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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

December 6, 1994

Mr. Gregory Peterson
Limno-Tech
2395 Huron Parkway
Ann Arbor, Michigan 48104

Re: Action Memorandum for Non-Time-Critical Removal Action, Roto-Finish Site, Portage, Michigan

Dear Mr. Peterson:

Enclosed is a copy of the Action Memorandum for the non-time-critical removal for the Roto-Finish site in Portage, Michigan. The Action Memorandum was signed on November 30, 1994. If you have any questions, or would like to discuss this matter further, please feel free to contact me at (312) 886-1843.

Sincerely,

Karen L. Sikora
Remedial Project Manager

cc: Susan Prout, CS-29A
Deborah Larsen, MDNR
Kirt Fischer, Weston
Phillip Dallosto, ITW
Susan Franzetti, Gardner, Carton and Douglas

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MEMORANDUM

REPLY TO THE ATTENTION OF:

SUBJECT: ACTION MEMORANDUM - Determination of Threat to Public Health or the Environment at the Roto-Finish Site, City of Portage, Kalamazoo County, Michigan (Site ID #4X)

FROM: Karen Sikora, Remedial Project Manager
Michigan/Wisconsin Remedial Response Branch Section 4

TO: William E. Muno, Director
Waste Management Division

THRU: Jodi Traub, Associate Division Director
Office of Superfund

I. PURPOSE

The purpose of this memorandum is to request and document the determination of an imminent and substantial threat to public health and the environment posed by the actual or threatened release of hazardous substances at or from the Roto-Finish Site located at 3700 East Milham Road in the City of Portage, Kalamazoo County, Michigan.

The Roto-Finish site is on the National Priorities List (NPL) and is an enforcement lead site. The non-time-critical response action proposed herein is based on the results of an Engineering Evaluation/Cost Analysis (EE/CA) voluntarily conducted by the Potentially Responsible Party (PRP) under the oversight of U.S. EPA and the Michigan Department of Natural Resources (MDNR) during the Remedial Investigation/Feasibility Study (RI/FS) (please see attached EE/CA (Attachment A) and Enforcement Confidential Addendum (Attachment B)). The proposed response action is a voluntary action that would be implemented immediately by the PRP and operated until the RI/FS is complete and a final remedy for the site is selected and implemented.

The CERCLIS ID number for the site is MID005340088.

II. SITE CONDITIONS AND BACKGROUND

A. Physical Location

The Roto-Finish site is located at 3700 East Milham Road in the City of Portage, Kalamazoo County, Michigan. The seven acre site is approximately 0.2 miles west of Sprinkle Road and directly east of the Conrail railroad and the Kalamazoo/Battle Creek International Airport (Figure 1). The land surrounding the site

volatile organic compounds (VOCs) 1,1-dichloroethene, 1,1,1-trichloroethane, trichloroethene and vinyl chloride. VOCs similar to those found in groundwater monitoring wells installed on the Roto-Finish property were also identified in a groundwater monitoring well installed approximately 0.25 miles downgradient of the site. The chemical concentrations detected in the downgradient monitoring well were approximately one order of magnitude lower than those observed in the on-site wells. The maximum levels of VOCs detected in the groundwater monitoring wells installed at and downgradient of the site are illustrated in Figure 4 and summarized below:

Chemical	On-Site (ug/l)	Downgradient (ug/l)
1,1-dichloroethene	480	32
1,1,1-trichloroethane	2700	190
trichloroethene	170	17
vinyl chloride	120	Not Detected

During the RI/FS, the PRP for the Roto-Finish Site voluntarily proposed to install and operate a groundwater collection system at the site until the RI/FS was completed and a final remedy selected and implemented. Following discussion, it was agreed that the PRP would conduct the proposed action as a non-time critical removal action and would voluntarily perform an EE/CA. It was also agreed that U.S. EPA would seek later agreement with the PRP to implement the selected non-time-critical removal action.

On September 12, 1994, a draft final EE/CA, including a streamlined risk evaluation, was submitted by the PRP to U.S. EPA for final review and approval. The results of the EE/CA and streamlined risk evaluation indicate that the ingestion of groundwater from drinking water wells installed in the immediate vicinity of the site could result in adverse carcinogenic and non-carcinogenic health effects. These effects are due to the high levels of carcinogenic and non-carcinogenic VOCs present in the groundwater beneath the site at concentrations approximately one to two orders of magnitude above Maximum Contaminant Levels (MCLs), as summarized below. The results of the EE/CA and streamlined risk evaluation further indicate that the chemicals in the groundwater beneath the Roto-Finish property are migrating off-site, and that the groundwater at and near the site is a potential drinking water supply.

Chemical	On-Site (ug/l)	Downgradient (ug/l)	Maximum Contaminant Level (MCL) (ug/l)
1,1-dichloroethene	480	32	7
1,1,1-trichloroethane	2700	190	200
trichloroethene	170	17	5
vinyl chloride	120	Not Detected	2

Following U.S. EPA and MDNR review, the EE/CA was approved by U.S. EPA on September 29, 1994. A public comment period was held from October 1 through October 31, 1994, and a public hearing was held on October 13, 1994. Although the groundwater beneath the Roto-Finish site and downgradient of the site is contaminated, the proposed removal action is intended to address only those areas that potentially pose the greatest risks to human health and the environment, i.e., those areas having the highest identified levels of groundwater contamination. The highest areas of identified groundwater contamination occur beneath the Roto-Finish property. The proposed removal action will not address groundwater contamination that occurs downgradient of the site, although it will reduce the mass of chemical constituents in the groundwater at the site and the volume of chemical constituents available for downgradient transport in the areas of highest identified impacts.

D. State and Federal Authorities' Role

Since 1989, the MDNR has provided oversight support to U.S. EPA during the enforcement-lead RI/FS. MDNR will continue to assist U.S. EPA during this proposed removal action and throughout the remainder of the RI/FS as well as any future remedial action.

III. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES

The levels of hazardous substances detected in the groundwater at the Roto-Finish site and the conditions present at the site constitute a threat to public health, welfare, or the environment based upon the factors set forth in section 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan, as amended (NCP), 40 CFR Part 300. These factors are based on the results of the streamlined risk evaluation performed for the site as part of the EE/CA (Attachment A), and include, but are not limited to, the following:

- **Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants.**

The streamlined risk evaluation indicates that this factor is present at the site due to the high levels of carcinogenic and non-carcinogenic VOCs present in the groundwater at the site, which, based on current water well records for the area, is a potential drinking water supply. VOCs were detected in the groundwater beneath the Roto-Finish property at concentrations between one and two orders of magnitude above MCLs. The VOCs are believed to be migrating off-site and were detected in a downgradient groundwater monitoring well installed approximately 0.25 miles northwest of the site at concentrations approximately within one order of magnitude above MCLs. The VOCs detected on

and downgradient of the Roto-Finish site are known or suspected human carcinogens and/or have the potential to cause non-carcinogenic health effects. Based on the streamlined risk evaluation, the levels of VOCs present in the groundwater at and near the site have the potential to cause unacceptable carcinogenic and non-carcinogenic health effects to populations who could potentially use the contaminated groundwater as a drinking water supply.

The VOCs detected in the groundwater beneath the Roto-Finish property are believed to be migrating and have the potential to impact existing drinking water supplies downgradient of the site. The groundwater beneath the Roto-Finish site flows generally to the north-northwest, and VOCs similar to those detected in the groundwater beneath the Roto-Finish property were detected at concentrations within one order of magnitude above MCLs in a downgradient groundwater monitoring well installed approximately 0.25 miles northwest of the site. The City of Kalamazoo draws its water from this aquifer via a city well nest approximately 1.33 miles north of the site, and several private drinking water wells exist downgradient of the site in areas approximately 0.55 miles west of the site and 1 mile northwest of the site. Groundwater contaminants migrating from the Roto-Finish site have the potential to impact these existing drinking water supplies, potentially exposing users to levels of chemicals which may pose unacceptable carcinogenic and/or non-carcinogenic health risks.

- **Actual or potential contamination of drinking water supplies or sensitive ecosystems.**

The streamlined risk evaluation indicates that this factor is present at the site due to the high levels of carcinogenic and non-carcinogenic VOCs present in the groundwater at the site, which, based on current water well records for the area, is a potential drinking water supply. VOCs were detected in the groundwater beneath the Roto-Finish property at concentrations between one and two orders of magnitude above MCLs. The VOCs are believed to be migrating off-site and were detected in a downgradient groundwater monitoring well installed approximately 0.25 miles northwest of the site at concentrations approximately within one order of magnitude above MCLs. The VOCs detected on and downgradient of the Roto-Finish site are known or suspected human carcinogens and/or have the potential to cause non-carcinogenic health effects. Based on the streamlined risk evaluation, the levels of VOCs present in the groundwater at and near the site have the potential to cause unacceptable carcinogenic and non-carcinogenic health effects to populations who could potentially use the contaminated groundwater as a drinking water supply.

The VOCs detected in the groundwater beneath the Roto-Finish property are believed to be migrating and have the potential to

impact existing drinking water supplies downgradient of the site. The groundwater beneath the Roto-Finish site flows generally to the north-northwest, and VOCs similar to those detected in the groundwater beneath the Roto-Finish property were detected at concentrations within one order of magnitude above MCLs in a downgradient groundwater monitoring well installed approximately 0.25 miles northwest of the site. The City of Kalamazoo draws its water from this aquifer via a city well nest approximately 1.33 miles north of the site, and several private drinking water wells exist downgradient of the site in areas approximately 0.55 miles west of the site and 1 mile northwest of the site. Groundwater contaminants migrating from the Roto-Finish site have the potential to impact these existing drinking water supplies, potentially exposing users to levels of chemicals which may pose unacceptable carcinogenic and/or non-carcinogenic health risks.

IV. ENDANGERMENT DETERMINATION

Due to the presence of hazardous substances including 1,1-dichloroethene, 1,1,1-trichloroethane, trichloroethene and vinyl chloride in the groundwater at the Roto-Finish site at levels which would pose unacceptable carcinogenic and non-carcinogenic health risks to people ingesting the groundwater; that the groundwater at and near the site is a potential drinking water supply; and that the chemicals detected in the groundwater at the Roto-Finish site are believed to be migrating and have the potential to impact existing water supplies downgradient of the site, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Action

1. Proposed Action Description

The proposed action reduces the potential threat to human health and the environment by reducing the mass of chemical constituents in the groundwater at the site and the volume of chemical constituents available for downgradient transport. The proposed action addresses the areas of highest identified groundwater impacts and would operate until the RI/FS is complete and a final remedy for the site is selected and implemented. Specific removal action tasks are as follows:

- Install two ground-water extraction wells on the Roto-Finish property in the areas of highest identified groundwater impacts;

- Extract groundwater and discharge to the City of Portage sanitary sewer system for conveyance to the City of Kalamazoo Water Reclamation Plant (KWRP). The water would be treated at the KWRP prior to discharge to the Kalamazoo River. The City of Kalamazoo has communicated in writing that the quantity and quality of the groundwater would not pose a problem for their treatment plant (see Attachment D); and

- Establish a groundwater monitoring program to evaluate the effectiveness of the removal action and to provide information which may be useful for the RI/FS.

2. Project Schedule

The proposed action would take approximately one month to implement, and would be operated until the RI/FS is complete and a final remedy for the site is selected and implemented.

3. Contribution to Remedial Performance

Implementation of the removal action would be effective in reducing the potential threat to human health and the environment by reducing the mass of chemical constituents in the groundwater at the site and the volume of chemical constituents available for downgradient transport in the areas of highest identified impacts. The proposed removal action would be implemented on a temporary basis and would be operated until the RI/FS is complete and a final remedy for the site is selected and implemented.

Given the levels of chemical constituents detected in the groundwater at the site, it is likely that a final remedy for the site would address groundwater. As such, the proposed removal action would not be inconsistent with a final remedy selected for the site; would, to the extent practicable, contribute to the efficient performance of any future remedial action; and would not interfere with an orderly transition to remedial action.

4. Description of Alternative Technologies

Discussion of various technologies have been addressed in the attached EE/CA.

5. EE/CA

An Engineering Evaluation and Cost Analysis (EE/CA) (Attachment A) was voluntarily conducted by the PRP to evaluate the various alternatives to address the highest areas of groundwater contamination at the Roto-Finish site until the RI/FS is completed and a final remedy for the site is selected and implemented. When determining the best technologies for a site, an EE/CA must consider the criteria of effectiveness,

implementability, cost and public acceptance. A detailed description and discussion of the various alternatives considered is contained in the attached EE/CA.

In accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 117, 42 U.S.C. Section 9617, the U.S. EPA issued the EE/CA for public comment on October 1, 1994, and held a public comment period from October 1, 1994 through October 31, 1994, to allow interested parties to comment on the EE/CA. The attached responsiveness summary (see Attachment E) documents the U.S. EPA's response to questions, concerns, and comments received during the comment period and during the public hearing. These comments and concerns were evaluated prior to selection of the removal actions for the site.

6. Applicable or Relevant and Appropriate Requirements (ARARs)

Section 300.415(i) of the NCP states that removal actions under CERCLA Section 104 shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal or state environmental or facility-siting laws. Other advisories, criteria, or guidance may be considered for a particular site situation. Specific ARAR discussions are provided in the attached EE/CA.

7. Post Removal Site Control

The proposed response action is a temporary action that the PRPs have voluntarily agreed to operate until the RI/FS is complete and a final remedy for the site is selected and implemented. As such, necessary post removal site control measures and risks from wastes or residuals remaining at the site after completion of the removal action will be addressed in the final remedy selected for the site.

The response actions described in this memorandum directly address actual or threatened releases of hazardous substances, pollutants or contaminants at the facility which may pose an imminent and substantial endangerment to public health and safety, and to the environment. These response actions do not impose a burden on affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

B. <u>Estimated Cost</u>

The estimated capital cost of the proposed action is $51,000. The cost for annual operation and maintenance (including groundwater monitoring and analysis for the groundwater monitoring program) is estimated to be $155,000. Assuming 2 years of operation until the RI/FS is complete and a final remedy

for the site is selected and implemented, the present worth cost of the proposed action is $322,000.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delay or non-action may result in continued or increased groundwater degradation and increase the potential for threats to human health for users who may use the groundwater as a potential drinking water supply.

VII. OUTSTANDING POLICY ISSUES

No significant policy issues are associated with the Roto-Finish site.

VIII. ENFORCEMENT

For Administrative purposes, information concerning the enforcement strategy for this site is contained in the Enforcement Confidential Addendum (Attachment B).

IX. RECOMMENDATION

This decision document represents the selected non-time-critical removal action for the Roto-Finish site in Portage, Michigan, developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record File for the site. Conditions at the site meet the NCP Section 300.415(b)(2) criteria for a removal action, and I recommend your approval of the proposed removal action.

APPROVE: _____ 11/30/94
Director, Waste Management Division — Date

DISAPPROVE: _____ _____
Director, Waste Management Division — Date

cc: Terri Johnson, OS-210
Don Henne, U.S. DOI
Deborah Larsen, MDNR

LIST OF FIGURES AND ATTACHMENTS

FIGURE 1
LOCATION OF ROTO-FINISH SITE
PORTAGE, MICHIGAN

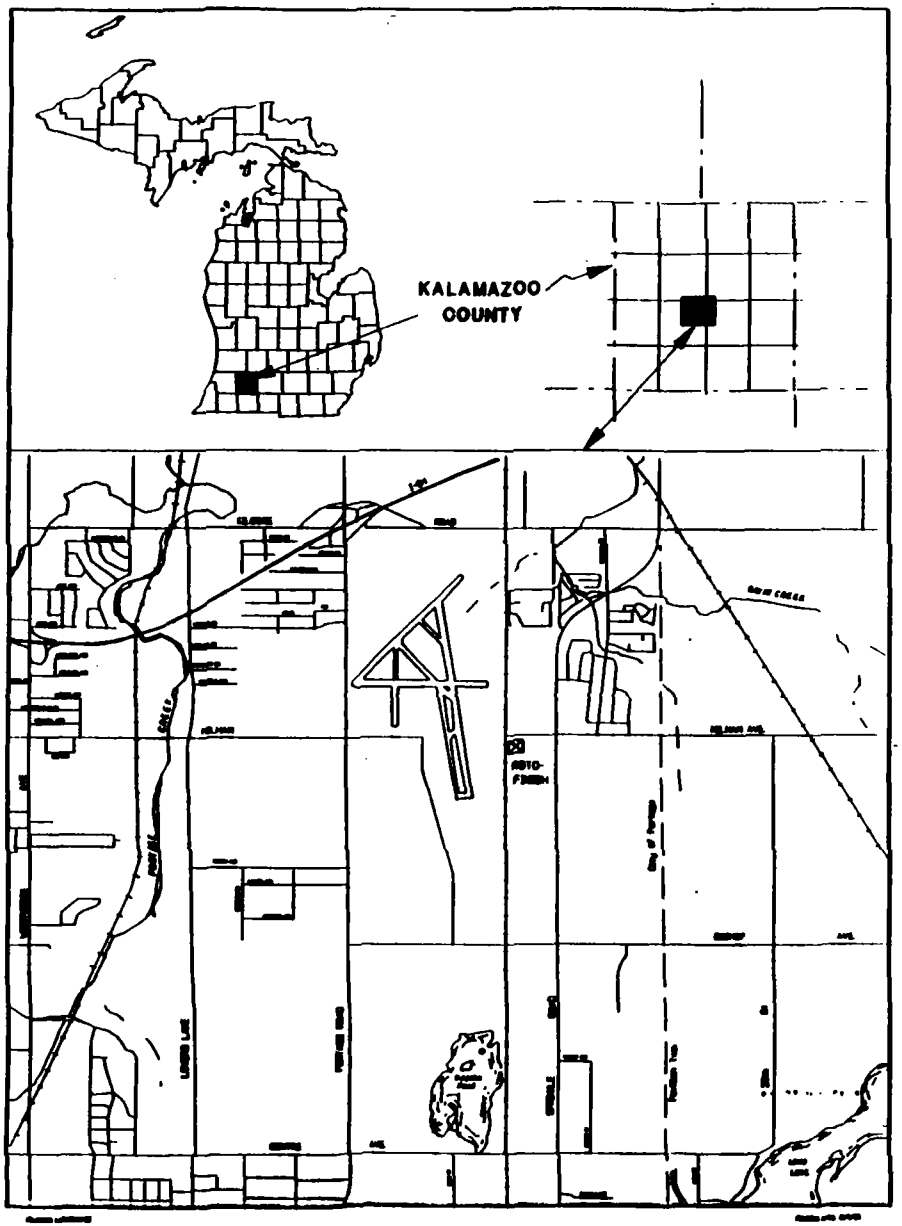
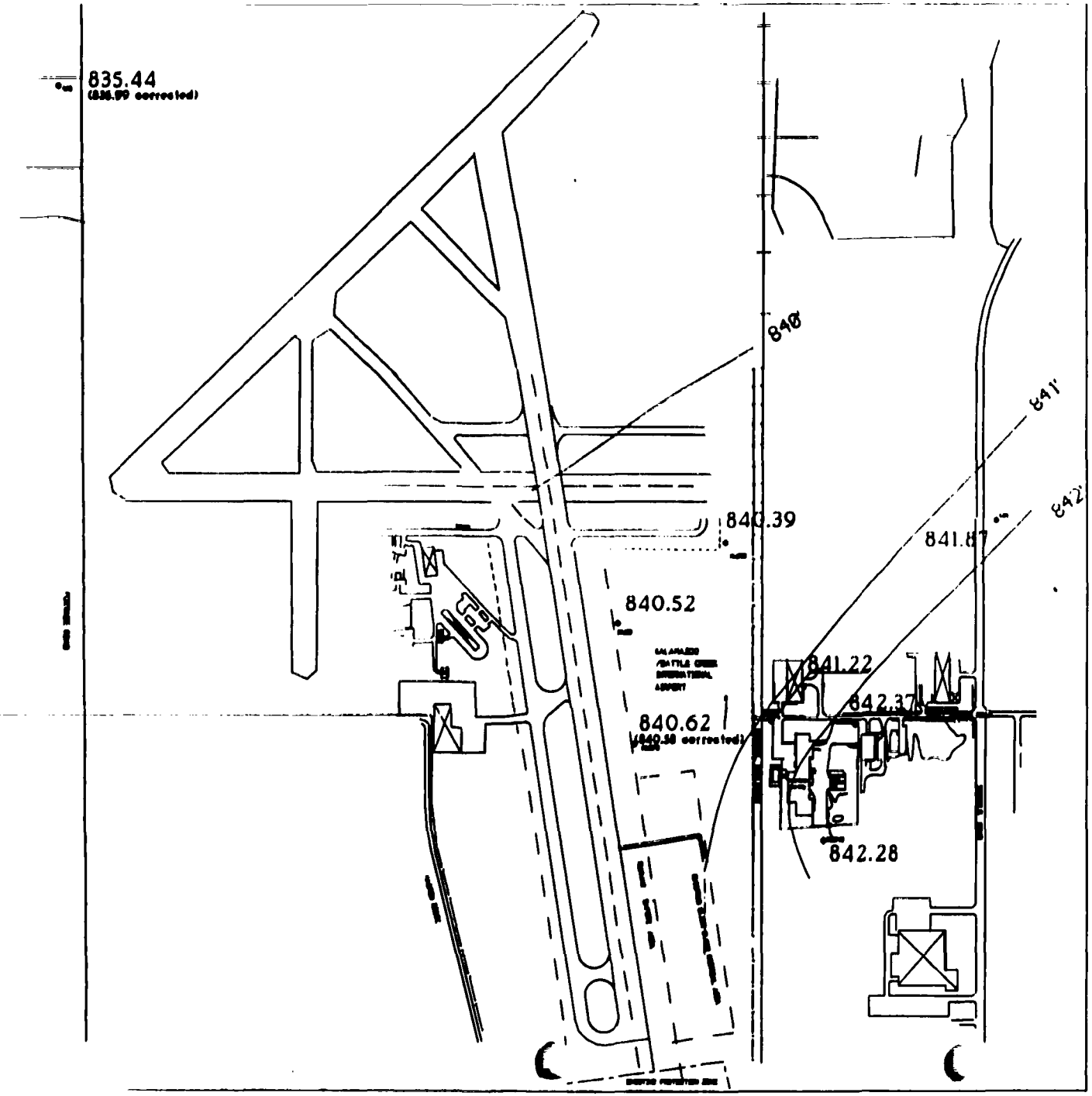


FIGURE 2
GROUNDWATER CONTOUR MAP



LTI-Limno-Tech,Inc.
Environmental Engineering

FIGURE 3
PRIVATE WELLS IN VICINITY OF SITE

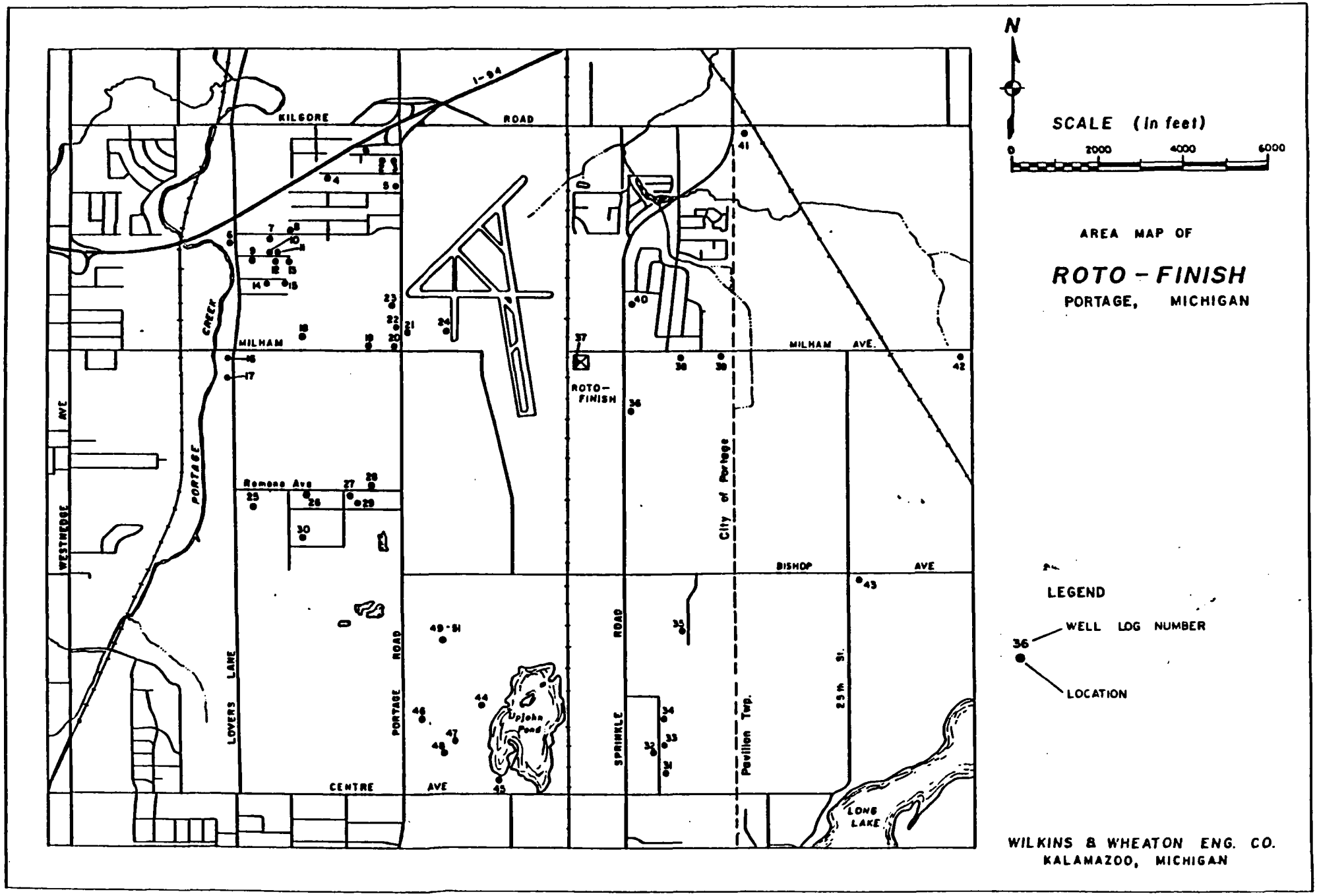
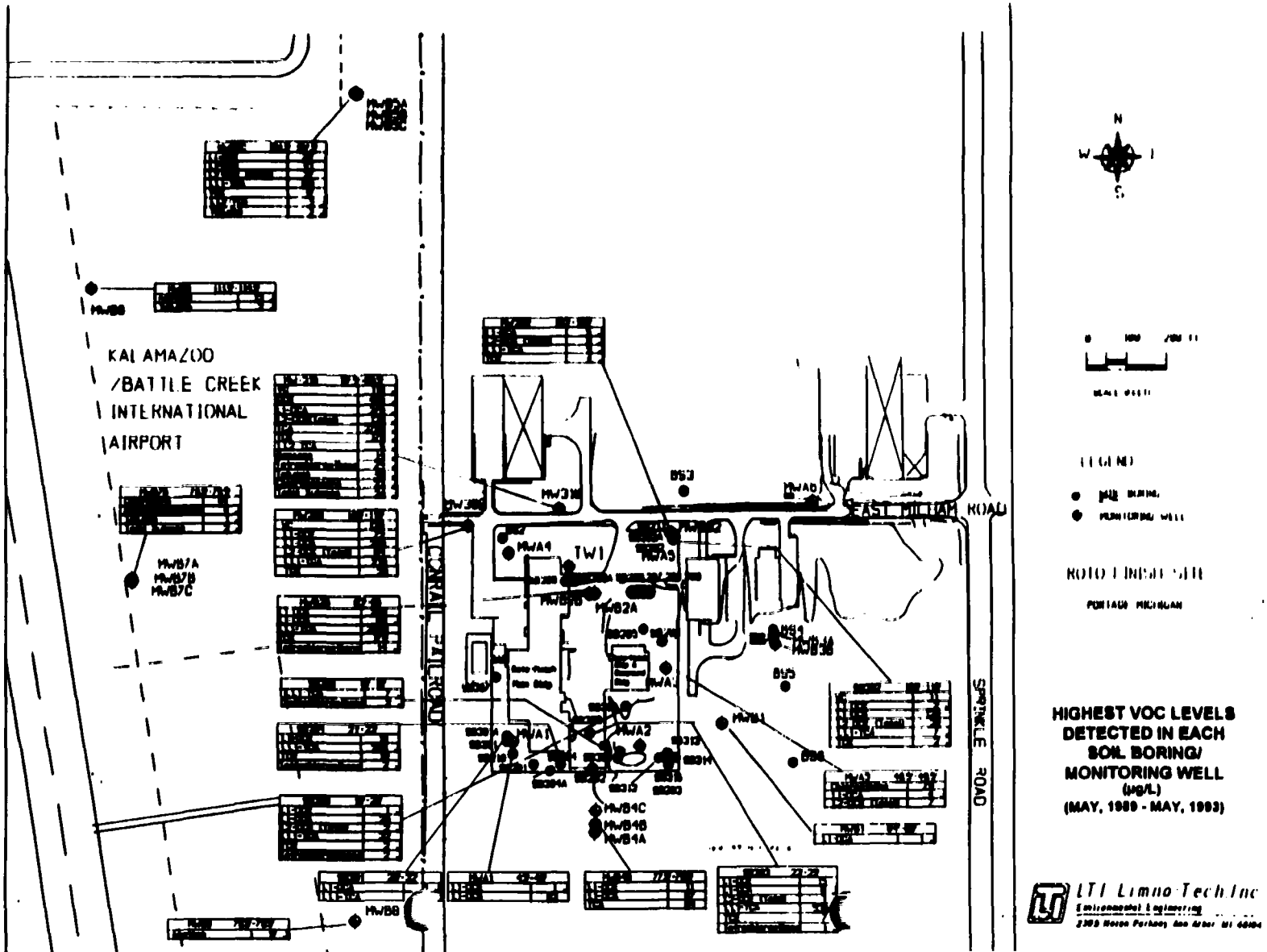


FIGURE 4
MAXIMUM DETECTED GROUNDWATER CONCENTRATIONS



ATTACHMENT A

ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) AND APPROVAL LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

VIA OVERNIGHT MAIL

SEP 29 1994

REPLY TO THE ATTENTION OF:

Mr. Philip Dallosto
Illinois Tool Works Inc.
Corporate Headquarters
3600 West Lake Avenue
Glenview, Illinois 60025

Re: Engineering Evaluation/Cost Analysis (EE/CA),
Roto-Finish Site, Portage, Michigan

Dear Mr. Dallosto:

The United States Environmental Protection Agency (U.S. EPA) has completed a review of the revised Engineering Evaluation/Cost Analysis voluntarily submitted by Illinois Tool Works Inc. for the Roto-Finish site in Portage, Michigan.

As discussed at our meeting of September 1, 1994, U.S. EPA and the Michigan Department of Natural Resources (MDNR) had several concerns regarding the objectives of the proposed non-time-critical removal action. In order to address these, as well as other concerns expeditiously and without causing a delay in the start of the public comment period, the revised EE/CA submitted to U.S. EPA on September 12, 1994 has been internally modified by the Agency.

As of this date, the modified EE/CA is approved. The approved EE/CA will be included in the Administrative Record File for the site. Fact sheets describing the EE/CA and U.S. EPA's recommended non-time-critical removal action have been mailed and the public comment period is scheduled to begin October 1, 1994. A copy of the approved EE/CA and the fact sheet are enclosed with this letter.

If you have any further questions or comments, please feel free to contact me at (312) 886-1843. Legal questions should be directed to Ms. Susan Prout, legal counsel for the Roto-Finish site at (312) 353-1029.

Sincerely,

Karen L. Sikora
Remedial Project Manager

cc: Wendy Carney, Section Chief, HSRW-6J (w/o enc.)
Susan Prout, CS-30A
Deborah Larsen, MDNR
Kirt Fischer, Weston
Gregory Peterson, Limno-Tech

ENGINEERING EVALUATION/COST ANALYSIS FOR THE ROTO-FINISH SITE PORTAGE, MICHIGAN

Limno-Tech, Inc.
Environmental Engineering
2395 Huron Parkway
Ann Arbor, Michigan 48104

ENGINEERING EVALUATION/COST ANALYSIS FOR THE ROTO-FINISH SITE PORTAGE, MICHIGAN

Prepared for:

Illinois Tool Works
Glenview, Illinois

Prepared by:

LTI, Limno-Tech, Inc.
Ann Arbor, Michigan

and

United Environmental Technologies, Inc.
Kalamazoo, Michigan

September, 1994 Revision

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1.0 INTRODUCTION

This engineering evaluation/cost analysis (EE/CA) was conducted to support the need for a proposed non-time-critical removal action for the Roto-Finish site. The recommended alternative proposes the installation and operation of a groundwater recovery well system to reduce the mass of chemical constituents in the groundwater at the site and to reduce the volume of chemical constituents available for downgradient transport. Reductions in the mass and volume of chemical constituents would be achieved through groundwater extraction with discharge to the municipal sanitary sewer system for treatment at the municipal wastewater treatment plant. It is proposed that the recommended alternative be implemented immediately as a temporary measure and continued until a final remedy for the site is selected and implemented.

This EE/CA has been structured to be consistent with the U.S.EPA guidance for conducting non-time-critical removal actions (EPA, 1993). This chapter presents the introduction to the EE/CA and the objectives of the proposed non-time-critical removal action. Chapter 2 presents site characterization information collected prior to the summer of 1993, including a summary of previous site investigations and physical and chemical data that describe the preliminary understanding of site conditions at that time. Chapter 3 presents an evaluation of risks to human health at the site. Chapter 4 presents the identification and evaluation of limited applicable alternatives and provides the rationale for selection of the recommended non-time-critical removal action technology.

1.1 OBJECTIVES OF THE NON-TIME-CRITICAL REMOVAL ACTION

The non-time-critical removal action is proposed to address chemical constituents that were found to be present in the groundwater beneath the Roto-Finish site. The objective of this action is to reduce the mass of chemical constituents in the groundwater at the site and to reduce the volume of chemical constituents available for downgradient transport until the remedial investigation/feasibility study (RI/FS) is completed and a final remedy is selected and implemented. In addition, groundwater monitoring conducted during operation of the removal action system may provide information that could be important in the development of a final remedy. The plan proposed herein would reduce the mass of chemical constituents in the groundwater at the site and the volume of chemical constituents available for downgradient transport through groundwater extraction with discharge to the municipal sanitary sewer system for treatment at the City of Kalamazoo Water Reclamation Plant.

Proceeding immediately with this proposed action has several projected benefits, including:

- The non-time-critical removal action would reduce the mass of chemical constituents in the groundwater and reduce the volume of chemical constituents available for downgradient transport. Reductions in the mass and volume of chemical constituents in on-site groundwater could begin almost immediately and would be conducted along a parallel path with the completion of the RI/FS work.

- Environmental benefits could be achieved much sooner than would be possible if no action were taken until the RI/FS is completed and a final remedy is selected and implemented.

- Immediate implementation of the proposed removal action is consistent with and in furtherance of the objectives and spirit of the Superfund Accelerated Cleanup Model (EPA, 1992a) and Michigan Public Act 307 (State of Michigan, 1982), and hence, it is in the public interest to proceed.

- Information obtained during performance monitoring of the system may be useful for the RI/FS and supplement the evaluation and selection of a final remedy.

- The proposed removal action would not be inconsistent with a final remedy. Given the levels of chemical constituents detected in groundwater samples collected at the site, it is likely that a final remedy would address groundwater.

- The Cities of Kalamazoo and Portage have indicated they are very receptive to the proposed action as a positive approach to addressing the impacted groundwater at the site and also have indicated that they will benefit from the additional revenue generated by disposing the extracted groundwater at the City of Kalamazoo wastewater treatment plant.

2.0 SITE CHARACTERIZATION

This chapter presents preliminary information concerning conditions at the site that are relevant to the design and implementation of the proposed non-time-critical removal action. Site background information, previous investigations, regional climate, regional and site geology, hydrogeology, and distribution of chemical impacts are discussed in the following sections.

2.1 SITE BACKGROUND

The following subsections present a description of the site setting, surrounding land use and populations, site usage, and structures.

2.1.1 Site Setting, Surrounding Land Use, and Populations

The Roto-Finish site is located at 3700 E. Milham Road in Portage, Michigan. The seven acre site is approximately 0.2 miles west of Sprinkle Road and directly east of the Conrail railroad and the Kalamazoo/Battle Creek International Airport, as shown in Figure 1. The surrounding land is zoned for current and future industrial use and is presently used for either industrial or commercial activities. According to the 1990 Census, the population of Portage, Michigan, was 41,042 and represents 18.4% of the total population and 16.7% of the geographic area of Kalamazoo County. Recent population information for the residential areas nearest the Roto-Finish site is available from the 1990 Census Block Group Statistics program. The two residential areas nearest the site include the Colonial Acres mobile home park (878 residents), located approximately one-half mile to the north, and the Lexington Green residential development (2181 residents), located approximately one-third mile to the northeast. An additional residential area is located approximately one mile northwest of the site on the other side of the Kalamazoo/Battle Creek International Airport. The remaining residential area (654 residents) is widespread and sparsely populated, and includes the areas east, south, and southwest of the Roto-Finish site.

The Roto-Finish site is located in a relatively flat, shallow basin which slopes northward toward the Kalamazoo River and is drained through the Davis Creek/Olmstead County Drain, which is located approximately 1 mile to the northeast of the site. The low topographic relief surrounding the facility varies in elevation from 855 feet to 865 feet above sea level. The elevation of Davis Creek to the northeast is approximately 845 feet.

2.1.2 Site Operations and Structures

The Roto-Finish Company manufactured specialized equipment to debur and polish metal castings, mechanical parts, and similar objects that required smooth finishes. It is undetermined when the company began operations in the present buildings, but it is believed to have begun in the late 1940's to the early 1950's. The business was sold and the facilities were closed in 1988. The layout of the Roto-Finish site is shown in Figure 2. There are two buildings on the site: the Manufacturing Building and the Chip and Compound Building. The Manufacturing Building housed the Roto-Finish offices, areas used for equipment manufacturing and testing, and areas used for storage of equipment and materials. The Chip and Compound Building was used for storage and production of the polishing media that were used with the manufactured finishing equipment. Most of the manufacturing and processing occurred in the Manufacturing Building.

Roto-Finish used two disposal systems for their wastes. The sanitary waste from rest rooms and other non-processing or laboratory wastes were discharged through a system of septic tanks, dry wells, and a tile field. The manufacturing and testing processes generated wastewater that was discharged to a series of lagoons. Three wastewater lagoons (herein referred to as the west, north, and south lagoons) were located near the eastern boundary of the property, along the east and north sides of the Chip and Compound Building (Figure 2). The west lagoon (located north of the Chip and Compound Building) was the first in operation. The north lagoon (located northeast of the Chip and Compound Building) was constructed later to receive drainage from the west lagoon as it became filled. By 1979, the west lagoon was no longer in use and its presence was not evident on-site. At this time, the north lagoon was used as the primary lagoon that received process wastewater and the south lagoon received drainage from the north lagoon. In 1983, the west lagoon was rediscovered buried under an abandoned sanitary tile field during preliminary work associated with a planned expansion of the Chip and Compound Building. The Roto-Finish facility was fully connected to the municipal sanitary sewer system in October, 1980, after which there were no further discharges to the lagoons. The water supply wells identified on Figure 2 and in Kalamazoo County water well records have been abandoned and are inoperable.

2.2 SUMMARY OF PREVIOUS INVESTIGATIONS

Environmental investigations have been conducted at the Roto-Finish site since 1979. An initial set of investigations, conducted from 1979 through 1983 under the oversight of MDNR, focused primarily on remediation of the wastewater lagoons. The currently on-going RI/FS investigations began in 1989 under the oversight of both the U.S.EPA and the MDNR. The purpose of the RI/FS is to characterize the nature and extent of environmental impacts and to identify and evaluate alternatives for the appropriate extent of remedial action necessary to prevent or mitigate further or existing impacts. The

investigations have been conducted in three phases, which are summarized further below. A chronology of the major activities conducted during the previous investigations is presented in Table 1.

In 1979, sediment and water samples from the north and south wastewater lagoons were collected and analyzed by MDNR. The results showed elevated levels of cadmium, chromium, iron, and 4,4'-methylene-bis-2-chloroaniline (MOCA). Between 1979 and 1984, the three known lagoons and areas of visibly stained surficial soils were excavated, the sediments and soils were disposed with MDNR approval in a licensed landfill, and the excavations were backfilled with clean material. In 1986, the site was included on the National Priorities List (NPL). The Administrative Order by Consent regarding Remedial Investigation and Feasibility Study (U.S.EPA Docket No. V-W-87-C-033) was executed and signed, and went into effect on January 4, 1988.

