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DESIGN REPORT
METAMORA LANDFILL
DRUM REMOVAL OPERABLE UNIT

PREPARED FOR
MICHIGAN DEPARTMENT OF NATURAL RESOURCES

BY

E.C. JORDAN

FEBRUARY 1988

This design report was prepared in conjunction with the plans and specifications for the Metamora Landfill Drum Removal Operable Unit. The report is intended to provide a record of the background information and assumptions used to prepare the design. This is not an official bid document, nor is it meant to be used as one. Specific requirements for work to be performed in the drum removal are contained in the specifications and drawings.

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TABLE OF CONTENTS

Section	Title	Page No.
1.0	INTRODUCTION	1
2.0	SITE DESCRIPTION AND DESIGN CONSIDERATIONS.	2
	2.1 Metamora Landfill Site Description	2
	2.2 Remediation Guidelines	2
	2.3 Design Considerations.	4
3.0	NARRATIVE DESCRIPTION OF WORK TASKS.	8
	3.1 Job Site Administration.	8
	3.2 Mobilization and Site Preparation.	9
	3.3 Temporary Facilities	12
	3.4 Excavation and Handling of Waste Materials	13
	3.5 Transportation and Disposal.	16
	3.6 Storage Area Maintenance	17
	3.7 Collection, Handling, and Disposal of Contaminated Water.	17
	3.8 Demobilization	17
4.0	CONTRACT MANAGEMENT ORGANIZATION.	19
	4.1 MDNR Site Coordinator.	19
	4.2 Consulting Engineer and Other On-site Personnel.	19
	4.3 RA Contractor's Site Manager	21
	4.4 Health and Safety Officer.	21
5.0	SITE OPERATIONS PLAN.	22
	5.1 Contractor Quality Control Plan.	22
	5.2 Health and Safety Plan	23
	5.3 Air Monitoring Plan.	23
	5.4 Sampling and Analysis Plan	24
	5.5 Waste Excavation and Handling Plan	24
6.0	SITE LOGISTICS.	25
	6.1 Site Layout and Security	25
	6.2 Sequencing and Scheduling.	25
7.0	DESIGN CALCULATIONS	28
	7.1 Drum and Soil Quantity Estimates	28
	7.2 Drum Content Estimates	28
	7.3 Storage Area Estimates	32
	7.4 Fencing Requirements	32
	7.5 Storage Area Design.	34
	7.6 Transportation Requirements.	34

Appendix A Technical Memorandum, Test-pitting Operations,
December 1986

Appendix B Design Calculations

Appendix C USEPA Off-site Disposal Policy

Appendix D Onsite Borrow Gradation Results

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LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page No.</u>
1	PERMIT REQUIREMENTS	10
2	DRUM ESTIMATES.	29
3	VOLUME OF SOIL IN STAGING PADS.	30
4	DRUM QUANTITY ESTIMATES	31
5	DRUM CONTENT ESTIMATES FROM TEST-PITTING RESULTS.	33

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>	<u>Page No.</u>
1	EXISTING SITE CONDITIONS.	3
2	PROPOSED SITE LAYOUT.	11
3	WASTE HANDLING PROCEDURES	14
4	CONTRACT MANAGEMENT ORGANIZATION CHART.	20
5	POSSIBLE SCHEDULE FOR METAMORA DRUM REMOVAL OPERABLE UNIT.	27

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1.0 INTRODUCTION

This report describes how E.C. Jordan Co. (Jordan) developed the technical specifications and drawings for the drum removal operable unit at the Metamora Landfill Superfund site in Metamora, Michigan. The report consists of the following sections:

- o Site Description and Design Considerations. Briefly describes the site history, as documented in the Site Investigation Report, Phased Feasibility Study, and subsequent site data collected by Jordan and Michigan Department of Natural Resources (MDNR); it also discusses design assumptions.
- o Narrative Description of Tasks. Discusses the tasks required of the remedial action contractor (RA Contractor) to complete excavation, repackaging, storage, transportation, and ultimate disposal of both the drums and the associated waste-saturated soil.
- o Contract Management Organization. Suggests organization for coordinating on-site activities, including sampling, monitoring, health and safety operations, site maintenance, security, and job oversight.
- o Site Operation Plan. Describes each of the required site operations plans to be developed by the RA Contractor, prior to commencing actual site work.
- o Site Logistics. Describes the site layout, operating procedures, protection levels, sequencing, and schedule envisioned for this design.
- o Design Calculations. Records the information and calculations involved in estimating numbers of drums, volume of soil and associated debris, storage area requirements, schedule requirements, transportation, and disposal requirements.

This report presents the concepts involved in developing specifications for drum removal. It is not intended to be an operations manual for the site; rather, each section leaves the RA Contractor significant discretion to define appropriate operating procedures during the remedial action subject to approval by MDNR. This design report records the background information and assumptions used in preparing the specifications package.

2.0 SITE DESCRIPTION AND DESIGN CONSIDERATIONS

This section briefly outlines the Metamora Landfill site history, and highlights some of the principal considerations that affected its design.

2.1 Metamora Landfill Site Description

The Metamora Landfill is located in Metamora Township, Lapeer County, Michigan, approximately 0.5 miles northeast of Metamora village, and 20 miles east-southeast of Flint, Michigan. The site, which is a National Priorities List (NPL) Superfund Site, is an 80-acre closed landfill that accepted industrial and municipal waste between 1966 and 1980. The area was previously used for gravel mining, which accounts for the many steep excavation faces and borrow pits on the site. A gravel-mining operation continues immediately south of the site, and a licensed solid waste transfer station currently operates in the western portion of the site. Surrounding land use is both residential and agricultural.

The landfill began operating in 1966 as a privately owned, unregulated, open dump. In 1969, the landfill was upgraded to meet existing standards, and licensed to receive general refuse. Two fires at the landfill were documented in 1972 and 1979. The 1972 fire reportedly burned out of control for three days, perhaps fueled by waste materials in the landfill. Until its closure in 1980, the site reportedly accepted both municipal and industrial waste. No records have been discovered that indicate the former operator's disposal practices. However, it is likely that waste and drums were disposed in unlined excavations (former mining pits or borrow areas).

Previous site investigations centered on two suspected drum-burial areas (Figure 1). Area 1, located in an abandoned gravel pit, is estimated to contain as many as 5,500 buried drums, holding a variety of hazardous solids, liquids, and sludges. Area 4, located adjacent to the closed landfill, is estimated to contain as many as 2,000 buried drums. Jordan identified a number of hazardous compounds during drum-sampling activities performed for MDNR in December 1986. A summary of data from these test-pitting activities is presented in Appendix A.

2.2 Remediation Guidelines

On September 30, 1986, the United States Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) for the Metamora Landfill site, describing an initial phase of remediation. This phase, the drum removal operable unit, involves excavation of drums and waste-saturated soils in Areas 1 and 4, and disposal (as required) of excavated material at off-site incinerators that comply with the Resource Conservation and Recovery Act (RCRA) and/or the Toxic Substances Control Act (TSCA).

The policy of USEPA and MDNR requires that all hazardous material removed from the site be destroyed in a treatment or disposal facility that complies with provisions of RCRA and/or TSCA, as appropriate. For the purposes of this project, the policy requires that all waste containing greater than 50 parts per million (ppm) PCBs be taken to an incineration facility that complies with the requirements of TSCA and has demonstrated such compliance during a



FIGURE 1
EXISTING SITE CONDITIONS
METAMORA LANDFILL

EC.JORDAN CO

regularly scheduled inspection within the last six months. Waste that contains less than 50 ppm PCBs must be taken to a RCRA-compliant facility. Incinerable wastes (i.e., liquids, solids, sludges, and soils) must be disposed of at an incinerator that complies with RCRA and has demonstrated compliance during a regularly scheduled inspection within the last six months. Non-incinerable wastes (i.e., crushed drums, rocks, and debris) must be disposed of at a landfill that complies with the provisions of RCRA and has demonstrated such compliance during a regularly scheduled inspection within the last six months. Contaminated water must be disposed of at a RCRA-compliant treatment facility.

This policy outline is detailed in Appendix C. For the remainder of this report and within the specifications, the terms "RCRA-compliant" and "TSCA-compliant" will be used to denote the previously described facilities.

2.3 Design Considerations

To implement the remedial action described in the ROD, Jordan has prepared bid documents for excavating and repackaging the waste, with subsequent disposal at an off-site facility. The remedial action required in the drum removal operable unit consists of the following activities:

- o upgrading existing staging and decontamination facilities near each of the two on-site excavation areas at the site;
- o constructing a storage facility for on-site storage of containerized wastes;
- o excavating drums and waste-saturated soils in Areas 1 and 4;
- o staging and packaging the excavated materials;
- o temporarily storing packaged material in an on-site storage facility;
- o transporting packaged material to an off-site RCRA- or TSCA-compliant incineration facility;
- o disposing material in a RCRA- or TSCA-compliant incinerator;
- o backfilling the excavated areas with uncontaminated soils; and
- o dismantling and disposing of staging facilities.

MDNR will assume the lead role in coordinating and overseeing the drum removal action. Throughout the project, MDNR will review work plans and operating procedures, authorize site activities, and oversee excavation activities. Successful completion of the contract will require extensive coordination between the RA contractor, MDNR, and USEPA.

The remainder of this section outlines some of the important issues that helped shape the design. A series of conversations with commercial

Incinerator operators provided much of the input used to sequence the work. Other influencing factors included the ROD, and guidelines for storage of hazardous wastes specified in RCRA. Where assumptions were made by Jordan, they are described in this text. The specifications are written in a manner that provides sufficient latitude in some areas (e.g., waste excavation and handling) for the bidders to propose alternative approaches to accomplish the goals of this remedial action, provided these alternatives are approved by MDNR and USEPA.

Results of Conversations with Commercial Facility Operators

In a series of phone conversations with operators of commercial hazardous waste incineration facilities, Jordan and MDNR personnel documented several restrictions on acceptable types and volumes of wastes. The following list itemizes important considerations that influenced the design.

1. Inability or unwillingness of commercial facilities to accept metal drums. Of the facility operators contacted, most expressed an aversion to processing metal drums. To avoid limiting the facilities able to accept Metamora waste, MDNR decided to allow crushing or shredding of drums after removal of the hazardous contents. These drums must then be disposed of at a RCRA-compliant landfill.
2. Limitation on available capacity. Many of the facilities contacted currently operate at or near capacity, particularly for solid wastes and wastes containing PCBs. Several aspects of the design reflect this circumstance. Since capacity cannot be guaranteed at the rate of excavation, the design calls for a storage area to be constructed for temporary holding of repackaged solid wastes. The size of the storage area reflects the area necessary to store the solids once they have been repackaged. The design requires that the RA Contractor characterize, log, and properly label all wastes during repackaging to ensure acceptance at the incineration facility. The contractor must analyze the wastes for PCB content and separate both solids and liquids into PCB and non-PCB lots.
3. Limitations on wastes fed to incinerators. Each facility operator contacted described a series of limitations on handling solids. Most facilities required packaging of solids in incinerable containers, and several facilities limited the weight of the filled containers. For the purpose of this design, Jordan assumed the use of plastic waste containers. Section 7.3 describes the weight limitations and packing densities assumed in design calculations.

Responding to possible future limitations on commercial incineration capacity, this design provides for temporary storage of all solid wastes. To avoid the potential of long-term maintenance on this facility, MDNR requires the contractor to demonstrate that capacity is available at the appropriate RCRA and TSCA treatment, storage, and disposal facilities prior to final award of the contract. This capacity must be sufficient to accept all wastes within

three years of notice to proceed with site work. This notice will be given following approval of the contractor's Site Operation Plan.

Between the time when excavation and repackaging of wastes is completed and the end of the contract, the contractor is required to maintain the on-site storage facility and provide appropriate inspections, spill cleanup, and security.

Considerations Based on the ROD and RCRA Regulations

To accomplish the goals set forth in the ROD, this design proposes excavation, followed by temporary storage on-site, and eventual destruction at an off-site incinerator.

To minimize the chance of spreading contamination around the site, this design limited the areas of contamination (hot zones) to the current excavation areas, and staging and decontamination pads to be constructed under this contract. All other portions of the site are designated as "clean-zones," including the temporary storage facility.

Several steps were needed to reduce the spread of contaminants and meet the substantive RCRA requirements for storage facilities. First, all waste had to be repackaged in the staging area into leak-proof containers. Since commercial facilities do not have available capability to handle bulk shipments, the waste will require repackaging into small incinerable containers. For this design, plastic drums were chosen because they are acceptable at commercial incinerators and hold up well under harsh weather conditions. They are also approved by the U.S. Department of Transportation (DOT) for shipment of hazardous wastes. Therefore, excavated wastes will be repackaged into plastic drums for temporary on-site storage.

The second consideration imposed by RCRA storage requirements involves the level of control required for liquids as opposed to solids. While storage requirements for solids can be easily met at the Metamora Landfill site (i.e., proper drainage, impermeable containers), storage requirements for liquids are relatively strict (i.e., double liners, leak detection, and groundwater monitoring). These considerations resulted in a design that segregates liquids from solids and sludges. After compatibility testing, liquids must be bulked and shipped immediately to an incineration facility for disposal. Solids and sludges can be repackaged with appropriate absorbents (e.g., corn cob chips, sawdust) to soak up free liquids. These "solid" wastes can then be stored on-site in a storage facility.

Due to greater capacity limitations at PCB incinerators, a third design consideration involved segregation of wastes. All wastes will be analyzed for PCBs and characterized for a number of incineration parameters. The material will be separated into PCB material, non-PCB material (i.e., PCBs less than 50 ppm), and non-incinerable material (e.g., crushed drums, metal debris). PCB and non-PCB materials will be clearly labeled, stored in separate areas of the storage facility, and shipped as incineration capacity becomes available. All liquids will be bulked and shipped to appropriate incineration facilities as they accumulate. Non-incinerable materials will be shipped to a RCRA landfill

as they accumulate. Non-incinerable PCB contaminated materials will be shipped to a TSCA-compliant landfill.

To satisfy RCRA requirements, a storage facility was designed to divert rainfall away from the drums. Asphalt paving is proposed to control runoff and improve access for equipment during wet weather conditions. The storage facility includes chainlink fence designed to limit access. Containers will be palletized for ease in handling ease.

This design report describes the effects of these considerations and others on the specifications. The next section presents a narrative description of the major tasks involved in the operable unit.

3.0 NARRATIVE DESCRIPTION OF WORK TASKS

This section describes the tasks necessary to successfully complete the drum removal operable unit. Jordan structured these tasks to facilitate measurement and payment. The tasks described in this section include:

- o job site administration
- o mobilization and site preparation
- o construction of temporary facilities
- o excavation and handling of waste materials
- o transportation and disposal
- o storage area maintenance
- o collection, handling, and disposal of contaminated water
- o demobilization

The sequencing of work and the specific requirements for each task are further discussed in later sections of this report and in the design specifications.

3.1 Job Site Administration

This task, which covers both the initial organizational work and ongoing administration of the contract, involves work throughout the life of the project.

Following is a description of the distinct elements of this task:

- a. Preparation of Site Operations Plan. The RA Contractor prepares and submits a number of work plans and operating procedures as part of a Site Operations Plan. MDNR must approve this plan prior to commencing of any site work. The Site Operations Plan includes the following:
 - o a Health and Safety Plan
 - o a Contractor Quality Control Plan
 - o a Sampling and Analysis Plan
 - o an Air Monitoring Plan
 - o a Waste Excavation and Handling Procedures Plan
 - o an Erosion Control Plan
 - o a Spill Control Plan

- o a Transportation Spill Prevention and Response Plan
- o copies of permits required for transporting and disposing of waste

A list of permits required for this contract is presented in Table 1. Following submission of the Site Operations Plan, MDNR and USEPA will review the plan and recommend changes. Following approval of the plan, the notice to proceed with site work will be given.

- b. Site Security. From the beginning of mobilization, throughout the excavation and demobilization, the RA Contractor maintains a full-time security guard during non-working hours. The security guard provides protection for contractor equipment on-site and limits the potential for health and safety problems due to unauthorized access.
- c. Site Maintenance. The RA Contractor maintains the site for the duration of the contract, generally policing the area for garbage and debris, maintaining the designated boundaries between contaminated and clean zones, and regular disposing of garbage and sewage. The RA Contractor will make repairs to site equipment and facilities, maintain erosion control measures, and clean up any spills during transportation and storage of waste.
- d. Site Communications. The RA Contractor maintains two-way radio communication between the excavation area, the staging area, the contractor trailer, and the MDNR Site Coordinator whenever excavation activity occurs. Job site administration will be performed throughout the duration of the contract; payment for this item will be made on a monthly basis.

3.2 Mobilization and Site Preparation

After the work plans have been reviewed and approved by MDNR, the RA Contractor begins site preparation and mobilization of equipment. During mobilization, the RA Contractor will install utilities necessary to operate on-site without disturbing existing site operations at the gravel pit and transfer station.

The RA Contractor will prepare the site for excavation activities. A proposed site layout is shown in Figure 2. Existing roads will be improved as needed to support the traffic expected during excavation and removal operations. Access to Area 4 will require constructing a road with minimal earthwork and grading, around the eastern side of the transfer station enclosure. The large flat area at the northeastern corner of the fence provides a good location for trailers. Access to the storage facility and Area 1 will require improving the existing road used by the gravel operation, and widening the road to the Area 1 excavation and staging areas. The roads will require regrading, minor runoff diversion, and placement of gravel to support the truck and heavy

TABLE 1
METAMORA LANDFILL DRUM REMOVAL OPERABLE
PERMIT REQUIREMENTS

1) Transportation Permits

- a. Permit from Michigan DNR demonstrating that the transportation contractor is licensed to haul wastes present at the Metamora Landfill site
- b. Permits from other states in which the transportation contractor will be operating
- c. Local road permits required by Lapeer County and other applicable county governments.

2) Disposal Permits

These permits must demonstrate compliance with USEPA's off-site disposal policy, contained in Appendix C:

- a. RCRA permits for Storage, Treatment, and Disposal of Hazardous Wastes, and a report from the most recent inspection that demonstrates current compliance from the following facilities:
 - (1) RCRA incineration facility
 - (2) RCRA landfill facility
 - (3) RCRA water treatment facility
- b. TSCA Permit for Storage, Treatment, and Disposal of Hazardous Wastes and a report from the most recent inspection (within last six months) that demonstrates current compliance from the TSCA incineration facility
- c. Copies of current inspection reports will be provided to MDNR by the contractor throughout the job.

Note: The permits listed above may not represent a complete list of permits required; the RA Contractor will be responsible for identifying and acquiring all required permits.

equipment traffic. A flat area between the storage facility and the Area 1 excavation will be prepared for trailers.

The storage facility will be located on the eastern side of the site, north of the gravel pit and east of the access road. This area is currently somewhat uneven, with mounds of gravel and swales from the gravel operation. The area will be cleared and leveled with access provided to the road. Final elevation is not crucial, but drainage from the entire area must flow off the northern edge, through the swale leading to the abandoned gravel pits east of Area 1.

Field offices will be mobilized near the excavation areas. During excavation at each of the areas, the following facilities will be provided:

- o contractors' offices and a visitors' trailer
- o a field laboratory
- o a personal decontamination facility
- o port-a-johns
- o a solid waste dumpster

MDNR will provide its own office trailer for oversight of the RA Contractor's activities.

3.3 Temporary Facilities

Following site preparation, temporary facilities will be installed on-site. These facilities include decontamination pads adjacent to the existing staging pads at Areas 1 and 4, and a temporary storage facility. In addition, modifications will be made to the staging pads as necessary to support the expected activities during excavation and repackaging.

Adjacent to each of the existing staging pads, a concrete decontamination pad will be constructed. This pad will be used to decontaminate both plastic drums as they leave the staging pad and vehicles loaded with metal, debris, and bulk liquids. Pressurized water or steam will be used for decontamination. The pad is designed to collect the decontamination water in a sump, and to pump the water into a collection tank.

The storage facility will be constructed of asphalt on the clear space prepared during mobilization activities. The asphalt will be sloped to drain into the swale north of the storage facility. Asphalt was selected for its ease of installation and low cost. The paved area will facilitate traffic during the loading and unloading of palletized drums.

The staging pads currently in place near Areas 1 and 4 are both approximately square, 125 feet on a side. The staging areas were constructed with an impermeable plastic liner and geofabric, a 6-inch layer of sand, a second impermeable liner with geofabric, and a top layer of mixed sand and gravel. These areas are bermed and sloped to one corner. During construction of

temporary facilities, the RA Contractor will improve these areas to accommodate the repackaging activities. Improvements may include adding more gravel, improving drainage, installing a sump to improve collection of contaminated rainfall, and expanding access to the excavation area. All temporary facilities will be installed before excavation begins.

3.4 Excavation and Handling of Waste Materials

The RA Contractor will excavate, classify, repackage, label, log, and transport all waste materials to the on-site storage facility. During these activities, an exclusion zone will be established around the staging, excavation, and decontamination areas. All personnel within this zone are required to be using Level B protection. A complete set of necessary excavation and handling equipment will operate within this zone; it will not leave the zone without undergoing decontamination.

The RA Contractor will begin the excavation by stripping off surficial soils that overlie the drums, and stockpiling these soils to one side. Once the drums have been uncovered, the excavation crew will remove all drums, drum fragments, and waste material encountered in the excavation. The MDNR Site Coordinator will establish limits of the excavation. During the excavation activities, MDNR may direct that soil samples in and around the excavation be collected for analysis to supplement the site's remedial investigation. Samples of drum contents may also be requested. The sampling activity is expected to occur on an intermittent basis throughout the excavation activities. The RA Contractor will collect these samples at the request of MDNR. Following removal of contaminated debris, the stockpiled overburden will be replaced in the excavation, compacted to reduce settlement, and sloped to drain away from the excavation site.

Following excavation, the contaminated material will be moved to the staging area. Any leaking drums will be moved in a container designed to confine the spillage. All other material will be stored in the staging area prior to compatibility testing. A flow chart showing the waste and handling procedures for each category is presented in Figure 3.

All material removed from the excavation will be classified as either drums, soil, or debris. Payment on these items will be made separately. A drum is considered to be any drum or drum fragment that is at least 50 percent intact. The RA Contractor will be paid per drum for excavation. The RA Contractor will be paid on the basis of weight for excavation of contaminated soil. All non-incinerable material, drum fragments, and metal debris will be separated and stockpiled with the crushed metal drums for disposal at a hazardous waste landfill. The RA Contractor will be paid on the basis of weight for excavating these materials.

An excavated drum log will be maintained to record the number of drums excavated, the condition of each drum, and the contents.

