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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-timecritical 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,

Fren to

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



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

#### MEMORANDUM

REPLY TO THE ATTENTION OF:

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- **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, 1,1,1trichloroethane, 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:

	On-Site	Downgradient
<u>Chemical</u>	<u>(ug/l)</u>	(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. -- -

On-Site	Downgradient	Maximum Contaminant Level (MCL)
(ug/1)	(uq/1)	<u>(uq/1)</u>
480	32	7
2700	190	200
170	17	5
120	Not Detected	2
	<u>(ug/l)</u> 480 2700 170	<u>(ug/l)</u> (ug/l) 480 32 2700 190 170 17

Following U.S. BPA and MDNR review, the BE/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 noncarcinogenic 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 noncarcinogenic 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 Rotc-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 1,1dichloroethene, 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. <u>Proposed Action</u>

#### 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

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> 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:

irect or / Waste Management Division

Date

**DISAPPROVE:** 

Director, Waste Management Division

Date

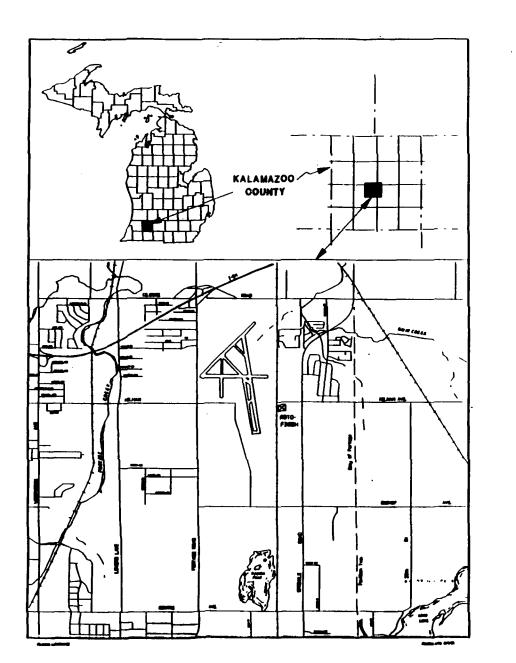
cc: Terri Johnson, OS-210 Don Henne, U.S. DOI Deborah Larsen, MDNR

## LIST OF FIGURES AND ATTACHMENTS

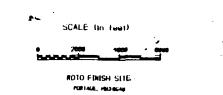
Figure 1 - Map of Facility Figure 2 - Groundwater Contour Map Figure 3 - Private Wells in Vicinity of Site Figure 4 - Maximum Detected Groundwater Concentrations
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Attachment B - Enforcement Confidential Addendum
Attachment C – MDPH Water Well Records for Private Wells in Vicinity of Roto-Finish Site and Map
Attachment D - Letters from the City of Portage and City of Kalamazoo Water Reclamation Plant
Attachment E - Responsiveness Summary
Attachment F - Administrative Record File Index

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**C FIGURE 1 C IOCATION OF ROTO-FINISH SITE PORTAGE, MICHIGAN** 

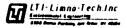


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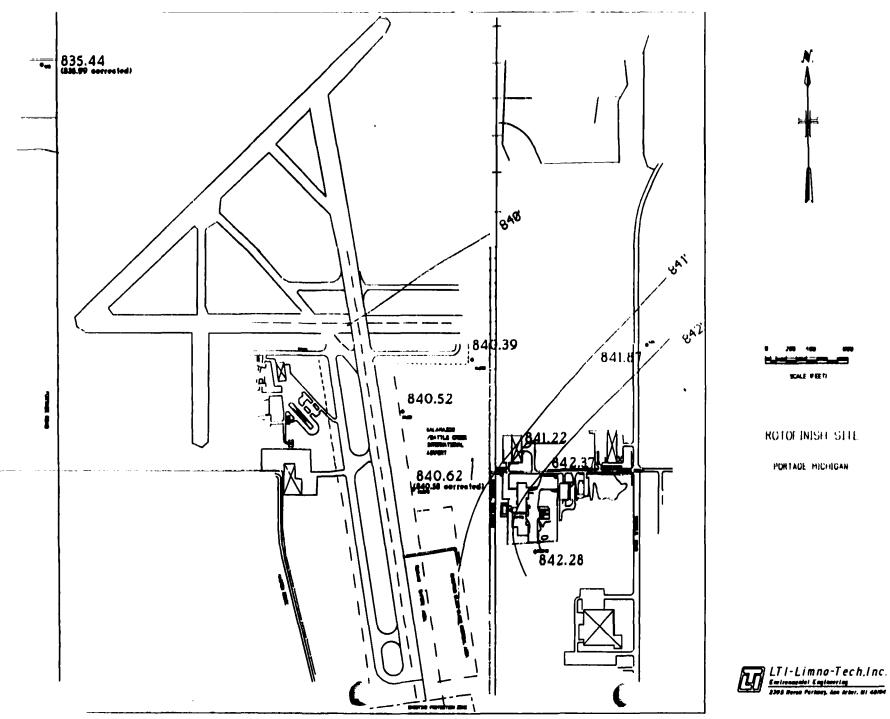
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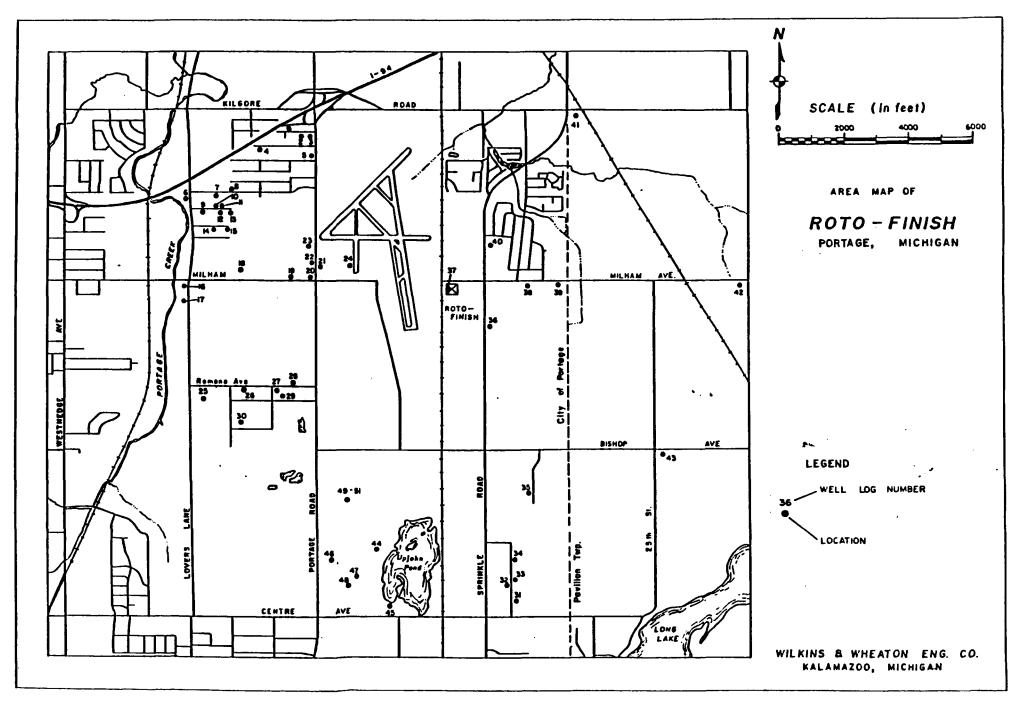


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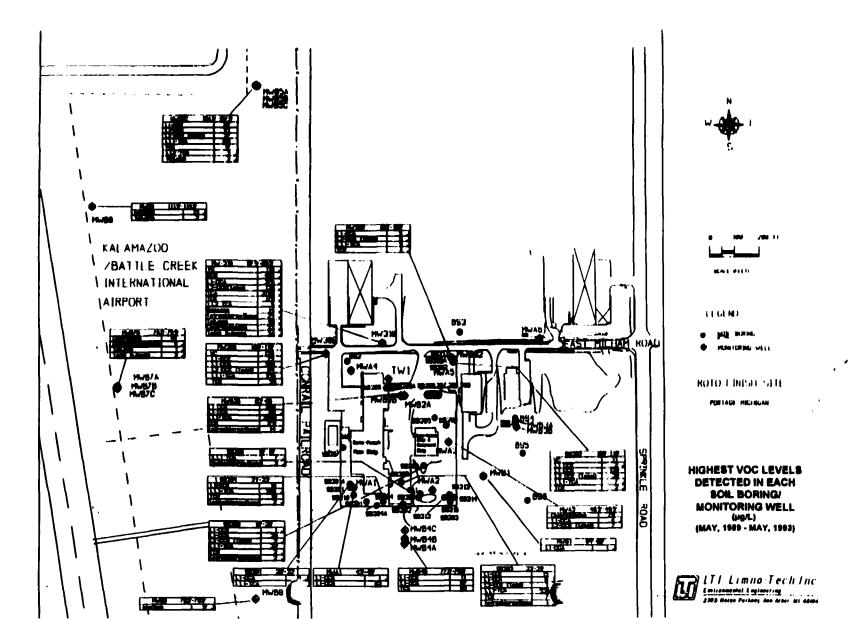
FIGURE 2 GROUNDWATER CONTOUR MAP



# FIGURE 3 PRIVATE WELLS IN VICINITY OF SITE



# FIGURE 4 MAXIMUM DETECTED GROUNDWATER CONCENTRATIONS



# ATTACHMENŢ A

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# 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 2 9 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-timecritical 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,

Cuinto

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

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Environmental Engineering 2395 Huron Parkway Ann Arbor, Michigan 48104

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

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## Prepared for:

Illinois Tool Works Glenview, Illinois

Prepared by:

:

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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 nunicipal 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 or 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.

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# 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.

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## 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 ongoing 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

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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 fails between April and September. Thunderstorms occur on approximately 37 days each year, generally during the months of June and July. The heaviest recorded 24hour 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

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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 noncontinuous 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

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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

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

The thinner sequence of apparently morainal deposits is distinguished 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:

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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 weil(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 inpacts. 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

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inconsistent with the final selected remeay, 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 Fundfinanced 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.
- 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 eithent 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 canable of effectively treating all chemical constituents identified in the groundwater at the Roto-Finish site. The KWRP uses a Zimoro 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.

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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 dischargé 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

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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 nontime-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

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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 visble 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 atternatives 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

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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 tinal 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, offsite 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

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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-timecritical 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

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

- Overail 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 Activities

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PARAMETER	KALAMAZOO COUNTY
Average Temperature (Summer)*	69.8° F
Average Daily Maximum Temperature Summer)*	81.3° F 4
lighest Recorded Temperature*	100° F
verage Temperature (Winter)*	28.7° F
verage Daily Minimum Temperature Winter)*	20.9° F
owest Recorded Temperature*	-16° F
otal Annual Precipitation*	34.8 inches
eeviest 24-hour Rainfall*	5.6 inches
verage Sessonal Snowfall*	73.1 inches
verage Relative Humidity at Dawn**	80%
verage Relative Humidity at Midday**	62%
Direction of Prevailing Winds**	southwest
Maximum Average Monthly Wind Speed**	11.7 mph

#### TABLE 2: METEOROLOGICAL DATA FOR KALAMAZOO COUNTY

#### Notes:

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> \* Reference: National Oceanic and Atmospheric Administration, 1989 \*\*Reference: Austin, 1979

Averages contain data from 1951 to 1980

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

			DEPTI		ELEVATI	
WELL I.D.		SURFACE	SCREEN II		SCREEN IN	ITERVAL
	DRILLED	ELEVATION	UPPER	LOWER	UPPER	LOWER
		<u>(FT)</u>	(FT)	(FT)	(FT)	(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	3 <b>9.34</b>	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-828	6/1 <b>0/9</b> 1	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	758.42
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	1 <b>05.00</b>	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-858	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. <b>50</b>	114.50	753.90	750.90
MW-B7A	5/12/93	860.92	46.50	49.50	814.42	811.42
MW-878	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:

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MW-A, KA series wells have 6' screens; all other monitoring wells have 3' screens except LG-1 and TW-1

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\* 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	Relative Stratigraph Screen Center Static Water Level Elevation (ft):			
Cluster	Location of Scree	en Elevation (ft)	8/27/93	
MWB2A	shallow	828.341	842.55	
MWB2B	intermediate	799.92	841.84	
	difference	28.42	0.71	
	gradient (ft/ft)*	ł	0.0250	

Well	<b>Relative Stratigrap</b>	Screen Center	Static Water Level Elevation (ft):	
Cluster	Location of Screen	Elevation (ft)	8/27/93	
MW-A5	shallow	820.42	842.06	
MW-302	d <b>ee</b> p	757.92	842.37	
	difference	62.50	-0.31	
	gradient (ft/ft)*		-0.0050	

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

Well	<b>Relative Stratigrap</b>	Screen Center	Static Water Level Elevation (ft):
Cluster	Location of Screen	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	Relative Stratigrapt Screen Center Static Water Level E			
Cluster	Location of Screen	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	<b>Relative Stratigra</b>	ph Screen Center	Static Water Level Elevation (ft):
Cluster	Location of Scree	n 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 Relative Stratigraph Screen Center Static Water Level Elevation (ft): Cluster Location of Screen Elevation (ft) 8/27/93 840.43 MWB5A shallow 815.65 MWB5B 780.65 840.43 intermediate difference---0.00 35.00 0.0000 gradient (ft/ft)\*ļ

#### TABLE 4: GROUND WATER VERTICAL GRADIENTS (AUGUST 27, 1983 STATIC GROUNDWATER ELEVATION DATA)

	ROTO-FINISH SITE, PORTAG	<b>E. 10</b>	
Well	<b>Relative</b> Stratigraph	Screen Center Static	Water Level Elevation (ft):
Cluster	Location of Screen	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
Weil	Relative Stratigraph	Screen Center: Static	Water Level Elevation (ft):
Cluster	Location of Screen	Elevation (ft)	8/27/93
MWB5A	shellow	815.65	840.43
MWB5C	deep	752.65	840.39
	difference	63.00	0.04
	gradient (R/R)*		0.0006
Well	<b>Relative Stratigraph</b>	Screen Center Static	Water Level Elevation (It):
Cluster	Location of Screen	Elevation (ft)	8/27/93
MWB7A	shellow	813.42	841.02
MWB7B	intermediate	783.42	840.68
	difference-	30.00	0.34
	gradient (R/R)*-		0.0113
Weil	<b>Relative Stratigraph</b>	Screen Center Static	Water Level Elevation (it):
Cluster	Location of Screen	Elevation (ft)	8/27/93
MWB7B	intermediate	783.42	840.68
MWB7C	deep	758.42	840.62
	difference-	25.00	0.06
	gradient (12/11)"	J	0.0024
Well	<b>Relative Stratigraph</b>	Screen Center Static	Water Level Elevation (It):
Cluster	Location of Screen		8/27/93
MWB7A	shallow	813.42	841.02
MWB7C	deep	758.42	840.62
	difference-	55.00	0.40
	gradient (1/11)"		0.0073

\* negative value indicates an upmant gradient positive value indicates a drammert gradient

SHULLOW SCREEN SHIT, WIETNEEDATE SCREEN (PM).

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**TABLE 5:** 

Page 1 of 3

Chemicals Analyzed in Ground Water Samples: Frequency and Concentration Range Rotofinish, Portage Michigan

(May. 1989 - May. 1993)

Chemicals	Frequency of	Range of	Range of
	Detection*	Detection Limits	Positively Detected
		(µ <b>g/I)</b>	Concentrations (µg/l)
norganics			
luminum	2 / 39	21.4 - 378	130 - 892
Intimony	0/39	23 - 36	
rsenic	8/39	1.2 - 50	1.5 - 26.7
Jarium	39 / 39	6	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
Colbait	10/39	5 - 12.4	6.6 - 23.2
Copper	16 / 39	3 - 20.2	4.2 - 16.7
no	25 / 39	7.7 - 175	54.5 - 2000
ead	7 / 39	2 - 9	2 - 3.1
lagnesium	39 / 39		4910 - 66200
langanese	39 / 39		8.1 - 1490
Aercury	; 1 / 39	0.2 - 0.2	0.24 - 0.24
lickel	20 / 39	9 - 35	8.9 - 57.1;
otassium	31 / 39	1740 - 8040	1730 - 35000
elenium	0/39	3 - 40	
liver	0/39	4.9 - 8	·
odium	38 / 39	11300 - 11300	3310 - 246000
hallium	0/39	1.1 - 4	
<b>/ana</b> dium	3/39	3 - 11.3	3.4 - 5.4
linc	32 / 39	10.7 - 27.9	19.9 - 3930
<b>Syanide</b>	2/39	10 - 21.8	15.3 - 15.9
olatile Organics			
hloromethane	0/49	10 - 120	
romomethane	0/49	10 - 120	
/inyl Chloride	11 / 49	10 - 120	10 - 120
hloroethane	4 / 49	10 - 120	5 - 79
lethylene Chloride	0/49	5 - 180	
cetone	4 / 49	10 - 120	13 - 27
arbon Disulfide	1 / 49	5 - 120	2 - 2
,1-Dichloroethene	23 / 49	5 - 25	1 - 480
,1-Dichloroethane	30 / 49	5 - 10	1 - 270
,2-Dichloroethene (total)	20 / 49	5 - 120	1 - 130
hloroform	1 / 49	5 - 120	44 - 44
,2-Dichloroethane	1 / 49	5 - 120	1 - 1
-Butanone	0/49	10 - 120	
,1,1-Trichloroethane	30 / 49	5 - 10	5 - 2700
arbon Tetrachioride	0/49	5 - 120	
inyl Acetate	0/6	10 - 10	
romodichloromethane	1 / 49	5 - 120	4 - 4
,2-Dichloropropane	0/49	5 - 120	
is-1,3-Dichloropropene	0/49	5 - 120	
a-i'a-alamaiahiahana		5 - 25	2 - 170
richloroethene	22 / 49	J - 2J	
richloroethene	22 / 49	1	
•••		5 - 120 5 - 120	2 - 5

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TABLE 5:

Page 2 of 3

Chemicals Analyzed in Ground Water Samples: Frequency and Concentration Range Rotofinish, Portage Michigan

(May, 1989 - May, 1993)

Chemicais	Frequency of	Range of	Range of
	Detection*	Detection Limits	Positively Detected
· · · · · · · · · · · · · · · · · · ·		(µ <b>9/I)</b>	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	
Tetrachioroethene	12/49	5 - 83	1 - 25
1,1,2,2-Tetrachioroethane	0/49	5 - 120	
Toluene	7/49	5 - 120	1 - 40
Chlorobenzene	8/49	- 5 - 120	6 - 270
Elhylbenzene	3/49	- 5 - 120	2 - 17
Styrene	0/49	5 - 120	0 04
Total Xylenes	2/49	5 - 120	2 - 24
Semi-Volatile Organics	o / <b>oo</b>	10 - 10	
Phenoi	9/39		2 - 40
bis (2-Chloroethyl) Ether	0 / 39 0 / 39	10 - 20 10 - 10	й 1 7
2-Chlorophenol	0/39	10 - 10	t •
1,3-Dichlorobenzene 1,4-Dichlorobenzene	1/39	10 - 10	2 - 2
-	0/6	10 - 10	<b>2 - 2</b>
Benzyl Alcohol 1.2-Dichlorobenzene	3/39	10 - 10	2 - 27
2-Methylphenol	0/39	10 - 10	2-21
2,2-Oxybis(1-Chloropropane)	0/33	10 - 10	
bis (2-Chloroisopropyl) Ether	0/6	10 - 10	
4-Methylphenol	0/39	10 - 10	
N-Niroso-Di-n-Propylamine	0/39	10 - 10	ł
Hexachioroethane	0/39	10 - 10	
Nirobenzene	0/39	10 - 10	
Isophorone	0 / 39	10 - 10	
2-Nirophenol	0/39	10 - 10	<b></b>
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	
Nephthelene	0/39	10 - 10	
4-Chiorceniline	0/39	10 - 10	
Hexachiorobutaciene	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	
2.4.8-Trichlorophenol	0/39	10 - 20	
2,4,5-Trichlorophenol	0/39	20 - 50	1
2-Chloronaphthalene	0/39	10 - 10	H .
2-Nitroeniline	0/39	10 - 50	
Dimethyl Phthalate	0/39	10 - 10	
Acenephthylene	0/39	10 - 10	
2,6-Dinitrotoluene	0/39	10 - 10	
3-Nitroeniline	0/39	20 - 50	
Acenephthene	0/39	10 - 10	
			ITI Limno-Tech Inc

# LTI, Limno-Tech, Inc.

TABLE 5:

Page 3 of 3

## Chemicals Analyzed in Ground Water Samples: Frequency and Concentration Range Rotofinish, Portage Michigan

	(May, 198	<b>19 - May</b> , 1993)		
Chemicals	Frequency of Detection*	Range of Detection Limits	Range of Positively Detected	
	Detection	(µgA)	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	:	
-Chlorophenyi-phenylether	0/39	10 - 10		
Fluorene	0/39	10 - 10	ļ.	
4-Nitroaniline	0/39	20 - 50		
4,6-Dinitro-2-Methylphenol	0/39	25 - 50	ł -	
N-Nitrosodiphenylamine (1)	0/39	10 - 10		
4-Bromophenyl-phenylether	0/39	10 - 10		
Hexachlorobenzene	0/39	10 - 10		
Pentachiorophenoi	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		
Butyibenzyiphthaiate	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	<b>L</b> - <b>L</b>	
Benzo (g,h,i) Perylene	1/39	10 - 10	3 - 3	
MOCA**	0/39	0.2 - 1	0 - 0	

(May, 1989 - May, 1993),

\* 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

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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 Vinyl Chloride

ACUTE TOXICITY SUMMARY Acute occupational exposure to high concentrations of viavi 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.

CHRONIC TOXICITY SUMMARY Human health effects associated with chronic occupational exposure to vinyl chloride include hepatitis-like liver changes, decreased blood platelets, enlarged spleens, decreased pulmonary function, acrosseolysis (sometimes with Raynaud-like syndrome) scierotic 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.

CANCER POTENTIAL 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.

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OTHER. Vinvl chloride is mutagenic in several test systems Chromosome aberrations have been reported in exposed workers. In humans, possible relationships between exposure and birth delects 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 nuce exposed during gestation

#### References:

Casarett and Douil, 1986. Toxicology, 3rd edition. Ed. C.D. Klassen, M.O. Amdur, and J. Doull. New York: Macmilian. International Agency for Research on Cancer, 1973, 1979, 1980. IARC Monographs, Lyon, France. National Academy of Sciences, 1977. Drinking Water and Health.
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Spencer and Schaumburg, 1980. Experimental and Clinical Neurotoxicology. Baltimore: Williams and Wilkins.
American Conference of Governmental Industrial Hygienists, 1980, 1984. Documentation of the Threshold Limit Values.
Sax and Lewis. 1987. Hazardous Chemicals Desk Reference. Van Nostrand Reinhold Company, New York.
NIOSH, 1990. Pocket Guide to Chemical Hazards. Washington, D.C.
40 CFR 141:25720-34. July 8, 1987. EPA, Drinking Water.

# TABLE 7:

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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 . . . . . .

Limno-Tech, Inc.

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 Costa	Engineering (10%)	\$17,00
	Overhead & Profit (10%)	\$17,00
	Contingency (25%)	\$43,00
Direct Operation & Maintenance Costs		\$397,00
Indirect Operation & Maintenance Costs	Engineering (10%)	• \$40,00
	Overhead & Profit (10%)	• \$40,00
	Contingency (25%)	\$99.QQ
Total for Operating Life of System, at Given Discount Rate:		\$1,289,00
Nir Stripping		<u> </u>
Direct Capital Cost		\$64,00
Indirect Capital Costs	Engineering (10%)	\$6,00
	Overhead & Profit (10%)	\$6,00
	Contingency (25%)	\$16,00
Direct Operation & Maintenance Costs		\$126,00
Indirect Operation & Maintenance Costs	Engineering (10%)	\$13,00
	Overhead & Profit (10%)	\$13,00
	Contingency (25%)	\$32.00
Total for Operating Life of System, at Given Discount Rate:		\$424,00

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# TABLE 8: Summary of Estimated Costs for Removal Action Alternatives

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

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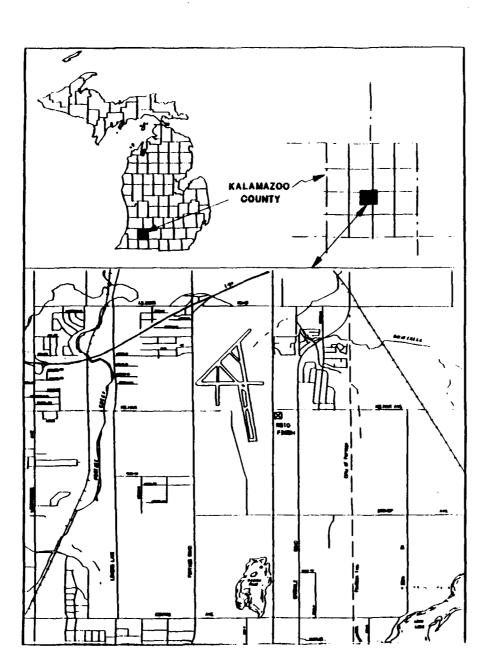
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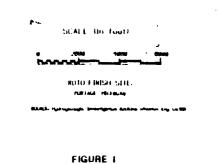
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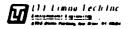
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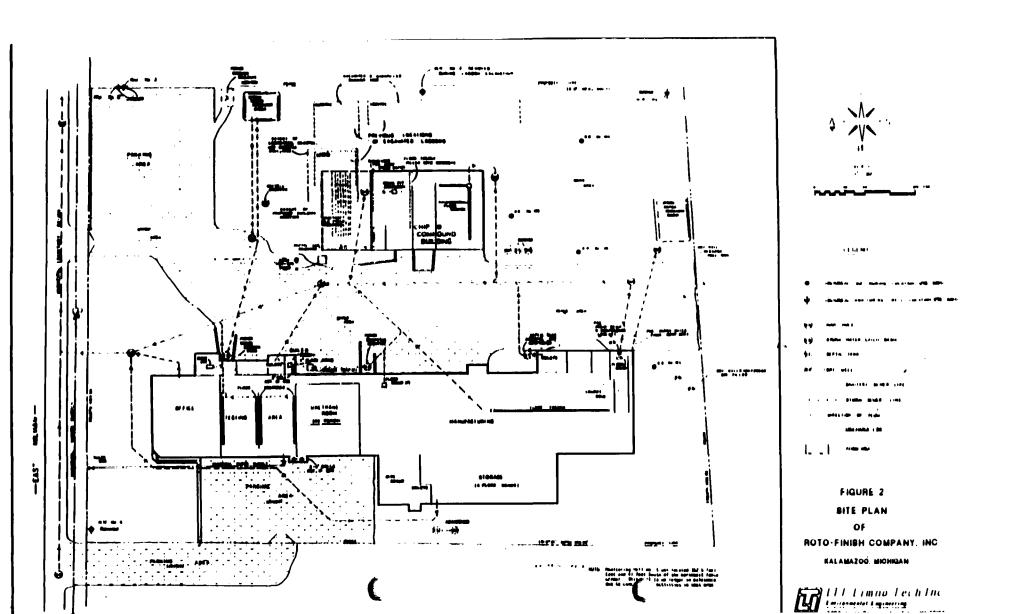