The Phase I and Phase II remedial investigations were conducted in accordance with approved work plans between 1989 and 1991 to characterize the extent and distribution of on-site soils and groundwater degradation. The Phase I and II investigations included analysis of soil and groundwater samples collected from 41 boreholes at multiple depths (down to 146 feet below ground surface) and the installation of 17 permanent monitor wells. The Phase I investigation did not include vertical aquifer sampling to the bottom of the aquifer prior to well installation and thus provided limited groundwater data. As a result, the Phase II investigation was conducted. Well and soil boring locations are presented in Figure 3.

As discussed in Section 2.7, the Phase I and II soils and limited groundwater data did not indicate the presence of continuing significant existing source areas. In addition, MOCA was not detected in any of the groundwater samples. However, the Phase II investigation results indicated the presence of volatile organic compounds (VOCs), metals, and semivolatile organic compounds in on-site and off-site groundwater samples. Based on these results, Phase III investigations were conducted.

The Phase III investigation commenced in 1992 to provide information about aquifer characteristics at the site and to provide information about the off-site extent of groundwater degradation identified in Phase I and II sample results. A pumping test was conducted in September 1992, to determine the hydraulic characteristics of the groundwater in the unconfined glacial drift beneath the site. In the spring of 1993, a second Phase III investigation commenced to preliminarily determine the horizontal extent of off-site groundwater degradation. Eight wells were installed and sampled for VOCs on the Kalamazoo/Battle Creek International Airport, located downgradient from the Roto-Finish site. VOCs similar in composition to those found in wells on the Roto-Finish site were identified in only one downgradient airport location (MWB5) and concentrations were approximately one order of magnitude lower than observed in the on-site wells. A proposal for further off-site Phase III work was approved by EPA/MDNR in October

1993 and conducted during April and May, 1994. The results of this last phase of work are currently being evaluated.

Appendices A and B present a summary of the validated Contract Laboratory Program (CLP) results for all compounds detected in soils and groundwater samples collected during the Phase I, Phase II, and Phase III RI/FS investigations to date.

2.3 REGIONAL CLIMATE

Meteorological data recorded for Kalamazoo County for the period of 1951 to 1980 (NOAA, 1989; Austin, 1979) is summarized in Table 2. The average summer temperature is 69.8°F and the average daily maximum temperature is 81.3°F. The highest recorded temperature for the area was 100°F on July 13, 1936. The average winter temperature is 28.7°F and the average daily minimum temperature is 20.9°F. The lowest recorded temperature for the area was -16°F on February 10, 1885.

The average annual precipitation in Kalamazoo County is 34.8 inches, of which 58 percent usually falls between April and September. Thunderstorms occur on approximately 37 days each year, generally during the months of June and July. The heaviest recorded 24-hour rainfall during the 1951 to 1980 period was 5.6 inches and occurred over May 11 and 12, 1914. The average annual snowfall is 73.1 inches. The annual average relative humidity is 62 percent at midday and 80 percent at dawn. The prevailing wind direction is from the southwest with the highest recorded monthly average wind speed of 11.7 miles per hour occurring during the month of January.

2.4 REGIONAL GEOLOGY

The Roto-Finish site is located near the geographic center of Kalamazoo County. The surficial geology of the area is the result of Wisconsinian glaciation, post-glacial erosion, and urbanization. Glacial sediments in this region are dominated by outwash deposits and, to a lesser extent, ground moraine deposits. Total thickness for the regional glacial deposits is estimated between 250 and 300 feet (Passero, 1978).

Bedrock immediately underlying the glacial sediments is the Mississippian Coldwater Shale. The Coldwater typically is a gray and bluish-gray shale with lesser amounts of argillaceous dolomite (Rheaume, 1990).

Soils are dominated by the Kalamazoo loam (2-6% slopes) and Urbanland-Kalamazoo complex (0-6% slopes). A typical soil profile consists of a 9 inch thick surface layer of dark grayish brown loam, underlain by a dark yellowish brown and dark brown subsoil 44

inches thick. This subsoil grades from a loam and clay loam, to a sandy loam, and then to a loamy coarse sand with increasing depth (Austin, 1979).

2.5 SITE GEOLOGY

The subsurface geology on and around the Roto-Finish site has been characterized generally and preliminarily through soil borings and monitoring wells drilled in the Phase I, Phase II and first part of the Phase III RI investigations described in Section 2.2. The interpreted distribution of the subsurface geology at the site is represented through two preliminary geologic cross-sections, trending approximately northwest-southeast and east-west across the site, as depicted in Figures 4, 5 and 6. The cross-sections were constructed by interpreting and correlating information from the lithologic descriptions in the soil boring logs. The distribution of site sediments is complex, and the cross-sections present a generalized interpretation using available information.

The cross-sections provide a preliminary working tool and simplified conceptual model for evaluating the hydrostratigraphy of the site until the remainder of the Phase III data is obtained and reviewed. The initial, generalized interpretations depicted on the preliminary cross-sections will be refined as necessary and presented in more detail in the RI report, based on the additional information obtained from the ongoing Phase III activities. The additional Phase III information will include new soil boring/monitoring well data and continuous gamma-ray log data from selected new and existing site wells. The information obtained from the continuous gamma-ray logs will be integrated with the lithologic physical descriptions in the soil boring logs. Because the lithologic descriptions in the soil boring logs were obtained at non-continuous sampling intervals, and because sampling zone intervals were sometimes obscured by incomplete sample recoveries, carrydown, and sand heave problems, it may be necessary to refine the soil boring logs based on the information obtained from the continuous gamma-ray logs. Facies changes may be better defined on the continuous gamma-ray logs, and interpolations between non-continuous lithologic descriptions will be assisted with the continuous gamma-ray log data. The finalized and integrated gamma-log and lithologic description data will be used to confirm and better define the working conceptual model; therefore, the details in the preliminary soil boring logs are not provided in the generalized cross-sections, but will be provided in the RI geologic cross-sections. In addition, the orientation of the geologic cross-sections may be revised for the RI report when the extent and distribution of chemicals in groundwater is determined from the additional Phase III groundwater monitoring data and when additional static water level data from the new monitoring wells is evaluated. Revised geologic cross-section orientations will be selected, if necessary, to better depict hydrogeologic trends for fate and transport evaluations.

Soil samples collected during the investigations indicate that the site subsurface geology can be classified broadly into two general glacial facies types: unconsolidated pro-glacial

fluvial (or outwash) and ground moraine deposits. Outwash deposits primarily consist of medium to very coarse sand and gravel, with intervals of pebble and cobble size grains common. Finer grained outwash deposits can occur as a result of the type of source material carried by the glacier, the degree of water energy present during deposition and re-working, and the distance of the outwash plain in front of the glacier. Moreover, outwash deposits typically are under-compacted, poorly graded/well sorted, and stratified in fining-upward intervals. Ground moraine deposits primarily consist of silty or clayey sands and sandy silts or clay (i.e. sandy till). These deposits commonly are dense and well graded/poorly sorted. Intervals associated with each depositional facies (outwash and ground moraine deposits) alternate with depth, likely coinciding with local advances and retreats of the glacial ice mass.

As depicted in Figures 5 and 6, fill material generally is encountered within the upper ten feet of the site, which is comprised primarily of sand and gravel according to the lithologic descriptions in the soil boring logs. The fill material appears to be underlain by glacial outwash and moraine deposits to a depth of over 150 feet below grade. The glacial outwash deposits are represented generally by three sand-dominated units, which occur in broad, likely interconnected zones alternating with finer-grained morainal deposits across most of the site. The morainal deposits appear to be breached by channels which apparently interconnect the three general sand-dominated units.

The upper band of outwash sands underlies the fill material down to a depth of approximately 20 feet below grade, and thins east-southeastward towards MW302 and MWA3. The preliminary soil boring logs indicate that this interval consists primarily of fine-to-medium, and medium-to-coarse sands, with some fine-to-coarse sand zones. Beneath the upper band of outwash sands, down to a depth of approximately 40 to 45 feet below grade, is a finer-grained sequence of sediments (represented in the soil boring logs as fine sands, silty fine sands and sandy silts). This sequence of sediments is interpreted to be morainal, and appears to be continuous across the extent of the site represented by the geologic profiles. It appears to extend vertically to a depth of approximately 30 to 50 feet below grade on the east-southeast side of the site, and vertically to a depth of approximately 60 feet below grade in the vicinity of MW309.

Underlying the morainal sequence of sediments is another band of sand-dominated sediments, followed by a thinner sequence of morainal sediments down to a depth of approximately 80 to 100 feet below grade across most of the eastern side of the site. The lithologic descriptions in the soil boring logs indicate the presence of individual fining upwards sand sequences in sand-dominated intervals beneath the site. The interpretations of the individual fining upwards sand sequences will be refined with the data from the continuous gamma-ray logs; however, these apparent sequences are suggestive of former stream channels in glacial outwash deposits. Because of the migrating nature of channels in a glaciofluvial depositional setting, these channels would tend to coalesce to create a nearly laterally continuous body of sand. Possible examples of isolated channels are

preliminarily interpreted from the data for borings SB309/MW309, TW1, MW302 and MWB2A/B2B.

The thinner sequence of apparently morainal deposits is distinquished in the vicinity of TW1 by an apparently anomalous zone of sediments in the interval from 90 to 110 feet below grade. This interval in TW1 consists of moist, dense fine sand and silt, overlying a dry dense fine-to-coarse sand and fine-to-coarse gravel at approximately 95 feet below grade. The dry sand/gravel zone is underlain by 20 to 25 feet of dense fine-to-coarse sand and fine gravel, with zones of highly weathered and altered exoctic (gabbro) and bands of a green silty material. This interval between 90 to 110 feet below grade in TW1 may represent a relatively isolated till deposit, in which the dry sand/gravel sediments were "encapsulated" and deposited by the glacier within a lens of finer-grained sediments.

Below the thinner sequence of morainal deposits is another zone of sand-dominated, (or apparently outwash) deposits, followed by a lower series of finer-grained (apparently morainal) sediments. Based on the lithologic descriptions in the soil boring logs, this lower unit of finer grained sediments consists of silty very-fine to fine sands throughout most of the area represented by the two geologic profiles. At the time of the 1992 Phase III pumping test, this lower fine-grained unit coincided with the vertical extent of detected chemicals in groundwater, and was interpreted to represent a possible zone of lower hydraulic conductivity (or aquitard) beneath the site. Based on the response of test well TW1 and the response of some the observation wells monitored during the pumping tests, this finer-grained zone may have leaked and provided recharge to the aquifer under the stress of pumping during the aquifer performance tests.

The preliminary geologic interpretation appears to be consistent with the hydraulic behavior of various observation wells that were monitored during the 1992 pumping test, as discussed below.

2.6 HYDROGEOLOGY

The hydrogeology on and around the Roto-Finish site has been preliminarily characterized using the geologic cross-sections (Figures 5 and 6), data from monthly monitoring of static water levels (since 1989), and an aquifer performance test conducted on-site in September, 1992. Potentiometric surface maps constructed from static water elevation data collected since 1989 have indicated a consistent horizontal flow direction that radiates outward from the site to the northwest, west, and southwest. A representative set of potentiometric surface maps based upon August 27, 1993, static groundwater level measurements for shallow, intermediate, and deep-screened monitoring wells is presented in Figures 7, 8, and 9. Table 3 presents the screen settings of the monitoring wells. The horizontal flow direction is consistent with depth but does vary in magnitude. The radial flow pattern that is depicted under the Roto-Finish site also appears to extend beneath the

airport property located downgradient from the site. In addition, the direction of groundwater flow at each of the depth zones measured on the airport to the south of MWB6 appears to have a more westerly component, while the groundwater flow east of the MWB5 well cluster appears to have a slightly more northern component.

The potentiometric data presented on the potentiometric surface maps indicate that there is a downward vertical gradient trend oriented approximately east-west through the site. This vertical gradient is most pronounced between monitoring wells set in the shallow and intermediate zones of the aquifer. Insufficient data exist from which to interpret vertical gradient patterns between the intermediate and deep screened zones. Table 4 presents the vertical gradient data for the August 27, 1993 static groundwater level measurements.

The vertical gradients are likely attributable to the three different hydrogeologic facies present beneath the Roto-Finish site. The static water elevations in the shallow wells set in upper intervals typically are higher than those from wells set in deeper intervals. This likely is the result of the distribution of fine-grain material in the upper interval; the effect being that the downward migration of water is slowed, thereby creating the vertical gradient. The upper interval may serve as an aquitard but does not occlude hydrologic connectivity with the deeper intervals. In addition, the pumping at the Upjohn facility on Bishop Road, southeast of the Roto-Finish site, may influence groundwater flow direction at the Roto-Finish site. The relationship of the shallow, intermediate and deep potentiometric zones will be evaluated with respect to the conceptual geologic model and the remaining Phase III data.

Evaluation of the hydrologic performance of the site aquifer was made in September, 1992, through pumping tests conducted in TW1 (LTI, 1993). Testing of TW1 consisted of three variable rate pump tests and two 70 to 72 hour constant rate pump tests. The aquifer performance evaluation allowed the preliminary calculation of specific well capacity, aquifer transmissivity, aquifer storativity, and hydraulic conductivity. Estimated average hydraulic characteristics of the aquifer include:

- Specific Capacity of the Test Well - 10 gpm per foot of drawdown;
- Aquifer Transmissivity - 48,400 gpd/ft;
- Aquifer Storativity - 0.00077; and
- Hydraulic Conductivity - 48.2 to 138.9 ft/day.

The preliminary results of the pump tests indicate that the hydrologic character of the site conforms to a semi-confined leaky aquifer, with possible recharge affecting the pump test performance.

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3.0 RISK EVALUATION

A streamlined evaluation of the risks to human health from exposure to the chemicals identified at the site was performed in accordance with U.S.EPA guidance for conducting EE/CAs (EPA, 1993). The risk evaluation was performed for one exposure pathway that is relevant to the removal action by:

- comparing chemical concentrations detected at the site with standards that are potential chemical-specific applicable or relevant and appropriate requirements (ARARs) for the action,
- identifying the chemicals which exceed the standards, and
- presenting a summary of health effects associated with those chemicals.

The proposed action is limited to a reduction in the mass of chemical constituents in the groundwater at the site and a reduction in the volume of chemical constituents available for downgradient transport until the remedial investigation/feasibility study (RI/FS) is completed and a final remedy is selected and implemented. Other exposure pathways may also be relevant at the site and will be addressed in a complete baseline risk assessment prepared and submitted with the Remedial Investigation Report.

For the purposes of facilitating a streamlined risk evaluation, the exposure assessment only considered one pathway of possible exposures that could exist at the Roto-Finish site during the projected time period of the removal action:

- ingestion of groundwater from drinking water wells installed in the immediate vicinity of the site.

While no known operational wells currently exist at the Roto-Finish site or immediately adjacent properties and the area is supplied by the municipal drinking water system, it is conceivable that new wells could be installed. Therefore, it is possible that oral ingestion of groundwater could take place at or near the site in the future.

Health risks related to ingestion of groundwater at the site appear to be present based upon a comparison of the highest detected chemical concentrations (from samples collected between 1989 and the summer of 1993) with maximum contaminant levels (MCLs). MCLs are standards promulgated under the federal Safe Drinking Water Act and would be applicable for groundwater at the point of exposure (drinking water wells). Five chemicals exceeded the associated MCL values, based upon the highest concentrations detected in groundwater sample results as follows:

Chemical	Highest detected concentration (ug/l)	MCL (ug/l)
benzene	14	5
1,1-dichloroethene	480	7
1,1,1-trichloroethane	2700	200
trichloroethene	170	5
vinyl chloride	120	2

Exposure to the chemicals exceeding MCLs (through oral ingestion or other routes) could result in adverse health effects. Table 8 presents summary toxicity profiles, including acute, chronic, and carcinogenic effects on human health, for the five chemicals with sample concentrations exceeding MCLs. This table includes the most representative effects in the areas of acute and chronic toxicities, carcinogenicity, and other information pertinent to adverse health effects posed by each chemical.

4.0 REMOVAL ACTION ALTERNATIVES

As summarized in Chapter 2, the remedial investigations conducted to date have identified groundwater impacts beneath the Roto-Finish property and immediate downgradient areas. Existing data preliminarily indicate that constituent concentrations in groundwater diminish with distance from the site. The existing data are adequate to confidently characterize the conditions on-site. However, additional investigations are necessary and are being conducted to further characterize downgradient off-site conditions.

The preliminary risk evaluation results presented in Chapter 3 indicate that there are no complete exposure routes and therefore no known existing human health threats posed by the identified impacted groundwater beneath the Roto-Finish property. However, under a future scenario where water supply well(s) are installed immediately downgradient of the site, it is possible that applicable or relevant and appropriate requirements (such as MCLs) would be exceeded. Based upon this preliminary analysis, a remedial alternative other than no action may be selected as the final alternative for this site once the RI/FS is completed.

ITW, the respondent to the Roto-Finish site, has voluntarily proposed to implement a non-time-critical removal action to reduce the mass of chemical constituents in the groundwater at the site and reduce the volume of chemical constituents available for downgradient transport. The non-time-critical removal action would be operated over the period during which the RI/FS is completed, and until an final remedy for the site is selected and implemented.

4.1 REMOVAL ACTION OBJECTIVES

The goal of the proposed non-time-critical removal action is to reduce the mass of chemical constituents in the groundwater at the site and reduce the volume of chemical constituents available for downgradient transport in the areas of highest identified impacts. This goal is consistent with the relevant factors of the National Contingency Plan (40 CFR 300.415(b)(2)) that are to be considered in determining the appropriateness of a removal action. Specifically, the removal action objective is to reduce potential degradation to downgradient water supplies and potential exposure to nearby human populations from chemicals identified in groundwater beneath the Roto-Finish property, consistent with 40 CFR 300.415(b)(2)(i-ii).

The non-time-critical removal action proposed for this site is considered a temporary action and it is expected that the final selected remedy will ultimately address the entire area of concern. It is expected that the proposed non-time-critical removal action will not be

inconsistent with the final selected remedy, would, to the extent practicable, contribute to the efficient performance of any future remedial action as required by 40 CFR 300.415 (c), and would not interfere with an orderly transition to remedial action as required by 40 CFR 300.415 (f).

The proposed non-time-critical removal action at the Roto-Finish site is not subject to statutory limits on removal actions. The proposed removal action would not be Fund-financed or conducted under Section 104 (b) of CERCLA. Therefore the statutory limits (40 CFR 300.415 (b)(5)) that require that the action be terminated after $2 million has been obligated or 12 months have elapsed, do not apply.

4.2 REMOVAL SCOPE AND SPECIFIC OBJECTIVES

The scope of the proposed removal action is limited to reducing the mass of chemical constituents in the groundwater at the site and the volume of chemical constituents available for downgradient transport until a final remedy for the site is selected and implemented. The specific objective of the proposed removal action is therefore to establish a hydraulic capture zone in the areas of highest identified groundwater contamination through installation of a groundwater collection system. The highest identified chemical concentrations identified at the site are located beneath the Roto-Finish property.

To the extent practical and necessary, the proposed removal action would comply with applicable or relevant and appropriate requirements (ARARs). Total site cleanup is not an objective or within the scope of the proposed removal action, but rather will be addressed as part of the final selected remedy. As the proposed removal action is intended to temporarily abate the migration of chemical constituents in on-site groundwater through installation of a containment system, cleanup levels applicable to a remedial action do not apply to the removal action and therefore are not identified in this engineering evaluation/cost analysis (EE/CA).

4.3 GENERAL REMOVAL SCHEDULE

Consistent with the requirements of 40 CFR 300.415 (b)(3), the proposed removal action would begin as soon as possible after public comments are addressed and U.S.EPA selects the non-time-critical removal action in an Action Memorandum. The currently scheduled start time for the removal action is November , 1994. The start date is subject to change as it is influenced by the Agency's alternative selection and public comment processes and

weather conditions. It is anticipated that a removal action would take approximately one to four months to construct and would continue to operate until a final remedy for the site is selected and implemented.

4.4 IDENTIFICATION AND EVALUATION OF TECHNOLOGIES

Technologies suitable to conditions at the Roto-Finish site were identified based on the removal action objectives and current understanding of the groundwater conditions. Consistent with the U.S.EPA guidance for conducting EE/CAs for non-time critical removal actions (EPA, 1993), the full universe of available technologies was not evaluated in favor of evaluating only a limited set of technologies that have been demonstrated to be effective for sites with similar conditions. The identified technologies fall into the general response categories of Groundwater Collection. Treatment, and Discharge. Each technology identified was evaluated for engineering feasibility and implementability. A description of the technologies identified for each of the response categories are described below with a summary of the results of the evaluation for implementability.

4.4.1 Groundwater Collection Technologies

The area of highest concentrations of chemical constituents in groundwater have been identified in the vicinity of MWB2B, MW309 and MW310 near the west and northwest portion of the Roto-Finish site. Technologies identified that would potentially meet the primary objective of the proposed removal action to temporarily collect the groundwater in this area include:

1) Extraction wells - Groundwater collection would be achieved through continual pumping of on-site groundwater extraction wells. This technology is retained as it is both feasible and implementable.

2) Groundwater collection trenches - Groundwater would be collected in perimeter trenches/drain tiles. This technology is not retained. The vertical depth of groundwater impacts (>100 ft) at the Roto-Finish site render this technology infeasible.

4.4.2 Treatment Technologies

Pumping of the extraction wells to collect the groundwater beneath the Roto-Finish site will generate water that requires treatment prior to disposal. The type and degree of treatment required will depend upon the particular chemical constituents in the extracted water and the effluent limits that must be met prior to discharge of the water. The primary chemical constituents in the groundwater at the Roto-Finish site likely requiring treatment include volatile organic compounds (VOCs) and possibly the metals arsenic, zinc, and/or manganese. The chemical constituent concentrations measured to date at the Roto-Finish site are summarized in Chapter 2. Technologies considered for the treatment of the extracted groundwater include:

1) Off-site Treatment - Under this technology, the groundwater would be discharged directly to the Kalamazoo Water Reclamation Plant (KWRP) for treatment. The KWRP is an advanced waste water treatment plant capable of effectively treating all chemical constituents identified in the groundwater at the Roto-Finish site. The KWRP uses a Zimpro activated carbon system for polishing its effluent prior to discharge into the Kalamazoo River. The system has the design capacity and capability to effectively treat the water that will be generated at the Roto-Finish site. The City of Kalamazoo has communicated in writing that the quantity and quality of the groundwater will not pose a problem for treatment in their plant (see Appendix D). During the September, 1992 pump test at the Roto-Finish site, purge water and pump test water was accepted and treated by the KWRP. Because this water contained chemical concentrations similar to those expected to be present in the extracted groundwater at the site, it is anticipated that the KWRP will have no difficulty in effectively treating the extracted groundwater. In addition, as shown in Table 9, the highest concentrations of constituents in groundwater are well below the industrial pretreatment limits for the KWRP. A sanitary sewer discharge location is present on-site, allowing for immediate implementation without further analysis. The sanitary sewer which is expected to receive the discharge from the extraction wells is separate from the storm sewer system, so a wet weather cut-off system will not be necessary. This technology is retained for further consideration.

2) Carbon Adsorption - Organic compound concentrations in aqueous or gaseous phase can be reduced through adsorption onto granular activated carbon. This technology could also be used as a polishing step for other treatment such as air stripping to further reduce organic chemical concentrations or to reduce air emissions. Specific design parameters for this technology are dependent upon flow rates and chemical constituent concentrations. This technology is retained for further evaluation.

3) Air stripping - Volatile organic compound concentrations in groundwater can be reduced by mass transfer of the compounds from the aqueous phase to the gaseous phase. Forced air is mixed with the water by diffusers, tray aerators, or using a packed column; compounds volatilize from the water and are entrained in the air and emitted with the off-gases. The aqueous phase may require further treatment depending upon the effluent discharge limits, non-volatile constituents present, and efficiency of removal. Off-gases may require treatment to comply with air emissions ARARs. Specific design parameters are dependent upon flow rates and chemical constituent concentrations. This technology is retained for further evaluation.

4.4.3 Discharge Technologies

The water generated from the extraction wells will require disposal. The technologies available for the discharge of the water include:

1) Off-site wastewater treatment plant - The water would be conveyed by sanitary sewer to the Kalamazoo Water Reclamation Plant (KWRP). This technology was described in the previous section with the discussion of treatment technologies. This technology is retained for further analysis.

2) Recharge to groundwater - Treated water could be recharged to groundwater through injection wells, infiltration basins or infiltration galleries. This technology can be used to enhance reduction of chemical concentrations in groundwater by increasing the rate of migration to the extraction wells. This technology may require that chemical constituents in the extracted groundwater be treated to non-detect levels prior to discharge in order to comply with ARARs. This discharge option may require treatment for metals (arsenic and manganese) in addition to organic compounds depending upon quality of groundwater extracted from the wells and the effluent requirements. Pilot studies to determine actual concentrations in extracted groundwater would be necessary to evaluate treatment requirements and design. Recharge locations would have to be evaluated to ensure that the recharge does not cause an expansion of the area of groundwater impacts. Depending upon the location of the recharge, permits and easements may be required before implementing. Due to the time required for design evaluations and to obtain discharge permits and access agreements, this technology would not be consistent with the objectives and proposed scope and schedule of the non-time-critical removal action. For this reason, this technology is eliminated from further consideration.

3) Discharge to surface water - Treated water could be discharged to the Olmstead County drain, located approximately 4000 feet north of Roto-Finish

property. A force main or gravity sewer would be required to be constructed to transport water from the site to the drain. Access approval and easements from the adjacent airport and railroad would be required to install the transport line. This technology may require a NPDES discharge permit and discharged water would be required to meet effluent limits established. Extracted groundwater may have to be treated for metals (arsenic and zinc) in addition to organic compounds depending upon the actual concentrations in extracted groundwater and effluent limits. Pilot studies to determine actual concentrations in extracted groundwater would be necessary to evaluate treatment requirements and design. Due to the time required for design evaluations and to obtain discharge permits and access agreements, this technology would not be consistent with the objectives and proposed scope and schedule of the non-time-critical removal action. For this reason, this technology is eliminated from further consideration.

4.5 ALTERNATIVE DEVELOPMENT

Groundwater alternatives were developed by assembling the technologies in the three response categories that passed the initial screening. A total of three alternatives have been identified. These alternatives represent the viable permutations of the retained treatment options (off-site treatment, on-site treatment with air stripping, on-site treatment with carbon adsorption), combined with the retained discharge option (discharge to the sanitary sewer). The alternatives are grouped according to the treatment technology employed and described below.

4.5.1 Description of Alternatives

The selected alternatives are divided into three groups by treatment technology. The selected alternatives are:

1. Groundwater Extraction with Off-Site Treatment
2. Groundwater Extraction with On-Site Carbon Treatment and Discharge to Sanitary Sewer
3. Groundwater Extraction with On-Site Air Stripping and Discharge to Sanitary Sewer

Brief descriptions of the selected candidate alternatives are presented below.

Alternative 1: Groundwater Extraction with Off-site Treatment. Under this alternative, two extraction wells would be installed on the Roto-Finish property. Groundwater would be continuously extracted at a rate of 50 gpm from each of the recovery wells to establish a collection zone through the drawdown cones of influence from

the operating recovery wells. Two wells are proposed so that each extraction well can operate as a separate system, allowing continuous operation of one well should the other well require service. In addition, the two wells are anticipated to create a larger collection zone than a one-well system pumping at a comparable rate. The recovery wells would collect impacted groundwater within the collection zone and reduce the mass of chemical constituents in the groundwater and the volume of chemical constituents available for downgradient transport, therefore meeting the objective of the removal action. Extracted groundwater would be discharged directly to the City of Portage sanitary sewer system for conveyance to the City of Kalamazoo Water Reclamation Plant (KWRP) for treatment before discharging to the Kalamazoo River. The KWRP is an advanced waste water treatment plant capable of effectively treating all chemical constituents identified in the groundwater at the Roto-Finish site. The system has the design capacity and capability to effectively treat the water that will be generated at the Roto-Finish site. The City of Kalamazoo has communicated in writing that the quantity and quality of the groundwater will not pose a problem for treatment in their plant (see Appendix D). In addition, during the September, 1992 pump test at the Roto-Finish site, purge water and pump test water was accepted and treated by the KWRP. Because this water contained concentrations of chemical constituents similar to those detected in groundwater at the site, it is expected that the KWRP will have no difficulty in effectively treating the extracted groundwater. In addition, as shown in Table 9, the highest concentrations of constituents in groundwater are well below the industrial pretreatment limits for the KWRP. The sanitary sewer which is expected to receive the discharge from the extraction wells is separate from the storm sewer system, so a wet weather cut-off system will not be necessary.

Alternative 2: Groundwater Extraction with On-Site Carbon Treatment. Under this alternative, the extracted groundwater would be treated on site through activated carbon adsorption to remove organic compounds. Because of the flow to be generated by the extraction wells and the levels of compounds likely to be present, a single large-scale carbon vessel would be used. Pretreatment of the extracted groundwater may be necessary to optimize performance of the carbon. After treatment, the treated groundwater would be discharged to the City of Portage sanitary sewer for conveyance to the KWRP.

Alternative 3: Groundwater Extraction with On-Site Air Stripping. This alternative is similar to alternative 2, with the exception that air stripping is employed to treat the extracted groundwater, rather than carbon. Forced air is mixed with the water by diffusers, tray aerators, or using a packed column; compounds volatilize from the water and are entrained in the air and emitted with the off-gases. The aqueous phase may require further treatment depending upon the effluent discharge limits, non-volatile constituents present, and efficiency of removal. Off-gases may require treatment to comply with air emissions ARARs. For purposes of this evaluation, it is assumed that treatment of the off-gases and polishing of the aqueous effluent would not be required. After treatment, the treated groundwater would be discharged to the City of Portage sanitary sewer for conveyance to the KWRP.

As summarized below, the candidate alternatives were each evaluated for effectiveness, implementability, and cost, consistent with U.S.EPA guidance (EPA, 1993).

4.5.2 Alternative Effectiveness

The effectiveness of the three alternatives was evaluated with consideration of the following criteria:

- Overall Protection of Public Health and the Environment;
- Compliance with ARARs;
- Long-Term Effectiveness and Permanence;
- Reduction of Toxicity, Mobility or Volume Through Treatment; and
- Short-Term Effectiveness and Time Until Response Objectives are Achieved.

The evaluation of the alternatives under each of these criteria is summarized below.

Overall Protection of Human Health and the Environment. Within the scope of the proposed removal action, all alternatives would provide the same degree of overall protection of public health and the environment, as they are all projected to meet the removal action objectives and other evaluation criteria. The groundwater extraction from recovery wells would collect impacted groundwater, thereby reducing the mass of chemical constituents in the groundwater at the site and the volume of chemical constituents available for downgradient transport. No adverse public health effects of implementing any alternative were identified. As discussed further below, all alternatives are projected to comply with ARARs, result in a reduction of the toxicity, mobility, or volume of hazardous substances, and reduce the health risks associated with the impacted groundwater. In addition, all alternatives include treatment of the extracted groundwater and therefore are consistent with the CERCLA section 121 preference for alternatives that include treatment components over other approaches.

Compliance with ARARs. Section 300.415(i) of the NCP requires that removal actions attain ARARs under Federal or State environmental laws or facility siting laws, to the extent practicable considering the scope of the removal. The potential chemical-, location- and action-specific Federal ARARs and state ARARs are summarized below:

Federal Chemical Specific ARARs. The primary federal regulations that make up the chemical specific ARARs relate to surface water and groundwater and include:

- Clean Water Act (33 USC 1251);
- Safe Drinking Water Act (42 USC 300f); and
- Resource Conservation and Recovery Act of 1976 (RCRA, 42 USC 6901).

Chemical specific criteria for surface waters and maximum contaminant levels (MCLs) for groundwater have been developed under these laws that would apply to a removal action at the Roto-Finish site. All alternatives would meet the ambient water quality criteria developed under the CWA as discharges to surface waters would be treated and discharged in accordance with NPDES permits established under the framework of the CWA. As the removal action objectives are limited to temporary reduction of the mass of chemical constituents in the groundwater at the site and volume of chemical constituents available for downgradient transport, it is not within the scope of the removal action to attain groundwater MCLs.

Federal Location Specific ARARs. No location specific potential ARARs are applicable to the removal action and therefore each alternative would comply. In addition, because the action to be implemented on the Roto-Finish site would not include activities that could interfere with operations at the nearby Kalamazoo/Battle Creek Airport, there are no location specific Federal Aviation Administration (FAA) regulations that would apply. The major regulations comprising the location specific ARARs for CERCLA removal actions include: Resource Conservation and Recovery Act, National Historic Preservation Act, Clean Water Act, Wilderness Act, Fish and Wildlife Coordination Act, Scenic Rivers Act, National Archaeological and Historical Preservation Act, Endangered Species Act, Coastal Zone Management Act, Protection of Wetlands Executive Orders, Protection of Floodplains Executive Order, and the Marine Protection Resources and Sanctuary Act.

The removal action would not occur within floodplains, wetlands, active fault areas, underground disposal areas, wilderness areas, national wildlife refuges, or coastal areas. The Roto-Finish site does not contain endangered species, scientific or prehistoric artifacts, and is not included on the National Register of Historic Places. Therefore, none of the potential location specific ARARs identified above are applicable or relevant to the removal action.

Federal Action Specific ARARs. The action specific ARARs that would be applicable include those related to the treatment and disposal of the extracted groundwater under the Clean Water Act and RCRA. For Alternative 1, the groundwater would be discharged directly to the City of Kalamazoo in accordance with a control document. The City would in turn monitor, treat and discharge the water in accordance with their NPDES permit, and therefore compliance with the Clean Water Act would be achieved. The City would impose conditions to regulate the discharge of the groundwater from the site to the sanitary sewer in a control document. The control document would assure compliance with requirements of the Clean Water Act and the City's NPDES permit.

For Alternative 2, in addition to the action-specific ARARs listed above, requirements for the disposal of carbon from the on-site treatment plant would be applicable. For Alternative 3, it is likely that an acid wash of the air stripper would periodically be required to remove accumulated scale. The spent wash waters would require appropriate disposal. These ARARs would include RCRA disposal requirements for solid and possibly

hazardous wastes. Generator requirements such as proper labeling, manifesting, transport, and disposal requirements would be followed, and therefore all action-specific ARARs would be met.

State of Michigan ARARs. The potential State of Michigan ARARs stem from the following laws related to public health or environmental concerns:

- Hazardous Waste Management Act (Act 64, 1979);
- Liquid Industrial Waste Removal Act (Act 136, 1969);
- The Fire Prevention Act (Act 207, 1941);
- Underground Storage Tank Regulatory Act - (Act 423, 1984);
- Leaking Underground Storage Tank Act - (Act 478, 1988);
- Michigan Water Resources Commission Act (Act 245, 1929);
- Mineral Well Act (Act 315, 1969);
- Waterworks and Sewerage Systems Act (1913);
- Solid Waste Management Act (Act 641, 1978);
- Water Supply and Sewer Systems Act (Act 368, 1978);
- Michigan Compiled Laws - Section 257.722;
- Air Pollution Act (Act 348, 1965);
- Safe Drinking Water Act (Act 399, 1976);
- Soil Erosion and Sedimentation Control Act (Act 347, 1972);
- Environmental Response Act (Act 307, 1982);
- Wetlands Protection Act (Act 203, 1979);
- Natural River Act (Act 321, 1979);
- Endangered Species Act (Act 203, 1974); and

- Environmental Protection Act (Act 127, 1970).

Of these, the only potential state ARARs applicable to Alternative 1 include Act 245 rules as they apply to the discharge and subsequent treatment of the extracted groundwater under NPDES permits. As discussed above, Alternative 1 would comply with these ARARs by meeting requirements of the discharge control document with the City. Compliance with the cleanup criteria specified in Act 307 is not within the scope of the removal action, as it is a temporary action, but these potential ARARs would be be addressed by a final remedial action. In addition to the Act 245 potential ARARs, Alternatives 2 and 3 would comply with the requirements of Act 64 and Act 641, as they relate to disposal of wastes generated on site. Alternative 3 would generate emissions to the atmosphere, requiring compliance with Act 348. No alternative would be constructed in wetlands, create soil erosion, nor cause environmental or ecological damage to occur. Therefore, all alternatives would comply with state laws and regulations protecting public health and the environment, as applicable, or relevant and appropriate.

Long-Term Effectiveness and Permanence. The removal action would be a temporary action operating only until a final remedy is selected and implemented. All alternatives would reduce the mass of chemical constituents in groundwater and reduce the volume of chemical constituents available for downgradient transport. All alternatives for the removal action would, to the extent practicable, contribute to the effectiveness of the remedial action and therefore, in this capacity, would, to the extent practicable, contribute to the long-term effectiveness and permanence of the final remedy. It is anticipated that none of the alternatives would interfere with an orderly transition to the remedial action. Necessary post removal site control measures and risks from wastes or residuals remaining at the site after completion of the removal action would be addressed by the remedial action, and therefore are not considered further in this EE/CA.

Reduction of Toxicity, Mobility, Volume Through Treatment. All alternatives would reduce the mobility and volume of hazardous substances at the site by containing, collecting and treating the impacted groundwater. All alternatives would result in treatment of approximately 100 gpm of impacted groundwater through carbon adsorption or air stripping. Regeneration of the carbon for all alternatives would result in the destruction of adsorbed organic chemicals. The mass of chemicals destroyed is estimated to be less than 1 lb per day. All alternatives address the statutory preference for alternatives involving treatment components.

Short-Term Effectiveness and Time Until Response Objectives are Achieved. All alternatives are projected to provide short-term effectiveness by collecting impacted groundwater to reduce the mass of chemical constituents in the groundwater and to reduce the volume of chemical constituents available for downgradient transport. Based upon the pumping test results (LTI, 1993) it is estimated that the collection zone would be established within a day of the initiation of pumping. All alternatives call for groundwater extraction from two wells in the northwest corner of the property at a rate of approximately 50 gpm from each well. It is estimated that alternative one could be constructed within a 30 day time frame. Alternatives 2 and 3 would likely require 90 to 120 days.

None of the alternatives would result in any adverse effects on the public during implementation. Major removal activities such as well installation and operation would be conducted on Roto-Finish property, and therefore would not disrupt traffic or the surrounding community. The treatment and discharge systems would be closed systems resulting in no adverse effects on the surrounding community due to emissions or fugitive dust. Worker health and safety requirements would be enforced during the installation and operation of the system.

4.5.3 Implementability

The implementability of all alternatives was evaluated with consideration of technical and administrative feasibility, availability of services and materials, and state and community acceptance. All three alternatives are technically and administratively feasible within the stipulated schedule. Necessary services and materials (e.g. personnel, technologies, off-site treatment capacity, laboratory services, utility services, etc.) are readily available to implement all phases of these removal alternatives. It is anticipated that all alternatives would be acceptable to the state and community.

Regarding technical feasibility, all alternatives are subject to weather constraints during installation, (e.g. frozen or saturated ground may delay the installation of the system). However, once installed, all alternatives could be operated continuously, independent of weather. During the September, 1992 pump test, the sanitary sewer line handled up to 190 gpm, so it is expected that there will be adequate capacity in both the sanitary sewer lines and the KWRP to effectively convey and treat discharge waters. Alternatives 2 and 3 would be more difficult to implement than Alternative 1, as they require the installation of a treatment system and building to house the system, in addition to the extraction wells, piping and controls. However, the treatment systems proposed for Alternatives 2 and 3 are commonly used, and readily available.

All alternatives would be administratively feasible. No waivers of statutory limits would be necessary, as the statutory limits do not apply. The statutory limits do not apply

because the removal action would not be fund-financed and will not be conducted under Section 104(b) of CERCLA.

A building permit would be required for Alternatives 2 and 3, and all alternatives would require electrical permits. All alternatives would require the drafting of control documents from the City of Kalamazoo, and permits to connect the discharge lines to the sanitary sewer. There are no difficulties anticipated with obtaining any of the required permits or control documents. The City of Portage and the City of Kalamazoo have provided letters (Appendix D) indicating their receptiveness to receiving the discharge water.

All alternatives should be acceptable to the state and community. As discussed above, all alternatives would comply with applicable state ARARs within the scope of the removal action. It is anticipated that any of the alternatives would meet with state and community acceptance, in that all would provide immediate benefits, with no adverse effects.