Prior to emptying the drums, the contents will be screened for PCBs. All drum contents with PCB concentrations exceeding 50 ppm will be handled separately. After logging and PCB screening, the drum contents will be repackaged into

**DRUMMED
HAZARDOUS
MATERIALS**

**NON
INCINERABLE
MATERIALS**

**SOILS AND
STAGING AREA
MATERIALS**

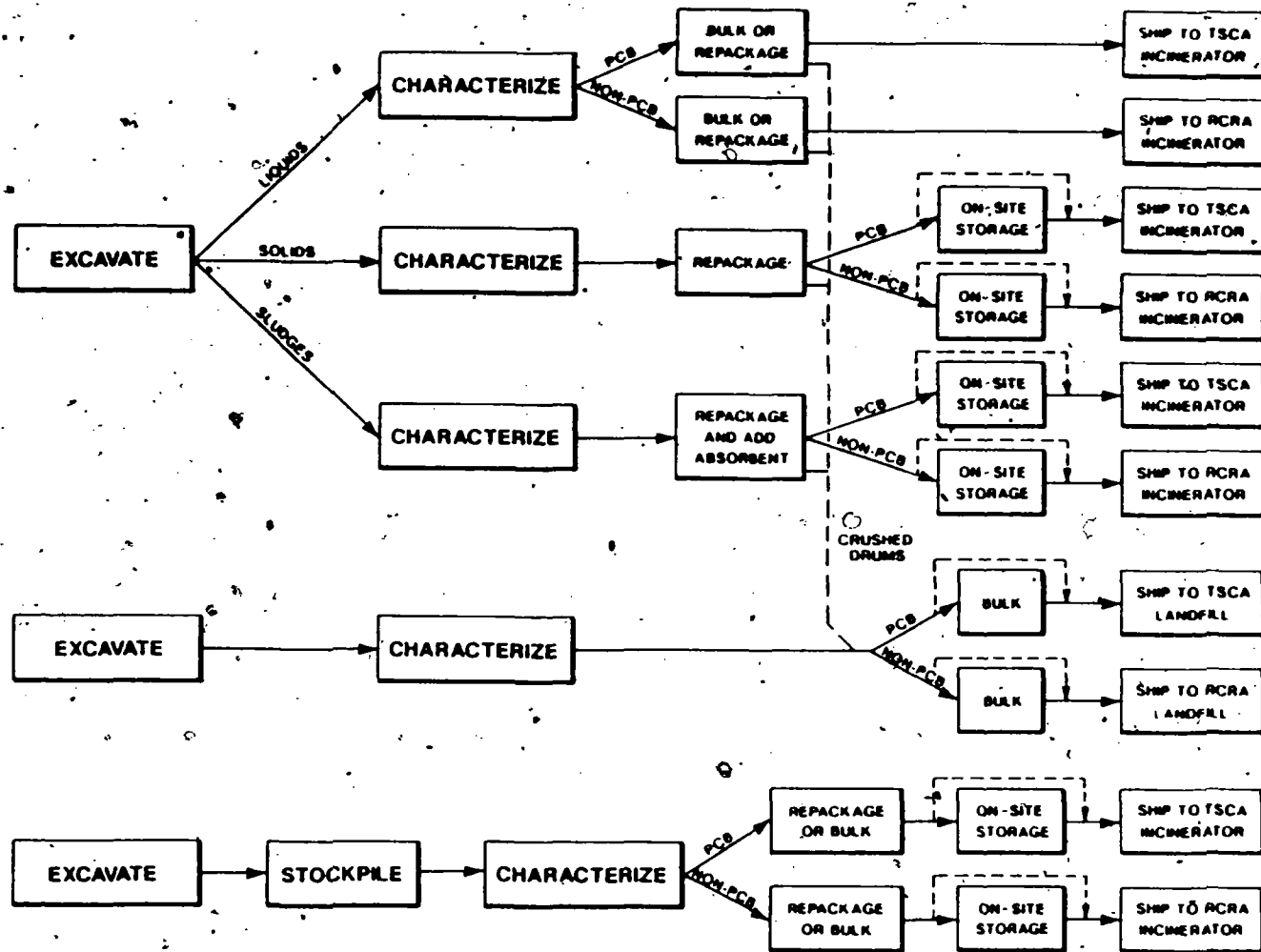


FIGURE 3
WASTE HANDLING PROCEDURES
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incinerable containers. Drums containing liquids will be pumped out into tanks or vacuum trucks following compatibility testing. These liquids will be transported off-site to a RCRA- or TSCA-compliant disposal facility as the tanks become full. Drums containing sludge or solids will be emptied using shovels, hydraulic rams, or other appropriate methods.

Sludges will be solidified using an absorbent material (e.g., corn cob chips and sawdust) that must absorb all free liquids prior to repackaging. The solids and solidified sludges can be packed in bulk containers or plastic drums for transport and storage on-site. The design has been developed assuming the materials will be packaged in 16-gallon plastic drums. Prior to sealing the containers, a representative sample will be screened for incineration parameters. Additional samples will be collected at the direction of MDNR. The outside of the containers will then be decontaminated, moved out of the exclusion zone, weighed on a calibrated scale, loaded onto pallets, and transported to the storage area using clean equipment. Each repacked drum will be recorded in a log with the following notations: its identification number; results of PCB screening, compatibility testing, and screening for incineration parameters; location in storage area; and weight. All drums will be labeled as to contents, complying with requirements of RCRA and TSCA. Material containing PCBs will be handled in a similar fashion, but the final drums will be labeled with PCB-identification labels and stored in a separate area of the storage facility.

After removing waste from the excavated drums, each empty metal drum will be crushed and stockpiled in a roll-off container. Drums that contain material with PCBs greater than 50 ppm will be placed in a separate roll-off container. During the excavation, if other non-incinerable material is encountered, it will be placed into the roll-off containers with non-PCB drums. As these roll-offs become full, they will be removed from the site and taken to an appropriate landfill. Material with PCBs greater than 50 ppm will be taken to a TSCA-compliant landfill. Material with PCB content less than 50 ppm will be taken to a RCRA-compliant landfill. These landfills will be identified in the bid. Payment for excavation, transport, and disposal of these items will be based on the weight receipt from the landfill.

Contaminated soil will be excavated as directed by MDNR. Soil will be screened for PCB content, prior to packaging, then packed into plastic drums and sampled for incineration parameters. Plastic drums containing soils will be stored with the other drums, and each drum will be labeled in compliance with RCRA and TSCA requirements. Drums containing soils with PCBs greater than 50 ppm will be labeled and stored with other PCB wastes.

When work is underway in the excavation and repackaging zone continuous, real-time air monitoring will be conducted in accordance with the Air Monitoring Plan.

Once the RA Contractor has completed the excavation and placed the backfill, the staging area will be dismantled and sand and gravel from the staging area placed into drums. Liners will be cut and placed into drums. The RA Contractor will handle these drums in a manner similar to the drums of contaminated soil.

Throughout the period of excavation, all water that collects on the staging pads, excavations, or decontamination pads will be pumped into containers and sampled. This contaminated water will be shipped to a RCRA-compliant, off-site treatment facility for disposal.

The plastic containers in the storage area will be stacked on pallets and bound together using metal bands or other methods. The pallets will be stacked two high and placed in rows on the paved surface. Drums containing PCB material will be clearly marked and stored in a separate part of the storage area.

All protective clothing and other materials contaminated by site personnel will be packaged in drums and treated with the incinerable solids.

3.5 Transportation and Disposal

Transportation and disposal of repackaged waste materials will be carried out during the excavation period and after excavation is complete. Material that cannot be incinerated (e.g., crushed metal drums, metal debris, large cobbles) will be placed in trucks or bulk containers and transported off-site as it accumulates. The RA Contractor will take this material to a RCRA-compliant or TSCA-compliant landfill for disposal.

The RA Contractor will test liquids pumped from drums during excavation for PCB content, compatibility, and appropriate incineration parameters. Liquids that are compatible will be bulked together in a vacuum truck or in storage tanks on-site. The RA Contractor will transport these storage tanks, when full, to an off-site incinerator. PCB liquids (over 50 ppm PCBs) will be taken to a TSCA-compliant incinerator, while non-PCB liquids (under 50 ppm PCBs) will be taken to a RCRA-compliant incinerator. In no case will liquid storage containers remain on-site for more than 90 days.

Any solids and sludges that cannot be accepted as liquids (due to high viscosity or other limiting factors) will be solidified and stored on-site. Appropriate solidification agents include sawdust, crushed corn cobs, kitty litter, or other absorbents that are amenable to incineration. Absorbents used by the RA Contractor will be approved by MDNR prior to application. They will be added to soak up any free liquids associated with sludges or semi-solid wastes.

As incineration capacity becomes available, during and after the excavation phase, solids stored in drums or bulk containers will be shipped off-site. In no case will any of the repackaged solid waste material remain on-site beyond the end of the contract. All drums labeled as PCB material will be taken to a TSCA-compliant incinerator. All drums labeled as non-PCB material will be taken to a RCRA-compliant incinerator. The RA Contractor will be responsible for preparing the waste manifest for each shipment of material. A representative from MDNR will sign the completed manifest prior to shipment.

The RA Contractor will follow DOT guidelines during transport of all hazardous materials. The RA Contractor will demonstrate that the transportation

subcontractor and all vehicles used to transport the wastes comply with applicable local, state, and federal regulations. •

The disposal facilities (i.e., RCRA landfill, TSCA landfill, TSCA incinerator, RCRA incinerator) will be identified in the bid. Capacity will be documented by the RA Contractor prior to the final award of the contract. Prior to shipment of any waste to a facility, the RA Contractor will demonstrate that the facility currently complies with all local, state, and federal regulations.

Transportation and disposal costs will be paid by the weight of material taken off-site. Transportation and disposal rates will be fixed in the contract.

3.6 Storage Area Maintenance

During the time between the end of excavation and the final waste material shipment from the site, the RA Contractor will maintain the storage area and roadways to the area. Maintenance includes weekly inspections to ensure that the fence and gate are in satisfactory condition and that no spills have occurred. If any problem is detected during these inspections, the RA Contractor will report it to MDNR and immediately act to rectify it. Payment for storage area maintenance will be made monthly after the excavation is completed.

3.7 Collection, Handling, and Disposal of Contaminated Water

During the excavation and repackaging phase, all water collected from the open excavation, staging areas, and decontamination pads will be taken to an off-site disposal facility. This water will be collected using sump pumps and stored in on-site storage tanks. The tank's contents will be sampled when full, then transported to an approved RCRA-compliant treatment facility. The RCRA-compliant treatment facility will be identified by the RA Contractor in the bid. In no case will a tank of contaminated water remain on-site more than 90 days. The RA Contractor will provide proof that the treatment facility complies with all local, state, and federal regulations prior to shipping any water.

3.8 Demobilization

The demobilization portion of the contract will occur in two phases. After the excavation is complete and both staging areas have been packaged and moved to the storage area, the RA Contractor will clean the decontamination pads using stiff brushes, detergent, and water. The decontamination pads will be left in place on-site. The site will be policed for any debris left by the RA Contractor, and all packaged materials will be labeled and placed in the storage area. The RA Contractor will remove trailers and temporary facilities that were mobilized for this contract.

The second phase of demobilization will occur after the last drums of waste material are trucked off-site. At this point, the RA Contractor will again police the area to remove any trash that may have collected during use of the storage area. The paved storage area, fence, and concrete decontamination

pads will be left intact. The storage area will be cleaned of any spill residue or other debris (which will be disposed of appropriately).

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4.0 CONTRACT MANAGEMENT ORGANIZATION

During handling of any hazardous wastes, proper site management provides the most important control over the work quality and safety of on-site personnel. This section details the management structure envisioned for the Metamora Drum Removal Operable Unit Contract. A possible management organization is diagrammed in Figure 4. This section discusses the important positions in the management of this contract, and the interrelationships between those positions.

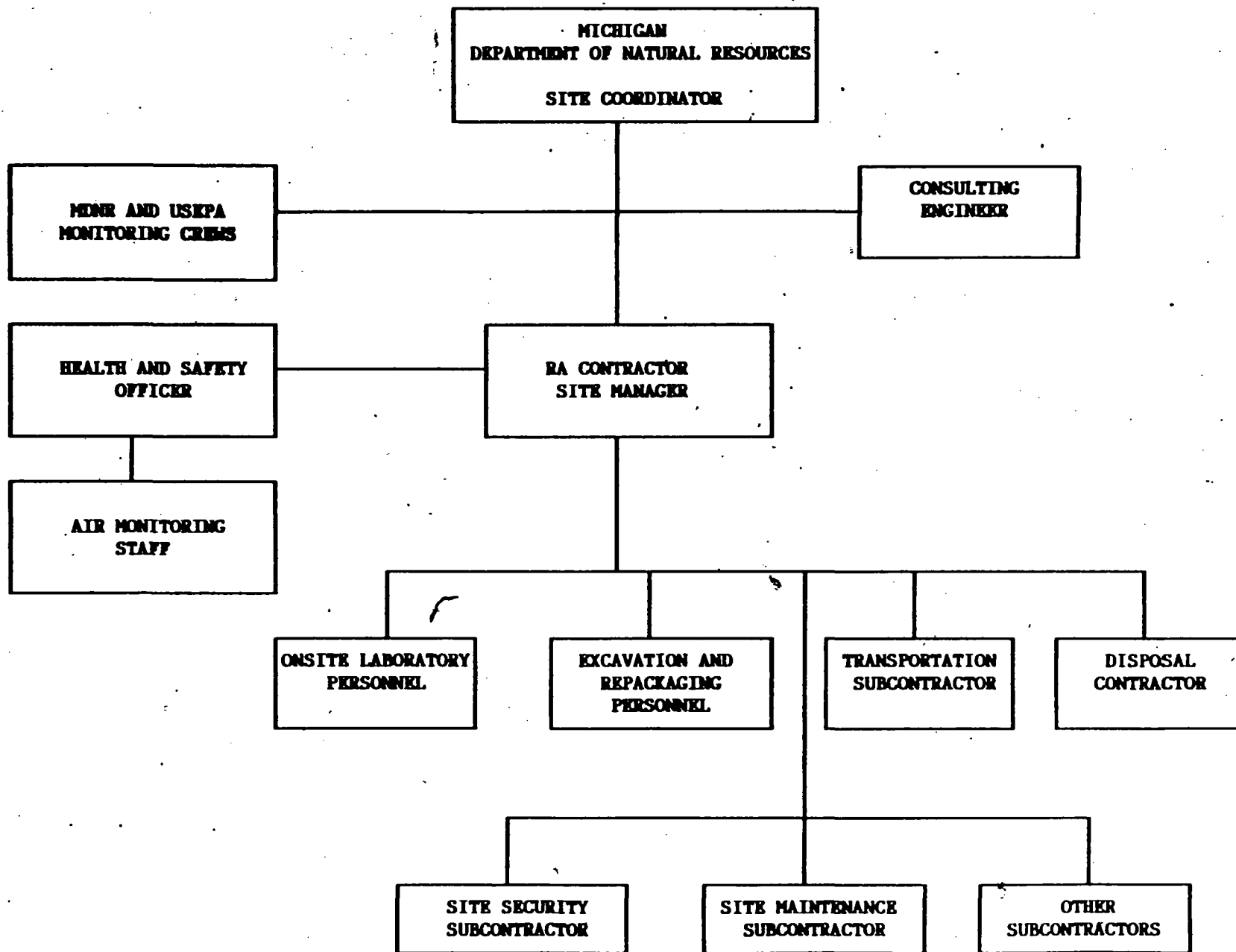
4.1 MDNR Site Coordinator

The MDNR representative on-site will act as Site Coordinator. Throughout the excavation and repackaging stages, an MDNR representative will be on-site. The Site Coordinator organizes the work daily and is the principal point of contact for monitoring and interpreting the contract. The Site Coordinator has the following responsibilities:

- o serves as the primary contact for the RA Contractor's Site Manager, coordinating communication between MDNR and the RA Contractor, and interpreting MDNR policy at the site;
- o controls decisions to stop and start work based on information received from the Consulting Engineer, the Site Manager, the monitoring crews, and the Health and Safety Officer;
- o interprets the contract and issues directions to the RA Contractor. The Site Coordinator ensures that the RA Contractor's activities follow the Health and Safety Plan, the Contractor's Quality Control Plan, and other work plans;
- o determines the extent of soil excavation between and beneath the excavated drums;
- o reviews daily progress logs and all payment requests;
- o attends all progress meetings; and
- o coordinates the activities of MDNR, USEPA, and other visitors to the site.

4.2 Consulting Engineer and Other On-site Personnel

During progress of the cleanup, a variety of people may be on-site to assist the Site Coordinator. These people may include a Consulting Engineer to oversee construction activities, and sampling personnel to validate the RA Contractor's air monitoring program and collect data for other investigations. Any personnel on-site that are not directly under the control of the RA Contractor's Site Manager will report to the MDNR Site Coordinator, who is responsible for coordinating activities with the RA Contractor's Site Manager.



4.3 RA Contractor's Site Manager

The RA Contractor's Site Manager coordinates all activities required under the terms of the contract. The Site Manager represents the primary contact between MDNR and the personnel working on-site. Performance, quality control, and job oversight are the primary concerns of the Site Manager, whose duties include the following:

- o assist in preparing of all work plans;
- o attend the kick-off meeting and all subsequent progress meetings;
- o prepare the daily logs and complete payment forms;
- o oversee all contractor site activities;
- o mediate disputes between subcontractors and represent the subcontractors to MDNR;
- o consult with the Site Health and Safety Officer on decisions to start and stop work on-site;
- o ensure that site personnel abide by the contractor's terms and conditions;
- o represent the contractor in change-order negotiations;
- o update and revise work plans, as necessary; and
- o ensure that project progress conforms to the project schedule.

4.4 Health and Safety Officer

The Site Health and Safety Officer has primary responsibility for carrying out the Health and Safety Plan (HASP). This plan includes considerations for level of protection, air monitoring, spill control, and evacuation procedures. The Health and Safety Officer reports to the RA Contractor's Site Manager.

In cases where the air quality contaminants exceed certain limits as established in the HASP, or when a potential threat to the safety of site workers exists, the Health and Safety Officer is required to report directly to the MDNR Site Coordinator so that appropriate action may be taken. In the event of an imminent threat to the safety of site personnel, however, the Health and Safety Officer is authorized to take immediate action as deemed appropriate, and shall report such actions to the MDNR Site Coordinator immediately thereafter.

5.0 SITE OPERATIONS PLAN

Prior to beginning any site work, the RA Contractor will develop a Site Operations Plan that includes several work plans. This section describes the content and purpose of these work plans. The RA Contractor will develop detailed contents of these plans in accordance with the outlines in the specifications.

5.1 Contractor Quality Control Plan

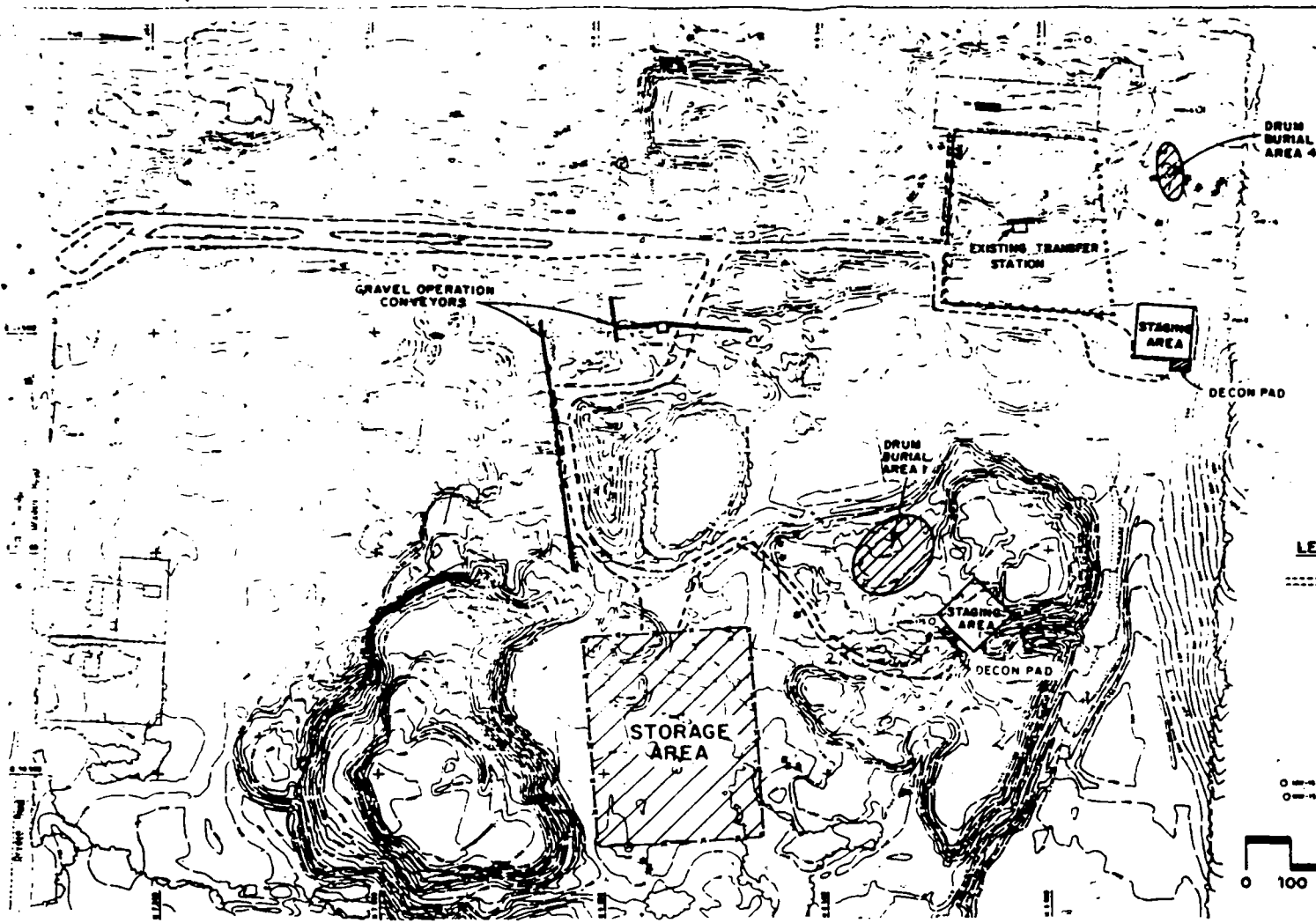
The RA Contractor must develop a plan that outlines quality control procedures followed at the site. A quality control staff must be designated to carry out the plan by conducting inspections, selecting appropriate quality control tests, and overseeing the testing and documentation procedures.

Specific parts of the contractor's quality control plan include the following:

- o provide for a pre-construction coordination meeting to discuss the quality control system review procedures, test methods, documentation procedures, and inspections;
- o designate the quality control staff and present an organizational chart depicting the responsibilities and authorities of each person;
- o describe appropriate test methods to verify that work products conform to contract requirements (specific areas of concern include concrete decontamination pads, staging areas, storage area, and excavation backfill);
- o initiate an inspection procedure for each major work element, including a preparatory inspection to review contract requirements and schedule, an initial inspection of materials and workmanship, a follow-up inspection to ensure continuing compliance with quality control standards, and a completion inspection to document the quality of the final product; and
- o develop a system to document the quality of all on-site work progress.

Documentation procedures are particularly important to the contractor quality control plan. The documentation must provide current records of all quality control testing and evidence that required testing has been performed. Results of the tests must be recorded in an easily accessible format.

Finally, the quality control plan must provide for correction of work determined to be defective or deficient. The plan should present specific procedures and timetables for bringing non-conforming work into compliance with contract requirements.



LEGEND

----- ROADS TO BE USED BY CONTRACTOR



FIGURE 2
PROPOSED SITE LAYOUT
METAMORA LANDFILL
 EC.JORDAN CO.

5.2 Health and Safety Plan

The RA Contractor will develop a HASP to guide the activities of personnel on-site. This plan will pay particular attention to safety-related concerns and will specify procedures for minimizing the risks of the various on-site activities. This plan will be required reading for all personnel at the site. The RA Contractor will be required to provide certifications that on-site personnel have read the plan.

Specific elements of the HASP should include the following:

- o site description, including known hazards and potential hazards;
- o proposed Health and Safety organizational chart;
- o site-operating procedures for tasks involved in the project;
- o training requirements and evidence of training for on-site personnel;
- o medical monitoring program requirements and evidence of personnel participation;
- o required levels of personal protective equipment for each task;
- o decontamination procedures;
- o procedures for handling wastes generated on-site; and
- o a plan for controlling contaminated and clean zones, with site maps designating these areas.

In addition to these elements, the HASP will designate a Health and Safety Officer who will have primary responsibility for implementing the plan, informing site personnel of changing conditions, updating the HASP as needed, and starting and stopping on-site work.

