95     2928     1.07 ppb       85
```

DL
11/20/96

```
 ------------------------------------------------------------------------------
 (#) = qualifier out of range (m) = manual integration
```

Quantitation Report

```
Data File : C:\HPCHEM\1\DATA\R1483.D                  Vial: 6
Acq On    : 11 Nov 96   4:43 pm                   Operator: TOMT
Sample    : 113681 10                             Inst    : 5971 - In
Misc      : H&A 8260.TCLP                         Multiplr: 1.00
Quant Time: Nov 11 17:16 1996

Method        : C:\HPCHEM\1\METHODS\8260VOA.M
Title         : 8260voa
Last Update   : Mon Nov 11 09:41:54 1996
Response via  : Single Level Calibration
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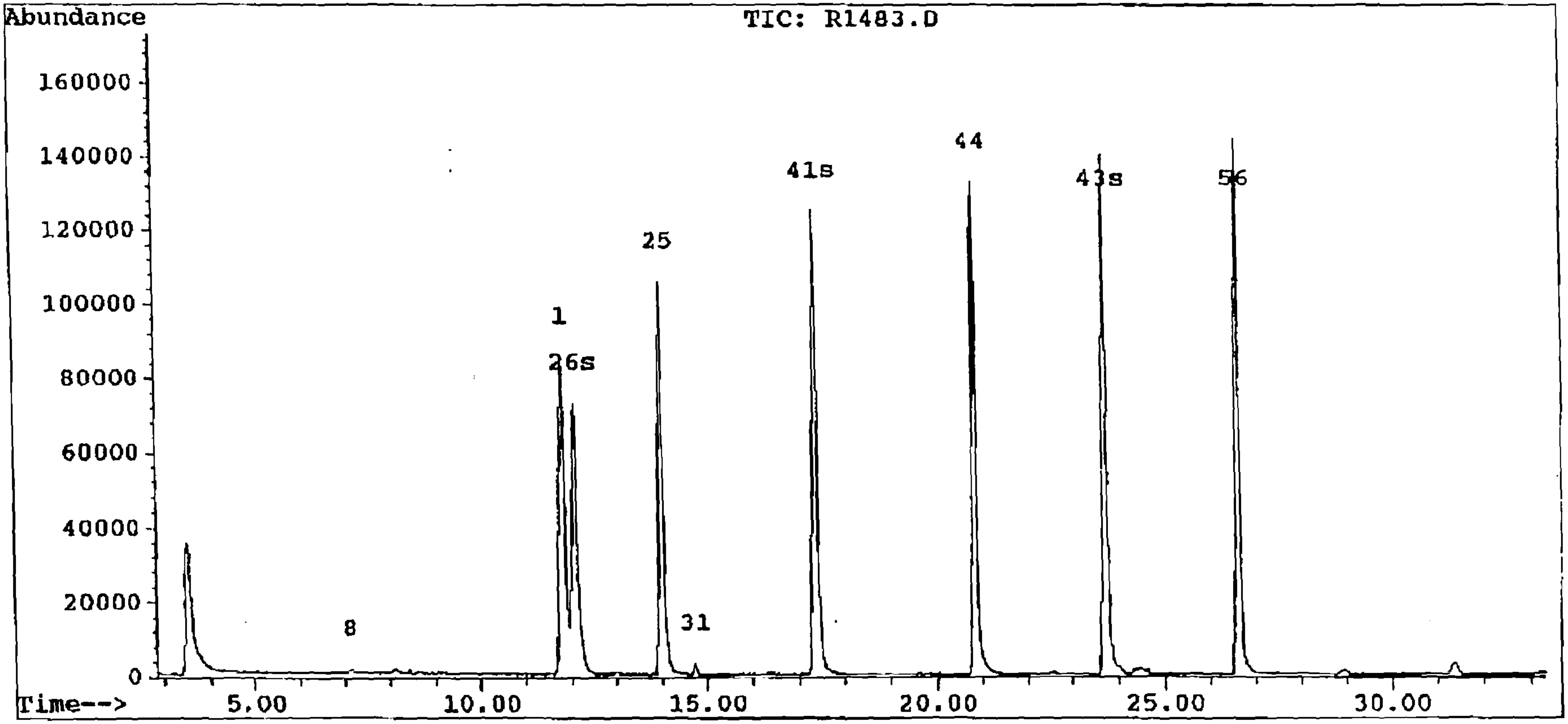
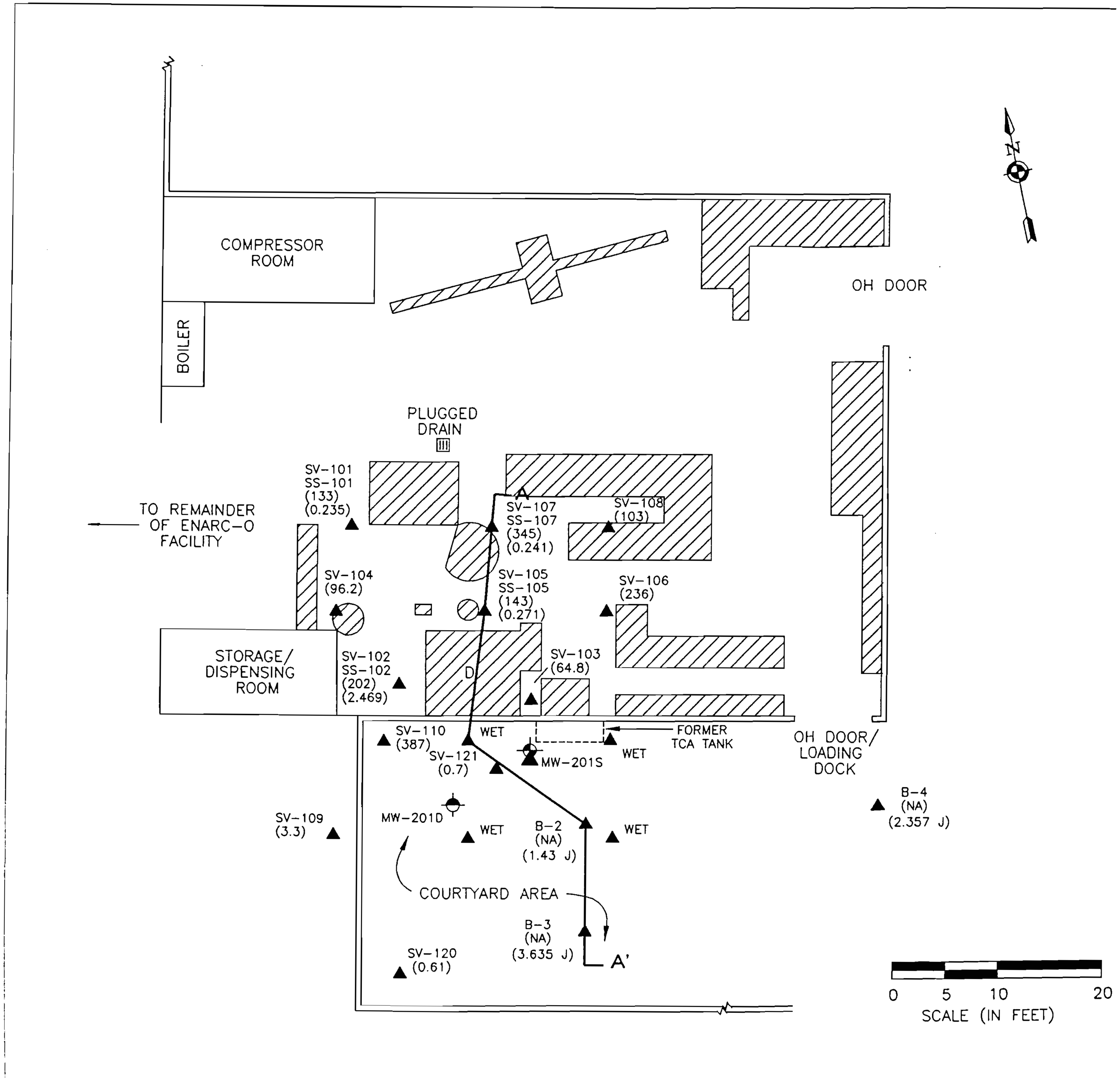