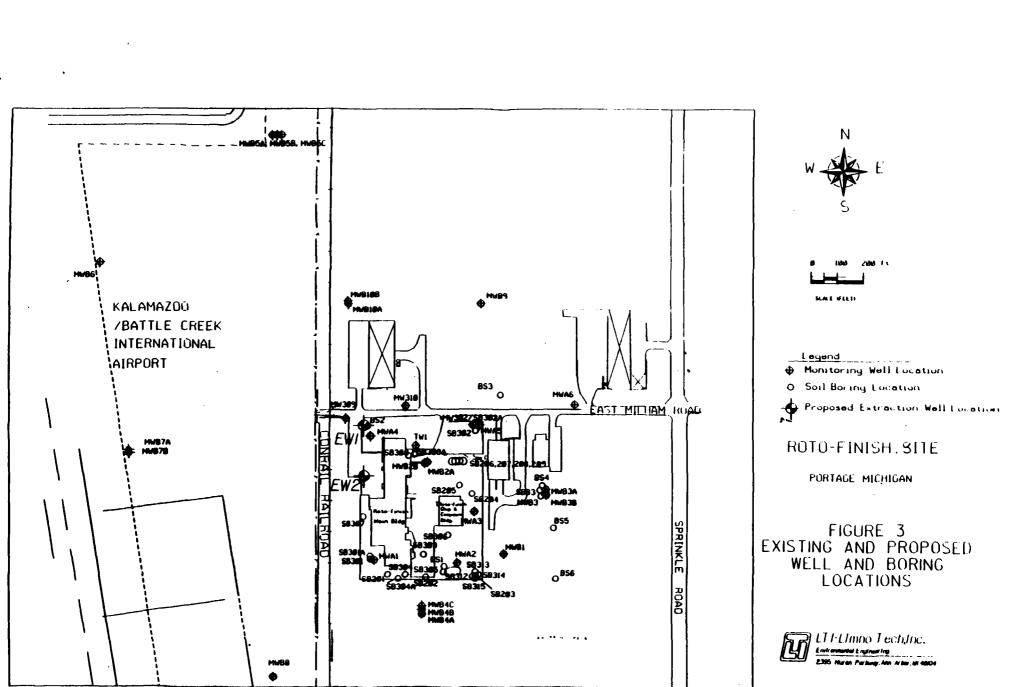
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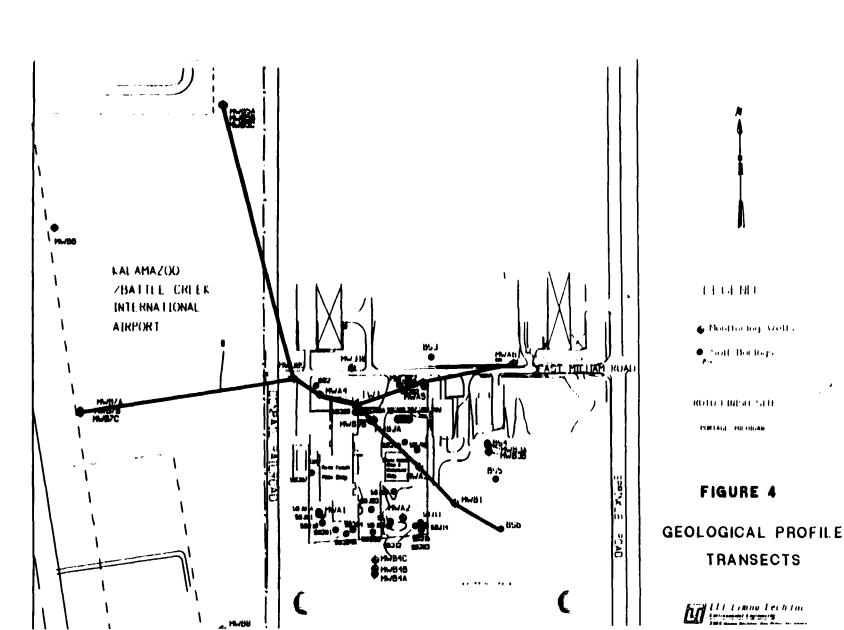
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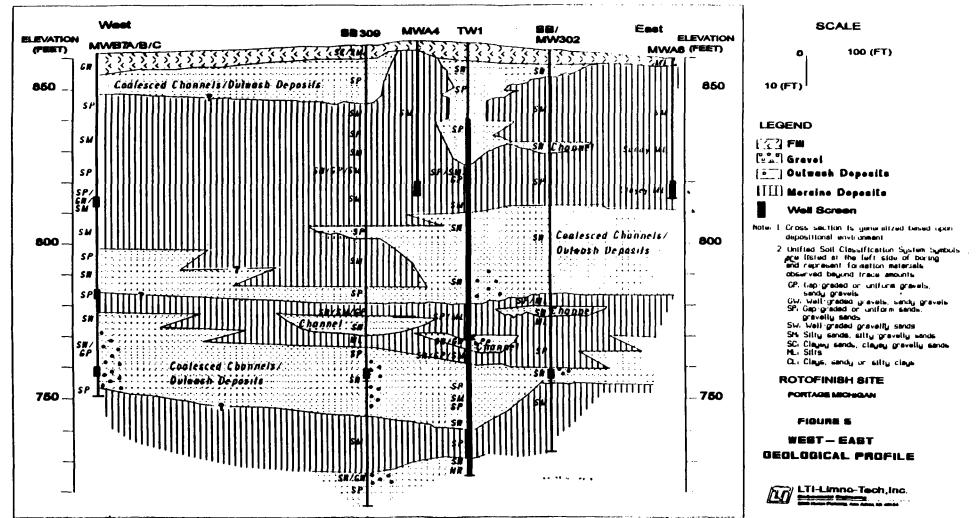




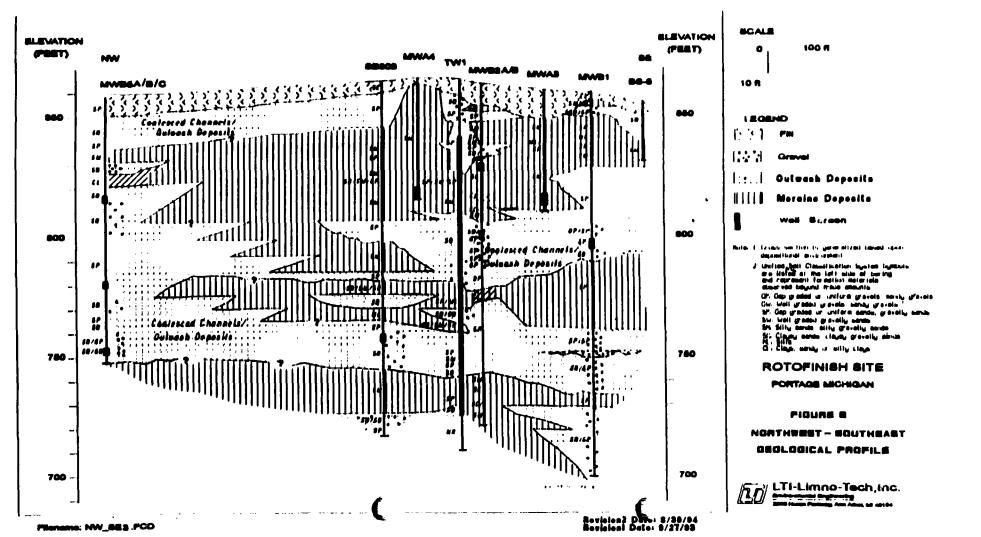


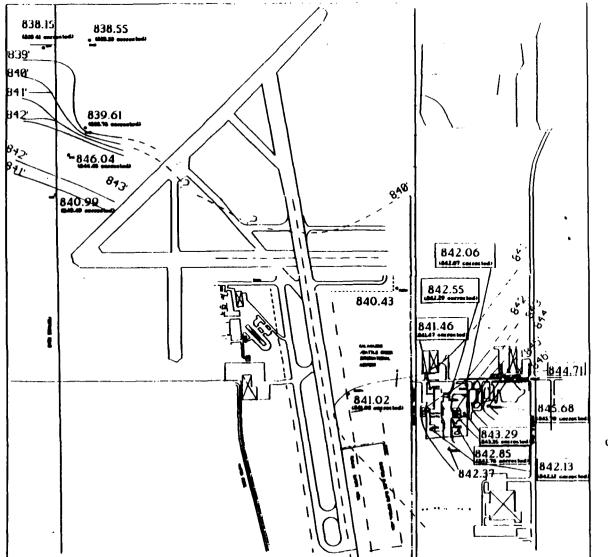
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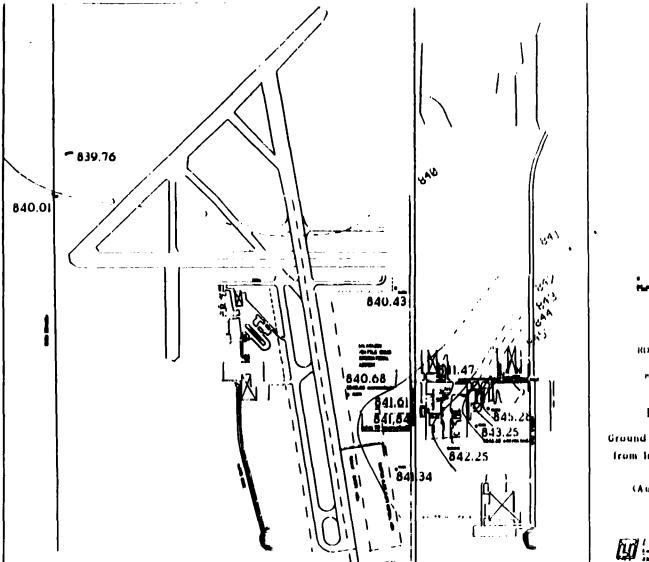
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#### Figure 7

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

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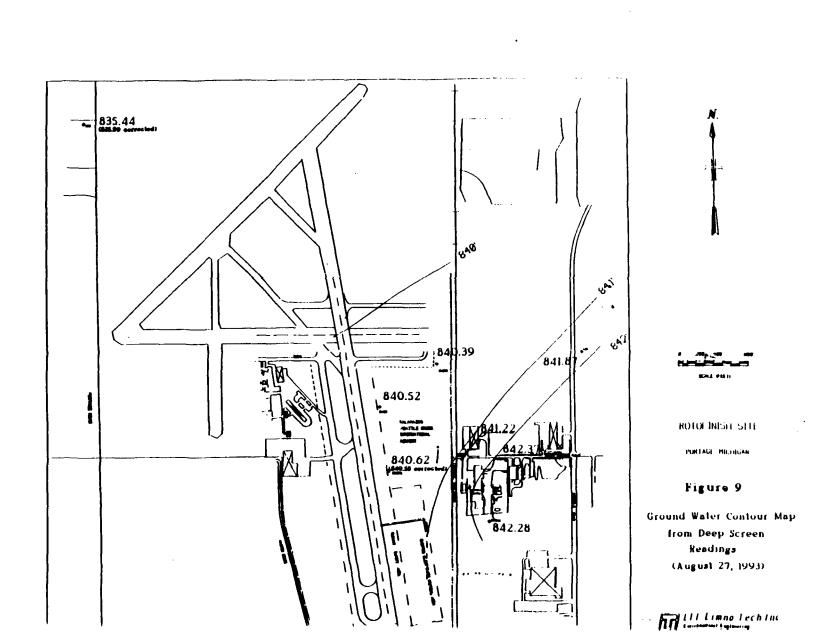
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Figure 4

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

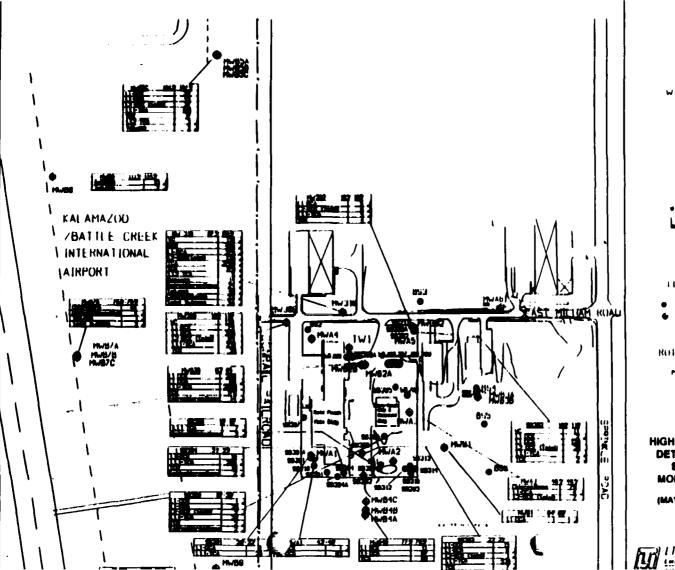


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HIGHEST VOC LEVELS DETECTED IN EACH SOIL BORING/ MONITORING WELL (µg/L) (MAY, 1969 - MAY, 1993)

IT Limno Tech Inc

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APPENDIX A

# Summary of Soil Sample Results

# ROTOFINISH SITE

_	Well ID	MWAT	MWA1-oup	MWA1	MWA2	MWA2-dup	MWA2	JWA3	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
	IORGANICS (mg/kg)	6470	1310	8010	7190	5190	3980	2710	2540
	Antimony	9.4 UJ		9.4 UJ	9.9 UJ				2540 14.9 U
	Arsenic	4.4	8.9	6.3	4.3	9.9 UJ 4.6	9.8 UJ 5.6	0.56	2.7
	Barium	39	8.8	38.8	40.8	54.2	25.3	16.6	15.4
	Berytlium	0.41	0.25 U	0.36	0.27 U	0.45	23.3 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	0.88 U	0.85 U
	Calcium	15900	22000	3090	942	12800	3440	441 J	46000 J
	Chromum	12.1	4.7	14.00	10.1	9.1	11.9	4	6.3
	Colbeit	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	57 <b>50</b>	14900	10 <b>700 J</b>	8350 J	9470 J	2690	5950
	Leed	7.9	7.8	5.9	5.9	5.7	1.00	1.6	2.4
	Magneelum	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
	Potessium	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 U
	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. <b>39</b> U	0.4 U	0.42 U	0.42 U	0.4 UJ	
	Vanedum	11.3	4.3 U	20.6	15.9	12.4	10.8	7.1 U	
	Zinc	43.6	35.7	51.3	39.5 J	52.3 J	42.1 J	15.9	23.5
	Cyanida	<u>1.1 U</u>	<u>1.1 U</u>	<u>1.1 U</u>	<u>1.2 U</u>	<u>1.1 U</u>	<u>1.2 U</u>	<u>1.1 U</u>	<u>1.1 U</u>
	OLATILE ORGANICS (µg/kg)								
	Chioromethane	12 U	11 U	11 U	12 UJ	11 W		11 W	11 U
	Vinyl Chloride	12 U 12 U	11 U 11 U	11 U 11 U	12 U 12 U	11 U 11 U	11 U	11 U 11 U	11 U 11 U
	Chioroethene	12 U	11 U	11 U	12 U	11 U	11 U 11 U	11 U	11 U
	Methylene Chloride	23 UJ		16 W	12 U	11 U	11 U	15 U	11 U
	Acetons	59 W		32 14	12 U	11 0	· · =	11 UJ	11 U
	Carbon Disutilda	60	6 U	5 U	6 U	6 U	5 U	6 U	5 0
	1.1-Dichlorosthene	6 0	6 U	5 U	6 0	6 0	5 U	6 U	5 U
	1,1-Dichloroethene	6 0	6 U	5 U	6 U	6 0	5 U	6 0	5 U
	1,2-Dichlorosthene (total)	6 0	6 U	5 U	6 U	6 U	5 U	6 U	5 0
	Chierolom	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 0
	1.2-Dichloroethane	6 0	6 U	5 U	6 U	6 U	5 U	6 U	5 U
	2-Butanone	12 UR				11 U	11 Ŭ	11 1	11 U
	1,1,1-Trichloroethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
	Carbon Tetrachioride	60	6 U	5 U	6 U	6 U	5 U	6 U	5 U
	Vinyi Acousto	12 U	11 Ŭ	11 U	12 U	11 U	11 U	11 U	11 U
	Bromodichioromethene	6 U	6 U	5 U	6 UJ		5 W	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
	Dibromochioromethene	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		5 U	6 U	5 U
	Trans-1,3-Dichloropropene	60	6 U	5 U	6 UJ			6 U	5 U
	Bromoform	60	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 W	11 U
	2-Hexanone	12 U	11 U	11 U	12 U	11 U	11 U	11 W	11 U
	Tetrachioroethene	60	6 U	5 U	6 U	6 U	5 U	6 U	5 U
	1,1,2,2-Tetrachioroethane	6 U	6 U	5 U	6 U	6 U	5 U	6 U	5 U
1	Toluene	6 U	6 U	5 U	6 UR		5 U	6 U	5 U
•	Chiorobenzene	6 U	6 U	5 U	6 UR		5 U	6 U	5 U
	Ethylbenzene	6 U	6 U	5 U	6 UR		5 U	6 U	5 U
	Styrene	6 U	6 U	5 U	6 UR	1 6 U	5 U	6 U	5 U
	Total Xvienes	60	6 U	5 U	6 UR	1 6 U	5 U	6 U	5 U

ROTOFICEN SITE

### SOL SAMPLES

Reveluen: 10:56 AM, 10/15/93 (MASTER\_S.XLS)

Well 4D	ARNA 1	MANA1-OLD	MWA1	MWA2	MWA2-OUP	MMA2	MWA3	MWA3
Sample Dapth	0.5-4.5	0.5-4.5	4.5-10.5	05-45	0.5-4.5	6.5-10.5	2-6	13-17
Date Collected	331/60	3/31/80	3/31/89	4/3/89	4/3/89	4389	4/7/89	4/7/89
SEMI-VOLATILE ORGANICS (ug/hg								
Phone	390 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
bis (2-Chlorosthyl) Ether	390 U	380 U	350 U	380 UJ	370 UJ	350 UJ	370 U	360 U
2-Chiarophanai	390 U 390 U	380 U 380 U	350 U 350 U	380 U 380 U	370 U 370 U	350 U 350 U	370 U 370 U	360 U 360 U
1,3-Olchicrobenzene 1,4-Olchicrobenzene	390 U	380 U 380 U	350 U 350 U	390 U 390 U	370 U 370 U	350 U 350 U	370 U 370 U	360 U 360 U
Banzyi Alcohol	390 W	360 W	350 U	380 U	₹ 370 U	350 U	370 U	360 U
1.2-Oichlorobertzene	390 U	380 U	350 U	380 U	370 U	350 U	370 U	380 U
2-Mathylphanci	390 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
2.2-Ocybia (1-Chloropropana)								
tus (2-Chiarasapropyi) Ether	390 W	380 UJ	350 UJ	380 UJ	370 UJ		370 U	360 U
4-Mailtylphanci	390 U	380 U	350 U	- 380 U	370 UJ		370 U	360 1
N-Messo Di a Propylanane	390 UJ		350 UJ	300 UJ	370 UJ		370 U	360 U
Hanachtereofteno	390 U	390 U	350 U	360 U	370 U	350 U	370 U	380 U 360 U
Nijebarižena Leopharizma	390 W 390 W	380 W 380 W	350 W 350 W	360 UJ 360 UJ	370 UJ 370 U	350 UJ 350 U	370 UJ 370 U	360 U ~~n U
2-Nirushanal	390 U	380 U	350 U	380 U	370 U	350 U	370 U	ں : ں <b>ای</b> ا
2.4-Olmathyghanci	390 U	380 U	350 U	360 U	370 U	350 U	370 W	360 U
Benzen: Acid	1900 U	1800 U	1700 U	1900 LU	1800 UJ		1800 U	1800 U
ble (2-Childrosthany) Methane	390 U	380 U	350 U	380 UJ	370 U	350 U	370 U	380 U
2,4-Olchiaveghanat	380 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
1,2,4-Tilcheurobenzene	380 U	380 U	350 U	380 U	370 U	350 U	370 U	380 U
Naphthalono	380 U	380 U	350 U	380 U	370 U	350 U	370 U	53 J
4-Charannine	300 W		350 UJ	380 (U)	370 W	350 W	370 U s	
Hanachlandardaria A Chines 3 Mathematics	390 U	380 U	350 U	380 U	370 U	350 U	370 U	
4-Chiere-3-Methylphensi 2-Methylmethylphens	390 U 390 U	380 U 380 U	350 U 350 U	380 U 380 U	370 U 370 U	350 U 350 U	370 U 370 U	360 U 360 U
Headdhierecycleseriedene	310 U	380 U	350 U	380 U	370 U	350 U	370 UJ	380 U
2.4.8-Trichlanghanai	360 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
2,4,5-Trichterephonei	1800 U	1809 U	1700 U	1900 U	1800 U	1700 U	1800 U	1800 U
2-Chlorosophilulano	380 U	380 U	360 U	380 UJ	370 U	350 U	370 U	380 U
2-Monutino	1900 UJ	1800 W	1 <b>700 U</b> J	1900 UJ	1800 UJ	1700 UJ	1 <b>800 U</b>	1 <b>800 U</b>
Dimethyl Phthelein	390 U	380 U	390 U	380 UJ	370 U	350 U	370 U	380 U
Aconapillaylana	380 U	380 U	350 U	380 W	370 U	350 U	370 U	360 U
2.6-Outoustano	390 U	380 U	350 U	380 U	370 U	350 U	370 U	. Yu
3-Missanine Accumulture	1900 U 390 U	1800 U 380 U	1700 U	1900 U	1800 U	1700 U 260 U	1800 U 370 U	<u>ຼ</u> ອຍ ແ 360 ປ
2.4-Onlinemand	1900 U	380 U 1800 U	350 U 1700 U	380 U 1900 U	370 U 1800 U	350 U 1700 U	370 U 1800 UJ	380 U 1800 U
4-Margahangi	1900 W	1800 W	1700 UJ	1900 U	1800 U	1700 U	1800 UJ	1800 U
Oberzehuen	380 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
2,4-Dinibutchume	390 U	380 U	350 U	380 W	370 U	350 U	370 U	380 U
Cladyphilater	380 U	380 U	350 U	380 UJ	370 U	350 U	370 U	380 U
4-Citarophanyt-phanytathar	390 UJ		390 UJ	380 U	370 U	350 U	370 U	380 U
Fuerene	390 U	389 U	350 U	380 U	370 U	350 U	370 U	360 U
4-Niroanina	1900 W		1700 UJ	1900 UJ	1800 UJ	1700 UJ	1800 UJ	1800 U
4.6-Distro-2-Mathylphanel	1900 U	1800 U	1700 U	1900 LU	1800 U	1700 U	1800 U	1800 U
N-Nibesediphenylenine (1)	390 U	380 U	350 U	380 U	370 U	350 U	370 U 370 U	360 U 360 U
4-Bremsphanyt-phanylather Heugsblanebenzono	390 U 390 U	389 U 380 U	350 U 350 U	380 U 380 U	370 U 370 U	350 U 350 U	370 U 370 U	360 U
Pentechlerophenol	1900 U	1800 U	350 U 1 <b>700</b> U	1900 U	370 U 1800 U	1700 U	1800 U	1800 U
Phanandurano	390 U	380 U	350 U	360 U	370 UJ	350 UJ	370 U	L 36
Artugano	390 U	380 U	350 U	360 U	370 U	350 U	370 U	360 L
Cadegole		0						•••• •
CI-n-Bullyfpitchalate	390 W	380 W	350 UJ	380 UJ	370 W	350 UJ	370 U	<b>360</b> L
Fluerenthene	390 U	380 U	350 U	380 U	370 U	350 U	370 U	63 1
Pyrate	390 U	380 U	350 U	380 U	370 U	350 U	370 U	<b>49</b> J
Buly loon zygen that an a	390 UJ	380 UJ	350 UJ	380 U	370 U	350 U	370 U	380 L
3.3-DicMarabanzadine	390 U	760 U	700 U	770 U	750 UJ	690 UJ	730 UJ	730 L
Banas (a) Andrecens	390 U	380 U	350 U	380 U	370 U	350 U	370 U	360 L
Chrysens	390 U	380_U	350 U	<u>380 U</u>	370 U	<u>350 U</u>	<u>370 U</u>	360 (

# SOIL SAMPLES

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Well ID	MWA1	MWA1-dup	MWA1	MWA2	MWA2-OLD	MWA2	MWAJ	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 (Ug/kg)	the the state of the second st	stat i i	e serate	e e e e e	n Maria ya M	e de la composición de la de	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	بالمراجع والمراجع والمراجع
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	380 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 U.
Benzo (a) Pyrene	390 U	380 U	350 U	380 U	370 U	350 U	370 U	360 U
Indeno (1,2,3-od) 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.

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# ANALYTICAL REBULTS ROTOPHEM SITE

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SOL SAMPLES

Well ID	MWA3	MANIA 4	MWA4	MWA4	MWAS	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	4469	44489	4489	4/369	4389	4369	4/5/80
INORGANICS (mg/kg)								
Alumenum	3100	1530	8140	2660	7460	11000	3710	7000
Artemolity	13.1 W	8.6 W	10 W	9.2 W	10.6 UJ	10.5 W		9.8 UI
Areanic	28	1.8	61.2	3.1	3.4	5.4	2.5	8.3 J
Benen	17.0 0.25 U	9.4 0.24 U	145 1,4	11.9 0.25 U	137 0.29 U	109 0.48	15.6 0.25 U	34 0.65
Beryllum Cadhum	0.45 U	0.79 U	0.92 U		20.98 U	0.97 U	0.45 U	0.9 U
Catchen	44600 J	347	20400	43000	5450	2010	501	492
Chromingen	6.0	52	16.8	4.3	12.1	13.3	7.0	14.4
Colum	27	34 U	16.0	4.00 U	8.5	9.3 U	3.3 U	5.3
Capper	33.5	4.5	10.9	8.1	16.0	8.9	11.2	31.3 J
Iran	6700	4280 J	48800 J	0060 J	11 <b>100</b> J	14300 J	6410 J	16300
Lead	2.6	1.9	4.5	* 10.7	10.0	11.2	2.8	32 J
Magneseum	14600	738	7100 J	15200 J	3120 J	2180	1440	1730
Mangunase	154	142 J	2590 J	1 <b>45 J</b>	824 J	625 J	161 J	508
Marcury	0.1 U	0.1 U	0.12 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U
Polansum	75 U 1040 U	7 U 976 U	33.3 1130 U	7.5 U 1040 U	9.1 1210 U	11.4 1200 U	8.5	1100
Selaman	1.5 W	0.29 UJ	3.1 UJ	0.3 LU	1210 U	1.0 UJ	1040 U 0.29 UJ	1.5 U
Sher	120	1.1 U	1.3 U	1.2 U	1.7 UJ 1.3 U	1.0 UJ	1.2 U	1.5 UI 1.2 U
Sector	624 U	670 W	775 W	999 UJ	730 U	717 U	623 U	885 U
Theffer	0.39 UJ	0.37 U	0.4 U	0.36 U	0.44 U	0.43 U	0.36 U	
Venadum	11.1 U	5.6 U	97.4	7.9	18.2	22.8	8.9	16.8
Znc	34.2	17.9 J	42.5 J	32.7 J	52.5 J	46.9 J	24.3 J	48.7
Crentde	<u>1.1 U</u>	<u>1.1 U</u>	<u>1.1 U</u>	<u> </u>	120	<u>12 U</u>	<u>1.1 U (</u>	
VOLATEL ORGANICE (1914)								
Cituremethene	11 W	11 W	11 W	10 U	11 W	11 W		11 U
Vend Chiarida	11 U 11 U	11 U 11 U	11 U 11 U	10 U 10 U	11 U 11 U	11 U 11 U		11 U 11 U
	11 U	11 U	11 U 11 U	10 U	11 U	11 U		11 U
Matteriere Chieride	11 U	11 U	13 U	12 U	11 U	35 U		14 U
Accesso:	11 W	11 W	13 W	10 U	11 W	100 U		22 W
Carbon Divelle	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,1-Oktoreethene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,1-Cichipresthane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,2-Oktoroethene (total)	5 U	6 U	5 U	5 U	6 U	5 U	•	لىرىپ
Chierchann	5 U	6 U	5 U	5 U	6 U	5 U		<b>""</b> ""
1,2-Oktoreethane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
2-8-44	11 W	11 U	11 W	10 U	11 U	11 W		11 W
1,1,1-Trichlereelhene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Carbon Totachistic	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Vinyi Accessio Granudichloromethene	11 U 5 U	11 U 6 W	11 U 5 U	10 U 5 U	11 U 6 W	11 U 5 U		11 U 6 U
1.2-Olderspropene	5 U	6 U	5 U	5 U	6 U	5 U		6 U
cip-1_3-Cichlorepropeno	50	6 U	5 W	5 U	6 U	50		6 U
Trichleresthere	5 U	6 U	5 U	5 0	6 U	5 U		6 U
Deremechteremethane	5 U	6 U	5 U	5 U	6 U	S U		6 U
1,1,2-Tácharcethane	5 U	6 U	s w	S W	6 U	5 U		6 U
Consono	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Trans-1,3-Dickloropropone	5 U	6 W	5 U	5 U	6 W	5 U		6 U
Branclarm	5 U	6 U	5 U	5 U	6 U	5 U		6 U
4-Machine Pertenano	11 W	11 U	11 W	10 U	11 U	11 W		11 UJ
2-Haughano	11 W	11 U	11 W	10 U	11 U	11 W		11 UJ
Tettechianathana	5 U	6 U	5 U	5 U	6 U	5 U		6 U
1,1,2,2-Testachiereshane	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Tohese	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Chiprobanzania	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Ebybonzono	5 U	6 U	5 U	5 U	6 U	5 U		6 U
Styreno Touri Midana	5 U	6 U	S U	5 U	6 U	5 U		6 U
Total Xylanas	<u> </u>	<u>6</u> U	<u> 5 U</u>	<u>5 U</u>	6 U	<u> </u>		<u>6 U</u>

# ROTOFINISH SITE SOIL SAMPLES

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#### Revision: 10:56 AM, 10/15/93 (MASTER\_S.XLS)