The HASP will include a Contingency Plan to be implemented in case of a site emergency. This plan will define specific limits that require plan implementation and describe test procedures for determining these limits. The plan will describe the coordinated effort required by site personnel, MDNR, and emergency response personnel in case of an emergency.

5.3 Air Monitoring Plan

The RA Contractor will prepare a plan to conduct air monitoring at the excavation area and at the perimeter of the site. This plan will designate an air monitoring expert and describe procedures used to collect and analyze samples. Data recording procedures will be outlined.

The plan will describe procedures for on-site air monitoring within the excavation area whenever personnel are working there. This monitoring will

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include both continuous real-time monitoring for total volatile organics and full-shift air sampling to be analyzed for certain organics.

The plan will include provisions for perimeter monitoring. The perimeter air monitoring program will include real-time monitoring for volatile organics and monitoring for specific organic compounds. The Air Monitoring Plan will include a provision for the Health and Safety Officer to notify MDNR immediately if detectable concentrations of volatile organics are migrating off-site.

5.4 Sampling and Analysis Plan

The Sampling and Analysis Plan is intended to provide direction for classifying waste before shipping to an off-site treatment and disposal facility. This plan will outline appropriate parameters and test methods for determining these parameters. Examples of information required to characterize the waste include ash content, moisture content, chlorine content, BTU value, and heavy metals screening. The waste will also be screened for PCBs and separated into PCB- and non-PCB-containing wastes. The Sampling and Analysis Plan will specify test methods for each characterization, as well as a location for the testing (e.g., on-site laboratory, off-site contract laboratory). The RA Contractor will provide reporting forms for logging the analysis results and assigning the proper results to the appropriate waste container.

5.5 Waste Excavation and Handling Plan

The RA Contractor will provide a Waste Excavation and Handling Plan that describes the personnel, equipment, and procedures that will be used to excavate drums, move drums to the staging area, sample drums, empty drums, repack the contents into incinerable containers, crush the empty metal drums, and decontaminate the incinerable waste containers.

This plan will specify the methods for handling liquid and solid wastes, and will describe procedures for adding absorbents to solidify sludges. The RA Contractor will provide a layout of the excavation and staging areas showing proposed locations for stockpiling clean soil, dirty soil, excavated drums, and repackaged drums. The RA Contractor will specify types of equipment that will be used and number of required personnel.

6.0 SITE LOGISTICS

This section discusses some of the logistical considerations used in this design and suggests an excavation sequence that may be appropriate at the site.

6.1 Site Layout and Security

To reduce the spread of contaminants, the exclusion zone (hot zone) is limited to the current staging areas and excavation areas. The design allows for two sets of operations; one within the exclusion zone that includes all the equipment and personnel for excavation, handling, and containerizing waste materials; and a second in the operating area, outside of the contaminated zone, to store and transport the containerized waste. Between the two operating areas, a decontamination pad will be constructed to decontaminate waste containers and any equipment leaving the contaminated zone. This pad will be constructed from concrete to withstand the continuous traffic and to facilitate collection of decontamination wash water.

Security for the site will be provided both during and after working hours. During working hours, all personnel entering the site will be required to sign in at the RA Contractor's trailer before reaching the excavation areas. This will control traffic on the roads into excavation areas and limit interference with on-site activities. After working hours, the site will be patrolled by a security guard to discourage vandalism and unauthorized entry. After the excavation and repackaging operation have been completed, the storage area fence will be locked to discourage access.

Communications at the site will be controlled by two-way radio hookups that will be maintained between personnel at the excavation, staging area, RA Contractor's trailer and the MDNR Site Coordinator. This communication system will help reduce response time in the case of an emergency.

6.2 Sequencing and Scheduling

This section presents a possible sequence for excavation activities and a proposed schedule for completion of the contract.

The sequence of on-site work will be determined by the RA Contractor. The following sequence is suggested by the design considerations included in this report:

1. Contractor submits work plans, followed by MDNR approval.
2. Mobilization including site preparation, utility installation, road improvements, earthwork required for the temporary storage facility, establishment of on-site offices, and laboratories.
3. Construct temporary storage area and concrete decontamination pads.

4. Excavate drums in Area 4, including sampling, characterizing, repackaging, decontaminating, and moving repacked material to a temporary storage area.
5. Excavate and package staging-area materials for Area 4.
6. Ship liquids off-site for incineration.
7. Decontaminate concrete pad.
8. Move trailers and monitoring instrumentation to Area 1.
9. Excavate drums in Area 1.
10. Excavate and package staging-area materials for Area 1.
11. Ship liquids off-site for incineration.
12. Decontaminate concrete pads.
13. Secure temporary storage area.
14. Demobilize excavation equipment.
15. Continue transporting containerized solids off-site for destruction.
16. Close temporary storage facility.

A proposed schedule for this sequence of events appears in Figure 5.

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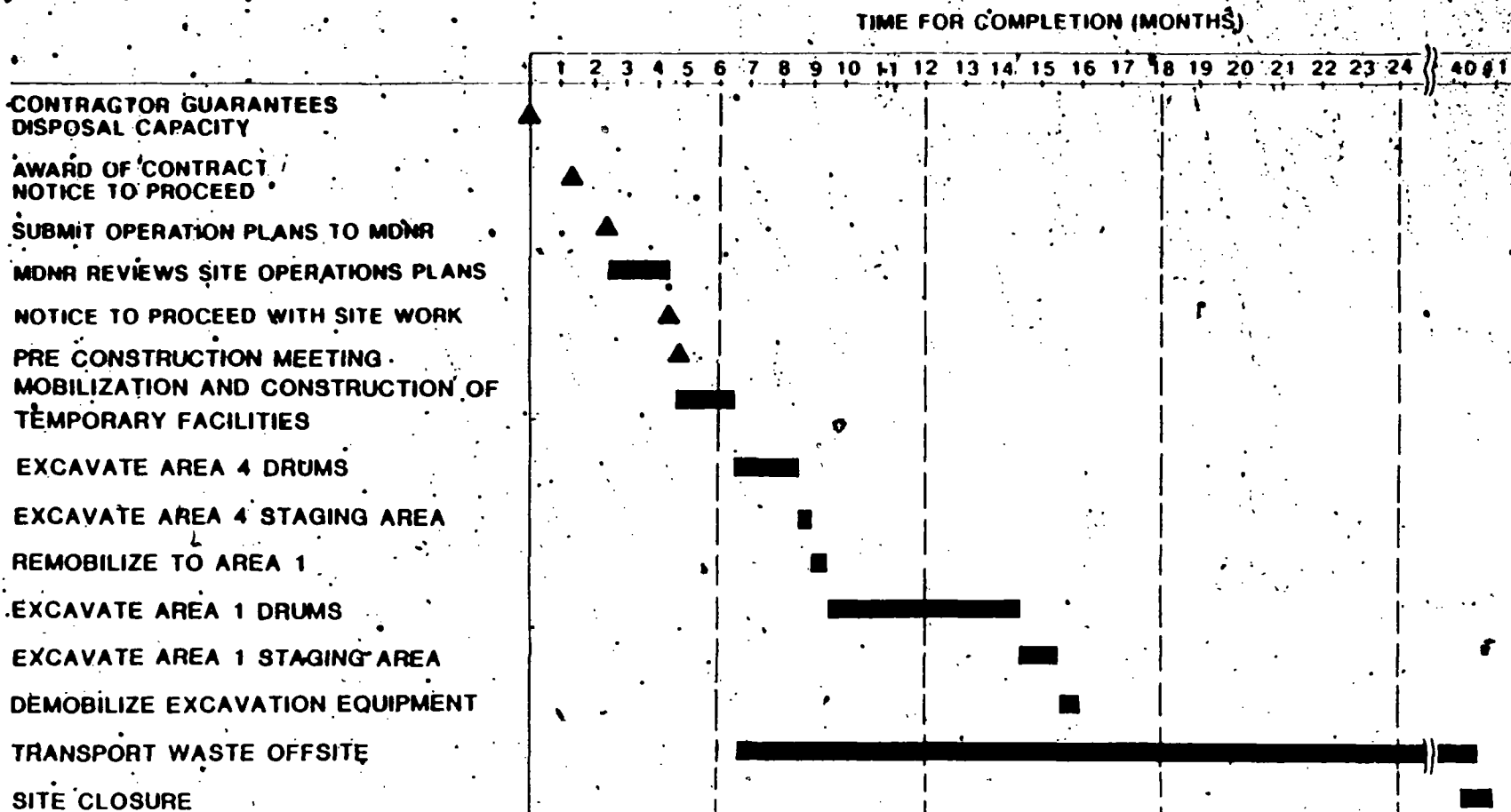


FIGURE 5
POSSIBLE SCHEDULE FOR METAMORA DRUM REMOVAL
OPERABLE UNIT

ECJORDANCO

7.0 DESIGN CALCULATIONS

This section presents calculations used in determining volumes of wastes, excavation and earthwork requirements, size of the temporary storage area, and time required for contract implementation. Detailed calculation sheets and cost-estimate calculations are presented in Appendices B and C, respectively.

7.1 Drum and Soil Quantity Estimates

The quantity of drums and amount of soil to be repackaged during the design are estimated by applying a factor of safety to the estimates derived from field test numbers. These field values are presented in the technical memorandum from test pitting contained in Appendix A. The test pit estimates and the values used for the design are presented in Table 2.

The safety factor value used in the design is approximately 50 percent higher than the field estimates. This higher value was directed by MDNR during the design process.

A second assumption was made to estimate the volume of saturated soil that would be removed during excavation of the drums. For the purpose of design estimates, MDNR directed that the saturated soil would equal the volume of the excavated drums. This volume equals 55 gallons per drum, multiplied by an estimated 7,500 drums, or 412,500 gallons (2,040 cubic yards) of soil.

Soil used to construct the staging area represents the other major portion of material to be packaged and disposed. The volume of material was estimated using the dimensions of the staging area and the depth to the second liner. The soil volume in each area is summarized in Table 3.

7.2 Drum Content Estimates

The analyses of drum contents performed in conjunction with the test-pitting operations were used to estimate the quantities of each waste class. Results of waste analyses showed that 20 percent of the drums sampled contained PCBs. These drums were further classified as solids, sludges, or liquids. Table 4 summarizes the calculations used to estimate the quantities of waste and soils excavated from each area. The following assumptions were used in these estimates:

- o Twenty percent of the excavated drums contained PCBs in excess of 50 ppm.
- o Each drum of waste was 75 percent full.
- o Sixteen-gallon plastic drums would each hold 15 gallons of waste or soil.
- o Sludges would be mixed with absorbents that increase the volume by 50 percent.

TABLE 2
METAMORA LANDFILL DRUM REMOVAL OPERABLE UNIT
DRUM ESTIMATES

	Number of Drums	
	Test-Pitting Estimate	Design Value
Area 4	1380	2000
Area 1	<u>3600</u>	<u>5500</u>
Total	4980	7500

Estimates based on Technical Memorandum from Test Pitting contained in Appendix A.

TABLE 3
METAMORA LANDFILL DRUM REMOVAL OPERABLE UNIT
ESTIMATED VOLUME OF SOIL IN STAGING PADS

	Approximate Dimensions	Estimated Depth	Total Volume (ft ³)
Area 1	120' x 117'	1'	14,040
Area 4	120' x 135'	1'	<u>16,200</u>
Total			30,240.

TABLE 4 DRUM QUANTITY ESTIMATES
METAMORA LANDFILL DRUM REMOVAL OPERABLE UNIT

Type of Waste	Quantity ¹	Unit Volume ² (gallons)	Total Volume (gallons)	Processed Volume ³ (gallons)	Container Type ⁴	Container Volume (gallons)	Number of Containers
Area 1							
Drums - PCB							
Solids	627	41.25	25,864	25,864	Plastic Drum	15	1,725
Liquids	77	41.25	3,176	3,176	Tank Truck	5,000	1
Sludges	396	41.25	16,335	24,503	Plastic Drum	15	1,634
Drums - Non-PCB							
Solids	2,508	41.25	103,455	103,455	Plastic Drum	15	6,897
Liquids	308	41.25	12,705	12,705	Tank Truck	5,000	3
Sludges	1,584	41.25	65,340	98,010	Plastic Drum	15	6,534
Saturated Soil ⁵	5,500	55	302,500	302,500	Plastic Drum	15	20,167
Staging Pad ⁶	14,040ft ³	7.48	105,019	105,019	Plastic Drum	15	7,001
Area 4							
Drums - PCB							
Solids	140	41.25	5,775	5,775	Plastic Drum	15	385
Liquids	52	41.25	2,145	2,145	Tank Truck	5,000	1
Sludges	208	41.25	8,580	12,870	Plastic Drum	15	858
Drums - Non-PCB							
Solids	560	41.25	23,100	23,100	Plastic Drum	15	1,540
Liquids	208	41.25	8,580	8,580	Tank Truck	5,000	2
Sludges	832	41.25	34,320	51,480	Plastic Drum	15	3,432
Saturated Soil ⁵	2,000	55	110,000	110,000	Plastic Drum	15	7,333
Staging Pad ⁶	16,200ft ³	7.48	121,176	121,176	Plastic Drum	15	8,078

Notes:

- 1 The number of drums in each category is based on the results from test-pitting; 20% of all drums are assumed to contain PCBs.
- 2 Each drum is assumed to be 75% full.
- 3 Processed volumes are the same as excavated volumes for liquids and solids. Processed volumes for sludges are assumed to be 50% higher than excavated volume due to addition of absorbent material.
- 4 Containers are 16-gallon plastic drums filled with 15 gallons of material, and 5,000-gallon tank trucks.
- 5 Saturated Soil Volume is assumed to be equal to the total volume of excavated drums.
- 6 Staging pad volumes were presented in Table 3, quantities are in ft³.
- 7 Estimated quantities and ratios taken from Test Pitting Memorandum contained in Appendix A.

- o Saturated soils would equal the volume of the excavated drums if the drums were full.
- o Drum contents were similar to those encountered during the test-pitting operation (Table 5) with regard to percentages of solids, liquids, sludges, and PCB levels.

The total number of repackaged plastic drums from both areas is 65,584. In addition to these drums, 26,606 gallons of liquid will be shipped off-site in bulk tank trucks.

7.3 Storage Area Estimates

The size of the storage area required to store the repackaged containers was calculated using the following assumptions:

- o All waste will be stored in the storage area prior to shipping off-site; a total of 65,587 16-gallon plastic drums.
- o Nine drums will be placed on each 4-foot-by-4-foot pallet.
- o The pallets will be stacked two high.
- o Each row of pallets would be two pallets wide and 300 feet long.
- o Rows of pallets would be separated by aisles in the following manner:
 1. double-wide row of pallets;
 2. 4-foot-wide inspection aisle;
 3. double-wide row of pallets;
 4. 16-foot-wide equipment access aisle; and
 5. repeat steps 1 through 4.
- o The entire storage area would be surrounded by a 15-foot minimum buffer between the drums and the fence.

Using this arrangement, the storage area will require an area of 163,200 ft², arranged in 50 rows of 300-foot length. The dimensions of the storage area will be 480 feet by 340 feet.

7.4 Fencing Requirements

The length of fence required to surround the storage area is 1,890 feet of fence including three 20-foot gates. The fence will be a 6-foot chainlink fence.

TABLE 5
DRUM CONTENT ESTIMATES FROM TEST-PITTING RESULTS
METAMORA LANDFILL DRUM REMOVAL OPERABLE UNIT

	Area 1	Area 4
Solids	57%	35%
Liquids	7%	13%
Sludges	36%	52%

Note: Percentages based on Test Pitting Memorandum contained in Appendix A.

7.5 Storage Area Design

Construction materials for the storage area include a subbase and an asphalt layer. Onsite borrow materials may be suitable for use in constructing the storage area. Results from analyses performed on soils in the proposed storage area location indicate that these materials may not be suitable for use as a base course. Results of these analyses are contained in Appendix D.

7.6 Transportation Requirements

For transportation of wastes to an off-site disposal site, the following assumptions were used:

1. Non-incinerable material will be placed in roll-off containers and transported to a RCRA landfill. Each roll-off container will contain 5 tons of material; a total of 175 tons (34 loads) will be shipped off-site.
2. Liquids will be shipped in 5,000-gallon tank trucks.
3. Drums of repackaged waste will be loaded onto flatbed trucks. Twenty pallets (180 drums) will be placed on each truck. Trucks with PCB wastes (26 loads) will travel to a PCB incinerator, while trucks with non-PCB wastes (339 loads) will travel to a RCRA incinerator.

APPENDIX A

TECHNICAL MEMORANDUM
TEST-PITTING OPERATIONS

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TECHNICAL MEMORANDUM NO. 2

PROJECT: Contract No. 1525, Metamora Landfill Site
Remedial Investigation/Feasibility Study

SUBJECT: Pollutant Characterization - Task 13

PREPARED BY: Kim Kasler-Arnold / E.C. Jordan Co. (Jordan)

INTRODUCTION

The purpose of this Technical Memorandum is to describe the Pollutant Characterization Task which took place at the Metamora Landfill Site during December, 1986. This work was performed as part of the Metamora Landfill Site Remedial Investigation/Feasibility Study (RI/FS) for the Michigan Department of Natural Resources (MDNR) under Contract Agreement No. 1525. With minor modifications, this task was performed as described in the Metamora Landfill Site Work Plan and the Quality Assurance Project Plan (QAPP).

In 1982 (prior to the initiation of the RI/FS) a magnetometer study was conducted at the Metamora Landfill Site by MDNR which identified five areas of anomalous magnetic readings. The sources of three of the five anomalies were thought to be buried deep within the landfill waste and have not since been investigated. The two remaining areas (areas 4 and 1) were believed to represent up to 25,000 drums buried at relatively shallow depths (see Figure TM-1). A limited excavation program in each of these shallow burial areas was conducted in 1982, and it confirmed the presence of buried drums in both areas. In 1986, a second magnetometer survey was conducted in Area 4 by Jordan to redefine the extent of buried drums.

During the Pollutant Characterization Task, shallow burial areas 4 and 1 were investigated. The purpose of this task was four-fold: 1) to confirm the presence of buried drums in the two shallow burial areas defined by MDNR; 2) to estimate the extent of each burial area and the density of drums in each area; 3) to characterize the drummed waste in these areas; and 4) to acquire information necessary to develop appropriate safety precautions to be followed during subsequent remediation activities.

During the Pollutant Characterization task, drums from shallow burial areas 4 and 1 were excavated, sampled and staged. Sampling and staging activities took place in staging areas that were constructed near each shallow burial area prior to the initiation of this task. Representative waste samples were sent to Clayton Environmental Consultants, Inc. (CEC), Novi, Michigan, for PCB and EP Toxicity analyses, and to Analytical & Biologic Laboratories (A&B) for analysis of % ash, chloride content and BTUs/lb. The drums were resampled in late March and early April, 1987, and sent to U.S. EPA Contract Laboratories for analysis of organic and inorganic constituents (see Technical Memorandum No. 3).

SCHEDULE

Construction of the staging areas began on November 3, 1986, and was completed by November 12, 1986. The Pollutant Characterization Task began on December

1986, and test pitting and drum removal began on December 5, 1986. Investigations in area 4 were completed by December 12, 1986, and investigations in Area 1 were completed by December 19, 1986.

The selection of representative waste samples for analysis was completed on January 21, 1987. Samples were delivered to the laboratories on January 23, 1987.

PERSONNEL

During construction of the staging areas, Jordan oversaw the construction. Great Lakes Environmental Services (GLE) provided labor, and M. L. Chartier Excavating, Inc. (Chartier) provided heavy equipment and operators. The personnel present during construction of the staging areas (not all simultaneously) were as follows:

- M. Jenue, Jordan
- K. Nesler-Arnold, Jordan
- J. Marzolino, Jordan
- D. Heine, GLE
- D. Kalsch, GLE
- M. Kochanski, GLE
- M. Kurkowski, GLE
- S. Matthes, GLE
- F. Scott, GLE
- B. Herceg, MDNR
- S. Phillips, MDNR
- R. Tasbreak, MDNR
- D. Bethuy, Chartier
- T. Chartier, Chartier
- W. Fehlan, Chartier
- U. Griffon, Chartier

During the Pollutant Characterization Task, Jordan provided an excavation crew and two people at the decontamination station; GLE provided the sampling team, a chemist to conduct compatibility testing, and additional labor; Chartier provided heavy equipment and operators. The personnel present during this task (not all simultaneously) included:

- M. Jenue, Jordan
- K. Nesler-Arnold, Jordan
- C. Hietty, Jordan
- J. Marzolino, Jordan
- J. Snowden, Jordan
- B. Herceg (MDNR)
- S. Phillips (MDNR)
- R. Tasbreak (MDNR)
- R. Irvin (MDNR)
- M. Gregory, GLE
- R. Jackson, GLE
- D. Kalsch, GLE
- F. Scott, GLE
- J. Sims, GLE
- M. Stewart, GLE
- G. Williams, GLE
- W. Fehlan, Chartier
- U. Griffon, Chartier
- L. Smith, Chartier

STAGING AREA CONSTRUCTION

Two drum staging areas were constructed prior to initiation of the Pollutant Characterization Task, one at each of the shallow burial areas (see Figures

Field Procedures

The senior member of the excavation crew directed the excavation process using hand signals and two-way radios. This person also received observations regarding the excavation and drums to the decontamination station where the notes were transcribed by a member of the decontamination crew. The test pits were excavated with a "backhoe" excavator machine until drums were encountered. Excavated materials were piled adjacent to each pit. When a drum was encountered, it was lifted from the pit with either the bucket of the excavator or by using drum brackles raised by another backhoe excavator.

Once the drum was out of the pit, it was searched for radiobatteries and then examined by the excavation crew or designated crew members for labels, markings, holes, contents, rustiness, drum type and any other distinguishing features. After a preliminary check of the drum, visible holes or openings were photographed with a video camera. Ground water was tested and the pit was photographed with a video camera if it was needed. If the drum was intact, it was secured with a device fitted on the drum brackles and flooded with an expandable rubber stopper if it contained liquid.

After examination of the drum, it was overpacked if the drum was leaking or had holes on the bottom or sides and was then placed on a pallet where it was numbered. The drums were numbered by using an alpha-numeric system which consisted of the area number (A or B), the test pit letter (A through H), and a sequential number for each drum (e.g., 4H-1 designates drum number 1 taken from Pit H in Area 4). The drum was then transported to the staging area with a rubber-tired front-end loader equipped with forks.

In the staging area, drums were placed with adequate space for the sanding crew to operate. Samples were taken by using various sanding tools depending on the consistency of the drummed material. Liquids were sampled with glass or plastic rods, and solids were sampled with a small coring device or long-handled spatula. In some cases, the drum contents were extremely hard and the sampler had to be broken down in pieces. Samples were placed in three 1-gallon glass jars for EP Toxicity, PCBs and incineration characteristics, and one 5-gallon plastic covered beaker for compatibility testing.

Compatibility testing was conducted in an onsite testing trailer located adjacent to the staging area. The samples were tested for: 1) pH; 2) reduction-oxidation potentials; 3) reactivity; 4) S; 5) A; water reactivity; 6) acid reactivity; 7) miscibility; 8) compatibility; and 9) chloride content. Compatibility test procedures are included in Appendix H. Based on the compatibility test data, drums were segregated into one of ten general classifications:

1. Strong acids
2. Strong bases
3. Oxidizers
4. Reducing agents
5. Cyanide/sulfide wastes
6. Water reactives
7. Flammable wastes
8. Halogenated organics
9. Non-halogenated organics

1. Non-characteristic

Class location was determined by the low crest from the figure that indicated the center each drum was classified. It was separated into its respective category within the drum stacking area. Upon completion of the excavation work in each area, the drums were closed in the case of overfills and covered with tarps.