4.5.4 Cost

The capital cost of Alternative 1 is estimated to be $51,000. The cost for annual operation and maintenance (O&M) is estimated to be $155,000 (including costs for periodic sampling of monitoring wells). The present worth (at 7% discount) of the removal alternative is $332,000, assuming 2 years of operation.

The capital cost for Alternative 2 is estimated to be $247,000. The cost for annual O&M is estimated to be $576,000 (including costs for periodic sampling of monitoring wells). The present worth (at 7% discount) of the removal alternative is $1,289,000, assuming 2 years of operation.

The capital cost for Alternative 3 is estimated to be $93,000. The cost for annual O&M is estimated to be $183,000 (including costs for periodic sampling of monitoring wells). The present worth (at 7% discount) of the removal alternative is $424,000, assuming 2 years of operation.

These cost estimates are summarized in Table 10. Cost estimate spreadsheets showing the basis for the cost estimates are provided in Appendix C.

4.5.5 Comparative Analysis of Alternatives

All alternatives considered in this EE/CA are similar in all aspects except for the treatment technology that would be employed. Alternatives 2 and 3 call for the on-site treatment of the extracted groundwater prior to discharging to the KWRP whereas Alternative 1 calls for the direct discharge of untreated groundwater to the KWRP. The KWRP is capable of treating all identified constituents identified in

the groundwater and would not require pre-treatment. As discussed above, all alternatives are projected to be as effective and implementable. The major differences between the alternatives are the degree of implementability and costs. Alternatives 2 and 3 are more difficult and costly to implement because of the additional design considerations, materials and services, and associated costs for installing and operating either of the on-site treatment systems. In addition, a per volume fee is levied by the City of Portage for discharge into their municipal sanitary sewer system (which connects to the KWRP) whether or not the groundwater is pretreated. No technical advantages or significant benefits have been identified for selecting Alternatives 2 or 3 over Alternative 1. All alternatives would meet the objectives and remain within the scope of the removal action.

4.6 SUMMARY OF THE EE/CA AND RECOMMENDED REMOVAL ACTION ALTERNATIVE

Since 1988, remedial investigations have been conducted at the Roto-Finish site under the direction of U.S.EPA and MDNR. Groundwater impacted with organic chemicals and metals have been identified at the site. The highest areas of impacted groundwater have been identified to be located beneath the Roto-Finish property. Potential source areas (waste water lagoons) were remediated prior to 1984. Investigations to determine the extent and distribution of chemical constituents in groundwater downgradient of the site are continuing to be conducted.

A preliminary risk evaluation (Chapter 3) did not identify any existing complete exposure routes, and therefore the site poses no known existing health threats. However, the concentrations of chemicals in groundwater beneath the Roto-Finish property exceed their respective MCLs and there is a potential for new wells to be installed at or near the site in the future. Therefore, upon completing the RI/FS, a remedial action other than no action may be selected as the final remedy for the site. As such, ITW, the respondent to the Roto-Finish site, has voluntarily proposed to proceed immediately with a non-time-critical action to reduce the mass of chemical constituents in the groundwater and to reduce the volume of chemical constituents available for downgradient transport until the RI/FS is completed and a final remedy for the site is selected and implemented.

As required by 40 CFR 300.415, an engineering evaluation and cost analysis of potential alternatives was conducted for the non-time-critical removal action. Three alternatives were identified that would meet the objectives and remain within the scope of the non-time-critical removal action. All alternatives were determined to meet the general criteria of effectiveness and implementability. The three candidate alternatives were comparatively

evaluated for effectiveness, implementability and cost with consideration of the following criteria:

- Overall protection of public health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility or volume through treatment;
- Short-term effectiveness;
- Technical feasibility;
- Administrative feasibility;
- Availability of services and materials; and
- State and community acceptance.

Based upon the engineering evaluation and cost analysis presented in the previous sections, Alternative 1 - Groundwater Extraction from Two On-site Recovery Wells and Discharge to the KWRP is the recommended alternative for immediate implementation. Alternative 1 would be as effective as and more implementable than alternatives 2 and 3. Alternative 1 would reduce the mass of chemical constituents in the groundwater at the site and reduce the volume of chemical constituents available for downgradient transport until the RI/FS for the site is completed and a final remedy is selected and implemented. Alternative 1 is projected to meet the objectives and evaluation criteria of the removal action. Alternatives 2 and 3 offer no significant benefit over Alternative 1; are more costly; and would not achieve any greater protection of human health and the environment.

The selected alternative would be implemented on an interim basis as a non-time-critical removal action and would be operated during the period which the RI/FS is completed and until a final remedy is selected and implemented. The alternative is projected to meet the stated objectives of the removal action which are to reduce the mass of chemical constituents in the groundwater at the site and reduce the volume of chemical constituents available for downgradient transport.

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TABLE 1
CHRONOLOGY OF INVESTIGATIONS
AT THE ROTO-FINISH SITE

May-September, 1979	Sampling of North and South Lagoons by MDNR
October, 1979-January,1980	Hydrogeological Investigation at Roto-Finish Site
October, 1980	Connection to Municipal Sewer Service
Fall, 1981	Excavation of North and South Lagoons
September-November, 1983	Supplemental Hydrogeological Investigation and Excavation of West (Buried) Lagoon
1986	Site Included on National Priorities List
January 4, 1988	Effective Date of Administrative Order by Consent Regarding Remedial Investigation and Feasibility Study
October, 1988	Submittal of Revised Phase I Remedial Investigation Workplans
March-June, 1989	Phase I Remedial Investigation Field Activities
January, 1990	Draft Phase I Remedial Investigation Report Submitted to EPA
June, 1991	Approval of Phase II Remedial Investigation Workplans
June-November, 1991	Phase II Remedial Investigation Field Activities
August, 1992	Approval of Phase III Remedial Investigation Workplans
September-October, 1992	Phase III Remedial Investigation - Pumping Test Field Activities
November, 1992	Submittal of Draft Technical Memorandum III.1 - Aquifer Performance Evaluation
February, 1993	Submittal of Validated Contract Laboratory Program Analytical Result Summarys for Phase I and Phase II Data
March, 1993	Submittal of Revised Technical Memorandum III.1 - Aquifer Performance Evaluation
April-June, 1993	Phase III Remedial Investigation - Off-site Investigation Field Activities
June, 1993	Submittal of Technical Memorandum III.2 - Preliminary Evaluation of Exploratory Well Data
October, 1993	Approval of Additional Phase III Remedial Investigation Off-site Field Activites

TABLE 2: METEOROLOGICAL DATA FOR KALAMAZOO COUNTY

PARAMETER	*KALAMAZOO COUNTY*
Average Temperature (Summer)*	69.8° F
Average Daily Maximum Temperature (Summer)*	81.3° F
Highest Recorded Temperature*	100° F
Average Temperature (Winter)*	28.7° F
Average Daily Minimum Temperature (Winter)*	20.9° F
Lowest Recorded Temperature*	-16° F
Total Annual Precipitation*	34.8 inches
Heaviest 24-hour Rainfall*	5.6 inches
Average Seasonal Snowfall*	73.1 inches
Average Relative Humidity at Dawn**	80%
Average Relative Humidity at Midday**	62%
Direction of Prevailing Winds**	southwest
Maximum Average Monthly Wind Speed**	11.7 mph

Notes:

* Reference: National Oceanic and Atmospheric Administration, 1989
**Reference: Austin, 1979
Averages contain data from 1951 to 1980

TABLE 3: SCREEN SETTINGS OF MONITORING WELLS
ROTOFINISH, Portage, MI

WELL I.D.	DATE DRILLED	SURFACE ELEVATION (FT)	DEPTH OF SCREEN INTERVAL* UPPER (FT)	DEPTH OF SCREEN INTERVAL* LOWER (FT)	ELEVATION OF SCREEN INTERVAL UPPER (FT)	ELEVATION OF SCREEN INTERVAL LOWER (FT)
MW-A1	3/13/89	861.65	40.00	45.00	821.65	816.65
MW-A2	4/3/89	858.86	31.09	36.09	827.77	822.77
MW-A3	4/7/89	860.54	43.00	48.00	817.54	812.54
MW-A4	4/4/89	865.33	45.25	50.25	820.08	815.08
MW-A5	4/4/89	862.26	39.34	44.34	822.92	817.92
MW-A6	4/5/89	859.93	39.47	44.47	820.46	815.46
MW-B1	6/20/91	859.38	60.50	63.50	798.88	795.88
MW-B2B	6/10/91	863.42	62.00	65.00	801.42	798.42
MW-B2A	7/1/91	862.84	33.00	36.00	829.84	826.84
MW-302	7/25/91	862.42	103.00	106.00	759.42	756.42
MW-B3A	10/10/91	858.50	40.00	43.00	818.50	815.50
MW-B3B	10/11/91	858.50	59.00	62.00	799.50	796.50
MW-B4A	10/25/91	860.80	41.00	44.00	819.80	816.80
MW-B4B	10/24/91	860.80	70.00	73.00	790.80	787.80
MW-B4C	10/14/91	860.80	101.50	104.50	759.30	756.30
MW-309	10/30/91	863.80	105.00	108.00	758.80	755.80
MW-310	10/28/91	864.10	81.50	84.50	782.60	779.60
TW-1	9/2/92	865.09	24.50	139.50	840.59	725.59
MW-B5A	4/29/93	858.15	41.50	44.50	816.65	813.65
MW-B5B	4/29/93	858.15	76.50	79.50	781.65	778.65
MW-B5C	4/28/93	858.15	104.50	107.50	753.65	750.65
MW-B6	5/7/93	865.40	111.50	114.50	753.90	750.90
MW-B7A	5/12/93	860.92	46.50	49.50	814.42	811.42
MW-B7B	5/12/93	860.92	76.50	79.50	784.42	781.42
MW-B7C	5/10/93	860.92	101.50	104.50	759.42	756.42
MW-B8	4/30/93	863.91	76.50	79.50	787.41	784.41
LG-1	5/1-3/91	854.40	134.00	179.00	720.40	675.40
KA-6	1986	871.03	33.00	38.00	838.03	833.03
KA-7	1986	871.03	67.00	72.00	804.03	799.03
KA-2	1986	864.53	29.00	34.00	835.53	830.53
KA-3	1986	864.53	89.00	94.00	775.53	770.53
KA-10	6/29/88	870.44	41.00	46.00	829.44	824.44
KA-4	1986	867.95	56.00	61.00	811.95	806.95
KA-5	1986	867.95	124.00	129.00	743.95	738.95
KA-13	7/5/88	870.91	50.00	55.00	820.91	815.91

NOTE:
MW-A, KA series wells have 5' screens; all other monitoring wells have 3' screens except LG-1 and TW-1
* measurement refers to the depth below ground level

TABLE 4: GROUND WATER VERTICAL GRADIENTS
(AUGUST 27, 1993 STATIC GROUNDWATER ELEVATION DATA)
ROTO-FINISH SITE, PORTAGE, MI

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB2A	shallow	828.34	842.55
MWB2B	intermediate	799.92	841.84
	difference—	28.42	0.71
	gradient (ft/ft)*—		0.0250

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MW-A5	shallow	820.42	842.06
MW-302	deep	757.92	842.37
	difference—	62.50	-0.31
	gradient (ft/ft)*—		-0.0050

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB3A	shallow	817.00	845.68
MWB3B	intermediate	798.00	845.28
	difference—	19.00	0.40
	gradient (ft/ft)*—		0.0211

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB4A	shallow	818.30	842.37
MWB4B	intermediate	789.30	842.25
	difference—	29.00	0.12
	gradient (ft/ft)*—		0.0041

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB4B	intermediate	789.30	842.25
MWB4C	deep	757.80	842.28
	difference—	31.50	-0.03
	gradient (ft/ft)*—		-0.0010

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB4A	shallow	818.30	842.37
MWB4C	deep	757.80	842.28
	difference—	60.50	0.09
	gradient (ft/ft)*—		0.0015

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB5A	shallow	815.65	840.43
MWB5B	intermediate	780.65	840.43
	difference—	35.00	0.00
	gradient (ft/ft)*—		0.0000

TABLE 4: GROUND WATER VERTICAL GRADIENTS
(AUGUST 27, 1993 STATIC GROUNDWATER ELEVATION DATA)
ROTO-FINISH SITE, PORTAGE, MI

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB5B	intermediate	780.65	840.43
MWB5C	deep	752.65	840.39
	difference—	28.00	0.04
	gradient (ft/ft)*—		0.0014

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB5A	shallow	815.65	840.43
MWB5C	deep	752.65	840.39
	difference—	63.00	0.04
	gradient (ft/ft)*—		0.0006

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB7A	shallow	813.42	841.02
MWB7B	intermediate	783.42	840.68
	difference—	30.00	0.34
	gradient (ft/ft)*—		0.0113

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB7B	intermediate	783.42	840.68
MWB7C	deep	758.42	840.62
	difference—	25.00	0.06
	gradient (ft/ft)*—		0.0024

Well Cluster	Relative Stratigraphic Location of Screen	Screen Center Elevation (ft)	Static Water Level Elevation (ft): 8/27/93
MWB7A	shallow	813.42	841.02
MWB7C	deep	758.42	840.62
	difference—	55.00	0.40
	gradient (ft/ft)*—		0.0073

* negative value indicates an upward gradient
positive value indicates a downward gradient

SHALLOW SCREEN (SW), INTERMEDIATE SCREEN (SW),
DEEP SCREEN (SW,S)

TABLE 5:

Chemicals Analyzed in Ground Water Samples: Frequency and Concentration Range

Rotofinish, Portage Michigan

(May, 1989 - May, 1993)

Chemicals	*Frequency of Detection**	*Range of Detection Limits (µg/l)*	*Range of Positively Detected Concentrations (µg/l)*
Inorganics			
Aluminum	2 / 39	21.4 - 378	130 - 892
Antimony	0 / 39	23 - 36	
Arsenic	8 / 39	1.2 - 50	1.5 - 26.7
Barium	39 / 39		10.8 - 279
Beryllium	0 / 39	0.5 - 2	
Cadmium	0 / 39	4 - 5	
Calcium	39 / 39		13200 - 259000
Chromium	4 / 39	3.8 - 7	4.3 - 5.5
Colbalt	10 / 39	5 - 12.4	6.6 - 23.2
Copper	16 / 39	3 - 20.2	4.2 - 16.7
Iron	25 / 39	7.7 - 175	54.5 - 2000
Lead	7 / 39	2 - 9	2 - 3.1
Magnesium	39 / 39		4910 - 66200
Manganese	39 / 39		8.1 - 1490
Mercury	1 / 39	0.2 - 0.2	0.24 - 0.24
Nickel	20 / 39	9 - 35	8.9 - 57.1
Potassium	31 / 39	1740 - 8040	1730 - 35000
Selenium	0 / 39	3 - 40	
Silver	0 / 39	4.9 - 8	
Sodium	38 / 39	11300 - 11300	3310 - 246000
Thallium	0 / 39	1.1 - 4	
Vanadium	3 / 39	3 - 11.3	3.4 - 5.4
Zinc	32 / 39	10.7 - 27.9	19.9 - 3930
Cyanide	2 / 39	10 - 21.8	15.3 - 15.9
Volatile Organics			
Chloromethane	0 / 49	10 - 120	
Bromomethane	0 / 49	10 - 120	
Vinyl Chloride	11 / 49	10 - 120	10 - 120
Chloroethane	4 / 49	10 - 120	5 - 79
Methylene Chloride	0 / 49	5 - 180	
Acetone	4 / 49	10 - 120	13 - 27
Carbon Disulfide	1 / 49	5 - 120	2 - 2
1,1-Dichloroethene	23 / 49	5 - 25	1 - 480
1,1-Dichloroethane	30 / 49	5 - 10	1 - 270
1,2-Dichloroethene (total)	20 / 49	5 - 120	1 - 130
Chloroform	1 / 49	5 - 120	44 - 44
1,2-Dichloroethane	1 / 49	5 - 120	1 - 1
2-Butanone	0 / 49	10 - 120	
1,1,1-Trichloroethane	30 / 49	5 - 10	5 - 2700
Carbon Tetrachloride	0 / 49	5 - 120	
Vinyl Acetate	0 / 6	10 - 10	
Bromodichloromethane	1 / 49	5 - 120	4 - 4
1,2-Dichloropropane	0 / 49	5 - 120	
cis-1,3-Dichloropropene	0 / 49	5 - 120	
Trichloroethene	22 / 49	5 - 25	2 - 170
Dibromochloromethane	0 / 49	5 - 120	
1,1,2-Trichloroethane	3 / 49	5 - 120	2 - 5
Benzene	1 / 49	5 - 120	14 - 14

TABLE 5:

Chemicals Analyzed in Ground Water Samples: Frequency and Concentration Range
Rotofinish, Portage Michigan
(May, 1989 - May, 1993)

Chemicals	*Frequency of Detection**	*Range of Detection Limits (µg/l)*	*Range of Positively Detected Concentrations (µg/l)*
Volatile Organics			
Trans-1,3-Dichloropropene	0 / 49	5 - 120	
Bromoform	0 / 49	5 - 120	
4-Methyl-2-Pentanone	0 / 49	10 - 120	
2-Hexanone	0 / 49	10 - 120	
Tetrachloroethene	12 / 49	5 - 83	1 - 25
1,1,2,2-Tetrachloroethane	0 / 49	5 - 120	
Toluene	7 / 49	5 - 120	1 - 40
Chlorobenzene	8 / 49	5 - 120	6 - 270
Ethylbenzene	3 / 49	5 - 120	2 - 17
Styrene	0 / 49	5 - 120	
Total Xylenes	2 / 49	5 - 120	2 - 24
Semi-Volatile Organics			
Phenol	9 / 39	10 - 10	2 - 40
bis (2-Chloroethyl) Ether	0 / 39	10 - 20	
2-Chlorophenol	0 / 39	10 - 10	
1,3-Dichlorobenzene	0 / 39	10 - 10	
1,4-Dichlorobenzene	1 / 39	10 - 10	2 - 2
Benzyl Alcohol	0 / 6	10 - 10	
1,2-Dichlorobenzene	3 / 39	10 - 10	2 - 27
2-Methylphenol	0 / 39	10 - 10	
2,2'-Oxybis(1-Chloropropane)	0 / 33	10 - 10	
bis (2-Chloroisopropyl) Ether	0 / 6	10 - 10	
4-Methylphenol	0 / 39	10 - 10	
N-Nitroso-Di-n-Propylamine	0 / 39	10 - 10	
Hexachloroethane	0 / 39	10 - 10	
Nitrobenzene	0 / 39	10 - 10	
Isophorone	0 / 39	10 - 10	
2-Nitrophenol	0 / 39	10 - 10	
2,4-Dimethylphenol	0 / 39	10 - 10	
Benzoic Acid	0 / 6		
bis (2-Chloroethoxy) Methane	0 / 39	10 - 10	
2,4-Dichlorophenol	0 / 39	10 - 10	
1,2,4-Trichlorobenzene	0 / 39	10 - 10	
Naphthalene	0 / 39	10 - 10	
4-Chloroaniline	0 / 39	10 - 10	
Hexachlorobutadiene	0 / 39	10 - 10	
4-Chloro-3-Methylphenol	0 / 39	10 - 10	
2-Methylnaphthalene	1 / 39	10 - 10	3 - 3
Hexachlorocyclopentadiene	0 / 39	10 - 10	
2,4,6-Trichlorophenol	0 / 39	10 - 20	
2,4,5-Trichlorophenol	0 / 39	20 - 50	
2-Chloronaphthalene	0 / 39	10 - 10	
2-Nitroaniline	0 / 39	10 - 50	
Dimethyl Phthalate	0 / 39	10 - 10	
Acenaphthylene	0 / 39	10 - 10	
2,6-Dinitrotoluene	0 / 39	10 - 10	
3-Nitroaniline	0 / 39	20 - 50	
Acenaphthene	0 / 39	10 - 10	

TABLE 5:

Chemicals Analyzed in Ground Water Samples: Frequency and Concentration Range

Rotofinish, Portage Michigan

(May, 1989 - May, 1993)

Chemicals	*Frequency of Detection**	*Range of Detection Limits (µg/l)*	*Range of Positively Detected Concentrations (µg/l)*
Semi-Volatile Organics			
2,4-Dinitrophenol	0 / 39	25 - 50	
4-Nitrophenol	1 / 39	10 - 50	1 - 1
Dibenzofuran	0 / 39	10 - 10	
2,4-Dinitrotoluene	0 / 39	10 - 10	
Diethylphthalate	0 / 39	10 - 10	
4-Chlorophenyl-phenylether	0 / 39	10 - 10	
Fluorene	0 / 39	10 - 10	
4-Nitroaniline	0 / 39	20 - 50	
4,6-Dinitro-2-Methylphenol	0 / 39	25 - 50	
N-Nitrosodiphenylamine (1)	0 / 39	10 - 10	
4-Bromophenyl-phenylether	0 / 39	10 - 10	
Hexachlorobenzene	0 / 39	10 - 10	
Pentachlorophenol	1 / 39	20 - 50	2 - 2
Phenanthrene	2 / 39	10 - 10	1 - 4
Anthracene	0 / 39	10 - 10	
Carbazole	0 / 33	10 - 10	
Di-n-Butylphthalate	0 / 39	10 - 10	
Fluoranthene	1 / 39	10 - 10	3 - 3
Pyrene	0 / 39	10 - 10	
Butylbenzylphthalate	0 / 39	10 - 10	
3,3'-Dichlorobenzidine	0 / 39	10 - 20	
Benzo (a) Anthracene	1 / 39	10 - 10	6 - 6
Chrysene	1 / 39	10 - 10	6 - 6
bis (2-Ethylhexyl) Phthalate	2 / 39	10 - 18	43 - 47
Di-n-Octyl Phthalate	2 / 39	10 - 10	15 - 17
Benzo (b) Fluoranthene	1 / 39	10 - 10	5 - 5
Benzo (k)Fluoranthene	1 / 39	10 - 10	6 - 6
Benzo (a) Pyrene	1 / 39	10 - 10	4 - 4
Indeno (1,2,3-cd) Pyrene	1 / 39	10 - 10	2 - 2
Dibenzo (a,h) Anthracene	0 / 39	10 - 10	
Benzo (g,h,i) Perylene	1 / 39	10 - 10	3 - 3
MOCA**	0 / 39	0.2 - 1	

* Number of samples in which the chemical was positively detected over the number of samples analyzed.

** 4,4'-Methylenebis 2-Chloro-aniline

TABLE 6: SUMMARY TOXICITY PROFILES OF SELECTED CHEMICALS

CHEMICAL	ACUTE TOXICITY SUMMARY	CHRONIC TOXICITY SUMMARY	CANCER POTENTIAL	OTHER
Benzene	Acute exposures (inhalation) to high levels of benzene may lead to depression of the central nervous system, unconsciousness, and death or may cause fatal cardiac arrhythmias.	Major toxic effect is hematopoietic toxicity (affects formation of blood); chronic exposure of workers to low levels has been associated with blood disorders, such as leukemia and aplastic anemia (depression of all three cell types of the blood in the absence of functioning marrow).	Sufficient evidence that benzene is a human and animal carcinogen; strong correlation between exposure to benzene by inhalation and leukemia.	Chromosomal aberrations in bone marrow and blood have been reported in experimental animals and some workers.
1,1-Dichloroethene	Liver appears to be principal target. Biochemical changes and necrosis in liver in fasted rats have been reported to develop rapidly after inhalation. Liver damage in fasted rats can occur after one oral dose. At high concentration, inhalation of 1,1-DCE can cause central nervous system depression in humans and unconsciousness.	Described as "exquisite hepatotoxin" because it is more potent and faster acting than classic hepatotoxin, carbon tetrachloride. Kidney injury can also occur at relatively low doses. Report of health effects on workers exposed to 1,1-DCE include liver function abnormalities, headaches, vision problems, weakness, fatigue, and neurological sensory disturbances.	One group of investigators reported an increase incidence of kidney tumors in mice exposed by inhalation and possibly mammary tumors in rats. Tumor initiator activity in mouse skin following several treatments with phorbol as promoter has been described.	Structure similar to vinyl chloride, a known human carcinogen; mutagenic in bacterial tests; may be fetotoxic in laboratory animals.
1,1,1-Trichloroethane	Trichloroethane is a CNS depressant and may impair psychophysiological functions. Human fatalities have been reported following deliberate inhalation or occupational exposures; lung congestion was found.	Exposure by inhalation can produce liver damage in mice and affects drug metabolism in liver of rats.	Mutagenic in some in vitro tests.	
Trichloroethene (TCE)	Exposure to TCE can cause depression of the CNS, including dizziness, headaches, incoordination similar to that induced by alcohol, nausea, vomiting, and unconsciousness.	Long-term inhalation exposure can affect liver and kidneys in animals. In humans, changes in liver enzymes have been associated with TCE exposure.	Exposure of mice (orally and by inhalation) and rats have produced increases in liver or lung or kidney tumors.	"Degreasers flush" has been described in TCE-exposed workers who consume alcohol.

TABLE 6: SUMMARY TOXICITY PROFILES OF SELECTED CHEMICALS (CONTINUED)

CHEMICAL	ACUTE TOXICITY SUMMARY	CHRONIC TOXICITY SUMMARY	CANCER POTENTIAL	OTHER
Vinyl Chloride	Acute occupational exposure to high concentrations of vinyl chloride can produce symptoms of narcosis in humans. Respiratory tract irritation, bronchitis, headache, irritability, memory disturbances, and tingling sensations may also occur. Deaths have been reported. In animals, ataxia, narcosis, blood clotting difficulties, congestion and edema in lungs, and kidney and liver effects have been demonstrated. At high doses excitement, contractions, convulsions, and an increase in respiration followed by respiratory failure precede death.	Human health effects associated with chronic occupational exposure to vinyl chloride include hepatitis-like liver changes, decreased blood platelets, enlarged spleens, decreased pulmonary function, acroosteolysis (sometimes with Raynaud-like syndrome) sclerotic syndrome, thrombocytopenia, cardiovascular and gastrointestinal toxicity, and disturbances in vision and in the CNS. In laboratory animals, liver and kidney toxicity may be severe and histopathological changes in lung and spleen may also occur with vinyl chloride exposure.	Vinyl chloride is a known human carcinogen causing liver angiosarcomas (a very rare tumor in humans) and possibly increasing incidence of tumors of the brain, lung, and hemolymphopoietic system in humans. Vinyl chloride is carcinogenic in mice, rats, and hamsters.	Vinyl chloride is mutagenic in several test systems Chromosome aberrations have been reported in exposed workers In humans, possible relationships between exposure and birth defects and fetal death have been reported Possible increased fetal mortality among wives of occupationally exposed workers has been debated Increased skeletal variants were found in offspring of mice exposed during gestation

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40 CFR 141:25720-34. July 8, 1987. EPA, Drinking Water.

TABLE 7:

Maximum Detected Concentrations vs. Likely KWRP
Industrial Pretreatment Discharge Requirements
Roto-Finish Site, Portage, Michigan

Parameter	Roto-Finish Highest Detected Concentration (ug/L)	Parameter	KWRP Industrial Pretreatment Limit (ug/L)
Total VOCs	<2500	VOCs	no limit
Dissolved Cadmium	<5	Total Cadmium	40
Dissolved Chromium	5.5	Total Chromium	4670
Dissolved Copper	16.7	Total Copper	2230
Dissolved Lead	3.1	Total Lead	110
Dissolved Nickel	57.1	Total Nickel	1590
Dissolved Zinc	3930	Total Zinc	5300
Dissolved Cyanide	15.9	Total Cyanide	250

KWRP Kalamazoo Water Reclamation Plant
VOCs: Volatile Organic Compounds

TABLE 8: Summary of Estimated Costs for Removal Action Alternatives

Treatment Option		Discharge Option KWRP
No Treatment		
Direct Capital Cost		$35,000
Indirect Capital Costs	*Engineering (10%)*	$4,000
	Overhead & Profit (10%)	$4,000
	Contingency (25%)	$9,000
Direct Operation & Maintenance Costs		$107,000
Indirect Operation & Maintenance Costs	*Engineering (10%)*	$11,000
	Overhead & Profit (10%)	$11,000
	Contingency (25%)	$27,000
Total for Operating Life of System, at Given Discount Rate:		$332,000
Carbon Adsorption		
Direct Capital Cost		$170,000
Indirect Capital Costs	*Engineering (10%)*	$17,000
	Overhead & Profit (10%)	$17,000
	Contingency (25%)	$43,000
Direct Operation & Maintenance Costs		$397,000
Indirect Operation & Maintenance Costs	*Engineering (10%)*	$40,000
	Overhead & Profit (10%)	$40,000
	Contingency (25%)	$99,000
Total for Operating Life of System, at Given Discount Rate:		$1,289,000
Air Stripping		
Direct Capital Cost		$64,000
Indirect Capital Costs	*Engineering (10%)*	$6,000
	Overhead & Profit (10%)	$6,000
	Contingency (25%)	$16,000
Direct Operation & Maintenance Costs		$126,000
Indirect Operation & Maintenance Costs	*Engineering (10%)*	$13,000
	Overhead & Profit (10%)	$13,000
	Contingency (25%)	$32,000
Total for Operating Life of System, at Given Discount Rate:		$424,000

NOTE: Assumes an operating life of 2 years and a 7% discount rate.

FIGURES

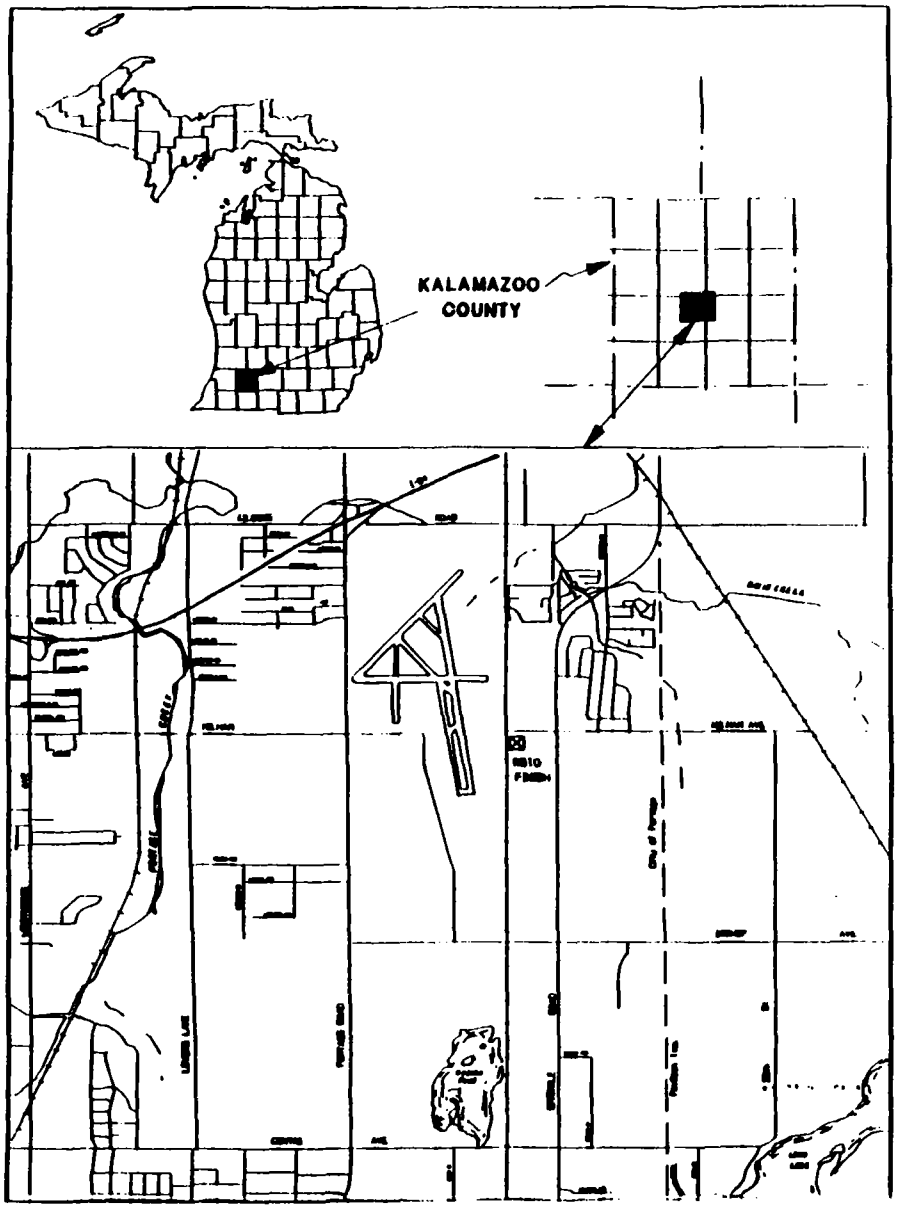


FIGURE 1

LOCATION OF ROTO-FINISH

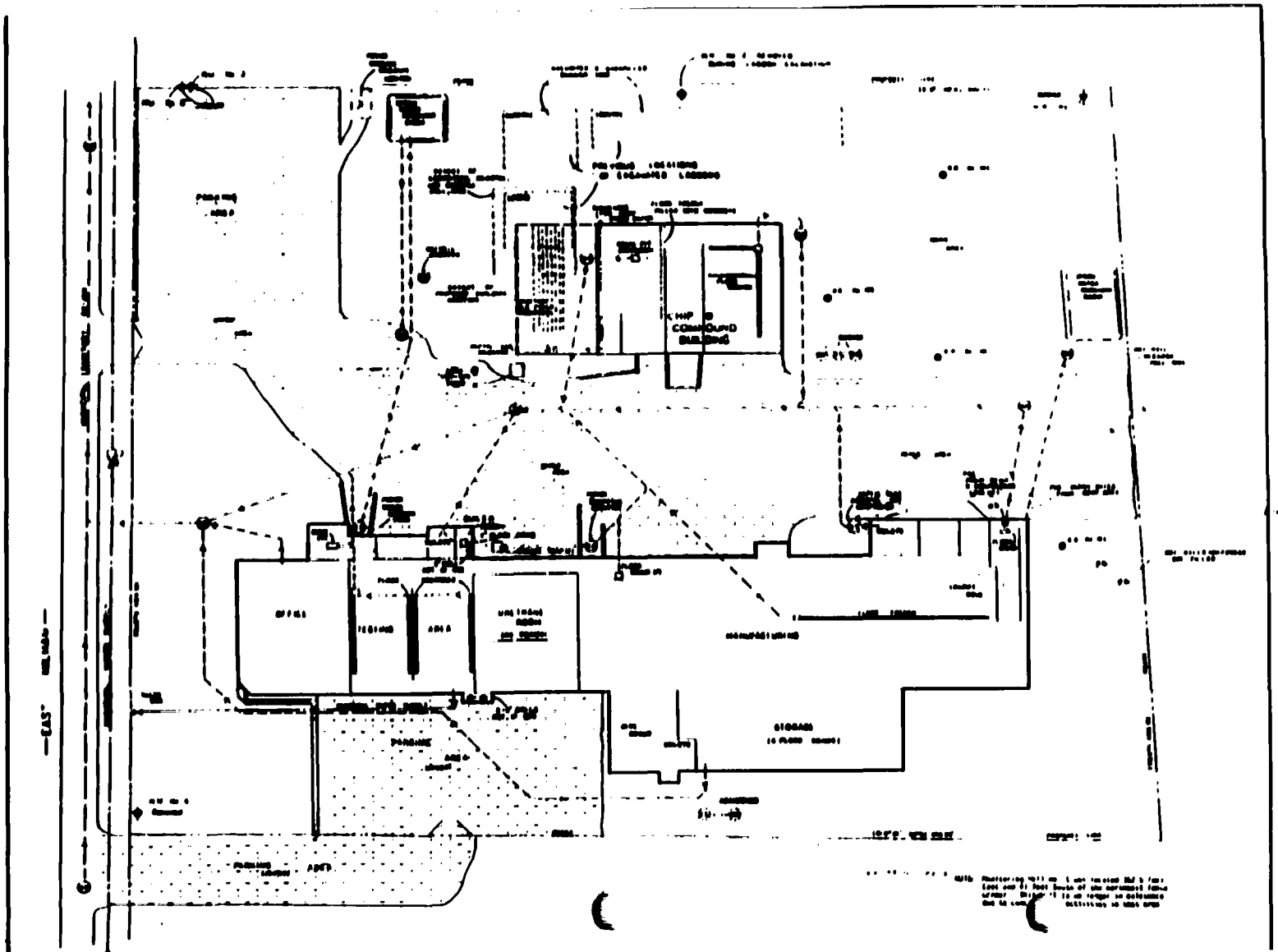


FIGURE 2

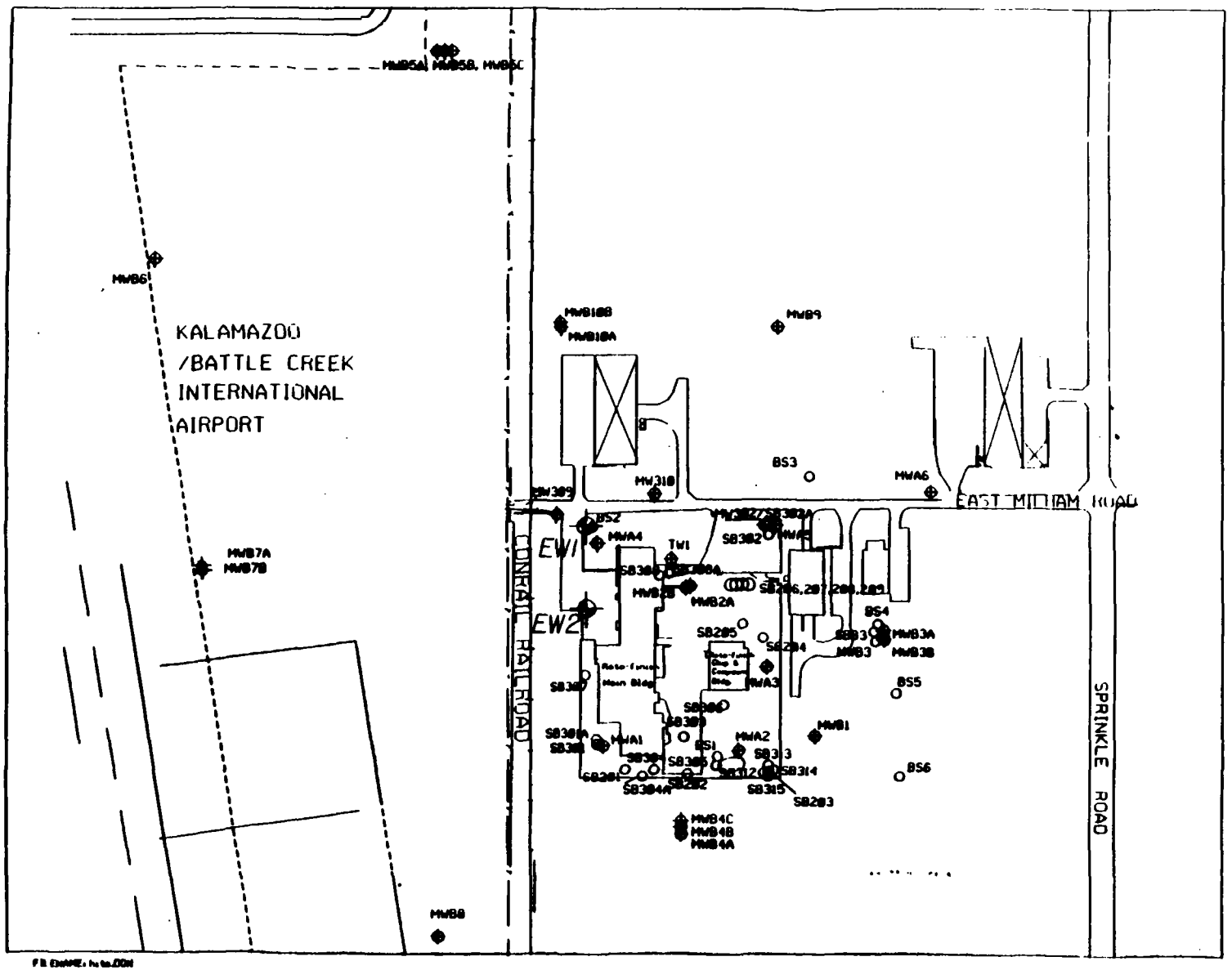
SITE PLAN

OF

ROTO-FINISH COMPANY, INC

KALAMAZOO, MICHIGAN

LTI Limno Tech Inc



N

W E

S

0 100 200 Ft

SCALE 1"=100'

Legend

- Monitoring Well Location
- Soil Boring Location
- Proposed Extraction Well Location