Well ID	MWA3	MWA4	MWAA	MWA4	MWA5	MWA5	MWA5-dup	MWA6
Sampie 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 (US		and the second se					·	
Phenol	360 U	370 U	360 U	340 U	370 U	350 U		370
bis (2-Chloroethyl) Ether	360 U	370 U.		340 UJ	370 UJ	350 UJ	1	370
2-Chiorophenol	360 U	370 U	360 U	340 U	370 U	350 U		370
1,3-Dichlorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370
1,4-Dichlorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370
Benzyl Alcohol	360 U	370 U	360 U		2 370 U	350 U		370
1,2-Dichlorobenzene	360 U	370 U 370 U	360 U	340 U	370 U 370 U	350 U		370
2-Methylphenol	360 U	3/0 0	360 U	340 U	370 0	350 U		370
2,2-Oxybis(1-Chloropropane)	360 U	370 U.	360 UJ	340 UJ	370 UJ	350 UJ		
bis (2-Chlorolsopropyl) Ether 4-Methylphenol	360 U	370 U. 370 U	360 U	340 UJ 340 U	370 UJ 370 U	350 U		370
N-Niroso-Di-n-Propylamine	360 U	370 U.		340 UJ	370 UJ	350 UJ		370
Hexachioroethane	360 U	370 U	360 U	340 U	370 U	350 U		370
Nirobenzene	360 U			340 UJ	370 UJ	350 UJ		370
Isophorone	360 U	370 U.		340 UJ	370 UJ	350 UJ		370
2-Nitrophenol	360 U	370 U	, 360 U	340 U	370 U	350 U		370
2.4-Dimethylphenol	360 U.			340 UJ	370 UJ	350 UJ	I	370
Benzoic Acid	1800 U	1800 U.		1700 UJ	1800 UJ	1700 UJ		1800
bis (2-Chloroethoxy) Methane	360 U	370 U.		340 UJ	370 UJ	350 UJ		370
2.4-Dichlorophenot	360 U	370 U	360 U	340 U	370 U	350 U		370
1,2,4-Trichiorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		; 370
Nachthalana	360 U	370 U	360 U	340 U	370 U	350 U		370
4-Chioroaniline	360 U	370 UJ		340 UJ	370 UJ	350 UJ		370
Hexachiorobutaciene	390 U	370 U	360 U	340 U	370 U	350 U		: 370
4-Chioro-3-Methylphenol	360 U	370 U	360 U	340 U	370 U	350 U		370
2-Methylnephthelene	360 U	370 U	380 U	340 U	370 U	350 U		370
Hexactebrocyclopentacliene	390 U.	J 370 U	380 U	340 U	370 U	350 U		370
2,4,6-Trichlorophenol	360 U	370 U	360 U	340 U	370 U	350 U		370
2,4,5-Trichlorophenol	1800 U	1800 U	1700 U	1700 U	1 <b>800</b> U	1 <b>700</b> U		1800
2-Chioronaphihaiene	360 U	370 UJ	J 360 UJ	340 UJ	370 UJ	350 UJ		370
2-Nirceniine	1800 U	1800 U.	1700 UJ	1700 UJ	1800 UJ	1700 UJ		1800
Dimethyl <sup>®</sup> Phthalate	360 U	370 U.	J 360 UJ	340 UJ	370 UJ	350 UJ		370
Acenephitylene	360 U	370 U.	J 360 UJ	340 UJ	370 ÜJ	350 UJ		370
2,6-Dinitizativene	360 U	370 U	360 U	340 U	370 U	350 U		370
3-Niroaniine	1800 U	1800 U	1 <b>700 U</b>	1700 U	1800 U	1 <b>700 U</b>		1800
Acenephihene	360 (/	370 U	360 U	340 U	370 U	350 U		370
2,4-Dinitrophenol	1800 U.		1700 U	1700 U	1800 U	1 <b>700</b> U		1800
4-Nitrophenoi	1 <b>800</b> U.		1700 U	1700 U	1 <b>800</b> U	1700 U		1800
Dibenzoluran	360 U	370 U	360 U	340 U	370 U	350 U		370
2.4-Dinitrotoluene	360 U	370 U.		340 UJ	370 UJ			370
Diethylphthalate	360 U	370 U.		340 UJ	370 UJ		l	370
4-Chiorophenyl-phenylether	360 U	370 U	360 U	340 U	370 U	350 U		370
Fluorene	360 U		360 U	340 U	370 U	350 U		370
4-Niroaniline	1800 U.			1700 UJ	1800 UJ			1800
4,6-Dinitro-2-Methylphenol	1800 U	1800 U.		1700 UJ	1800 UJ		l	1800
N-Nirosodiphenylamine (1)	360 U		380 U	340 U	370 U	350 U		370
4-Bromophenyl-phenylether	380 U	370 U	360 U	340 U	370 U	350 U		370
Hexachiorobenzene	360 U	370 U	360 U	340 U	370 U	350 U		370
Pentachiorophenol	1800 U	1800 U	1700 U	1700 U	1800 U	1700 U		1800
Phenenthrono	360 U		360 U	340 U	370 U	350 U		370
Anthracene	360 U	370 U	360 U	340 U	370 U	350 U		370
Carbazole								
Di-n-Butyiphthalate	360 U	39 U	360 UJ	340 UJ	370 UJ	350 UJ		370
Fluoranthene	360 U	370 U	360 U	340 U	370 U	350 U		370
Pyrene	360 U		360 U	340 U	370 U	350 U		370
Butybenzylphthelete	360 U		360 U	340 U	370 U	350 U		370
3,3'-Dichiorobenzidine	730 U		720 U	690 U	740 U	700 U		740
Benzo (a) Anthracene	360 U		360 U	340 U	370 U	350 U		370
Chrysene	360 U	370 U	360 U	340 U	370 U	350 U		370

### ROTOFINISH SITE

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### SOL SAMPLES

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Well ID	AANAJ	MMA4	MMAA	MWA4	MNAS	MAKA5	MWAS-dup	MWAG
Sample Dapth	17-21	0.5-4.5	6.5-10.5	10.5-12.5	05.35	5.5-10.5	5.5-10.5	0.5-4.5
Date Collected	4/7/80	44489	4489	4440	4/309	4389	4/309	4/5/89
SEMI-VOLATILE ORGANICS (Ughi	-							
Dis (2-Elliyhanyi) Philippia	360 U	370 U	73 U	340 U	190 Ŭ	690		43
Di-n-Octyl Phthalate	310 U	370 U	380 U	340 U	370 U	350 U		370
Benzo (b) Fluoranthene	310 UJ	370 U	380 U	340 U	370 U	350 U		370
Benzo (k. )Fluoranthene	310 UJ	370 U	380 U	340 U	370 U	350 U		370
Benzo (a) Pyrene	380 U	370 U	380 U	340 U	370 U	350 U		370
Induno (1.2.3-cd) Pyrene	340 W	370 UJ	360 UJ	340 UJ	1 370 W	350 U.	J	370
Olsenzo (a,h) Anthracano	310 U	370 U	360 U	340 U	370 U	350 U		370
Benzo (g.t.) Perylana	310 U	370 U	360 U	340 U	370 U	350 U		370
MOCA**	170	60 U	60 U	50 U	60 U	50 U	50 U	60

U Analyte was analyzed for but not detected above the reported sample detection or quantitation and

.

J Analyte was positively identified but the concentration is an estimated value.

UJ Analyte was not detected above the reported sample detection or quarteration limit but the limit is an estimated value.

R Analyte was detected but the presence cannot be veniled. The results are unreliable due to sensus deficiencies in the analysis.

UR Analyte was not detected but the results are unreliable due to sensus deficiencies in the analysis.

(1) cannot be separated from Diphenylamine

\*\* 4.4"-Mollylanubis 2-Chloro-anline; special analyte

Blank columns indicate that analysis for the compound was not performed.

# ROTOFINIEH SITE

Weil ID	MWA6	MWB1	MWB2A	MW828	MWB2B	MWB2B	MWB38	MWB48
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)							a system i s	n al state de la
Aluminum	15400	1790			2630			1120
Antemony	10.6 UR	7.6 UJ	l i		7.0 L	L		7.3 UJ
Arsenic	8.4 J	2 J			3.7 J			3.6
Berium	101	7.8			12.4			4.5
Beryllium	0.71	0.23 U			0.21 U	5		0.2 U
Cadmium	0. <b>99 U</b>	0.92 U			έ0.85 L	J		1 U
Calcium	1690	45000			44400			52400 J
Chromum	20.6	5.2			5			3.7 J
Colbeit	7.7	1.7			2.6			1.6
Copper	29.1 J	8.2			22.8			2.4
kron	17100	4640			6290			3920
Lead	12.8 J	3.1			2.8			2.2 J
Magnesium	2940	17100			15300			22300 J
Manganese	546	1 <b>39 J</b>			1 <b>49</b> J			69.9
Mercury	0.11 U	0.1 U			0.11 U	1		0.1 U
Nickel	16.9	5.2			6.1			3.5
Potassium	1 <b>210 U</b>	354 U			546 L			148 U
Selenium	1.7 UR	0. <b>88 U</b>			0. <b>85</b> L			0.62 UJ
Silver	1.4 U	1.1 UJ	l		1.T U	IJ		1.2 UJ
Sodium	726 UJ	131			228			146 U
Thellum	0.43 U	0.44 U			0.43 L	l		0.41 W
Vanadum	26.9	6.9			11.3			; 5.7
Zinc	61.8	20.9 J			35.9 J			: 10.4
Cyanida	<u>12U</u>	<u> </u>			<u>0.55 U</u>			: 0.52 U
VOLATILE ORGANICS (µg/kg)			<b></b>					
Chioromethane	10 W	11 U		19			11 U	10 U
Bromomethane	10 U	11 U		19 (			11 U	10 U
Vinyl Chioride	10 U	11 U		19 (			11 U	10 U
Chiorosthane Materiale	10 U	11 U		19			11 U	10 U
Methylane Chloride	14 U	14 UJ		36			35 W	100 UJ
Acetone Carbon Disulfide	42 UJ	11 W		35			55 UJ	30 W
1,1-Dichlorosthene	5 U 5 U	11 U		19 (	-		11 U	10 U 10 U
1,1-Dichloroethane	5 U	11 U		19 (			11 U	
1,2-Dichlorcethene (total)	5 U	11 U 11 U		19 ( 19 (			11 U 11 U	10 U 10 U
Chierolom	5 U	11 U		19 (			11 U	10 U
1.2-Dichioroethene	5 U	11 U		19			11 U	10 U
2-Butanone	10 W	11 0		19	-		11 6	10 0
1.1.1-Trichiprosthere	5 U	11 U	•	19 (			11 U	10 U
Carbon Tetrachioride	50	11 U		19			11 U	10 U
Vinvi Acetale	10 U			1.	-			14.0
Bromodichloromethane	5 ป	11 U		19	u		11 U	· 10 U
1.2-Dichloropropene	5 U	11 U		19	-		11 U	10 U
cis-1,3-Dichloropropene	5 U	11 U		19			11 U	10 U
Trichlorgehene	5 0	11 U		19			11 U	10 U
Dibromochioromethene	5 U	11 U		19			11 U	10 U
1,1,2-Trichloroethane	5 U	11 U		19			11 U	10 U
Benzene	5 U	11 U		19			11 U	10 U
Trans-1,3-Dichloropropene	5 U	11 U		19	-		11 U	10 U
Brompiorm	5 U	11 U		19	-		11 U	10 U
4-Methyl-2-Pentanone	10 W	11 U		19			11 U	10 U
2-Hexanone	10 W	11 0	ł	19			11 U	10 U
Tetrachiorcethene	5 U	11 U	•	19			11 U	10 U
1,1,2,2-Tetrachiorosthane	7	11 U		19			11 U	10 U
Totune	, 5 U	11 U		19			11 U	10 U
Chiprobenzene	5 U	11 U		19			11 U	10 U
Ethybenzene	5 U	11 U		19			11 U	10 U
1	5 U			_			11 U	10 U
Styrene Total Videman		11 U		19	-			10 U
Total Xylenes	<u>5 U</u>	11 U		19	<u>u</u>		<u>11 U</u>	10 0

NOTOPHINH SITE

SOL SAMPLES

Well ID	MWAS	MWB1	MANE2A	MW828	AMR28	AM828	MWB3B	MWB	48
Sample Dapth	6.5-10.5	10-12	15-17	15-17	17-19	15-19	13-15	7.5-9.	
Date Collected	4580	6/20/91	7/1/91	6/10/91	6/10/91	6/10/91	10/11/91	10/23	<b>V9</b> 1
SEMI-VOLATILE ORGANICS (ug/lig)									
Phendi	340 U	380 U				440 U			340 U
the (2-Chicrosoftyi) Estar	340 U	380 U				440 L			340 U
2-Chlorophand	340 U	380 U				440 U			340 U
1,3-Dicklorobenzene	340 U	380 U				440 U			340 U
1,4-Oichioroberzene	340 U	380 U				440 U			340 U
Benzyi Alcohot 1.2-Olchlorobenzene	340 U 340 U	380 U			i.	440 U			
2-Mathylangi	340 U	380 U				440 U			340 U 340 U
2.2-Output 1-Chiprogramme)		380 U				440 U			340 U
tis (2-Chierescorceve Ether	340 U								340 0
4-Mathyphangi	340 U	380 U				440 U	1		340 U
N-Mireso-QL-n-Propulsione	340 U	380 U		•		440 U			340 U
Hangchitzeathana	340 U	380 U				440 U			340 U
Myabanzane	340 W	360 U				440 U	1		340 U
leophorone	340 U	380 U				440 U	1		340 U
2-Nitrophanal	340 U	380 U				440 U	I		3
2.4-Dimotrytyhunst	340 U	380 U				440 U	1		3400
Bungan: Acid	1700 UJ	_							
bis (2-Chicrosoficacy) Madhane	340 U	380 U			•	440 U			340 U
2.4-Okhiarephonel	340 U	380 U				440 U			340 U
1,2,4-Tricklandsmanne Naskitelere	340 U 340 U	380 U 380 U				440 U		:	340 U
4-Character	340 UJ	380 U				440 U 440 U		;	340 U 340 U
Humchinghadadaa	340 U	380 U				440 U		:	340 U
4-Chine-3-Mailminianat	340 U	380 U				440 U		•	340 U
2-Mathemathetere	340 U	380 U				440 U			340 U
Hundelaracyclapanaglana	340 UJ	389 U				440 U			340 U
2,4,8-Telchiareghangi	340 U	380 U				440 U	I		340 U
2,4,5-Tricklerephonel	1700 U	<b>100</b>				1 <b>100</b> U	i		810 U
2-Chiereneghthelene	340 U	380 U				440 U			340 U
2-Hirosofine	1700 U	<b>930</b> U.	J			1 <b>100</b> U			810 U
Claudity! Philadate	340 U	380 U				440 U			340 U
Aconophilityture 2.6-Civitytytytyte	340 U 340 U	380 U 380 U				440 U			340 U
3-Identifiere	1700 UJ	920 U				440 U 1100 U			340 U
Accounting	340 U	380 U				440 U			3000
2.4-Ohirephansi	1700 LU	920 U	R			1100 U			810 W
4-Nilsophanel	1700 U	990 U	-			1100 U			810 U
Disectoren	340 U	380 U				440 U			340 U
2,4-Oinitratsiane	340 U	380 U				440 U			340 U
Clashylphthalate	340 U	380 U				440 U	r		340 U
4-Citerophenyl-phenylsther	340 U	380 U				440 U	ł		340 U
Fuerere	349 U	380 U				440 U	l		340 U
4-Mireanilne	1700 UJ	920 U				1 <b>100 U</b>			810 W
4.8-Dinizo-2-Methylphenol	1700 UJ	920 U				1100 U			810 U
N-Missediphenylawne (1)	340 U	380 U.	J			440 U			340 U
4-Gremophenyl-phenylscher	340 U	380 U				440 U			340 U
Hauschlorobanzana Pentechlorophanai	340 U 1700 U	380 U 920 U				440 U			340 UJ 810 U
Physion de la company	340 U	380 U				1100 U 440 U			340 U
Antwecene	340 U	360 U				440 U			340 U
Carbazato		360 U				440 U			340 U
	340 U	380 U				440 U			71 U
Resentance	340 U	380 U				440 U			340 U
Pyrane	340 U	380 U				440 U	1		340 U
Butythenzylphthalala	340 U	380 U				440 U	l		340 W
3,3-Okhinabanzidno	690 UJ	380 U				440 U			340 U
Bango (a) Anthracano	340 U	380 U				440 U			340 U
Chrysene	340 U	380 U				440 U	l		340 U

# ROTOFINISH SITE

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Well ID	MWAG	MWB1	MWB2A	MW828	MW828	MW828	MWB38	MWB48
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)	te da analyza da			4 M. A.				and the event
bis (2-Ethylhexyl) Phthelate	88 U	380 U				440 (	J	340 UJ
Di-n-Octyl Phthalate	340 U	380 U				440 L	J	340 UJ
Benzo (b) Fluoranthene	340 U	380 U				440 (	J	340 U
Benzo (k.)Fluoranthene	340 U	380 U				440 (	J	340 U
Benzo (a) Pyrene	340 U	380 U				440 (	J	340 U
Indeno (1,2,3-cd) Pyrene	340 UJ	380 U				440 L	J	340 U
Dibenzo (a,h) Anthracene	340 UJ	380 U			é.	440 L	J	340 U
Benzo (g.h.i) Perviene	340 UJ	380 UJ				440 L	u	340 U
MOCA**	50 U	10 U	10 L	J				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 REBULTS ROTOFUSEN SITE

SOL SAMPLES

Revision: 10:56 AM, 10/15/93 (MASTER\_S.XLS)

Well ID	MW309	AW310	58201	S8201	SB202	S8202	S <b>8203</b>	SB 203
Sample Depth	7.59.5	7595	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	102991	3/30/69	3/30/89	3/31/89	3/30/89	3/29/89	3/29/89
INORGANICS (mg/kg)								
Augustum	2960	3220	10000	5510	8910	2430	4070	3510
Andmony	74 W 3.8	6.5 W 4.2	9.7 JJ 42	9.3 W 5.7	9.4 UJ 4.8 J	92 W 3.1	92 W 5.6	9.4 I 3.2
Areanic Banum	115	14.9	•∡ 51.4	42.7	44.6	- 3.1 11.5	39.7	3.2 21.5
Baythan	0.2 U	0.24 U	0.50	0.26 U	0.26 U	0.40	0.39	0.26
Cadman	10	1.2 U	0.9 U	0.86 U	2 0.87 U	0.85 U	0.85 U	0.87 1
Calcum	52900 J	98500 J	1280	8700	20000	66900	3710	575
Chromen	9.8	9.2	13.4	15.1	16.7	9.4	7.0	16.0
Collett	23	35	5.9 U	6.4 U	5.0 U	3.8 U	5.6 U	5.6 1
Capper tren	4.6	7.7 <b>6230</b>	14.8 14200	21.5 1 <b>3300</b>	18.2 14000	14.8 9730	13.3 1 <b>5200</b>	4.8 7610
Land	3.4	11.9	8.3	4.5	11.9	4.4	7.3	3.9
Magnestan	17800 J	36700 J	1980	8540	11800	19800	3030	1780
Marganese	146	229	336 J	472 J	296 J	216 J	682 J	243 .
Marcaly	01 U	0.11 U	0.10	0.1 U	0.1 U	0.1 U	0.1 U	Q.1 L
Nichol	6.5 U	8.1 U	12.5	13.2	11.7	7.5 U	14.2	
Poinsingin Selaman	226 U 0.61 U	391 U 0.74 U	1 <b>290</b> 0.31 UJ	1 <b>290</b> 0. <b>29 U</b> J	1530 0.31 UJ	1050 U 1.5 UJ	1350	7380
Sher	12 W	1.4 UJ		1.2 U	12 U	1.5 W	0.3 UJ 1.2 U	0.3 U 1.2 U
Sedam	152 U	233 U	664 U	634 U	1160 U	780 U	1140 U	1070 L
Theilin	0.41 UR			0.37 U	0.4 U	0.38 U	0.36 U	
Vereihim	8.8	11.7	18.7	15.5	20.4	9.1	15.0	12.7
	17.6	18.2	47.8	55.5	84.8	43.5	51.9	35.9
Cyando VOLATILE ORGANICS (uplig)			110	110	<u>1.1 U</u>	1.1 U	1.1 U	<u>1.1 L</u>
Capanatana	11 W	12 W	11 U	11 U	11 U	11 U	11 U	11 4
Bunanatara	11 U	12 U	11 U	11 U	11 U	11 U	11 6	11 L
Veryl Chlorida	11 U	12 U	11 Ū	11 U	11 U	11 U	11 U	11 L
Chiaresthane	11 U	12 U	11 U	11 U	1t U	11 U	11 U	11 L
Madhylane Chiaride	30 U	40 U	23 U	11 U	11 U	11 U	53 U	40 (
Acetate Cadate Disulida	11 W 11 U	12 UJ 12 U		14 W 5 U	11 W 6 U	11 W 5 U	140 UJ 6 U	62 L 5 L
1,1-Oktorestano	11 U	12 U	6 U 6 U	5 U 5 U	6 U	5 U	6 U	51
1,1-Dichisronduno	11 U	12 U	6 U	5 U	6 U	5 U	6 U	51
1,2-Cichiarasana (uus)	11 U	12 U	6 U	S U	6 U	5 U	6 U	اقي ا
Chieranam	11 U	12 U	6 U	5 U	6 U	5 U	6 U	
12-Dicherestrate	11 U	12 U	6 U	5 U	6 U	5 U	6 U	51
2-Buttonene	11 W	12 W		11 UR			11 UR	11 L
1, 1, 1-Trickieweelkene Carbon Totrachiando	11 U 11 U	12 U	6 U	5 U 5 U	6 U	5 U	6 U 6 U	5 L 5 L
Vend Acetae		12 U	6 U 11 U	5 U 11 U	6 U 11 U	5 U 11 U	11 U	5 L 11 L
Brenodchistematiene	11 U	12 U	€U	50	6 U	5 0	6 U	51
1,2-Olchloropropere	11 U	12 U	6 U	SU	6 U	5 U	6 U	5 L
cia-1,3-Olchierepropene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 L
Triplieroothane	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 L
Obvemachtereinsthere	11 U	12 U	6 U	5 U	6 U	5 U	6 W	51
1,1,2-Trichlorgehane Benzene	11 U 11 U	12 U	6 U	5 U	6 U	5 U 5 U	6 U 6 U	5 L 5 L
Trans-1,3-Oktoropropene	11 U	12 U 12 U	6 U 6 U	5 U 5 U	6 U 6 U	5 U 5 U	6 U	51
Bransform	11 U	12 U	6 U	5 U	6 U	5 U	6 W	51
4-Madhy2-Pentinone	11 W	12 W		11 U	11 U	11 U	11 W	11 L
2-11-11-12-12-12	11 44	12 W		11 U	11 U	11 U	11 U	11 L
Tetrachicrostene	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 L
1,1,2,2-Tetracteorcetune	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 L
Teleste	11 U	12 U	6 U	5 U	6 U	5 U	6 U	51
	11 U	12 U	6 U	5 U	6 U	5 U	6 U	51
	11 U	12 U	6 U	5 U	6 U	5 U	6 U	5 L 5 L
Siyraha Total Xylanas	11 U 11 U	12 U	6 U	5 U	6 U 6 ม	5 U 5 U	6 U 6 U	51
	<u></u>	12 U	<u>6 U</u>	<u>5 U</u>	<u> </u>	<u> </u>	<u> </u>	

ANALYTICAL	RESULTS
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### ROTOFINISH SITE

4

ดศรีทร์ และสิรัตร์ รับรู้ญี่สุดครั้ง การเลือกรับการเรา เกม รับริษณร์ มีการเราะสิรัตร์ที่มีการเราะสิรัตร์ - สรี - 7

Well ID	MW309	MW310	S <b>B20</b> 1	SB201	S8202	58202	-B203	SB 203
Sample Depth	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 (Hg/kg)					1		·····	an an thurst
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-Chiorophenol	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 1.2-Dichlorobenzene	340 U	400 U	370 U 370 U	350 U 350 U	≟ 370 U 370 U	350 U 350 U	370 U 370 U	360 U 360 U
2-Methylphenol	340 UR	400 UF	370 U	350 U	370 U 370 U	350 U	370 U 370 U	360 U
2.2'-Oxybis(1-Chloropropane)	340 UJ	400 UJ	3/0 0	350 0	3/0 0	350 0	3/0 0	360 0
bis (2-Chloraisopropyl) Ether			370 UJ	350 LU	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-Nilroso-Di-n-Propylamine	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Hexachioroethane	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Nirobenzene	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-Chloroethaxy) Methene 2.4-Dichlorochenol	340 U 340 UR	400 U 400 UF	370 U 370 U	350 U	370 U	350 U	370 U	360 U
1.2.4-Trichiorobenzene	340 U	400 UF 400 U	370 U 370 U	350 U 350 U	370 U 370 U	350 U 350 U	370 U 370 U 〔	360 U 360 U
Nachthaisne	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
4-Chioroaniline	340 UJ	400 UJ	370 UJ	350 U	370 UJ	350 UJ	370 UJ 2	380 U
Herachiorobutaciane	340 U	400 U	370 U	350 U	370 U	350 U	370 U S	380 U
4-Chioro-3-Methylphenoi	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	380 U
2-Methylnephthelene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	380 U
Hexachlorocyclopentaclene	340 U	400 U	370 UJ	350 UJ	370 UJ	350 UJ	370 UJ	380 UJ
2,4,6-Trichiorophenoi	340 UR	400 UF	370 U	350 U	370 U	350 U	370 U	360 U
2,4,5-Trichlorophenol	840 UR	970 UF	1 <b>800 U</b>	1700 U	1 <b>800</b> U	1700 U	1 <b>800</b> U	1700 U
2-Chioronaphihalene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2-Niroaniine	840 W	970 UJ	1800 UJ	1700 UJ	1800 UJ	1700 UJ	1800-UJ	1700 UJ
Dimethyl Phihaiate Acenachithylene	340 U 340 U	400 U 400 U	370 U	350 U	370 U	350 U	370 U	360 U
2.6-Dinitrototuene	340 U	400 U	370 U 370 U	· 350 U 350 U	370 U 370 U	350 U 350 U	370 U 370 U	360 U 360 U
3-Nirceniine	840 UJ	970 UJ	1800 UR		• • • •		1800 UR	1700 UR
Acenephthene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
2,4-Dinitrophenot	840 UR	970 UF	1800 U	1700 U	1800 U	1700 U	1800 U	1700 U
4-Nirophenoi	840 UR	970 UF	1800 UJ	1700 UJ	1800 UJ	1700 UJ	1800 UJ	1700 UJ
Dibenzoluran	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-Chicrophenyl-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	380 U
4-Nirosniine	840 UJ	970 UJ	1800 U	1700 U	1800 U	1700 U	1800 U	1700 U
4,6-Dinitro-2-Methylphenot	840 UR	970 UF	1800 UJ	1700 UJ	1800 UJ		1800 UJ	1700 UJ
N-Nitrosodiphenylamine (1) 4-Bromophenyl-phenylether	340 U 340 U	400 U 400 U	370 U	350 U	370 U	350 U 350 U	370 U 370 U	360 U 360 U
Hexachiorobenzene	340 U	400 U 400 U	370 U 370 U	350 U 350 U	370 U 370 U	350 U	370 U	380 U
Pentachiorophenoi	840 UR	970 UF	1800 U	1700 U	1800 U	1700 U	1800 U	1700 U
Phenenthrene	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
Carbezole	340 U	400 U						
Di-n-Butytphthelate	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360 U
Fluoranthene	30 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
Butylbenzylphihalate	340 U	45 U	370 U	350 U	370 U	350 U	370 U	360 U
3,3-Dichlorobenzicine	340 U	400 U	740 UJ	710 W	740 UJ		740 UJ	720 UJ
Benzo (a) Anthracens	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 REBULTS ROTOFINISH SITE SOL SAMPLES

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Revision: 10:56 AM, 10/15/93 (MASTER\_S.XLS)

Well (D	MANJOD	AM310	S8201	S8201	58202	\$8202	SB203	58 203
Sample Dapth	7.50.5	7.5-8.5	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	1029/91	3/30/89	3/3069	3/31/89	3/30/89	3/29/89	3/29/89
SEMI-VOLATILE ORGANICS (UPIng							e source	6 - 19 - 19 - 19 - 19 - 19 - 19 - 19 - 1
tus (2-Edythanyi) Philadada	340 W	670 J	370 U	350 U	370 U	350 U	100 U	43 (
Di-n-Octyl Philuisse	340 W	400 UJ	370 U	350 U	370 U	350 U	370 U	380 8
Benzo (b) Fluttanthene	340 U	400 U	370 U	350 U	370 U	350 U	370 U	380 1
Banzo (k.) Autzanthana	340 U	400 U	370 U	350 U	370 U	350 U	370 U	360
Sanzo (a) Pyrono	340 U	400 U	370 U	350 U	370 U	350 U	370 U	380 (
Indens (1,2,3-cd) Pyrens	340 U	400 U	370 U	350 U	, 370 U	350 U	370 U	380 (
Dibanzo (a,h) Antivacano	340 U	400 U	370 U	350 U	* 370 U	350 U	370 U	380 (
Banzo (g.k.)) Parytana	340 U	400 U	370 U	350 U	370 U	350 U	370 U	380 (
MOCA"	54 U	<u>53</u> U	60 U	50 U	<u>60</u> U	<u>50 U</u>		50 L

U Analyte was analyzed for but not delected above the reported eartiple 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 ventiled. The results are unreliable due to sentous deficiencies in the analysis.

UR Analyte was not detected but the results are unreliable due to sensus deficiencies in the analysis.

(1) Cannot be separated from Diphenylamine

\*\* 4,4-Methyleneous 2-Chloro-eniine: special analyle

Blank columns indicate that analysis for the compound was not performed.