Results

Field Observations - Area 4

Area 4 is located west of the landfill in a flat area between two low ridges. In Area 4, six pit locations (designated A through F) were staked by MDRS and located prior to the initiation of test citting activities. Drums were only located at locations A and B; refuse was found at locations C, D, E and F (see Figure TM-1).

Test pit locations and the estimated extent of buried drums in Area 4 are shown in Figure TM-1. Based on a total area of approximately 3,800 square feet, a thickness of 8 feet, and a drum density of 14%, the number of drums estimated to be buried in Area 4 is 1,120. This estimate was based on observations made in the field during test citting activities.

A total of 111 drums were removed from Area 4, and 119 were sampled. Thirty-four percent of the samples were solids, 50% were sludges, 10% were liquids, and 6% was contaminated dirt. Compositolite test data showed that wastes from most of the drums had a slightly acid pH of about 5. No acids or water-reactives were present, most were insoluble, almost all were ignitable, and none were chlorinated.

Drums at locations A1 and A2 were found at a depth of about 6 to 12 inches below the ground surface. They were randomly placed in sand and gravel with very little fill material, although a washer, chrome plated finishing trim, and cans were found randomly among the drums. In some areas, the drums were stacked 2 to 3 high, and they were found as deep as 15 feet below the ground surface.

At location B2 and the southern portion of location B1, drums were found at a depth of about 6 to 12 inches below the ground surface. They were randomly placed in sand and gravel, although garbage was encountered at the base of the pit where the excavation stopped about N1250, E8400. Drums were found as deep as 8 to 10 feet.

In the northeastern portion of location B1, the western edge of the landfill was discovered. Drums in this area were encountered at 5 feet below grade, and they were found as deep as 12 feet. Leachate was noted in this excavation at a depth of about 12 to 13 feet. Leachate was not found in any of the other excavations in this area.

Drums were not found at locations C, D, E and F. The magnetic anomalies at these locations were apparently caused by metallic objects buried in the refuse, or by the sharp contrast in magnetic readings between fill and natural soil which caused a false anomaly when the data was contoured. At location C,

garbage was encountered to depths of 8 to 11 feet. A driver, a car hood, and a water heater were found amongst the refuse. At location G, garbage, sheet metal, and tires were found to a depth of 17 feet. At location H, garbage, metal bands were found with a considerable amount of dirt. At location I, garbage, metal bands, fill sand and a hot water heater were found to a depth of 12 feet.

Field Observations - Area 1

Area 1 is located south of the railroad proper between a borrow area and a utilization pond. Topographically, the area can be envisioned as a tier. It has a somewhat steep northeastern face that rises above the level where the staging area is situated. In top of the anomaly, it flattens out over a fairly large area. Along the southwest boundary, a bank rises to about 15 feet, ending abruptly at the utilization pond. The overall nature of this area appeared best suited to be a site for the northeast side of the road at the top of the anomaly. A total of eleven test pit locations were established in Area 1, labeled A, B, C, D, E, F, G, H, I, J and K as shown in Figure 14-7.

Figure 14-7 shows the estimated extent of buried drums in this area, based on an estimated area of 30,000 square feet, a thickness of 10 feet, and a drum density of 7%. The estimated number of drums contained in Area 1 is 2,100. This estimate is based on observations made during test pitting activities.

A total of 114 drums were excavated in Area 1, and 117 samples were taken. Fifty-three percent of the samples were solids, 24% were sludges, 7% were liquids, and 16% were contaminated dirt. Most waste samples had a slightly acidic pH of 5. No water reactives were present, but 21 solid reactives were noted. One of these samples (14-21) is a surprise waste (i.e., sulfide was generated during the reactivity tests). Most of the samples were insoluble, unreactive, and non-chlorinated.

Excavations at locations A, B, C and D were conducted along the northeast face of Area 1. In this area, drums were randomly placed along the entire face. Most of the drums (and often the contents) were badly burned. This correlates with the fact that several fires occurred at the site in 1973 (MDNR Magnetometer Survey, 1982, p. 2). Drums were randomly placed, and they were encountered at a depth of about 3 feet or less, although at some locations a considerable amount of fill sand covered the drums. These pits extended into the face of the anomaly, about 20 to 25 feet.

Test pits at locations E through J were conducted on the upper part of the anomaly. At location F, the first drum was encountered at a depth of about 5 feet beneath site soil. Drums at this location were found as deep as 15 feet below the ground surface (the maximum depth attainable by the excavator). At location G, located closer to the northeast edge, drums were found at a depth of about 12 inches. Some burned drums were found, and in general drums were packed more tightly in this area. At location H, a hard layer was encountered at a depth of about 2 to 3 feet. At a depth of 6 feet, discontinuous ash lenses were noted, and drums were encountered at 8 feet. A large piece of metal (possibly a drive shaft) and tires were also found at this location.

At location J, natural soil material was encountered to a depth of 12 feet. Reddish soil sands was found to a depth of about 5 feet, and below that gray silt was encountered. The soil strata was worked to the north, south, east, and west ends, and at the northern end a drum was found at a depth of 12 feet. At 14 feet, burned cobbles and pieces of metal were encountered. No drums were found in this area, although it appeared that the southern boundary of the burial area began at the northern edge a foot or location J.

At location E, fire material, such as cobbles, scrap metal, nails, paper and cartage were encountered at a depth of about 10 feet. Drums were found just below 1 foot. More cobbles were found at 8 feet, and drums, paint cans and glass jars were found at 14 feet. At 15 feet, water was encountered.

At the western edge of location J, natural soil materials were encountered to a depth of 5 feet. Working toward the east, a hard layer was encountered at about 10 feet. Scrap metal was found at 12 feet, and no drums were encountered there.

At location H, natural soils were encountered at the northern end of the excavation to a depth of about 5 feet. Working further to the south, drums and some 5 gallon paint cans were encountered at a depth of 6 feet. This location appeared to be the northern edge of the shallow burial area.

Analytical Results

As mentioned above, 100 representative waste samples were analyzed for PCBs, EP Toxics, metals, EP Toxics pesticides and herbicides, Tash, chlorides, and PHS etc. The results are presented in Table 7. The Appendix B, and are summarized below.

Total PCBs - Forty-seven samples contained total PCBs at concentrations above the detection limit, and 19 samples contained total PCBs at concentrations clear below. The highest concentration detected was 1000 ppm.

EP Toxics Pesticides and Herbicides - EP Toxics pesticides and herbicides were not detected above the EPA standard in any of the samples. In fact, analyses for all 125 samples were below the detection limit. It should be noted, however, that the detection limit for some of the samples was higher than the EPA standard because of the small amount of sample submitted to the laboratory.

EP Toxics Metals - EP Toxics metals were often detected at concentrations above the detection limit, and 15 samples exhibited concentrations above the EPA standard.

Cinc Although no EPA standard exists, cinc was the most commonly detected metal. It was found at concentrations as high as 110 ppm in 79 samples.

Lead Lead was detected in 58 samples at concentrations as high as 110 ppm. Thirteen samples had concentrations greater than 5.0 ppm, the EPA standard.

Mercury Mercury was detected in 27 samples at concentrations as high as

- Lead Four samples were above the EPA standard of 1.0 ppm.
- Mercury Three samples contained mercury at concentrations up to 0.1 ppm. Three of these samples were above the EPA standard of 0.1 ppm.
- Cadmium Cadmium was detected in 3 samples at concentrations up to 0.2 ppm. Five samples contained cadmium at concentrations above the EPA standard of 0.1 ppm.
- Barium Four samples contained barium at concentrations up to 1.0 ppm. One sample contained barium at a concentration that exceeded the EPA standard of 100.0 ppm.
- Arsenic The sample contained 1.5 ppm of arsenic which is above the EPA standard of 0.1 ppm. All other samples were below the detection limit.
- Selenium Selenium was not detected in 30 samples above the detection limit.
- Copper Although no EPA standard exists for copper, it was detected in five samples at concentrations up to 5 ppm.

Percentages ranged from 0.11 to 95.9%. The average was 29.57%.

Chloride Chloride ranged from 100.000 ppm to 5.112 ppm. The average was 25.43 ppm.

Fluoride Fluoride ranged from 10 to 17.55%. The average was 7.24%.

AIR QUALITY MONITORING

Because of the potential for the release of volatile organic compounds from drum wastes during the Pollutant Characterization test, air quality monitoring was conducted throughout the test pitting program. Personal sampling pumps with charcoal tubes were used near the excavations, and photoacoustic TIF P1 meters were used at the excavations and the staging area to provide real-time indications of airborne contaminant concentrations. This information served as a guide for any modification in the health and safety program during the excavation activities.

Field Procedures

Air sampling was conducted on December 3, 1986 prior to commencement of the excavation activities to establish background air quality. During test pitting activities, four ambient air monitoring stations were established in the working area. Locations were based on wind direction and other site conditions such as topography, accessibility, and the locations of future excavations. One station was always established upwind to obtain a background air sample, and this station was moved throughout the day if the wind direction changed significantly. Another station was established for the

collection of duplicate samples. This station was placed in a downwind location near the ejection. The remaining two stations were staggered further downwind. Wind speed monitoring locations are left as part of the air monitoring data forms (see Appendix 1).

Each air monitoring station consisted of a calibrated SO₂-F₂ Bend: personal sampling pump equipped with 10 50 ml MBM charcoal sample collection tubes. The pumps were attached to stakes and placed at their designated stations at the start of each day. The pumps were taken down at the conclusion of the day's activities. The average running times for the pumps varied from 4 to 6.5 hours (see data sheets for specific times). The samples were desorbed and transported each day to ERI.

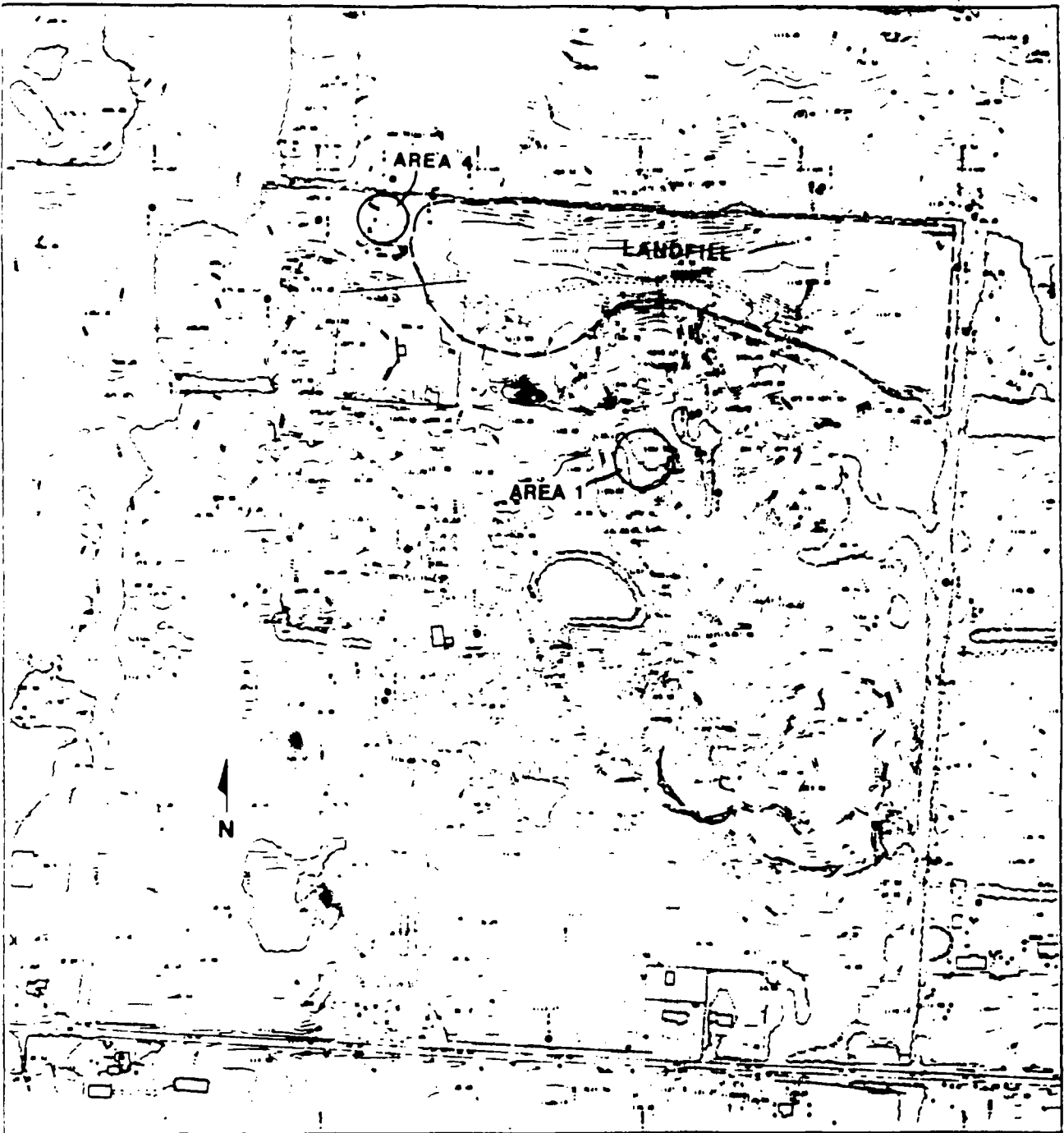
Results

The results of the air quality monitoring program are presented in Table 1. Table 1. This data indicates that the concentrations of volatile organic compounds released during test sitting activities were very low. All samples were analyzed for total hydrocarbons as hexane (AOAC Analytical Methods: 1550, NIOSH 2nd ed.) with a limit of detection of 0.001 ug. In addition, one sample was selected for quantitative analysis by gas chromatograph/mass spectrometry (GC/MS), but the scan indicated that no compounds were detected, i.e., the amount of individual hydrocarbons present was too low to quantify. Field blanks and duplicate samples were submitted on a daily basis. A total of 70 samples were submitted for analysis during the program.

Meteorological Monitoring

In addition to air quality monitoring, a meteorological station was established prior to the initiation of ejection activities. Wind speed and direction were monitored throughout the program using a round vane wind monitor and a model 1111 wind speed wind direction indicator. Temperature and general weather conditions were also recorded (see data sheets for specific weather information). The wind monitor was placed atop a metal, self-supported wind vane at approximately 5 feet. The wind monitor indicator system was set up such that the 0 degree azimuth on the indicator was true north. Weather conditions were recorded two or three times a day.

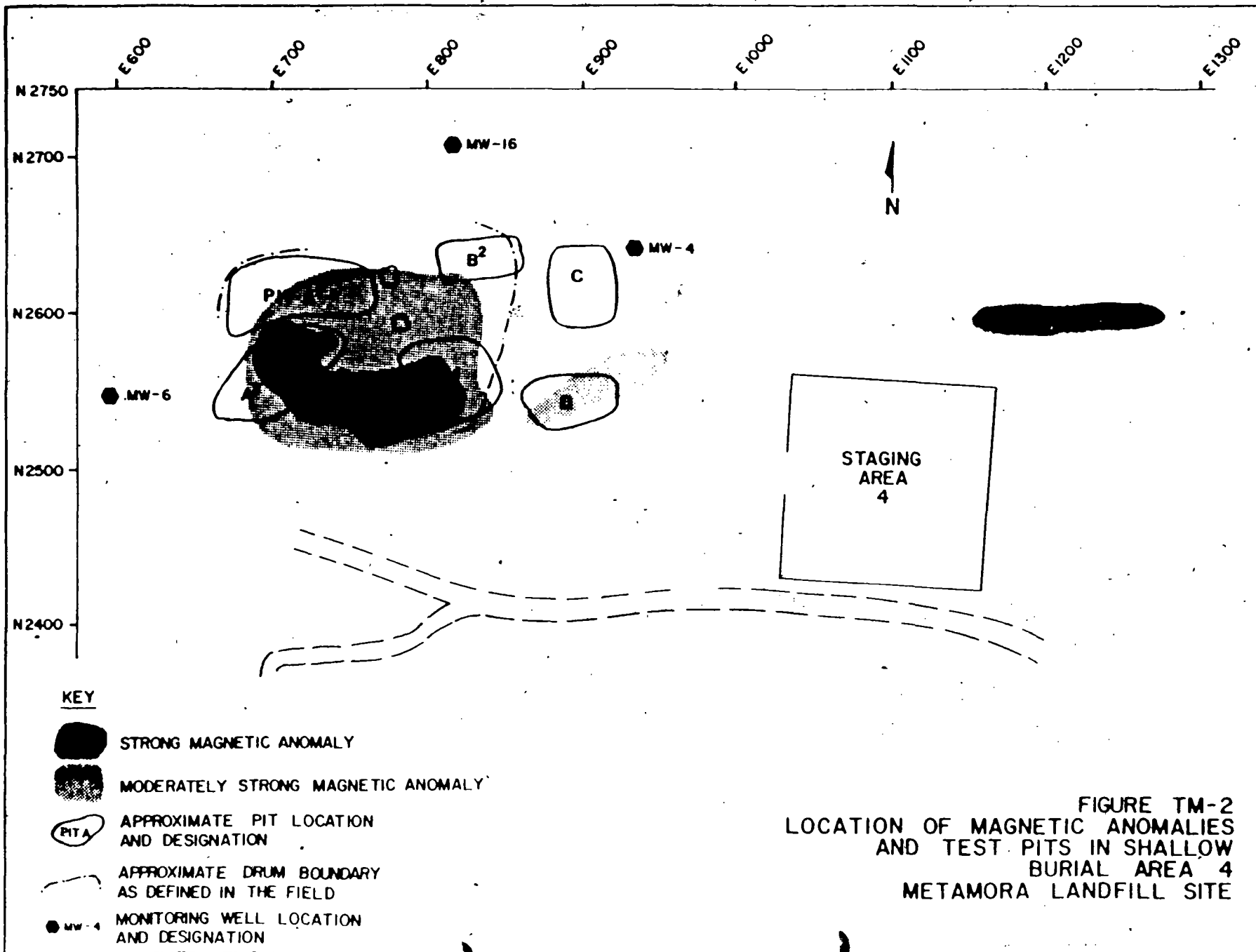
Wind vane were erected near each of the ejection locations and the staging areas to indicate wind direction to personnel working in those areas. In the event that ejection to an upwind location was necessary, the wind vane provided the wind direction information.

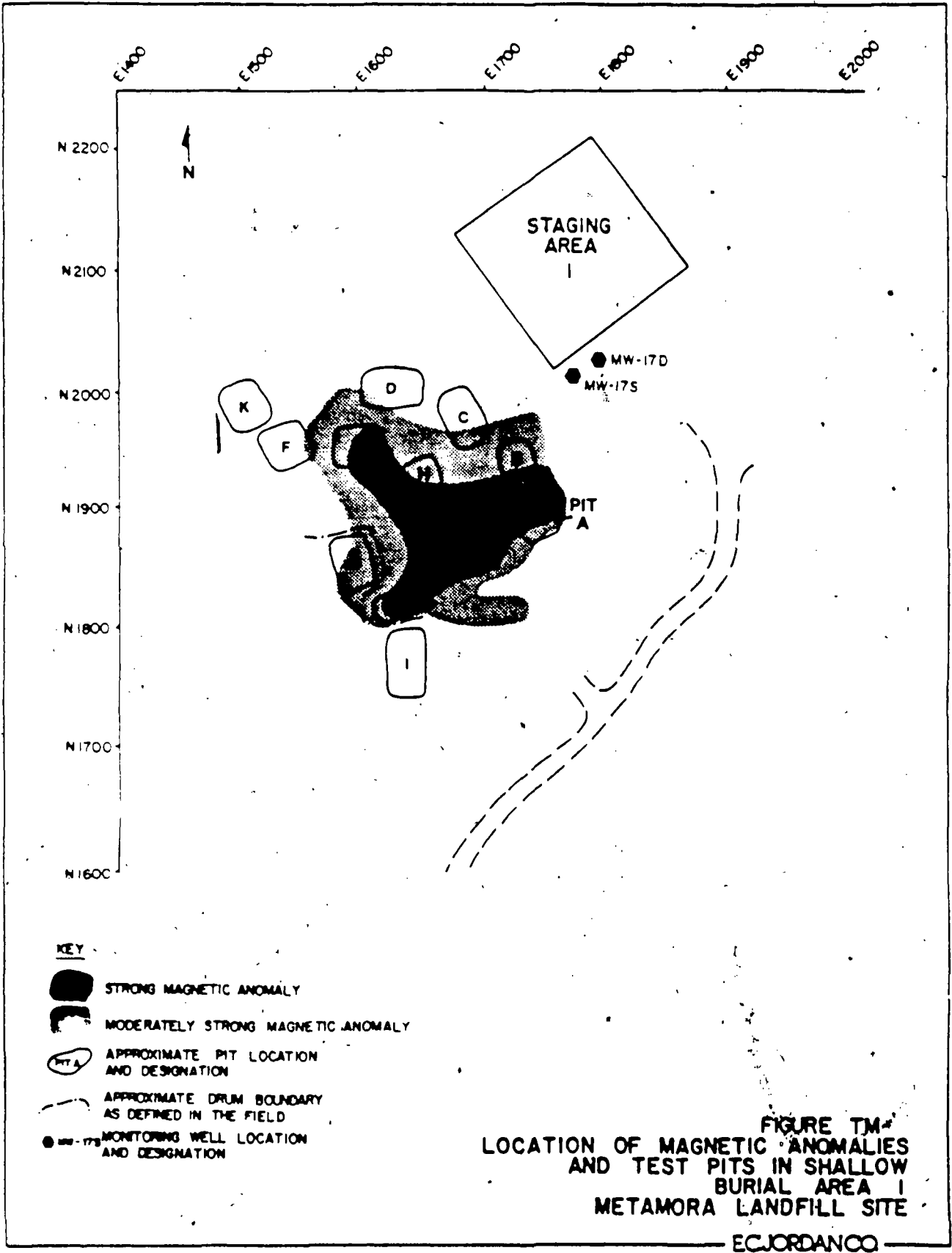


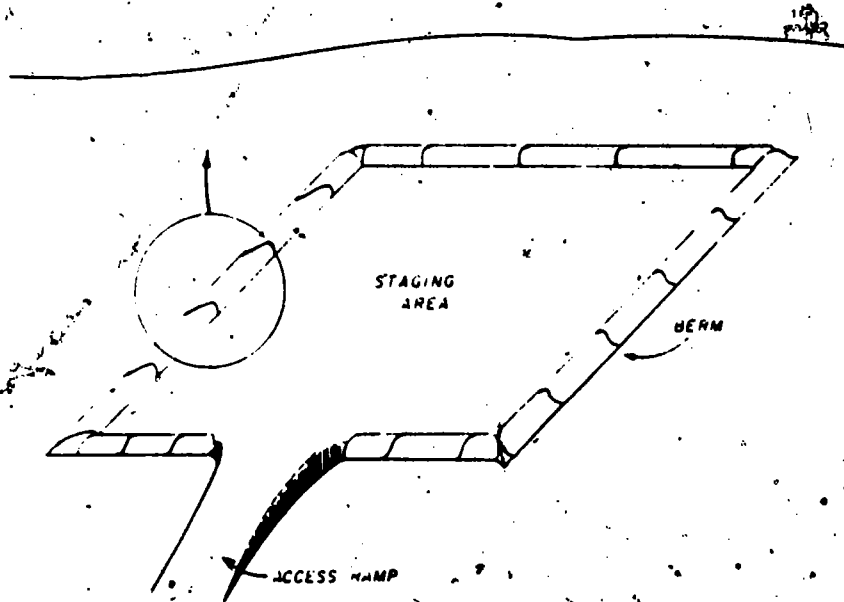
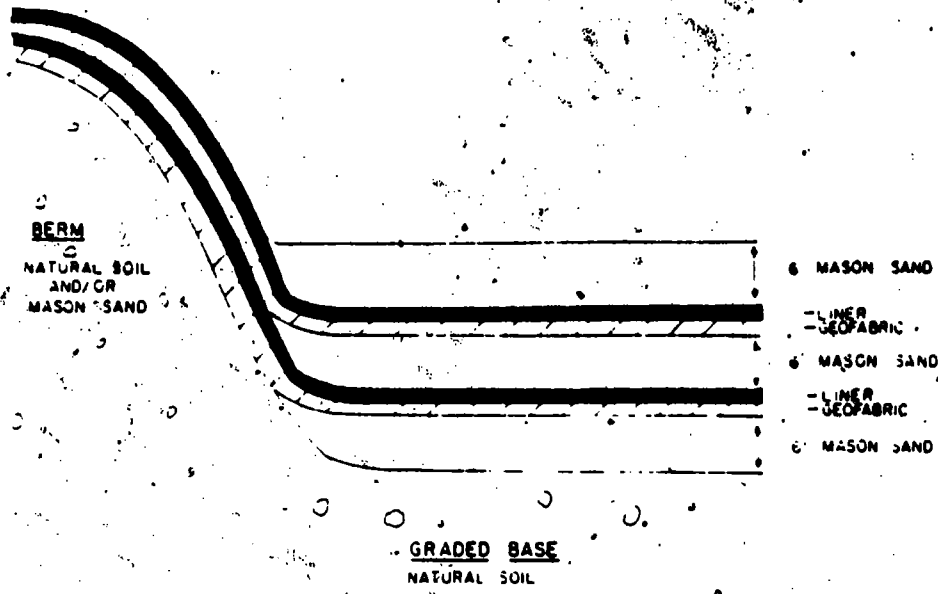
1" REPRESENTS APPROX. 430'