ROTO-FINISH SITE

PORTAGE MICHIGAN

FIGURE 3
EXISTING AND PROPOSED
WELL AND BORING
LOCATIONS

LTI-Limno Tech,Inc.
Environmental Engineering
2395 Huron Parkway, Ann Arbor, MI 48104

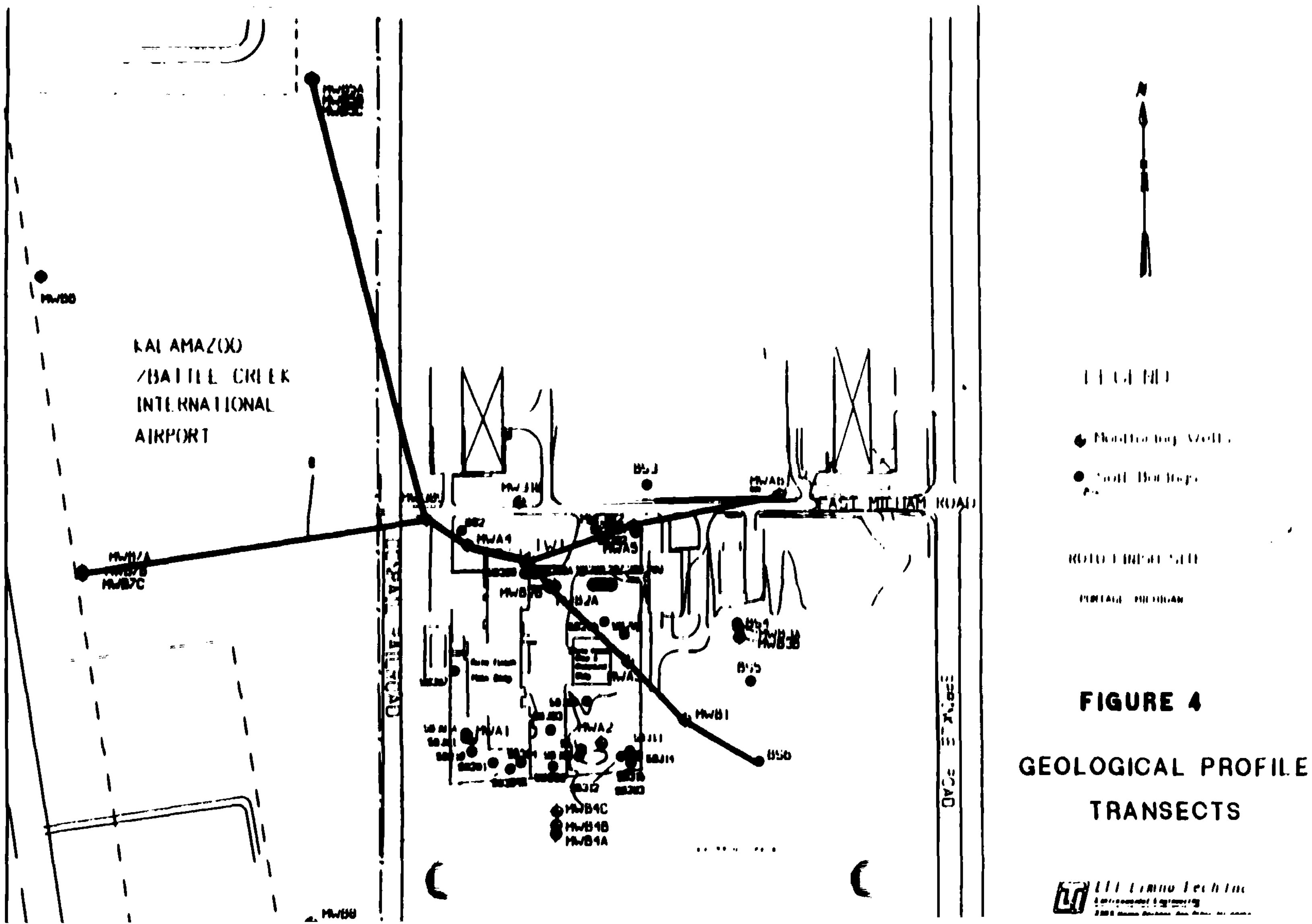
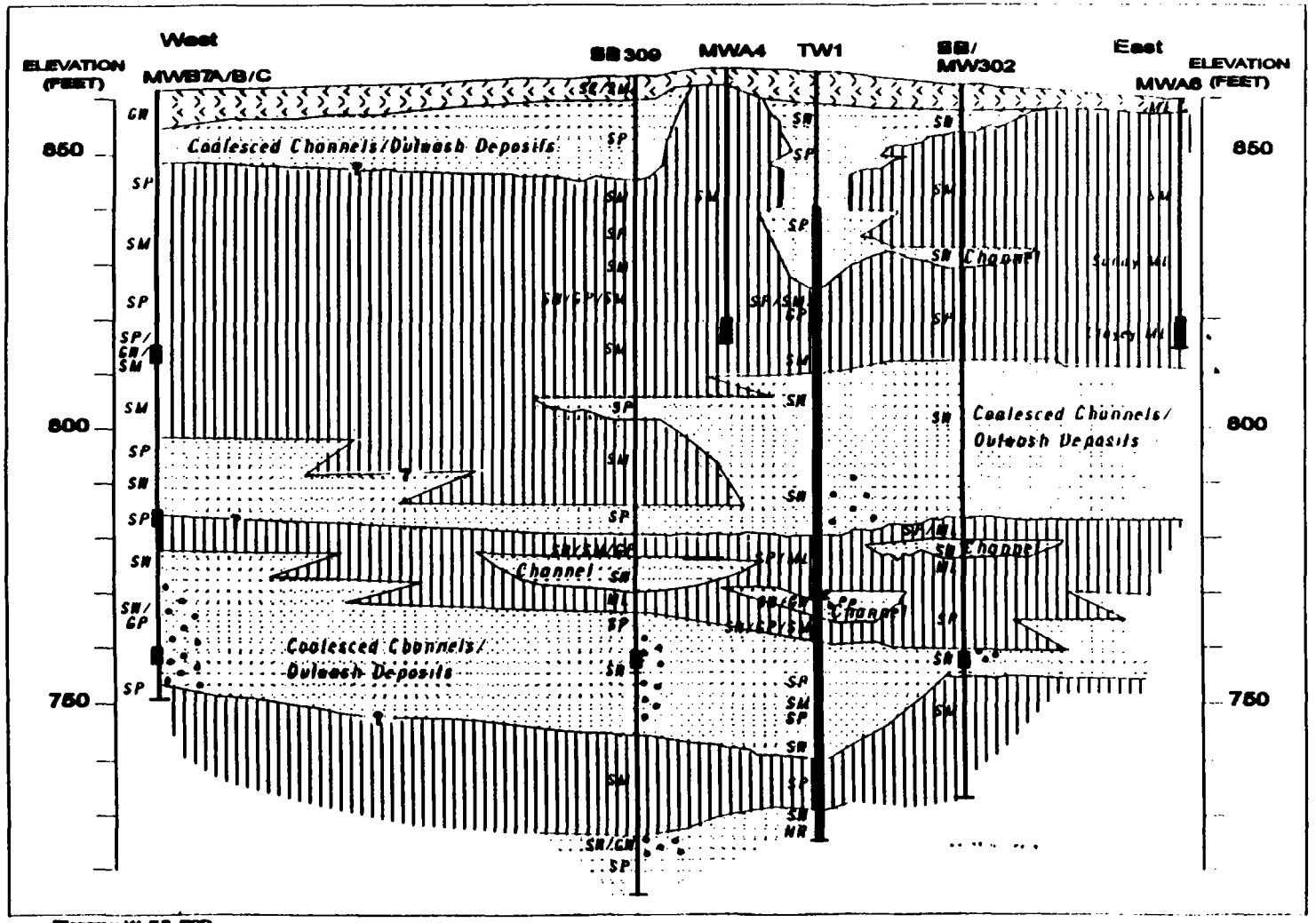


FIGURE 4

GEOLOGICAL PROFILE TRANSECTS

LTI Limno-Tech, Inc.



SCALE

0 100 (FT)

10 (FT)

LEGEND

- FILL
- Gravel
- Outwash Deposits
- Moraine Deposits
- Well Screen

Note: 1 Cross section is generalized based upon depositional environment

2 Unified Soil Classification System symbols are listed at the left side of boring and represent formation materials observed beyond trace amounts

GP: Gap-graded or uniform gravels, sandy gravels
GW: Well-graded gravels, sandy gravels
SP: Gap-graded or uniform sands, gravelly sands
SW: Well-graded gravelly sands
SM: Silty sands, silty gravelly sands
SC: Clayey sands, clayey gravelly sands
ML: Silts
CL: Clays, sandy or silty clays

ROTOFINISH SITE

PORTAGE MICHIGAN

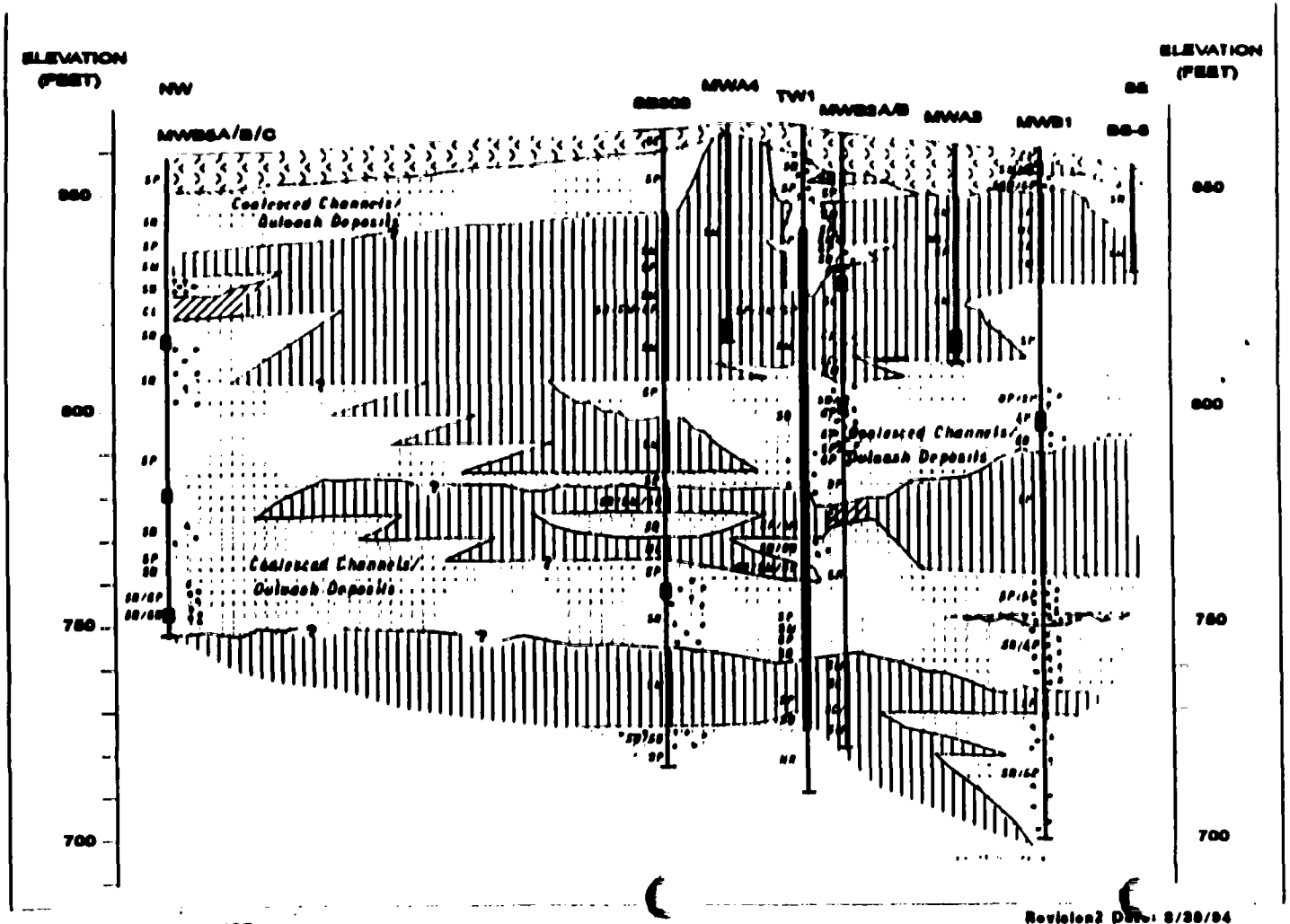
FIGURE 5

WEST – EAST GEOLOGICAL PROFILE

LTI-Limno-Tech, Inc.

Filename: W_ES .FOD

Revision2 Date: 8/30/96



SCALE

0 100 ft

10 ft

LEGEND

- FM
- Gravel
- Outwash Deposits
- Moraine Deposits
- Well Screen

Note: 1. Strata variation in general direction based upon depositional environment.

2. Unified Soil Classification system symbols are listed at the left side of boring and represent formation materials observed beyond these points.
   GP. Gap graded or uniform gravels, sandy gravels
   GW. Well graded gravels, sandy gravels
   SP. Gap graded or uniform sands, gravelly sands
   SW. Well graded gravelly sands
   SM. Silty sands, silty gravelly sands
   SC. Clayey sands, clayey gravelly sands
   ML. Silts
   CL. Clays, sandy or silty clays

ROTOFINISH SITE

PORTAGE MICHIGAN

FIGURE 8

NORTHWEST – SOUTHEAST GEOLOGICAL PROFILE

LTI-Limno-Tech, Inc.
Environmental Engineering
2395 Huron Parkway, Ann Arbor, MI 48104

Filename: NW_SE3.FCD

Revision2 Date: 8/30/94
Revision1 Date: 8/27/93

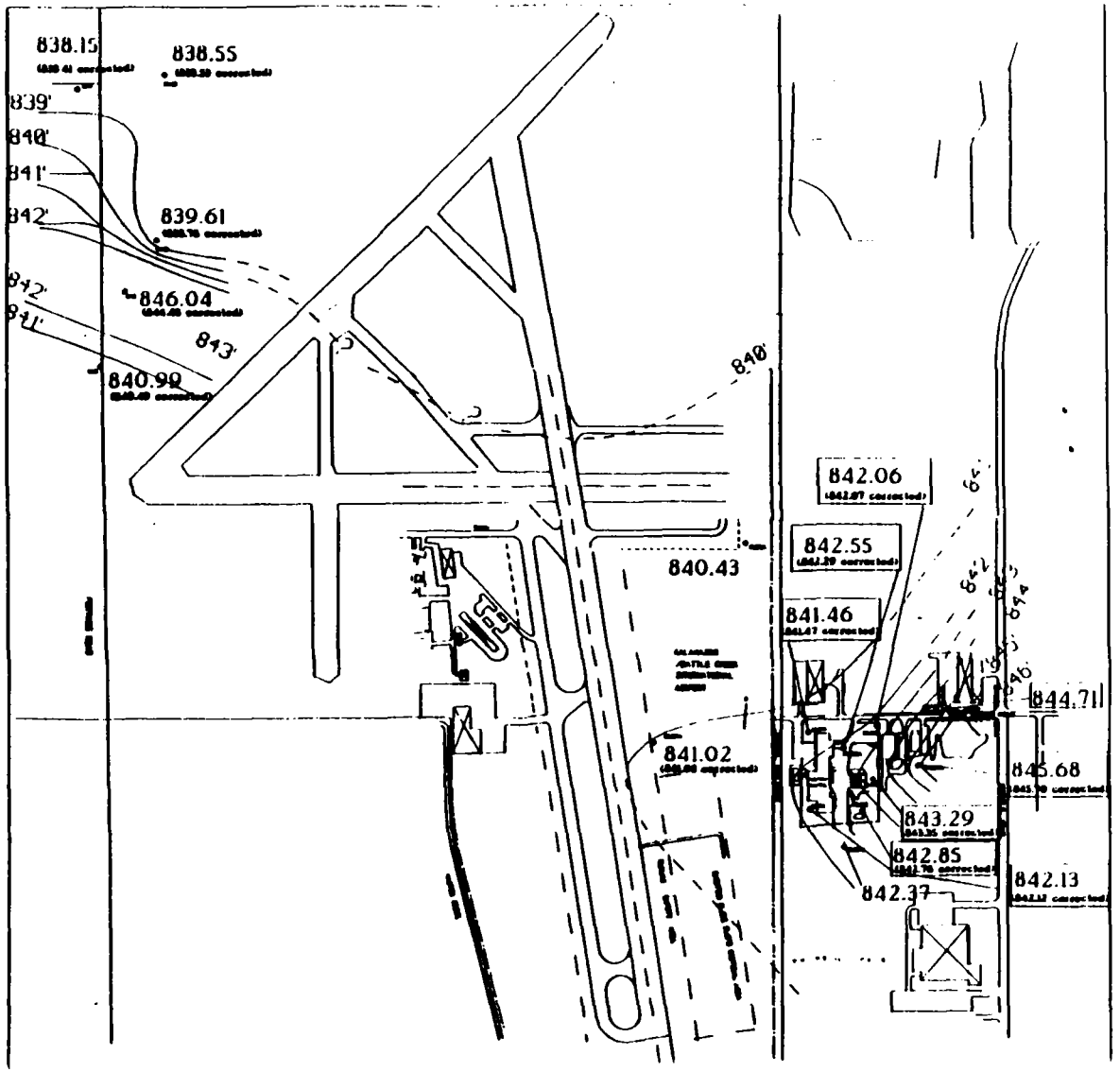
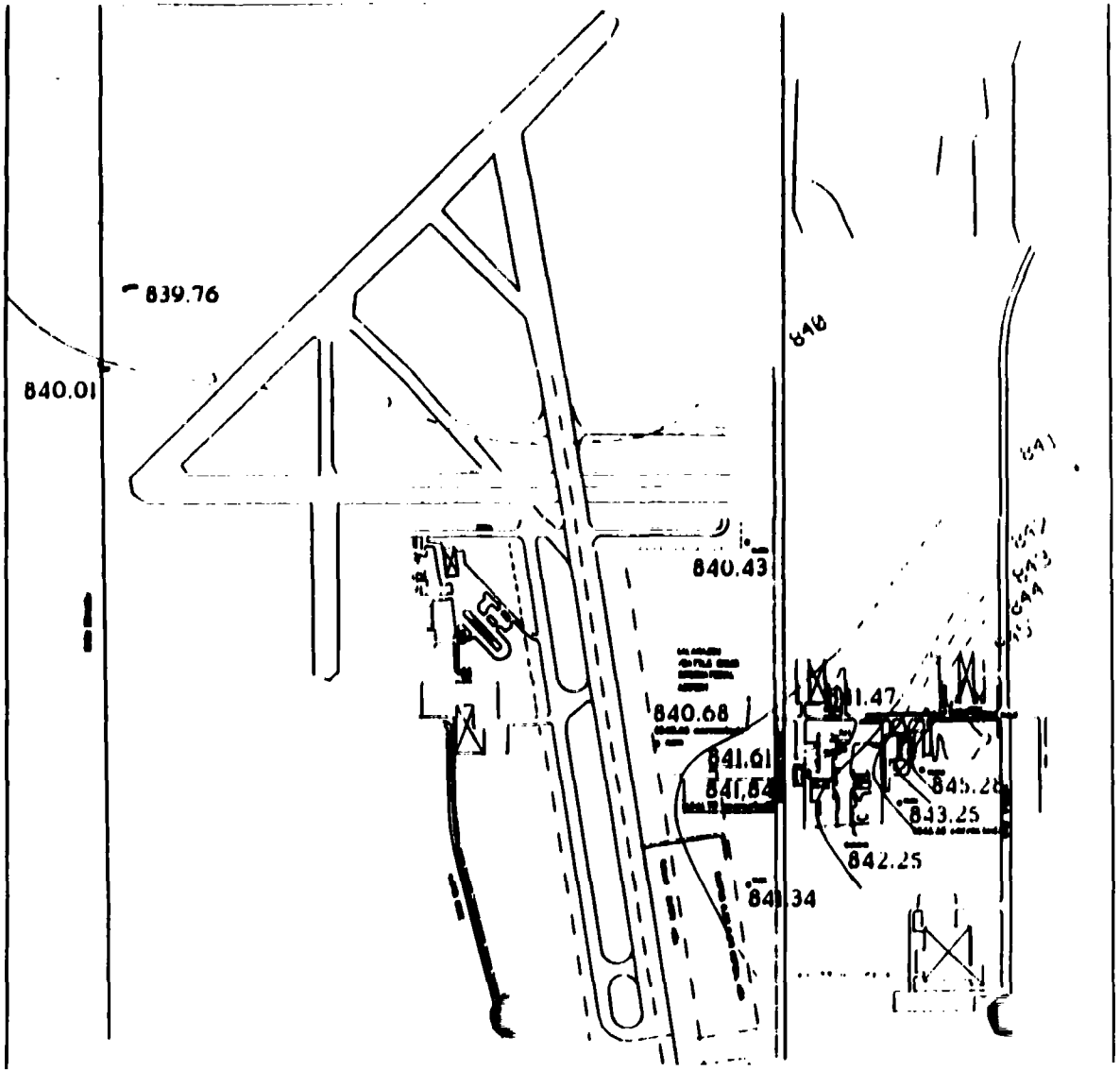


Figure 7

Ground Water Contour Map
from Shallow Screen
Readings
(August 27, 1993)

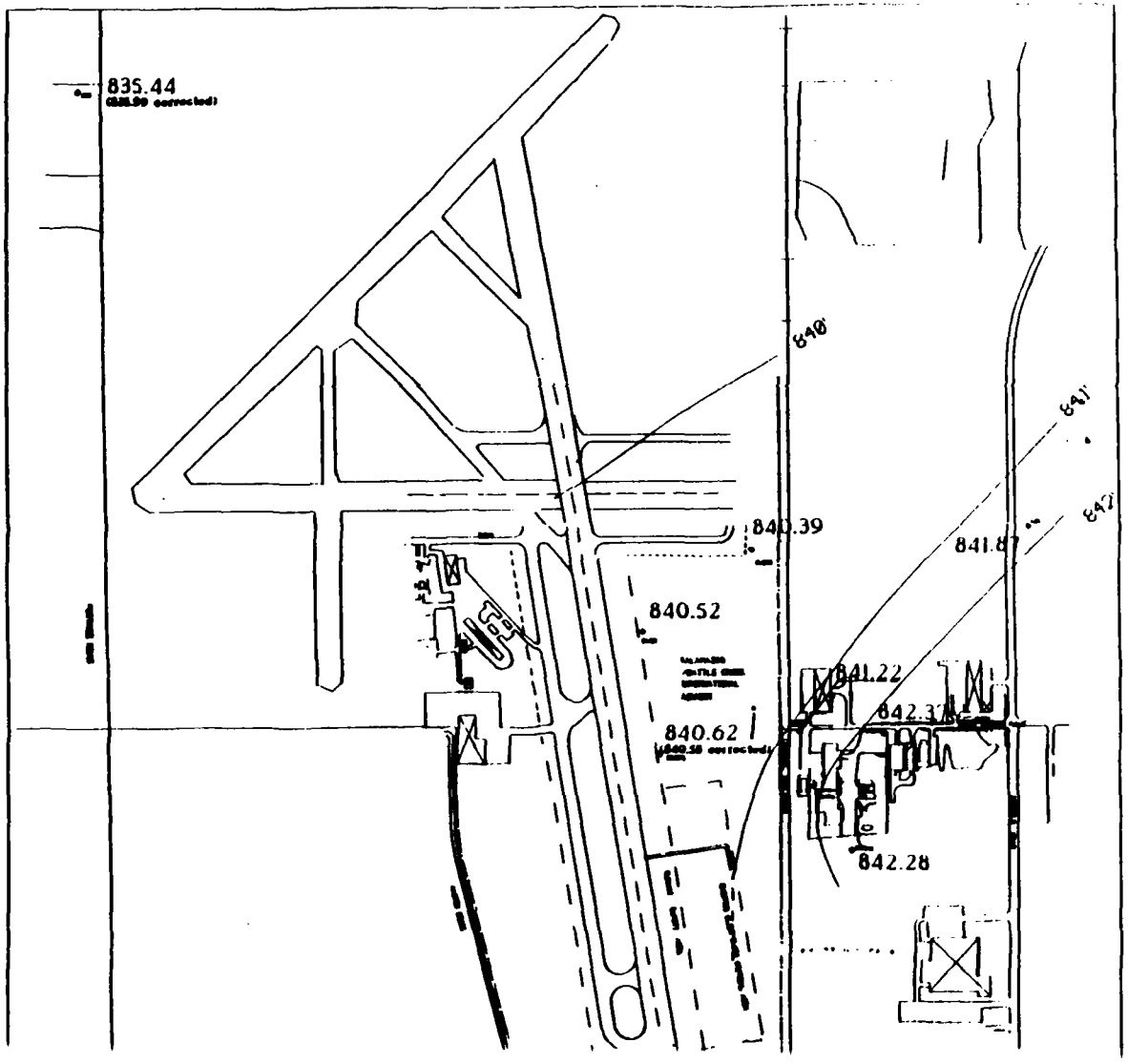
LFI Enviro Technic



N

Figure 8

Ground Water Contour Map
from Intermediate Screen
Readings
(August 27, 1993)



N.

ROTO FINISH SITE

PORTAGE MICHIGAN

Figure 9

Ground Water Contour Map
from Deep Screen
Readings
(August 27, 1993)

LTI Limno Tech Inc

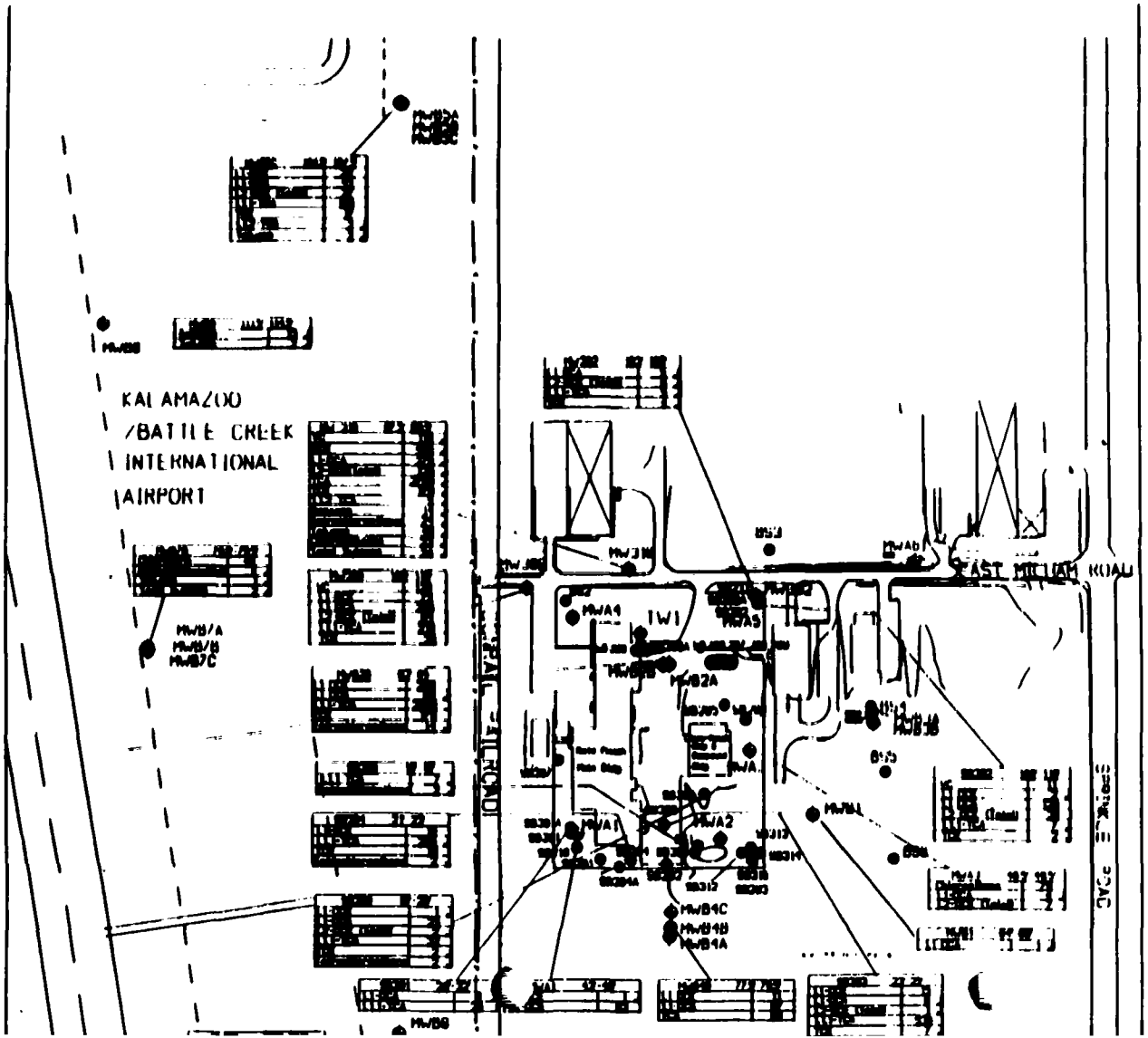


FIGURE 10

HIGHEST VOC LEVELS DETECTED IN EACH SOIL BORING/ MONITORING WELL (µg/L) (MAY, 1989 - MAY, 1993)

APPENDIX A

Summary of Soil Sample Results

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	MWA1	MWA1-dup	MWA1	MWA2	MWA2-dup	MWA2	MWA3	MWA3
Sample Depth	0.5'-4.5'	0.5'-4.5'	4.5'-10.5'	0.5'-4.5'	0.5'-4.5'	6.5'-10.5'	2'-6'	13'-17'
Date Collected	3/31/89	3/31/89	3/31/89	4/3/89	4/3/89	4/3/89	4/7/89	4/7/89
INORGANICS (mg/kg)								
Aluminum	6470	1310	8010	7190	5190	3980	2710	2540
Antimony	9.4 UJ	8.9 UJ	9.4 UJ	9.9 UJ	9.9 UJ	9.8 UJ	12.7 UJ	14.9 UJ
Arsenic	4.4	8.9	6.3	4.3	4.6	5.6	0.56	2.7
Barium	39	8.8	38.8	40.8	54.2	25.3	16.6	15.4
Beryllium	0.41	0.25 U	0.36	0.27 U	0.45	0.27 U	0.26 U	0.26 U
Cadmium	0.87 U	0.82 U	0.87 U	0.91 U	0.91 U	0.91 U	0.86 U	0.85 U
Calcium	15900	22000	3090	942	12800	3440	441 J	46000 J
Chromium	12.1	4.7	14.00	10.1	9.1	11.9	4	6.3
Cobalt	3.7 U	1.1 U	8.7	6.5 U	5.0 U	4.8 U	1.1 U	2.3
Copper	21.8	11.8	14.6	8.5	15.9	18.2	3.8 U	13.5
Iron	11300	5750	14900	10700 J	8350 J	9470 J	2690	5950
Lead	7.9	7.8	5.9	5.9	5.7	1.00	1.6	2.4
Magnesium	10900	9650	3880	1490	4170 J	1880	514	13600
Manganese	384 J	142 J	422 J	333 J	442 J	277 J	35.7	140
Mercury	0.1 U	0.1 U	0.1 U	0.12 U	0.12 U	0.11 U	0.1 U	0.11 U
Nickel	14.7	7.3 U	15.6	10.3	8.1 U	11.7	7.7 U	7.5 U
Potassium	1070 U	1010 U	2060	1120 U	1120 U	1120 U	1080 U	1050 U
Selenium	0.29 UJ	0.29 UJ	0.3 UJ	0.31 UJ	0.32 UJ	0.33 UJ	0.31 UR	0.29 UR
Silver	1.2 U	1.1 U	1.2 U	1.3 U	1.3 U	1.3 U	1.2 U	1.2 U
Sodium	640 U	607 U	960 U	841 UJ	673 U	715 UJ	647 U	630 U
Thallium	0.38 U	0.38 U	0.39 U	0.4 U	0.42 U	0.42 U	0.4 UJ	0.37 UJ
Vanadium	11.3	4.3 U	20.6	15.9	12.4	10.8	7.1 U	10.5 U
Zinc	43.6	35.7	51.3	39.5 J	52.3 J	42.1 J	15.9	23.5
Cyanide	1.1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.1 U
VOLATILE ORGANICS (ug/kg)								
Chloromethane	12 U	11 U	11 U	12 UJ	11 UJ	11 UJ	11 UJ	11 UJ
Bromomethane	12 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U
Vinyl Chloride	12 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U
Chloroethane	12 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U
Methylene Chloride	23 UJ	16 UJ	16 UJ	12 U	11 U	11 U	15 U	11 U
Acetone	59 UJ	45 UJ	32 UJ	12 UJ	11 UJ	14 UJ	11 UJ	11 UJ
Carbon Disulfide	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
1,1-Dichloroethene	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
1,1-Dichloroethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
1,2-Dichloroethene (total)	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
Chloroform	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
1,2-Dichloroethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
2-Butanone	12 UR	11 UR	11 UR	12 U	11 U	11 U	11 UJ	11 UJ
1,1,1-Trichloroethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
Carbon Tetrachloride	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
Vinyl Acetate	12 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U
Bromodichloromethane	6 U	6 U	5 U	6 UJ	6 UJ	5 UJ	6 U	5 U
1,2-Dichloropropane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
cis-1,3-Dichloropropene	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
Trichloroethene	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
Dibromochloromethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
1,1,2-Trichloroethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
Benzene	6 U	6 U	5 U	6 UR	6 U	5 U	6 U	5 U
Trans-1,3-Dichloropropene	6 U	6 U	5 U	6 UJ	6 UJ	5 UJ	6 U	5 U
Bromoform	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
4-Methyl-2-Pentanone	12 U	11 U	11 U	12 U	11 U	11 U	11 UJ	11 UJ
2-Hexanone	12 U	11 U	11 U	12 U	11 U	11 U	11 UJ	11 UJ
Tetrachloroethene	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
1,1,2,2-Tetrachloroethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
Toluene	6 U	6 U	5 U	6 UR	6 U	5 U	6 U	5 U
Chlorobenzene	6 U	6 U	5 U	6 UR	6 U	5 U	6 U	5 U
Ethylbenzene	6 U	6 U	5 U	6 UR	6 U	5 U	6 U	5 U
Styrene	6 U	6 U	5 U	6 UR	6 U	5 U	6 U	5 U
Total Xylenes	6 U	6 U	5 U	6 UR	6 U	5 U	6 U	5 U

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

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(MASTER_S.XLS)

Well ID	MWA1	MWA1-dup	MWA1	MWA2	MWA2-dup	MWA2	MWA3	MWA3
Sample Depth	0.5-4.5	0.5-4.5	4.5-10.5	0.5-4.5	0.5-4.5	6.5-10.5	2-6	13-17
Date Collected	3/31/89	3/31/89	3/31/89	4/3/89	4/3/89	4/3/89	4/7/89	4/7/89
SEMI-VOLATILE ORGANICS (µg/kg)								
Phenol	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
bis (2-Chloroethyl) Ether	360 U	360 U	350 U	360 UJ	370 UJ	350 UJ	370 U	360 U
2-Chlorophenol	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
1,3-Dichlorobenzene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
1,4-Dichlorobenzene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Benzyl Alcohol	360 UJ	360 UJ	350 UJ	360 U	370 U	350 U	370 U	360 U
1,2-Dichlorobenzene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
2-Methylphenol	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
2,2'-Oxybis(1-Chloropropane) bis (2-Chloroisopropyl) Ether	360 UJ	360 UJ	350 UJ	360 UJ	370 UJ	350 UJ	370 U	360 U
4-Methylphenol	360 U	360 U	350 U	360 U	370 UJ	350 UJ	370 U	360 U
N-Nitroso-Di-n-Propylamine	360 UJ	360 UJ	350 UJ	360 UJ	370 UJ	350 UJ	370 U	360 U
Hexachloroethane	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Nitrobenzene	360 UJ	360 UJ	350 UJ	360 UJ	370 UJ	350 UJ	370 UJ	360 U
Isophorone	360 UJ	360 UJ	350 UJ	360 UJ	370 U	350 U	370 U	360 U
2-Nitrophenol	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
2,4-Dimethylphenol	360 U	360 U	350 U	360 UJ	370 U	350 U	370 UJ	360 U
Benzoic Acid	1900 U	1800 U	1700 U	1900 UJ	1800 UJ	1700 UJ	1800 U	1800 U
bis (2-Chloroethoxy) Methane	360 U	360 U	350 U	360 UJ	370 U	350 U	370 U	360 U
2,4-Dichlorophenol	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
1,2,4-Trichlorobenzene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Naphthalene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	53 J
4-Chloroaniline	360 UJ	360 UJ	350 UJ	360 UJ	370 UJ	350 UJ	370 U	360 U
Hexachlorobutadiene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
4-Chloro-3-Methylphenol	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
2-Methylnaphthalene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Hexachlorocyclopentadiene	360 U	360 U	350 U	360 U	370 U	350 U	370 UJ	360 U
2,4,6-Trichlorophenol	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
2,4,5-Trichlorophenol	1800 U	1800 U	1700 U	1800 U	1800 U	1700 U	1800 U	1800 U
2-Chloronaphthalene	360 U	360 U	350 U	360 UJ	370 U	350 U	370 U	360 U
2-Nitroaniline	1900 UJ	1800 UJ	1700 UJ	1900 UJ	1800 UJ	1700 UJ	1800 U	1800 U
Dimethyl Phthalate	360 U	360 U	350 U	360 UJ	370 U	350 U	370 U	360 U
Acenaphthylene	360 U	360 U	350 U	360 UJ	370 U	350 U	370 U	360 U
2,6-Dinitrotoluene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
3-Nitroaniline	1900 U	1800 U	1700 U	1900 U	1800 U	1700 U	1800 U	1800 U
Acenaphthene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
2,4-Dinitrophenol	1900 U	1800 U	1700 U	1900 U	1800 U	1700 U	1800 UJ	1800 U
4-Nitrophenol	1900 UJ	1800 UJ	1700 UJ	1900 U	1800 U	1700 U	1800 UJ	1800 U
Dibenzofuran	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
2,4-Dinitrotoluene	360 U	360 U	350 U	360 UJ	370 U	350 U	370 U	360 U
Diethylphthalate	360 U	360 U	350 U	360 UJ	370 U	350 U	370 U	360 U
4-Chlorophenyl-phenylether	360 UJ	360 UJ	350 UJ	360 U	370 U	350 U	370 U	360 U
Fluorene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
4-Nitroaniline	1900 UJ	1800 UJ	1700 UJ	1900 UJ	1800 UJ	1700 UJ	1800 UJ	1800 U
4,6-Dinitro-2-Methylphenol	1900 U	1800 U	1700 U	1900 UJ	1800 U	1700 U	1800 U	1800 U
N-Nitrosodiphenylamine (1)	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
4-Bromophenyl-phenylether	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Hexachlorobenzene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Pentachlorophenol	1900 U	1800 U	1700 U	1900 U	1800 U	1700 U	1800 U	1800 U
Phenanthrene	360 U	360 U	350 U	360 U	370 UJ	350 UJ	370 U	96 J
Anthracene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Carbazole								
Di-n-Butylphthalate	360 UJ	360 UJ	350 UJ	360 UJ	370 UJ	350 UJ	370 U	360 U
Fluoranthene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	63 J
Pyrene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	49 J
Butylbenzylphthalate	360 UJ	360 UJ	350 UJ	360 U	370 U	350 U	370 U	360 U
3,3'-Dichlorobenzidine	360 U	700 U	700 U	770 U	750 UJ	690 UJ	730 UJ	730 U
Benzo (a) Anthracene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U
Chrysene	360 U	360 U	350 U	360 U	370 U	350 U	370 U	360 U