LEGEND:

SV-102 SS-102 (202) (2.469) ▲	APPROXIMATE LOCATION OF SOIL VAPOR SAMPLE (SV-102) SOIL SAMPLE (SS-102 OR B-2) TOTAL VOCS (PPMV) IN VAPOR TOTAL VOCS (PPM) IN SOIL
▨	FLOOR AREA OBSTRUCTED BY EQUIPMENT, STORAGE OR OTHER, (DIMENSIONS APPROXIMATE). "D" DESIGNATES DEGREASER LOCATED IN CONCRETE PIT
MW-201S ⊕	OVERBURDEN MONITORING WELL
MW-201D ⊕	BEDROCK MONITORING WELL
A A'	SUBSURFACE PROFILE LINE

NOTES:

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE, BASED ON TAPE PLAN OF FACILITY. MONITORING WELL LOCATIONS AND SV-120, SV-121 WERE SURVEYED.
2. SOURCE AREA SAMPLE LOCATIONS SHOWN. SOIL SAMPLE DEPTH IS 40-52 INCHES. SOIL VAPOR SAMPLES DEPTH IS TO 40 INCHES. SOIL SAMPLES VALUES DO NOT INCLUDE UNKNOWN VOCS.
4. SOIL VAPOR SAMPLE IN SV-121 TAKEN FROM DEPTH OF 0.5-2.5 FEET BELOW GROUND SURFACE.
5. SEE TEXT FOR ADDITIONAL INFORMATION. REFER TO FIGURE 6 FOR SUBSURFACE PROFILE A-A'.