FIGURE TM-
METAMORA LANDFILL SITE
AND LOCATIONS OF SHALLOW
BURIAL AREAS 4 & 1

— ECJORDANCO —





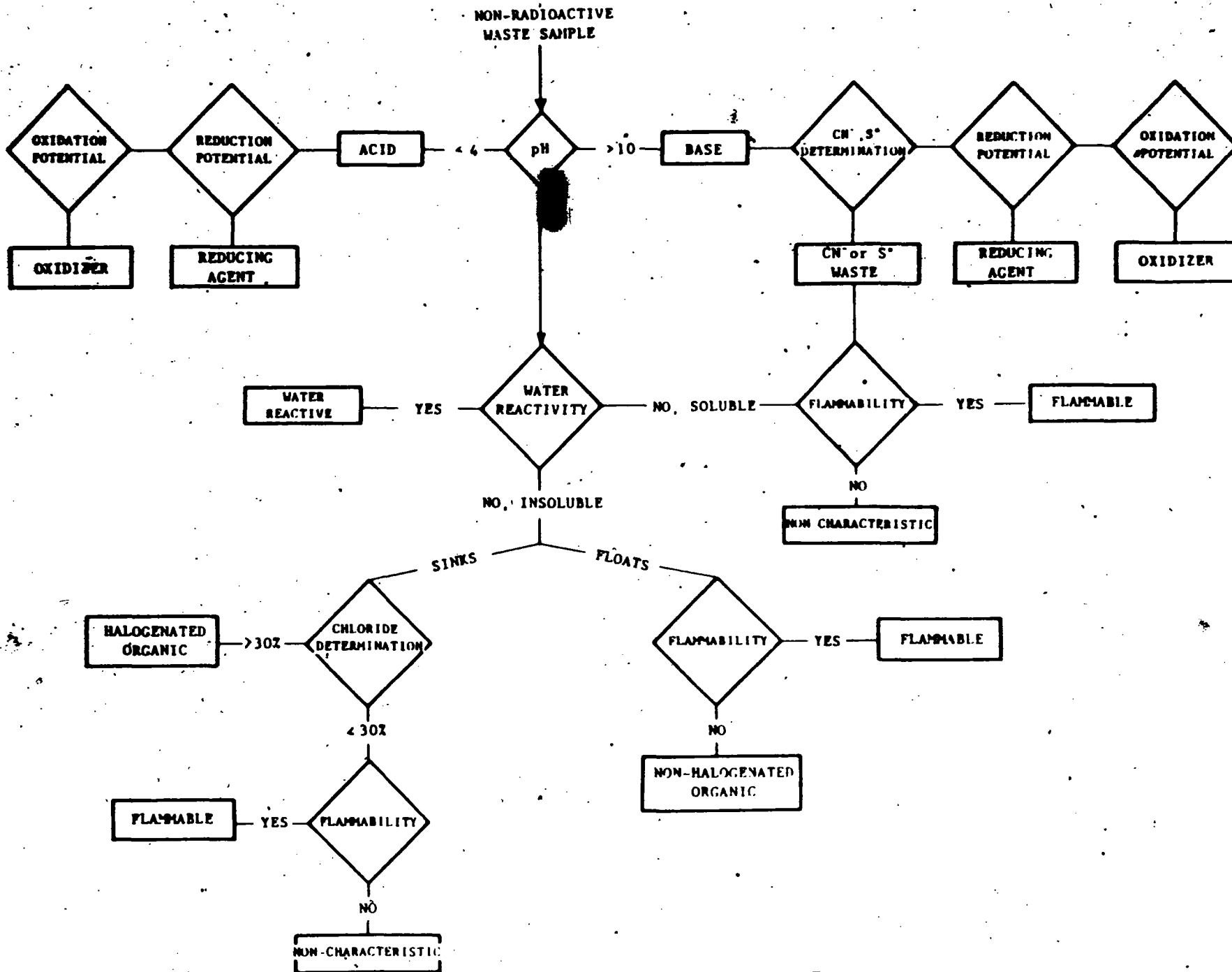


**FIGURE TM-
SCHEMATIC OF STAGING
AREA CONSTRUCTION
(CROSS SECTIONAL VIEW)
METAMORA LANDFILL SITE**

APPENDIX A

Compatibility Tests

- (1) Figure TM-5 - Compatibility Test Flow Chart
- (2) Compatibility Test Procedures



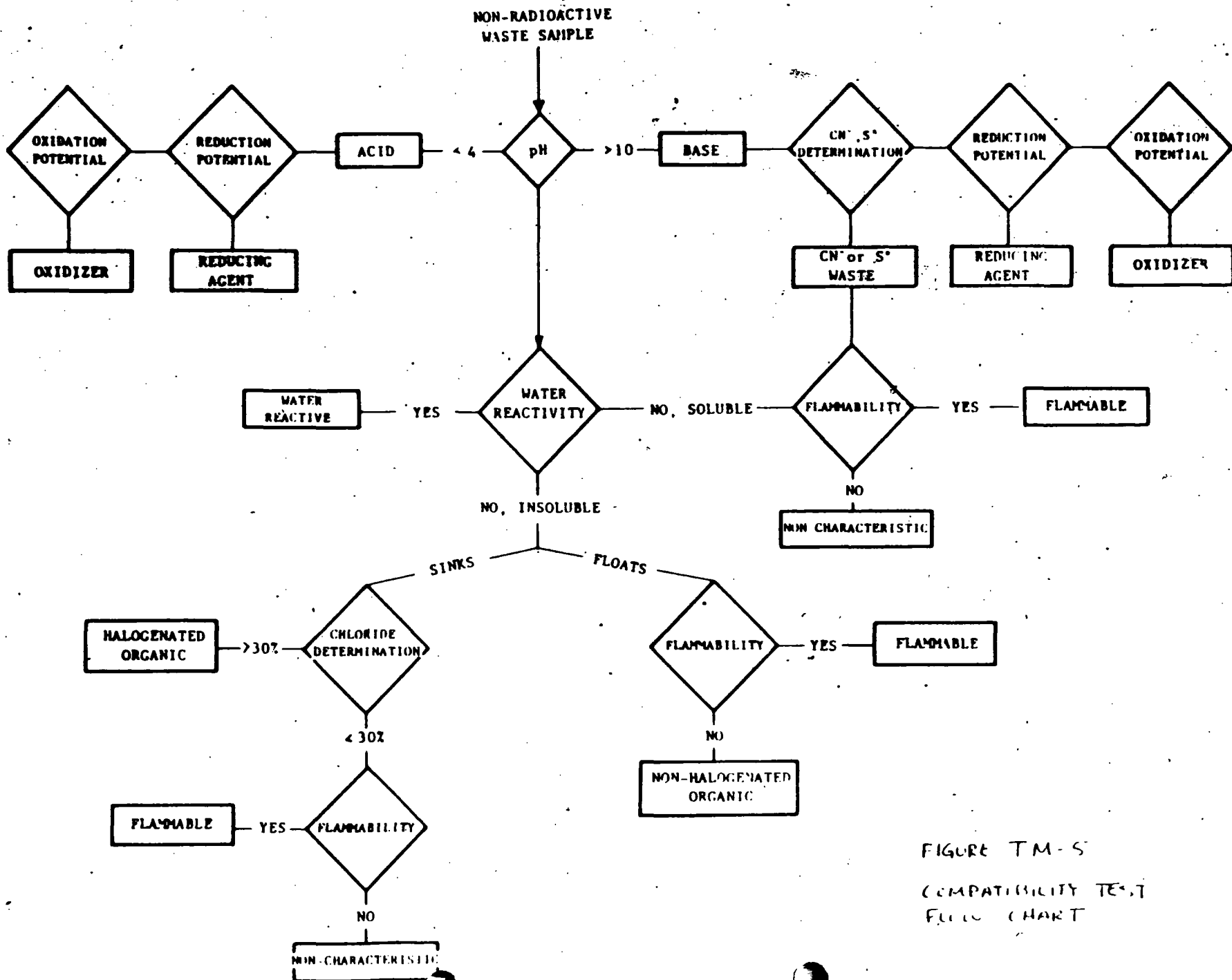


FIGURE TM-5
COMPATIBILITY TEST
FLOW CHART

2.) Water Reactivity/Solubility

It is very important to determine if a sample will react with water because it is very likely that at some point in time the material will come in contact with water. The procedure is simple and with additional observation, it is extremely informative. Special precautions and handling procedures must be implemented during this test.

Equipment: Disposable beakers
Disposable pipets
Thermometer
Glass rods
Distilled water
Stainless steel beaker
Protective shield

Procedure: Make sure all necessary safety equipment is in place. Fill the disposable beaker half full with distilled water, place it in the stainless steel beaker, and place the thermometer in the disposable beaker. Make sure that the beaker base is resting flat with the open end pointing upwards (away from you). Read the temperature of the water. Carefully add 1 ml or 1 gm of sample to the water and note temperature changes, fuming of any kind, and/or spattering or spitting. If no reaction takes place, stir the sample with a glass rod and look for reactions. If there is still no reaction, stir in another 4 ml or 4 gms, one at a time. If there is still no reaction, add another 5 ml or 5 gms.

A positive result is observed when any of the following occurs: 1) a significant increase in temperature (it is very important that both the water and the sample are at the same initial temperature); 2) gases are generated; or 3) a violent reaction takes place (i.e., spattering or spitting).

The solubility of the sample can be determined during this test as well, if the sample is not water reactive. As the sample is stirred into the water in the beaker, observe if the sample is soluble. If not, observe whether it floats or sinks. These observations may not be readily made in the beaker. If so, use a separatory funnel and slowly drop 3-5 ml of non-reactive material (liquid) into the water-filled separatory funnel.

If the sample floats, it is classified as a "non-halogenated organic". If the sample sinks, it is classified as a "halogenated organic".

3.) Oxidation/Reduction Potential

This test is performed because of the violent reactions that take place when an oxidizing agent comes in contact with easily oxidized material. If an oxidizing material is found on a site, it should be segregated from other materials on the site and disposed of separately.

Equipment: Orion 407 A/F Multimeter
Redox electrode
0.001 Normal ferrous ammonium sulfate solution
0.001 Normal potassium chromate solution
Heavy polypropylene cup

Procedure: Place 50 ml of 0.001 Normal ferrous ammonium sulfate solution into a 4.5 oz. heavy polypropylene cup. Measure the cell potential of the ferrous ammonium sulfate solution using a millivolt (mV) meter with a platinum sensing electrode and standard reference electrode. Remove the electrodes and add 50 ml. of sample to the ferrous ammonium sulfate solution. Mix the solutions and let stand for one minute. Measure the change in cell potential of the mixture with the millivolt meter. A change of 50 mV in the positive direction indicates the presence of an oxidizing agent in the sample. Ferrous ammonium sulfate is used in this procedure because it is easily oxidized and the difference in oxidation potential may be measured with the millivolt meter.

To determine the presence of a reducing agent, follow the same procedure using potassium chromate.

If the sample is organic in nature, the mixture may separate into layers. The organic layer of the mixture should be drained off and only the aqueous layer of the mixture is tested. It is important to keep the probes away from organic materials because they will foul and require constant maintenance.

4.) Cyanide/Sulfide Determination and Acid Reactivity

Equipment: Orion 407 A/F Multimeter
Cyanide ion specific electrode
Hydrochloric acid
Lead acetate paper

Cyanide will be determined using the Orion 407 A/F Multimeter and a cyanide ion specific electrode. Using this method enables the determination of cyanide both qualitatively and quantitatively in a sample. The procedure for this method will be determined on a case by case basis taking site specific requirements and possible findings into consideration.

Samples that do not contain cyanide will be tested for sulfide and acid reactivity. Acidify the sample with HCl and place a lead acetate paper in the

head space of the sample jar. Seal the jar and wait about 2 minutes. If the paper turns dark, the test is positive for sulfide. If the paper does not turn dark, but the sample reacts with acid, it is acid reactive.

5.) Flammability

Equipment: Sand box
Disposable pipet
Disposable beaker
Propane torch, matches, or other ignition source

Procedure: Place 3-5 ml. or mg. of a representative sample into a disposable beaker and place the beaker into a sand box. Slowly pass a lighted torch over the sample (the sample should be at ambient room temperature - 70 to 80 degrees F). If no flame arises, pass the torch over the sample 3-4 more times.

If a flame is observed, the result is positive. The waste is classified as "flammable". If no flame is observed after several passes, the result is negative, and the sample is classified as "non-flammable".

6.) Flame Test (chloride determination)

The flame test (or Beilstein test) is a screening method for chloride. The test is a simple test based on the fact that chlorinated compounds produce a green flame when introduced to a flame.

Equipment: Bunsen burner, or other flame source
Glass rod or pipet

Procedure: Dip the glass rod into the sample so that the rod is coated with the sample. Quickly move the rod from the sample to the flame. Observe the color of the flame when the material on the glass rod burns. A positive result is found when a green flame is observed. A positive result indicates the presence of chloride (Cl > 30%). This indicates the presence of a chlorinated solvent (e.g., methylene chloride, trichloroethane, perchloroethylene). A negative result is found when a green flame is not observed.

APPENDIX B

Results of Analytical Tests

- (1) **Table TM-1**
Field Observations and Compatibility Test Results
- (2) **Table TM-2**
PCBs and EP Toxicity Metals
- (3) **Table TM-3**
**EP Toxicity Pesticides and Herbicides and
Incineration Characteristics**

TABLE 1
Page 1

FIELD OBSERVATIONS AND COMPATIBILITY TEST DATA - WASTE SAMPLES
General Investigation Retarded Landfill Site, Upper Level, Michigan

DRUM ID	DATE	FILL	DESCRIPTION	RD	PH	RD POT	REACT	RD REACT	RD REACT	REACTIVITY	IGN	CMOR	COMPATIBILITY CLASSIFICATION	REMARKS
1-0-1	12-15-00	1002	GREEN/GRAY SOLID	N	4	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-2	12-15-00	1002	GREEN/GRAY SOLID	N	4	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-3	12-15-00	1002	GREEN/GRAY SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-4	12-15-00	1002	GREEN/GRAY SOLID	N	3-4	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-5	12-15-00	1002	GREEN SOLID	N	4-5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-6	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-7	12-15-00	1002	BROWN PEARLS SOLID	N	4-5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-8	12-15-00	1002	GRASS SOLID W/ROOT	N	5-6	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-9	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	5-6	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-10	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	4	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-11	12-15-00	1002	GREEN SOLID	N	5-6	NA	NA	N	N	PARTLY SOLUBLE	V	N	1002 F000E	
1-0-12	12-15-00	1002	BROWN GREEN SOLID	N	4-5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-13	12-15-00	1002	BROWN GREEN SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-14	12-15-00	1002	BROWN PEARLS SOLID	N	5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-15	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-16	12-15-00	1002	GREEN/GRAY SOLID	N	5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-17	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-18	12-15-00	1002	BROWN LIQUID	N	5	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-19	12-15-00	1002	GREEN/GRAY SOLID	N	3	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-20	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-21	12-15-00	1002	GRAY/GREEN LIQUID	N	7-10	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-22	12-15-00	1002	METALLIC GRAY SOLID	N	4	N	NA	N	N	INSOLUBLE	N	N	1002 F000E	
1-0-23	12-15-00	1002	BLACK PEARLS SOLID	N	4-5	N	NA	N	N	INSOLUBLE	N	N	1002 F000E	
1-0-24	12-15-00	1002	GREEN/GRAY SOLID	N	5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-25	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-1	12-15-00	1002	LIGHT GREEN SLUDGE	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-2	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-3	12-15-00	1002	BROWN GREEN SLUDGE	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-4	12-15-00	1002	PURPLE SLUDGE	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-5	12-15-00	1002	RED SLUDGE	N	3-4	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-6	12-15-00	1002	BROWN SLUDGE	N	5-6	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-7	12-15-00	1002	BROWN SLUDGE	N	5-6	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-8	12-15-00	1002	BROWN SLUDGE	N	5-6	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-9	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-10	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-11	12-15-00	1002	PURPLE/GRAY SOLID	N	5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-12	12-15-00	1002	LIGHT RED SOLID	N	5-6	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-13	12-15-00	1002	GREEN/GRAY SOLID	N	4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-14	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-15	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-16	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-17	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-18	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-19	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-20	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-21	12-15-00	1002	BROWN SLUDGE	N	3-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-22	12-15-00	1002	PUR SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-23	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-24	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-25	12-15-00	1002	CLEAR LIQUID	N	3-4	N	NA	N	N	PARTLY SOLUBLE	V	N	1002 F000E	
1-0-26	12-15-00	1002	BROWN GREEN SLUDGE	N	4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-27	12-15-00	1002	GREEN/GRAY SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-28	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-29	12-15-00	1002	BROWN LIQUID	N	13-14	N	NA	N	N	SOLUBLE	V	N	1002 F000E	
1-0-1	12-15-00	1002	BLUE SOLID	N	8-9	N	NA	N	N	SOLUBLE	N	N	1002 F000E	
1-0-2	12-15-00	1002	BLUE SOLID	N	3-4	N	NA	N	N	SOLUBLE	V	N	1002 F000E	
1-0-3	12-15-00	1002	BLACK/BROWN LIQUID	N	5	NA	NA	N	N	SOLUBLE	V	N	1002 F000E	
1-0-4	12-15-00	1002	BLACK/BROWN SEMI-SOLID	N	3-4	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-5	12-15-00	1002	GREEN/GRAY SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	V	N	1002 F000E	
1-0-6	12-15-00	1002	BLACK PEARLS SOLID	N	4-7	N	NA	N	N	INSOLUBLE	N	N	1002 F000E	
1-0-7	12-17-00	1002	WHITE SOLID	N	3-4	NA	NA	N	N	INSOLUBLE FLOUTS	N	N	1002 F000E	
1-0-8	12-17-00	1002	BROWN SOLID	N	4-7	N	NA	N	N	PARTLY SOLUBLE	N	N	1002 F000E	
1-0-9	12-17-00	1002	BROWN SOLID	N	3-4	N	NA	N	N	INSOLUBLE	V	N	1002 F000E	

Notes:
 1. Samples collected by E.C. Jordan, December, 1990.
 2. Compatibility test analyzed by Great Lakes Environmental.
 3. No drum was collected with the designation 1-0-1.
 4. No sample was collected from 1-0-8.
 5. S Fullness is approximate.
 6. TOC - total organic carbon measured with a Phospor 13P.

Notes:
 1. RD - radioactivity
 2. RD POT - radon potential
 3. REACT - reactivity (see 10-5)
 4. RD REACT - acid reactive
 5. RD REACT - acid reactive
 6. IGN - ignitable
 7. CMOR - chlorinated organic
 8. N - negative result
 9. V - positive result
 10. NA - Not applicable

TABLE 1 (Cont.) FIELD OBSERVATIONS AND COMPATIBILITY TEST WITH WASTE SAMPLES
 Remedial Investigation Potomac Landfill Site, Lapeer County, Michigan

DEAN ID	DATE	% FILL	DESCRIPTION	END	pH	OD POT	REACT	MSU REACT	ACID REACT	BIODegradability	IGN	CHLOR	COMPATIBILITY CLASSIFICATION	COMMENTS
1-F-4	12-17-06	100%	GREEN/BROWN SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-5	12-17-06	100%	GREEN/BROWN SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	Labeled "Dirty"
1-F-6	12-17-06	-	BLACK/BROWN SEMI-SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-7	12-17-06	-	BROWN SOLID	N	6-7	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-8	12-17-06	-	BLACK/BROWN SEMI-SOLID	N	3-5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-9	12-17-06	-	BROWN SLUDGE	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	Labeled "Redspot", "Sludge"
1-F-10	12-17-06	-	GREEN SOLID	N	6-7	NA	NA	N	N	PARTLY SOLUBLE	N	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-11	12-17-06	-	BROWN SOLID	N	3-5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-12	12-17-06	100%	YELLOW SOLID	N	4-5	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-13	12-17-06	100%	BLACK/BROWN SEMI-SOLID	N	3-5	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-14	12-17-06	100%	PURPLE SLUDGE	N	4-5	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	Labeled "Redspot", "Sludge"
1-F-15	12-17-06	75%	GREEN SOLID	N	6-7	N	NA	N	N	PARTLY SOLUBLE	N	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-16	12-17-06	100%	PURPLE SLUDGE	N	3-4	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-17	12-17-06	50%	GREEN SOLID	N	6-7	N	NA	N	N	PARTLY SOLUBLE	N	N	1603 F001 E	Labeled "Dirty Sludge"
1-F-18	12-17-06	-	CONTAMINATED DIRT	N	6-7	N	N	N	N	PARTLY SOLUBLE	N	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-19	12-17-06	100%	GREEN/BROWN SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-20	12-17-06	100%	BLUE SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-21	12-17-06	100%	GREEN/BROWN SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-22	12-17-06	100%	GREEN/BROWN SOLID	N	3-4	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-23	12-17-06	100%	GREEN/BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-24	12-17-06	100%	BLUE SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-25	12-17-06	100%	GREEN/BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-26	12-17-06	100%	BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-27	12-17-06	100%	GREEN/BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-28	12-17-06	100%	GREEN/BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-29	12-17-06	100%	GREEN/BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-30	12-17-06	75%	GREEN/BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-31	12-17-06	-	GREEN/BROWN SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-32	12-17-06	-	GREEN/BROWN SOLID	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-33	12-17-06	100%	BROWN SOLID	N	12-13	N	NA	N	Y	SOLUBLE	Y	N	1603 F001 E	NOTE
1-F-34	12-17-06	-	BLACK/BROWN SEMI-SOLID	N	5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-35	12-17-06	100%	BROWN SLUDGE	N	5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-36	12-17-06	50%	GREEN/BROWN SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-37	12-17-06	-	BROWN SLUDGE	N	5	N	NA	N	N	PARTLY SOLUBLE	Y	N	1603 F001 E	
1-F-38	12-17-06	-	BROWN SLUDGE	N	5	NA	NA	N	N	INSOLUBLE SLUDGE	Y	N	1603 F001 E	
1-F-39	12-17-06	-	CONTAMINATED DIRT	N	5	NA	NA	N	N	PARTLY SOLUBLE	N	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-40	12-17-06	75%	BLACK SLUDGE	N	5	N	NA	N	N	SOLUBLE	N	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-41	12-17-06	100%	RED LIQUID	N	3-5	NA	NA	N	N	INSOLUBLE FLUENTS	Y	N	1603 F001 E	
1-F-42	12-17-06	-	BLACK/BROWN SEMI-SOLID	N	3-4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-43	12-17-06	100%	CONTAMINATED ROCKS	N	7-8	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-44	12-17-06	-	BROWN SLUDGE	N	0-9	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-45	12-17-06	-	BLACK SLUDGE	N	0-9	N	N	N	SLIGHT	PARTLY SOLUBLE	Y	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-46	12-17-06	-	BLUE SLUDGE	N	5	NA	NA	N	N	INSOLUBLE FLUENTS	Y	N	1603 F001 E	
1-F-47	12-17-06	100%	LIGHT GREEN SLUDGE	N	2-3	N	NA	N	N	PARTLY SOLUBLE	Y	N	1603 F001 E	
1-F-48	12-17-06	-	BROWN SLUDGE	N	4-5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-49	12-17-06	100%	CONTAMINATED DIRT	N	5	NA	NA	N	N	PARTLY SOLUBLE	Y	N	1603 F001 E	NON-COMPATIBLISTIC
1-F-50	12-17-06	-	BLUE SLUDGE	N	5	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-51	12-17-06	-	GRAY/WHITE SLUDGE	N	5	N	NA	N	N	PARTLY SOLUBLE	Y	N	1603 F001 E	
1-F-52	12-17-06	-	BLACK/BROWN SEMI-SOLID	N	5	N	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-53	12-17-06	100%	BLUE/WHITE SOLID	N	5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-54	12-17-06	100%	PURPLE SLUDGE	N	5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-55	12-17-06	-	LIGHT ORANGE SOLID	N	4-5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-56	12-17-06	-	BLACK/BROWN SEMI-SOLID	N	5	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-57	12-17-06	-	BLUE SOLID/WHITE FOAM	N	4	NA	NA	N	N	INSOLUBLE	Y	N	1603 F001 E	
1-F-58	12-17-06	50%	PURPLE SOLID	N	4	NA	NA	N	N	PARTLY SOLUBLE	Y	N	1603 F001 E	
1-F-59	12-17-06	75%	BROWN LIQUID	N	5	NA	NA	N	N	INSOLUBLE FLUENTS	Y	N	1603 F001 E	

Notes:
 1. Samples collected by E.C. Jordan, December, 1994.
 2. Compatibility test analysis by Great Lakes Environmental.
 3. % Füllness is approximate.
 4. TOU - total organic vapors measured with a Fluorac TIP.