Well ID	MWA1	MWA1-dup	MWA1	MWA2	MWA2-dup	MWA2	MWA3	MWA3
Sample Depth	0.5'-4.5'	0.5'-4.5'	4.5'-10.5'	0.5'-4.5'	0.5'-4.5'	6.5'-10.5'	2'-6'	13'-17'
Date Collected	3/31/89	3/31/89	3/31/89	4/3/89	4/3/89	4/3/89	4/7/89	4/7/89
SEMI-VOLATILE ORGANICS (µg/kg)								
bis (2-Ethylhexyl) Phthalate	390 U	380 U	50 U	310 U	700	240 U	370 U	360 U
Di-n-Octyl Phthalate	390 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
Benzo (b) Fluoranthene	390 U	380 U	350 U	380 U	370 U	350 U	370 UJ	360 UJ
Benzo (k)Fluoranthene	390 UJ	380 UJ	350 UJ	380 U	370 U	350 U	370 UJ	360 UJ
Benzo (a) Pyrene	390 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
Indeno (1,2,3-cd) Pyrene	390 U	380 U	350 U	380 UJ	370 UJ	350 UJ	370 UJ	360 UJ
Dibenzo (a,h) Anthracene	390 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
Benzo (g,h,i) Perylene	390 U	380 U	350 U	380 U	370 UJ	350 UJ	370 U	360 U
MOCA**	121 U	191 U	141 U	60 U	60 U	60 U	60 U	50 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
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Well ID	MWA3	MWA4	MWA4	MWA4	MWA5	MWA5	MWA5-dup	MWA6
Sample Depth	17-21'	0.5-4.5'	6.5-10.5'	10.5-12.5'	0.5-3.5'	5.5-10.5'	5.5-10.5'	0.5-4.5'
Date Collected	4/7/89	4/4/89	4/4/89	4/4/89	4/3/89	4/3/89	4/3/89	4/5/89
INORGANICS (mg/kg)								
Aluminum	3100	1530	8140	2660	7460	11000	3710	7000
Antimony	13.1 UJ	8.6 UJ	10 UJ	9.2 UJ	10.6 UJ	10.5 UJ	9.1 UJ	9.8 UJ
Arsenic	2.8	1.8	61.2	3.1	3.4	5.4	2.5	8.3 J
Barium	17.0	9.4	145	11.9	137	109	15.6	34
Beryllium	0.25 U	0.24 U	1.4	0.25 U	0.29 U	0.48	0.25 U	0.65
Cadmium	0.85 U	0.79 U	0.92 U	0.85 U	0.98 U	0.97 U	0.85 U	0.9 U
Calcium	44800 J	347	20400	43000	5450	2010	501	492
Chromium	6.0	5.2	16.8	4.3	12.1	13.3	7.0	14.4
Cobalt	2.7	3.4 U	16.0	4.00 U	8.5	9.3 U	3.3 U	5.3
Copper	33.5	4.5	10.9	8.1	16.0	8.9	11.2	31.3 J
Iron	6700	4280 J	46800 J	6880 J	11100 J	14300 J	6410 J	16300
Lead	2.6	1.9	4.5	10.7	10.0	11.2	2.8	3.2 J
Magnesium	14800	738	7100 J	15200 J	3120 J	2180	1440	1730
Manganese	154	142 J	2580 J	146 J	824 J	625 J	161 J	508
Mercury	0.1 U	0.1 U	0.12 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U
Nickel	7.5 U	7 U	33.3	7.5 U	9.1	11.4	8.5	
Potassium	1040 U	976 U	1130 U	1040 U	1210 U	1200 U	1040 U	1110 U
Selenium	1.5 UJ	0.29 UJ	3.1 UJ	0.3 UJ	1.7 UJ	1.0 UJ	0.29 UJ	1.5 UJ
Silver	1.2 U	1.1 U	1.3 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U
Sodium	624 U	670 UJ	775 UJ	999 UJ	730 U	717 U	623 U	695 U
Thallium	0.39 UJ	0.37 U	0.4 U	0.38 U	0.44 U	0.43 U	0.38 U	0.39 U
Vanadium	11.1 U	5.6 U	97.4	7.9	18.2	22.8	8.9	16.8
Zinc	34.2	17.9 J	82.5 J	32.7 J	52.5 J	46.9 J	24.3 J	48.7
Cyanide	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.1 U
VOLATILE ORGANICS (ug/kg)								
Chloromethane	11 UJ	11 UJ	11 UJ	10 U	11 UJ	11 UJ		11 UJ
Bromomethane	11 U	11 U	11 U	10 U	11 U	11 U		11 U
Vinyl Chloride	11 U	11 U	11 U	10 U	11 U	11 U		11 U
Chloroethane	11 U	11 U	11 U	10 UJ	11 U	11 U		11 U
Methylene Chloride	11 U	11 U	13 U	12 U	11 U	35 U		14 U
Acetone:	11 UJ	11 UJ	13 UJ	10 U	11 UJ	100 UJ		52 UJ
Carbon Disulfide	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,1-Dichloroethene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,1-Dichloroethane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,2-Dichloroethene (total)	5 U	6 U	5 U	5 U	6 U	5 U		U
Chloroform	5 U	6 U	5 U	5 U	6 U	5 U		U
1,2-Dichloroethane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
2-Butanone	11 UJ	11 U	11 UJ	10 U	11 U	11 UJ		11 UJ
1,1,1-Trichloroethane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Carbon Tetrachloride	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Vinyl Acetate	11 U	11 U	11 U	10 U	11 U	11 U		11 U
Bromodichloromethane	5 U	6 UJ	5 U	5 U	6 UJ	5 U		6 U
1,2-Dichloropropane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
cis-1,3-Dichloropropene	5 U	6 U	5 UJ	5 U	6 U	5 U		6 U
Trichloroethene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Dibromochloromethane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,1,2-Trichloroethane	5 U	6 U	5 UJ	5 UJ	6 U	5 U		6 U
Benzene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Trans-1,3-Dichloropropene	5 U	6 UJ	5 U	5 U	6 UJ	5 U		6 U
Bromoform	5 U	6 U	5 U	5 U	6 U	5 U		6 U
4-Methyl-2-Pentanone	11 UJ	11 U	11 UJ	10 U	11 U	11 UJ		11 UJ
2-Hexanone	11 UJ	11 U	11 UJ	10 U	11 U	11 UJ		11 UJ
Tetrachloroethene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,1,2,2-Tetrachloroethane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Toluene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Chlorobenzene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Ethylbenzene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Styrene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Total Xylenes	5 U	6 U	5 U	5 U	6 U	5 U		6 U

Well ID	MWA3	MWA4	MWA4	MWA4	MWA5	MWA5	MWA5-dup	MWA6
Sample Depth	17'-21'	0.5'-4.5'	6.5'-10.5'	10.5'-12.5'	0.5'-3.5'	5.5'-10.5'	5.5'-10.5'	0.5'-4.5'
Date Collected	4/7/89	4/4/89	4/4/89	4/4/89	4/3/89	4/3/89	4/3/89	4/5/89
SEMI-VOLATILE ORGANICS (µg/kg)								
Phenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
bis (2-Chloroethyl) Ether	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
2-Chlorophenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
1,3-Dichlorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
1,4-Dichlorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Benzyl Alcohol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
1,2-Dichlorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
2-Methylphenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
2,2'-Oxybis(1-Chloropropane)								
bis (2-Chloroisopropyl) Ether	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
4-Methylphenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
N-Nitroso-Di-n-Propylamine	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
Hexachloroethane	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Nitrobenzene	360 UJ	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 UJ
Isophorone	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
2-Nitrophenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
2,4-Dimethylphenol	360 UJ	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
Benzoic Acid	1800 U	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1700 UJ		1800 UJ
bis (2-Chloroethoxy) Methane	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
2,4-Dichlorophenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
1,2,4-Trichlorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Naphthalene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
4-Chloroaniline	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 UJ
Hexachlorobutadiene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
4-Chloro-3-Methylphenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
2-Methylnaphthalene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Hexachlorocyclopentadiene	360 UJ	370 U	360 U	340 U	370 U	350 U		370 UJ
2,4,6-Trichlorophenol	360 U	370 U	360 U	340 U	370 U	350 U		370 U
2,4,5-Trichlorophenol	1800 U	1800 U	1700 U	1700 U	1800 U	1700 U		1800 U
2-Chloronaphthalene	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
2-Nitroaniline	1800 U	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1700 UJ		1800 U
Dimethyl Phthalate	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
Acenaphthylene	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
2,6-Dinitrotoluene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
3-Nitroaniline	1800 U	1800 U	1700 U	1700 U	1800 U	1700 U		1800 UJ
Acenaphthene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
2,4-Dinitrophenol	1800 UJ	1800 U	1700 U	1700 U	1800 U	1700 U		1800 UJ
4-Nitrophenol	1800 UJ	1800 U	1700 U	1700 U	1800 U	1700 U		1800 U
Dibenzofuran	360 U	370 U	360 U	340 U	370 U	350 U		370 U
2,4-Dinitrotoluene	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
Diethylphthalate	360 U	370 UJ	360 UJ	340 UJ	370 UJ	350 UJ		370 U
4-Chlorophenyl-phenylether	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Fluorene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
4-Nitroaniline	1800 UJ	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1700 UJ		1800 UJ
4,6-Dinitro-2-Methylphenol	1800 U	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1700 UJ		1800 UJ
N-Nitrosodiphenylamine (1)	360 U	370 U	360 U	340 U	370 U	350 U		370 U
4-Bromophenyl-phenylether	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Hexachlorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Pentachlorophenol	1800 U	1800 U	1700 U	1700 U	1800 U	1700 U		1800 U
Phenanthrene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Anthracene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Carbazole								
Di-n-Butylphthalate	360 U	39 U	360 UJ	340 UJ	370 UJ	350 UJ		370 U
Fluoranthene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Pyrene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Butylbenzylphthalate	360 U	370 U	360 U	340 U	370 U	350 U		370 U
3,3'-Dichlorobenzidine	730 UJ	730 U	720 U	690 U	740 U	700 U		740 UJ
Benzo (a) Anthracene	360 U	370 U	360 U	340 U	370 U	350 U		370 U
Chrysene	360 U	370 U	360 U	340 U	370 U	350 U		370 U

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

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(MASTER_S.XLS)

Well ID	MWA3	MWA4	MWA4	MWA4	MWA5	MWA5	MWA5-dup	MWA6
Sample Depth	17'-21'	0.5'-4.5'	6.5'-10.5'	10.5'-12.5'	0.5'-3.5'	5.5'-10.5'	5.5'-10.5'	0.5'-4.5'
Date Collected	4/7/89	4/4/89	4/4/89	4/4/89	4/3/89	4/3/89	4/3/89	4/5/89
SEMI-VOLATILE ORGANICS (ug/kg)								
bis (2-Ethylhexyl) Phthalate	380 U	370 U	73 U	340 U	190 U	690		43 U
Di-n-Octyl Phthalate	380 U	370 U	380 U	340 U	370 U	350 U		370 U
Benzo (b) Fluoranthene	380 UJ	370 U	380 U	340 U	370 U	350 U		370 U
Benzo (k)Fluoranthene	380 UJ	370 U	380 U	340 U	370 U	350 U		370 U
Benzo (a) Pyrene	380 U	370 U	380 U	340 U	370 U	350 U		370 U
Indeno (1,2,3-cd) Pyrene	380 UJ	370 UJ	380 UJ	340 UJ	370 UJ	350 UJ		370 U
Dibenzo (a,h) Anthracene	380 U	370 U	380 U	340 U	370 U	350 U		370 U
Benzo (g,h,i) Perylene	380 U	370 U	380 U	340 U	370 U	350 U		370 U
MOCA**	170	60 U	60 U	50 U	60 U	50 U	50 U	60 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analyses.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analyses for the compound was not performed.

Well ID	MWA6	MWB1	MWB2A	MWB2B	MWB2B	MWB2B	MWB3B	MWB4B
Sample Depth	6.5'-10.5'	10-12'	15-17'	15'-17'	17'-19'	15'-19'	13-15'	7.5-9.5'
Date Collected	4/5/89	6/20/91	7/1/91	6/10/91	6/10/91	6/10/91	10/11/91	10/23/91
INORGANICS (mg/kg)								
Aluminum	15400	1790			2630			1120
Antimony	10.6 UR	7.6 UJ			7.0 UJ			7.3 UJ
Arsenic	8.4 J	2 J			3.7 J			3.6
Barium	101	7.8			12.4			4.5
Beryllium	0.71	0.23 U			0.21 U			0.2 U
Cadmium	0.99 U	0.92 U			0.85 U			1 U
Calcium	1690	45000			44400			52400 J
Chromium	20.6	5.2			5			3.7 J
Cobalt	7.7	1.7			2.6			1.6
Copper	29.1 J	8.2			22.8			2.4
Iron	17100	4640			6290			3920
Lead	12.8 J	3.1			2.8			2.2 J
Magnesium	2940	17100			15300			22300 J
Manganese	546	139 J			149 J			69.9
Mercury	0.11 U	0.1 U			0.11 U			0.1 U
Nickel	16.9	5.2			6.1			3.5
Potassium	1210 U	354 U			546 U			148 U
Selenium	1.7 UR	0.88 U			0.85 U			0.62 UJ
Silver	1.4 U	1.1 UJ			1.1 UJ			1.2 UJ
Sodium	726 UJ	131			228			148 U
Thallium	0.43 U	0.44 U			0.43 U			0.41 UJ
Vanadium	26.9	6.9			11.3			5.7
Zinc	61.8	20.9 J			35.9 J			10.4
Cyanide	1.2 U	0.57 UJ			0.55 UJ			0.52 U
VOLATILE ORGANICS (µg/kg)								
Chloromethane	10 UJ	11 U		19 U		11 U		10 U
Bromomethane	10 U	11 U		19 U		11 U		10 U
Vinyl Chloride	10 U	11 U		19 U		11 U		10 U
Chloroethane	10 U	11 U		19 U		11 U		10 U
Methylene Chloride	14 U	14 UJ		36 UJ		35 UJ		100 UJ
Acetone	42 UJ	11 UJ		36 UJ		55 UJ		30 UJ
Carbon Disulfide	5 U	11 U		19 U		11 U		10 U
1,1-Dichloroethene	5 U	11 U		19 U		11 U		10 U
1,1-Dichloroethane	5 U	11 U		19 U		11 U		10 U
1,2-Dichloroethene (total)	5 U	11 U		19 U		11 U		10 U
Chloroform	5 U	11 U		19 U		11 U		10 U
1,2-Dichloroethane	5 U	11 U		19 U		11 U		10 U
2-Butanone	10 UJ	11 UJ		19 UJ		11 UJ		10 UJ
1,1,1-Trichloroethane	5 U	11 U		19 U		11 U		10 U
Carbon Tetrachloride	5 U	11 U		19 U		11 U		10 U
Vinyl Acetate	10 U							
Bromodichloromethane	5 U	11 U		19 U		11 U		10 U
1,2-Dichloropropane	5 U	11 U		19 U		11 U		10 U
cis-1,3-Dichloropropene	5 U	11 U		19 U		11 U		10 U
Trichloroethene	5 U	11 U		19 U		11 U		10 U
Dibromochloromethane	5 U	11 U		19 U		11 U		10 U
1,1,2-Trichloroethane	5 U	11 U		19 U		11 U		10 U
Benzene	5 U	11 U		19 U		11 U		10 U
Trans-1,3-Dichloropropene	5 U	11 U		19 U		11 U		10 U
Bromoform	5 U	11 U		19 U		11 U		10 U
4-Methyl-2-Pentanone	10 UJ	11 U		19 U		11 U		10 U
2-Hexanone	10 UJ	11 UJ		19 U		11 U		10 U
Tetrachloroethene	5 U	11 U		19 U		11 U		10 U
1,1,2,2-Tetrachloroethane	7	11 U		19 U		11 U		10 U
Toluene	5 U	11 U		19 U		11 U		10 U
Chlorobenzene	5 U	11 U		19 U		11 U		10 U
Ethylbenzene	5 U	11 U		19 U		11 U		10 U
Styrene	5 U	11 U		19 U		11 U		10 U
Total Xylenes	5 U	11 U		19 U		11 U		10 U

Well ID	MWA6	MWB1	MWB2A	MWB2B	MWB2B	MWB2B	MWB3B	MWB4B
Sample Depth	6.5-10.5'	10-12'	15-17'	15-17'	17-19'	15-19'	13-15'	7.5-9.5'
Date Collected	4/5/89	6/20/91	7/1/91	6/10/91	6/10/91	6/10/91	10/11/91	10/23/91
SEMI-VOLATILE ORGANICS (ug/kg)								
Phenol	340 U	380 U				440 U		340 U
bis (2-Chloroethyl) Ether	340 U	380 U				440 U		340 U
2-Chlorophenol	340 U	380 U				440 U		340 U
1,3-Dichlorobenzene	340 U	380 U				440 U		340 U
1,4-Dichlorobenzene	340 U	380 U				440 U		340 U
Benzyl Alcohol	340 U							
1,2-Dichlorobenzene	340 U	380 U				440 U		340 U
2-Methylphenol	340 U	380 U				440 U		340 U
2,2'-Oxybis(1-Chloropropane)		380 U				440 UJ		340 U
bis (2-Chloroisopropyl) Ether	340 U							
4-Methylphenol	340 U	380 U				440 U		340 U
N-Nitroso-Di-n-Propylamine	340 U	380 U				440 U		340 U
Hexachloroethane	340 U	380 U				440 U		340 U
Nitrobenzene	340 UJ	380 U				440 U		340 U
Isophorone	340 U	380 U				440 U		340 U
2-Nitrophenol	340 U	380 U				440 U		3[illegible]
2,4-Dimethylphenol	340 U	380 U				440 U		340 U
Benzoic Acid	1700 UJ							
bis (2-Chloroethoxy) Methane	340 U	380 U				440 U		340 U
2,4-Dichlorophenol	340 U	380 U				440 U		340 U
1,2,4-Trichlorobenzene	340 U	380 U				440 U		340 U
Naphthalene	340 U	380 U				440 U		340 U
4-Chloroaniline	340 UJ	380 UJ				440 UJ		340 U
Hexachlorobutadiene	340 U	380 U				440 U		340 U
4-Chloro-3-Methylphenol	340 U	380 U				440 U		340 U
2-Methylnaphthalene	340 U	380 U				440 U		340 U
Hexachlorocyclopentadiene	340 UJ	380 U				440 U		340 U
2,4,6-Trichlorophenol	340 U	380 U				440 U		340 U
2,4,5-Trichlorophenol	1700 U	920 U				1100 U		810 U
2-Chloronaphthalene	340 U	380 U				440 U		340 U
2-Nitroaniline	1700 U	920 UJ				1100 UJ		810 U
Dimethyl Phthalate	340 U	380 U				440 U		340 U
Acenaphthylene	340 U	380 U				440 U		340 U
2,6-Dinitrotoluene	340 U	380 U				440 U		340 U
3-Nitroaniline	1700 UJ	920 U				1100 U		[illegible]
Acenaphthene	340 U	380 U				440 U		340 U
2,4-Dinitrophenol	1700 UJ	920 UR				1100 UR		810 UJ
4-Nitrophenol	1700 U	920 U				1100 UJ		810 U
Dibenzofuran	340 U	380 U				440 U		340 U
2,4-Dinitrotoluene	340 U	380 U				440 U		340 U
Diethylphthalate	340 U	380 U				440 U		340 U
4-Chlorophenyl-phenylether	340 U	380 U				440 U		340 U
Fluorene	340 U	380 U				440 U		340 U
4-Nitroaniline	1700 UJ	920 U				1100 UJ		810 UJ
4,6-Dinitro-2-Methylphenol	1700 UJ	920 U				1100 U		810 U
N-Nitrosodiphenylamine (1)	340 U	380 UJ				440 U		340 U
4-Bromophenyl-phenylether	340 U	380 U				440 U		340 U
Hexachlorobenzene	340 U	380 U				440 U		340 UJ
Pentachlorophenol	1700 U	920 U				1100 U		810 U
Phenanthrene	340 U	380 U				440 U		340 U
Anthracene	340 U	380 U				440 U		340 U
Carbazole		380 U				440 U		340 U
Di-n-Butylphthalate	340 U	380 U				440 U		71 U
Fluoranthene	340 U	380 U				440 U		340 U
Pyrene	340 U	380 U				440 U		340 U
Butylbenzylphthalate	340 U	380 U				440 U		340 UJ
3,3'-Dichlorobenzidine	680 UJ	380 U				440 UJ		340 U
Benzo (a) Anthracene	340 U	380 U				440 U		340 U
Chrysene	340 U	380 U				440 U		340 U

Well ID	MWA6	MWB1	MWB2A	MWB2B	MWB2B	MWB2B	MWB3B	MWB4B
Sample Depth	6.5'-10.5'	10-12'	15-17'	15'-17'	17'-19'	15'-19'	13-15'	7.5-9.5'
Date Collected	4/5/89	6/20/91	7/1/91	6/10/91	6/10/91	6/10/91	10/11/91	10/23/91
SEMI-VOLATILE ORGANICS (µg/kg)								
bis (2-Ethylhexyl) Phthalate	88 U	380 U				440 U		340 UJ
Di-n-Octyl Phthalate	340 U	380 U				440 U		340 UJ
Benzo (b) Fluoranthene	340 U	380 U				440 U		340 U
Benzo (k)Fluoranthene	340 U	380 U				440 U		340 U
Benzo (a) Pyrene	340 U	380 U				440 U		340 U
Indeno (1,2,3-cd) Pyrene	340 UJ	380 U				440 U		340 U
Dibenzo (a,h) Anthracene	340 UJ	380 U				440 U		340 U
Benzo (g,h,i) Perylene	340 UJ	380 UJ				440 UJ		340 U
MOCA**	50 U	10 U	10 U					50 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline: special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	MW309	MW310	SB201	SB201	SB202	SB202	SB203	SB 203
Sample Depth	7.5-9.5	7.5-9.5	0.5-4.5	4.5-10.5	0.5-4.5	4.5-10.5	0.5-2.5	7-9
Date Collected	10/29/91	10/29/91	3/30/89	3/30/89	3/31/89	3/30/89	3/29/89	3/29/89
INORGANICS (mg/kg)								
Aluminum	2860	3220	10000	5510	8910	2430	4070	3510
Antimony	7.4 UJ	8.5 UJ	9.7 UJ	9.3 UJ	9.4 UJ	9.2 UJ	9.2 UJ	9.4 U
Arsenic	3.8	4.2	4.2	5.7	4.8 J	3.1	5.6	3.2
Barium	11.5	14.9	51.4	42.7	44.6	11.5	39.7	21.5
Beryllium	0.2 U	0.24 U	0.50	0.26 U	0.26 U	0.40	0.39	0.26 U
Cadmium	1 U	1.2 U	0.9 U	0.86 U	0.87 U	0.85 U	0.85 U	0.87 U
Calcium	52800 J	98500 J	1280	8700	20000	68800	3710	575
Chromium	9.8	9.2	13.4	15.1	16.7	9.4	7.0	16.0
Cobalt	2.3	3.5	5.9 U	6.4 U	5.8 U	3.8 U	5.6 U	5.6 U
Copper	4.6	7.7	14.8	21.5	18.2	14.8	13.3	4.8
Iron	6480	8230	14200	13300	14000	9720	15200	7610
Lead	3.4	11.9	8.3	4.5	11.9	4.4	7.3	3.9
Magnesium	17800 J	38700 J	1980	8540	11800	19800	3030	1780
Manganese	146	229	338 J	472 J	296 J	216 J	682 J	243 J
Mercury	0.1 U	0.11 U	0.10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	6.5 U	8.1 U	12.5	13.2	11.7	7.5 U	14.2	7 U
Potassium	226 U	391 U	1290	1290	1530	1050 U	1350	1380
Selenium	0.61 U	0.74 U	0.31 UJ	0.29 UJ	0.31 UJ	1.5 UJ	0.3 UJ	0.3 U
Silver	1.2 UJ	1.4 UJ	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Sodium	152 U	233 U	664 U	634 U	1160 U	780 U	1140 U	1070 U
Thallium	0.41 UR	0.49 UF	0.4 U	0.37 U	0.4 U	0.38 U	0.38 U	0.38 U
Vanadium	8.8	11.7	18.7	15.5	20.4	9.1	15.0	12.7
Zinc	17.6	18.2	47.8	55.5	64.8	43.5	51.9	35.9
Cyanide			1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VOLATILE ORGANICS (ug/kg)								
Chloromethane	11 UJ	12 UJ	11 U	11 U	11 U	11 U	11 U	11 U
Bromomethane	11 U	12 U	11 U	11 U	11 U	11 U	11 UJ	11 U
Vinyl Chloride	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U
Chloroethane	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U
Methylene Chloride	39 U	40 U	23 U	11 U	11 U	11 U	53 U	40 U
Acetone	11 UJ	12 UJ	20 UJ	14 UJ	11 UJ	11 UJ	140 UJ	62 U
Carbon Disulfide	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
1,1-Dichloroethene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
1,1-Dichloroethane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
1,2-Dichloroethene (total)	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Chloroform	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
1,2-Dichloroethane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
2-Butanone	11 UJ	12 UJ	11 UR	11 UR	11 UR	11 UR	11 UR	11 U
1,1,1-Trichloroethane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Carbon Tetrachloride	11 U	12 U	6 U	5 U	6 U	5 U	6 UJ	5 U
Vinyl Acetate			11 U	11 U	11 U	11 U	11 U	11 U
Bromodichloromethane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
1,2-Dichloropropane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
cis-1,3-Dichloropropene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Trichloroethene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Dibromochloromethane	11 U	12 U	6 U	5 U	6 U	5 U	6 UJ	5 U
1,1,2-Trichloroethane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Benzene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Trans-1,3-Dichloropropene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Bromoform	11 U	12 U	6 U	5 U	6 U	5 U	6 UJ	5 U
4-Methyl-2-Pentanone	11 UJ	12 UJ	11 U	11 U	11 U	11 U	11 UJ	11 U
2-Hexanone	11 UJ	12 UJ	11 U	11 U	11 U	11 U	11 U	11 U
Tetrachloroethene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
1,1,2,2-Tetrachloroethane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Toluene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Chlorobenzene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Ethylbenzene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Styrene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U
Total Xylenes	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 U

Well ID	MW309	MW310	SB201	SB201	SB202	SB202	SB203	SB 203
Sample Depth	7.5-9.5'	7.5-9.5'	0.5'-4.5'	4.5'-10.5'	0.5'-4.5'	4.5'-10.5'	0.5'-2.5'	7'-9'
Date Collected	10/29/91	10/29/91	3/30/89	3/30/89	3/31/89	3/30/89	3/29/89	3/29/89
SEMI-VOLATILE ORGANICS (µg/kg)								
Phenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
bis (2-Chloroethyl) Ether	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2-Chlorophenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
1,3-Dichlorobenzene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
1,4-Dichlorobenzene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Benzyl Alcohol			370 U	350 U	370 U	350 U	370 U	360 U
1,2-Dichlorobenzene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2-Methylphenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
2,2'-Oxybis(1-Chloropropane)	340 UJ	400 UJ						
bis (2-Chloroisopropyl) Ether			370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	360 UJ
4-Methylphenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
N-Nitroso-Di-n-Propylamine	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Hexachloroethane	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Nitrobenzene	340 U	400 U	370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	360 UJ
Isophorone	340 U	400 U	370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	360 UJ
2-Nitrophenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
2,4-Dimethylphenol	340 UR	400 UF	370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	360 UJ
Benzoic Acid			1800 UJ	1700 UJ	1800 UJ	1700 UJ	1800 UJ	1700 UJ
bis (2-Chloroethoxy) Methane	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2,4-Dichlorophenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
1,2,4-Trichlorobenzene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Naphthalene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
4-Chloroaniline	340 UJ	400 UJ	370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	360 UJ
Hexachlorobutadiene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
4-Chloro-3-Methylphenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
2-Methylnaphthalene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Hexachlorocyclopentadiene	340 U	400 U	370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	360 UJ
2,4,6-Trichlorophenol	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
2,4,5-Trichlorophenol	840 UR	970 UF	1800 U	1700 U	1800 U	1700 U	1800 U	1700 U
2-Chloronaphthalene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2-Nitroaniline	840 UJ	970 UJ	1800 UJ	1700 UJ	1800 UJ	1700 UJ	1800 UJ	1700 UJ
Dimethyl Phthalate	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Acenaphthylene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2,6-Dinitrotoluene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
3-Nitroaniline	840 UJ	970 UJ	1800 UR	1700 UR	1800 UR	1700 UR	1800 UR	1700 UR
Acenaphthene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2,4-Dinitrophenol	840 UR	970 UF	1800 U	1700 U	1800 U	1700 U	1800 U	1700 U
4-Nitrophenol	840 UR	970 UF	1800 UJ	1700 UJ	1800 UJ	1700 UJ	1800 UJ	1700 UJ
Dibenzofuran	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2,4-Dinitrotoluene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Diethylphthalate	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
4-Chlorophenyl-phenylether	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Fluorene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
4-Nitroaniline	840 UJ	970 UJ	1800 U	1700 U	1800 U	1700 U	1800 U	1700 U
4,6-Dinitro-2-Methylphenol	840 UR	970 UF	1800 UJ	1700 UJ	1800 UJ	1700 UJ	1800 UJ	1700 UJ
N-Nitrosodiphenylamine (1)	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
4-Bromophenyl-phenylether	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Hexachlorobenzene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Pentachlorophenol	840 UR	970 UF	1800 U	1700 U	1800 U	1700 U	1800 U	1700 U
Phenanthrene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Anthracene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Carbazole	340 U	400 U						
Di-n-Butylphthalate	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Fluoranthene	39 J	59 J	370 U	350 U	370 U	350 U	370 U	360 U
Pyrene	40 J	97 J	370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	360 UJ
Butylbenzylphthalate	340 U	45 U	370 U	350 U	370 U	350 U	370 U	360 U
3,3'-Dichlorobenzidine	340 U	400 U	740 UJ	710 UJ	740 UJ	700 UJ	740 UJ	720 UJ
Benzo (a) Anthracene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Chrysene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

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Well ID	MW309	MW310	SB201	SB201	SB202	SB202	SB203	SB 203
Sample Depth	7.5-9.5	7.5-9.5	0.5-4.5	4.5-10.5	0.5-4.5	4.5-10.5	0.5-2.5	7-9
Date Collected	10/29/91	10/29/91	3/30/89	3/30/89	3/31/89	3/30/89	3/29/89	3/29/89
SEMI-VOLATILE ORGANICS (ug/kg)								
bis (2-Ethylhexyl) Phthalate	340 UJ	670 J	370 U	350 U	370 U	350 U	100 U	43 U
Di-n-Octyl Phthalate	340 UJ	400 UJ	370 U	350 U	370 U	350 U	370 U	360 U
Benzo (b) Fluoranthene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Benzo (k)Fluoranthene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Benzo (a) Pyrene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Indeno (1,2,3-cd) Pyrene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Dibenzo (a,h) Anthracene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Benzo (g,h,i) Perylene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
MOCA**	54 U	53 U	60 U	50 U	60 U	50 U	310	50 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analyses.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) Cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analyses for the compound was not performed.

Well ID	SB 204	SB 204	SB 204	SB 205	SB 205	SB 205	SB 207	SB 209
Sample Depth	2'-4'	8'-12'	12'-16'	3.5'-7.5'	16'-20'	20'-24'	11'-17'	11'-15'
Date Collected	4/11/89	4/11/89	4/11/89	4/11/89	4/11/89	4/11/89	4/6/89	4/6/89
INORGANICS (mg/kg)								
Aluminum	3160	2460	2970	3280	4560	3970	3160	2760
Antimony	6.9 UJ	8.0 UJ	6.9 UJ	10.3 UJ	6.5 UJ	7.6 UJ	13.00 UJ	16.2 J
Arsenic	1.1	2.0	2.3	7.1	3.4	2.9	2.5 U	3.9
Barium	17.9	11.4	14.3	12.2	21.6	15.1	14.2	13.9
Beryllium	0.11 U	0.13 U	0.15 U	0.17 U	0.34 U	0.29 U	0.25 U	0.26 U
Cadmium	0.92 U	0.91 U	0.92 U	0.86 U	0.87 U	1 U	0.85 U	0.88 U
Calcium	524	31100	53100	86700	39800	31000	48700 J	46000 J
Chromium	4.5	16.1	6.9	8.7	10.4	7.5	7.7	6.1
Cobalt	2.0 U	3.6 U	3.7 U	4.1 U	4.2 U	4.4 U	1.9	2.8
Copper	12.9	13.4	12.3	14.7	31.7	33.1	38.8	7.0 U
Iron	3250	5890	7080	7670	8220	7810	6390	6330
Lead	2.0	3.1	3.0	4.0	3.6	4.6	2.7	2.8
Magnesium	605	12400	15300	14400	15800	11600	16800	15800
Manganese	64.2	178	220	253	207	159	173	163
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12 U	0.1 U	0.11 U
Nickel	4.1 U	4.8	8.2	6.4	7.3	6.8	8.5	7.8 U
Potassium	412 U	377 U	379 U	354 U	585 U	457 U	1040 U	1080 U
Selenium	1.1 UJ	1.1 UJ	1.1 UJ	0.95 J	1 UJ	1.6 J	1.5 UR	0.31 UR
Silver	1.1 U	1.1 U	1.1 U	1 U	1 U	1.2 U	1.2 U	1.2 U
Sodium	341 U	337 U	340 U	317 U	324 U	373 U	623 U	651 U
Thallium	0.25 UJ	0.24 UJ	0.24 UJ	0.23 UJ	0.22 UJ	0.28 UJ	0.38 UJ	0.4 UJ
Vanadium	8.9 U	7.8 U	9.3 U	12.8 U	12.2 U	11.8 U	10.2 U	11.5 U
Zinc	21.4	22.8	25.6	26.9	36.9	40.5	45.4	24.2
Cyanide	1.1 U	1.1 U	1.1 U	1 U	1 U	1.2 U	1.1 U	1.1 U
VOLATILE ORGANICS (µg/kg)								
Chloromethane	11 U	11 U	11 U	11 U	11 U	12 U	11 UJ	11 UJ
Bromomethane	11 U	11 U	11 U	11 U	11 U	12 U	11 U	11 U
Vinyl Chloride	11 U	11 U	11 U	11 U	11 U	12 U	11 U	11 U
Chloroethane	11 U	11 U	11 U	11 U	11 U	12 U	11 U	11 U
Methylene Chloride	11 UJ	11 UJ	11 UJ	17 UJ	16 UJ	12 UJ	15 U	11 U
Acetone	11 UJ	27 UJ	29 UJ	11 UJ	11 UJ	33 UJ	59 UJ	18 UJ
Carbon Disulfide	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
1,1-Dichloroethane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
1,1-Dichloroethene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
1,2-Dichloroethene (total)	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Chloroform	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
1,2-Dichloroethane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
2-Butanone	11 UR	11 UR	11 UR	11 UR	11 UR	12 UR	11 UJ	11 UJ
1,1,1-Trichloroethane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Carbon Tetrachloride	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Vinyl Acetate	11 U	11 U	11 U	11 U	11 U	12 U	11 U	11 U
Bromodichloromethane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
1,2-Dichloropropane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
cis-1,3-Dichloropropene	5 UJ	6 UJ	5 UJ	5 UJ	5 UJ	6 UJ	5 U	5 UJ
Trichloroethene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Dibromochloromethane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
1,1,2-Trichloroethane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Benzene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Bromoform	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
4-Methyl-2-Pentanone	11 U	11 U	11 U	11 U	11 U	12 U	11 UJ	11 UJ
2-Hexanone	11 UJ	11 UJ	11 UJ	11 UJ	11 UJ	12 UJ	11 UJ	11 UJ
Tetrachloroethene	5 UJ	6 UJ	5 UJ	5 UJ	5 UJ	6 UJ	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Toluene	5 U	2 J	3 J	18	5 U	6 U	5 U	5 U
Chlorobenzene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Ethylbenzene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Styrene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U
Total Xylenes	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5 U

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

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Well ID	SB 204	SB 204	SB 204	SB 205	SB 205	SB 205	SB 207	SB 209
Sample Depth	2'-4'	8'-12'	12'-16'	3.5'-7.5'	16'-20'	20'-24'	11'-17'	11'-15'
Date Collected	4/11/89	4/11/89	4/11/89	4/11/89	4/11/89	4/11/89	4/6/89	4/6/89
SEMI-VOLATILE ORGANICS (ug/kg)								
Phenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
bis (2-Chloroethyl) Ether	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2-Chlorophenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
1,3-Dichlorobenzene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
1,4-Dichlorobenzene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Benzyl Alcohol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
1,2-Dichlorobenzene	360 U	370 U	360 U	350 U	460	230 J	360 U	350 U
2-Methylphenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2,2'-Oxybis(1-Chloropropane) bis (2-Chloroisopropyl) Ether	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
4-Methylphenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
N-Nitroso-Di-n-Propylamine	360 UJ	370 UJ	360 UJ	350 UJ	360 UJ	360 UJ	360 U	350 U
Hexachloroethane	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Nitrobenzene	360 UJ	370 UJ	360 UJ	350 UJ	360 UJ	360 UJ	360 UJ	350 UJ
Isophorone	360 UJ	370 UJ	360 UJ	350 UJ	360 UJ	360 UJ	360 U	350
2-Nitrophenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350
2,4-Dimethylphenol	360 U	370 U	360 U	350 U	360 U	360 U	360 UJ	350 UJ
Benzoic Acid	1700 UJ	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1900 UJ	1700 U	1700 U
bis (2-Chloroethoxy) Methane	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2,4-Dichlorophenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
1,2,4-Trichlorobenzene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Naphthalene	360 U	370 UJ	360 U	350 U	360 U	360 U	360 U	350 U
4-Chloroaniline	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Hexachlorobutadiene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
4-Chloro-3-Methylphenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2-Methylnaphthalene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Hexachlorocyclopentadiene	360 UJ	370 UJ	360 UJ	350 UJ	360 UJ	360 UJ	360 UJ	350 UJ
2,4,6-Trichlorophenol	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2,4,5-Trichlorophenol	1700 U	1800 U	1700 U	1700 U	1800 U	1900 U	1700 U	1700 U
2-Chloronaphthalene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2-Nitroaniline	1700 UJ	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1900 UJ	1700 U	1700 U
Dimethyl Phthalate	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Acenaphthylene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2,6-Dinitrotoluene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350
3-Nitroaniline	1700 U	1800 U	1700 U	1700 U	1800 U	1900 U	1700 U	1700
Acenaphthene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2,4-Dinitrophenol	1700 UJ	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1900 UJ	1700 UJ	1700 UJ
4-Nitrophenol	1700 U	1800 U	1700 U	1700 U	1800 U	1900 U	1700 UJ	1700 UJ
Dibenzofuran	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
2,4-Dinitrotoluene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Diethylphthalate	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
4-Chlorophenyl-phenylether	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Fluorene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
4-Nitroaniline	1700 U	1800 U	1700 U	1700 U	1800 U	1900 U	1700 UJ	1700 UJ
4,6-Dinitro-2-Methylphenol	1700 UJ	1800 UJ	1700 UJ	1700 UJ	1800 UJ	1900 UJ	1700 U	1700 U
N-Nitrosodiphenylamine (1)	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
4-Bromophenyl-phenylether	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Hexachlorobenzene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Pentachlorophenol	1700 U	1800 U	1700 U	1700 U	1800 U	1900 U	360 U	1700 U
Phenanthrene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Anthracene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Carbazole								
Di-n-Butylphthalate	360 U	370 U	360 U	350 U	360 U	360 U	120 U	350 U
Fluoranthene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Pyrene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Butylbenzylphthalate	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
3,3'-Dichlorobenzidine	720 UJ	750 UJ	720 UJ	700 UJ	730 UJ	770 UJ	720 UJ	710 UJ
Benzo (a) Anthracene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Chrysene	360 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U

Well ID	SB 204	SB 204	SB 204	SB 205	SB 205	SB 205	SB 207	SB 209
Sample Depth	2'-4'	8'-12'	12'-16'	3.5'-7.5'	16'-20'.	20'-24'	11'-17'	11'-15'
Date Collected	4/11/89	4/11/89	4/11/89	4/11/89	4/11/89	4/11/89	4/6/89	4/6/89
SEMI-VOLATILE ORGANICS (µg/kg)								
bis (2-Ethylhexyl) Phthalate	37 U	370 U	360 U	350 U	42 U	380 U	120 U	91 U
Di-n-Octyl Phthalate	360 U	370 U	360 U	350 U	360 U	380 U	360 U	350 U
Benzo (b) Fluoranthene	360 U	370 U	360 U	350 U	360 U	380 U	360 UJ	350 UJ
Benzo (k)Fluoranthene	360 U	370 U	360 U	350 U	360 U	380 U	360 UJ	350 UJ
Benzo (a) Pyrene	360 U	370 U	360 U	350 U	360 U	380 U	360 U	350 U
Indeno (1,2,3-cd) Pyrene	360 UJ	370 UJ	360 UJ	350 UJ	360 UJ	380 UJ	360 UJ	350 UJ
Dibenzo (a,h) Anthracene	360 UJ	370 UJ	360 UJ	350 UJ	360 UJ	380 UJ	360 U	350 U
Benzo (g,h,i) Perylene	360 UJ	370 UJ	360 UJ	350 UJ	360 UJ	380 UJ	360 U	350 U
MOCA**	191 U	201 U	221 U	311 U	171 U	241 U	60 U	50 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline: special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