H & A OF NEW YORK
Geotechnical Engineers & Environmental Consultants

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

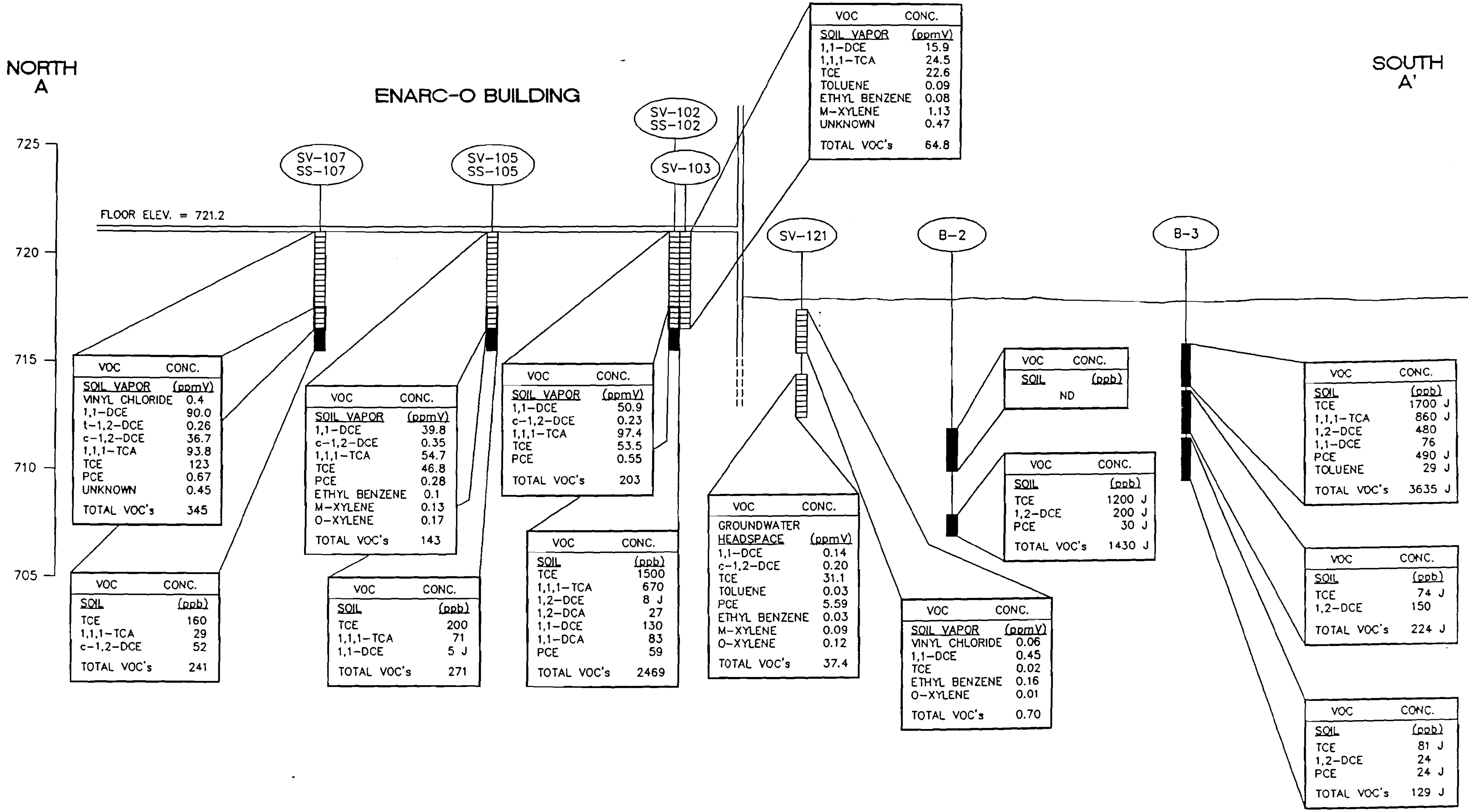
SOURCE AREA SOIL AND SOIL VAPOR VOC CONCENTRATION PLAN

SCALE AS SHOWN
REVISED AUGUST 1996

FILENAME: 70372-047:RIW003AB.DWG

FIGURE 3

FILE No. 70372-047



VOC	CONC.
SOIL VAPOR	(ppmV)
1,1-DCE	15.9
1,1,1-TCA	24.5
TCE	22.6
TOLUENE	0.09
ETHYL BENZENE	0.08
M-XYLENE	1.13
UNKNOWN	0.47
TOTAL VOC's	64.8

VOC	CONC.
SOIL VAPOR	(ppmV)
VINYL CHLORIDE	0.4
1,1-DCE	90.0
t-1,2-DCE	0.26
c-1,2-DCE	36.7
1,1,1-TCA	93.8
TCE	123
PCE	0.67
UNKNOWN	0.45
TOTAL VOC's	345

VOC	CONC.
SOIL	(ppb)
TCE	160
1,1,1-TCA	29
c-1,2-DCE	52
TOTAL VOC's	241

VOC	CONC.
SOIL VAPOR	(ppmV)
1,1-DCE	39.8
c-1,2-DCE	0.35
1,1,1-TCA	54.7
TCE	46.8
PCE	0.28
ETHYL BENZENE	0.1
M-XYLENE	0.13
O-XYLENE	0.17
TOTAL VOC's	143

VOC	CONC.
SOIL	(ppb)
TCE	200
1,1,1-TCA	71
1,1-DCE	5 J
TOTAL VOC's	271

VOC	CONC.
SOIL VAPOR	(ppmV)
1,1-DCE	50.9
c-1,2-DCE	0.23
1,1,1-TCA	97.4
TCE	53.5
PCE	0.55
TOTAL VOC's	203

VOC	CONC.
SOIL	(ppb)
TCE	1500
1,1,1-TCA	670
1,2-DCE	8 J
1,2-DCA	27
1,1-DCE	130
1,1-DCA	83
PCE	59
TOTAL VOC's	2469

VOC	CONC.
GROUNDWATER HEADSPACE	(ppmV)
1,1-DCE	0.14
c-1,2-DCE	0.20
TCE	31.1
TOLUENE	0.03
PCE	5.59
ETHYL BENZENE	0.03
M-XYLENE	0.09
O-XYLENE	0.12
TOTAL VOC's	37.4