Notes:
 1. END - redox potential
 2. OD POT - oxygen potential
 3. REACT - reactivity with HCl or H₂O
 4. MSU REACT - water reactive
 5. ACID REACT - acid reactivity
 6. IGN - ignitability
 7. CHLOR - chlorinated (300%)
 8. N - negative result
 9. Y - positive result
 10. NA - Not applicable

TABLE 1 (Cont'd)
Page 4

FIELD OBSERVATIONS AND COMPATIBILITY TEST DATA - WHITE SLUDGES
Removal Investigation Reference Number: L-100, L-101, L-102, L-103, L-104, L-105, L-106, L-107, L-108, L-109, L-110, L-111, L-112, L-113, L-114, L-115, L-116, L-117, L-118, L-119, L-120, L-121, L-122, L-123, L-124, L-125, L-126, L-127, L-128, L-129, L-130, L-131, L-132, L-133, L-134, L-135, L-136, L-137, L-138, L-139, L-140, L-141, L-142, L-143, L-144, L-145, L-146, L-147, L-148, L-149, L-150, L-151, L-152, L-153, L-154, L-155, L-156, L-157, L-158, L-159, L-160, L-161, L-162, L-163, L-164, L-165, L-166, L-167, L-168, L-169, L-170, L-171, L-172, L-173, L-174, L-175, L-176, L-177, L-178, L-179, L-180, L-181, L-182, L-183, L-184, L-185, L-186, L-187, L-188, L-189, L-190, L-191, L-192, L-193, L-194, L-195, L-196, L-197, L-198, L-199, L-200, L-201, L-202, L-203, L-204, L-205, L-206, L-207, L-208, L-209, L-210, L-211, L-212, L-213, L-214, L-215, L-216, L-217, L-218, L-219, L-220, L-221, L-222, L-223, L-224, L-225, L-226, L-227, L-228, L-229, L-230, L-231, L-232, L-233, L-234, L-235, L-236, 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BOUR ID	DATE	Z FULL	DESCRIPTION	FWD	PH	PD FOT	FLML	MLD	MLD	RESISTIBILITY	FLM	FLM	COMMENTS
40-12	12-9-66	1002	PURPLE SLUDGE	N	4.4	N	N	N	N	INSOLUBLE	V	N	1002
40-13	12-9-66	-	BROWN GRAY SLUDGE	N	5	N	N	N	N	PARTLY SOLUBLE	N	N	1002
40-14	12-9-66	-	PURPLE SLUDGE	N	4.8	N	N	N	N	INSOLUBLE	V	N	1002
40-15	12-9-66	-	BROWN SLUDGE	N	5	N	N	N	N	PARTLY SOLUBLE	V	N	1002
40-16	12-9-66	1002	PURPLE SLUDGE	N	4.4	N	N	N	N	INSOLUBLE	V	N	1002
40-17	12-9-66	1002	GRAY SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-18	12-9-66	1002	SILVER/WHITE SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-19	12-9-66	-	BROWN LIQUID	N	5.6	N	N	N	N	INSOLUBLE FLUENTS	V	N	1002
40-20	12-9-66	-	BROWN SLUDGE	N	5.6	N	N	N	N	INSOLUBLE	V	N	1002
40-21	12-9-66	-	WHITE FLUOY SOLID	N	4.7	N	N	N	N	SOLUBLE	N	N	1002
40-22	12-9-66	-	GRAY SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-23	12-9-66	1002	BROWN SOLID	N	4.5	N	N	N	N	INSOLUBLE	V	N	1002
40-24	12-9-66	-	WHITE SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-25	12-9-66	-	CONTAMINATED GILT	N	5	N	N	N	N	PARTLY SOLUBLE	N	N	1002
40-26	12-9-66	-	BLUE/YELLOW SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-27	12-9-66	1002	BROWN SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-28	12-9-66	1002	WHITE FLUOY SOLID	N	5	N	N	N	N	SOLUBLE	N	N	1002
40-29	12-9-66	-	LIGHT GREEN SOLID	N	5	N	N	N	N	INSOLUBLE	N	N	1002
40-30	12-9-66	-	WHITE FLUOY SOLID	N	4.7	N	N	N	N	SOLUBLE	N	N	1002
40-31	12-9-66	-	CONTAMINATED GILT	N	5	N	N	N	N	N	N	N	1002
40-32	12-9-66	1002	RED SOLID	N	4	N	N	N	N	PARTLY SOLUBLE	N	N	1002
40-33	12-9-66	-	BLUE AND YELLOW SOLID	N	4.7	N	N	N	N	INSOLUBLE	N	N	1002
40-34	12-9-66	-	PARTIALLY SOLID SOLID	N	5	N	N	N	N	PARTLY SOLUBLE	N	N	1002
40-35	12-9-66	-	PARTIALLY SOLID SOLID	N	7	N	N	N	N	PARTLY SOLUBLE	N	N	1002
40-36	12-10-66	-	GRAY/GREEN SLUDGE	N	4	N	N	N	N	INSOLUBLE	V	N	1002
40-37	12-10-66	-	CANAL THICK LIQUID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-38	12-10-66	-	BROWN LIQUID	N	5	N	N	N	N	INSOLUBLE FLUENTS	V	N	1002
40-39	12-10-66	1002	GRAY/GREEN SLUDGE	N	4	N	N	N	N	INSOLUBLE	V	N	1002
40-40	12-10-66	1002	PURPLE SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-41	12-10-66	1002	BROWN SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-42	12-10-66	1002	GRAY/GREEN SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-43	12-10-66	1002	RED SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-44	12-10-66	-	LEAFY SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-45	12-10-66	-	WHITE LIQUID	N	7	N	N	N	N	INSOLUBLE	V	N	1002
40-46	12-10-66	-	GREEN-WHITE SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-47	12-10-66	-	GRAY SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-48	12-10-66	1002	GREEN SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-49	12-10-66	-	GRAY SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-50	12-10-66	1002	YELLOW LIQUID	N	4	N	N	N	N	INSOLUBLE FLUENTS	V	N	1002
40-51	12-10-66	1002	BLACK SOLID	N	4	N	N	N	N	INSOLUBLE	V	N	1002
40-52	12-10-66	1002	GREEN SOLID	N	7	N	N	N	N	INSOLUBLE	V	N	1002
40-53	12-10-66	1002	BROWN LIQUID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-54	12-10-66	1002	BROWN SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-55	12-10-66	1002	BLACK SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-56	12-10-66	-	BLACK SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-57	12-10-66	1002	GREEN SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-58	12-10-66	-	BROWN SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-59	12-10-66	1002	GREEN SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-60	12-10-66	-	BLUE SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-61	12-10-66	1002	CLEAN BROWN SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-62	12-10-66	-	BLACK SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-63	12-10-66	1002	GRAY SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-64	12-10-66	-	BLUE/BLACK SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-65	12-10-66	-	GRAY SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-66	12-10-66	-	GRAY SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-67	12-10-66	-	GRAY/GREEN SLUDGE	N	5	N	N	N	N	INSOLUBLE	V	N	1002
40-68	12-10-66	-	RED SOLID	N	4	N	N	N	N	INSOLUBLE	V	N	1002
40-69	12-10-66	1002	GRAY SOLID	N	4.5	N	N	N	N	INSOLUBLE	V	N	1002
40-70	12-10-66	-	GREEN SOLID	N	4.5	N	N	N	N	INSOLUBLE	V	N	1002
40-71	12-10-66	1002	BLACK AND BROWN SOLID	N	4.5	N	N	N	N	PARTLY SOLUBLE	V	N	1002
40-72	12-10-66	-	METALLIC BLUE AND CANAL	N	4.5	N	N	N	N	INSOLUBLE	V	N	1002
40-73	12-10-66	-	GREEN/PINK SOLID	N	5	N	N	N	N	INSOLUBLE	V	N	1002

- Notes:
 1. Sample collected by E.C. Jordan, October, 1966.
 2. Compatibility test designed by Great Lakes Environmental
 3. Fullness is approximate.
 4. Time - Ratio to particle water measured with a Fritsch TSP.
 5. No sample was collected from 40-14.

- Notes:
 1. FWD - Fullness
 2. PH - pH
 3. PD FOT - Particle/Filtrate Ratio
 4. FLML - Fullness Limit
 5. MLD - Maximum Limit
 6. RESISTIBILITY - Resistance to Flocculation
 7. FLM - Fullness Limit
 8. FL - Fullness
 9. V - Variable
 10. N - Not Applicable

TABLE 2
Page 1

PCBS AND EP TOXICITY METALS - WASTE SAMPLES
Remedial Investigation Metcalf Landfill Site, Lapeer County, Michigan

DRUM ID	Structure				EP Toxicity Metals										
	1242	1246	1254	1260	AS	BA	CD	CR	CU	PB	HU	SE	HG	ZN	
1-A-1	<0.3	<0.3	25	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	0.67	<0.010	<0.5	<0.10	4.7	
1-A-2	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.9	<0.010	<0.5	<0.10	1.3	
1-A-3	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	2.1	<0.010	<0.5	<0.10	4.2	
1-A-4	<0.3	<0.3	80	<0.3	<0.5	13	<0.10	0.72	<0.50	21	<0.010	<0.5	<0.10	4.2	
1-A-5	<0.3	<0.3	<0.3	<0.3	<0.5	5.6	5.4	<0.50	<0.50	47	<0.010	<0.5	<0.10	9.2	
1-A-6	<0.3	0.6	0.3	<0.3	<0.5	8.8	<0.10	<0.50	<0.50	2.2	<0.010	<0.5	<0.10	17	
1-A-7	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	119	
1-A-8	<0.3	<0.3	24	<0.3	<0.5	<5.0	<0.10	32	<0.50	1.4	<0.010	<0.5	<0.10	0.5	
1-A-9	<0.3	<0.3	18	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	0.01	<0.5	<0.10	9.7	
1-A-10	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-11	<0.3	<0.3	34	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	0.01	<0.5	<0.10	9.7	
1-A-12	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-13	<0.3	<0.3	120	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-14	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-15	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-16	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-17	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-18	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-19	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-20	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.5	<0.010	<0.5	<0.10	7.5	
1-A-21	1100	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	8.8	
1-A-22	70	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	4	<0.010	<0.5	<0.10	5.2	
1-A-23	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	4	<0.010	<0.5	<0.10	5.2	
1-A-24	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	4	<0.010	<0.5	<0.10	5.2	
1-A-25	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	4	<0.010	<0.5	<0.10	5.2	
1-B-1	<0.3	<0.3	28	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.4	<0.010	<0.5	<0.10	2.2	
1-B-2	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.4	<0.010	<0.5	<0.10	2.2	
1-B-3	<0.3	80	68	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	2.8	
1-B-4	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.7	1.4	<0.010	<0.5	<0.50	
1-B-5	15	<0.3	29	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.0	<0.010	<0.5	<0.10	<0.50	
1-B-6	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.0	<0.010	<0.5	<0.10	<0.50	
1-B-7	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.0	<0.010	<0.5	<0.10	<0.50	
1-B-8	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.0	<0.010	<0.5	<0.10	<0.50	
1-B-9	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.0	<0.010	<0.5	<0.10	<0.50	
1-B-10	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	5.0	<0.010	<0.5	<0.10	<0.50	
1-B-11	11	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	27	<0.010	<0.5	<0.10	1.5	
1-B-12	<0.3	<0.3	0.5	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-13	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-14	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-15	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-16	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-17	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-18	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-19	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-20	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50	
1-B-21	<0.3	87	55	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.9	<0.010	<0.5	<0.10	24	
1-B-22	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.2	<0.010	<0.5	<0.10	1	
1-B-23	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.2	<0.010	<0.5	<0.10	1	
1-B-24	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.2	<0.010	<0.5	<0.10	1	
1-B-25	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.012	<0.5	<0.10	<0.50	
1-B-26	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.7	<0.010	<0.5	<0.10	3	
1-B-27	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.7	<0.010	<0.5	<0.10	3	
1-B-28	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.7	<0.010	<0.5	<0.10	3	
1-B-29	<0.1	<0.1	<0.1	<0.1	<0.5	<5.0	<0.10	2.3	1.1	2.6	0.025	<0.5	<0.10	0.48	
1-D-1	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	0.80	<0.010	<0.5	<0.10	0.50	
1-D-2	<0.3	170	210	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	0.9	<0.010	<0.5	<0.10	5	
1-D-3 (water)	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	0.5	0.63	<0.010	<0.5	<0.10	1.9
1-D-3 (oil) (S)	<0.3	<0.3	95	<0.3	h	<10	<0.5	45	5	15	0.11	h	h	0.5	
EPA STANDARD	-	-	-	-	5.0	100.0	1.0	5.0	-	5.0	0.2	1.0	5.0	-	

Notes:

1. Results in ppm.
2. Samples collected by E.C. Jordan Co., December, 1988.
3. Analyses by Clayton Environmental Consultants.
4. No drum was collected with the designation 1-B-5.
5. No sample was collected from 1-B-13.
6. h - Sample was an oil and could not be analyzed.
7. EPA Standard - maximum concentration of contaminant for characteristic of EP Toxicity.
8. No entry - sample was not analyzed.
9. Sample 1-D-3 was phase separated, therefore both the liquid portion and the oil portion were analyzed.

TABLE 2 (Cont'd)
Page 2

PCBS AND EP TOXICITY METALS - HMSTE SAMPLES
Remedial Investigation Reference Landfill Site, Leapeer County, Michigan

SAMPLER ID	Aroclors				EP Toxicity Metals									
	1242	1248	1254	1260	HS	BA	CO	CR	CU	PB	MO	SE	Mn	ZN
1-D-4														
1-D-5														
1-D-6														
1-F-1	43	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.015	<0.5	0.10	1.3
1-F-2														
1-F-3	39	<0.3	7.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	2.4	0.011	<0.5	0.10	1.9
1-F-4														
1-F-5														
1-F-6														
1-F-7	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.01	<0.5	0.10	1.4
1-F-8														
1-F-9	24	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.2	0.016	<0.5	<0.10	0.37
1-F-10														
1-F-11	22	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.01	<0.5	0.10	0.96
1-F-12	13	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	3.4	0.01	<0.5	0.10	1
1-G-1	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	0.55
1-G-2														
1-G-3														
1-G-4														
1-G-5														
1-G-6														
1-G-7														
1-G-8														
1-G-9														
1-G-10														
1-G-11														
1-G-12														
1-G-13	5	<3	4	<3	<0.5	5.0	<0.10	4.1	<0.50	1.6	<0.010	0.5	0.10	0.59
1-G-14														
1-H-1														
1-H-2														
1-H-3	<0.3	<0.3	6.1	<0.3	<0.5	<5.0	<0.10	0.50	<0.50	<0.50	<0.010	<0.5	0.10	0.57
1-H-4	<30	<30	<30	<30	NA	110	1.5	39	9	110	<0.05	NA	<1	3.4
1-H-5	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	0.10	0.50
1-H-6	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	0.10	0.50
1-H-7	<3	<3	240	<3	<0.5	<1	<0.05	0.6	<0.5	<0.5	<0.01	<0.5	0.10	2.0
1-H-8														
1-H-9	<0.3	<0.3	<0.3	<0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-H-10	<0.3	72	77	<0.3	<0.5	<5.0	<0.10	0.50	<0.50	<0.50	<0.010	<0.5	0.10	7.7
1-H-11	<0.3	170	<0.3	<0.3	<0.5	6.5	4.0	2.2	6.1	12	<0.010	<0.5	0.10	4.8
1-H-12														
1-H-13	<0.3	1.4	<0.3	<0.3	<0.5	5.0	<0.10	0.50	<0.50	0.56	<0.010	<0.5	0.10	0.50
1-H-14														
1-E-1	<0.3	<0.3	0.4	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	0.10	0.50
1-E-2														
1-E-3	<0.3	470	540	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	0.5	0.10	2.0
1-E-4														
1-E-5	<0.3	26	48	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	0.10	0.50
1-E-6														
1-E-7	<0.3	160	200	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	0.10	4.4
1-E-8														
1-E-9	<0.3	66	110	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	0.10	1.5
1-E-10	<0.3	58	71	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	3.5	<0.010	<0.5	0.10	13
1-K-1	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.020	<0.5	0.10	0.50
EPA STANDARD					5.0	100.0	1.0	5.0		5.0	0.2	1.0	5.0	

Notes:

1. Results in ppm.
2. Samples collected by E.C. Jordan Co., December, 1986.
3. Analyses by Clayton Environmental Consultants.
4. NA - Sample was an oil and could not be analyzed.
5. EPA Standard - maximum concentration of contaminant for characteristic of EP TOXICITY.
6. No entry - sample was not analyzed.
7. NA - not analyzed.

TABLE 2 (cont.) PCBs AND EP TOXICITY METALS - WASTE SAMPLES
 Page 3 Remedial Investigation Metamora Landfill Site, Lapeer County, Michigan

DRUM ID	Aroclors				EP Toxicity Metals									
	1242	1248	1254	1260	AS	BA	CD	CR	CU	PB	MO	SE	MS	ZINC
4-A-2	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50
4-A-3	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	1.1	<0.010	<0.5	<0.10	<0.50
4-A-4														
4-A-5														
4-A-6	13	<0.3	10	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	2.2	<0.010	<0.5	<0.10	5.0
4-A-7														
4-A-8	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50
4-A-9	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	0.84
4-B-10	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50
4-A-11														
4-A-12	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50
4-A-13	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	<0.50
4-A-14														
4-A-15	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.015	<0.5	<0.10	<0.50
4-A-16	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	2.7	<0.50	<0.50	0.67	0.11	<0.5	<0.10	1.0
4-A-18														
4-A-19	300	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	0.9
4-A-20														
4-A-21	<3	<3	9	<3	<0.5	<5.0	<0.10	<0.50	<0.50	2.1	<0.010	<0.5	<0.10	1.1
4-A-22	<0.3	<0.3	1.4	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	0.9
4-A-23	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.014	<0.5	<0.10	3.2
4-A-24														
4-A-25	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	1.1	<0.010	<0.5	<0.10	1.8
4-A-26	<3	<3	14	<3	<0.5	<5.0	<0.10	<0.50	<0.50	0.31	<0.010	<0.5	<0.10	1.4
4-A-27														
4-A-28	<0.3	<0.3	<0.3	<0.3	2.5	<5.0	0.37	<0.50	<0.50	3.2	0.012	<0.5	<0.10	1.0
4-A-29	0.50	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	1.9
4-A-30														
4-A-31														
4-A-32														
4-A-33														
4-A-34														
4-A-35														
4-A-36														
4-A-37	160	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.17	<0.5	<0.10	<0.50
4-A-38	140	<3	<3	<3	<0.5	<5.0	8.3	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	1.7
4-A-39														
4-A-40	<3	<3	<3	<3	<0.5	<5.0	<0.10	3.9	<0.50	<0.50	<0.010	<0.5	<0.10	5.5
4-A-41	13	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	0.015	<0.5	<0.10	3.9
4-A-42	9.0	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	<0.50	<0.010	<0.5	<0.10	1.2
4-A-43														
4-A-44														
4-A-45														
4-A-46														
4-A-47														
4-A-48	<3	<3	<3	<3	<0.5	<5.0	<0.10	2.2	<0.50	<0.50	<0.010	<0.5	<0.10	3.7
4-A-49														
4-B-14	0.5	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	3.2	<0.010	0.5	<0.10	0.66
4-B-2	<0.3	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	4.3	<0.010	0.5	<0.10	<0.50
4-B-3														
4-B-4	5	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	1.4	<0.010	<0.5	<0.10	0.98
4-B-5														
4-B-6														
4-B-7														
4-B-8	<3	<3	<3	<3	<0.5	<5.0	<0.10	<0.50	<0.50	7.3	<0.010	<0.5	<0.10	2.1
4-B-9														
4-B-10	3.5	<0.3	<0.3	<0.3	<0.5	<5.0	<0.10	<0.50	<0.50	3.9	<0.010	0.5	<0.10	2.8
4-B-11														

EPA STANDARD

Notes:

1. Results in ppm.
2. Samples collected by E.C. Jordan Co., December, 1988.
3. Analyses by Clayton Environmental Consultants.
4. EPA Standard - maximum concentration of contaminant for characterization of EP Toxicity.
5. No entry - sample was not analyzed.
6. No sample was collected from 4-A-1.
7. No drum was collected with the designation 4-A-17.