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Well ID	BS1	BS2	SB301	DUPSB	SB302	SB303	DUPSC	SB304	SB304A
Sample Depth	1'-5'	1'-5'	20-22'	SB301-20-22'	8-10'	13-17'	(SB304-11-15',	15-19'	16-18'
Date Collected	3/30/89	4/5/89	7/8/91	7/8/91	7/12/91	7/26/91	7/30/91	7/30/91	7/30/91
INORGANICS (mg/kg)									
Aluminum	9910	6150	2810	2930	1440	3060	1070	1620	898
Antimony	9.4 UJ	8.9 UR	7.3 UJ	7.4 UJ	6.9 UJ	7.1 UJ	6.7 UJ	7.5 UJ	8.2 UJ
Arsenic	4.5	2.7 J	2.1 J	1.5 J	2.9 J	2.7 J	1.5	2.6 J	2.2 J
Barium	59.5	27.2	12.7	13	9	14.7	5.2	8.6	4.3
Beryllium	0.54	0.25	0.22 U	0.23 U	0.21 U	0.22 U	0.2 U	0.23 U	0.25 U
Cadmium	0.87 U	0.82 U	0.89 U	0.9 U	0.83 U	0.86 U	0.82 U	0.91 U	0.99 U
Calcium	1180	1140	47200	51200	35400	42200	37400	43800	17200
Chromium	12.7	9.8	5.2 J	5.7 J	4.1 J	5.2 J	2.6	5.4 J	2.3 J
Cobalt	4.0 U	6.4	2.1	2.5	1.6	2	1.2 U	2.1	1.5 U
Copper	25.1	17.2 J	7.8	13	13.6	8.6	3.9	7.6	5.5
Iron	13100	11000	5540	6440	4080	6280	2570	5700	2580
Lead	6.1	1.9 J	2.5	2.7	2.5	2.5	1.5	2.5	2.3
Magnesium	1900	3270	14800	19500	11700	13800	8580	10000	4760
Manganese	364 J	148	139	140	112 J	157 J	73 J	112 J	47.2 J
Mercury	0.11 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U
Nickel	13.0	12.1	6.1	7.1	5.2 J	10.1 J	3.8 J	6.2 J	J
Potassium	1220	2520	643	688	242	623	218 U	357	2??
Selenium	0.3 UJ	1.5 UR	0.87 U	0.9 U	0.83 U	0.86 U	0.81 U	0.91 U	1 U
Silver	1.2 U	1.1 U	1.1 UJ	1.1 UJ	1 UJ	1.1 UJ	1 UJ	1.1 UJ	1.2 UJ
Sodium	640 U	606 UJ	182 J	200 J	167	150	148	169	121
Thallium	0.39 U	0.37 U	0.44 U	0.45 U	0.41 U	0.43 U	0.4 U	0.46 U	0.5 U
Vanadium	18.1	11.8	8.1 J	9.9 J	5.2	9.2	3.3	8.7	4
Zinc	52.0	42.6	22.9	24.2	15.2	18.4	11.1	21.3	9.2
Cyanide	1.1 U	1.1 U							
VOLATILE ORGANICS (ug/kg)									
Chloromethane	11 U	11 U	11 U	11 U	11 UJ	11 U	10 U	11 U	12 U
Bromomethane	11 U	11 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Vinyl Chloride	11 U	11 U	11 U	11 U	11 UJ	11 U	10 U	11 U	12 U
Chloroethane	11 U	11 U	11 UJ	11 U	11 U	11 U	10 U	11 U	12 U
Methylene Chloride	18 U	35 U	19 U	16 UJ	11 UJ	20 UJ	23 UJ	59 UJ	38 UJ
Acetone	14 U	22 U	12 UJ	18 UJ	11 UJ	53 UJ	30 UJ	94 UJ	34 UJ
Carbon Disulfide	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1-Dichloroethene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1-Dichloroethane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,2-Dichloroethene (total)	6 U	6 U	11 U	11 U	11 U	11 U	10 U	1 J	U
Chloroform	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	U
1,2-Dichloroethane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
2-Butanone	11 UR	11 UJ	11 U	11 UJ	11 U	11 UJ	10 UJ	11 UJ	12 UJ
1,1,1-Trichloroethane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Carbon Tetrachloride	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Vinyl Acetate	11 U	11 U							
Bromodichloromethane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,2-Dichloropropane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
cis-1,3-Dichloropropene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Trichloroethene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Dibromochloromethane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1,2-Trichloroethane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Benzene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Trans-1,3-Dichloropropene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Bromoform	6 U	6 U	11 U	11 UJ	11 U	11 U	10 U	11 U	12 U
4-Methyl-2-Pentanone	11 U	11 UJ	11 U	11 UJ	11 UJ	11 U	10 U	11 U	12 U
2-Hexanone	11 U	11 UJ	11 UJ	11 UJ	11 UJ	11 U	10 U	11 U	12 U
Tetrachloroethene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1,2,2-Tetrachloroethane	6 U	6 UJ	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Toluene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Chlorobenzene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Ethylbenzene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Styrene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Total Xylenes	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U

ANALYTICAL RESULTS
FIOTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	BS1	BS2	SB301	DUPSB	SB302	SB303	DUPSC	SB304	SB304A
Sample Depth	1'-5'	1'-5'	20-22'	(SB301-20-22'	8-10'	13-17'	(SB304-11-15',	15-19'	16-18'
Date Collected	3/30/89	4/5/89	7/8/91	7/8/91	7/12/91	7/26/91	7/30/91	7/30/91	7/30/91
SEMI-VOLATILE ORGANICS (µg/kg)									
Phenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
bis (2-Chloroethyl) Ether	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2-Chlorophenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
1,3-Dichlorobenzene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
1,4-Dichlorobenzene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Benzyl Alcohol	400 UJ	370 U							
1,2-Dichlorobenzene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2-Methylphenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,2'-Oxybis(1-Chloropropane)			360 UJ	380 UJ	340 U	360 U	340 U	380 U	410 U
bis (2-Chloroisopropyl) Ether	400 UJ	370 U							
4-Methylphenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
N-Nitroso-Di-n-Propylamine	400 UJ	370 U	360 U	380 U	340 U	360 UJ	340 U	380 U	410 U
Hexachloroethane	400 U	370 U	360 U	380 U	340 U	360 UJ	340 U	380 U	410 U
Nitrobenzene	400 UJ	370 UJ	360 U	380 U	340 U	360 UJ	340 U	380 U	410 U
Isophorone	400 UJ	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2-Nitrophenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,4-Dimethylphenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Benzoic Acid	1900 U	1800 UJ							
bis (2-Chloroethoxy) Methane	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,4-Dichlorophenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
1,2,4-Trichlorobenzene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Naphthalene	400 U	370 U	360 U	380 U	56 J	360 U	340 U	380 U	410 U
4-Chloroaniline	400 UJ	370 UJ	360 UJ	380 UJ	340 U	360 UJ	340 U	380 U	410 U
Hexachlorobutadiene	400 U	370 U	360 U	380 U	340 UJ	360 U	340 U	380 U	410 U
4-Chloro-3-Methylphenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2-Methylnaphthalene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Hexachlorocyclopentadiene	400 U	370 UJ	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,4,6-Trichlorophenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,4,5-Trichlorophenol	1900 U	1800 U	860 U	920 U	830 U	870 U	820 U	920 U	990 U
2-Chloronaphthalene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2-Nitroaniline	1900 UJ	1800 U	860 UJ	920 UJ	830 U	870 UJ	820 U	920 U	990 U
Dimethyl Phthalate	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Acenaphthylene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,6-Dinitrotoluene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
3-Nitroaniline	1900 U	1800 UJ	860 U	920 U	830 UJ	870 U	820 U	920 U	990 U
Acenaphthene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,4-Dinitrophenol	1900 U	1800 UJ	860 UF	920 UR	830 UR	870 UJ	820 U	920 U	990 U
4-Nitrophenol	1900 UJ	1800 U	860 U	920 U	830 UJ	870 UJ	820 U	920 U	990 U
Dibenzofuran	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2,4-Dinitrotoluene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Diethylphthalate	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
4-Chlorophenyl-phenylether	400 UJ	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Fluorene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
4-Nitroaniline	1900 UJ	1800 UJ	860 U	920 U	830 U	870 U	820 U	920 U	990 U
4,6-Dinitro-2-Methylphenol	1900 U	1800 UJ	860 U	920 U	830 U	870 U	820 U	920 U	990 U
N-Nitrosodiphenylamine (1)	400 U	370 U	360 UJ	380 UJ	340 U	360 UJ	340 U	380 U	410 U
4-Bromophenyl-phenylether	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Hexachlorobenzene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Pentachlorophenol	1900 U	1800 U	860 UJ	920 UJ	830 U	870 U	820 U	920 U	990 U
Phenanthrene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Anthracene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Carbazole			360 U	380 U	340 U	360 U	340 U	380 U	410 U
Di-n-Butylphthalate	400 UJ	370 U	360 UJ	380 UJ	340 U	360 U	340 U	380 U	410 U
Fluoranthene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Pyrene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Butylbenzylphthalate	400 UJ	370 U	360 U	380 U	340 U	360 UJ	41 U	77 U	410 U
3,3'-Dichlorobenzidine	790 U	730 UJ	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Benzo (a) Anthracene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Chrysene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

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Well ID	BS1	BS2	SB301	DUPSB	SB302	SB303	DUPSC	SB304	SB304A
Sample Depth	1'-5'	1'-5'	20-22'	(SB301-20-22'	8-10'	13-17'	(SB304-11-15',	15-19'	16-18'
Date Collected	3/30/89	4/5/89	7/8/91	7/8/91	7/12/91	7/26/91	7/30/91	7/30/91	7/30/91
SEMI-VOLATILE ORGANICS (ug/kg)									
bis (2-Ethylhexyl) Phthalate	50 U	370 U	380 UJ	52 UJ	41 UJ	380 UJ	350 U	1100 U	410
Di-n-Octyl Phthalate	400 U	370 U	380 UJ	380 UJ	340 U	380 UJ	340 U	380 U	410
Benzo (b) Fluoranthene	400 U	370 U	380 U	380 U	340 U	380 U	340 U	380 U	410
Benzo (k)Fluoranthene	400 UJ	370 U	380 U	380 U	340 U	380 U	340 U	380 U	410
Benzo (a) Pyrene	400 U	370 U	380 U	380 U	340 U	380 U	340 U	380 U	410
Indeno (1,2,3-cd) Pyrene	400 U	370 UJ	380 U	380 U	340 U	380 U	340 U	380 U	410
Dibenzo (a,h) Anthracene	400 U	370 UJ	380 U	380 U	340 U	380 U	340 U	380 U	410
Benzo (g,h,i) Perylene	400 U	370 UJ	380 U	380 U	340 U	380 U	340 U	380 U	410
MOCA**	50 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	10

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analyses.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline: special analyte
Blank columns indicate that analyses for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
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Well ID	SB305	SB306	SB307	SB308	SB308A	SB312	SB313	DUPSA	SB314
Sample Depth	12-16'	13-17'	20-22'	0-1'	0-0.5'	1.5-2.5'	1.5-2.5'	(SB313-1.5-2.5'	1.5-2.5'
Date Collected	7/29/91	7/29/91	7/30/91	7/18/91	6/18/91	6/18/91	6/18/91	6/18/91	6/18/91
INORGANICS (mg/kg)									
Aluminum	2090	3640	3880	1830	6460	9060	10300	12700	4760
Antimony	7.6 UJ	7.8 UJ	7.5 UJ	6.8 UJ	7.7 UJ	7.3 UJ	7.0 UJ	6.9 UJ	7.0 UJ
Arsenic	3.8 J	4.5 J	2.3 J	9.1 J	5.6 J	5.5 J	4.4 J	5.3 J	4.6 J
Barium	9.8	13.9	17.4	12.5	79.4	44.5	55.7	70.8	36.4
Beryllium	0.23 U	0.24 U	0.23 U	0.21 U	0.41 U	0.35 U	0.38 U	0.43 U	0.23 U
Cadmium	0.93 U	0.94 U	0.91 U	0.83 U	53.2 J	0.88 U	0.85 U	0.84 U	0.85 U
Calcium	43500	61700	63400	64800	1700	5810	9640	11300	98200
Chromium	4.1 J	6.4 J	6.3 J	5.5 J	17.2	12.7	13.7	18.8	8.5
Cobalt	1.4	3.4	2.9	3.3	6.8	4.2	6.3	5.4	2.8
Copper	10.3	26.8	21.2	7.6	19.4	10.5	10.9	12.2	8.3
Iron	5910	9670	6700	9090	12000	11800	14000	15900	8920
Lead	4.1	5.2	3	5.7	162	86	9.0	6.3	6.8
Magnesium	16200	25200	15100	15600	1480	3670	4290	7280	61000
Manganese	169 J	298 J	159 J	297 J	718 J	327 J	363 J	371 J	711 J
Mercury	0.12 U	0.11 U	0.1 U	0.11 U	0.37	0.11 U	0.11	0.14	0.11 U
Nickel	5.6 J	9 J	6.9 J	8.2 J	11.8	10.9	13.3	13.9	6.2
Potassium	312	678	780	415	589 U	900 U	710 U	1070 U	463 U
Selenium	0.91 U	0.92 U	0.89 U	0.83 U	0.94 U	0.89 U	0.87 U	0.87 U	0.86 U
Silver	1.2 UJ	1.2 UJ	1.1 UJ	1 UJ	1.2 UJ	1.1 UJ	1.1 UJ	1.0 UJ	1.1 UJ
Sodium	173	212	158	235	153	132	113	165	180
Thallium	0.45 U	0.46 U	0.45 U	0.41 U	0.47 U	0.44 U	0.87 U	0.43 U	0.43 U
Vanadium	7.4	12.2	10.5	8.3	18.2	21.2	24.8	34.2	15.2
Zinc	22.6	37.1 J	23	21.6 J	370 J	35.1 J	55.0 J	54.4 J	30.0 J
Cyanide									
VOLATILE ORGANICS (µg/kg)									
Chloromethane	12 U	12 U	11 U	11 UJ	12 UJ				
Bromomethane	12 U	12 U	11 U	11 U	12 U				
Vinyl Chloride	12 U	12 U	11 U	11 UJ	12 U				
Chloroethane	12 U	12 U	11 U	11 UJ	12 U				
Methylene Chloride	32 UJ	50 UJ	24 UJ	17 UJ	22 UJ				
Acetone	67 UJ	210 UJ	38 UJ	21 UJ	12 UJ				
Carbon Disulfide	12 U	12 U	11 U	11 U	12 U				
1,1-Dichloroethene	12 U	12 U	11 U	11 U	12 U				
1,1-Dichloroethane	12 U	12 U	11 U	11 U	12 U				
1,2-Dichloroethene (total)	12 U	1 J	11 U	11 U	12 U				
Chloroform	12 U	12 U	11 U	11 U	12 U				
1,2-Dichloroethane	12 U	12 U	11 U	11 U	12 U				
2-Butanone	12 UJ	12 UJ	11 UJ	11 U	12 U				
1,1,1-Trichloroethane	12 U	12 U	11 U	11 U	12 U				
Carbon Tetrachloride	12 U	12 U	11 U	11 U	12 U				
Vinyl Acetate									
Bromodichloromethane	12 U	12 U	11 U	11 U	12 U				
1,2-Dichloropropane	12 U	12 U	11 U	11 U	12 U				
cis-1,3-Dichloropropene	12 U	12 U	11 U	11 U	12 U				
Trichloroethene	12 U	12 U	11 U	11 U	12 U				
Dibromochloromethane	12 U	12 U	11 U	11 U	12 U				
1,1,2-Trichloroethane	12 U	12 U	11 U	11 U	12 U				
Benzene	12 U	12 U	11 U	11 U	12 U				
Trans-1,3-Dichloropropene	12 U	12 U	11 U	11 U	12 U				
Bromoform	12 U	12 U	11 U	11 U	12 U				
4-Methyl-2-Pentanone	12 U	12 U	11 U	11 U	12 U				
2-Hexanone	12 U	12 U	11 U	11 U	12 U				
Tetrachloroethene	12 U	12 U	11 U	11 U	12 U				
1,1,2,2-Tetrachloroethane	12 U	12 U	11 U	11 U	12 U				
Toluene	12 U	12 U	11 U	11 U	12 U				
Chlorobenzene	12 U	12 U	11 U	11 U	12 U				
Ethylbenzene	12 U	12 U	11 U	11 U	12 U				
Styrene	12 U	12 U	11 U	11 U	12 U				
Total Xylenes	12 U	12 U	11 U	11 U	12 U				

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	SB305	SB306	SB307	SB308	SB308A	SB312	SB313	DUPSA	SB314
Sample Depth	12-16'	13-17'	20-22'	0-1'	0-0.5'	1.5-2.5'	1.5-2.5'	(SB313-1.5-2.5'	1.5-2.5'
Date Collected	7/29/91	7/29/91	7/30/91	7/18/91	6/18/91	6/18/91	6/18/91	6/18/91	6/18/91
SEMI-VOLATILE ORGANICS (µg/kg)									
Phenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
bis (2-Chloroethyl) Ether	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2-Chlorophenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
1,3-Dichlorobenzene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
1,4-Dichlorobenzene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Benzyl Alcohol									
1,2-Dichlorobenzene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2-Methylphenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2,2'-Oxybis(1-Chloropropane)	380 U	380 U	380 U	340 UJ	400 UJ	360 UJ	390 UJ	390 U	330 U
bis (2-Chloroisopropyl) Ether									
4-Methylphenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
N-Nitroso-Di-n-Propylamine	380 UJ	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Hexachloroethane	380 UJ	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Nitrobenzene	380 UJ	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Isophorone	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2-Nitrophenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2,4-Dimethylphenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Benzoic Acid									
bis (2-Chloroethoxy) Methane	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2,4-Dichlorophenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
1,2,4-Trichlorobenzene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Naphthalene	380 U	380 U	380 U	340 UJ	45 J	360 U	390 U	390 U	330 U
4-Chloroaniline	380 UJ	380 U	380 U	340 UJ	400 UJ	360 UJ	390 UJ	390 UJ	330 U
Hexachlorobutadiene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
4-Chloro-3-Methylphenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2-Methylnaphthalene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Hexachlorocyclopentadiene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2,4,6-Trichlorophenol	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2,4,5-Trichlorophenol	930 U	940 U	910 U	830 UJ	980 U	880 U	960 U	940 U	800 U
2-Chloronaphthalene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2-Nitroaniline	930 UJ	940 U	910 U	830 UJ	980 UJ	880 UJ	960 UJ	940 UJ	800 U
Dimethyl Phthalate	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Acenaphthylene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
2,6-Dinitrotoluene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
3-Nitroaniline	930 U	940 U	910 U	830 UJ	980 U	880 U	960 U	940 U	800 U
Acenaphthene	380 U	380 U	380 U	340 UJ	250 J	360 U	390 U	390 U	330 U
2,4-Dinitrophenol	930 UJ	940 U	910 U	830 UJ	980 UR	880 UR	960 UR	940 UR	800 U
4-Nitrophenol	930 UJ	940 U	910 U	830 UJ	980 U	880 U	960 U	940 U	800 U
Dibenzofuran	380 U	380 U	380 U	340 UJ	95 J	360 U	390 U	390 U	330 U
2,4-Dinitrotoluene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Diethylphthalate	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
4-Chlorophenyl-phenylether	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Fluorene	380 U	380 U	380 U	340 UJ	230 J	360 U	390 U	390 U	330 U
4-Nitroaniline	930 U	940 U	910 U	830 UJ	980 U	880 U	960 U	940 U	800 U
4,6-Dinitro-2-Methylphenol	930 U	940 U	910 U	830 UJ	980 U	880 U	960 U	940 U	800 U
N-Nitrosodiphenylamine (1)	380 UJ	380 U	380 U	340 UJ	400 UJ	360 UJ	390 UJ	390 UJ	330 U
4-Bromophenyl-phenylether	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Hexachlorobenzene	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Pentachlorophenol	930 U	940 U	910 U	830 UJ	980 U	880 U	960 U	940 U	800 U
Phenanthrene	380 U	380 U	380 U	340 UJ	4200 J	360 U	390 U	390 U	330 U
Anthracene	380 U	380 U	380 U	340 UJ	420	360 U	390 U	390 U	330 U
Carbazole	380 U	380 U	380 U	340 UJ	400	360 U	390 U	390 U	330 U
Di-n-Butylphthalate	380 U	380 U	380 U	340 UJ	61 U	360 U	390 U	390 U	330 U
Fluoranthene	380 U	380 U	380 U	340 UJ	7300 J	360 U	390 U	390 U	330 U
Pyrene	380 U	380 U	380 U	340 UJ	6800 J	360 U	390 U	390 U	330 U
Butylbenzylphthalate	380 UJ	40 U	39 U	340 UJ	41 U	360 U	390 U	390 U	330 U
3,3'-Dichlorobenzidine	380 U	380 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Benzo (a) Anthracene	380 U	380 U	380 U	340 UJ	2700	360 U	390 U	390 U	330 U
Chrysene	380 U	380 U	380 U	340 UJ	2400	360 U	390 U	390 U	330 U

Well ID	SB305	SB306	SB307	SB308	SB308A	SB312	SB313	DUPSA	SB314
Sample Depth	12-16'	13-17'	20-22'	0-1'	0-0.5'	1.5-2.5'	1.5-2.5'	(SB313-1.5-2.5'	1.5-2.5'
Date Collected	7/29/91	7/29/91	7/30/91	7/18/91	6/18/91	6/18/91	6/18/91	6/18/91	6/18/91
SEMI-VOLATILE ORGANICS (µg/kg)									
bis (2-Ethylhexyl) Phthalate	380 UJ	390 U	450 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Di-n-Octyl Phthalate	380 UJ	390 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Benzo (b) Fluoranthene	380 U	390 U	380 U	340 UJ	5100 X	360 U	390 U	390 U	330 U
Benzo (k)Fluoranthene	380 U	390 U	380 U	340 UJ	5100 X	360 U	390 U	390 U	330 U
Benzo (a) Pyrene	380 U	390 U	380 U	340 UJ	2200	360 U	390 U	390 U	330 U
Indeno (1,2,3-cd) Pyrene	380 U	390 U	380 U	340 UJ	1100	360 U	390 U	390 U	330 U
Dibenzo (a,h) Anthracene	380 U	390 U	380 U	340 UJ	340 J	360 U	390 U	390 U	330 U
Benzo (g,h,i) Perylene	380 U	390 U	380 U	340 UJ	1000	360 U	390 U	390 U	330 U
MOCA**	20	10 U	10 U	10 U	10	10 U	10 U	10 U	10 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) Cannot be separated from Diphenylamine
X Indistinguishable isomers
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	SB315	BS3	BS3	BS3	BS4	BS4	BS4	BS5	BS5
Sample Depth	1.5-2.5'	14-16'	16-18'	23-25'	8-10'	13-15'	18-18.5'	9-9.75'	11-13'
Date Collected	6/18/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91
INORGANICS (mg/kg)		SAND	SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAN
Aluminum	8270		2850	4790	3190	5000			
Antimony	7.0 UJ		7.6 UJ	7.5 UJ	7.7 UJ	9 UJ			
Arsenic	5.3 J		1.4 J	2.4 J	2.2 J	3.4 J			
Barium	42.2		11.3	25	15.8	24.7			
Beryllium	0.35 U		0.23 U	0.24 U	0.23 U	0.27 U			
Cadmium	0.84 U		0.92 U	0.91 U	0.93 U	1.1 U			
Calcium	37800		22400	57400	45200	35300			
Chromium	11.7		7.6 J	8.8 J	6.2 J	10.6 J			
Cobalt	4.2		2.4	3.6	2.5	3.6			
Copper	9.7		8.7	14.1	7.1	55.1			
Iron	11100		5720	8130	6410	8080			
Lead	8.5		2.4	4	3.1	7.5			
Magnesium	23400		12000	19800	14800	11400			
Manganese	289 J		136	199	158	218			
Mercury	0.11 U		0.11 U	0.11 U	0.12 U	0.14 U			
Nickel	9.7		6.5	9.9	6.6	9.1			
Potassium	805 U		536	981	702	889			
Selenium	0.84 U		0.91 U	0.91 U	0.89 U	1.1 U			
Silver	1.1 UJ		1.1 UJ	1.1 UJ	1.2 UJ	1.4 UJ			
Sodium	143		182 J	180 J	175 J	184 J			
Thallium	0.42 U		0.46 U	0.45 U	0.44 U	0.55 U			
Vanadium	18.2		9.6 J	12.3 J	9.7 J	12.3 J			
Zinc	30.9 J		21.1	24.9	22.7	47.4			
Cyanide									
VOLATILE ORGANICS (ug/kg)									
Chloromethane									
Bromomethane									
Vinyl Chloride									
Chloroethane									
Methylene Chloride									
Acetone									
Carbon Disulfide									
1,1-Dichloroethene									
1,1-Dichloroethane									
1,2-Dichloroethene (total)									
Chloroform									
1,2-Dichloroethane									
2-Butanone									
1,1,1-Trichloroethane									
Carbon Tetrachloride									
Vinyl Acetate									
Bromodichloromethane									
1,2-Dichloropropane									
cis-1,3-Dichloropropene									
Trichloroethene									
Dibromochloromethane									
1,1,2-Trichloroethane									
Benzene									
Trans-1,3-Dichloropropene									
Bromoform									
4-Methyl-2-Pentanone									
2-Hexanone									
Tetrachloroethene									
1,1,2,2-Tetrachloroethane									
Toluene									
Chlorobenzene									
Ethylbenzene									
Styrene									
Total Xylenes									

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	SB315	BS3	BS3	BS3	BS4	BS4	BS4	BS5	BS5
Sample Depth	1.5-2.5'	14-16'	16-18'	23-25'	8-10'	13-15'	18-18.5'	9-9.75'	11-13'
Date Collected	6/18/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91
SEMI-VOLATILE ORGANICS (µg/kg)		SAND	SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND
Phenol	380 U		380 U	370 U		450 U		380 U	
bis (2-Chloroethyl) Ether	380 U		380 U	370 U		450 U		380 U	
2-Chlorophenol	380 U		380 U	370 U		450 U		380 U	
1,3-Dichlorobenzene	380 U		380 U	370 U		450 U		380 U	
1,4-Dichlorobenzene	380 U		380 U	370 U		450 U		380 U	
Benzyl Alcohol									
1,2-Dichlorobenzene	380 U		380 U	370 U		450 U		380 U	
2-Methylphenol	380 U		380 U	370 U		450 U		380 U	
2,2'-Oxybis(1-Chloropropane)	380 UJ		380 U	370 U		450 UJ		380 U	
bis (2-Chloroisopropyl) Ether									
4-Methylphenol	380 U		380 U	370 U		450 U		380 U	
N-Nitroso-Di-n-Propylamine	380 U		380 UJ	370 UJ		450 U		380 UJ	
Hexachloroethane	380 U		380 U	370 U		450 U		380 U	
Nitrobenzene	380 U		380 U	370 U		450 U		380 U	
Isophorone	380 U		380 U	370 U		450 U		380 U	
2-Nitrophenol	380 U		380 U	370 U		450 U		380 U	
2,4-Dimethylphenol	380 U		380 UJ	370 UJ		450 U		380 UJ	
Benzoic Acid									
bis (2-Chloroethoxy) Methane	380 U		380 U	370 U		450 U		380 U	
2,4-Dichlorophenol	380 U		380 U	370 U		450 U		380 U	
1,2,4-Trichlorobenzene	380 U		380 U	370 U		450 U		380 U	
Naphthalene	380 U		380 U	370 U		450 U		380 U	
4-Chloroaniline	380 UJ		380 UJ	370 UJ		450 UJ		380 UJ	
Hexachlorobutadiene	380 U		380 U	370 U		450 UJ		380 U	
4-Chloro-3-Methylphenol	380 U		380 UJ	370 UJ		450 U		380 U	
2-Methylnaphthalene	380 U		380 U	370 U		450 U		380 U	
Hexachlorocyclopentadiene	380 U		380 U	370 U		450 U		380 U	
2,4,6-Trichlorophenol	380 U		380 U	370 U		450 U		380 U	
2,4,5-Trichlorophenol	930 U		920 U	910 U		1100 U		930 U	
2-Chloronaphthalene	380 U		380 U	370 U		450 U		380 U	
2-Nitroaniline	930 UJ		920 U	910 U		1100 UJ		930 U	
Dimethyl Phthalate	380 U		380 U	370 U		450 U		380 U	
Acenaphthylene	380 U		380 U	370 U		450 U		380 U	
2,6-Dinitrotoluene	380 U		380 U	370 U		450 U		380 U	
3-Nitroaniline	930 U		920 U	910 U		1100 UJ		930 U	
Acenaphthene	380 U		380 U	370 U		450 U		380 U	
2,4-Dinitrophenol	930 UR		920 UJ	910 UJ		1100 UJ		930 UJ	
4-Nitrophenol	930 U		920 UJ	910 UJ		1100 U		930 UJ	
Dibenzofuran	380 U		380 U	370 U		450 U		380 U	
2,4-Dinitrotoluene	380 U		380 U	370 U		450 U		380 U	
Diethylphthalate	380 U		380 U	370 U		450 U		380 U	
4-Chlorophenyl-phenylether	380 U		380 U	370 U		450 U		380 U	
Fluorene	380 U		380 U	370 U		450 U		380 U	
4-Nitroaniline	930 U		920 UJ	910 UJ		1100 UJ		930 UJ	
4,6-Dinitro-2-Methylphenol	930 U		920 U	910 U		1100 U		930 U	
N-Nitrosodiphenylamine (1)	380 UJ		380 UJ	370 UJ		450 U		380 UJ	
4-Bromophenyl-phenylether	380 U		380 U	370 U		450 U		380 U	
Hexachlorobenzene	380 U		380 U	370 U		450 U		380 U	
Pentachlorophenol	930 U		920 U	910 U		1100 U		930 U	
Phenanthrene	380 U		380 U	370 U		450 U		380 U	
Anthracene	380 U		380 U	370 U		450 U		380 U	
Carbazole	380 U		380 U	370 U		450 U		380 U	
Di-n-Butylphthalate	380 U		380 U	370 U		450 U		380 U	
Fluoranthene	380 U		380 U	370 U		450 U		380 U	
Pyrene	380 U		380 U	370 U		450 U		380 U	
Butylbenzylphthalate	380 U		380 U	370 U		450 U		380 U	
3,3'-Dichlorobenzidine	380 U		380 UJ	370 UJ		450 U		380 UJ	
Benzo (a) Anthracene	380 U		380 U	370 U		450 U		380 U	
Chrysene	380 U		380 U	370 U		450 U		380 U	

ANALYTICAL RESULTS
ROTOPRESS SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	SB515	BS3	BS3	BS3	BS4	BS4	BS4	BS5	BS5
Sample Depth	1.5-2.5'	14-16'	16-18'	23-25'	8-10'	13-15'	18-18.5'	9-9.75'	11-13'
Date Collected	6/18/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91
SEMI-VOLATILE ORGANICS (ug/kg)		SAND	SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND	SILTY S.
bis (2-Ethylhexyl) Phthalate	380 U		380 U	370 U		450 U		380 U	
Di-n-Octyl Phthalate	380 U		380 UJ	370 UJ		450 U		380 UJ	
Benzo (b) Fluoranthene	380 U		380 U	370 U		450 U		380 U	
Benzo (k)Fluoranthene	380 U		380 U	370 U		450 U		380 U	
Benzo (a) Pyrene	380 U		380 U	370 U		450 U		380 U	
Indeno (1,2,3-cd) Pyrene	380 U		380 U	370 U		450 U		380 U	
Dibenzo (a,h) Anthracene	380 U		380 U	370 U		450 U		380 U	
Benzo (g,h,i) Perylene	380 U		380 U	370 U		450 U		380 U	
MOCA**	10 U	10 U		10 U			10 U		10

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) Cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline: special analyte
Blank columns indicate that analysis for the compound was not performed.

Well ID	BS5	BS5	BS6	BS6	BS6	BS6	BS6
Sample Depth	15-17'	21-23'	5-7'	13-15'	15-17'	17-19'	17-19'
Date Collected	7/2/91	7/2/91	7/8/91	7/8/91	7/8/91	7/8/91	7/8/91
INORGANICS (mg/kg)	SAND	SAND	SAND	SILTY SAND	SILTY SAND	SAND	SILTY SAND
Aluminum	1600	1620				1830	2540
Antimony	7.7 UJ	7.3 UJ				7.1 UJ	7.1 UJ
Arsenic	1.1 UJ	1.3 J				2.2 J	1.8 J
Barium	9.1	6.6				7.6	15
Beryllium	0.23 U	0.22 U				0.22 U	0.22 U
Cadmium	0.93 U	0.97				0.86 U	0.86 U
Calcium	42500	51100				46500	58000
Chromium	4.8 J	4.4 J				6.4 J	4.8 J
Cobalt	1.4 U	2.2				1.4	2.1
Copper	11.7	53.3				12.6	15.5
Iron	3560	4110				5080	5620
Lead	1.5	2.1				3.5 J	2.9
Magnesium	11500	13500				18200	20000
Manganese	104	123				107	212
Mercury	0.12 U	0.11 U				0.11 U	0.11 U
Nickel	4.7	7				6.6	5.4
Potassium	453	507				430	739
Selenium	0.91 U	0.89 U				0.86 U	0.88 U
Silver	1.2 UJ	1.1 UJ				1.1 UJ	1.1 UJ
Sodium	214 J	137 J				175 J	178 J
Thallium	0.46 U	0.44 U				0.43 U	0.44 U
Vanadium	6 J	5.8 J				6.3 J	8.5 J
Zinc	16.5 U	33.7				26.7	22.7
Cyanide							
VOLATILE ORGANICS (ug/kg)							
Chloromethane							
Bromomethane							
Vinyl Chloride							
Chloroethane							
Methylene Chloride							
Acetone							
Carbon Disulfide							
1,1-Dichloroethene							
1,1-Dichloroethane							
1,2-Dichloroethene (total)							
Chloroform							
1,2-Dichloroethane							
2-Butanone							
1,1,1-Trichloroethane							
Carbon Tetrachloride							
Vinyl Acetate							
Bromodichloromethane							
1,2-Dichloropropane							
cis-1,3-Dichloropropene							
Trichloroethene							
Dibromochloromethane							
1,1,2-Trichloroethane							
Benzene							
Trans-1,3-Dichloropropene							
Bromoform							
4-Methyl-2-Pentanone							
2-Hexanone							
Tetrachloroethene							
1,1,2,2-Tetrachloroethane							
Toluene							
Chlorobenzene							
Ethylbenzene							
Styrene							
Total Xylenes							

ANALYTICAL RESULTS
ROTOFINISH SITE
SOIL SAMPLES

Revision: 10:56 AM, 10/15/93
(MASTER_S.XLS)

Well ID	BS5	BS5	BS6	BS6	BS6	BS6	BS6
Sample Depth	15-17'	21-23'	5-7'	13-15'	15-17'	17-19'	17-19'
Date Collected	7/2/91	7/2/91	7/8/91	7/8/91	7/8/91	7/8/91	7/8/91
SEMI-VOLATILE ORGANICS (ug/kg)	SAND	SAND	SAND	SILTY SAND	SILTY SAND	SAND	SILTY SAND
Phenol	380 U	370 U	380 U		370 U		
bis (2-Chloroethyl) Ether	380 U	370 U	380 U		370 U		
2-Chlorophenol	380 U	370 U	380 U		370 U		
1,3-Dichlorobenzene	380 U	370 U	380 U		370 U		
1,4-Dichlorobenzene	380 U	370 U	380 U		370 U		
Benzyl Alcohol							
1,2-Dichlorobenzene	380 U	370 U	380 U		370 U		
2-Methylphenol	380 U	370 U	380 UJ		370 U		
2,2'-Oxybis(1-Chloropropane)	380 UJ	370 U	380 U		370 UJ		
bis (2-Chloroisopropyl) Ether							
4-Methylphenol	380 U	370 U	380 U		370 U		
N-Nitroso-Di-n-Propylamine	380 U	370 UJ	380 U		370 U		
Hexachloroethane	380 U	370 U	380 U		370 U		
Nitrobenzene	380 U	370 U	380 U		370 U		
Isophorone	380 U	370 U	380 U		370 U		
2-Nitrophenol	380 U	370 U	380 U		370 U		
2,4-Dimethylphenol	380 U	370 UJ	380 U		370 U		
Benzoic Acid							
bis (2-Chloroethoxy) Methane	380 U	370 U	380 U		370 U		
2,4-Dichlorophenol	380 U	370 U	380 U		370 U		
1,2,4-Trichlorobenzene	380 U	370 U	380 U		370 U		
Naphthalene	380 U	370 U	380 U		370 U		
4-Chloroaniline	380 UJ	370 UJ	380 U		370 UJ		
Hexachlorobutadiene	380 UJ	370 U	380 U		370 U		
4-Chloro-3-Methylphenol	380 U	370 UJ	380 U		370 U		
2-Methylnaphthalene	380 U	370 U	380 U		370 U		
Hexachlorocyclopentadiene	380 U	370 U	380 U		370 U		
2,4,6-Trichlorophenol	380 U	370 U	380 U		370 U		
2,4,5-Trichlorophenol	930 U	880 U	910 U		880 U		
2-Chloronaphthalene	380 U	370 U	380 U		370 U		
2-Nitroaniline	930 UJ	880 UJ	910 U		880 UJ		
Dimethyl Phthalate	380 U	370 U	380 U		370 U		
Acenaphthylene	380 U	370 U	380 U		370 U		
2,6-Dinitrotoluene	380 U	370 U	380 U		370 U		
3-Nitroaniline	930 UJ	880 U	910 U		880 U		
Acenaphthene	380 U	370 U	380 U		370 U		
2,4-Dinitrophenol	930 UJ	880 UJ	910 UJ		880 UJ		
4-Nitrophenol	930 U	880 UJ	910 UJ		880 U		
Dibenzofuran	380 U	370 U	380 U		370 U		
2,4-Dinitrotoluene	380 U	370 U	380 U		370 U		
Diethylphthalate	380 U	370 U	380 U		370 U		
4-Chlorophenyl-phenylether	380 U	370 U	380 U		370 U		
Fluorene	380 U	370 U	380 U		370 U		
4-Nitroaniline	930 UJ	880 UJ	910 UJ		880 U		
4,6-Dinitro-2-Methylphenol	930 U	880 U	910 U		880 U		
N-Nitrosodiphenylamine (1)	380 U	370 UJ	380 U		370 UJ		
4-Bromophenyl-phenylether	380 U	370 U	380 U		370 U		
Hexachlorobenzene	380 U	370 U	380 U		370 U		
Pentachlorophenol	930 U	880 U	910 U		880 UJ		
Phenanthrene	380 U	370 U	380 U		370 U		
Anthracene	380 U	370 U	380 U		370 U		
Carbazole	380 U	370 U	380 U		370 U		
Di-n-Butylphthalate	380 U	370 U	380 U		370 UJ		
Fluoranthene	380 U	370 U	380 U		370 U		
Pyrene	380 U	370 U	380 U		370 U		
Butylbenzylphthalate	380 U	370 U	380 U		370 UJ		
3,3'-Dichlorobenzidine	380 U	370 UJ	380 U		370 U		
Benzo (a) Anthracene	380 U	370 U	380 U		370 U		
Chrysene	380 U	370 U	380 U		370 U		

Well ID	BS5	BS5	BS6	BS6	BS6	BS6	BS6
Sample Depth	15-17'	21-23'	5-7'	13-15'	15-17'	17-19'	17-19'
Date Collected	7/2/91	7/2/91	7/8/91	7/8/91	7/8/91	7/8/91	7/8/91
SEMI-VOLATILE ORGANICS (µg/kg)	SAND	SAND	SAND	SILTY SAND	SILTY SAND	SAND	SILTY SAND
bis (2-Ethylhexyl) Phthalate	380 U	370 U	380 UJ		180 UJ		
Di-n-Octyl Phthalate	380 U	370 UJ	380 U		370 U		
Benzo (b) Fluoranthene	380 U	370 U	380 U		370 U		
Benzo (k)Fluoranthene	380 U	370 U	380 U		370 U		
Benzo (a) Pyrene	380 U	370 U	380 U		370 U		
Indeno (1,2,3-cd) Pyrene	380 U	370 U	380 U		370 U		
Dibenzo (a,h) Anthracene	380 U	370 U	380 U		370 U		
Benzo (g,h,i) Perylene	380 U	370 U	380 U		370 U		
MOCA**	10 U	10 U	10 U	10 U			