VOC	CONC.
SOIL VAPOR	(ppmV)
VINYL CHLORIDE	0.06
1,1-DCE	0.45
TCE	0.02
ETHYL BENZENE	0.16
O-XYLENE	0.01
TOTAL VOC's	0.70

VOC	CONC.
SOIL	(ppb)
ND	

VOC	CONC.
SOIL	(ppb)
TCE	1200 J
1,2-DCE	200 J
PCE	30 J
TOTAL VOC's	1430 J

VOC	CONC.
SOIL	(ppb)
TCE	1700 J
1,1,1-TCA	860 J
1,2-DCE	480
1,1-DCE	76
PCE	490 J
TOLUENE	29 J
TOTAL VOC's	3635 J

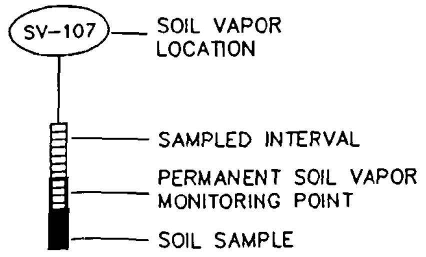
VOC	CONC.
SOIL	(ppb)
TCE	74 J
1,2-DCE	150
TOTAL VOC's	224 J

VOC	CONC.
SOIL	(ppb)
TCE	81 J
1,2-DCE	24
PCE	24 J
TOTAL VOC's	129 J

NOTES:

1. SEE FIGURE 3 FOR PROFILE LOCATION.
2. ALL SOIL VAPOR VALUES IN PARTS PER MILLION BY VOLUME (ppmV).
3. ALL SOIL VALUES IN UG/KG OR PARTS PER BILLION (ppb).
4. SV-102, 103, 105 AND 107 VAPOR SAMPLES OBTAINED DURING SOURCE AREA SOIL VAPOR SURVEY WORK ON 5 MAY 1994. SV-121 WAS SAMPLED DURING SITEWIDE SURVEY WORK ON 10-11 MAY 1994. B-2 AND B-3 SAMPLED NOVEMBER 1990.
5. REFER TO TEXT FOR ADDITIONAL INFORMATION.

LEGEND:



H & A OF NEW YORK
Geotechnical Engineers & Environmental Consultants

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

SOURCE AREA SOIL VAPOR SURVEY SUBSURFACE PROFILE A-A'

SCALE: 1" = 5'
REVISED AUGUST 1995

FILENAME: PRFL2.DWG

FIGURE 6

FILE No. 70372-047

R. History

New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
Bureau of Hazardous Waste Facilities
50 Wolf Road, Albany, New York 12233-7252
(518) 457-9255 Fax (518) 457-9240

John Cahill
Acting Commissioner

January 6, 1997

Mr. Ronald Iannucci, Sr., President
Kaddis Manufacturing Corp.
P.O. Box 92985
Rochester, NY 14992-9085

Dear Mr. Iannucci:

Re: Enarc-O Machine Products, Inc.
Lima, New York

Department staff have reviewed the soil and TCLP leachate data for the four samples collected on October 31, 1996 at the Enarc-O Machine Products site in Lima, New York.

The data quality of the soil samples appears to be fine and this data does demonstrate that the amount of contamination in the soil samples is well below, by a factor of about 50 times, the soil sediment action levels in TAGM 3028.

The TCLP leachate values for these same locations result in three samples being non-detected, and one location reporting values of 84 ppb for tetrachloroethylene and 77 ppb for trichloroethylene. These leachate values appear to have a high bias since they are grater than the theoretical amount that could be leached based on the soil sample results.

These TCLP leachate values are well below the values that would classify this material as a characteristic waste. Because of this the Department sees no reason why this material cannot be disposed of in a permitted solid waste landfill. We believe this choice will be protective of the environment and cost-effective for your company.

If you need and further assistance, please contact Mr. John Petiet regarding this issue at (518) 457-9255.

Sincerely,

Steve Kaminski

Steve Kaminski P.E.
Supervisor
Eastern Engineering Section
Bureau of Hazardous waste Facilities
Division of Soil & Hazardous Materials

cc: D. Rollins, Reg. 8
Mike Ryan
R. Mahoney, H&A ✓