TABLE 2
Page 4

PCDS AND EP TOXICITY DATA - WASTE SAMPLES
Remedial Investigation Station Landfill Site, Jasper County, Michigan

WELL ID	Benzene				EP Toxicity Data									
	A202	A203	A204	A205	01	02	03	04	05	06	07	08	09	10
+0-12	<0.3	7.3	<0.3	0.5	<0.5	<0.5	<0.10	<0.00	<0.00	1.1	<0.010	<0.5	<0.10	0.0
+0-13	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	0.07	<0.00	3.9	<0.010	<0.5	<0.10	0.0
+0-14	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	<0.00	<0.010	<0.5	<0.10	<0.00
+0-15	1.0	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	<0.00	<0.010	<0.5	<0.10	17
+0-16														
+0-17														
+0-18														
+0-19														
+0-20														
+0-21														
+0-22														
+0-23														
+0-24	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	<0.00	0.012	<0.5	<0.10	<0.00
+0-25	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	<0.00	0.011	<0.5	<0.10	<0.00
+0-26	0.7	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	<0.00	<0.010	<0.5	<0.10	0.01
+0-27														
+0-28														
+0-29	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	0.0	<0.00	<0.00	<0.010	<0.5	<0.10	<0.00
+0-30														
+0-31	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	<0.00	0.01	<0.5	<0.10	<0.00
+0-32	1.7	<0.3	0.0	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	0.3	<0.010	<0.5	<0.10	0.0
+0-33	<0.3	<0.3	<0.3	1.7	<0.5	<0.5	<0.10	<0.00	<0.00	10.2	<0.010	<0.5	<0.10	27
+0-34	0.5	<0.3	0.7	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	10	<0.010	<0.5	<0.10	22
+0-35														
+0-36														
+0-37	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	1.0	<0.010	<0.5	<0.10	<0.00
+0-38														
+0-39	<0.3	<0.3	1.1	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	4.0	0.010	<0.5	<0.10	11
+0-40														
+0-41														
+0-42														
+0-43	1.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	2.0	<0.010	<0.5	<0.10	2.7
+0-44	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	1.2	0.020	<0.5	<0.10	7.0
+0-45	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	0.3	<0.010	<0.5	<0.10	<0.00
+0-46	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	2.0	0.010	<0.5	<0.10	0.2
+0-47														
+0-48	<0.3	<0.3	1.0	<0.3	<0.5	<0.5	<0.10	4.2	<0.00	<0.00	<0.010	<0.5	<0.10	11
+0-49														
+0-50	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	0.2	0.011	<0.5	<0.10	0.0
+0-51	<0.3	<0.3	2.7	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	0.00	<0.010	<0.5	<0.10	4.0
+0-52														
+0-53	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	2.0	0.010	<0.5	<0.10	4.0
+0-54														
+0-55														
+0-56	<0.3	0.7	1.0	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	2.2	0.020	<0.5	<0.10	0.0
+0-57														
+0-58														
+0-59														
+0-60														
+0-61														
+0-62														
+0-63	<0.3	<0.3	2.0	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	1.4	<0.010	<0.5	<0.10	1.7
+0-64	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	1.0	<0.010	<0.5	<0.10	3.0
+0-65														
+0-66														
+0-67	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	2.0	<0.010	<0.5	<0.10	0.0
+0-68	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	1.7	<0.010	<0.5	<0.10	2.0
+0-69														
+0-70														
+0-71	0.5	<0.3	3.7	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	0.0	<0.010	<0.5	<0.10	1.2
+0-72	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	3.4	<0.010	<0.5	<0.10	<0.00
+0-73	3.0	<0.3	2.0	<0.3	<0.5	<0.5	<0.10	<0.00	<0.00	<0.00	<0.010	<0.5	<0.10	1.0
EPA STANDARD					5.0	100.0	1.0	0.0		0.0	0.2	1.0	0.0	

Notes:

1. Results in ppm.
2. Samples collected by E.C. Jordan Co., December, 1986.
3. Analyses by Clayton Environmental Consultants.
4. = - Sample was an oil and could not be analyzed.
5. EPA Standard - maximum concentration of contaminant for characteristic of EP Toxicity.
6. No entry - sample was not analyzed.
7. No sample was collected from 4-0-64.

TABLE 2
Page 1

EP TOXICITY METALS AND PESTICIDES AND INCINERATION CHARACTERISTICS - WASTE SAMPLES
Remedial Investigation Refinery Landfill Site, Lapeer County, Michigan

SAMPLE NO.	LEAD	CADMIUM	CHROMIUM	2,4-D	TOXICITY	2,4,6-TP HALOGEN	CHLORIDES	S O ₂	HEAVY METALS
1-0-1	<1	<0.5	5	<20	<10	<10	10.05	10.00	0.001
1-0-2	<1	<0.5	5	<20	<10	<10	70.00	04.11	0.327
1-0-3	<1	<0.5	5	<20	<10	<10	00.03	24.4	0.000
1-0-4	<1	<0.5	5	<20	<10	<10	407.0	70.05	0.703
1-0-5	<1	<0.5	5	<20	<10	<10	<10.0	00.77	<100
1-0-6	<1	<0.5	5	<20	<10	<10	44.04	05.00	4.005
1-0-7	<1	<0.5	5	<20	<10	<10	70.02	20.0	0.714
1-0-8	<1	<0.5	5	<20	<10	<10	<10.0	0.15	14.201
1-0-9	<1	<0.5	5	<20	<10	<10	10.10	12.52	10.070
1-0-10	<1	<0.5	5	<20	<10	<10	1000.0	10.0	100
1-0-11	<1	<0.5	5	<20	<10	<10	20.70	21.70	10.430
1-0-12	<1	<0.5	5	<20	<10	<10	300.0	01.04	3.004
1-0-13	<1	<0.5	5	<20	<10	<10	12.02	0.33	12.700
1-0-14	<1	<0.5	5	<20	<10	<10	<10.0	2.70	11.300
1-0-15	<1	<0.5	5	<20	<10	<10	<10.0	0.0	12.020
1-0-16	<1	<0.5	5	<20	<10	<10	05.63	05.6	0.200
1-0-17	<1	<0.5	5	<20	<10	<10	110.0	04.20	1.410
1-0-18	<1	<0.5	5	<20	<10	<10	274.00	10.07	0.441
1-0-19	<1	<0.5	5	<20	<10	<10	20.05	5.05	12.004
1-0-20	<1	<0.5	5	<20	<10	<10	<10.0	0.02	12.100
1-0-21	<1	<0.5	5	<20	<10	<10	10.00	30.73	7.030
1-0-22	<1	<0.5	5	<20	<10	<10	3002.0	20.00	0.200
1-0-23	<1	<0.5	5	<20	<10	<10	410.10	07.71	<100
1-0-24	<1	<0.5	5	<20	<10	<10	110.10	4.00	12.004
1-0-25	<1	<0.5	5	<20	<10	<10	321.1	0.07	10.003
1-0-26	<1	<0.5	5	<20	<10	<10			
1-0-27	<1	<0.5	5	<20	<10	<10			
1-0-28	<1	<0.5	5	<20	<10	<10			
1-0-29	<1	<0.5	5	<20	<10	<10			
1-0-30	<1	<0.5	5	<20	<10	<10			
1-0-31	<1	<0.5	5	<20	<10	<10			
1-0-32	<1	<0.5	5	<20	<10	<10			
1-0-33	<1	<0.5	5	<20	<10	<10			
1-0-34	<1	<0.5	5	<20	<10	<10			
1-0-35	<1	<0.5	5	<20	<10	<10			
1-0-36	<1	<0.5	5	<20	<10	<10			
1-0-37	<1	<0.5	5	<20	<10	<10			
1-0-38	<1	<0.5	5	<20	<10	<10			
1-0-39	<1	<0.5	5	<20	<10	<10			
1-0-40	<1	<0.5	5	<20	<10	<10			
1-0-41	<1	<0.5	5	<20	<10	<10			
1-0-42	<1	<0.5	5	<20	<10	<10			
1-0-43	<1	<0.5	5	<20	<10	<10			
1-0-44	<1	<0.5	5	<20	<10	<10			
1-0-45	<1	<0.5	5	<20	<10	<10			
1-0-46	<1	<0.5	5	<20	<10	<10			
1-0-47	<1	<0.5	5	<20	<10	<10			
1-0-48	<1	<0.5	5	<20	<10	<10			
1-0-49	<1	<0.5	5	<20	<10	<10			
1-0-50	<1	<0.5	5	<20	<10	<10			
1-0-51	<1	<0.5	5	<20	<10	<10			
1-0-52	<1	<0.5	5	<20	<10	<10			
1-0-53	<1	<0.5	5	<20	<10	<10			
1-0-54	<1	<0.5	5	<20	<10	<10			
1-0-55	<1	<0.5	5	<20	<10	<10			
1-0-56	<1	<0.5	5	<20	<10	<10			
1-0-57	<1	<0.5	5	<20	<10	<10			
1-0-58	<1	<0.5	5	<20	<10	<10			
1-0-59	<1	<0.5	5	<20	<10	<10			
1-0-60	<1	<0.5	5	<20	<10	<10			
1-0-61	<1	<0.5	5	<20	<10	<10			
1-0-62	<1	<0.5	5	<20	<10	<10			
1-0-63	<1	<0.5	5	<20	<10	<10			
1-0-64	<1	<0.5	5	<20	<10	<10			
1-0-65	<1	<0.5	5	<20	<10	<10			
1-0-66	<1	<0.5	5	<20	<10	<10			
1-0-67	<1	<0.5	5	<20	<10	<10			
1-0-68	<1	<0.5	5	<20	<10	<10			
1-0-69	<1	<0.5	5	<20	<10	<10			
1-0-70	<1	<0.5	5	<20	<10	<10			
1-0-71	<1	<0.5	5	<20	<10	<10			
1-0-72	<1	<0.5	5	<20	<10	<10			
1-0-73	<1	<0.5	5	<20	<10	<10			
1-0-74	<1	<0.5	5	<20	<10	<10			
1-0-75	<1	<0.5	5	<20	<10	<10			
1-0-76	<1	<0.5	5	<20	<10	<10			
1-0-77	<1	<0.5	5	<20	<10	<10			
1-0-78	<1	<0.5	5	<20	<10	<10			
1-0-79	<1	<0.5	5	<20	<10	<10			
1-0-80	<1	<0.5	5	<20	<10	<10			
1-0-81	<1	<0.5	5	<20	<10	<10			
1-0-82	<1	<0.5	5	<20	<10	<10			
1-0-83	<1	<0.5	5	<20	<10	<10			
1-0-84	<1	<0.5	5	<20	<10	<10			
1-0-85	<1	<0.5	5	<20	<10	<10			
1-0-86	<1	<0.5	5	<20	<10	<10			
1-0-87	<1	<0.5	5	<20	<10	<10			
1-0-88	<1	<0.5	5	<20	<10	<10			
1-0-89	<1	<0.5	5	<20	<10	<10			
1-0-90	<1	<0.5	5	<20	<10	<10			
1-0-91	<1	<0.5	5	<20	<10	<10			
1-0-92	<1	<0.5	5	<20	<10	<10			
1-0-93	<1	<0.5	5	<20	<10	<10			
1-0-94	<1	<0.5	5	<20	<10	<10			
1-0-95	<1	<0.5	5	<20	<10	<10			
1-0-96	<1	<0.5	5	<20	<10	<10			
1-0-97	<1	<0.5	5	<20	<10	<10			
1-0-98	<1	<0.5	5	<20	<10	<10			
1-0-99	<1	<0.5	5	<20	<10	<10			
1-0-100	<1	<0.5	5	<20	<10	<10			
EPH STANDARD	20	100	10,000	10,000	500	1,000			

Notes:

1. EP Toxicity results in ppb; chlorides in ppm.
2. Samples collected by E.C. Jordan Co., December 1985.
3. Analyses by Clayton Environmental Consultants (EP Toxicity metals) and Analytic & Biological Laboratories (incineration characteristics).
4. No drum was collected with the designation 1-0-5.
5. No sample was collected from 1-0-3.
6. The limit of detection for bulk samples varied with sample size.
7. EPH Standard - maximum concentration of contaminant for characteristic of EP Toxicity.
8. No entry - sample was not analyzed.
9. Phase separation noted in Table 2 was lost during extraction.

TABLE 3 (Cont'd)
Page 2

EP TOXICITY HERBICIDES AND PESTICIDES AND INCINERATION CHARACTERISTICS - WASTE SAMPLES
Remedial Investigation Rotunda Landfill Site, Lapeer County, Michigan

SAMPLE ID	ENDRIN	LINDBER	DEMETRACHLOR	2,4-D	ISOPYRIFL	2,4,5-TP SILVER	CHLORIDES	E GSH	BIOM/LR
1-0-1									
1-0-2									
1-0-3									
1-0-4									
1-0-5									
1-0-6									
1-0-7									
1-0-8									
1-0-9									
1-0-10									
1-0-11									
1-0-12									
1-0-13									
1-0-14									
1-0-1									
1-0-2									
1-0-3									
1-0-4									
1-0-5									
1-0-6									
1-0-7									
1-0-8									
1-0-9									
1-0-10									
1-0-11									
1-0-12									
1-0-13									
1-0-14									
1-0-1									
1-0-2									
1-0-3									
1-0-4									
1-0-5									
1-0-6									
1-0-7									
1-0-8									
1-0-9									
1-0-10									
1-0-11									
1-0-12									
1-0-13									
1-0-14									
1-0-1									
1-0-2									
1-0-3									
1-0-4									
1-0-5									
1-0-6									
1-0-7									
1-0-8									
1-0-9									
1-0-10									
1-0-11									
1-0-12									
1-0-13									
1-0-14									
1-0-1									
1-0-2									
1-0-3									
1-0-4									
1-0-5									
1-0-6									
1-0-7									
1-0-8									
1-0-9									
1-0-10									
1-0-11									
1-0-12									
1-0-13									
1-0-14									
1-E-1									
1-E-2									
1-E-3									
1-E-4									
1-E-5									
1-E-6									
1-E-7									
1-E-8									
1-E-9									
1-E-10									
1-K-1									
EPA STANDARD	20	400	10,000	10,000	500	1,000			

Notes:

1. EP Toxicity results in ppm; chlorides in ppn.
2. Samples collected by E.C. Jordan Co., December 1980.
3. Analyses by Clayton Environmental Consultants (EP Toxicity metals) and Analytic & Biological Laboratories (incineration characteristics).
4. The limit of detection for bulk samples varied with sample size.
5. EPA Standard - maximum concentration of contaminant for characteristic of EP Toxicity.
6. No entry - sample was not analyzed.

TABLE 3 (con't)
Page 3

EP TOXICITY PESTICIDES AND HERBICIDES AND INCINERATION CHARACTERISTICS - WASTE SAMPLES
Remedial Investigation Rotunda Landfill Site, Lapeer County, Michigan

SAMPLE ID	CHLORIN	LINDANE	METHOMYL CHLOR	2,4-D	ISOPROPHENE	2,4,6-TP SILVER	CHLORIDES	Z OX	RES/LB.
4-2	<1	<1	<5	<3	<10	<2	<10.0	20.24	9,270
4-3	0	0	<10	<20	<20	<10	271.1	14.06	6,617
4-4									
4-5									
4-6	0	<1	<10	<7	<20	<3	90.08	9.66	12,204
4-7									
4-8	<1		<5	<20	<10	<10	17.53	51.31	5,040
4-9	<1	0.5	<5	<20	<10	<10	31.83	5.60	9,737
4-10	<1	0	<10	<3	<20	<2	20.42	0.61	16,803
4-11									
4-12	0	<1	<10	<0.7	<20	<0.3	19.29	26.04	0,072
4-13	0	<1	<10	<50	<20	<20	<10.0	11.9	3,996
4-14									
4-15	0	<1	<10	<3	<20	<2	22.46	0.16	13,047
4-16	0	0.5	<5	<3	<10	<2	<10.0	26.04	<100
4-18									
4-19	0	<1	<10	<7	<20	<3	51.65	21.69	6,109
4-20									
4-21	<5	0.5	<50	<8	<100	<4	89.03	30.21	0,544
4-22	<5	0.5	<20	<8	<50	<4	31.65	81.4	1,903
4-23	<5	0.5	<50	<4	<100	<2	41.88	22.82	11,762
4-24									
4-25	<10	0.5	<50	<4	<100	<2	19.21	10.14	13,565
4-26	<10	0.5	<50	<6	<100	<3	90.66	0.26	16,011
4-27									
4-28	<10	0.5	<20	<6	<50	<2	261.4	0.20	0,016
4-29	<10	0.5	<50	<4	<100	<2	34.79	6.60	13,517
4-30									
4-31									
4-32									
4-33									
4-34									
4-35									
4-36									
4-37			<10	<20	<20	<10	50.31	0.21	6,697
4-38	0	0.5	<10	<8	<20	<10	22.87	41.60	0,920
4-39									
4-40	<1	0.5	<5	<3	<10	<2	16.29	23.53	9,550
4-41	<1	0.5	<50	<7	<20	<3	<10.0	7.61	13,163
4-42	<1	0.5	<5	<20	<10	<10	15.71	9.00	12,737
4-43									
4-44									
4-45									
4-46									
4-47									
4-48	<1	0.5	<5	<20	<10	<10	23.03	6.0	14,196
4-49									
4-1	0	<1	<10	<3	<20	<2	<10.0	26.39	7,714
4-2	<0.1	<0.05	<0.5	<3	<1	<2	19.99	1.13	13,633
4-3									
4-4	0	0	<10	<7	<20	<3	42.11	5.64	13,612
4-5									
4-6									
4-7									
4-8	<1	<0.5	<5	<6	<10	<3	72.20	0.08	<100
4-9									
4-10	<1	<1	<5	<3	<10	<2	51.4	7.11	12,046
4-11									
EPA STANDARD	20	100	10,000	10,000	500	1,000	-	-	-

Notes:

1. EP Toxicity results in ppb; chlorides in ppm.
2. Samples collected by E.C. Jordan Co., December 1986.
3. Analyses by Clayton Environmental Consultants (EP Toxicity notes) and Analytic & Biological Laboratories (incineration characteristics).
4. The limit of detection for bulk samples varied with sample size.
5. EPA Standard - maximum concentration of contaminant for characteristic of EP Toxicity.
6. No entry - sample was not analyzed.
7. No sample was collected from 4-A-1.
8. No drum was collected with the designation 4-A-17.

TABLE 3 (Con't)
Page 4

EP TOXICITY HERBICIDES AND PESTICIDES AND INCINERATION CHARACTERISTICS - WASTE SAMPLES
Rotamora Landfill Site, Lapeer County, Michigan

WASTE ID	ENDRIN	LINDBERG	DETHIONOS, CHLOR	2,4-D	ISOPYRIFEN	2,4,6-TP SILVER	CHLORIDES	Z OSH	BTU/LB.
+0-12	<10	<5	<60	<8	<100	<4	137	1.65	14,404
+0-13	<2	<1	<10	<7	<20	<3	30	43.63	7,703
+0-14									
+0-15	<2	<1	<10	<7	<20	<3	116.9	60.81	2,631
+0-16									
+0-17									
+0-18	<2	<1	<10	<8.7	<20	<8.4	16	20.69	6,909
+0-19									
+0-20									
+0-21									
+0-22									
+0-23									
+0-24	<0.5	<0.2	<2	<20	<5	<10	29.37	47.03	0,003
+0-25	<2	<1	<10	<20	<20	<10	41.96	90.30	<100
+0-26	<1	<0.5	<5	<3	<10	<2	25.42	75.4	1,514
+0-27									
+0-28									
+0-29	<2	<1	<10	<7	<20	<3	103.7	10.03	5,006
+0-30									
+0-31	<2	<1	<10	<20	<20	<10	<10.0	60.6	1,704
+0-32	<2	<1	<10	<4	<20	<2	87.10	32.9	4,069
+0-33	<2	<1	<10	<4	<20	<2	70.36	34.06	2,766
+0-34	<0.1	<0.05	<0.5	<3	<1	<2	39.56	40.5	<100
+0-35									
+0-36									
+0-37	<1	<0.5	<5	<10	<10	<7	21.02	0.41	12,199
+0-38									
+0-39	<2	<2	<10	<20	<20	<10	34.96	17.8	11,307
+0-40									
+0-41									
+0-42									
+0-43	<1	<0.5	<5	<10	<10	<7	37.34	20.39	6,941
+0-44	<2	<5	<10	<20	<20	<10	39.09	0.31	247
+0-45	<3,000	<2,000	<20,000	<1,000	<30,000	<500	117.6	1.27	199
+0-46	<2	<5	<10	<7	<20	<3	37.48	10.34	12,652
+0-47									
+0-48	<1	<1	<5	<3	<10	<2	30.99	10.21	12,960
+0-49									
+0-50	<2	<5	<10	<8	<20	<4	35.60	16.09	10,548
+0-51	<2	<1	<10	<10	<20	<7	73.53	14.03	11,519
+0-52									
+0-53	<2	<1	<10	<7	<20	<3	46.0	0.37	6,660
+0-54									
+0-55									
+0-56									
+0-57	<2	<5	<10	<7	<20	<3	36.6	24.62	10,764
+0-58									
+0-59									
+0-60									
+0-61									
+0-62									
+0-63	<2	<2	<10	<20	<20	<2	39.07	16.46	11,091
+0-64	<2	<1	<10	<7	<20	<3	35.2	14.02	12,354
+0-65									
+0-66									
+0-67	<1	<0.5	<5	<7	<10	<3	53.21	15.06	11,540
+0-68	<2	<1	<10	<10	<20	<7	32.64	63	5,020
+0-69									
+0-70									
+0-71	<2	<2	<10	<10	<20	<7	23.31	31.04	7,161
+0-72	<2	<2	<10	<7	<20	<3	56.17	36.02	9,075
+0-73	<1	<0.5	<5	<10	<10	<7	36.77	10.75	12,310
EPA STANDARD	20	400	10,000	10,000	500	1,000	-	0	0
							0	0	0

Notes:

1. EP Toxicity results in pph; chlorides in ppm.
2. Samples collected by E.C. Jordan Co., December 1986.
3. Analyses by Clayton Environmental Consultants (EP Toxicity metals) and Analytic & Biological Laboratories (incineration characteristics).
4. The limit of detection for bulk samples varied with sample size.
5. EPA Standard - maximum concentration of contaminant for characteristic of EP Toxicity.
6. No entry - sample was not analyzed.
7. No sample was collected from 4-0 64.