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) Cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

APPENDIX B

Summary of Groundwater Sample Results

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 2:47 PM, 10/14/93
(MASTER_W.XLS)

Well ID	MWA1	MWA2	MWA3	MWA4	MWA5	MWA6	MWB1	MWB1
Sample Depth	43'-46'	33'-36'	46.5'-49.5'	47'-50'	41'-44'	41.5'-44.5'	64'-66'	144'-146'
Date Collected	5/4/89	5/5/89	5/5/89	5/5/89	5/5/89	5/4/89	6/26/91	6/25/91
INORGANICS (µg/l))								
Aluminum	21.4 U	21.4 U	130	21.4 U	21.4 U	21.4 U	104 U	138 U
Antimony	31.5 U	31.5 U	31.5 U	31.5 U	31.5 U	31.5 U	33 U	33 U
Arsenic	4.1 J	1.2 UJ	6 UJ	1.2 UJ	1.5 J	1.6 J	5 U	10.8
Barium	69.7	65.6	12.2	52.2	105	93.4	51.4	77.3
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	1 U	1 U
Cadmium	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4 U	4 U
Calcium	79900	84200	13200	120000	100000	120000	75000	66300
Chromium	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	4 U	4 U
Colbalt	6.6 U	8.7 U	11.1 U	12.2 U	12.4 U	5.6 U	6 U	6 U
Copper	7.3 U	7.3 U	7.9	7.3 U	7.3 U	7.3 U	4.5	4.9
Iron	149	54.5	155	7.7 U	195	316	74.9	1230
Lead	9 UJ	9 UJ	9 UJ	9 UJ	9 UJ	0.9 UR	2.2 UJ	2.4 UJ
Magnesium	25900	26400	4910	32600	27800	37100	24800	16900
Manganese	77.9	219	25.8	8.1	80.4	53.8	437	160
Mercury	0.2 U	0.2 U	0.24	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	18.6 U	18.6 U	18.6 U	18.6 U	18.6 U	18.6 U	12.4	9 U
Potassium	3020 U	3630 U	4140	4620 U	8040 U	1740 U	2830	1730
Selenium	5 UJ	5 U	5 U	5 U	5 U	5 U	4 U	4 U
Silver	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	5 U	5 U
Sodium	11300 U	28000	223000	30800	21600	23000	29700	6970
Thallium	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	2 UJ	2 UJ
Vanadium	6.1 U	6.9 U	9.1 U	11.3 U	10.7 U	5.8 U	3 U	3 U
Zinc	16.9 U	42	27.9 U	10.7 U	18.2 U	20.4 U	111	220
Cyanide	10 U	10 U	10 U	10 U	10 U	10 U	15.3	15.9 J
VOLATILE ORGANICS (µg/l)								
Chloromethane	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	79	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	5 UJ	5 UJ	10 UJ	5 UJ	5 UJ	5 UJ	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
1,1-Dichloroethene	1 J	5 U	5 U	5 U	5 U	5 U	10 U	10 U
1,1-Dichloroethane	83	5 U	4 J	5 U	5 U	5 U	1 J	10 U
1,2-Dichloroethene (total)	5 U	5 U	7	5 U	5 U	5 U	10 U	10 U
Chloroform	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
2-Butanone	10 UR	10 UR	10 UF	10 UF	10 UF	10 UR	10 UJ	10 UJ
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Vinyl Acetate	10 U	10 U	10 U	10 U	10 U	10 U		
Bromodichloromethane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Trichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Dibromochloromethane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Benzene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Bromoform	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	10 U	10 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Toluene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Styrene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U
Total Xylenes	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 U

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 11:10 AM, 10/15/93
(MASTER_W.XLS)

Well ID	MWA1	MWA2	MWA3	MWA4	MWA5	MWA6	MWB1	MWB1
Sample Depth	43'-45'	33'-35'	46.5'-49.5'	47'-50'	41'-44'	41.5'-44.5'	64'-66'	144'-146'
Date Collected	5/4/89	5/5/89	5/5/89	5/5/89	5/5/89	5/4/89	6/26/91	6/25/91
SEMI-VOLATILE ORGANICS (ug/l)								
Phenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
bis (2-Chloroethyl) Ether	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U		
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,2'-Oxybis(1-Chloropropane)							10 UJ	10 UJ
bis (2-Chloroisopropyl) Ether	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U		
4-Methylphenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
Isophorone	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1[illegible]
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10[illegible]
Benzoic Acid	50 UR	50 UR	50 UF	50 UF	50 UF	50 UR		
bis (2-Chloroethoxy) Methane	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	25 U	25 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	25 UJ	25 UJ
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	50 UJ	50 UJ	50 U	50 U	50 U	50 U	25 U	2[illegible]
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10[illegible]
2,4-Dinitrophenol	50 U	50 U	50 UJ	50 UJ	50 UJ	50 UJ	25 UJ	25 UJ
4-Nitrophenol	50 UJ	50 UJ	50 U	50 U	50 U	50 U	25 U	25 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
4-Nitroaniline	50 UJ	50 UJ	50 U	50 U	50 U	50 U	25 U	25 U
4,6-Dinitro-2-Methylphenol	50 UJ	50 UJ	50 U	50 U	50 U	50 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	25 U	2 J
Phenanthrene	4 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbazole							10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U
3,3'-Dichlorobenzidine	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	10 U	10 U
Benzo (a) Anthracene	6 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	6 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 2:47 PM, 10/14/93
(MASTER_W.XLS)

Well ID	*MWA1*	*MWA2*	*MWA3*	*MWA4*	*MWA6*	*MWA6*	*MWB1*	*MWB1*
Sample Depth	*43'-46'*	*33'-36'*	*46.5'-49.5'*	*47'-50'*	*41'-44'*	*41.5'-44.5'*	*64'-66'*	*144'-146'*
Date Collected	*5/4/89*	*5/5/89*	*5/5/89*	*5/5/89*	*5/5/89*	*5/4/89*	*6/26/91*	*6/25/91*
SEMI-VOLATILE ORGANICS (µg/l)								
bis (2-Ethylhexyl) Phthalate	47 J	43 J	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (b) Fluoranthene	5 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (k)Fluoranthene	6 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (a) Pyrene	4 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene	2 J	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U
Dibenzo (a,h) Anthracene	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U
Benzo (g,h,i) Perylene	3 J	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
MOCA**	1 U	1 U	1 U	1 U	1 U	1 U	0.2 U	0.2 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 2:47 PM, 10/14/93
(MASTER_W.XLS)

Well ID	MW82B	MW82B	MW82B	MW82B	MW82B	MW82B	MW82B	MW82B
Sample Depth	19.5'-21.5'	44'-46'	48'-50'	53'-55'	58'-60'-	63'-65'	73'-75'	78'-80'
Date Collected	6/18/91	6/18/91	6/18/91	6/17/91	6/17/91	6/17/91	6/14/91	6/14/91
INORGANICS (ug/l)								
Aluminum	378 U	143 U	134 U	892	108 U	80.0 U	111 U	140 U
Antimony	33.0 U	33.0 U	33.0 U	33.0 U	33.0 U	33.0 U	33.0 U	33.0 U
Arsenic	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	26.7 J
Barium	59.6 J	130 J	106 J	161 J	92 J	84.8 J	279 J	116 J
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Calcium	54400	176000	130000	126000	89700	102000	102000	42900
Chromium	5.5 J	4.3 J	4.0 UJ	4.4 J	4.0 UJ	4.0 UJ	4.0 UJ	4.0 U
Cobalt	6.0 U	10.0	8.4	10.8	6.0 U	6.0 U	8.1	6.0 U
Copper	11.7	12.9	10.9	16.7	12.1	11.7	11.7	4.2
Iron	402	40.4 U	40.4 U	2000	34.3 U	28.2 U	36.3 U	1900
Lead	2.0 UJ	2.0 UJ	2.1 UJ	6.3 UJ	2.0 UJ	2.0 UJ	4.1 UJ	2.0 U
Magnesium	17600	64200	46800	44800	29400	30800	41500	25200
Manganese	342	1490	1080	1240	704	463	1100	55.8
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	9.0	14.6	20.7	20	12.7	13.2	28.9	[illegible]
Potassium	9240	9180	7120	11700	8760	11700	35000	9830
Selenium	40.0 UJ	4.0 UJ	40.0 UJ	4.0 UJ	4.0 UJ	4.0 UJ	4.0 UJ	4.0 UJ
Silver	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Sodium	248000	88500	42700	44000	28200	31200	74100	105000
Thallium	2.0 UJ	2.0 UJ	2.0 UJ	2.0 UJ	2.0 UJ	2.0 UJ	2.0 UJ	2.0 UJ
Vanadium	3.0 U	3.0 U	3.0 U	5.4	3.0 U	3.0 U	3.6	3.0 U
Zinc	278 J	2340 J	2880 J	2520 J	1480 J	1710 J	3930 J	332 J
Cyanide	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
VOLATILE ORGANICS (ug/l)								
Chloromethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Bromomethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Vinyl Chloride	10 U	10 U	10 U	10	83 U	120 U	18 J	98
Chloroethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	29
Methylene Chloride	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Acetone	10 UJ	10 UJ	10 UJ	10 UJ	83 UJ	120 UJ	20 U	25 U
Carbon Disulfide	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
1,1-Dichloroethene	10 U	6 J	9 J	31	150	250	29	25 U
1,1-Dichloroethane	3 J	18	18	88	49 J	64 J	42	[illegible]
1,2-Dichloroethene (total)	2 J	3 J	1 J	7 J	83 U	120 U	9 J	[illegible]J
Chloroform	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
2-Butanone	10 UJ	10 UJ	10 UJ	10 UJ	83 UJ	120 UJ	20 U	25 U
1,1,1-Trichloroethane	11	28	54	170	1100	2000	280	8 J
Carbon Tetrachloride	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Vinyl Acetate								
Bromodichloromethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Trichloroethene	4 J	5 J	3 J	16	88	170	20	25 U
Dibromochloromethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Benzene	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Bromoform	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
2-Hexanone	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Tetrachloroethene	10 U	10 U	10 U	2 J	83 U	14 J	9 J	25 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Toluene	10 U	10 U	10 U	10 U	83 U	120 U	20 U	5 J
Chlorobenzene	10 U	10 U	10 U	6 J	83 U	120 U	10 J	270
Ethylbenzene	10 U	10 U	10 U	10 U	83 U	120 U	20 U	17 J
Styrene	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Total Xylenes	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 11:11 AM, 10/15/93
(MASTER_W.XLS)

Well ID	MWB2B	MWB2B	MWB2B	MWB2B	MWB2B	MWB2B	MWB2B	MWB2B
Sample Depth	19.5'-21.5'	44'-46'	48'-50'	53'-55'	58'-60'	63'-65'	73'-75'	78'-80'
Date Collected	6/18/91	6/18/91	6/18/91	6/17/91	6/17/91	6/17/91	6/14/91	6/14/91
SEMI-VOLATILE ORGANICS (µg/l)								
Phenol	10 U	10 UR	10 U	10 U	40	17 J	10 UR	10 U
bis (2-Chloroethyl) Ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl Alcohol								
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	27
2-Methylphenol	10 UJ	10 UR	10 UJ	10 UJ	10 U	10 UJ	10 UR	10 U
2,2'-Oxybis(1-Chloropropane)	10 U	10 UJ	10 UJ	10 U	10 UJ	10 UJ	10 U	10 U
bis (2-Chloroisopropyl) Ether								
4-Methylphenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 UJ
2,4-Dimethylphenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 U
Benzoic Acid								
bis (2-Chloroethoxy) Methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 UJ	10 UJ	10 U	10 UJ	10 UJ	10 U	10 U
Hexachlorobutadiene	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 U
2,4,5-Trichlorophenol	25 U	25 UR	25 UJ	25 U	25 U	25 UJ	25 UR	25 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	25 U	25 U	25 U	25 U	25 UJ	25 UJ	25 UJ	25 UJ
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ
3-Nitroaniline	25 U	25 UJ	25 UJ	25 U	25 U	25 U	25 UJ	25 UJ
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 UJ	25 UR	25 UJ	25 UJ	25 UR	25 UR	25 UR	25 UJ
4-Nitrophenol	25 UJ	25 UR	25 UJ	25 UJ	25 U	25 UJ	25 UR	25 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	25 U	25 UJ	25 UJ	25 U	25 UJ	25 UJ	25 UJ	25 UJ
4,6-Dinitro-2-Methylphenol	25 U	25 UR	25 UJ	25 U	25 U	25 UJ	25 UR	25 UJ
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 UR	25 UJ	25 U	25 U	25 UJ	25 UR	25 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbazole	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Butylbenzylphthalate	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 UJ
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ
Benzo (a) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 2:47 PM, 10/14/93
(MASTER_W.XLS)

Well ID	*MW82B*	*MW82B*	*MW82B*	*MW82B*	*MW82B*	*MW82B*	*MW82B*	*MW82B*
Sample Depth	*19.5'-21.5'*	*44'-46'*	*48'-50'*	*53'-55'*	*58'-60'*	*63'-65'*	*73'-75'*	*78'-80'*
Date Collected	*6/18/91*	*6/18/91*	*6/18/91*	*6/17/91*	*6/17/91*	*6/17/91*	*6/14/91*	*6/14/91*
SEMI-VOLATILE ORGANICS (ug/l)								
bis (2-Ethylhexyl) Phthalate	18 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U	15	10 U	10 U
Benzo (b) Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (k)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (a) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo (a,h) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (g,h,i) Perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
MOCA**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analyses.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analyses.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline: special analyte
Blank columns indicate that analyses for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 12:01 PM, 10/15/93
(MASTER_W.XLS)

Well ID	MWB2B	DUPWA	MWB3A	MWB3B	MWB4B	MWB4B	MW302	DUPWD
Sample Depth	83'-85'	(MWB2B-85)	40'-43'	59'-62'	70'-73'	77.5'-79.5'	103'-106'	(MW302-10
Date Collected	6/14/91	6/14/91	10/29/91	10/29/91	10/30/91	10/24/91	10/28/91	10/28/91
INORGANICS (µg/l)								
Aluminum	139 U	168 U	136 U	171 U	91.2 U	92 U	125 U	97.7
Antimony	33.0 U	33.0 U	23 U	23 U	23 U	36 U	23 U	23
Arsenic	15.4 J	50.0 UJ	5 U	5 U	5 U	5 UJ	5 U	5.3
Barium	93.9 J	86.2 J	82.6	67.7	44.5	52.1	218	218
Beryllium	1.0 U	1.0 U	2 U	2 U	2 U	1 U	2 U	2
Cadmium	4.0 U	4.0 U	5 U	5 U	5 U	5 U	5 U	5
Calcium	45500	41500	61900	41300	56800	63100	56800	57200
Chromium	4.0 UJ	4.7 J	7 UJ	7 UJ	7 U	4 U	7 UJ	7 U
Cobalt	6.0 U	6.0 U	7 U	7 U	7 U	5 U	7	7 U
Copper	4.6	7.4	11.7 U	15.5 U	7.8 U	6	3.9 U	3 U
Iron	1180	1090	93.8 U	175 U	392	119	1880	1910
Lead	2.0 UJ	2.0 UJ	2.2 J	2 UJ	2 U	2 U	2.8 J	3.1 J
Magnesium	23800	21700	21800	13900	18000	19800	19000	19100
Manganese	64.6	59	52.8	53.4	44.6	92.4	204	205
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	18.8	17.9	35 U	35 U	35 UJ	8.9	49.9 J	35.4 J
Potassium	4340 U	4740 U	3380	1950	1860 U	1760	6110	6680
Selenium	4.0 UJ	40 UJ	3 UJ	3 UJ	3 UJ	3 U	3 UJ	3 U
Silver	5.0 U	5 U	8 U	8 U	8 U	6 U	8 U	8 U
Sodium	88800	80300	36400	72300	13900	17000 J	49200	49000
Thallium	2.0 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 U
Vanadium	3.0 U	3.4	6 U	6 U	6 U	6 U	6 U	6 U
Zinc	630 J	562 J	97.7	124	32.1	1170	45.9	44.2
Cyanide	10.0 U	10.0 U	10 U	10 U	10 U	20 U	10 U	10 U
VOLATILE ORGANICS (µg/l)								
Chloromethane	17 U	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U
Bromomethane	17 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	100	100	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	12 J	5 J	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	17 U	10 U	24 U	35 U	24 U	10 U	35 U	15 U
Acetone	17 U	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U
Carbon Disulfide	17 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U
1,1-Dichloroethene	17 U	1 J	10 UJ	10 U	8 J	11	10 U	10 U
1,1-Dichloroethane	140	150	10 U	10 U	72	87	5 J	4 J
1,2-Dichloroethene (total)	10 J	10	10 U	10 U	10 U	10 U	6 J	6 J
Chloroform	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	17 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ
2-Butanone	17 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 U	10 U
1,1,1-Trichloroethane	8 J	7 J	10 U	10 U	47	84	5 J	5 J
Carbon Tetrachloride	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Acetate								
Bromodichloromethane	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	17 U	10 U	10 U	10 U	10 U	10 U	4 J	4 J
Dibromochloromethane	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	17 U	10 U	10 UJ	10 UJ	10 U	10 U	10 UJ	10 UJ
Trans-1,3-Dichloropropene	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	17 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	17 U	10 U	10 UJ	10 UJ	10 U	10 U	10 UJ	10 UJ
Chlorobenzene	53	52	10 UJ	10 UJ	10 U	10 U	10 UJ	10 UJ
Ethylbenzene	2 J	2 J	10 UJ	10 UJ	10 U	10 U	10 UJ	10 UJ
Styrene	17 U	10 U	10 UJ	10 UJ	10 U	10 U	10 UJ	10 UJ
Total Xylenes	17 U	10 U	10 UJ	10 UJ	10 U	10 U	10 UJ	10 UJ

ANALYTICAL RESULTS
ROTOPRESS SITE
GROUNDWATER SAMPLES

Revision: 11:29 AM, 10/15/93
(MASTER_W.XLS)

Well ID	MW82B	DUPWA	MW83A	MW83B	MW84B	MW84B	MW302	DUPWD
Sample Depth	83'-85'	(MW82B-85)	40'-43'	59'-62'	70'-73'	77.5'-79.5'	103'-105'	(MW302-10
Date Collected	6/14/91	6/14/91	10/29/91	10/29/91	10/30/91	10/24/91	10/28/91	10/28/91
SEMI-VOLATILE ORGANICS (ug/l):								
Phenol	10 U	10 U	10 U	10 U	10 U	7 J	10 U	10
bis (2-Chloroethyl) Ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Benzyl Alcohol								
1,2-Dichlorobenzene	2 J	3 J	10 U	10 U	10 U	10 U	10 U	10
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,2'-Oxybis(1-Chloropropane)	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10
bis (2-Chloroisopropyl) Ether								
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Benzoic Acid								
bis (2-Chloroethoxy) Methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
4-Chloroaniline	10 U	10 U	10 UJ	10 UJ	10 U	10 UJ	10 UJ	10
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2-Methylnaphthalene	10 U	10 U	10 U	10 U	3 J	10 U	10 U	10
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2-Nitroaniline	25 UJ	25 UJ	25 UJ	25 U	25 U	25 U	25 U	25
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10
3-Nitroaniline	25 UJ	25 UJ	25 U	25 U	25 U	25 UJ	25 U	25
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,4-Dinitrophenol	25 UJ	25 UJ	25 U	25 U	25 U	25 UJ	25 U	25
4-Nitrophenol	25 U	25 U	25 UJ	25 UJ	25 U	1 J	25 UJ	25
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
4-Nitroaniline	25 UJ	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25
4,6-Dinitro-2-Methylphenol	25 UJ	25 UJ	25 U	25 U	25 U	25 U	25 U	25
N-Nitrosodiphenylamine (1)	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Pentachlorophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25
Phenanthrene	10 U	10 U	10 U	10 U	1 J	10 U	10 U	10
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Carbazole	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Fluoranthene	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10
Pyrene	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Benzo (a) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10

Well ID	MWB2B	DUPWA	MWB3A	MWB3B	MWB4B	MWB4B	MW302	DUPWD
Sample Depth	83'-85'	(MWB2B-85)	40'-43'	59'-62'	70'-73'	77.5'-79.5'	103'-106'	(MW302-106')
Date Collected	6/14/91	6/14/91	10/29/91	10/29/91	10/30/91	10/24/91	10/28/91	10/28/91
SEMI-VOLATILE ORGANICS (µg/l)								
bis (2-Ethylhexyl) Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 UJ	10 UJ	10 U	10 UJ	10 UJ
Benzo (b) Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (k)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (a) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo (a,h) Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (g,h,i) Perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
MOCA**	0.2 U	0.2 U	1 U	1 U	1 U	1 U	1 U	1 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline: special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 2:47 PM, 10/14/93
(MASTER_W.XLS)

Well ID	MW309	MW309	MW310	MW310	DUPWE	MWB5A	MWB5B
Sample Depth	103'-105'	108'-110'	82.5-84.5'	87.5-89.5'	(MW310-87.5-89.5)	41.5-44.5'	76.5-79.5'
Date Collected	10/30/91	10/30/91	10/28/91	10/28/91	10/28/91	5/21/93	5/18/93
INORGANICS (ug/l)							
Aluminum		98.8 U	116 U	76.6 U	86.8 U		
Antimony		23 U	23 U	23 U	23 U		
Arsenic		5 U	5 U	5 U	5 U		
Barium		46.8	171	144	146		
Beryllium		2 U	2 U	2 U	2 U		
Cadmium		5 U	5 U	5 U	5 U		
Calcium		80000	133000	123000	124000		
Chromium		7 U	7 UJ	7 UJ	7 UJ		
Cobalt		7 U	21.2	23.2	23		
Copper		11.7 U	15.5 U	15.5 U	13.6 U		
Iron		370	719	910	918		
Lead		2.9	2 UJ	2 UJ	2 UJ		
Magnesium		28400	42500	41700	41800		
Manganese		92	354	86.7	86.7		
Mercury		0.2 U	0.2 U	0.2 U	0.2 U		
Nickel		35 UJ	43.2 J	35 U	37.8 J		
Potassium		1900	15300	9420	8370		
Selenium		3 UJ	3 UJ	3 UJ	3 UJ		
Silver		8 U	8 U	8 U	8 U		
Sodium		49800	96100	89400	89400		
Thallium		2 UJ	2 UJ	2 UJ	2 UJ		
Vanadium		6 U	6 U	6 U	6 U		
Zinc		181	191	20.2	19.9		
Cyanide		10 U	10 U	10 U	10 U		
VOLATILE ORGANICS (ug/l)							
Chloromethane	10 U	17 U	50 U	15 UJ	71 UJ	10 U	10 U
Bromomethane	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
Vinyl Chloride	14	120	50	39 J	110 J	10 U	10 U
Chloroethane	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
Methylene Chloride	10 U	10 U	17 U	31 U	180 U	10 U	10 U
Acetone	27	17 U	50 UJ	15 U	71 UJ	10 UJ	10 UJ
Carbon Disulfide	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
1,1-Dichloroethene	24	72	190 J	220 J	480 J	10 U	7 J
1,1-Dichloroethane	120	200	120	120 J	270 J	10 U	12
1,2-Dichloroethene (total)	14	84	70	76 J	130 J	10 U	[illegible]
Chloroform	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
1,2-Dichloroethane	1 J	17 U	50 U	15 UJ	71 UJ	10 U	10 U
2-Butanone	10 UJ	17 U	50 UJ	15 U	71 UJ	10 U	10 U
1,1,1-Trichloroethane	63	210	1900 J	2200	2700 J	10 U	10
Carbon Tetrachloride	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
Vinyl Acetate							
Bromodichloromethane	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
1,2-Dichloropropane	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
cis-1,3-Dichloropropene	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
Trichloroethene	16	38	130	150	170 J	10 U	10 U
Dibromochloromethane	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
1,1,2-Trichloroethane	2 J	17 U	50 U	5 J	71 UJ	10 U	10 U
Benzene	10 U	17 U	50 UJ	15 UJ	14 J	10 U	10 U
Trans-1,3-Dichloropropene	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
Bromoform	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
4-Methyl-2-Pentanone	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
2-Hexanone	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
Tetrachloroethene	10 U	17 U	25 J	17	24 J	10 U	1 J
1,1,2,2-Tetrachloroethane	10 U	17 U	50 U	15 U	71 UJ	10 U	10 U
Toluene	10 U	17 U	50 UJ	15 UJ	40 J	10 U	2 J
Chlorobenzene	10 U	17 U	17 J	29 J	33 J	10 U	10 U
Ethylbenzene	10 U	17 U	50 UJ	15 UJ	71 UJ	10 U	10 U
Styrene	10 U	17 U	50 UJ	15 UJ	71 UJ	10 U	10 U
Total Xylenes	10 U	17 U	50 UJ	15 UJ	24 J	10 U	10 U

Well ID	MW309	MW309	MW310	MW310	DUPWE	MWB5A	MWB5B
Sample Depth	103'-105'	108'-110'	82.5-84.5'	87.5-89.5'	(MW310-87.5-89.5)	41.5-44.5'	76.5-79.5'
Date Collected	10/30/91	10/30/91	10/28/91	10/28/91	10/28/91	5/21/93	5/18/93
SEMI-VOLATILE ORGANICS (µg/l)							
Phenol		10 U	10 U	10 U	10 U		
bis (2-Chloroethyl) Ether		10 U	10 U	10 U	10 U		
2-Chlorophenol		10 U	10 U	10 U	10 U		
1,3-Dichlorobenzene		10 U	10 U	10 U	10 U		
1,4-Dichlorobenzene		10 U	10 U	10 U	10 U		
Benzyl Alcohol							
1,2-Dichlorobenzene		10 U	10 U	10 U	10 U		
2-Methylphenol		10 U	10 U	10 U	10 U		
2,2'-Oxybis(1-Chloropropane)		10 U	10 UJ	10 U	10 UJ		
bis (2-Chloroisopropyl) Ether							
4-Methylphenol		10 U	10 U	10 U	10 U		
N-Nitroso-Di-n-Propylamine		10 U	10 U	10 U	10 U		
Hexachloroethane		10 U	10 U	10 U	10 U		
Nitrobenzene		10 U	10 U	10 U	10 U		
Isophorone		10 U	10 U	10 U	10 U		
2-Nitrophenol		10 U	10 U	10 U	10 U		
2,4-Dimethylphenol		10 U	10 U	10 U	10 U		
Benzoic Acid							
bis (2-Chloroethoxy) Methane		10 U	10 U	10 U	10 U		
2,4-Dichlorophenol		10 U	10 U	10 U	10 U		
1,2,4-Trichlorobenzene		10 U	10 U	10 U	10 U		
Naphthalene		10 U	10 U	10 U	10 U		
4-Chloroaniline		10 U	10 U	10 U	10 UJ		
Hexachlorobutadiene		10 U	10 UJ	10 U	10 U		
4-Chloro-3-Methylphenol		10 U	10 U	10 U	10 U		
2-Methylnaphthalene		10 U	10 U	10 U	10 U		
Hexachlorocyclopentadiene		10 U	10 UJ	10 U	10 U		
2,4,6-Trichlorophenol		10 U	10 U	10 U	10 U		
2,4,5-Trichlorophenol		25 U	25 U	25 U	25 U		
2-Chloronaphthalene		10 U	10 U	10 U	10 U		
2-Nitroaniline		25 U	25 U	25 U	25 U		
Dimethyl Phthalate		10 U	10 U	10 U	10 U		
Acenaphthylene		10 U	10 U	10 U	10 U		
2,6-Dinitrotoluene		10 U	10 U	10 U	10 U		
3-Nitroaniline		25 U	25 U	25 U	25 U		
Acenaphthene		10 U	10 U	10 U	10 U		
2,4-Dinitrophenol		25 UJ	25 UJ	25 UJ	25 U		
4-Nitrophenol		25 UJ	25 UJ	25 U	25 UJ		
Dibenzofuran		10 U	10 U	10 U	10 U		
2,4-Dinitrotoluene		10 U	10 U	10 U	10 U		
Diethylphthalate		10 U	10 U	10 U	10 U		
4-Chlorophenyl-phenylether		10 U	10 U	10 U	10 U		
Fluorene		10 U	10 U	10 U	10 U		
4-Nitroaniline		25 UJ	25 UJ	25 UJ	25 UJ		
4,6-Dinitro-2-Methylphenol		25 U	25 U	25 U	25 U		
N-Nitrosodiphenylamine (1)		10 U	10 U	10 U	10 U		
4-Bromophenyl-phenylether		10 U	10 U	10 U	10 U		
Hexachlorobenzene		10 U	10 U	10 U	10 U		
Pentachlorophenol		25 U	25 U	25 U	25 U		
Phenanthrene		10 U	10 U	10 U	10 U		
Anthracene		10 U	10 U	10 U	10 U		
Carbazole		10 U	10 U	10 U	10 U		
Di-n-Butylphthalate		10 U	10 U	10 U	10 U		
Fluoranthene		10 U	10 U	10 UJ	10 U		
Pyrene		10 U	10 U	10 U	10 U		
Butylbenzylphthalate		10 U	10 U	10 U	10 U		
3,3'-Dichlorobenzidine		10 U	10 U	10 U	10 U		
Benzo (a) Anthracene		10 U	10 U	10 U	10 U		
Chrysene		10 U	10 U	10 U	10 U		

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 3:11 PM, 10/20/93
(MASTER_W.XLS)

Well ID	MW309	MW309	MW310	MW310	DUPWE	MWB5A	MWB5B
Sample Depth	103'-105'	108'-110'	82.5-84.5'	87.5-89.5'	(MW310-87 5-89.5)	41.5--4 5'	76.5-79.5'
Date Collected	10/30/91	10/30/91	10/28/91	10/28/91	10/28/91	5/21/93	5/18/93
SEMI-VOLATILE ORGANICS (µg/l)							
bis (2-Ethylhexyl) Phthalate		10 U	15 U	10 U	10 U		
Di-n-Octyl Phthalate		10 U	10 UJ	10 U	10 UJ		
Benzo (b) Fluoranthene		10 U	10 U	10 U	10 U		
Benzo (k)Fluoranthene		10 U	10 UJ	10 U	10 U		
Benzo (a) Pyrene		10 U	10 U	10 U	10 U		
Indeno (1,2,3-cd) Pyrene		10 U	10 U	10 U	10 U		
Dibenzo (a,h) Anthracene		10 U	10 U	10 UJ	10 U		
Benzo (g,h,i) Perylene		10 U	10 UJ	10 UJ	10 U		
MOCA**		1 U	1 U	1 U	1 U		

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analyses.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analyses.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 11:30 AM, 10/15/93
(MASTER_W.XLS)

Well ID	MWB5C	MWB6	MWB7A	MWB7B	MWB7C	DUP	MWB8	SB301
Sample Depth	104.5-107.5'	111.5-114.5'	46.5'-49.5'	76.5-79.5'	101.5-104.5'	MWB7C-104.5'	76.5-79.5'	28'-32'
Date Collected	5/21/93	5/18/93	5/21/93	5/18/93	5/18/93	5/18/93	5/21/93	7/9/91
INORGANICS (µg/l)								
Aluminum								129 U
Antimony								33 U
Arsenic								5 U
Barium								48.7
Beryllium								1 U
Cadmium								4 U
Calcium								75400
Chromium								4 U
Cobalt								6 U
Copper								6.3
Iron								409
Lead								2.6 U
Magnesium								23800
Manganese								85.9
Mercury								0.2 U
Nickel								9 U
Potassium								2880
Selenium								4 U
Silver								5 U
Sodium								5740
Thallium								2 U
Vanadium								3 U
Zinc								14.5 U
Cyanide								10 U
VOLATILE ORGANICS (µg/l)								
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10 UJ	13 J	10 UJ	10 UJ	10 UJ	10 UJ	17 J	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	32	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	41	10 U	10 U	10 U	10 U	10 U	10 U	6 J
1,2-Dichloroethene (total)	37	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	44	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	190	10 U	10 U	10 U	10 U	10 U	10 U	28
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Acetate								
Bromodichloromethane	10 U	10 U	10 U	4 J	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	17	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	2 J	2 J	10 U	1 J	1 J	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total Xylenes	10 U	10 U	10 U	2 J	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 2:47 PM, 10/14/93
(MASTER_W.XLS)

Well ID	MWB5C	MWB6	MWB7A	MWB7B	MWB7C	DUP	MWB8	SB301
Sample Depth	104.5-107.5'	111.5-114.5'	46.5'-49.5'	76.5-79.5'	101.5-104.5'	MWB7C-104.5'	76.5-79.5'	28'-32'
Date Collected	5/21/93	5/18/93	5/21/93	5/18/93	5/18/93	5/18/93	5/21/93	7/9/91
SEMI-VOLATILE ORGANICS (ug/l)								
Phenol								10 U
bis (2-Chloroethyl) Ether								10 U
2-Chlorophenol								10 U
1,3-Dichlorobenzene								10 U
1,4-Dichlorobenzene								10 U
Benzyl Alcohol								
1,2-Dichlorobenzene								10 U
2-Methylphenol								10 U
2,2'-Oxybis(1-Chloropropane)								10 U
bis (2-Chloroisopropyl) Ether								
4-Methylphenol								10 U
N-Nitroso-Di-n-Propylamine								10 U
Hexachloroethane								10 U
Nitrobenzene								10 U
Isophorone								10 U
2-Nitrophenol								10 U
2,4-Dimethylphenol								10 U
Benzoic Acid								
bis (2-Chloroethoxy) Methane								10 U
2,4-Dichlorophenol								10 U
1,2,4-Trichlorobenzene								10 U
Naphthalene								10 U
4-Chloroaniline								10 U
Hexachlorobutadiene								10 U
4-Chloro-3-Methylphenol								10 U
2-Methylnaphthalene								10 U
Hexachlorocyclopentadiene								10 U
2,4,6-Trichlorophenol								10 U
2,4,5-Trichlorophenol								25 U
2-Chloronaphthalene								10 U
2-Nitroaniline								25 U
Dimethyl Phthalate								10 U
Acenaphthylene								10 U
2,6-Dinitrotoluene								10 U
3-Nitroaniline								25 U
Acenaphthene								10 U
2,4-Dinitrophenol								25 U
4-Nitrophenol								25 U
Dibenzofuran								10 U
2,4-Dinitrotoluene								10 U
Diethylphthalate								10 U
4-Chlorophenyl-phenylether								10 U
Fluorene								10 U
4-Nitroaniline								25 U
4,6-Dinitro-2-Methylphenol								25 U
N-Nitrosodiphenylamine (1)								10 U
4-Bromophenyl-phenylether								10 U
Hexachlorobenzene								10 U
Pentachlorophenol								25 U
Phenanthrene								10 U
Anthracene								10 U
Carbazole								10 U
Di-n-Butylphthalate								10 U
Fluoranthene								10 U
Pyrene								10 U
Butylbenzylphthalate								10 U
3,3'-Dichlorobenzidine								10 U
Benzo (a) Anthracene								10 U
Chrysene								10 U

Well ID	MWB5C	MWB6	MWB7A	MWB7B	MWB7C	DUP	MWB8	SB301
Sample Depth	104.5-107.5'	111.5-114.5'	46.5'-49.5'	76.5-79.5'	101.5-104.5'	MWB7C-104.5'	76.5-79.5'	28'-32'
Date Collected	5/21/93	5/18/93	5/21/93	5/18/93	5/18/93	5/18/93	5/21/93	7/9/91
SEMI-VOLATILE ORGANICS (µg/l)								
bis (2-Ethylhexyl) Phthalate								10 U
Di-n-Octyl Phthalate								10 U
Benzo (b) Fluoranthene								10 U
Benzo (k)Fluoranthene								10 U
Benzo (a) Pyrene								10 U
Indeno (1,2,3-cd) Pyrene								10 U
Dibenzo (a,h) Anthracene								10 U
Benzo (g,h,i) Perylene								10 U
MOCA**								0.2 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 11:31 AM, 10/15/93
(MASTER_W.XLS)

Well ID	SB301	SB302	SB302A	SB303	SB303	SB303	SB304	SB304A
Sample Depth	53'-57'	108'-110'	60'-64'	18'-20'	23'-25'	28'-30'	21'-23'	19'-21'
Date Collected	7/10/91	7/16/91	7/22/91	7/26/91	7/26/91	7/26/91	7/30/91	7/30/91
INORGANICS (µg/l)								
Aluminum	99.6 U	136 U	119 U	128 U	118 U	116 U	71.6 U	128 U
Antimony	33 U	33 U	33 U	33 U	33 U	33 U	33 U	33 U
Arsenic	6.4	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Barium	69.8	94.6	89.1	105	67.5	36.2	26.1	24
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Calcium	68800	58800	95100	259000	155000	93200	62500	68200
Chromium	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Cobalt	6 U	7.9	6 U	6 U	6 U	6 U	6 U	6 U
Copper	4.7	5.9 U	4 U	13.9 U	20.2 U	10.3 U	10.3 U	8.7 U
Iron	184	1320	582	43.9 U	27.2 U	67.8 U	35.5 U	29.3 U
Lead	2.5 UJ	2 U	2 U	2 U	3.1	2 U	2	2 U
Magnesium	22200	20200	25700	68200	42500	24800	17500	19700
Manganese	79	212	248	192	142	52.5	129	42.7
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	9 U	57.1	9 U	11.2	11.5	9 U	9 U	9 U
Potassium	3800	4030	7000	4800	3910	2910	3020	0
Selenium	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Silver	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Sodium	7730	50800	25800	37300	53800	27800	11800	8080
Thallium	2 UJ	2 UJ	2 UJ	4 UJ	2 UJ	2 UJ	2 UJ	2 U
Vanadium	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Zinc	31.7	251	14.8 U	1880	344	483	436	143
Cyanide	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U
VOLATILE ORGANICS (µg/l)								
Chloromethane	10 U	10 U	10 U	10 UJ	10 UJ	20 UJ	10 UJ	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 UJ	20 U	10 U	10 U
Vinyl Chloride	10 U	11	10 U	10 UJ	10 UJ	20 UJ	10 UJ	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Methylene Chloride	10 U	10 U	10 U	10 U	10 UJ	20 U	10 U	10 U
Acetone	10 UJ	10 UR	10 U	10 UJ	10 UJ	15 J	10 U	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
1,1-Dichloroethene	10 U	2 J	10 U	9 J	15	12 J	10	10 U
1,1-Dichloroethane	10 U	120	10 U	2 J	6 J	3 J	10 U	10 U
1,2-Dichloroethene (total)	10 U	38	10 U	10 U	1 J	20 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
2-Butanone	10 U	10 UJ	10 U	10 U	10 UJ	20 U	10 U	10 U
1,1,1-Trichloroethane	10 U	7 J	10 U	320 J	530	270	280 J	37
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Vinyl Acetate								
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Trichloroethene	10 U	2 J	10 U	8 J	7 J	4 J	19	2 J
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Benzene	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 UJ	10 UJ	20 UJ	10 UJ	10 U
2-Hexanone	10 U	10 U	10 U	10 UJ	10 UJ	20 UJ	10 UJ	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	1 J	20 U	2 J	1 J
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Styrene	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U
Total Xylenes	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U

Well ID	SB301	SB302	SB302A	SB303	SB303	SB303	SB304	SB304A
Sample Depth	53'-57'	108'-110'	60'-64'	18'-20'	23'-25'	28'-30'	21'-23'	19'-21'
Date Collected	7/10/91	7/16/91	7/22/91	7/26/91	7/26/91	7/26/91	7/30/91	7/30/91
SEMI-VOLATILE ORGANICS (µg/l)								
Phenol	2 J	10 U	10 UJ	3 J	3 J	3 J	4 J	2 J
bis (2-Chloroethyl) Ether	10 U	10 U	10 UJ	20 UJ	20 UJ	20 UJ	20 U	20 U
2-Chlorophenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Benzyl Alcohol								
1,2-Dichlorobenzene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2-Methylphenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2,2'-Oxybis(1-Chloropropane)	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
bis (2-Chloroisopropyl) Ether								
4-Methylphenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Hexachloroethane	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Nitrobenzene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Isophorone	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2-Nitrophenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Benzoic Acid								
bis (2-Chloroethoxy) Methane	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Naphthalene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
4-Chloroaniline	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Hexachlorobutadiene	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 UJ	20 UJ	20 UJ	20 UJ	20 U	20 U
2,4,5-Trichlorophenol	25 U	25 U	25 UJ	20 UJ	20 UJ	20 UJ	20 U	20 U
2-Chloronaphthalene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2-Nitroaniline	25 U	25 U	25 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Dibethyl Phthalate	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Acenaphthylene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
3-Nitroaniline	25 U	25 UJ	25 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ
Acenaphthene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2,4-Dinitrophenol	25 UR	25 U	25 UR	40 UJ	40 UJ	40 UJ	40 UJ	40 UJ
4-Nitrophenol	25 U	25 UJ	25 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Dibenzofuran	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Diethylphthalate	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Fluorene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
4-Nitroaniline	25 U	25 U	25 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ
4,6-Dinitro-2-Methylphenol	25 U	25 U	25 UJ	30 UJ	30 UJ	30 UJ	30 U	30 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
4-Bromophenyl-phenylether	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Hexachlorobenzene	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Pentachlorophenol	25 U	25 U	25 UJ	20 UJ	20 UJ	20 UJ	20 U	20 U
Phenanthrene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Anthracene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Carbazole	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Di-n-Butylphthalate	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Fluoranthene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Pyrene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Butylbenzylphthalate	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
3,3'-Dichlorobenzidine	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Benzo (a) Anthracene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Chrysene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 11:32 AM, 10/15/03
(MASTER_W.XLS)