V

#### ROTOFINISH SITE

#### SOIL SAMPLES

F	Well ID Sample Depth	SB 204	SB 204 8-12	SB 204	58 205 3.5-7.5	SB 205 . 16-20	SB 205 20'-24'	SB 207	58 209
┝	Date Collected	2'-4' 4/11/89	4/11/89	4/11/89	<u>3.5-7.5</u> 4/11/89	4/11/89	4/11/89	4/6/89	11-15
ŀ	INORGANICS (mg/kg)		4/11/09	4/11/59	4/11/89	4/11/09	4411/89		4/5/89
F	Aumnum	3160	2460	2970	3280	4560	3970	3160	2760
l	Animony	6.9 UJ			10.3 UJ	-560 6.5 UJ	7.6 UJ	13.00 UJ	
l	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
	Berytium	0.11 U	0.13 U	0.15 U	0.17 U	0.34 U	0.29 U	0.25 U	0.26
l	Cadmium	0.92 U	0.91 U	0.92 U	0.86 U	2 0.87 U	1 U	0.85 U	0.88
l	Galcium	524	31100	53100	86700	39600	31000	48700 J	46000
ł	Chromum	4.5	16.1	6.9	8.7	10.4	7.5	7.7	6.1
l	Colbet	2.0 U	3.6 U	3.7 U	4.1 U	4.2 U	4.4 U	1.9	2.8
l	Copper	12.9	13.4	12.3	14.7	31.7	33.1	38.8	7.0
I	kon	3250	5890	7080	7670	8220	7810	6390	6330
	Leed	2.0	3.1	3.0	4.0	3.6	4.6	2.7	2.8
1	Magnasium	605	12400	15300	14400	15800	11800	16800	15600
ł	Manganese	64.2	178	220	253	207	159	173	163
1	Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12 U	0.1 U	0.11
	Nickel	4.1 U	4.8	8.2	6.4	7.3	6.8	8.5	7.8
ł	Potassium	412 U	377 U	379 U	354 U	585 U	457 U	10 <b>40</b> U	1080
	Selensum	1.1 UJ	i 1.1 UJ	1.1 UJ	0. <b>95 J</b>	1 W	1.6 J	1.5 UR	0.31
	Silver	1.1 U	1.1 U	1.1 U	1 U	1 U	1.2 U	1.2 U	1.2
1	Sodium	341 U	337 U	340 U	317 U	324 U	373 U	623 U	651
	Thelium	0.25 U		0.24 UJ	0.23 UJ	. 0.22 UJ	0.26 UJ	0.38 UJ	0.4
1	Venedium	8.9 U	7.8 U	9.3 U	12.8 U	12.2 U	11.8 U	10.2 U	11.5
	Zinc	21.4	22.8	25.6	26.9	36.9	40.5	45.4	24.2
F	Cyanida	1.1 U	<u>1.1 U</u>	<u>1.1 U</u>	<u> </u>	<u> </u>	<u> </u>	<u>1.1 U</u>	: 1.1
F	VOLATILE ORGANICS (µg/kg) Chioromethene								
Į	Bromomethane	11 U	11 U 11 U	11 U 11 U	11 U 11 U	11 U 11 U	12 U	11 W	11
I	Vinvi Chioride	11 U	11 U	11 U	11 U	11 U	12 U 12 U	11 U	11
I	Chicrosthane	11 U	11 U	11 U	11 U	11 U	12 U	11 U	11
I	Methylane Chiarda	11 11			17 W	16 W	12 U	15 U	11
		11 00			11 W	11 W	33 UJ	59 W	18
I	Carbon Disulide	50	6U	5 U	5 U	5 U	53 UJ 6 U	5 U	5
I	1,1-Olchloroethene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
I	1.1=Dichloroethene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
ł	1,2-Dichloroethene (total)	50	6 U	5 U	5 Ü	5 U	6 U	50	5
	Chioraiorm	50	6 U	5 U	5 U	5 U	6 U	50	5
ł	1.2-Dichiorgethene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
1	2-Butenche	11 UF							11
ł	1,1,1-Trichioroethene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
1	Carbon Tetrachioride	50	6 U	5 U	50	5 U	6 U	5 U	5
l	Vinvi Acetaie	110	11 U	11 U	11 U	11 U	12 U	11 U	11
I	Bromodichloromethene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
L	1_2-Dichloropropene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
1	cis-1,3-Dichloropropene	5 00			ទ័យ	5 14		5 U	5
L	Trichlorgethene	5 U	6 U	5 U	5 U	5 U	6 U	5 U	5
l	Dibromochloromethane	50	6 U	5 U	5 U	5 U	6 U	5 U	5
L	1,1,2-Trichloroethene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
l	Benzene	50	6 U	5 U	5 U	. 5 U	6 U	5 U	5
l	Trans-1,3-Dichloropropene	50	6 U	5 U	5 U	5 U	6 U	5 U	5
	Bromolorm	5 U	6 U	5 U	5 0	5 U	6 U	5 U	5
l	4-Methyl-2-Pentanone	11 U	11 U	11 U	11 U	11 U	12 U	11	
	2-Hexanone	11 11			11 ພ	11 W	12 UJ	11 W	
1	Tetrachicrosthene	5 1			5 W	5 W	6 W	5 U	5
1	1.1.2.2-Tetrachioroethane	50	, 6U	5 U	5 U	5 U	6 U	5 0	5
	Toluene	50	2 J	3 J	18	5 U	6 U	5 U	5
I	Chicrobenzene	50	∠ J 6 U	5 U	10 5 U	5 U	6 U	5 U	5
	Ethylbergene	50	6 U	5 U 5 U	5 U 5 U	5 U 5 U	6 U	5 U	5
1	Styrene	50	6 U	5 U 5 U	5 U 5 U	5 U	6 U	5 U	5
			n ()		<b>N</b> 11	5 1			

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ACTOPHICH SITE

SOL SAMPLES

we o	58 204	58 204	S <b>8 20</b> 4	S <b>8 20</b> 5	S8 205	58 205	S <b>B 2</b> 07	S8 209
Sample Dapth	2-5	8-12	12-16	3.5-7.5	16-20	20-24	11-17	11-15
Date Collected	4/11/80	4/11/80	4/11/69	4/11/89	4/11/80	4/11/89	4669	4689
SEM-VOLATILE ORGANICS (ug/tig								
Phenol	360 U	370 U	360 U	350 U	360 U	380 U	360 U	350 U
bis (2-Chlorosity)) Ether 2-Chlorostranol	360 U	370 U	360 U 360 U	350 U 350 U	350 U	380 U	360 U 360 U	350 U 350 U
1.3-Oichigraberzane	380 U 380 U	370 U 370 U	380 U	350 U	380 U 380 U	380 U 380 U	380 U	350 U
1.4-Dichlorobenzene	380 U	370 U	380 U	350 U		380 U	360 U	350 U
Bangyi Aloshol	380 U	370 U	360 U	350 U	380 U	380 U	360 U	350 U
12-Dichardbergene	380 U	370 U	380 U	350 U	460	230 J	390 U	350 U
2-Machylahanci	380 U	370 U	380 U	350 U	380 U	380 U	360 U	350 U
2.2-Onybia(1-Chieropropane)								
bis (2-Criteroisopropyl) Ether	360 U	370 U	380 U	350 U	380 U	380 U	360 U	350 U
4-Madhylphanci	360 U	370 U	380 U	• 350 U	360 U	380 U	360 U	350 U
N-Nexas-Ci-n-Propylanine	380 W	370 UJ	380 UJ	,350 W	380 UJ		380 U	350 U
Hangdarosthane	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
	360 UJ 360 UJ	370 W	380 (U)	350 UJ	380 W		380 UJ	350 00
2-Minatural	380 U	370 UJ 370 U	360 UJ 360 U	350 UJ 350 U	360 UJ 360 U	380 UJ 380 U	360 U 360 U	350 350
2.4-Dimetrytahanai	380 U	370 U	360 U	350 U	360 U	380 U	360 UJ	350 W
Benzer: Acid	1700 UJ		1700 UJ	1700 UJ	1800 UJ		1700 U	1700 U
tis (2-Chierestany) Methane	380 U	370 U	360 U	350 U	380 U	380 U	360 U	350 U
2,4-Olchiorophanal	389 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
1,2,4-Trichisrobenzene	380 U	370 U	380 U	350 U	380 U	380 U	380 U	- 350 U
Naphthalana	380 U	370 W	380 U	350 U	380 U	380 U	380 U	350 U
4-Chipmandine	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
Hengchlereinstadiene	360 U	370 U	380 U	350 U	360 U	380 U	380 U	: 350 U
4-Chiero-3-Mollylphungi	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
2-Mastringth Bullano	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
Hauschlandtyclapanisciane 2.4.8-Trichiarashanal	300 W	370 W	380 W	350 UJ	380 83		380 UJ	350 UJ
2.4.5-Trichiaraphanat	380 U 1700 U	370 U 1800 U	380 U 1700 U	390 U	380 U	380 U	300 U	350 U
2-Chieranathtaine	300 U	370 U	360 U	1700 U 360 U	1800 U 360 U	1900 U 380 U	1700 U 380 U	1700 U 350 U
2-Manualine	1700 W	1800 LU	1700 LU	1700 UJ	1800 LU		1700 U	1700 U
Clauded Philadate	389 U	370 U	360 U	350 U	380 U	380 U	380 U	350 U
Acaraghilin/lane	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
2.6-Okalizatakano	380 U	370 U	380 U	350 U	380 U	380 U	380 U	· 350
3-Mountine	1700 U	1800 U	1700 U	1700 U	1800 U	1900 U	1700 U	1700
Aconophibiano	380 U	370 U	380 U	350 U	380 U	380 U	360 U	350 U
2,4-Olubruphanal	1769 UJ	1600 UJ	1700 UJ	1700 UJ	1800 W		1700 UJ	1700 UJ
4-Hisophanol	1700 U	1800 U	1700 U	1700 U	1 <b>800</b> U	1900 U	1700 UJ	1700 UJ
Dengshaan	309 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
2,4-Oinitratulana	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
Clabylphibalaia 4-Chiaraphanyl-phanylaikar	389 U 389 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
Plante	300 U	370 U 370 U	380 U 380 U	350 U 350 U	380 U	380 U	380 U 380 U	350 U 350 U
4-Minastiline	1700 U	1800 U	1700 U	1700 U	380 U 1600 U	380 U 1900 U	1700 UJ	1700 UJ
4.6-Cinite-2-Mathemat	1700 LU	1800 UJ		1700 UJ	1800 UJ	-	1700 U	1700 U
H-Marcadaham/lamine (1)	380 U	370 U	360 U	350 U	360 U	380 U	380 U	350 U
4-Bramaphanyt phanytathar	380 U	370 U	360 U	350 U	360 U	360 U	360 U	350 U
Hangchickobanzano	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
Pentachiarophenol	1700 U	1800 U	1700 U	1700 U	1800 U	1900 U	380 U	1700 U
Phonestheans	380 U	370 U	380 U	350 U	360 U	380 U	360 U	350 U
	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
Carbazolo								1
Di-m-Budy (phillipping	369 U	370 U	380 U	350 U	380 U	380 U	120 U	350 U
Figure and the second second	380 U	370 U	380 U	350 U	360 U	380 U	360 U	350 U
Pyrene	380 U	370 U	380 U	350 U	380 U	380 U	360 U	350 U
Butyberzysphilaiate	380 U	370 U	380 U	350 U	380 U	380 U	380 U	350 U
3,3-Dicklorobenzxime	720 UJ	750 UJ	720 W	700 UJ	730 UJ		720 UJ	710 W
Benes (a) Arthracens	380 U	370 U	380 U	350 U	380 U	380 U	360 U	350 U
Chrysens	380 U	<u>370 U</u>	380 U	<u>350 U</u>	360 U	380 U	360 U	350 U

# ROTOFINISH SITE

Well ID	SB 204	58 204	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)	e Martin and an and a state	atu di suu	a the group and		· · · ·	• • • • • • •	-Westin - Elistowy szyre	ar an the second second
bis (2-Ethylhexyl) Phthalate	37 U	370 U	360 U	350 U	42 U	380 U	120 U	91 U
Di-n-Octyl Phihalate	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 U.
Benzo (k.)Fluoranthene	360 U	370 U	360 U	350 U	360 U	380 U	360 UJ	350 U.
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 U.	J 370 UJ	360 UJ	350 UJ	🤌 360 UJ	380 U.	) 360 UJ	350 U.
Dibenzo (a,h) Anthracene	360 U.	J. 370 UJ	360 UJ	350 UJ	<u>ີ 360 ເມ</u>	380 UJ	I 360 U	350 U
Benzo (g,h,i) Perviene	360 U.	J 370 UJ	360 UJ	350 UJ	360 UJ	380 U.	i 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 delected 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'-Meltylenebis 2-Chloro-aniline; special analyte

Blank columns indicate that analysis for the compound was not performed.

ROTOFINEH SITE

SOL SAMPLES

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Well ID	861	852	S8301	DUPSB	56302	58303	DUPSC	S8304	S8304A
Sample Dapth	_		20-22	'S8301-20-22	8-10	13-17	(\$8304-11-15,	15-19	16-18
Date Callected	33080	4/500	7.8/91	7/8/91	7/1291	7/25/91	7/30/91	7/30/91	7/30/91
INORGANICS (mg/kg)							•		
Alumnum	9910	6150	2810	2930	1440	3060	1070	1620	896
Arginary	9.4 W 4.5	8.9 UR 2.7 J	73 W 2.1 J	74 UJ 1.5 J	6.9 W	7.1 W 2.7 J	6.7 W	7.5 W 2.6 J	82 UJ 22 J
Arbeitec Berteilte	59.5	272	12.7	1.5 J	29 J 9	14.7	52	2.6 J 8.6	4.3
Berytham	0.54	0.25	0.22 U	0.23 U	0.21 U	0.22 U	02 U	0.23 U	0.25 U
Cadman	0.87 U	0.42 U	0.89 U	0.9 U	0.63 U	0.86 U	0.82 U	0.91 U	U 99.0
Catchen	1180	1140	47200	51200	35400	42200	37400	43600	17200
Chughnam	12.7	9.8	52 J	5.7 J	4.1 J	52 J	26	5.4 J	2.3 J
Calual	4.0 U	6.4	2.1	2.5	1.6	2	1.2 U	2.1	1.5 U
Copper	25.1	17 <b>2</b> J	7.8	13	13.6	8.6	3.9	7.6	5.5
lean	13100	11000	5540	6440	4080	6280	2570	5700	2580
Land	6.1 1900	1,9 J	2.5 14800	2.7 * 1 <b>9500</b>	2.5 . 11700	2.5 1 <b>3900</b>	1.5 8580	2.5 10000	2.3 4760
Magnassan	364 J	3270 146	139	140	112 J	157 J	73 J	112 J	47.2 J
Marcury	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
Nichal	13.0	121	6.1	7.1	5.2 J	10.1 J	3.8 J	6.2 J	L.
Potestan	1220	2530	643	GIR	242	623	218 U	357	<b>Y</b>
Selamm	W 6.0	1.5 UR	0.87 U	0.9 U	0.83 U	0.86 U	0.81 U	0.91 U	1 U
Sher	12 U	1.1 U	1.1 W	1.1 UJ	1 W	1.1 UJ		1.1 W	1.2 W
Sedam	640 U	606 W	182 J	200 J	167	150	148	169	121
Theften	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
Venetium Zinc	18.1 52.0	11.8 42.6	&1 J 22.9	9.9 J 24.2	5.2 15.2	92 184	33 11.1	6.7 21.3	92
Crentes	1.1 U	110		2				;	
VOLATILE ORGANICE worker		charter that	ne of themes		1				
Citeremetrene	11 U	11 U	11 Ú	11 U	11 W	11 U	10 U	11 U	12 U
Grunsmathano	11 U	11 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Veyi Chishide Chismethete	11 U	11 U	11 U	11 U	11 W	11 U	10 U	11 U	12 U
Madaytane Chilada	11 U 18 U	11 U 36 U	11 W 19 U	11 U 16 W	11 U	11 U 20 UJ	10 U 23 W	11 U 59 UJ	12 U 38 UJ
	14 U	22 U	12 W	18 W	11 W 11 W	53 W		94 W	34 W
Carbon Cleville	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1-Okderesthene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1-Dicherostrano	60	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,2-Cichiaresthune (total)	6 U	6 U	11 U	11 U	11 U	11 U	10 U	1 J	U.
Citerolum	60	6 U	11 U	11 U	11 U	11 U	10 U	11 U	U
1,2-Oktorostano 2-Deteneno	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1,1-Trichterestione	11 UR 6 U	11 W	11 U 11 U	11 W 11 U	11 U 11 U	11 W 11 V	10 UJ 10 U	11 W 11 U	12 UJ 12 U
Casten Tetrachieride	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Vind Acatala	11 U	11 U							
Brensdakkransbane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,2-Cickioropropane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
cie-1,3-Dichloriprepene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Trichleresthene	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Obremechteremethere	• U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1,2-Tricklorouthane	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Benzene Trene-1,3-Dichiorepropene	6 U 6 U	6 U 6 U	11 U	11 U	11 U	11 U	10 U 10 U	11 U 11 U	12 U 12 U
Brenstern	60	6 U	11 U 11 U	11 U 11 W	11 U 11 U	11 U 11 U	10 U	11 U	12 U
4-Mattyl-2-Partmense	11 U	11 W	11 U	11 W	11 W	11 U	10 U	11 U	12 U
2-Humana	11 U	11 W	11 W	11 6	11 W	11 U	10 U	11 U	12 U
Tetrachisroothana	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
1,1,22-Tebacharcebane	6 U	6 W	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Taluano	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Chierabanzone	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Ebylbanzone	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Stymes .	6 U	6 U	11 U	11 U	11 U	11 U	10 U	11 U	12 U
Total Xylenas	6 U	<u>6 U</u>	<u>11 U</u>	11 U	<u>11 U</u>	<u>11 U</u>	<u>10 U</u>	<u> </u>	12 U

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# FIOTOFINISH SITE

Well ID	BS1	BS2	SB301	DUPSE	S <b>B302</b>	S <b>B303</b>	DUPSC	S8304	SB304A
Sample Depth	1'-5'	1'-5'	20-22	(SB301-20-22	8-10	13-17	(SB304-11-15	; 15-19	16-18
Dete Collected	3/30/89	4/5/89	7/ <b>8/91</b>	7/8/91	7/12/91	7/26/91	7/30/91	7/30/91	7/30/91
EMI-VOLATILE ORGANICS (µg/kg)		en la depensión de	N 115 M	2 V	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -				selle p
Phenoi	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-Chiorophenoi	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 Ų	360 U	340 U	380 U	410 U
Benzyl Alcohol	400 UJ				<b>i</b>				
1,2-Dichiorobenzene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
2-Melhylphenol	400 U	370 U	360 U	390 U	340 U	360 U	340 U	380 U	410 U
2,2-Oxybis(1-Chloropropane)		370 U	360 UJ	380 UJ	340 U	360 U	340 U	380 U	410 U
bis (2-Chloroisopropyl) Elher 4-Melhylohenol	400 UJ 400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Menyphana N-Niroso-Di-n-Propylamine	400 U		360 U	380 U	340 U	380 U	340 U	380 0	410 U
Hexachiorosithene	400 U	370 U	360 U	380 (		360 UJ	340 U	380 U	410 U
Nirobenzene	400 U			380 U	340 U	360 UJ	340 U	380 U	410 U
lacphorane	400 U		360 U	380 U	340 U	360 U	340 U	380 U	410 U
2-Nilrochanol	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 U.							
bis (2-Chlorosthaxy) 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	380 U	380 U	340 U	380 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
Naphthaiene	400 U	370 U	360 U	380 U	56 J	360 U	340 U	380 U	410 U
4-Chioroaniline	400 UJ	370 U.	) 360 UJ	380 UJ	340 U	360 UJ	340 U	380 U	410 U
Hexachiorobutaciene	400 U	370 U	360 U	380 U	340 UJ	380 U	340 U	380 U	410 U
4-Chioro-3-Methylphenol	400 U	370 U	360 U	380 U	340 U	360 U	340 U	360 U	410 U
2-Methytnaphthalene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Hexachiorocyclopentacliene	400 U	370 U.		380 U	340 U	380 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	1 <b>800</b> U	860 U	920 U	630 U	870 U	820 U	920 U	990 U
2-Chioronaphthaiene	400 U	370 U	360 U	380 U	340 U	380 U	340 U	380 U	410 U
2-Niroinline	1900 UJ		860 UJ			870 UJ	820 U	920 U	990 U
Dimethyl Philhelete	400 U	370 U	360 U	380 U	340 U	380 U	340 U	380 U	410 U
Acenaphiliylene	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-Niroaniine	1900 U 400 U	1800 U. 370 U	i 960 U 360 U	920 U	830 UJ		820 U	920 U 380 U	990 U
Acenephihene 2,4-Dinitrophenol	1900 U	1800 U		380 U : 920 UF	340 U 1 830 UF	360 U 1 870 UJ	340 U 820 U	380 U 920 U	410 U 990 U
4-Nilrophanol	1900 UJ		860 U	· 920 U	830 UJ		820 U	920 U	990 U
Dibenzoluran	400 U	370 U	360 U	380 U	340 U	360 U	340 U	360 U	410 U
2.4-Dinitratiume	400 U	370 U	380 U	380 U	340 U	360 U	340 U	380 U	410 U
Diethylphihaiaia	400 U	370 U	360 U	380 U	340 U	380 U	340 U	380 U	410 U
4-Chlorophenyi-phenyiether	400 UJ		380 U	380 U	340 U	380 U	340 U	380 U	410 U
Fuorene	400 U	370 U	360 U	380 U	340 U	380 U	340 U	380 U	410 U
4-Nitroeniline	1900 UJ			920 U	830 U	870 U	820 U	920 U	990 U
4,6-Dinitro-2-Methylphenol	1900 U	1800 U.		920 U	830 U	870 U	820 U	920 U	990 U
N-Nitrosociphenylemine (1)	400 U	370 U	360 UJ			360 UJ	340 U	380 U	410 U
4-Bromophenyl-phenylether	400 U	370 U	380 U	380 U	340 U	360 U	340 U	380 U	410 U
Hexachiorobenzene	400 U	370 U	360 U	380 U	340 U	360 U	340 U	380 U	410 U
Pentachiorophenol	1900 U	1800 U	860 UJ			870 U	820 U	920 U	990 U
Phenenthrene	400 U	370 U	360 U	380 U	340 U	380 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
Carbazoie	ł		360 U	380 U	340 U	380 U	340 U	380 U	410 U
Di-n-Butylphthalate	400 UJ	370 U	380 UJ			380 U	340 U	380 U	410 U
Fluoranthene	400 U	370 U	360 U	380 U	340 U	380 U	340 U	380 U	410 U
Pyrane	400 U	370 U	360 U	380 U	340 U	380 U	340 U	380 U	410 U
Butytbenzylphthelate	400 UJ	370 U		380 U	340 U	380 UJ	41 U	77 U	410 U
3,3-Dichlorobenzidine	790 U	730 U.		380 U	340 U	380 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 REBULTS ROTOPHIEM SITE

SOL SAMPLES

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Web 10	851	852	S8301	DUPSB	S8302	58303	DUPSC	S8304	S8304A
Sample Depth	1-5	1-5	20-22	(\$8301-20-22	8-10	13-17	(\$8304-11-15,	15-19	16-18
Date Collected	33089	4/540	7/8/91	7/8/91	7/12/91	7/26/91	7/30/91	7/30/91	7/30/91
SEMI-VOLATILE ORGANICS (JUDAN)	d an						5.95		enter y
be (2-Ethythenyt) Philippine	50 U	370 U	360 UJ	52 W	41 W	360 W	350 U	1100 U	410
Di-e-Octyl Philadae	400 U	370 U	380 UJ	380 W	340 U	380 UJ	340 U	360 U	410
Benzo (b) Rubranthana	400 U	370 U	380 U	380 U	340 U	380 U	340 U	380 U	410
Bango (k )Rusranthano	400 W	370 U	380 U	380 U	340 U	380 U	340 U	380 U	410
Bunze (a) Pyrene	400 U	370 U	380 U	380 U	340 U	360 U	340 U	380 U	410
Industs (1,2,3-cd) Pyrene	400 U	370 W	380 U	380 U	340 <sup>4</sup> U	380 U	340 U	380 U	410
Diberze (e,h) Anthracene	400 U	370 UJ	360 U	380 U	340 U	380 U	340 U	380 U	410
Bango (g.h.) Paryteno	400 U	370 UJ	380 U	380 U	340 U	380 U	340 U	380 U	410
MOCA-	<u>50 U</u>	<u>50 U</u>	<u>10 U</u>	10 U	1 <u>0 U</u>	10 U	<u>10 U</u>	10 U	10

U Analyte was analyzed for but not detected above the reported sample detection or

quantitation land.

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 sensus deficiencies in the analysis.

UR Analyte with not detected but the results are unveilable due to sensus deficiencies in the analysis.

(1) cannot be separated from Diphenylamore

\*\* 4.4-Methylanable 2-Chioro-aniline: special analyse

Blank columns indicate that analysis for the compound was not performed.

# ROTOFINISH SITE

[]	Well ID	S8305	S <b>B306</b>	S <b>B30</b> 7	SB308	S8308A	S <b>B3</b> 12	S <b>B3</b> 13	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	
ļ.	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
<u> </u>	NORGANICS (mg/kg)					· · · · · · ·				1.111 AV
	Aumnum	2090 7.6 UJ	3640 7.8 UJ	3880	1830 6.8 UJ	6460	9060	10300	12700	4760
	Animony Arsenic	3.8 J	4.5 J	7.5 UJ 2.3 J	9.1 J	7.7 WJ 5.6 J	7.3 UJ 5.5 J	i 7.0 UJ 4.4 J	6.9 UJ 5.3 J	7.0 U. 4.6 J
	Berium	9.8	13.9	17.4	12.5	5.8 J 79.4	44, <b>5</b>	55.7	5.3 J 70.8	4.6 J 36.4
- Į	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
	Cadmum	0.93 U	0.94 U	0.91 U	0.83 U	53.2 4	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
	Colbeit	1.4	3.4	2.9	3.3	6.8	4.2	6.3	5.4	2.6
	Copper	10.3	26.8	21.2	7.6	19.4	10.5	10.9	12.2	8.3
ł	Iron	5910	9670	6700	9090	12000	11600	14000	15900	8920
	Lead	4.1	5.2	3	5.7	162	86	9.0	6.3	6.8
	Magnesium	16200	25200	15100	1 <b>5600,</b>	14 <b>80</b>	3670	4290	7280	61000
	Manganese	169 J	298 J	1 <b>59 J</b>	<b>297</b> 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
Ī	Nickel	5.6 J	9 J	6.9 J	8.2 J	11.8	10.9	13.3	13.9	6.2
1	Potassium	312	678	780	415	589 U	900 U	710 U	1070 U	463 U
	Selenium Silver	0.91 U 1.2 UJ	0.92 U	0. <b>89 U</b>	0. <b>83 U</b>	0.94 U	0.89 U	0.87 U	0.87 U	0.86 U
-	Sodum	173	1.2 UJ 212	1.1 UJ 158	1 UJ 235	1.2 W 153	1.1 UJ 1 <b>32</b>	1.1 UJ 113	1.0 UJ 1 <b>65</b>	1.1 UL 180
	Theilum	0.45 U	0.46 U	0.45 U	2.35 0.41 U	0.47 U	0.44 U	0.87 U	0.43 U	0.43 U
1	Vanachum	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									
<u>[</u> ]	VOLATILE ORGANICS (µg/kg)						ma - Tana -			
	Chioromethane	12 U	12 U	11 U	ារ <del>យ</del>					
	Bromomethane	12 U	12 U	11 U	11 U	12 U				
	Vinyl Chloride	12 U	12.U	11 U	11 W					
	Chicroshane	12 U	12 U	11 U	11 W	-				
	Methylene Chioride	32 W 67 W	50 UJ 210 UJ							
	Carbon Disulide	12 U	12 U	່ 36000 1110	11 U	12 UJ 12 U				
1	1,1-Dichiprosthene	12 U	12 U	11 U	11 U	12 U				
	1,1-Dichiorosthans	12 U	12 U	11 U	11 U	12 U				
	1_2-Dichloroethene (total)	12 U	1 J	11 U	11 U	12 U			•	
	Chiarolarm	12 U	12 U	11 U	11 Ū	12 U				
1	1,2-Dichloroethane	12 U	12 U	11 U	11 U	12 U				
<b>k</b> 1	2-Butanone	12 W	12 UJ		-	12 U				
	1, 1, 1-Trichloroethane	12 U	12 U	11 U	11 U	12 U				
	Carbon Tetrachioride	12 U	12 U	11 U	11 U	12 U				
1	Vinyi Acetale									
	Bromodichioromethane	12 U	12 U	11 U	11 U	12 U				
12	1,2-Dichioropropane	12 U	12 U	11 U	11 U	12 U				
	cis-1,3-Dichiaropropene	12 U	12 U	11 U	11 U	12 U				
- 2	Trichlaraethene Dibramachiaramethene	12 U	12 U	11 U	11 U	12 U				
:	1.1.2-Trichioroethene	12 U 12 U	12 U 12 U	11 U 11 U	11 U 11 U	12 U 12 U				
	Benzene	12 U	12 U	11 U	11 U	12 U				
17	Trans-1,3-Dichloropropene	12 U	12 U	11 U	11 U	12 U				
	Bromotorm	12 U	12 U	11 U	11 U	12 U				
	4-Metry-1-2-Pentanone	12 U	12 U	11 U	11 U	12 U				
·	2-Hexanone	12 U	12 U	11 U	11 U	12 U				
	Tetrachioroethene	12 U	12 U	11 U	11 U	12 U				
	1,1,2,2-Tetrachioroethane	12 U	12 U	11 U	11 U	12 U				
	Toluene	12 U	12 U	11 U	11 U	12 U				
1	Chiorobenzene	12 U	12 U	11 U	11 U	12 U				
	Ethybenzene	12 U	12 U	11 U	11 U	12 U				
	Styrene	12 U	12 U	11 U	11 Ū	12 U				
	Total Xylenes	12 U	12 U	11 U	11 U	12 U				