Well ID	SB301	SB302	SB302A	SB303	SB303	SB303	SB304	SB304A
Sample Depth	53'-57'	108'-110'	60'-64'	16'-20'	23'-26'	28'-30'	21'-23'	19'-21'
Date Collected	7/10/91	7/16/91	7/22/91	7/26/91	7/26/91	7/26/91	7/30/91	7/30/91
SEMI-VOLATILE ORGANICS (µg/l)								
bis (2-Ethylhexyl) Phthalate	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U
Benzo (b) Fluoranthene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Benzo (k)Fluoranthene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Benzo (a) Pyrene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Indeno (1,2,3-cd) Pyrene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Dibenzo (a,h) Anthracene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
Benzo (g,h,i) Perylene	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U
MOCA**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

Well ID	SB305	SB306
Sample Depth	16'-18'	18'-20'
Date Collected	7/29/91	7/29/91
INORGANICS (µg/l))		
Aluminum	131 U	181 U
Antimony	33 U	33 U
Arsenic	5 U	5 U
Barium	10.8	78
Beryllium	1 U	1 U
Cadmium	4 U	4 U
Calcium	39800	95700
Chromium	4 U	4 U
Cobalt	6 U	6.6
Copper	7.5 U	8.7 U
Iron	25.1 U	182
Lead	2.2	2 U
Magnesium	7650	28200
Manganese	22.6	940
Mercury	0.2 U	0.2 U
Nickel	9 U	19.1
Potassium	1890	13500
Selenium	4 U	4 U
Silver	5 U	5 U
Sodium	3310	47600
Thallium	2 UJ	2 UJ
Vanadium	3 U	3 U
Zinc	263	585
Cyanide	10 UJ	21.8 UJ
VOLATILE ORGANICS (µg/l)		
Chloromethane	10 UJ	10 UJ
Bromomethane	10 U	10 U
Vinyl Chloride	10 UJ	10 UJ
Chloroethane	10 U	10 U
Methylene Chloride	10 U	10 U
Acetone	10 UJ	10 UJ
Carbon Disulfide	10 U	10 U
1,1-Dichloroethene	10 U	1 J
1,1-Dichloroethane	10 U	25
1,2-Dichloroethene (total)	10 U	2 J
Chloroform	10 U	10 U
1,2-Dichloroethane	10 U	10 U
2-Butanone	10 U	10 U
1,1,1-Trichloroethane	7 J	32
Carbon Tetrachloride	10 U	10 U
Vinyl Acetate		
Bromodichloromethane	10 U	10 U
1,2-Dichloropropane	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U
Trichloroethene	10 U	2 J
Dibromochloromethane	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U
Benzene	10 U	10 U
Trans-1,3-Dichloropropene	10 U	10 U
Bromoform	10 U	10 U
4-Methyl-2-Pentanone	10 UJ	10 UJ
2-Hexanone	10 UJ	10 UJ
Tetrachloroethene	2 J	2 J
1,1,2,2-Tetrachloroethane	10 U	10 U
Toluene	10 U	10 U
Chlorobenzene	10 U	10 U
Ethylbenzene	10 U	10 U
Styrene	10 U	10 U
Total Xylenes	10 U	10 U

ANALYTICAL RESULTS
ROTOFINISH SITE
GROUNDWATER SAMPLES

Revision: 2:47 PM, 10/14/93
(MASTER_W.XLS)

Well ID	*SB305*	*SB306*
Sample Depth	*16'-18'*	*16'-20'*
Date Collected	*7/29/91*	*7/29/91*
SEMI-VOLATILE ORGANICS (ug/l)		
Phenol	10 U	10 U
bis (2-Chloroethyl) Ether	10 U	10 U
2-Chlorophenol	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U
1,4-Dichlorobenzene	10 U	2 J
Benzyl Alcohol		
1,2-Dichlorobenzene	10 U	10 U
2-Methylphenol	10 U	10 U
2,2'-Oxybis(1-Chloropropane)	10 UJ	10 UJ
bis (2-Chloroisopropyl) Ether		
4-Methylphenol	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	10 U
Hexachloroethane	10 U	10 U
Nitrobenzene	10 U	10 U
Isophorone	10 U	10 U
2-Nitrophenol	10 U	10 U
2,4-Dimethylphenol	10 U	10 U
Benzoic Acid		
bis (2-Chloroethoxy) Methane	10 U	10 U
2,4-Dichlorophenol	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U
Naphthalene	10 U	10 U
4-Chloroaniline	10 UJ	10 UJ
Hexachlorobutadiene	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 U
2-Methylnaphthalene	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U
2-Chloronaphthalene	10 U	10 U
2-Nitroaniline	25 UJ	25 UJ
Dimethyl Phthalate	10 U	10 U
Acenaphthylene	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U
3-Nitroaniline	25 U	25 U
Acenaphthene	10 U	10 U
2,4-Dinitrophenol	25 U	25 U
4-Nitrophenol	25 UJ	25 UJ
Dibenzofuran	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U
Diethylphthalate	10 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U
Fluorene	10 U	10 U
4-Nitroaniline	25 U	25 U
4,6-Dinitro-2-Methylphenol	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U
Hexachlorobenzene	10 U	10 U
Pentachlorophenol	25 U	25 U
Phenanthrene	10 U	10 U
Anthracene	10 U	10 U
Carbazole	10 U	10 U
Di-n-Butylphthalate	10 U	10 U
Fluoranthene	10 U	10 U
Pyrene	10 U	10 U
Butylbenzylphthalate	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U
Benzo (a) Anthracene	10 U	10 U
Chrysene	10 U	10 U

Well ID	*SB305*	*SB306*
Sample Depth	*16'-18'*	*18'-20'*
Date Collected	*7/29/91*	*7/29/91*
SEMI-VOLATILE ORGANICS (µg/l)		
bis (2-Ethylhexyl) Phthalate	10 U	10 U
Di-n-Octyl Phthalate	17 J	10 U
Benzo (b) Fluoranthene	10 U	10 U
Benzo (k)Fluoranthene	10 U	10 U
Benzo (a) Pyrene	10 U	10 U
Indeno (1,2,3-cd) Pyrene	10 U	10 U
Dibenzo (a,h) Anthracene	10 U	10 U
Benzo (g,h,i) Perylene	10 U	10 U
MOCA**	0.2 U	0.2 U

U Analyte was analyzed for but not detected above the reported sample detection or quantitation limit.
J Analyte was positively identified but the concentration is an estimated value.
UJ Analyte was not detected above the reported sample detection or quantitation limit but the limit is an estimated value.
R Analyte was detected but the presence cannot be verified. The results are unreliable due to serious deficiencies in the analysis.
UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analysis.
(1) cannot be separated from Diphenylamine
** 4,4'-Methylenebis 2-Chloro-aniline; special analyte
Blank columns indicate that analysis for the compound was not performed.

APPENDIX C

Cost Estimate Spreadsheets for Removal Action Alternatives

Alternative 1: Groundwater Extraction, Discharge to Existing Sewer, No On-Site Treatment

Description	Unit	Unit Cost	Qty.	Lump Sum	Cost	Source/Notes
1. Extraction System (2 Wells)						
1.a. Subcontractors						
Driller/Drill Crew	day	1500.00	4		$6,000	Vendor
1.b. Materials						
Casing (6" sch.80 PVC)	10' sec.	122.00	14		$1,708	Vendor
Screen (6" sch.80 no.30 PVC)	10' sec.	152.00	8		$1,216	Vendor
Bottom Plug/Cap	per ea.	36.00	2		$72	Vendor
Filter Pack (Clean Sand)	bags	10.00	50		$500	LTI
Bentonite	bags	10.00	45		$450	LTI
Cement	bags	10.00	42		$420	LTI
Pump (Grundfos 80S50-5)	per ea.	2200.00	2		$4,400	Vendor
Pitless Adaptor	per ea.	150.00	2		$300	Vendor
Concrete Manhole w/ Steel Lid	per ea.	1000.00	2		$2,000	Means
1.5" sch. 80 PVC Piezometer	l.f.	2.00	220		$440	Vendor
Bumper Guards (3" Steel)	per ea.	100.00	6		$600	LTI
Gravel (for floor of manhole)	cu. yd.	25.00	2		$50	Vendor
Sampling Valves	per ea.	20.00	2		$40	Vendor
Throttling Valve	per ea.	50.00	2		$100	Vendor
Flowmeter	per ea.	650.00	2		$1,300	Vendor
Pressure Transducer	per ea.	1000.00	2		$2,000	Vendor
Electrical Conduit (1" Galv.)	l.f.	2.00	250		$500	Means
Control Conduit (3" Galv.)	l.f.	8.00	250		$2,000	Means
Transducer Cable	l.f.	1.75	600		$1,050	Vendor
Pump Controller System	per ea.	2500.00	1		$3,000	
Steel Control Panel	per ea.	350.00	1		$350	Means
4'x4'x10' Pressure Treated	per. ea.	20.00	2		$40	
Misc Hardware	-	-	-		$500	
2. Containment System						
Not Applicable	-	-	-	-	-	
3. Treatment System						
Not Applicable	-	-	-	-	-	
4. Disposal/Conveyance/Discharge						
1.a. Subcontractors						
General Contractor/Crew	hr	60.00	40		$2,400	
Electrical Contractor	hr	40.00	40		$1,600	
1.b. Materials						
Pipe (2" sch.80 PVC)	l.f.	2.00	800		$1,600	Vendor
Elbows	per ea.	8.50	10		$85	Vendor
Couplers	per ea.	4.00	40		$160	Vendor
Tee Connectors	per ea.	115.00	3		$345	Vendor
Check Valves	per ea.	20.00	6		$120	Vendor
		Total Direct Cost:			$35,346	

Alternative 1: Groundwater Extraction, Discharge to Existing Sewer, No On-Site Treatment

Description	Unit	Unit Cost	Qty.	Lump Sum	Cost	Assumptions/Notes
A. System Maintenance						
1. Wells (Equipment Maintenance)	lump			X	$5,000	Service pumps and transducers, redevelop wells.
B. Monitoring & Sampling						
1. Monthly KWRP Discharge Sampling						
Lab Costs	event	540.00	12		$6,480	City of Kalamazoo Self monitoring parameters
Sampling Equip./PPE/Disposables	event	50.00	12		$600	Filters, Shipping, Field Equipment
2. Monthly System Performance Sampling						
Lab Costs	event	500.00	12		$6,000	10 VOCs and 10 TALs per event
Sampling Equip./PPE/Disposables	event	50.00	12		$600	
C. Discharge Fees						
1. Discharge to Existing Sewer						
City of Portage Meter Charge	qtr.	44.40	4		$178	City of Portage
Flow Charge	1000 gal	1.66	52560		$86,301	Flow = 100 gpm, continuous operation
		Total Cost:			$107,158	

Alternative 2: Groundwater Extraction, On-Site Treatment w/ Carbon, Discharge to Existing Sewer

Description	Unit	Unit Cost	Qty.	Lump Sum	Cost	Source/Notes
1. Extraction System						
1.a. Subcontractors						
Driller/Drill Crew	day	1500.00	4		$6,000	Vendor
1.b. Materials						
Casing (6" sch.80 PVC)	10' sec.	122.00	14		$1,708	Vendor
Screen (6" sch.80 no.30 PVC)	10' sec.	152.00	8		$1,216	Vendor
Bottom Plug/Cap	per ea.	36.00	2		$72	Vendor
Filter Pack (Clean Sand)	bags	10.00	50		$500	LTI
Bentonite	bags	10.00	45		$450	LTI
Cement	bags	10.00	42		$420	LTI
Pump (Grundfos 80S50-5)	per ea.	2200.00	2		$4,400	Vendor
Pitless Adaptor	per ea.	150.00	2		$300	Vendor
Concrete Manhole w/ Steel Lid	per ea.	1000.00	2		$2,000	Means
1.5" sch. 80 PVC Piezometer	l.f.	2.00	220		$440	Vendor
Bumper Guards (3" Steel)	per ea.	100.00	6		$600	LTI
Gravel (for floor of manhole)	cu. yd.	25.00	2		$50	Vendor
Throttling Valve	per ea.	50.00	2		$100	Vendor
Flowmeter	per ea.	650.00	2		$1,300	Vendor
Sampling Valves	per ea.	20.00	2		$40	Vendor
Pressure Transducer	per ea.	1000.00	2		$2,000	Vendor
Electrical Conduit (1" Galv.)	l.f.	2.00	250		$500	Means
Control Conduit (3" Galv.)	l.f.	8.00	250		$2,000	Means
Transducer Cable	l.f.	1.75	600		$1,050	Vendor
Pump Controller System	per ea.	2500.00	1		$3,000	
Steel Control Panel	per ea.	350.00	1		$350	Means
4'x4'x10' Pressure Treated	per. ea.	20.00	2		$40	
Misc Hardware	-	-	-	X	$500	
2. Containment System						
Not Applicable	-	-	-	-	-	
3. Treatment System						
1.a. Subcontractors						
General Contractor	hr	60.00	40		$2,400	Means
Crane Contractor	-	-	-	X	$1,000	Means
Electrical Contractor	hr	40.00	20		$800	Means
1.b. Materials						
20,000 lb Carbon Vessel	-	-	-	X	$115,000	Vendor
Concrete Pad (Slab on Grade)	s.f.	2.00	400		$800	Means
Plumbing	-	-	-	X	$1,000	
Electrical	-	-	-	X	$1,000	
Pretreatment Equipment	-	-	-	X	$10,000	
Pretreatment Housing	-	-	-	X	$3,000	
4. Disposal/Conveyance/Discharge						
1.a. Subcontractors						
General Contractor/Crew	hr	60.00	40		$2,400	Means
Electrical Contractor	hr	40.00	40		$1,600	Means
1.b. Materials						
Pipe (2" sch.80 PVC)	l.f.	2.00	800		$1,600	Vendor
Elbows	per ea.	8.50	10		$85	Vendor
Couplers	per ea.	4.00	40		$160	Vendor
Tee Connectors	per ea.	115.00	3		$345	Vendor
Check Valves	per ea.	20.00	6		$120	Vendor
		Total Direct Cost:			$170,346	

Alternative 2: Groundwater Extraction, On-Site Treatment w/ Carbon, Discharge to Existing Sewer

Description	Unit	Unit Cost	Qty.	Lump Sum	Cost	Assumptions/Notes
A. System Maintenance						
1. Wells (Equipment Maintenance)	lump			X	$5,000	Service pumps and transducers, redevelop wells,
2. Carbon Treatment System	event	1000.00	24		$24,000	Backflushing, clean bag filters
3. Carbon Change-Out	event	23000.00	11		$253,000	
B. Monitoring & Sampling						
1. Monthly KWRP Discharge Sampling						
Lab Costs	event	540.00	12		$6,480	City of Kalamazoo Self monitoring parameters
Sampling Equip./PPE/Disposables	event	50.00	12		$600	Filters, Shipping, Field Equipment
2. Monthly System Performance Sampling						
Lab Costs	event	500.00	12		$6,000	10 VOCs and 10 TALs per event
Sampling Equip./PPE/Disposables	event	50.00	12		$600	
3. Bimonthly Carbon Monitoring						
Lab Costs	event	500.00	24		$12,000	10 VOCs and 10 TALs per event
Sampling Equip./PPE/Disposables	event	50.00	24		$1,200	
C. Discharge Fees						
1. Discharge to Existing Sewer						
City of Portage Meter Charge	qtr.	44.40	4		$178	City of Portage
Flow Charge	1000 gal	1.66	52560		$86,301	Flow = 100 gpm, continuous operation
		Total Cost:			$397,358	

Alternative 3: Groundwater Extraction, On-Site Treatment w/ Air Stripping, Discharge to Existing Sewer

Description	Unit	Unit Cost	Qty.	Lump Sum	Cost	Source/Notes
1. Extraction System						
1.a. Subcontractors						
Driller/Drill Crew	day	1500.00	4		$6,000	Vendor
1.b. Materials						
Casing (6" sch.80 PVC)	10' sec.	122.00	14		$1,708	Vendor
Screen (6" sch.80 no.30 PVC)	10' sec.	152.00	8		$1,216	Vendor
Bottom Plug/Cap	per ea.	36.00	2		$72	Vendor
Filter Pack (Clean Sand)	bags	10.00	50		$500	LTI
Bentonite	bags	10.00	45		$450	LTI
Cement	bags	10.00	42		$420	LTI
Pump (Grundfos 80S50-5)	per ea.	2200.00	2		$4,400	Vendor
Pitless Adaptor	per ea.	150.00	2		$300	Vendor
Concrete Manhole w/ Steel Lid	per ea.	1000.00	2		$2,000	Means
1.5" sch. 80 PVC Piezometer	l.f.	2.00	220		$440	Vendor
Bumper Guards (3" Steel)	per ea.	100.00	6		$600	LTI
Gravel (for Floor of Manhole)	cu. yd	25.00	2		$50	Vendor
Throttling Valve	per ea.	50.00	2		$100	Vendor
Flowmeter	per ea.	650.00	2		$1,300	Vendor
Sampling Valves	per ea.	20.00	2		$40	Vendor
Pressure Transducer	per ea.	1000.00	2		$2,000	Vendor
Electrical Conduit (1" Galv.)	l.f.	2.00	250		$500	Means
Control Conduit (3" Galv.)	l.f.	8.00	250		$2,000	Means
Transducer Cable	l.f.	1.75	600		$1,050	Vendor
Pump Controller System	per ea.	2500.00	1		$3,000	
Steel Control Panel	per ea.	350.00	1		$350	Means
4'x4'x10' Pressure Treated	per. ea.	20.00	2		$40	
Misc Hardware	-	-	-	X	$500	
2. Containment System						
Not Applicable	-	-	-	-	-	
3. Treatment System						
1.a. Subcontractors						
General Contractor	hr	60.00	40		$2,400	Means
Crane Contractor	-	-	-	X	$1,000	Means
Electrical Contractor	hr	40.00	20		$800	Means
1.b. Materials						
Low Profile Air Stripper	-	-	-	X	$8,500	Vendor
Concrete Pad (Slab on Grade)	s.f.	2.00	400		$800	Means
Plumbing	-	-	-	X	$1,000	
Electrical	-	-	-	X	$1,000	
Pretreatment Equipment	-	-	-	X	$10,000	
Pretreatment Housing	-	-	-	X	$3,000	
4. Disposal/Conveyance/Discharge						
1.a. Subcontractors						
General Contractor/Crew	hr	60.00	40		$2,400	Means
Electrical Contractor	hr	40.00	40		$1,600	Means
1.b. Materials						
Pipe (2" sch.80 PVC)	l.f.	2.00	800		$1,600	Vendor
Elbows	per ea.	8.50	10		$85	Vendor
Couplers	per ea.	4.00	40		$160	Vendor
Tee Connectors	per ea.	115.00	3		$345	Vendor
Check Valves	per ea.	20.00	6		$120	Vendor
		Total Direct Cost:			$63,846	

Alternative 3: Groundwater Extraction, Treatment w/ Air Stripping, Discharge to Existing Sewer

Description	Unit	Unit Cost	Qty.	Lump Sum	Cost	Assumptions/Notes
A. System Maintenance						
1. Wells (Equipment Maintenance)	lump			X	$5,000	Service pumps and transducers, redevelop wells.
2. Air Stripper System	event	1000.00	6		$6,000	
B. Monitoring & Sampling						
1. Monthly KWRP Discharge Sampling						
Lab Costs	event	540.00	12		$6,480	City of Kalamazoo Self monitoring parameters
Sampling Equip./PPE/Disposables	event	50.00	12		$600	Filters, Shipping, Field Equipment
2. Monthly System Performance Sampling						
Lab Costs	event	500.00	12		$6,000	10 VOCs and 10 TALs per event
Sampling Equip./PPE/Disposables	event	50.00	12		$600	
3. Air Stripper Monitoring						
Lab Costs	event	500.00	24		$12,000	10 VOCs and 10 TALs per event
Sampling Equip./PPE/Disposables	event	50.00	24		$1,200	
C. Discharge Fees						
1. Discharge to Existing Sewer						
City of Portage Meter Charge	qtr.	44.40	4		$178	City of Portage
Flow Charge	1000 gal	1.68	52560		$88,301	Flow = 100 gpm, continuous operation
		Total Cost:			$126,358	

APPENDIX D

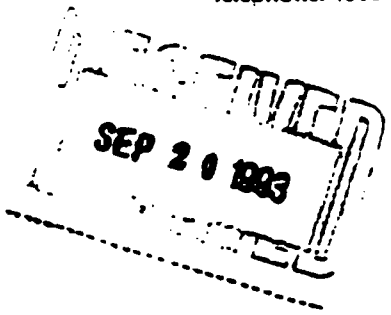
Municipal Approval For Discharge And Treatment

CITY OF PORTAGE

Department of Public Services

7810 South Westnedge Avenue • Portage, Michigan 49002

Telephone: (616) 329-4444



September 17, 1993

David Piotrowski
UNITED ENVIRONMENTAL TECHNOLOGIES
5066 Sprinkle Road
Kalamazoo, MI 49002

Dear Mr. Piotrowski:

This is in response to your request to discharge water from a ground water remediation project into the City of Portage sanitary sewer system. The proposed flow of 100 gpm should not pose any difficulty to the City of Portage.

Prior to discharging flow into the sanitary sewer, a permit will be required. The permit will need to be obtained from the City Community Development Department. The permit will be a "no charge," if you provide the meter for recording the flow to the sanitary sewer. The purpose of the permit is to establish an account for billing purposes.

The discharge to the sanitary sewer will be regulated under the City of Kalamazoo Industrial Pre-treatment Program. Prior to discharging the purge well water into the sanitary sewer, the City of Kalamazoo will need to issue a control document for the site. Compliance with the control document will be a requirement for discharge into the sanitary sewer system.

The base quarterly charge for a 2" meter is $44.40. The commodity charge for flow into the sanitary sewer is $1.68 per 1,000 gallons.

Please feel free to contact me at 1-616-329-4448 if further information is required.

Sincerely,

Robert Kimmer
Utility Administrator

c: Lisa Wininger, Dep. Dir. of Economic Dev. Services
Mike Tracy, Utility Systems Manager

THE CITY OF

Kalamazoo

DEPARTMENT OF PUBLIC UTIL
Water Reclam
415 N
Kalamazoo, Michigan 49007-
(616) 337-
FAX (616) 337-

September 10, 1993

Mr. David J. Piotrowski
United Environmental Technologies, Inc.
5066 Sprinkle Road
Kalamazoo, MI 49002

Dear Mr. Piotrowski:

This is in response to your request for a letter verifying that the Kalamazoo Water Reclamation Plant will accept wastewater from the groundwater remediation project at the Roto-Finish site at 3700 East Milham Road. Analytical data received previously from your company indicates that the discharge should not pose any difficulty to the Kalamazoo Water Reclamation Plant and would be accepted so long as all limits and requirements continue to be met.

The discharge from the remediation project will be regulated under the City of Kalamazoo's Industrial Pretreatment Program. Prior to the commencement of discharge, we must issue a control document for the site. Compliance with the control document will be a necessary condition for continued discharge approval.

As discussed in previous conversations and our letter of August 18, 1992, connection to the sanitary sewer and billing arrangements must be made through the City of Portage.

We will be looking forward to assisting you with the cleanup of this site. Please feel free to call me at (616) 337-8715 if you have any questions.

Sincerely,

Kent Mottinger,
Industrial Services Supervisor

c: Mr. Robert Kimmer, City of Portage

Kalamazoo Water Reclamation Plant
Discharge Limitations

Discharges to the Kalamazoo Water Reclamation Plant are controlled by the following limitations:

Pollutant	Daily Maximum Concentration Limit (mg/L)
Cadmium, T	0.040
Chromium, T	4.67
Copper, T	2.23
Lead, T	0.110
Nickel, T	1.59
Zinc, T	5.30
Cyanide, T	0.250
Oils & Greases	100
pH	6.2 - 9.8 S.U.

Prohibited Discharges - condensed from the General Pretreatment Regulations and the Kalamazoo City Code of Ordinances.

1. PCBs - no discharge allowed.
2. Mercury - no discharge allowed.
3. Pollutants which cause a fire or explosion hazard including, but not limited to, wastestreams with a closed cup flash point of less than 140 degrees Fahrenheit or 60 degrees Centigrade.
4. Solid or viscous pollutants in amounts which will cause obstruction in flow.
5. Any pollutant, including oxygen demanding pollutants (BOD, etc.) which will cause interference with wastewater treatment or which will pass through untreated.
6. Heat in amounts which will inhibit biological activity, but in no case heat in such quantities that the temperature at the plant exceeds 40° C (104° F).
7. Pollutants which result in the presence of toxic gases, vapors, or fumes in a quantity that may cause worker health and safety problems for sewer workers or the general public.
8. Any trucked or hauled pollutants except at the designated discharge point at the Kalamazoo Water Reclamation Plant.
9. Radioactive wastes or isotopes, unless their disposal via wastewater is authorized by federal, state, and local regulations, and then only when discharge into the wastewater system does not cause damage or a hazard to the system, persons operating the system, or the general public.
10. Wastewater discharged at a rate which upsets or interferes with the treatment process or causes a hydraulic surge.
11. Storm water, uncontaminated groundwater, unpolluted non-contact cooling water.

In addition to these limitations, certain industrial discharges are subject to Categorical Pretreatment Standards.

ATTACHMENT B

ENFORCEMENT CONFIDENTIAL ADDENDUM

ATTACHMENT C

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL RECORDS
FOR
PRIVATE WELLS IN VICINITY OF SITE
AND MAP

WATER WELL LOCATION MAP AND WATER WELL LOGS

HAVE BEEN REDACTED – 51 PAGES

CONTAINS POTENTIAL PERSONALLY-IDENTIFYING INFORMATION

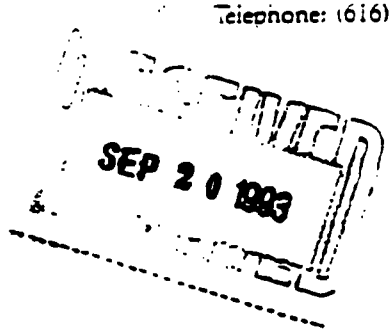
ATTACHMENT D

LETTERS FROM THE CITY OF PORTAGE AND CITY OF KALAMAZOO WATER RECLAMATION PLANT

CITY OF PORTAGE

Department of Public Services

7810 South Westnedge Avenue • Portage, Michigan 49002 Telephone: (616) 329-4444



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5066 Sprinkle Road
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Robert Kimmer
Utility Administrator

c: Lisa Wininger, Dep. Dir. of Economic Dev. Services
Mike Tracy, Utility Systems Manager

THE CITY OF

Kalamazoo

DEPARTMENT OF PUBLIC UTILITIE
Water Reclamatic
[illegible] N. Harrisc
Kalamazoo, Michigan 49007-[illegible]
(616) 337-815
FAX (616) 337-869

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5066 Sprinkle Road
Kalamazoo, MI 49002

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In addition to these limitations, certain industrial discharges are subject to Categorical Pretreatment Standards.

ATTACHMENT E

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
ENGINEERING EVALUATION/COST ANALYSIS
AND PROPOSED NON-TIME-CRITICAL REMOVAL ACTION
ROTO-FINISH SITE, PORTAGE, MICHIGAN

I. RESPONSIVENESS SUMMARY OVERVIEW

The U.S. Environmental Protection Agency (U.S. EPA) held a public comment period from October 1, 1994 through October 31, 1994 for interested parties to comment on the Engineering Evaluation/Cost Analysis (EE/CA) and the proposed Non-Time-Critical Removal Action for the Roto-Finish site in Portage, Michigan.

On September 26, 1994, a fact sheet summarizing the EE/CA was mailed to citizens in the community surrounding the site and other interested parties. The fact sheet provided a summary of the EE/CA and the background information leading up to the public comment period, including information pertaining to the history of the site, the scope of the proposed removal action and its role in the overall site cleanup, the potential risks posed by the contaminated groundwater, descriptions of the removal alternatives evaluated by U.S. EPA, the identification of U.S. EPA's recommended alternative, the rationale for U.S. EPA's recommended alternative, and the community's role in the removal action selection process.

U.S. EPA held a public meeting at 7:00 p.m. on October 13, 1994, at the City Hall Council Chambers in Portage, Michigan, to discuss the results of the EE/CA and to present U.S. EPA's proposed removal action to address the contaminated groundwater at the Roto-Finish site until the Remedial Investigation/Feasibility Study (RI/FS) is completed and a final remedy for the site is selected and implemented.

The responsiveness summary, required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, the Superfund Law, provides a summary of citizens' comments and concerns identified and received during the public comment period, and U.S. EPA's responses to those comments and concerns. All comments received by U.S. EPA during the public comment period were considered in EPA's final decision for selecting the removal alternative to address contamination at the Roto-Finish site.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERN

As part of the RI/FS, U.S. EPA conducted community interviews in August 1988 to determine the interest and concerns of the community for the Roto-Finish site. The interviews were conducted with state and local officials, and local residents. During the interviews, the respondents indicated that there was a strong level of environmental awareness in Portage and Kalamazoo due to the large number of environmental sites in the area, as

well as extensive local media coverage of these sites. Although the respondents indicated an interest in learning more about the Roto-Finish site and planned investigations, no history of community concern specific to the Roto-Finish site was identified.

Community concerns expressed during these interviews focussed on several major areas: concerns about the National Priorities List (NPL) selection process and the rationale for including specific sites on the NPL; the implication of the site's Superfund status on the sale of the site property; any potential need for expansion of Portage's municipal water system; and concerns about future discharges of groundwater or other water from the site to the Kalamazoo Water Reclamation Plant during field investigations or remedial action that could negatively impact the plant's discharge permit with the Michigan Department of Natural Resources (MDNR).

As part of U.S. EPA's responsibility and commitment to the Superfund program, the community has been kept informed of ongoing activities conducted at the Roto-Finish site. U.S. EPA has established an information repository at the Portage Public Library where relevant site documents may be reviewed. Documents available at the repository include:

- Background information for the site including RI/FS Workplans, Health and Safety Plan, Quality Assurance Project Plan, Community Relations Plan and other pertinent correspondence;
- Analytical results of soil and groundwater sampling
- The EE/CA;
- Fact sheets summarizing the technical studies conducted at the site, including the fact sheet describing the proposed removal action;
- Public meeting transcript for the proposed removal action;
- Written comments received during the public comment period for the proposed removal action.

U.S. EPA's selection of the removal action to address contaminated groundwater at the Roto-Finish site until the RI/FS is complete and a final remedy is selected and implemented is presented in a document known as an Action Memorandum. The Action Memorandum and the documents containing information which U.S. EPA used in making its decision (except for documents that are published and generally available) will also be placed in the information repository, as will this responsiveness summary.

III. SUMMARY OF QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND U.S. EPA's RESPONSES TO THESE COMMENTS

During the public comment period for the proposed removal action for the Roto-Finish site, U.S. EPA received written comments from the Kalamazoo County Board of Commissioners, the Kalamazoo County Chamber of Commerce, and the Michigan Manufacturers Association. No other written comments were received, nor were any oral comments were raised during the public meeting. The comments received by U.S. EPA during the public comment period are summarized below, followed by U.S. EPA's responses to these comments.

COMMENT: *The Kalamazoo County Board of Commissioners expressed concern regarding the volatile organic compounds (VOCs) detected in one of the groundwater monitoring wells installed downgradient of the Roto-Finish site on the Kalamazoo/Battle Creek International Airport property. The County is concerned that the VOCs pose certain potential health risks as well as affect the value of the Airport property unless natural or bioremediation is to occur. The County recommends that U.S. EPA seriously consider extracting groundwater at the contaminated Airport well for treatment as part of the recommended removal action. In addition, the County further recommends that pumping and treatment of the groundwater at the Airport should certainly be included in the final remedy for the site, after the RI/FS is completed.*

RESPONSE: VOCs similar to those detected in the groundwater beneath the Roto-Finish site were detected in one of the groundwater monitoring wells installed downgradient of the site on the Kalamazoo/Battle Creek International Airport. Of the chemicals detected in this well, two were detected at concentrations within an order of magnitude above the MCL[1]. Although a final risk assessment has not yet been completed for the site, this data preliminarily indicates that the levels of chemicals detected in the groundwater beneath the Airport could potentially pose an unacceptable health risk to people using this groundwater as a sole source of drinking water. The potential risk posed by the chemicals in this groundwater is only a future potential risk, however, as there are no water supply wells currently installed in this area of groundwater contamination and no one is currently drinking the contaminated groundwater.

Compared to the levels of contamination detected beneath the Roto-Finish site (four chemicals detected at concentrations between one to two orders of magnitude above the MCL), as well as a currently incomplete route of exposure, U.S. EPA does not

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[1]Maximum Contaminant Levels (MCLs) are drinking water standards established under the Safe Drinking Water Act.

believe that the conditions at the Airport meet the criteria for determining whether a site poses a threat to human health or welfare or the environment and whether a removal action is appropriate, as set forth in Section 300.415(b)(2) of the National Oil and Hazardous Substances Contingency Plan (NCP). As a result, and because a final remedy for the site will be selected once the RI/FS is complete, U.S. EPA believes that it is more appropriate to focus the short-term removal action for the Roto-Finish site on those areas that potentially pose the greatest risks to human health and the environment at the site, i.e., those areas having the highest identified levels of groundwater contamination. This includes the groundwater beneath the Roto-Finish site, but would not include the groundwater beneath the Airport property.

U.S. EPA understands the County's concern regarding the potential for devaluation of the Airport property due to groundwater contamination; however, U.S. EPA's removal and remedial response authorities under CERCLA and the NCP are limited to providing for actions to protect human health, welfare or the environment. U.S. EPA does not have the authority to conduct removal or remedial actions based on the potential for devaluation of a contaminated property. However, the County's recommendation that the final remedy for the site include pumping and treating of Airport groundwater is noted and will be evaluated after the RI/FS is complete and a final remedy for the site is proposed.

COMMENT: *The president of the Kalamazoo County Chamber of Commerce states that the ongoing top priority of his organization is economic development, and that the Roto-Finish Superfund site offers the community an opportunity to develop a unique economic development project for the City of Portage and County of Kalamazoo, which would provide an additional tax base and new jobs for citizens. The president questions whether the site's placement on the National Priorities List was inappropriate and based on outdated information, as much of the site had been remediated several years earlier. The Chamber of Commerce appreciates U.S. EPA's approval of the EE/CA and supports the proposed removal action. The Chamber of Commerce feels that the Potentially Responsible Party (PRP) (Illinois Tool Works) has worked diligently over the past several years in their effort to clearly show that the site poses no long-term threat to the local environment. The Chamber of Commerce encourages U.S. EPA to move forward with a process that "de-lists" the Roto-Finish industrial site as a Superfund site.*

RESPONSE: Between 1979 and 1984, contaminated sediments in three lagoons at the Roto-Finish site were excavated under MDNR oversight, disposed in an off-site landfill, and backfilled with clean material. While this action is believed to have addressed the majority of source contamination at the site, the RI/FS is being conducted to confirm the effectiveness of this action and

evaluate the potential for residual groundwater contamination. U.S. EPA appreciates the Chamber of Commerce's support of the proposed removal alternative. U.S. EPA would like to reiterate that the removal action is only a temporary action operating until the RI/FS is complete and a final remedy for the site is selected and implemented. In addition, the Agency would also like to clarify that no determinations have been made regarding long-term threats from the site; such determinations will be based on the results of the final risk assessment, which will be submitted to U.S. EPA for review and approval with the other RI/FS documents. As the RI/FS is not complete, and a final remedy has not yet been selected for the site, it would be premature for the Agency to begin procedures to de-list the site from the NPL.

COMMENT: *The Michigan Manufacturers Association supports U.S. EPA's proposed removal alternative, and urges the Agency to move forward with the clean-up as quickly as possible so that the plant can be returned to a job-creating, tax-paying, profit center.*

RESPONSE: U.S. EPA appreciates the Michigan Manufacturers Association's support of the proposed removal alternative. U.S. EPA's anticipates that the removal action will take approximately one month to construct, and anticipates that the RI/FS will be completed and a final remedy selected for the site during mid-1995.

ATTACHMENT F

ADMINISTRATIVE RECORD FILE INDEX

U.S. EPA ADMINISTRATIVE RECORD
REMOVAL ACTION
ROTO-FINISH SITE
PORTAGE, MICHIGAN
ORIGINAL
09/30/94

AR

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	01/04/88	U.S. EPA	Recipients	Administrative Order by Consent	36
2	03/00/88	Canonie Environmental	U.S. EPA	Project Work Plans: Site Investigation Plan, QAPP, Health and Safety Plan, Phase I RI	416
3	01/00/89	Jacobs Engineering Group Inc.	U.S. EPA	Community Relations Plan, Final	46
4	05/01/91	LTI-Limno-Tech, Inc.	U.S. EPA	RI Phase II Site Investigation Work Plan, Final	37
5	05/31/91	LTI-Limno-Tech, Inc.	U.S. EPA	Phase II RI Field Sampling Plan	33
6	02/08/92	Peterson, G. and Betz, R., LTI-Limno--Tech, Inc.	Sikora, K., U.S. EPA	Letter Forwarding Attached Phase I and Phase II Data Validation Tables	53
7	07/30/92	LTI-Limno-Tech, Inc.	U.S. EPA	RI Phase III Site Investigation Work Plan	22
8	08/13/93	Peterson, G., LTI-Limno-Tech, Inc.	Sikora, K., U.S. EPA	Letter re: Additional Field Investigations Proposed in Technical Memorandum III.2	4
9	09/03/93	Peterson, G. and Betz, R., LTI-Limno--Tech, Inc.	Sikora, K., U.S. EPA	Letter re: Revision to the Additional Field Investigations Proposed in Technical Memorandum III.2	11
10	09/23/93	Sikora, K., U.S. EPA	Dallosto, P., Illinois Tool Works, Inc.	Letter re: Proposed Extraction Well System for Groundwater Containment w/FAX Cover Sheet	3
11	09/30/93	Peterson, G., LTI-Limno-Tech, Inc.	Sikora, K., U.S. EPA	Letter re: Proposed Interim Extraction Well System	2
12	10/12/93	Sikora, K., U.S. EPA	Dallosto, P., Illinois Tool Works, Inc.	Letter re: U.S. EPA/MDNR's Review and Approval w/Modifications of the Phase III Work Plan Addendum	15
13	09/00/94	Illinois Tool Works Inc.	U.S. EPA	Engineering Evaluation/Cost Analysis (EE/CA)	124
14	09/00/94	U.S. EPA	Public	Fact Sheet: "U.S. EPA to Address Ground Water Contamination"	8
15	09/28/94	Adamkus, V., U.S. EPA	U.S. EPA	EE/CA Approval Memorandum	3

U.S. EPA ADMINISTRATIVE RECORD
REMOVAL ACTION
ROTO-FINISH SUPERFUND SITE
PORTAGE, KALAMAZOO COUNTY, MICHIGAN
UPDATE #1
11/18/94

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	00/00/90	Michigan Department of Public Health	U.S. EPA	Private Water Wells Identified in Vicinity of Roto-Finish Superfund Site	53
2	10/19/94	Kleiman, R., Kalamazoo County Board of Commissioners	Valetkevitch, H., U.S. EPA	Letter re: Public Comment on the Proposed EE/CA	2
3	10/21/94	Gerger-Moretti Reporting	U.S. EPA	Transcript of October 13, 1994 Public Meeting	19
4	10/27/94	Hadden, C., Michigan Manufacturers Association	U.S. EPA	Letter re: Public Comment on Cleanup Alternatives	1
5	10/28/94	Mankin, L., Kalamazoo County Chamber of Commerce	U.S. EPA	Letter re: Public Comment on the EE/CA	1