# ANALYTICAL REBULTS ROTOFEBBIN SITE

SOL SAMPLES

	\$8305	58306	S8307	S <b>8308</b>	5 <b>8308A</b>	S <b>B3</b> 12	S <b>BJ13</b>	DUPSA	SB314
Sample Dapth	12-16	13-17	20-22	0-1	0-0.5	1.525	1.5-2.5	(\$8313-1.5-2.5	
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
EMI-VOLATILE ORGANICS (Ugh				240 111		200.11	200 (1)		
Phanal	380 U 380 U	390 U 390 U	380 U 380 U	340 UJ 340 UJ		360 U 360 U	390 U 390 U	390 U 390 U	330 330
tas (2-Chicrosoftyi) Ether 2-Chicrogeneral	3600		380 U	340 UJ		360 U	390 U	390 U	330
1.3-Oktorebenzene	380 U		380 U	340 UJ		350 U	390 U	390 U	330
1.4-Oichigrgbenzene	380 U		380 U	340 UJ		360 U	390 U	390 U	330
Benzyl Alcohol					1				
1.2-Olchlorobenzene	380 U	390 U	380 U	340 UJ		380 U	390 U	390 U	330
2-Methylphanol	360 U		380 U	340 UJ		360 U	390 U	390 U	330
2,2-Oxylas(1-Chioropana)	360 U	390 U	380 U	340 UJ	400 LU	360 U.	390 UJ	390 U	330
bis (2-Charasapropyi) Ether				- · · · · ·					
4-Mailtylyhendi M Millione Ol a Danadamian	380 U		380 U	340 UJ 340 UJ		380 U	390 U	390 U	330
N-Niseso-Ol-A-Propylamine Hexacitizmethene	380 U. 380 U.		380 U 380 U	340 UJ		380 U 380 U	390 U 390 U	390 U 390 U	330 330
Minihastana	380 U		380 U	340 UJ		360 U	390 U	390 U	330
leggherene	380 U		380 U	340 UJ		380 U	390 U	390 U	330
2-Mirechand	380 U		380 U	340 UJ		360 U	390 U	390 U	م
2.4-Dimetryphenel	380 U	390 U	380 U	340 UJ		360 U	390 U	390 U	330
Bengelc Acid									
bis (2-Chiorosthamy) Mathema	380 U		380 U	340 UJ		. 360 U	390 U	390 U	330
2,4-Olchierephenel	380 U		360 U	340 UJ		380 U	390 U	390 U	330
1,2,4-Tichiarubanzana	380 U	390 U	380 U	340 UJ		380 U	390 U	390 ()	330
Haphthalana A Chiannan Tan	380 U	380 U	380 U	340 UJ		380 U	390 U	390 Ý	330
4-Chiereantine .	380 U. 380 U		380 U 380 U	340 UJ 340 UJ		360 UJ 360 U	i 390 UJ 390 U	1 390 ¥J 390 U	
4-Chipro-3-Mathylphanal	380 U		380 U	340 UJ		340 U	390 U	390 U	330 330
2-Mathytraphthalana	380 U	390 U	380 U	340 UJ		380 U	390 U	390 U	330
Hanachterecyclepentadiene	380 U		380 U	340 UJ		380 U	390 U	390 U	330
2,4,6-Trichlerephenel	380 U	380 U	380 U	340 UJ		380 U	390 U	390 U	330
2,4,5-Trichlerephonet	930 U	948 U	910 U	830 UJ	980 U	U 016	980 U	940 U	800
2-Citerenephthelene	380 U	300 U	380 U	340 UJ	400 U	300 U	390 U	390 U	330
2-Mbesiline	930 U.		<b>910</b> U	830 UJ					800
Dinetty(Philaine	380 U		380 U	340 UJ		360 U	390 U	390 U	330
Accountingly lane	380 U		380 U	340 UJ		380 U	390 U	390 U	330
2,6-Chilestakano 3-Nitranino	380 U 930 U	380 U	380 U	340 UJ		360 U	390 U	390 U	330
Accounting	380 U		910 U 380 U	830 UJ 340 UJ		360 U 360 U	980 U 390 U	940 U 390 U	<u>د الم</u>
2.4-Olabestunai	930 U.		910 U	830 UJ					
4-Mirephanal	939 U.		910 U	830 U		810 U	980 U	940 U	800
Oberesteren	380 U		380 U	340 UJ		360 U	390 U	390 U	330
2.4-Cinizatione	380 U		380 U	340 UJ		360 U	390 U	390 U	330
Distryphication	380 U		380 U	340 UJ		380 U	390 U	390 U	330
4-Citarophanyl-phonylather	380 U	386 U	380 U	340 UJ	400 U	360 U	390 U	390 U	330
Puerete	380 U		380 U	340 UJ	230 J	380 U	390 U	390 U	330
4-Miteanine	930 U		910 U	830 UJ	980 U	000 U	980 U	940 U	800
4.6-Distre-2-Mailtylphonel	930 U		<b>910</b> U	830 UJ		U 086	980 U	940 U	800
N-Nibosodiphanylamine (1)	380 U.	+ +	360 U	340 UJ					330
4-Bremephenyl-phenyletter	380 U		380 U	340 UJ		380 U	390 U	390 U	330
Hanachlarabanaana Pentachlaraphanal	390 U	-	380 U	340 UJ		380 U	390 U	390 U	330
Phasendoruse	1 930 U 380 U		910 U	830 UJ		800 U	980 U	940 U 390 U	800 330
Antivezano	380 U	390 U 390 U	380 U 380 U	340 UJ 340 UJ		360 U 360 U	390 U 390 U	390 U	330
Cadegado	380 U		380 U	340 UJ		360 U	390 U	390 U	330
	380 U	390 U	380 U	340 UJ		360 U	390 U	390 U	330
Resulting	- 380 U		380 U	340 UJ		360 U	390 U	390 U	330
Pyrene	380 U		380 U	340 W		360 U	390 U	390 U	330
Bayborzyphihalato	380 U.		39 U	340 UJ		360 U	390 U	390 U	330
3.3-Dicitorobenzidire	380 U		380 U	340 UJ		380 U	390 U	390 U	330
Bango (a) Anthracana	380 U		380 U	340 UJ		360 U	390 U	390 U	330
Chrysene	380 U	390 U	380 U	340 UJ		360 U	390 U	390 U	330

# SOIL SAMPLES

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Well ID	S8305	S <b>B306</b>	S <b>B307</b>	S <b>B308</b>	S <b>B308A</b>	S <b>B312</b>	S <b>B313</b>	JUPSA	58314
Sample Depth	12-16	13-17	20-22	0-1	0-0.5	1.5-2.5	1.5-2.5	(58313-1.5-2.5	1.5-2.5
Date Collected	7/29/91	7/29/91	7/30/91	7/1 <b>8/91</b>	6/18/91	6/18/91	6/18/91	6/18/91	6/18/91
SEMI-VOLATILE ORGANICS (Ug/kg)			di seriere e			a arreat to allow	<b>in second and second second</b>	in the second state of the	
bis (2-Ethylhexyl) Phthelete	380 UJ		450 U	340 UJ	400 U	360 U	390 U	390 U	330 U
Di-n-Octyl Philipine	380 UJ	J 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	380 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	3 <b>30 U</b>
Indeno (1,2,3-cd) Pyrene	380 U	390 U	380 U	340 UJ	1 <b>1 1 00</b> y	360 U	390 U	390 U	330 U
Dibenzo (a,h) Anthracene	380 U	390 U	380 U	340 UJ	340 J	380 U	390 U	390 U	330 U
Benzo (g.h.i) Perviene	380 U	390 U	380 U	340 UJ	1000	380 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.

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# NOTOFILIEN SITE

SOL SAMPLES

WO	158315	853	853	853	854	854	8\$4	855	855
Sample Dapth	1.5-2.5	14-16	16-18	23-25	8-10	13-15	18-18.5	9-9.75	11-13
Date Collected	6/1001	7/201	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91
INORGANICS (mg/lig)		SAND	SAND		SILTY SAND		SILTY SAN	SILTY SAND	SILTY SAN
Abantan	8270		2950	4790	3190	5000	_		
Animany	7.0 W		7.6 UJ			9 U. 3.4 J			
Areanc	53 J 422		1.4 J 11.3	2.4 J 25	22 J 15 <b>.</b> 8	24.7			
Berythen	0.35 U		0.23 U	0.24 U	0.23 U	0.27 U			
Cadman	0.84 U		0.92 U	0.91 U	0.93 U	1.1 U			
Calcham	37900		22400	57400	45200	35300			
Chromeum	11.7		7.6 J	8.8 J	62 J	10.6 J			
Collect	42		24	3.6	25	3.6			
Capper	9.7 11100		8.7 5720	14.1 81 <b>30</b>	7.1 6410	55.1 8020			
Land	8.5		2.4	4	3.1	7.5			
Magnesaam	23400		12000	19900	14800	11400			
Murganase	200 J		136	199	158	218			
Mercery	0.11 U		0.11 U	0.11 U	0.12 U	0.14 U			
Nichul Polason	9.7 605 U		6.5 536	9.9 981	6.6 702	9.1 669			
Selemen	0.84 U		0.91 U	0.91 U	0.89 U	1.1 U			
Sher	1.1 W		1.1 W			-	I		
Sedan	143		1 <b>82</b> J	180 J	1 <b>75 J</b>	184 J			
Thelium	0.42 U		0.46 U	0.45 U	0.44 U	0.55 U			
Vunadam Zinc	19.2 30.9 J		9.6 J 21.1	12.3 J 24.9	9.7 J 22.7	12.3 J 47.4			
Cyunite			••••						
VOLATLE ORGANICS worked	and a second sec		na at	••		- mi	°€"		t Billing and the
Claremetrare									
Brememethane									
Veyl Chieride Chieresthere									
Madintana Chiasta	}								
Acotony									
Castern Dimilide	1								
1,1-Cicipercenene									
1,1-Oktorestiane 1,2-Oktorestiane (izial)	1								<b>1</b>
Colonian									
1,2-Cichisreethane									
2-Butanene									
1,1,1-Titchissestene									
Carbon Teleschlende									
Vinyi Acetate Bremedichiaremethene									
1,2-Oktoreprepano									
cie-1,3-Olchierepropene									
Trichteresthene	1								
Obremechterenhebene									
1,1,2-Trichleroethene Bergene									
Trans-1,3-Oktorepropens	ľ								
Bramatam	1								
4-Mathys-2-Pentanone									
2-Henenone									
Tebechisroedhane									
1,1,2,2-Tetrachiprositures									
Taluano Chiarabangano	li li								
Eliyberzene	ч								
Shrano									
Total Xylanas	1								
						· · · · · ·			

ROTOFINISH SITE

Well ID	S8315	853	853	853	BS4	854	B\$4	<b>BS5</b>	8\$5
Semple 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 SA	NE SILTY SAN	ID SILTY SA	ND SILTY SAND
Phenoi	380 U		380 U			450	-	380 (	-
bis (2-Chlorosthyl) Ether	380 U		380 U	370 U		450		380 (	,
2-Chlorophenol	380 U		380 U			450	U	380 (	
1,3-Dichlorobenzene	380 U		380 U			450	-	380 (	
1,4-Dichlorobenzene	380 U		380 U	370 U		450	U	380 L	J
Benzyl Alcohol					1				
1,2-Dichiorobenzene	360 U		380 U			450	-	360 L	- 1
2-Methylphenol	380 U		380 U			450		380 L	- 1
2,2-Oxybis(1-Chioropropens)	380 UJ		380 U	370 U		450	μ μ	380 L	, ,
bis (2-Chioroisopropyi) Ether									.
4-Methylphenol	380 U		380 U			450		380 L	
N-Nilroso-Di-n-Propylamine Hexachiorosthane	380 U 380 U		380 U 380 U			450	-	380 (	
Nirobenzene	380 U		380 U		-	450 1 450 1	-	380 L 380 L	
leapharane	380 U		380 U			450	-	380 0	· · · · · · · · · · · · · · · · · · ·
2-Nirophenol	380 U		380 U			450	-	380 (	· · · · · · · · · · · · · · · · · · ·
2.4-Dimetiviphenol	380 U		380 U		1	450	-	380 L	
Benzaic Acid					,		-	300 (	~
bis (2-Chlorosthoxy) Methans	380 U		380 U	370 U		450	u	380 1	, I
2,4-Dichiorophenol	380 U		380 U			450	-	360 L	
1.2.4 Trichlorgbenzene	380 U		360 U			450		380 L	
Nachthalene	380 U		380 U			450	_	380 1	• •
4-Chioroaniine	380 UJ		380 U		1	450	-	380 L	· · ·
Hexachiorobutaciene	380 U		380 U			450		380 L	
4-Chloro-3-Methylphenol	380 U		380 U		I	450	U	380 L	j
2-Methylnephthelene	380 U		380 U			450	J	360 L	
Hexachiorocyclopentaclene	380 U		380 U	370 U		450	U	380 L	,
2,4,8-Trichlorophenol	380 U		360 U	370 U		450	U	380 L	) [
2,4,5-Trichlorophenol	930 U		920 U	910 U		1100	U	930 L	
2-Chloronaphthalene	380 U		380 U	370 U		450	U	380 L	) }
2-Nirospiine	930 W		920 U			1100		930 L	
Dimethyl Phtheiste	380 U		380 U			450		380 L	
Aceneptitiviene	380 U		380 U			450		380 L	
2,6-Dinirciciuene	380 U		360 U			450	-	380 L	
3-Niroaniine	930 U		920 U	910 U		1100		930 L	
Acenaphihene	380 U		360 U			450	-	380 L	· · · · · · · · · · · · · · · · · · ·
2,4-Dinirophenoi	930 UR		920 U			1100	-	930 L	
4-Nirophanol	930 U		920 U	-	l	1100	_	930 U	. 1
2,4-Dinitrotokuene	380 U 380 U		380 U			450		380 L	
Diethvichihalais	380 U		380 U 380 U			450 ( 450 (		360 L 360 L	
4-Chlorophenyl-phenylether	380 U		380 U			450		380 L	
Fluorene	380 U		380 U	+		450		380 (	
4-Nirogniline	930 U		920 U		1	1100		930 L	
4.6-Diniro-2-Methylahenal	930 U		920 U		•	1100		930 L	
N-Nitrosociphenylamine (1)	380 UJ		360 U		I	450		380 (	,
4-Bramaphenyl-phenylether	380 U		380 U			450		380 L	
Hexachiorobenzene	380 U		380 U		· •	450		380 L	, (
Pentachiorophenol	930 U		920 U			1100		930 L	, 1
Phenenthrene	380 U		380 U			450		380 L	,
Anthracene	380 U		380 U			450		. 380 L	,
Carbazole	380 U		380 U			450		380 L	, 1
Di-n-Butylphthalate	380 U		380 U			450		380 L	J
Fluoranthene	380 U		380 U			450		380 L	)
Pyrene	380 U		380 U			450	U	380 L	J
Butybenzylphthalate	380 U		380 U			450	U	380 L	<u>ا</u> ر
3,3'-Dichiorobenzidine	380 U		380 U		I	450	U	380 L	u l
Benzo (a) Antivacene	380 U		380 U			450	U	380 L	)
Chrysene	380 U		380 U			450	U	380 (	J
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### ANALYTICAL RESULTS NOTOFINISH SITE SOL SAMPLES

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	58315	853	8\$3	8\$3	854	854	<b>8</b> \$4	855	8\$5
Sample Depth	1.525	14-16	16-18	23-25	8-10	13-15	18-18.5	9-9.75	11-13
Date Collected	6/1891	7/2/91	7/2/91	1/2/91	7/2/91	7/2/91	7/2/91	7/2/91	7/2/91
SEMI-VOLATILE ORGANICS (JIG/10)		SAND	SAND	SILTY SANC	SILTY SAND	SILTY SAN	SILTY SAND	SILTY SAND	SILTY S
tes (2-Elhydhasyl) Philadae	380 U		380 U	370 U		450 U		380 U	
Di-e-Octyl Philippine	360 U		380 UJ	370 UJ		450 U		360 UJ	
Banco (b) Fluoranthane	360 U		380 U	370 U		450 U		380 U	
Banzo (k. )Russenhano	310 U		380 U	370 U		450 U		380 U	
Banzo (a) Pyrano	360 U		380 U	370 U	•	450 U		380 U	
Indene (1,2,3-cd) Pyrene	380 U		380 U	370 U	•	450 U		380 U	
Olbenzo (a,h) Anthracene	380 U		380 U	370 U		450 U		380 U	
Bango (g.h.)) Parylana	380 U		380 U	370 U		450 U		380 U	
NOCA"	ט סו	10 ໂ	)	10 U			10 U		1

U Analyte was analyzed for but not detected above the reported sample detection or quantitation

Ind.

J Analyte was contively 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 at estimated value.

R Analyte was detected but the presence cannot be veniled. The results are unvalighte due to sensus deficiencies in the analysis.

UR Analyte was not delected but the results are unreliable due to sensus deficiencies in the analysis.

(1) Caunat be separated from Diphenylanune

\*\* 4,4-Mothylanetus 2-Chioro-aniline: apacusi analyte

Elastic columns indicate that analysis for the compound was not performed.

#### ROTOFINISH SITE

SOIL SAMPLES

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Well ID	8\$5	BS5	856	BS6	BS6	<b>BS6</b>	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		SILTY SAND
Aumnum	1600	1620				1830	2540
Antimony	7.7 UJ					7.1 UJ	
Arsenic	1.1 W					2.2 J	1.8 J
Barium	9.1	6.6 0.22 U				7.6	15
Berylikum Cadmium	0.23 U 0.93 U	0.22 0			4	0.22 U 0.86 U	0.22 U 0.86 U
Calcium	42500	51100			4	46500	58000
Chromum	4.8 J	4.4 J				6.4 J	4.8 J
Colbeit	1.4 U	2.2				1.4	2.1
Copper	11.7	53.3				12.6	15.5
kon	3560	4110				5080	5620
Leed	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 Silver	0.91 U	0.89 U 1.1 UJ				0.86 U	0.86 U
Silver Sodum	1.2 W				•	1.1 UJ	
Socium Thailum	0.46 U	137 J 0.44 U				175 J 0.43 U	178 J 0.44 U
Vanadum	6 J	5.8 J				6.3 J	8.5 J
Zinc	16.5 U	33.7				26.7	22.7
Cyanida							
VOLATILE ORGANICS (ug/kg)							
Chloromethane							
Bromomethane							
Vinyi Chioride	]						
Chicroshane	1						
Methylene Chloride							
Acetone Disuttate							ļ
Carbon Disuilde							
-1,1-Dichiarcethane							
1,2-Dichlorosthene (total)							1
Chieraterm	l •						
1.2-Dichioroethene							
2-Butanone							ł
1, 1, 1-Trichlorosthans							
Carbon Tetrachioride							
Vinyl Acetate							
Bramadichiaromethene							
1,2-Dichioropropane							
cie-1,3-Dichloropropene	1						
Trichloroethene							
Dibromochioromethane							
1,1,2-Trichicrosthene Benzene	1						
Trans-1,3-Dichloropropene	[						
Bromotorm							
							1
4-Methyl-2-Pentanone							
4-Methyl-2-Pentanone 2-Hexanone							
4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene							
4-Methyl-2-Pentanone 2-Hexanone Tetrachiorosthene 1,1,2,2-Tetrachiorosthane							
4-Methyl-2-Pentanone 2-Hexanone Tetrachlorosthene 1,1,2,2-Tetrachlorosthane Toluene							
4-Methyl-2-Pentanone 2-Hexanone Tetrachloroethene 1,1,2,2-Tetrachloroethene Toluene Chlorobenzene							

NOTOFICEN SITE

SOL SAMPLES

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SOL SAMPLES					•		
	865	855	856	BS6	856	856	856
Sample Depth	15-17	21-23	57	13-15	15-17	17-10	17-19
Date Collected	7/201	7/291	7/8/91	7/8/91	7/8/91	7/8/91	7/8/91
SEMI-VOLATILE ORGANICS (Ug/1g)	SAND	SAND	SAND	SILTY SAN	D SILTY SAM	O SANO	SILTY SAND
Phenol	380 U	370 Ú	380 U		370 L	1	
tile (2-Chioreedryl) Ether	380 U	370 U	380 U		370 L	J	
2-Chierophenel	380 U	370 U	380 U		370 L	J	
1,3-Olchlorobenzene	380 U	370 U	360 U		370 L	J	
1.4-Olchiorobenzene	360 U	370 U	360 U		,370 L	J	
Benzyl Alcohol	ļ				é.		
1,2-Olcherobenzene	310 U	370 U	380 U		370 L	)	
2-Methylphanol	380 U	370 U	360 UJ		370 L	J	
2,2-Oxytes(1-Chioropropane)	380 UJ	370 U	390 U		370 L	J	
bis (2-Chierosceropy)) Ether							
4-Listhytphangi	360 U	370 U	380 U	•	370 L		
N-Nerces-Di-n-Propytumme	380 U	370 UJ	380 U		370 L		
Haugchteresthane	380 U	370 U	360 U	-	370 L		
Nilpabanzana	380 U	370 U	380 U		370 (		
lesphorene	380 U	370 U	380 U		370 (		
2-Histophanel	380 U	370 U	380 U		370 (		
2.4-Olmathylphanol	380 U	370 W	360 U		370 (	J	
Bengen: Acid							
bie (2-Chiereschuny) Medhane	380 U	370 U	380 U		370 (		
2,4-Oichlarophensi	310 U	370 U	380 U		370 (		
1,2,4-Tricklerchengene	300 U	270 U	380 U		370 1		
Neghthelene	380 U	370 U	380 U		370	-	
4-Chieruaniine	300 W				370		
Husedbrobundene	300 W		380 U		370 (		
4-Chiere-3-Mathylphanel	300 U	370 UJ			370 l 370 l		-
2-Muthybrayhthatene	380 U	370 U 370 U	380 U 380 U		370 (		
Hanachterecyclopentediste	300 U	370 U	380 U		370		
2,4,6-Tikblanghanal 2,4,5-Tikblanghanal	380 U 1920 U	370 U	910 U		800		
2-Colorenastituiene	300 U	370 U	380 U		370		
2-10-00-00-0	100 W				800		
Discont Photos	300 U	370 U	360 U		370		
Accountering	300 U	370 U	380 U		370 1		
2.6-Oktobathane	300 U		380 U		370	-	
3-1000000	1 1 1 1 U		910 U		890		
Acusations	310 U		380 U		370		
2,4-Dinizophanai	120 W	+		1		UJ	
4-Nirophanel	990 U	880 U.		]	880 1	U	
Oberschenn	380 U	370 U	380 U		370		
2.4-Obdrotzhane	300 U	370 U	380 U		370		
	380 U	370 U	380 U		370	U	
4-Chicrophanyi-phonyisihar	380 U	370 U	380 U		370	U	
Rustene	380 U	370 U	380 U		370	U	
4-Hitranino	1 120 U				890	U	
4.6-Dinitro-2-Miniferrational	<b>120</b> U	890 U	910 U		800	U	
H-Hillscoodphanylumine (1)	380 U	370 U.	J 380 U		370	ω.	
4-Bramaphanyl-phanylathar	380 U	370 U	380 U		370	U	
Herechterebengene	380 U	370 U	380 U		370	U	
Pentechlorophenol	920 U	880 U	910 U		890	W	
Pharanthrono	380 U	370 U	380 U		370	U	
Antorecene	380 U	370 U	380 U		370	U	
Carbazza	380 U	370 U			370	V	
Di-n-Bullyfordialate	380 U	370 U	380 U		370	u	
Reserves	380 U	370 U			370	U	
Pyretto	380 U	370 U	380 U		370	U	
Barberzytekhalute	380 U	370 U			370	u.	
3.3-Olchierobergidne	380 U	370 U.			370	U	
Banco (a) Anthracano	380 U				370	U	
Chrysens	380 U	370 U			370		
		_					

# ANALYTICAL RESULTS ROTOFINEH SITE SOIL SAMPLES

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Well ID	BS5	BS5	8S6	856	856	856	856
Sample Dapth	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) Phthelete	380 U	370 U	380 UJ		180 UJ		
Di-n-Octyl Philadate	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		<sup>4</sup> 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 senous 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.

LTI - Limno-Tech, Inc.

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# APPENDIX B

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# Summary of Groundwater Sample Results

# ANALYTICAL RESULTS ROTOFINISH SITE GROUNDWATER SAMPLES

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/ <b>5/89</b>	5/5/89	5/4/89	6/26/91	6/25/91
NORGANICS (µg/I))								100.11
Alumnum	21.4 U	21.4 U 31.5 U	130	21.4 U	21.4 U	21.4 U	104 U	138 U
Antimony	31.5 U	31.5 U 1.2 UJ	31.5 U 6 UJ	31.5 U	31.5 U	31.5 U 1.6 J	33 U 5 U	33 U
Arsenic	4.1 J	65.6			105 I	1.6 J 93.4	51.4	10.8 77.3
Barium	69.7	0.5 U	12.2	52.2 0.5 U	. –		57,4 1 U	
Beryllium	0.5 U 4.2 U	4.2 U	0.5 U	4.2 U	0.5 U 4.2 U	1.5 U	-	1 U 4 U
Cadmium Calcium	79900		4.2 U	4.2 U 120000		4.2 U 120000	4 U 75000	
	79900 3.8 U	84200 3.8 U	13200 3.8 U	3.8 U	100000			66300
Chromum	5.6 U	3.8 U 8.7 U	3.8 U 11.1 U	12.2 U	3.8 U	3.8 U	4 U 6 U	4 U
Colbeit	7.3 U	8.7 U 7.3 U	7.9	7.3 U	12.4 U 7.3 U	5.6 U 7.3 U	4.5	6 L 4.9
Copper	149	54.5	7.9 155	7.3 U 7.7 U	7.3 U 195	316	4.5 74,9	4.9 1 <b>230</b>
Iron	9 UJ		155 9 UJ		-		-	2.4 U
Leed						-		
Magnesium	25900 77.9	26400 219	4910	32600 - 8.1	27 <b>800</b> 80,4	37100 53.8	24800 437	18900
Manganese		0.2 U	25.8	· · · · · · · · · · · · · · · · · · ·			•37 0.2 U	160 0.2 L
Mercury Nickel	0.2 U 18.6 U	0.2 U 18.6 U	0.24 18.6 U	0.2 U 18.6 U	0.2 U 18,6 U	0.2 U 18.6 U	12.4	91
Potessum	3020 U	3630 U	18.6 U 4140	4620 U	18.6 U 8040 U	18.6 U 1740 U	2830	1730
Selenium	5 UJ		4140 5 U	4620 U 5 U	3040 U 5 U	1740 U 5 U	25-30 410	1/30 4 L
Silver	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4 U 5 U	
Sodium	11300 U	28000	223000	30900	4.9 U 21600	4.9 U 23000	29700	6970
Thalium	1.1 UJ		223000 1.1 UJ				29/00 2 UJ	
Vanadum	6.1 U	6.9 U	9.1 U				2 UJ 3 U	. 21
Zinc	16.9 U	42		11.3 U 10.7 U	10.7 U	5.8 U		
Żinc Cyanide	10 U		27.9 U 10 U		18.2 U	20.4 U 10 U	111 15.3	220 15.9 J
DLATILE ORGANICS (Hg/I)		10 U		<u>    10 U</u>	<u>10 U</u>	10.0	13.3	15.9 3
Chloromethene	10 W	10 UJ	10 W				10 U	10 L
Bromomethane	10 00	10 U	10 U	10 U	10 U	10 U	10 U	10 L
Vinyi Chioride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 L
Chioroethane	10 U	10 U	79	10 U	10 U	10 U	10 U	10 L
Methylene Chloride	5.00		/ទ 10 យ				10 U	10 L
	10 U	10 U	10 0	10 U	10 U	10 U	10 U	10 0
Carbon Disulide	50	50	50	50	5 U	5 U	10 U	10 U
1.1-Dichiorosthene	1 J	5 U	_	5 U	5 U	5 U	10 U	10 L
1,1-Dichioroeihane	83	5 U	5 U 4 J	5 U	5 U	5 U	1 J	10 L
1,2-Dichloroethene (total)	5 U	5 U	<b>4</b> J 7	5 U-	5 U	5 U	10 U	10 L
Chiarolom	50	5 U	, 5 ປ	5 U	5 U	5 U	10 U	10 1
1.2-Dichloroethane	50	5 U	-	5 U	5 U	5 U 5 U	10 U	10 0
2-Butanone			5 U	-				
1, 1, 1-Trichloroethane	10 UF	10 UR 5 U	10 UF 5 U	: 10 UF 5 U	10 UF 5 U	: 10 UR 5 U	10 UJ 10 U	10 l 10 l
Carbon Tetrachioride	50	5 U			5 U 5 U	5 U	10 U	10 1
Vinvi Acetate	10 U		5 U	5 U 10 U		5 U 10 U	10 0	
Bromodichioromethane	5 U	10 U 5 U	10 U		10 U	5 U	10 U	10 L
	50		5 U	5 U	5 U	5 U	10 U	10 1
1,2-Dichloropropane	,	5 U	5 U	5 U	5 U		10 U	10 0
cis-1,3-Dichloropropane Trichloroethene	5 U 5 U	5 U. 5 U	5 U	5 U	5 U	5 U 5 U	10 U	10 0
Dibramachioramethene	50		5 U	5 U	5 U	5 U	10 U	10 1
1,1,2-Trichioroeinane	50	5 U	5 U	5 U	5 U	5 U	10 U	10 1
• •	50	5 U	5 U	5 U	5 U		10 U	10 (
Benzene Trans-1,3-Dichloropropene	50	5 U 5 ป	5 U	5 U 5 U	5 U 5 U	5 U 5 U	10 U	10 0
Bromolorm	50		5 U			5 U	10 U	10 1
		5 U	5 U	5 U	5 U		10 U	10 1
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 1
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10-U 10 U	
Tetrachioroethene	5 W						-	10 L
1,1,2,2-Tetrachioroethane	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 L
Toluene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 L
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 L
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 L
Styrene	5 U	5 U	5 U	5 U	5 U	5 U	10 U	10 L
Total Xvienes	50	5 U	5 U	5 U	5 U	5 U	10 U	10 L

LTI - Limno-Tech, inc.

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ROTOFBERH SITE

#### GROUNDWATER SAMPLES

Revision: 11:10 AM. 10/15/93 (MASTER\_W.XLS) - .....

Well (D	ARMA 1	MWA2	MWA3	MWA4	MWAS	MWA6	MWB:	MWB1
Sample Dapits	45-46	37-38	4.5-495	47-50	41-44	41.5-44.5	64-85	144-146
Date Collected	54.00	5/5/00	5/5/00	5/5/89	5/5/80	54.00	6/26/91	6/25/91
SEMI-VOLATILE ORGANICS (up)						<u> </u>		
Phone:	10 U	10 U	10 U	10 U	10 U	10 U 10 U	10 U	10 U
bis (2-Chlorosbyl) Elter 2-Chlorosbund	10 U 10 U	10 U 10 U	10 UJ 10 U	i 10 UJ 10 U	l 10 W 10 U	10 U 10 U	10 U 10 U	10 U 10 U
1.3-Okbioshermene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1.4-Dichlersbencere	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bangut Alcohal	10 U	10 U	10 00			10 U		
1.2-Okhiorchengene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Mail-Juhanel	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2.2-Onybia(1-Chipropropane)	l .						10 W	10 UJ
bis (2-Chloroisepropyl) Ether	10 U	10 U	10 W	10 W	10 W	10 U		
4-Listlyiphanai	10 U	10 U	10 W		10 W	10 U	10 U	10 U
N-Mireso-Ol-a-Propylamine	10 W		10 W				10 U	10 U
Heneddaroethene	10 U	10 U	10 UJ				10 U	10 U
Mitabantana	10 U	10 U	10 UJ				10 U	10 U
	10 U	10 U	10 W			10 U	10 U	10 U
2-Mirephanel 2.4-Dimetrytehenel	10 U	10 U	10 U	10 U	10 U	10 U	10 U	اسک!
Bentai: Acid	10 U 50 UR	10 U SO UR	10 U 50 UF	10 U ≎ 50 UF	10 U 50 UFF	10 U 50 UR	10 U	10
bie (2-Chiercetherer) Methane	10 U	10 U	10 U			10 U	10 U	10 U
2.4-Cistometrani	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
124 Tittlersbanase	10 U	10 U	10 U	10 U	10 U	10 U	10 U	. 10 U
Haghibalana	10 U	10 U	10 U	10 U	10 U	10 U	10 U	÷ 10 U
4-Citerestine	10 W		10 LU			10 W	10 W	÷ 10 UJ
Haussidersbutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chiero-S-Mathylphanai	10 U	10 U	10 U	10 U	10 U	10 U	10 U	- 10 U
2-Listrytrephthelene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hausshinesystepentedene	10 U	10 U	10 U	10 U	10 U	10 U -	10 U	10 U
2.4.6-Tilshinrephanal	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Tilshisrephanai	<b>50</b> U	50 U	50 U	50 U	50 U	50 U	25 U	25 U
5-Carpondana ano	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
	<b>50 W</b>	90 W	<b>80 U</b> J			50 UJ	25 W	25 UJ
	10 U	10 U 10 U	10 U	10 U	10 U	10 U	10 U	10 U
	10 U 10 U	10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U
	ສິພ	50 LU	50 U	50 U	50 U	50 U	25 U	2, 1
Accessible	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
2.4-Olabrahanai	<b>80</b> U	50 U	50 111			ສພ	25 1	25 W
4-Mitrephonel	<b>8</b> W	<b>50 W</b>	50 U	50 U	50 U	50 U	25 U	25 U
Disenselaren	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Cinitatulano	10 W	10 W	10 U	10 U	10 U	10 U	10 U	10 U
Clathylphthetate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chierephenyt-phenytether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluerene	10 W		10 W			10 W	10 U	10 U
4-Hireanine	50 W	50 W	50 U	50 U	50 U	<b>50</b> U	25 U	25 U
4.6-Chilto 2 Mallylphanel	<b>50 W</b>		50 U	50 U	50 U	50 U	25 U	25 U
N-Hibboodiphonytamino (1)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bramephanyl-phanylathar	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
HaugeNersborgene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Penlashisraphonel Phynanibrana	50 U 4 J	<b>90 U</b>	50 U	50 U	50 U	50 U	25 U	2 J 10 U
Antorenno	10 U	10 U 10 U	10 U	10 U	10 U	10 U	10 U 10 U	10 0
Cutastio		10 0	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Buly(phthalala	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Rugenbaro	31	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrone	10 U	10 U	10 U			10 U	10 U	10 U
Budylinency/philinelate	10 U	10 U	10 10			10 U	10 U	10 U
3,5-Oktorebergedra	20 เม	20 UJ	20 U			20 W	10 U	10 U
Bango (a) Antivacano	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

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GROUNDWATER SAMPLES

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Well ID	MWA1	MWA2	MWA3	MWA4	MWA6	MWA6	MWB1	MWB1
Sample Depth	43'-46'	33'-36'	46.5'-49.5'	47.50	47'-44'*	41.5'-44.5'	64'- <b>66</b> '	144'-146'
Date Collected	5/4/89	5/5/89	5/ <b>5/89</b>	5/5/89	5/5/89	5/4/89	6/26/91	6/25/91
SEMI-VOLATILE ORGANICS (µg/I)							•	
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	έ 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.

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ROTOFINISH SITE

#### GROUNDWATER SAMPLES

	MWB28	<b>WE28</b>	MWB28	MW828	MW828	AM828	MW828	MWB28
Sample Daptie	19.5-21.5	45-46	48-50	S <b>J-55</b>	58-80-	ഔ-ഔ	73-75	78-80
	6/18/91	6/18/91	67891	6/17/91	6/17/91	6/17/91	6/14/91	6/14/91
INORGANICS (µg/))				·				
Austerum	378 U	143 U	134 U	892	108 U	80.0 U	111 U	140 L
Animony	33.0 U	33.0 U	33.0 U	33.0 U	33.0 U	33.0 U	33.0 U	33.0 L
Araenic Benath	5.0 UJ 59.6 J	50 UJ 130 J	5.0 UJ 106 J	5.0 W 161 J	5.0 UJ 92 J		5.0 W	26.7 J 116 J
Berythan	1.0 U	1.0 U	1.0 U	1.0 U	362 J 1.0 U	84.8 J 1.0 U	279 J 1.0 U	1.0 U
Cadham	40 U	40 U	40 U	4.0 U		4.0 U	4.0 U	4.0 U
Catchen	54400	176000	130000	128000	89700	102000	102000	42900
Chrometer	5.5 J	4.3 J	40 เม		4.0 UJ	4.0 W	4.0 W	4.0 U
Colbet	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
l tran	402	40.4 U	40.4 U	2000	34.3 U	28.2 U	36.3 U	1900
Land	2.0 W		21 W				4.1 W	2.0 U
Magnasaun	17800	64200	40500	44800	29400	30800	41500	25200
Manganese	342	1490	1080	1240	704	463	1100	55.8
Marcary	02 U	0.2 U	02 U	0.2 U	02 U	02 U	0.2 U	^ 2 U
Nichel Poteseum	9.0 9240	14. <b>5</b> 9180	20.7 7120	20 11 <b>700</b>	12.7 8780	13.2 11700	28.9 35000	9530
Seignage	40.0 (1)		40.0 UJ				4.0 UJ	4.0 U
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
Sadan	246000	88500	42700	44000	28200	31200	74100	105000
' Theften '	20 W	20 W	2.0 W	20 W		20 W	2.0 W	2.0 U
Vanadium	3.0 U	3.0 U	3.0 U	5.4	3.0 U	30 U	3.6	: 30 U
Znc	278 J	2340 J	2000 J	2520 J	1 <b>460 J</b>	1 <b>710 J</b>	3930 J	; 332 J
Cyeride	10.0 U	10.0 U	10.0 U	10.0 U	10.9 U	10.0 U	10.0 U	10.0 U
VOLATILE ORGANICS (ugh)	alini - P	ويدر فكروك وكروي ويسورها		29 <b>246</b> 1 14				
Chieremethere	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Vinyt Chiasta Chiartathana	10 U 10 U	10 U 10 U	10 U	10	83 U	120 U	18 J	96
Magnitana Chipatda	10 U	10 U	10 U 10 U	10 U 10 U	83 U 83 U	120 U 120 U	20 U 20 U	29 25 U
Abatana	10 W		10 เม	10 W		120 U	20 U	25 U
Caston Dividide	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
1,1-Dichloroethene	10 U	6 J	L 6	31	150	250	29	25 U
1,1-Dichlarosijano	3 J	18	18	66	40 J	64 J	42	279
1,2-Olchiorasthane (total)	2 J	3 J	1 J	7 J	<b>83</b> U	120 U	L 6	د افسیا
Chippelow	10 U	10 U	10 U	10 U	63 U	120 U	20 U	25 U
1,2-Dichlerceihane	10 U	10 U	10 U	10 U	<b>83</b> U	120 U	20 U	25 U
2-Butanono	10 W		10 W	10 W	83 W	120 W	20 U	25 U
1,1,1-Trickingeliene	11	26	54	170	1100	2000	290	6 J
Carbon Tobachlando	10 U	10 U	10 U	10 U	<b>83</b> U	1 <b>20</b> U	20 U	25 U
Vinyi Acetain Bramadichiananahana	10 U	10 U	10.11			130.11	20 U	25 U
1,2-Okharapapana	10 U	10 U	10 U 10 U	10 U 10 U	43 U 43 U	120 U 120 U	20 U 20 U	25 U
cie-1,3-Dichiarageneene	10 U	10 U	10 U	10 U	83 U	120 U	20 U	250
Tricidencettere	4 J	5 J	3 1	16		170	20	25 U
Dischartenethane	10 U	10 U	10 U	10 U	<b>83</b> U	120 U	20 U	25 U
1,1,2-Trichtmostune	10 U	10 U	10 U	10 U	<b>63</b> U	120 U	20 U	25 U
Banzano	10 U	10 U	10 U	10 U	<b>83</b> U	120 U	20 U	25 U
Trans-1,3-Dicideropropuna	10 U	10 U	10 U	10 U	<b>63</b> U	120 U	20 U	25 U
Brendem	10 U	10 U	10 U	10 U	<b>83</b> U	120 U	20 U	25 U
4-Madhy4-2-Penimone	10 U	10 U	10 U	10 U	<b>83</b> U	120 U	20 U	25 U
2-Handhane	10 U	10 U	10 U	10 U	83 U	120 U	20 U	25 U
Tetrachicrostiene	10 U	10 U	10 U	2 J	83 U	14 J	51	25 U
1.1.2.2-Tetachiordetane	10 U	10 U	10 U	10 U	<b>83</b> U	120 U	20 U	25 U
Tchurre	10 U	10 U	10 U	10 U	83 U	120 U	20 U	5 J 770
Chicrobenzene	10 U	10 U	10 U	6 J	83 U	120 U	10 J	270
Ellybolizano Starano	10 U	10 U	10 U	10 U	83 U	120 U	20 U 20 U	17 J 25 U
Total Xylanas	10 U 10 U	10 U	10 U	10 U	43 U	120 U	20 U 20 U	25 U
		10 U	10 U	10 U	<u>63 U</u>	120 U		<u>6</u> 0

## ANALYTICAL RESULTS ROTOFINISH SITE GROUNDWATER SAMPLES

Well ID	MWB2B	MWB2B	MWB2B	MWB2B	MWB2B	MW828	MWB2B	MWB2B
Sampie Depth	19.5-21.5	44'-46'	48-50	53'-55'	58'-69'	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 (USA)							ins part of the second	
Phenol	10 U	10 UR		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 U	10 UJ		10 U
1,3-Dichiorobenzene	10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 1 10 U 1
1.4-Dichiorobenzene Benzyl Alcohol	10 U	10 0	10 0	10 0	10 0		10 0	10 0
1.2-Dichiorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	27
2-Methyphenol	10 W				10 U	10 0	-	10 U
2.2'-Oxybie(1-Chloropropene)	10 U	10 01	10 UJ	10 0	10 UJ	10 00		10 U
bis (2-Chloroisopropyi) 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 .
Hexachioroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nirobenzene	10 U	10 UJ	10 UJ	4 10 U	10 U	10 U	10 U	10 U
laophorone	10 U	10 U	10 U	- 10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 UR		-	10 U	10 UJ		10 UJ.
2,4-Dimethylphenol	10 U	10 UR	10 UJ	10 U	10 U	10 UJ	10 UR	10 U
Benzoic Acid								
bie (2-Chloroethaxy) Methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichierophenot	10 U	10 UR			10 U	10 UJ		10 U .
1,2.4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U :
Naphthaiene 4-Chiomantine	10 U 10 U	10 U 10 UJ	10 U	10 U	10 U 10 UJ	10 U 10 UJ	10 U	: 10 U
Herachiorobutaciene	10 U	10 UJ	10 UJ 10 UJ	10 U 10 U	10 03	10 UJ 10 U		10 U 10 U
4-Chioro-3-Methylphanoi	10 U	10 US		10 U	10 U	10 U		•
2-Metivinephineiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U a
Hexachiorocyciopentacliene	10 U	10 U	10 UJ		10 U	10 U	10 U	10 U 3
2.4.6-Trichiorophenoi	10 U	10 UR		10 U	10 U	10 UJ		10 U /
2.4.5-Trichlorophenol	25 U	25 UR		25 U	25 U	25 U		25 U :
2-Chioronephiheiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniine	25 U	25 U	25 U	25 U	25 UJ	25 UJ		25 UJ
Dimethyl Philadala	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U -
Abenephthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U .
2,8-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ:
3-Niroaniine	25 U	25 W	25 UJ		25 U	25 U	25 UJ	25 UJ.
Acenephthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinirophenoi	25 W	25 UR			25 UR			25 UJ
4-Nitrophenol	25 W				25 U	25 UJ		25 U
Dibenzoluran 0.4 Disitataturan	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene Diethylphihaiate	10 U 10 U	10 U 10 U	10 U	10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 UJ 10 U
4-Chiorophenyi-phenyiether	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U	10 U	10 U
4-Chicrophenyi-phenyiener Fluorene	10 U	10 U	10 U	10 U 10 U	10 U	10 U	10 U	10 U
4-Niroanline	25 U	25 UJ	25 UJ		25 UJ	25 U		25 UJ
4,6-Dinito-2-Methylphenol	25 U	25 UR			25 U	25 UJ		
N-Nirceodphenylemine (1)	10 U	10 U	10 U	10 U	10 W	10 U		10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachiorobenzene	10 U	10 W	10 UJ		10 U	10 U	10 U	10 U
Pentachiorophenoi	25 U	25 UR			25 U	25 UJ	25 UR	25 U
Phananthrana	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 Ū	10 U	10 U	10 U	10 U	10 U
Cerbazole	10 U	10 W	10 UJ	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphtheiste	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 W	10 U
Butylbenzylphiheiele	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 UJ
3,3'-Dichiorobenzidine	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

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#### ROTOFINION SITE

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#### GROUNDWATER SAMPLES

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Well (D	MWB28	444828	444828	MWB28	MWB28	MMB28	MWB2B	MWB28
Sample Dapth	19.5-21.5	44-46	48-50	53-55	58-60	ଣୀ-ରେ	73-75	78-80
Date Collected	6/18/91	6/18/91	6/1 <b>8/91</b>	6/17/91	6/17/91	6/17/91	6/14/91	6/14/91
SEMI-VOLATILE ORGANICS (ugf)						·		
Dis (2-Ethythexyl) Philippin	18 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-Octyl Philadate	10 U	10 U	10 U	10 U	10 U	15	10 U	10 U
Benzo (b) Ruoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (k.)Ruoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Banzo (a) Pyrana	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 (e.h) Anthracene	10 U	10 U	10 U	10 U	<sup>4</sup> 10 U	10 U	10 U	10 U
Banzo (g.h.) Parytana	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	02 U	02 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 Analyse 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 sensus deficiencies in the analysis.

UR Analyte was not detected but the results are unveloble due to serious deficiencies in the analytes.

(1) cannot be separated from Diphenylamine

\* 4,4-Methytenebis 2-Chloro-aniline: special analyte

Blank columns indicate that analysis for the compound was not performed.

## ANALYTICAL RESULTS ROTOFINISH SITE GROUNDWATER SAMPLES

Barlum         93.9 J         862 J         82.6         67.7         44.5           Baryblum         1.0 U         1.0 U         2 U         2 U         2           Cadmium         4.0 U         4.0 U         5 U         5         5           Cadmium         4.0 U         4.0 U         7 U         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7	77.5°-79.5' 10/24/91	103-106	(1014/200 10
INDERGANICS (Ug1)         Image:	10/24/91		(MW302-10
Aumnum         139 U         168 U         136 U         171 U         912           Ansenic         33.0 U         33.0 U         23 U         22 U         22 U         22 Cadmium         40 U         4.0 U         7 U         7 U         7         7         7         7         7         7         7         7         7         7         7         7         17         7         10         7         10         7         10         7         10         7         10         7         10         7         10         7         10         7         10         7         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10		10/28/91	10/28/91
Ansmony         33.0         33.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0         23.0		u nasur ninga nin	
Arenic         15.4 J         500 UJ         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U <t< td=""><td></td><td></td><td>97.7</td></t<>			97.7
Barylaum         Q3.9 J         962.3 J         82.6 (7.7)         44.5 J           Barylaum         1.0 U         1.0 U         2 U         2 U         2 U         2 J           Cadinum         44.0 U         4.0 U         5 U         5 U         5 S         5 U         5 S         5 U         5 S         5 U         5 S         5 U         5 U         5 S         5 U         5 S         5 U         5 S         5 U         5 S         5 U         5 S         5 U         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         5 S         3 S         5 S         5 S         3 S         5 S         3 S         5 S         3 S         5 S         3 S         5 S         3 S         3 S         3 S         3 S         3 S         3 S         3 S         3 S         3 S         3 S         3 S         3 S         3 S		-	23
Beryllum         1.0 U         1.0 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U <t< th=""><th>U 5U 52.1</th><th>JJ 5U 218</th><th>5.3 218</th></t<>	U 5U 52.1	JJ 5U 218	5.3 218
Cadmium         4.0 U         4.0 U         5 U         5 U         2 S           Calcium         45500         41500         61800         41300         56820           Churantum         4.0 UJ         4.7 J         7 UJ         2 UJ	o sz.1 ⊔ 10/		218 2 '
Catolum         45500         41500         61900         41300         56800           Chommum         4.0         4.0         4.7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         8         8         6         0         2         10         2         10         2         10         10         10         10         10         10         10         10         10         10         10         10         10         10	U 10		2 · 5 :
Chromaum         4.0 UJ         4.7 J         7 UJ         7 UJ         7 UJ         7           Cobatt         6.0 U         6.0 U         7 U         7 U         7         7           Copper         4.6         7.4         11.7 U         15.5 U         7.8           Iron         1180         1090         93.8 U         175 U         392           Lead         2.0 UJ         2.0 UJ         2.2 J         2 UJ         2           Magnesum         23800         21700         21000         13800         18600           Magnesum         64.8         59         52.8         53.4         44.4           Mattal         18.8         17.9         35.U         35.U         35.U           Potasskam         4340 U         4740 U         3380         1950         13800           Salver         5.0 U         5 U         8 U         8 U         6 U         6 U           Sodum         3300 J         34.4         6 U         6 U         6 Znc         2.10 U         2 UJ         2 UJ         2 UJ         2 UJ         2 Zn         2 Znc		56800	57200
Colbait         6.0 U         6.0 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         7 U         3 U         3 3 U         3 3 U         3 3 U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U         3 S U <t< td=""><td>U 4U</td><td></td><td></td></t<>	U 4U		
Copper         4.6         7.4         11.7         U         15.5         U         7.8           iron         1160         1000         93.8         U         175         U         392           Leed         2.0         U.2         2.0         2.100         21600         13600         18000           Megreskum         23800         21700         21600         13600         18000           Megreskum         64.8         59         52.8         53.4         44.6           Mecury         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2	บ 50		71
Iron         1180         1080         93.8 U         175 U         392           Megnesum         2.0 UJ         2.0 UJ         2.2 J         2 UJ         2           Megnesum         23000         21700         21800         13900         19900           Menganese         64.6         59         52.8         53.4         44.6           Mercury         0.2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U		3.9 U	31
Lead         2.0 UJ         2.0 UJ         2.2 J         2 UJ         2           Mergreskum         23800         21700         21800         13800         18800           Mergreskum         64.6         59         52.8         53.4         44.6           Mercury         0.2 U		1880	1910
Magnesium         23800         21700         21800         13800         18000           Margarisee         64.5         59         52.5         53.4         44.6           Margarisee         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2         0.2 <td< td=""><td>U 2U</td><td>) 2.8 J</td><td>3.1 J</td></td<>	U 2U	) 2.8 J	3.1 J
Marcary         0.2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2	19800	19000	1 <b>9100</b>
Nickel         18.8         17.9         35 U         36 U         37 U         30 U         <		204	205
Potasskam         4340 U         4740 U         3390         1950         1860           Salver         5.0 U         5 U         8 U         8 U         8           Sodum         88600         80300         36400         72300         13900           Thallum         2.0 UJ         2 UJ         10 U			021
Selenium         4.0 UJ         40 UJ         3 UJ         2 UJ	UJ 8.9	49.9 J	35.4 J
Silver         5.0 U         5 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         2 U         2 UU		6110	6680
Sodium         89900         80300         36400         72300         13900           Thallum         2.0 UJ         2 UJ         3 ZI         12 U         10 U	UJ 3U		
Thailium         20 UJ         2 UJ	U 6U 17000 J		8 U
Vanadum         3.0 U         3.4         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         10 U <th< td=""><td>່ 17000 J :UJ 2 U</td><td></td><td>49000</td></th<>	່ 17000 J :UJ 2 U		49000
Zinc         630 J         562 J         97.7         124         32.1           Cyanide         10.0 U         10.0 U         10 U	UJ 2U. U 6U		•
Cyanida         10.0 U         10.0 U         10 U		/ 6U 45.9	: 6U : 442
VOLATILE ORGANICS (µ0)         2000           Chloromethane         17 U         10 UJ         10 U         10 UJ         10 U			
Chicromethane         17 U         10 UJ	<u> </u>		
Bromonestiene         17 U         10 UU         10 U	U 10 U	i 10 W	
Vinyl Chloride         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100         100			10 U
Chorcethane         12 J         5 J         10 U         10 U         10 U         10 U           Methytens Chiorids         17 U         10 U         24 U         35 U         24           Acetone         17 U         10 U         10 UJ         10 U         24         10 U         10 U <th></th> <th>) 10 U</th> <th>10 U</th>		) 10 U	10 U
Methylene Chlorida         17 U         10 U         24 U         35 U         24           Acetone         17 U         10 U         22           1,1-Dichlorosethene         17 U         1 J         10 U         10 U         10 U         23         10 U         10 U         10 U         23           1,2-Dichlorosethene         140         150         10 U	U 10 U	10 U	10 U
Carbon Disulficie         17 U         10 U         10 U         10 U         2           1,1-Dichlorosethene         17 U         1 J         10 U         10 U         10 U         2           1,1-Dichlorosethene         17 U         1 J         10 U         10 U         10 U         2           1,2-Dichlorosethene         10 J         10 J         10 U         10 U         10 U         10 U         10 U           1,2-Dichlorosethene         17 U         10 U	U 10 U	i 35 U	15 U
1,1-Dichiorosthere       17 U       1 J       10 UJ       10 U       10 U         1,1-Dichiorosthere       140       150       10 U       10 U       72         1,2-Dichiorosthere       10 J       10 J       10 U       10 U       10 U       72         1,2-Dichiorosthere       10 J       10 U       10 U       10 U       10 U       10 U       10 U         1,2-Dichiorosthere       17 U       10 U       10 U       10 U       10 U       10 U       10 U         1,2-Dichiorosthere       17 U       10			10 U.
1,1-Dichtorosthane       140       150       10 U       10 U       72         1,2-Dichtorosthane (total)       10 J       10 J       10 U       10 U       10 U       10 U         1,2-Dichtorosthane       17 U       10 U       10 U       10 U       10 U       10 U       10 U         1,2-Dichtorosthane       17 U       10 U <t< td=""><td>J 10 U</td><td></td><td>10 U</td></t<>	J 10 U		10 U
1.2-Dichlorositiene (total)       10 J       10 J       10 U	J 11	10 U	10 U
Chiorolom         17 U         10 U		5 J	4 J
1,2-Dichlorosthane       17 U       10 U       1			L 8
2-Butanone         17 U         10 U			10 U 10 U
1, 1, 1-Trichloroethane       8 J       7 J       10 U       10 U       47         Carbon Tetrachtoride       17 U       10 U<	U 10 U UJ 10 U		10 U
Carbon Tetrachloride         17 U         10 U<		5 J	10 U 5 J
Vinyl Acetate         17 U         10 U			10 U
Bromodichioromethane         17 U         10 U<	V		•
1,2-Dichloropropene       17 U       10 U	U 10 U	J 10 U	10 U .
cis-1,3-Dichloropropene         17 U         10			10 U i
Trichlorosthene         17 U         10 U	U 10 U	J 10 U	10 U I
1,1,2-Trichlorosthane         17 U         10 U	U 10 U	J 4 J	4.1
Benzene         17 U         10 U         10 UJ         10 UJ <th< td=""><td></td><td></td><td>10 U</td></th<>			10 U
Trans-1,3-Dichloropropene         17 U         10 U			10 U
Bromolorm         17 U         10 U			
4-Methyl-2-Pentanone         17 U         10 U<			10 U
2-Hexanone 17 U 10 U 10 U 10 U 10			10 U
			10 U
			10 U
Tetrachiorcethene         17 U         10 U <td></td> <td></td> <td>10 U</td>			10 U
1,1,2,2-Tetrachloroelhene 17 U 10 U 10 U 10 U 10 U 10 U			10 U
Tolume         17 U         10 U         10 UJ			
Chicrobenzene 53 52 10 UJ 10 UJ 10			
Ethylenzene         2 J         2 J         10 UJ         10 UJ         10           17 U         10 UJ			
Styrene         17 U         10 U         10 UJ         10 UJ <th< td=""><td></td><td></td><td></td></th<>			
Total Xylenes 17 U 10 U 10 UJ 10 UJ 10		10 W	LU 01 UJ

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ROTOFUEN SITE

GROUNDWATER SAMPLES

Revision: 11:29 AM, 10/15/93 (MASTER\_W.XLS)

.

WellD	AME28	DUPWA	AMERIA	MWB38	MARIE	MW848	MW302	DUPWD
Sample Dapth	83-85	(MWB28-85)		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
SEM-VOLATILE ORGANICS (Jug/)								
Phenos	10 U	7 J	10 U	10				
bis (2-Chicstonia) Ether	10 U	10 U	10 U	10				
2-Chlorophanol	10 U	10 U	10 U	10				
1,3-Okbiarabengene 1,4-Okbiarabengene	10 U 10 U	10 U 10 U	10 U 10 U	10 U	10 U 10 U	10 U 10 U	10 U 10 U	10
Benzyl Alcohol			10 0	10 U	10 0	10 0		10
1.2-Oichiesthesteen	2 J	3 J	10 U	10 U	<sup>1</sup> 10 U	10 U	10 U	10
2-Mathetabanal	10 U	10 U	10 U	10				
2.2-October (1-Chiertermanne)	10 U	10 U	10 U	10 W	10 U	10 U	10 0	10
bis (2-Chiorenceropy) Ether								
4-Methylphongi	10 U	10 U	10 U	10				
N-Hibeso-Ol-o-Propylanino	10 U	10 U	10 U	Í 10 U	10 U	10 U	10 U	10
Hangchioreethane	10 U	10 U	10 U	j0 U	10 U	10 U	10 U	10
Nizebanzene	10 U	10 U	10 U	10				
Incoherente	10 U	10 U	10 U	10				
2-Minghanst	10 U	10 U	10 U	10				
2,4-Dimethylphonel Benzes: Acté	10 U	10 U	10 U	10				
tis (2-Chisrophus) Mathema	10 U	10 U	10 U	.0				
2.4-Oktomational	10 U	10 U	10 U	10 10				
1.2.4-Techingtonenee	10 U	10 U	10 U	10				
Nashdiatano	10 U	10 U	10 U					
4-Chioreanline	10 U	10 U	10 UJ		10 U	10 UJ	10 LU	
Hanachiereburgedene	10 U	10 U	10 U					
4-Chipro-3-MuShylphonal	10 U	10 U	10 U					
2-Mathylangh Balana	10 U	10 U	10 U	10 U	31	10 U	10 U	10
Hanachierecyclepeniadene	10 U	10 U	10 U	10				
2,4,6-Trickinephonel	10 U	10 U	10 U	10				
2,4,5-Tikhimuphanal	25 U	25 U	25 U	25				
2-Chloronaphthalana	10 U	10 U	10 U	10				
2-Minutelline Classifici Philippine	25 W		25 W		25 U	25 U	25 U	25
Acamabilitatione	10 U 10 U	10 U - 10 U	10 U 10 U	10 10				
2.8-Obtratione	10 U	10 W	10 U	10				
3-Minandra	25 4		25 U	25 U	25 U	25 11	25 U	225
Aconophiliano	10 U	10 U	10 U					
2.4-Cinitraphanal	25 W		25 U	25 U	25 U	25 ເມ	25 U	25
4-Mirephanel	25 U	25 U	25 UJ		25 U	1 J	25 W	25
Oliverzehren	10 U	10 U	10 U	10				
2.4-Obdoetstuste	10 U	10 U	10 U	10				
Clethylphthalase	10 U	10 U	10 U	10				
4-Chlorophanyt-phanytother	10 U	10 U	10 U	10				
Planene	10 U	10 U	10 U	10				
4-Nixogaline 4.6-Cisipe-2-Mailadahanat	25 W		25 U	25 U	25 UJ		25 U	2
	25 W		25 U	25 U	25 U	25 U	25 U	25
N-Nineselijken/tanine (1)	10 U 10 U	10 U 10 U	10 UJ		10 U	10 U	10 U 10 U	10 10
Handdersbarzene	10 U	10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U 10 U	10 U	10
Pentechlorechanel	25 U	25 U	25 U	2				
Phonendivens	10 U	10 U	10 U	10 U	1 J	10 U	10 U	10
Arthugano	10 U	10 U	10 U	10				
Carbanete	10 U	10 U	10 U	10				
Di-m-Budy (philliphiliphiliphiliphiliphiliphiliphi	10 U	10 U	10 U	1(				
Futurentiane	10 U	10 U	10 U	10 U	10 W		10 U	1(
Pyrene	10 W		10 U	10 U	10 U	10 U	10 U	1(
Baybarzylyhitaine	10 U	10 U	10 U	10 U	10 W		10 U	16
3.3-Okhisrabanzadno	10 U	10 U	10 U	1(				
Banzo (a) Anthracano	10 U	10 U	10 U	1(				
Стузала	10 U	10 U	10 U	1(				

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## ROTOFINISH SITE

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#### GROUNDWATER SAMPLES

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Well ID	MWB2B	DUPWA	MWB3A	MWB38	MWB48	MWB48	MW302	DUPWD
Sample Depth	83'-85'	(MWB2B-85)	40'-43'	59 <b>'-62'</b>	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 (491)	15					12.14 J		بالعابيتين
bis (2-Ethythexyl) Phthalate	10 U	10 U	10 U	10 U	10 U	10 Ü	10 Ū	10 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 UJ	10 UJ	10 U	10 W	10 UJ
Benzo (b) Fluoranthene	10 U	10 U	10 U	10 U	10 U	1 <b>0 ប</b>	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) Perviene	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	<u>1 U</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.

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## GROUNDWATER SAMPLES

Revelor: 2:47 PM, 10/14/93 (MASTER\_W.XLS)

Well ID	AMISOD	MW309	MW310	MM/310	DUPWE	MWBSA	MWB58
Sample Dapath	103-105	108-110	82.5-84.5	87.5-89.5	(MW310-87.5-89.5)		76.5-79.5
Date Collected ORGANICS (µg/l))	10/30/91	10/30/91	10/28/91	10/29/91	10/28/91	5/21/93	5/18/93
Aumman		98.8 U	116 U	76.6 U	86.8 U		
Antemony		23 U	23 U	23 U	23 U		
Areenic	ł	5 U	5 U	5 U	5 U		
Berum		46.8	171	144	146		
Beryllum		2 U	2 U	2 U	2 U		
Cadman		5 U	5 U	5 ປ	5 U		
Calcarin		80000	133000	123000	124000		
Chroman		7 U	7 W	7 W	7 W		
Colbeit		7 U 11.7 U	21.2 15.5 U	23.2 15.5 U	23 13.6 U		
Copper Iran		370	719	910	919		
		2.9	2 01	2 W	2 W		
Magnasaum		26400	42500	• 41700	41800		
Manganese		92	354	86.7	86.7		
Mercury		0.2 U	0.2 U	02 U	0.2 U		
Nichel		35 W		35 U	37.8 J		<b>1</b>
Potestan		1900	15300	9420	8370		-
Selenem		3 W		3 W	3 W		
Silver Sochen		8 U 48800	8 U 96100	8 U 89400	U 8 00488		
Thelian		2 W		2 W	2 14		
Venedum		6 U	6 U	6 U	6 U		•
Zhc	i	181	191	20.2	18.9		;
Cyanido		10 U	10 U	10 U	10 U		:
NATILE ORGANICE (1999)	Hotel Barrow Will 1			Alexandrian State			
Chieromethene	10 U		50 U	15 W	71 W	10 U	10 U
Brememothene	10 U		50 U	15 U	71 W	10 U	10 L
Vinyi Chieride	14	120	<b>50</b>	39 J	110 J	10 U	10 L
Charaothana Materiana Chiarida	10 U		50 U 17 U	15 U 31 U	71 W 180 U	10 U 10 U	10 L 10 U
Acatana	27	17 U	50 W	31 U 15 U	71 UJ	10 U	
Carbon Disulido	10 U		50 U	15 U	71 W	10 U	10 U
1,1-Cichlorosthane	24	72	190 J	220 J	400 J	10 U	7 1
1,1-Olchoraethene	120	200	120	120 J	270 J	10 U	12
1,2-OlcHorestene (Izial)	14	54	70	76 J	1 <b>30 J</b>	10 U	<u>ا</u> لب ا
Chievelorm	10 U		50 U	15 U	71 W	10 U	10 1
1,2-Ocherostane	1 J		50 U	15 W	71 W	10 U	10 L
2-Bulante	10 U		50 UJ	15 U	71 W	10 U	10 L
1,1,1-Trickloreethene Carbon Tobachlando		210	1900 J	2200	2700 J 71 UJ	10 U	10
Vind Active	10 U	I 17 U	50 U	15 U		10 U	10 L
Brunodchiorumatiene	10 U	J 17 U	50 U	15 U	71 W	10 U	10 U
1,2-Olchloropropune	10 U		50 U	15 U	71 W	10 U	10 L
cia-1,3-Olchioropropone	10 U		50 U	15 U	71 W	10 U	10 U
Trichloroethene	16	36	130	150	170 J	10 U	10 U
Dibramachiaramathane	10 U		50 U	15 U	71 W	10 U	10 L
1,1,2-Trichiorosthane	2 J		50 U	5 J	71 W	10 U	10 U
Bergene	10 U		50 UJ	15 W	14 J	10 U	10 U
Trans-1,3-OicHoropropens	10 U		50 U	15 U	71 W	10 U	10 L
Bremstom A Mathat & Destances	10 U		50 U	15 U	71 W	10 U	10 L
4-Mobyl-2-Persona 2-Haugeone	10 U		50 U	15 U	71 W 71 W	10 U 10 U	10 L 10 L
Telecitionations	10 U 10 U		50 U 25 I	15 U 17	24 J	10 U	1.
1,1,2,2-Tetactionotherne	10 U		25 J 50 U	17 15 U	71 W	10 U	10 L
Tokene	10 0		50 U	15 U	40 J	10 U	2.
Chiprobenzene	10 U		50 UJ 17 J	29 J	331	10 U	10 L
Elyberzene	10 0		50 UJ	15 W	71 W	10 U	10 0
Styrane	10 U		50 LU	15 W		10 U	10 נ
Total Xylanas	10 U		50 W	15 W		10 U	10 L

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## GROUNDWATER SAMPLES

Well 10	MW309	MW309	MW310	MW310	DUPWE MWB5A	MWB58
Sample Depth	103-105	1 <b>08'-11</b> 0'	82.5-84.5	87. <b>5-89</b> .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
EMI-VOLATILE ORGANICS (Jg/)	E					
Phenol	1	10 U	10 U	10 U	10 U	
bis (2-Chloroethyl) Ether	}	10 U	10 U	10 U	10 U	
2-Chiorophenoi		10 U	10 U	10 U	10 U	
1,3-Dichlorobenzene		10 U	10 U	10 U	10 U	
1,4-Dichlorobenzene	ļ	10 U	10 U	10 U	10 U	
Benzyi Alcohol			10.11	10.0	10.11	
1,2-Dichlorobenzene		10 U 10 U	10 U 10 U	10.0	10 U 10 U	
2-Methylphenol 2.2'-Oxybis(1-Chloropropane)		10 U	10 UJ	10 U	10 UJ	
bis (2-Chloroisopropyl) Ether	ĺ	10 0	10 05	10 0	10 05	
4-Methylphenol		10 U	10 U	10 U	10 U	
N-Nitroso-Di-n-Propylamine		10 U	10 U	10 U	10 U	
Hexachiomethene		10 U	10 U	10 U	10 U	
Nitrobenzene	1	10 U	10 U	10 U	10 U	
Isophorone		10 U	10 Ú	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		10 0			10 0	
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-Chioroaniline		10 U	10 U	10 U	10 LU	;
Hexachiorobutacliene		10 U	10 W	10 U	10 U	:
4-Chloro-3-Methylphenol		10 U	10 U	10 U .	10 U	:
2-Methylnephthelene		10 U	10 U	10 U	10 U	
Hexachiorocyclopentaciene		10 U	10 UJ	10 U	10 U	
2.4.6-Trichiorophenol		10 U	10 U	10 U	10 U	
2,4,5-Trichlorophenol		25 U	25 U	25 U	25 U	
2-Chioronaphthaiene		10 U	10 U	10 U	10 U	
2-Nitroaniline		25 U	25 U	25 U	25 U	
Gimethyl Phihalate		10 U	10 U	10 U	10 U	
Acenaphilitylene	1	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	
Acenaphihene		10 U	10 U	10 U	10 U	
2,4-Dinitrophenoi		25 UJ	25 UJ	25 UJ	25 U	
4-Nitrophenol		25 UJ		25 U	25 W	
Dibenzoluran		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-phenyletter		10 U	10 U	10 U	10 U	
Fluorene		10 U	10 U	10 U	10 U	
4-Nitroaniline		25 UJ	25 UJ	25 W	25 UJ	
4,6-Dinitro-2-Methylphanol		25 U	25 U	25 U	25 U	
N-Nitrosociphenylamine (1)		10 U	10 U	10 U	10 U	
4-Bromophenyl-phenylether		10 U	10 U	10 U	10 U	
Hexachiorobenzene		10 U	10 U	10 U	10 U	
Pentachiorophenoi		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	
Carbezole		10 U	10 U	10 U	10 U	
Di-n-Butylphthelate		10 U	10 U	10 U	10 U	
Fluoranthene		10-0	10 U	10 W		
Pyrene		10 U	10 U	10 U	10 U	
Butybenzylphthalate		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	

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#### ROTOFINISH SITE

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#### GROUNDWATER SAMPLES

Revelion: 3:11 PM, 10/20/93 (MASTER\_W.XLS)

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Well ID	MW309	100000	MW310	MW310	DUPWE MWB5A	MWB58
Sample Depth	105-105	105-110	12.5-84.5	87.5-89.5	(MM310-87 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 (1991)						
Dis (2-Ethylhaxyl) Philadala	1	10 U	15 U	10 U	10 U	
Di-n-Octof Philippine	i -	10 U	10 W	10 U	10 W	
Benzo (b) Fluoranthene		10 U	10 U	10 U	10 U	
Benzo (k. )Ruorenthene	ł	10 U	10 LU	10 U	10 U	
Benzo (a) Pyrane	1	10 U	10 U	10 U	10 U	
Indeno (1.2.3-cd) Pyrene		10 U	10 U	10 U	10 U	
Dibanzo (a,h) Anthracana		10 U	10 U	10 JU	10 U	
Benzo (g.r.,) Parylana	]	10 U	10 W	10 <sup>4</sup> UJ	10 U	
MOCA-	[	1 U	1 3	10	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 unveloble due to serious deficiencies in the analytes.
- UR Analyte was not detected but the results are unreliable due to serious deficiencies in the analytes.
- (1) cannot be separated from Diphenylamme
- \*\* 4,4"-Methytenebis 2-Chiero-andine; special analyte

Blank columns indicate that analysis for the compound was not performed.

## ANALYTICAL RESULTS ROTOFINISH SITE GROUNDWATER SAMPLES

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Well ID	MWB5C	MWB6	MWB7A	MWB7B	MWB7C	DUP	MWB8	S <b>B30</b> 1
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 (Hg/I))	<b></b>		· · · ·			na ann an Stateanna an Stateanna Stateanna an Stateanna an Stateann	an antique a	
Auminum	1							129 U
Animony								33 U
Araenic								5 U
Barium								48.7
Beryllium								1 U
Cadmium					1			4 U
Calcium Chromum								75400
Colbeit								4 U 6 U
Copper								6.3
iran								409
Leed								2.6 U.
Magnesium								23800
Manganese								85.9
Mercury								0.2 U
Nickel								9 U
Potneskam								2880
Selenium								4 U
Silver								5 U
Sodium								5740
Th <b>allum</b> Matada m							•	2 U.
Vanadum Zinc								3 U
<b>Cyanida</b>	1							14.5 U 10 U.
VOLATILE ORGANICS (191)								
Chioromethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyi Chioride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chiorosthane	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 W	13 J	10 UJ			10 W	17 J	10 U.
Carbon Disuilde	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, (-Dichlorosthane 1,2-Dichlorosthane (total)	41	10 U	10 U	10 U	10 U	10 U	10 U	L 8
	10 U	10 U 10 U	10 U	10 U	10 U	10 U	10 U	10 U
1.2-Dichiorosthane	10 U	10 U	10 U 10 U	44 10 U	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-Trichlorosthane	190	10 U	10 U	10 U	10 U	10 U	10 U	26
Carbon Tetrachioride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyi Acetate								
Bromodichioromethane	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-Dichioropropene	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
Dibramachiaramethene	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 Terre 4 & Dichierene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trans-1,3-Dichioropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromolorm	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone 2-Hexanone	10 U 10 U	10 U	10 U	10 U	10 U	10 U 10 U	10 U 10 U	10 U 10 U
Tetrachioroethene	10 U	10 U 10 U	10 U	10 U	10 U 10 U	10 U	10 U	10 U
1,1,2,2-Tetrachiorosthene	10 U		10 U	10 U	10 U	10 U	10 U	10 U
Tokene	2 J	10 U 2 J	10 U	10 U 1 J	10 U	10 U	10 U	10 U
Chiorobenzene	10 U		10 U			10 U	10 U 10 U	10 U
Elivibenzene	10 U 10 U	10 U	10 U	10 U	10 U	10 U 10 U	10 U	10 U 10 U
E stytene	10 U	10 U	10 U	10 U	10 U	10 U 10 U	10 U 10 U	10 U 10 U
•		10 U	10 U	10 U	10 U		10 U	10 U
Total Xylenes	<u>10 U</u>	<u>10 U</u>	10 U	2 J	<u>10 U</u>	<u>10 U</u>	10 0	10 0

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ROTOFINISH SITE

#### GROUNDWATER SAMPLES

#### Revision: 2:47 PM, 10/14/93 (MASTER\_W.XLS)

Well ID	MWBSC	ANDS	MWB7A	MW878	MWB7C	DUP	AWI98	S <b>830</b> 1
Sample Dapth	104.5-107 5	111.5-114 5	46.5-49 5	76.5-79.5	101.5-104.5	MWB7C-104.5		28-32
Date Collected	5/21/93	5/18/93	5/21/93	5/18/93	5/18/93	5/1893	5/21/93	7/9/91
SEMI-VOLATILE ORGANICS (ug/)						-		
Phenoi								10
bis (2-Chlorostiyi) Ether								10
2-Chierophenel								10 1
1,3-Dichiorobenzene								10 1
1,4-Olchiorobanzana Benzyi Alcohol								10 (
1.2-Olcharobenzene	1				2			10 1
2-Mathylphanci								10 1
2.2-Oxytem(1-Chicropropane)								10 1
bis (2-Chlorosopropyl) Ether								
4-Methylphend								10 1
N-Mirces-Ol-n-Propylamme	ſ			•				10 L
Heimchlorosthene				•				10 1
Neuberzene								10 1
ioophorene Commenter								10 l
2-Mirophanal 2.4-Dimatingkhanal								10 1
Bungan: Acid	ĺ							
bis (2-Chicrosthany) Mathema								10 L
2.4-Dichterephonel								10 L
1,2,4-Telcharabergene							-	10 L
Naghthalano								10 L
4-Chierounline							;	10 L
Henechlorebuladiene							1	10 (
4-Cidere-3-Mellylphensi							•	10 (
2-Mathylraphthalane								10 1
Hundhisrecyclepurindene								10 (
2,4,6-Trichlanghangi 2,4,5-Trichlanghangi								10 (
2-Chierengehthalane								25 I 10 I
2-Igreenine								251
Clemathyl Philippine								10 1
Acongetitytana								10 (
2.6 Obdretzkene				·				10 (
3-Mountine								251
Aconophithene								ا مالىپ
2.4-Cinitrophonal								25 (
4-Miscohenel								25 (
Olberzehren								10 (
2.4-Obitettikene								10 (
Diadhylphiliaine 4-Chlorophanyl phanylothar								10 1
Reserve								10 l 10 l
4-19-00-0								25 1
4.6-Obles 2-Mathylphanal								231
N-Hiscoodyhanylamine (1)								10 1
4-Bramaphanyi phanyisthar								10 1
Hexactionsbenzene								10 1
Pentachiorephonot								25
Phananthrana	P							10 1
Anthrecene								10 1
Carbazelo								10 1
Di-a-Butylphthubute								<b>10</b> I
Researchano								<b>10</b> (
Pyrene								10 (
Butythenzylphthetes								10
3,3-Dichierobenzidne								10
Benzo (a) Antivacene								10
Chrysens	-							10

## LTI - Limno-Tech, Inc.

## ANALYTICAL RESULTS ROTOFINISH SITE GROUNDWATER SAMPLES

MOCA\*\*

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Revision: 2:47 PM, 10/14/93 (MASTER\_W.XLS)

0.2 U

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Well ID	MWB5C	MWB6	MWB7A	MW878	MW87C	DÜP	MWB8	S <b>B301</b>
Sample Depth	104.5-107.5'	111.5-114.5'	46.5'-49.5'	76.5-79.5	101.5-104.5	MW87C-104.5	76. <b>5-79.5</b>	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 (491)	1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 - 1961 -	-				•	Letter e	े हे दुई दत्त
bis (2-Ethylhexyl) Phthalate	ſ							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					2			10 U
Benzo (g.h.i) Perviene	1							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.

## AMALYTICAL RESULTS ROTOFDIEN SITE

GROUNDWATER SAMPLES

Revelor: 11.31 AM, 10/15/93 (MASTER\_W.XLS)

Construint         27607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607         72607	Well (D	S8301	\$8302	S8302A	S <b>B303</b>	58303	S8303	S8304	S8304A
Constraint         Constraint <thconstraint< th="">         Constraint         Constrai</thconstraint<>	Sample Depth	53-57		60-64		23-25	28-30	21-23	19-21
Average in the interval of the interval int		7/10/91	7/16/91	7/22/91	7/26/91	7/26/91	7/26/91	7/30/91	7/ <b>30/9</b> 1
Amesons         Casulo         Salu	INORGANICS (µg/l))								N 1
Avenue         64         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U </th <th>Alumenum</th> <th>U 3.00</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>128 (</th>	Alumenum	U 3.00							128 (
Barytin         Bes 0         94.5         95.1         105         67.5         26.2         28.1         29.2           Contam         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0         4.0	Antemany	J 33 U							33
Samples         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U	Areanic	6.4	5 U						5 !
Calmann         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü         A Ü	Bendh	69.8							24
Constant         estato         Setto         Setto         Setto         Setto         Setto         Constant         AU	Berythan	_	1 U	1 U	1 U	1 U			1
Comparison         AU	Cadman	40	4 U	4 U	4 U	4 U	4 U	4 U	4 (
Commun.         6 U         7.9         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         6 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         8 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U <th2 th="" u<=""> <th2 <="" th="" u<=""><th>Calcham</th><th></th><th></th><th></th><th></th><th><b>A</b></th><th></th><th></th><th>68200</th></th2></th2>	Calcham					<b>A</b>			68200
Compare         4.7         5.9         4.0         13.0         22.2         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3         10.3 <th< th=""><th>Chromeen</th><th>40</th><th>-</th><th>_</th><th>-</th><th>-</th><th></th><th>_</th><th>4 (</th></th<>	Chromeen	40	-	_	-	-		_	4 (
mail         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128         128 <th>Colbelt</th> <th>6 U</th> <th>-</th> <th>6 U</th> <th>6 U</th> <th></th> <th></th> <th></th> <th>6 (</th>	Colbelt	6 U	-	6 U	6 U				6 (
Lamid         25 UU         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U         2 U <th2 th="" u<<=""><th>Copper</th><th>4.7</th><th>5.9 U</th><th>4 U</th><th></th><th></th><th></th><th></th><th>8.7 I</th></th2>	Copper	4.7	5.9 U	4 U					8.7 I
Imagenesisment         22800         28700         * feature         525         158         62.0         158         162         52.5         159         62.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.2.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0         0.0.0 <th0.0.0< th=""> <th0< th=""><th>l len</th><th>184</th><th></th><th>552</th><th></th><th></th><th></th><th></th><th>29.3</th></th0<></th0.0.0<>	l len	184		552					29.3
Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager Manager	Lead								2
Manual         0.2 U         0.2 U <t< th=""><th>Magnosium</th><th></th><th></th><th></th><th></th><th>-</th><th>-</th><th></th><th>19700</th></t<>	Magnosium					-	-		19700
Natural         9 U         97.1         9 U         11.2         11.5         9 U         9 U         6 U           Selenam         300         600         700         400         400         400         400         200         3000         2000         3000         2000         3000         2000         1100         600         3000         2000         1100         600         2000         1100         600         2000         1100         600         2000         1100         600         2000         1100         600         2000         1100         600         2000         1100         600         200         2000         11000         600         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         100         200         200         100         200         200         100         200         200         200         200         200         200         200	Manganase								42.7
Processon         3600         ccc0         7000         ecc0         3700         2800         2800         3000         2800         3000         2800         3000         28000         3000         28000         3000         28000         27000         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         500         7000         8000         27000         1000         200         1000         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200         200									0.2 1
State         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         4 U         2 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         5 U         2 U         2 UU									91
Su         SU<						-			
Andem         7750         50000         25000         37500         53000         27000         11000         8000           Tenham         2         UU         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         3         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U				-	-			-	-4
Tember         2 UU         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U         1 U <th1 th="" u<=""> <th1 th="" u<=""> <th1 th="" u<=""></th1></th1></th1>									5 (
Venedam         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U         3 U									
Desc         31.7         251         14.8 U         1800         344         463         435         160           Operate Character         70 UU         10							_		. – .
Openate         NOLL									
CALLE ORGANICS (up)         Subscription (up)         Subscripi         Subscription (up) <th< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th<>									
Catesensistere         10 U				RO UL					
Best service         NOU         NOU <t< th=""><th>Charles Charles and</th><th>· · · · · · · · · · · · · · · · · · ·</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	Charles Charles and	· · · · · · · · · · · · · · · · · · ·							
Weyl Chinkles         NOU         11         10 U         NOU         <			• =						10 1
Characterise         10 U	View Chinese			-					10 L
Matrixes Calends         16 U         10 U									10 1
Asseme         10 LU         10 LU         10 LU         10 LU         10 LU         15 J         10 U         10 U           Coben Dimities         10 U         10 U <th>Martine Charles</th> <th>-</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>10 1</th>	Martine Charles	-							10 1
Cates Divelia         10 U         10 U         10 U         10 U         20 U         10 U         20 U         10 U         10 U           1.1-Dickinsentene         10 U         2 J         10 U         9 J         15         12 J         10 U         10 U </th <th>Accesso</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>10 1</th>	Accesso								10 1
1.1-Obtimestane         10 U         2 J         10 U         9 J         15         12 J         10         10           1.1-Obtimestane         10 U         120         10 U         2 J         6 J         3 J         10 U         10           1.2-Obtimestane         10 U         10 U <th>Contrast Characteria</th> <th>1</th> <th></th> <th>-</th> <th></th> <th></th> <th></th> <th></th> <th>10 1</th>	Contrast Characteria	1		-					10 1
1.1-Dickinsestense       10 U       120       10 U       2 J       6 J       3 J       10 U       10 U         1.2-Dickinsestense       10 U       30 U       10 U									10 1
12-Dickierushane (MM)         10 U         38         10 U         10 U         1 J         20 U         10 U         10 U           Chinadam         10 U         10 U </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>10 1</th>									10 1
Chestern         10 U         20 U         10 U				_					10 1
12-Oldheventere         10 U         10 U         10 U         10 U         20 U         10 U         10 U         20 U         10 U         10 U         10 U         20 U         10 U         10 U         10 U         10 U         20 U         10 U	Chanter	1	-						
2-Dimension         Ye U	12-Oichingshape								
1,1,1-Titchisesethane       10 U       7 J       10 U       320 J       530       270       280 J       373         Castern Tetrachlande       10 U       10 U<	2-0-0000							-	10 1
Caster Tetrachteide         10 U         10 U </th <th>1.1.1-Trickingsthate</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>37</th>	1.1.1-Trickingsthate								37
Vinji Acetano         10 U         20 U         10 U		1							10 1
Duradchingenalises         10 U         10 U <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>									
1.2 Oldienspresen         10 U         10 U         10 U         10 U         10 U         20 U         10 U <th></th> <th>10 U</th> <th>10 U</th> <th>10 U</th> <th>10 U</th> <th>10 U</th> <th>20 U</th> <th>10 U</th> <th>10 (</th>		10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 (
cb-1,3-Okkingagane         10 U         10 U         10 U         10 U         20 U         10 U <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>10 (</th>									10 (
Tricklassestane         10 U         2 J         10 U         8 J         7 J         4 J         19         2           Dimensitivementane         10 U         10 U         10 U         10 U         10 U         10 U         20 U         10 U <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>10 1</th>									10 1
Obvense/datasenadare         10 U         10 U<									2.
1,1,2-Tickingsolupe       10 U	Devenación emotione								10 4
Burstene         10 U	1.1.2-Trickingeren								10 1
Trans-1.3-Olchlangragene         10 U         1		1							10 (
Densition         10 U	Trans-1,3-Olchiorepropene	1						10 U	10 (
4-Modyl-2-Perturane       10 U									10 1
2-Hammane         10 U									10
Tetrachloresthere         10 U         10 U <th>-</th> <th>1</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>10 1</th>	-	1							10 1
1,1,2,2-Tetechteresthere       10 U		1							1,
Telesine         10 U									10
Chlenbergene         10 U									10 1
Elliphonzono 10 U 10 U 10 U 10 U 10 U 20 U 10 U 10 U		1							10
Styrene 10 U 10									10
									10
									10 1

## ANALYTICAL RESULTS ROTOFINISH SITE GROUNDWATER SAMPLES

Well ID	S <b>B30</b> 1	S <b>B302</b>	SB302A	S <b>B303</b>	S <b>B303</b>	S <b>B303</b>	58304	S8304A
Sample Depth	53-57	105-110	60'-64'	18'-20'	23-25	28-30	21'-23	19-21
Dete 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 (ug/) Phenal					•			
bis (2-Chloroethyl) Ether	2 J	10 U 10 U	10 UJ	3 J	3 J	3 J	4 J	2 J
2-Chiorophenoi	10 U 10 U	10 U	10 UJ 10 UJ	20 UJ 10 UJ	20 UJ 10 UJ	20 UJ 10 UJ	20 U 10 U	20 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 03	10 UJ	10 UJ	10 00	10 0	10 0
Benzvi Alcohol								10 0
1,2-Dichlorobenzene	10 U	10 U	10 W	10 UJ	<sup>2</sup> 10 W	10 UJ	10 U	10 U
2-Methylphenol	10 U	10 U	10 W	10 UJ	10 W	10 W	10 U	10 U
2.2-Oxybis(1-Chioropropane)	10 W	10 U	10 UJ	10 UJ	10 W	10 UJ	10 UJ	10 UJ
bis (2-Chloroisopropyl) Ether								
4-Methylphenol	10 U	10 U	10 UJ	10 UJ	10 W	10 W	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 W	10 U	10 W	10 UJ	10 W	10 W	10 UJ	10 W
Hexachioroethane	10 U	10 U	10 W	ຸ 10 LU	10 W	10 UJ	10 U	10 U
Nirobenzene	10 U	10 U	10 W	10 UJ	10 W	10 W	10 U	10 U
Isophorens	10 U	10 U	10 W	10 UJ	10 W	10 W	10 U	10 U
2-Nirophenol	10 U	10 U	10 UJ	10 W	10 UJ	10 W	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 UJ	10 W	10 UJ	10 UJ	10 U	10 U
Benzoic Acid								
bis (2-Chlorosthoxy) Methane	10 U	10 U	10 W	10 UJ	10 UJ	10 W	10 U	10 U
2,4-Dichlorophenol 1,2,4-Trichlorobenzene	10 U 10 U	10 U	10 W	10 UJ	10 W	10 UJ	10 U	10 U
Nachthelene	10 U	10 U	10 W	10 UJ	10 UJ	10 UJ	10 U	
4-Chiorgeniine	10 0	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U ;	
Hexactionobutaciana	10 00	10 W 10 W	10 W	10 W	10 UJ	10 W	10 W;	
4-Chiaro-3-Methylahanal	10 U	10 00	10 W 10 W	10 UJ 10 UJ	10 UJ	10 W	10 U *	
2-Methylnephthelene	10 U	10 U	10 UJ	10 UJ	10 W 10 W	10 W 10 W	10 U <sup>3</sup>	
Hexachiorocyclopentacliene	10 U	10 U	10 03	10 03	10 UJ	10 W	10 U 10 U	10 U 10 U
2.4.6-Trichiorophenol	10 U	10 U	10 W	20 10	20 1	20 UJ	20 U	20 U
2.4.5-Trichlorophenol	25 U	25 U	25 UJ	20 UJ 20 UJ	20 UJ	20 UJ	20 U 20 U	20 U
2-Chioronaphthaiana	10 U	10 U	10 W	10 W	10 UJ	10 W	10 U	10 U
2-Nirceniine	25 U	25 U	25 W	10 00	10 00	10 00	10 W	10 10
Dirbelly/ Philalate	10 U	10 U	10 10	10 W	10 00	10 00	10 U	10 U
Acenechtiviene	10 U	10 U	10 UJ	10 00	10 00	10 00	10 U	10 U
2,6-Dinitrototuene	10 U	10 U	10 LU	10 W	10 00	10 00	10 U	10 U
3-Nirceniine	25 U	25 UJ	25 UJ	20 UJ	20 เม	20 W	20 1	20 เม
Acenephthene	10 U	10 U	10 UJ	10 W	10 UJ	10 W	10 U	10 U
2,4-Dinitrophenol	25 UR	25 U	25 UR	40 UJ	40 UJ	40 UJ	40 UJ	40 UJ
4-Nirophenol	25 ∪	25 UJ	25 UJ	10 UJ	10 UJ	10 W	10 WJ	10 UJ :
Dibenzoluran	10 U	10 U	10 W	10 W	10 W	10 W	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 W	10 UJ	10 W	10 W	10 W	10 UJ
Diethylphthalate	10 U	10 U	10 W	10 W	10 UJ	10 W	10 U	10 U
4-Chiorophenyl-phenylether	10 U	10 U	10 W	10 W	10 UJ	10 W	10 U	10 U
Fluorene	10 U	10 U	10 W	10 W	10 W	10 W	10 U	10 U
4-Nilroaniine	25 U	25 U	25 UJ	20 UJ	20 UJ	20 UJ	20 W	20 W
4,6-Diniso-2-Melhylphenol	25 U	25 U	25 W	30 W	30 W	30 W	30 U	30 U
N-Nirosociphenylamine (1)	10 U	10 U	10 W	10 UJ	10 W	10 W	10 W	10 UJ
4-Bromophenyl-phenylether	10 U	10 UJ	10 W	10 W	10 W	10 UJ	10 U	10 U
Hexachiorobenzene	10 U	10 UJ	10 W	10 UJ.	10 UJ	10 W	10 U	10 U
Pentachiorophenol	25 U	25 U	25 U	20 UJ	20 UJ	20 UJ	20 U	20 U
Phenenthrene	10 U	10 U	10 W	10 UJ	10 W	10 W	10 U	10 U
Anthracene	10 U	10 U	10 UJ	10 W	10 UJ	10 W	10 U	10 U
Carbazole Di a Di di di bibliologi	10 U	10 UJ	10 W	10 UJ	10 UJ	10 W	10 U	10 U
Di-n-Butylphthelete	10 U	10 U	10 UJ	10 W	10 W	10 W	10 U	10 U
Fluoranthene	10 U	10 U	10 W	10 UJ	10 W	10 W	10 W	10 W
Pyrene	10 U	10 U	10 W	10 UJ	10 UJ	10 W	10 U	10 U
Butylbenzylphthelate	10 U	10 W	10 W	10 W	10 W	10 W	10 W	10 W
3,3'-Dichlorobenzidine	10 U	10 W	10 W	10 W	10 W	10 W	10 W	10 W
Benzo (a) Antivacene	10 U	10 U	10 W	10 W	10 W	10 W	10 U	10 U
Chrysene	10 U	<u>10 U</u>	10 UJ	<u>10 W</u>	10 W	<u>10 UJ</u>	<u> </u>	<u>10 U</u>

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## AMALYTICAL REBULTS ROTOFDEEN SITE

## GROUNDWATER SAMPLES

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Well (D	S8301	S8302	SB302A	\$8303	S8303	S8303	S <b>B304</b>	SB304A
Sample Dapth	53-57	108-110	60'-64'	18-20	23-25	28-30	21-23	19-21
	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 (19/1)					•			
tus (2-Ethythaxyt) Phahalase	10'	10 W	10 W	10 W	10 W	10 W	i 10 U	10
Cl-a-Octyl Philippine	10 U	10 W	10 W	10 W	10 W	10 W	10 UJ	10 1
Banzo (b) Flucrandure	10 U	10 U	10 UJ	10 W	10 UJ	10 W	l 10 U	10
Bango (k. )Flucrandhano	10 U	10 U	10 UJ	10 W	10 W	10 W	J 10 U	10
Banzo (a) Pyrene	10 U	10 U	10 W	10 UJ	10 W	10 W	I 10 U	10
induno (1,2,3-cd) Pyrono	10 U	10 U	10 W	10 UJ	10 W	10 W	i 10 U	10
Obanzo (a,h) Antivacano	10 U	10 U	10 W	10 W	έ 10 W	10 W	l 10 U	10
Banzo (g.)) Perylana	10 U	10 U	10 W	10 W	10 W	10 W	l 10 U	10
MOCA-	02 U	0 <u>2</u> U	02 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2

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 finit is an estimated value.
- R Analyte was detected but the presence cannot be verified. The results are unreliable due to sensus deficiencies in the analytes.
- UR Analyte was not detected but the results are unreliable due to sensus deficiencies in the analyses.
- (1) cannot be separated from Diphenylamine
- \*\* 4,4-Mothylenebis 2-Chloro-aniline; special analyte
  - Blank columns indicate that analysis for the compound was not performed.

### ROTOFINISH SITE

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## GROUNDWATER SAMPLES

Well ID	S8305	S <b>B306</b>
Sample Depth	16-18	18-20
Date Collected	7/29/91	7/29/91
INORGANICS (µg/I))		
Aluminum	131 L	
Antimony	33 U	
Arsenic	51	•••
Barium Describert	10.8	78
Beryllium	1 4	
Cadmium Calcium	39800	95700
Chromium	41	
Colbert	61	
Copper	7.5 L	
Iran	25.1 L	
Lead	2.2	20
Magnesium	7650	28200
Manganese	22.6	940
Mercury	0.2 เ	J 0.2 U
Nickel	91	J 19.1
Potassium	1890	13500
Selenium	41	J 4U
Silver	5 L	
Socium	3310	47600
Thellium	2.1	
Vanadium	31	
Zinc	263	565
Cyanide VOLATILE ORGANICS (µg/I)	<u>10 L</u>	
Chipromethane	10 L	ມ 10 ເມ
Bromomethane	10 1	
Vinvi Chloride	10 1	+
Chiprosthane	10 1	
Methylene Chloride	10 0	
Acetone	10 נ	
Carbon Disulide	10 L	J 10 Ū
1,1-Dichloroethene	10 U	J 1.J
1,1-Dichloroethane	10 L	J 25
1,2-Dichloroethene (total)	10 L	J 2J
Chiorolom	10 נ	J 10 U
1,2-Dichloroethane	10 L	J 10 U
2-Butanone	10 L	
1,1,1-Trichloroethane	7 5	
Carbon Tetrachioride Virwi Acetate	10 L	J 10 U
Vinyi Acesan Bramodichiaramethene	10 נ	J 10 U
1.2-Dichioropropene	10 0	-
cie-1,3-Dichioropropene	10 1	
Trichioroethene	10 1	
Dibromochioromethene	10 1	
1,1,2-Trichlorosthane	10 L	
Benzene	10 (	J 10 U
Trans-1,3-Dichloropropene	10 t	J 10 U
Bromotorm	10 L	J 10 U
4-Methyl-2-Pentanone	10 L	
2-Hexanone	10 L	
Tetrachicrosthene	2.	
1,1,2,2-Tetrachiorosthane	10 L	
Toluene	10 L	
Chiorobenzene	10 (	
Ethylbenzene	10 \	
Styrene ·	10 (	
Total Xylenes	10 1	U 10 U

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**ROTOFILIEH SITE** 

#### GROUNDWATER SAMPLES

Well D	58305	S8306
Sample Dapth	16-18	18-20
Date Collected	7/29/91	7/29/91
SEMI-VOLATILE ORGANICS (JUD		
Phono:	10 U	10 U
bis (2-Chlorosthyl) Ether	10 U	10 U
2-Chierophenei	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U
1,4-Olchiorobenzene	10 U	2 J
Benzyl Alcohol		
1,2-Dichlorobenzene	10 U	10 U
2-Mathylphanol	10 U	10 U
2.2-Oxybis(1-Chloropropane)	10 W	10 U.
bis (2-Chiarasapropyi) Ether		
4-Mathylphanci	10 U	10 U
N-Nisceo-(II-n-Propylamine	10 U	10 U
Hemechanoethene	10 U	10 U
Missbangana	10 U	10 U
leopherene	10 U	10 U
2-Mirophanal	10 U	10 U
2,4-Dimetrylphenol	10 U	10 U
Benearc Acid		-
bis (2-Charbethany) Methane	10 U	10 U
2.4-Dichlarophanal	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U
Nephhelene	10 U	10 U
4-Chisrosofine	10 W	10 U.
Hemechlersbutediene	10 U	10 U
4-Chiere-3-blothylphonal	10 U	10 U
2-Mathylaghthalana	10 U	10 U
Himshierecyclopentaclene	10 U	10 U
2,4,8-Trictigraphenel	10 U	10 U
2,4,5-Titchterophenet	25 U	25 U
2-Chiarchegintheiene	10 U	20 10 U
2-Minanilae	25 W	25 W
Dimethyl Philadate	10 U	10 U
Acamaphiliptane	10 U	10 U
2.6-Obligation	10 U	_
3-100000000		10 U
Accessible	25 U	25 U
2.4-Distantianci	10 U	10 U
4-Nibeshansi	25 U	25 U
	25 W	25 W
Distantingen	10 U	10 U
2,4-Obdottatene	10 U	10 U
Diethylphthalate	10 U	10 U
4-Chlorophanyl-phanylather	10 U	10 U
Plusiene	10 U	10 U
4-Nivenine	25 U	25 U
4.6-Disto-2-Mathylphanol	25 U	25 U
N-Nibcoodyhanykumine (1)	10 U	10 U
4-Bremephanyl-phanyletter	10 U	10 U
Hemechandensen	10 U	10 U
Penlachtarophanol	25 U	25 U
Phoneneuro	10 U	10 U
Andresono	10 U	10 U
Carbazole	10 U	10 U
Di	10 U	10 U
Flatmanthene	10 U	10 U
Pyrane	10 U	10 U
Bulytoneyquitalate	10 U	10 U
3.3-Olcharoberzidine	10 U	
Banzo (a) Andreasano	10 U	10 U
Chrysene		10 U
	10 U	10 U

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## ROTOFINEH SITE

### GROUNDWATER SAMPLES

Well ID	SB305	S <b>B306</b>
Sample Dapth	16-18	18-20
Date Collected	7/29/91	7/29/91
SEMI-VOLATILE ORGANICS (µg/)	el de la compañía	
bis (2-Ethythexyl) Phthelate	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.

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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.

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APPENDIX C

Cost Estimate Spreadsheets for Removal Action Alternatives

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Alternative 1: Gro	oundwater Extraction, I	Discharge to Existing	Sewer, N	lo On-Site	Treatment
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Description	Unit	Unit Cost	Qty.	Lump Sum	Cest	Source/Notes
. Extraction System (2 Wells)				T T		
1.a. Subcontrectors						
Driller/Drill Crew	day	1500.00	4	1 1	\$6,000	Vendor
<u>1.b. Matenais</u>						1
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	1	\$72	Vendor
Filter Pack (Clean Sand)	bags	10.00	50	1	\$500	LTI
Bentonite	bags	10.00	45		\$450	LTI
Cement	bags	10.00	42		\$420	LTI
Pump (Grundfos 80550-5)	per es.	2200.00	2		\$4,400	Vendor
Pitless Adaptor	per ea.	150.00	2		\$300	Vendor
Concrete Menhole w/ Steel Lid	per es.	1000.00	2		\$2,000	Meens
1.5" sch. 80 PVC Piezometer	l.f.	2.00	220		\$440	Vendor
Bumper Guards (3" Steel)	per ea.	100.00	16 -		\$ 600	LTI
Gravel (for floor of manhole)	cu. vd.	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 ee.	650.00	2		\$1,300	Vendor
Pressure Transducer	per ea.	1000.00	2		\$2,000	Vendor
Electrical Conduit (1° Galv.)	I.f.	2.00	250		\$500	Means
Control Conduit (3" Gelv.)	l.f.	8.00	250		\$2,000	Means .
Transducer Cable	l.f.	1.75	600		\$1,050	Vendor :
Pump Controller System	per ee.	2500.00	1		\$3,000	
Steel Control Panel	per es.	350.00	1		\$350	Means
4'x4'x10' Pressure Treated	per. ea.	20.00	2		\$40	•
Misc Hardware		-	•		\$500	
. Containment System						
Not Applicable		•	-	•	-	
Treatment System						
Not Applicable		-	•		-	
Disposal/Conveyance/Discharge					-	
1.e. Subcontrectors						
General Contractor/Crew	hr	60.00	40		\$2,400	
Electrical Contractor	hr	40.00	40		\$1,600	
<u>1.b. Meteriele</u> Pipe (2° sch.80 PVC)	I.f.	2.00	800		\$1,600	Vendor
Elbows	per es.	8.50	10		\$85	Vendor
Coupiers	per es.	4.00	40		\$160	Vendor
Tee Connectors	per es.	115.00	3		\$345	Vendor
Check Valves	per es.	20.00	6		\$120	Vendor
		Total Direct	Conti	<u> </u>	\$35,346	

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Alternative	): (	Broundwater	Estrection.	Discharge to	E sistina	former.	. No On-	1 منافل	Treetment

Description	Unit	Unit Cost	Qity.	Lump Sum	Ceet	Accumptions Nistes
A. System Maintenance 1. Wells (Egulpment Maintenance)	tump			×	\$5,000	Bervice pumps and transducers, redevelop wells,
<ol> <li>Monitoring &amp; Sempling         <ol> <li>Monitoring &amp; Sempling             <ol> <li>Monithly KWNP Discharge Sampling</li></ol></li></ol></li></ol>	evant evant	540.00 60.00	12		\$800	City of Kalamazoo Salf monitoring parametera Filters, Bhipping, Field Equipment
Lab Coste Bampling Equip:/PPE/Disposables	event event	500.00 <b>50</b> .00			\$6,000 <b>\$60</b> 0	10 VOCs and 10 TALs per event
C. Discharge Fees 1. Discharge to Existing Sewer City of Portage Moter Charge Flow Charge	qtr. 1000 gat	44.40 1. <b>00</b>	4 52500			City of Portage Flow = 100 gpm, continuous operation
	-	Total Cost:			4107,168	

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Alternative 2: Groundwater Extraction, On-Site T	reatment w/ Carbon, Discharg	e to Existing	Sewer

Unit	Unit Cost	Qty.	Lump Sum	Cost ·	Soures/Notes
				1	
1					-
day	1500.00	4		\$8,000	Vendor
10' sec.	122.00	14		\$1,708	Vendor
10' sec.	152.00	8		\$1,218	Vendor
per ea.	38.00	2		. \$72	Vendor
bags	10.00	50	1	4500	ILTI
-	1	45		\$450	
-	10.00	42		\$420	ILTI
-		2		\$4.400	1-
		-			Vendor
		-			
					Vendor
				-	
1.5	í 1		1		Vendor
		_			Vendor
		-	1		
-		-	1		Vendor
1.		-		· -	
		-	1		1
					Vendor .
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per. ea.	20.00	2	} 1		
•	•	•	×	1500	•
	•	•		-	
1			1		
hr	60.00	40		\$2,400	Means
		•	X	\$1,000	Means
hr	40.00	20		1800	Means
			· ·		
.			l x l	\$115.000	Vendor
s.f.	2.00	400			Means
		-			
			1 2		
		-	x x	\$3,000	1
			l İ		1
	<u> </u>				
	60.00	40	1 I	\$2,400	iveans.
hr					
hr i hr	40.00	40		\$1,800	Means .
		40			
				\$1,600 \$1,600	
hr	40.00			\$1,600	
hr Lf.	40.00 2.00	800		\$1,600 \$85	Vendor
hr I.f. per ea.	40.00 2.00 8.50	<b>800</b> 10 40		\$1,600 \$85 \$160	Vendor Vendor
hr I.f. per ea. per ea.	40.00 2.00 8.50 4.00	<b>800</b> 10 40		\$1,600 \$85 \$160 \$345	Vendor Vendor Vendor
	Unit day 10' sec. 10' sec. per ea. bags bags per ea. per ea. l.f. per ea. cu. yd. per ea. l.f. l.f. l.f. l.f. l.f. l.f. l.f. per ea. per ea. per ea. per ea. per ea. l.f. l.f. l.f. l.f. l.f. per ea. bag e ea. per ea. l.f. l.f. l.f. l.f. per ea. l.f. l.f. l.f. per ea. l.f. l.f. per ea. l.f. l.f. l.f. l.f. per ea. l.f. l.f. l.f. per ea. l.f. l.f. l.f. per ea. l.f. l.f. l.f. l.f. l.f. l.f. l.f. l.	Unit Unit Cast day 1500.00 10' sec. 122.00 10' sec. 152.00 per ea. 36.00 bags 10.00 bags 10.00 bags 10.00 per ea. 2200.00 per ea. 150.00 per ea. 1000.00 Lf. 2.00 per ea. 650.00 per ea. 50.00 per ea. 50.00 per ea. 50.00 per ea. 2200.00 per ea. 350.00 per ea. 20.00 per ea. 20.00 per ea. 20.00 per ea. 20.00 per ea. 20.00 per ea. 350.00 per ea. 350.00 per ea. 350.00 per ea. 350.00 per ea. 350.00 per ea. 20.00 hr 80.00 per ea. 20.00	Unit         Unit         Qty.           day         1500.00         4           10' sec.         122.00         14           10' sec.         152.00         8           per ea.         36.00         2           bags         10.00         45           bags         10.00         45           bags         10.00         42           per ea.         2200.00         2           per ea.         1000.00         2           l.f.         2.00         2           per ea.         50.00         2           per ea.         20.00         2           l.f.         2.00         2           per ea.         350.00         1           per ea.         350.00         1           per ea.         350.00         1           per ea.         360.00         2           .         .         .	Unit         Unit         Qty.         Lump           day         1500.00         4         10' sec.         122.00         14           10' sec.         122.00         14         10' sec.         152.00         8           per ea.         36.00         2         50         50         50           bags         10.00         45         50         50         50           bags         10.00         42         50         2         50           bags         10.00         42         50         2         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50         50	Cost         Sum           day         1500.00         4         \$6,000           10' sec.         122.00         14         \$1,708           10' sec.         152.00         8         \$1,216           per ea.         36.00         2         \$72           bags         10.00         50         \$500           bags         10.00         45         \$4500           bags         10.00         42         \$420           per ea.         2200.00         2         \$44,400           per ea.         150.00         2         \$300           per ea.         1000.00         2         \$44,400           per ea.         1000.00         2         \$440           per ea.         100.00         6         -         \$600           cu. yd.         25.00         2         \$1300         \$6100           per ea.         1000.00         2         \$1300         \$6100           per ea.         1000.00         2         \$1,300         \$6100           per ea.         20.00         2         \$400         \$1,000           l.f.         1.75         6000         \$1,050         \$1,050

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## Alternative 2: Groundwater Entraction, On Site Treatment w/ Carbon, Discharge to Entring Sower

Description	Unit	Unit Ceet	City.	Lump	Cool	AssumptionsAletes
A. System Maintenance						
1. Wells (Equipment Maintenance)	- turno			l x	45.000	Bervice pumps and transducers, redevelop wells,
2 Carbon Treelment System	event	1000 00	24			Hackflushing, clean bag fillers
3. Carbon Change-Out	event	2 3000.00			\$253,000	
B. Monitoring & Sempling				[	а. — т	
1. Monthly KWNP Discharge Sampling						
Lab Coots	event	540.00	12		40,480	City of Kalemazoo Self monitoring parameters
Sampling Equip /PPE/Disposables	event	50.00	12			Filters, Shipping, Field Equipment
2. Munitily System Performance Sampling	1				ļ	
Lab Costs	event	500.00	12		\$6,000	10 VOCs and 10 TALs per event
Sampling Equip /PPE/Disposables	event	50.00	12		5000	
3. Bimonthly Carbon Monitoring						
Lab Costs	event	500.00	24		612,000	10 VOCs and 10 TALs per event
Sempling Equip./PPE/Disposables	event	50.00	24		\$1,200	•
C. Discharge Fees					· ·	
1. Discharge to Existing Sewer					1	
City of Portage Muter Charge	qur.	44 40	4		6178	City of Portage
Flow Charge	1000 eni	1.00	52560			flow = 100 gpm, continuous operation
l		Total Cost;			\$397,358	}

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ecription	Unit	Unit Cost	Qty.	Lump	Cost	Source/Notes
Extraction System	i					
1.a. Subcontractors						
Driller/Drill Crew	dav	1500.00	4		\$8,000	Vendor
1.b. Matenais					-	
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.	38.00	2	1 1		Vendor
Filter Pack (Clean Sand)	begs	10.00	50	l l	\$500	(LTI
Bentonite	bags	10.00	-45		\$450	
Cement	bags	10.00	42		\$420	ILTI
Pump (Grundfos 80850-5)	per ea.	2200.00	2		\$4,400	Vendor
Pitiess Adaptor	per es.	150.00	2		\$300	Vendor
Concrete Manhole w/ Steel Lid	per ea.	1000.00	2		\$2,000	Means
1.5" sch. 80 PVC Piezometer	1.1.	2.00	220		\$440	Vendor
Bumper Guards (3" Steel)	per ea.	100.00	6 1		\$ 800	LTI
Gravel (for Floor of Manhole)	CU. 70	25.00	2	{ }	\$50	Vendor
Throttling Valve	per ea.	50.00	2		\$100	
Flowmeter	per ea.	650.00	2	۱ ۱		
Sampting Valves	per ea.	20.00	2		140	Vendor
Pressure Transducer	per ea.	1000.00	2		\$2,000	Vendor
Electrical Conduit (1" Galv.)	1.1.	2.00	-		\$500	
Control Conduit (3" Galv.)	l.f.	8.00	250		\$2.000	Means
Traneducer Cable	1.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		-	Means
4'x4'x10' Pressure Treated	per. ea.	20.00	2		\$40	
Misc Hardware		•	•	×	1500	
Containment System Not Applicable			•		•	
T						ļ
Treetment System						1
1.a. Subcontractore		60.00	40		\$2,400	1
General Contractor	hr	80.00	40	x	\$1,000	Meane
Crane Contractor		40.00	•	<b>^</b>	\$1,000	Means
Electrical Contractor	hr	40.00	20	} }	1000	
1.b. Materials	1	Į				Needer
Low Profile Air Stripper					+8,500	Vendor
Concrete Pad (Slab on Grade)	s.f.	2.00	400		1800	Means
Plumbing	•		•	X	\$1,000	1
Electrical	1 - 1		•	X	\$1,000	1
Pretreatment Equipment	•	•	•	X	\$10,000	}
Pretreatment Housing		·	•		\$3,000	
Disposal/Cenveyanes/Discharge						
1.a. Subcontractors						l
General Contractor/Crew	hr	60.00	40	<u>ا</u> ا	\$2,400	
Electrical Contractor	hr	40.00	40		\$1,600	Means
1.b. Materials						
Pipe (2" sch.80 PVC)	I.f.	2.00	800			Vendor
Elbows	per ea.	8.50	10		185	Vendor
Coupiers	per ea.	4.00	40		\$180	Vendor
Tee Connectors	per ea.	115.00	3	1 1	\$345	Vendor
Check Valves	per ea.	20.00	6	1	¢120	Vendor

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

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

Description	Unit	Unit Coot	Gty.	Lump Ourp	Coot	Accumptions Motes
A. System Maintenance						
1. Wells (Equipment Maintenance)	Nimp	} 1		X	45,000	Service pumps and transducers, redevelop wells,
2. Air Stripper System	event	1000.00	•		\$6,000	
5. Monitoring & Sempling					<u> </u>	
1. Monthly KWNP Discharge Sampling					{	
Lab Costs	event	540.00	12	1	\$6,480	City of Kalamazoo Self monitoring parameters
Bempling Equip./PPE/Disposables	event	<b>50.00</b>	12		\$800	Filters, Bhipping, Field Equipment
2. Monthly System Performance Sampling	1				}	
Lab Costs	event	500 00	12		\$8,000	10 VOCs and 10 TALs per event
Gampling Equip /PPE/Dispessibles	event	60.00	12		\$400	
3. Air Stripper Monitoring					1	
Lab Costs	event	500.00	24		612,000	10 VOCs and 10 TALs per event
Sempling Equip./PPE/Disposables	event	50.00	24		\$1,200	
2. Discharge Fees				·	<b></b>	
1. Discharge to Existing Sewer	1	1			I	
City of Portage Meter Charge	etr.	44 40	4		4176	City of Portage
Flow Charge	1000 gal	1.68	52560		\$00,301	Flow = 100 gpm, continuous operation
		Total Cost:			1120,350	

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APPENDIX D

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Municipal Approval For Discharge And Treatment

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# CITY OF PORTAGE

TT19 South Westnedge Avenue • Portage, Michigan 49002

Department of Public Services

Telephone: (616) 329



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 sever is \$1.68 per 1,000 gallons.

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

Sincergly,

Robert Kimmer Utility Administrator

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

THE CITY OF



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 size. 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,

:

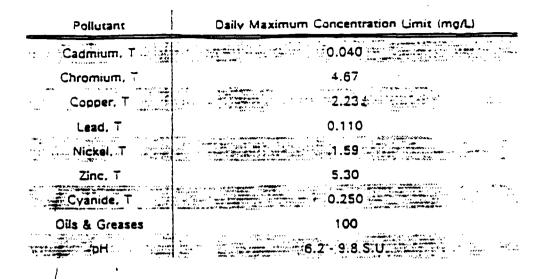
Y

2 5 motion

Kent Mottinger, Industrial Services Supervisor

c: Mr. Robert Kimmer, City of Portage

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



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

1. PCBs - no discharge allowed.

South Street Street

- 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).
- Pollutants which result in the presence of toxic gases, vapors, or furnes in a quantity that may cause worker health and safety problems for sewer workers or the general public.
- 8. Any trucked of 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

7719 South Vestnedge Avenue • Portage, Michigan 49002

Department of Public Services

Telephone: (616) 329



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 sever is \$1.68 per 1,000 gallons.

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

Sincerply,

Robert Kimmer Utility Administrator

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

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DEPARTMENT OF PUBLIC UTILITIE Water Reclamatic (415 N. Harrisc Kalamazoo, Michigan 49007-235 (616) 337-815 FAX (616) 337-869

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,

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Kent Mottinger, Industrial Services Supervisor

c: Mr. Robert Kimmer, City of Portage

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

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Pollutant	Daily Maximum Concentration Limit ImpAL				
Cadmium.	0.040				
Chromium.	4.67				
Cooper.	2.234				
Lesd. T	0.110				
Nickel	.1.59				
Zinc. T	5.30				
Cyanide.	- 0.250				
Oils & Greases	100				
-DH	-6.2 · 9.8 S.U				
<b>-</b>					

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.
- 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.
- X. 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 westewater treatment or which will pass through untreated.
- 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).
- Pollutants which result in the presence of toxic gases, vapors, or furnes in a quantity that may cause worker health and safety problems for sewer workers or the general public.
- 8. Any trucked of hauled pollutants except at the designated discharge point at the Kalamazoo Water Reclamation Plant.
- 9. Redioactive 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, incontaminated groundwater, unpolluted non-contact cooling water.

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

# ATTACHMENT E

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# **RESPONSIVENESS SUMMARY**

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

### I. <u>RESPONSIVENESS SUMMARY OVERVIEW</u>

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. <u>SUMMARY OF QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC</u> <u>COMMENT PERIOD AND U.S. EPA'S RESPONSES TO THESE COMMENTS</u>

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.

The Kalamazoo County Board of Commissioners expressed COMMENT: 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 The County recommends that U.S. EPA seriously consider to occur. 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<sup>1</sup>. 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

<sup>&</sup>lt;sup>1</sup>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.

The president of the Kalamazoo County Chamber of COMMENT: 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 iobs 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

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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

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