APPENDIX C

Air Monitoring Data

- (1) Table TM-4
Results of Air Quality Monitoring
during the Pollutant Characterization Task
- (2) Field Data
- (3) Laboratory Reports

TABLE TM-4
 RESULTS OF AIR QUALITY MONITORING DURING THE POLLUTANT CHARACTERIZATION TASK
 Metamora Landfill Site

SAMPLING DATE	SAMPLE NO.	TOTAL HYDROCARBONS AS n-HEXANE (mg)	AIR VOLUME (L)	CONCENTRATION (ug/L)
12/3/86	512600 *	0.001	39.0	0.02
	512601 *	0.001	38.3	0.03
	512602 *	0.002	40.7	0.05
	512603 B	<0.001	-	-
12/5/86	514076 *	0.010	69.7	0.14
	514077	0.027	68.8	0.54
	514078	0.014	74.0	0.19
	514079	0.015	69.1	0.22
	514080	0.004	70.0	0.06
	514081 B	<0.001	-	-
12/8/86	513083	<0.001	74.3	<0.01
	513084	0.051	77.0	0.66
	513085	0.052	82.7	0.63
	513086	<0.001	76.8	<0.01
	513087 *	<0.001	78.6	<0.01
	513088 B	<0.001	-	-
12/9/86	513455 *	0.004	72.2	0.05
	513456	0.52	71.5	7.27
	513457	0.48	74.5	6.44
	513458	0.001	70.0	0.01
	513459	<0.001	71.2	<0.01
	513460 B	0.002 [1]	-	-
12/10/86	514275 *	0.001	67.1	0.01
	514276	0.037	67.9	0.54
	514277	0.019	72.9	0.26
	514278	0.014	68.9	0.20
	514279	0.009	70.2	0.13
	514280 B	<0.001	-	-
12/11/86	514664 *	<0.001	58.2	<0.02
	514665	0.002	57.1	0.04
	514666	0.001	61.3	0.02
	514667	0.001	57.2	0.02
	514668	0.002	58.2	0.03
	514669 B	<0.001	-	-

SAMPLING DATE	SAMPLE NO.	TOTAL HYDROCARBONS		AIR VOLUME (L)	CONCENTRATION (ug/L)
		AS	n-HEXANE (mg)		
12/12/86	515465	*	<0.001	46.9	<0.02
	515466		0.002	47.7	0.04
	515467		0.003	51.2	0.06
	515468		0.001	47.8	0.02
	515469		0.002	48.9	0.04
	515470	B	<0.001	-	-
12/15/86	515851		0.058	65.6	0.88
	515852		0.035	64.6	0.54
	515853	*	0.004	69.9	0.06
	515854		0.018	66.2	0.27
	515855		0.019	66.8	0.28
	515856	B	<0.001	-	-
12/16/86	516148		0.014	64.7	0.22
	516149		0.018 [2]	64.3	0.28
	516150	*	<0.001	68.3	<0.01
	516151		0.010	64.6	0.15
	516152		0.010	65.4	0.15
	516153	B	<0.001	-	-
12/17/86	516340		0.13	56.1	2.32
	516341		0.11	55.7	1.97
	516342	*	0.005	63.5	0.08
	516343		0.010	56.9	0.17
	516344		0.014	57.8	0.24
	516345	B	<0.001	-	-
12/18/86	516595		0.041	64.7	0.63
	516596		0.043	64.3	0.67
	516597	*	<0.001	68.3	<0.01
	516598		0.003	65.5	0.05
	516599		<0.001	66.5	<0.01
	516600	B	<0.001	-	-
12/19/86	516880		<0.001	71.5	<0.01
	516881		0.035	71.0	0.49
	516882	*	<0.001	76.4	<0.01
	516883		0.011	71.9	0.01
	516884		0.009	73.4	0.012
	516885	B	<0.001	-	-

Notes:

1. Actual value of client blank; results were blank corrected.
2. A qualitative GC/MS scan of this sample indicated that no compounds were detected.
3. Limit of detection 0.001 mg.
4. * - Background Sample
5. B - Blank

AIR MONITORING DATA

DATE: 12/3/86

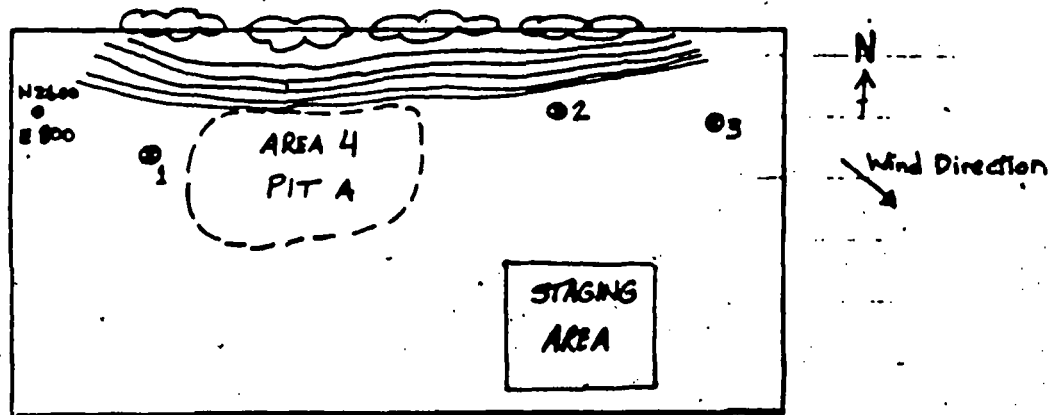
PUMP #	TIME START	TIME END	TOTAL TIME (min.)	FLOW RATE	ANALYSIS TOTAL HYDROCARBONS n-HEPTANE
① 000103	1134	1555	261	149.5 $\frac{cc}{min}$	"
② 000099	1142	1600	258	148.6 $\frac{cc}{min}$	"
③ 000064	1149	1604	255	159.6 $\frac{cc}{min}$	"

COMMENTS: Background

WEATHER CONDITIONS

TIME	WIND DIRECTION	WIND SPEED	TEMPERATURE	GENERAL
1145	≈ NORTHWEST	N.A.	N.A.	

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/5/86

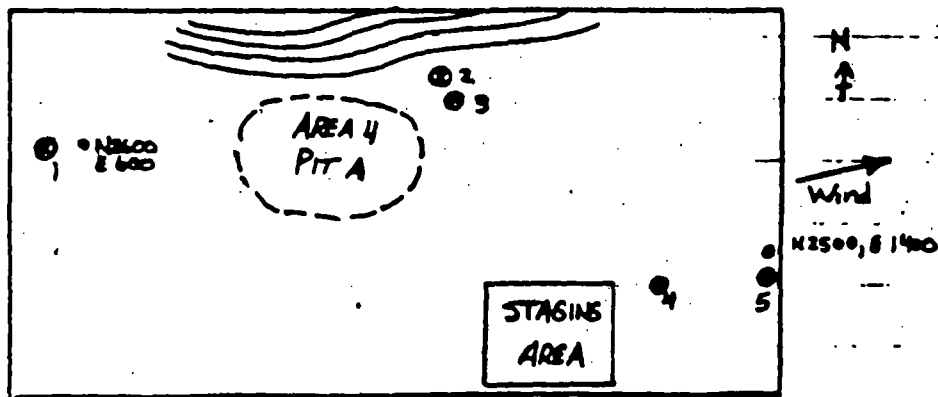
PUMP #	TIME START	TIME END	TOTAL TIME (min.)	FLOW RATE (cc/min)	ANALYSIS TOTAL HYDROCARBON n-Hexan
① 000103	0747	1533	466	149.5	"
② 000059	0750	1533	463	148.6	"
③ 000064	0750	1534	464	159.6	"
④ 000050	0757	1538	461	149.8	"
⑤ 000057	0759	1536	457	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(F) TEMPERATURE	GENERAL
0737	249°	4.1	20°	Cloudy, light snow
1345	248°	6.5	28°	Partly Sunny

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/8/86

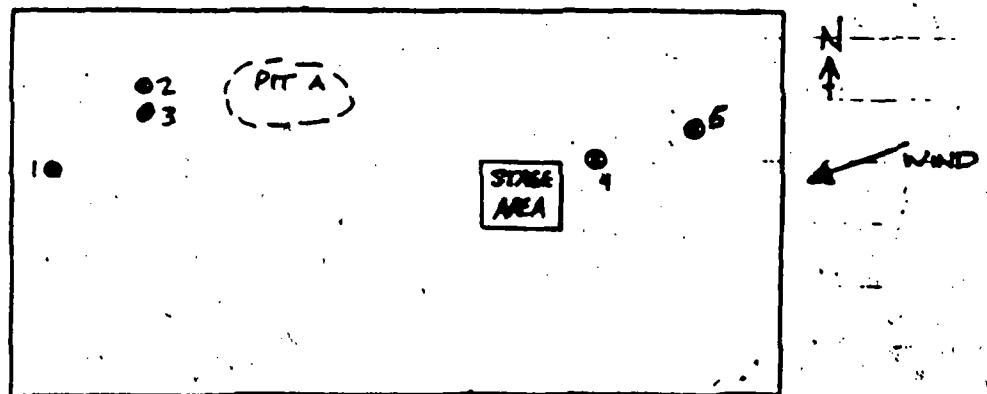
PUMP #	TIME START	TIME END	TOTAL TIME (min.)	FLOW RATE (cc/min.)	ANALYSIS TOTAL HYDROCARBONS n-HEXANE
① 000103	0812	1629	497	149.5	
② 000099	0750	1628	518	148.6	"
③ 000064	0750	1628	518	159.6	"
④ 000050	0800	1633	513	149.8	"
⑤ 000057	0801	1634	513	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(°F) TEMPERATURE	GENERAL
0745	18°	3.3	23°	Cloudy
1303	55°	4.6	24°	Cloudy, Flurries
1636	111°	9.8	21°	cloudy, Snow

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/9/86

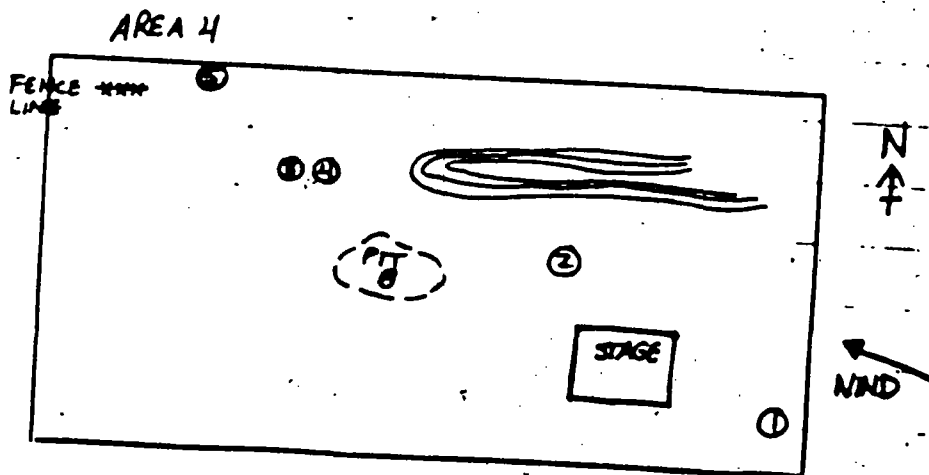
PUMP #	TIME START	TIME END	TOTAL TIME (min)	FLOW RATE (g/min)	ANALYSIS
D 000103	0735	1538	483	149.5	TOTAL HYDROCARBON
D 000059	0740	1541	481	148.6	"
D 000064	0745	1532	467	159.6	"
D 000050	0745	1532	467	149.8	"
D 000057	0750	1535	465	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(mm) WIND SPEED	(°F) TEMPERATURE	GENERAL
0727	145°	6.2	29°	Fog
0906	164°	5.0	29°	Rain
1109	253°	2.4	32°	RAIN
1231	251°	4.6	32°	RAIN

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/10/86

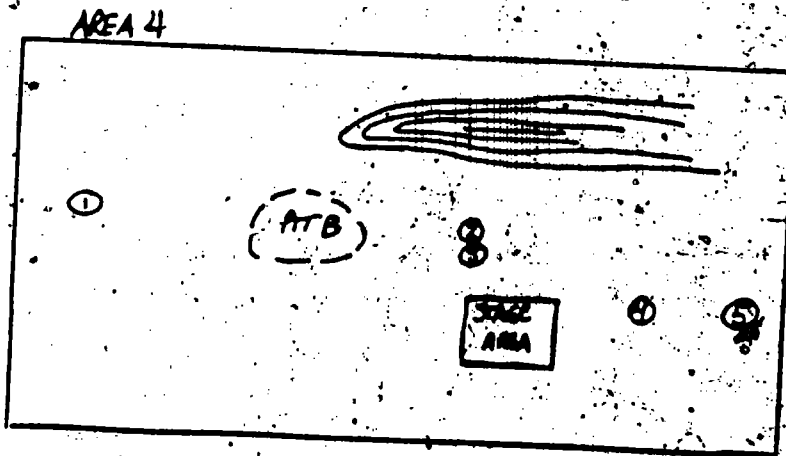
PUMP #	TIME START	TIME END	TOTAL TIME (min)	FLOW RATE (cf/min)	ANALYSIS: TOTAL HYDROCARBON: n-hexane
① 000193	0733	1502	449	149.5	
② 000059	0727	1504	457	148.6	11
③ 000064	0727	1504	457	159.6	
④ 000050	0729	1509	460	149.8	
⑤ 000057	0731	1509	458	153.2	

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(°F) TEMPERATURE	GENERAL
0723	250°	10.5	14°	Cloudy, Gusty wind.
1300	260°	14.5	17°	Partly Cloudy
1505	242°	11.0	18°	Partly Cloudy

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/11/86

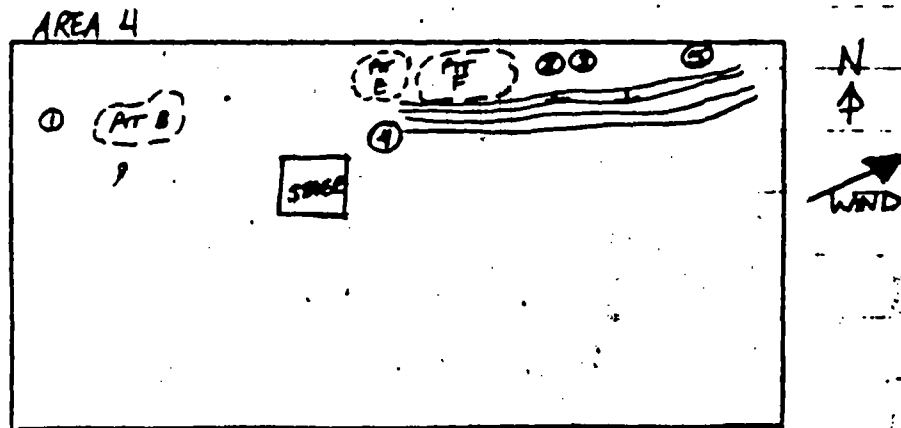
PUMP #	TIME START	TIME END	TOTAL TIME (min.)	FLOW RATE (cc/min)	ANALYSIS TOTAL HYDROCARBONS n-Hexane
000103	0741	1410	389	149.5	
000059	0733	1357	384	148.6	"
000064	0733	1357	384	159.6	"
000050	0738	1400	382	149.8	"
000057	0736	1356	380	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(°F) TEMPERATURE	GENERAL
0730	195°	9.0	12°	Clear
1030	208°	5.2	13°	Clear
1215	185°	13.5	20°	Clear
1408	185°	9.0	23°	Clear

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/12/86

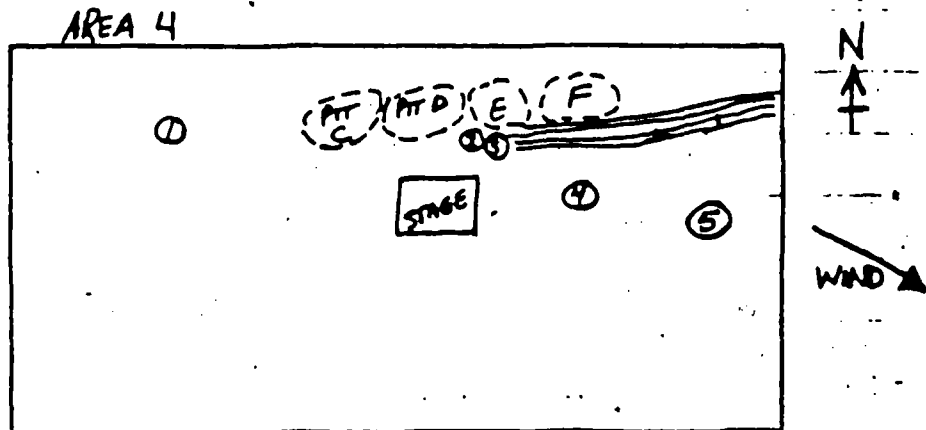
PUMP #	TIME START	TIME END	TOTAL TIME (min.)	FLOW RATE (cc/min)	ANALYSIS TOTAL HYDROCARBONS D. HEXANE
) 000103	0802	1316	314	149.5	"
) 000091	0753	1314	321	148.6	"
) 000064	0753	1314	321	159.6	"
) 000050	0754	1313	319	149.8	"
) 000057	0753	1312	319	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(°F) TEMPERATURE	GENERAL
0750	290°	6.0	18°	Cloudy
1030	280°	3.5	20°	Partly Cloudy
1300	268°	5.9	18°	Cloudy

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/15/86

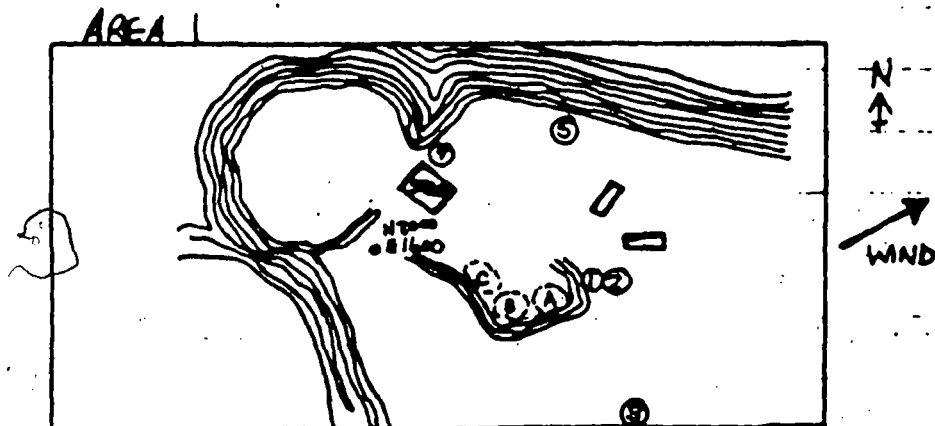
PUMP #	TIME START	TIME END	TOTAL TIME (min.)	FLOW RATE (CF/min)	ANALYSIS TOTAL HYDROCARBONS n-HEXANE
D 000103	0830	1549	439	149.5	
D 000059	0834	1549	435	148.6	
D 000064	0830	1548	438	159.6	
D 000050	0830	1552	442	149.8	
D 000057	0838	1554	436	153.2	

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(°F) TEMPERATURE	GENERAL
0814	240°	2.5	29°	Cloudy
1310	225°	8.0	30°	Cloudy
1630	212°	5.8	30°	Cloudy

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/16/86

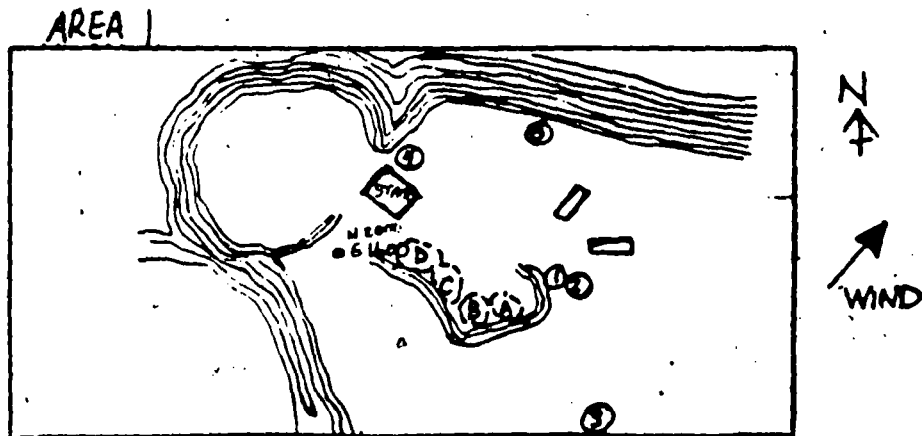
PUMP #	TIME START	TIME END	TOTAL TIME (min)	FLOW RATE (cc/min)	ANALYSIS:
000103	0808	1521	433	149.5	TOTAL HYDROCARBONS M-Hexane
000059	0808	1521	433	148.6	+ GC/MS
000064	0812	1520	428	159.6	TOT. HYD. M-Hexane
000050	0815	1526	431	149.8	"
000057	0817	1524	427	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(°F) TEMPERATURE	GENERAL
0750	200°	3.5	34°	Cloudy
1310	245°	2.5	33°	Cloudy + Drizzle
1550	260°	2.7	32°	Cloudy + Snow

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/17/86

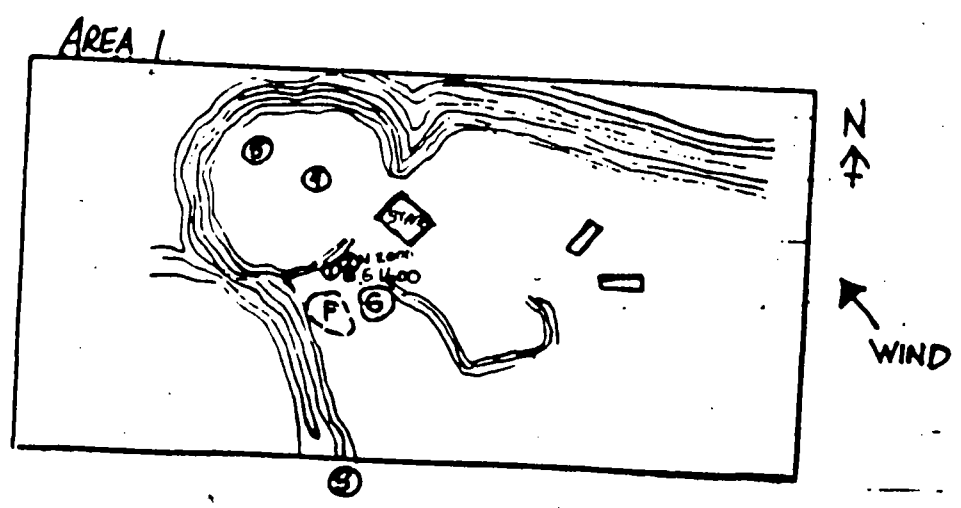
PUMP #	TIME START	TIME END	TOTAL TIME (min)	FLOW RATE (cm^3/min)	ANALYSIS: TOTAL HYDROCARBONS α -Hexane
① 000103	0915	1530	375	149.5	
② 000099	0915	1530	375	148.6	
③ 000064	0912	1550	398	159.6	
④ 000050	0916	1536	380	149.8	
⑤ 000057	0918	1535	377	153.2	

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	($^{\circ}\text{F}$) TEMPERATURE	GENERAL
0800	168 $^{\circ}$	>5.0	32 $^{\circ}$	FOG
1250	145 $^{\circ}$	3.5 MPH	32 $^{\circ}$	FOG
1610	120 $^{\circ}$	6.1	34 $^{\circ}$	FOG

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/18/86

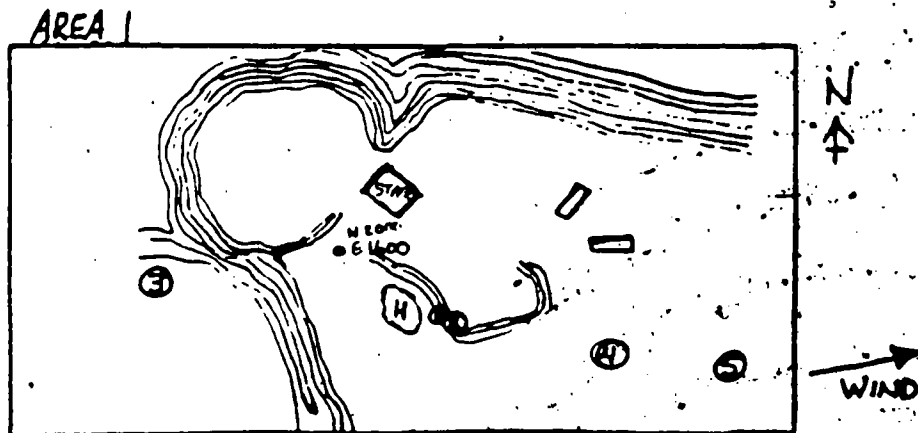
PUMP #	TIME START	TIME END	TOTAL TIME (min)	FLOW RATE (cc/min)	ANALYSIS TOTAL HYDROCARBON: n-HEXANE
D 000103	0807	1520	433	149.5	"
D 000059	0807	1520	433	148.6	"
D 000064	0815	1523	428	159.6	"
D 000050	0811	1528	437	149.8	"
D 000057	0813	1527	434	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	(MPH) WIND SPEED	(°F) TEMPERATURE	GENERAL
0750	257°	14	28°	Cloudy
1300	250°	13	25°	"
1550	256°	7	28°	"

SAMPLING LOCATION



AIR MONITORING DATA

DATE: 12/19/86

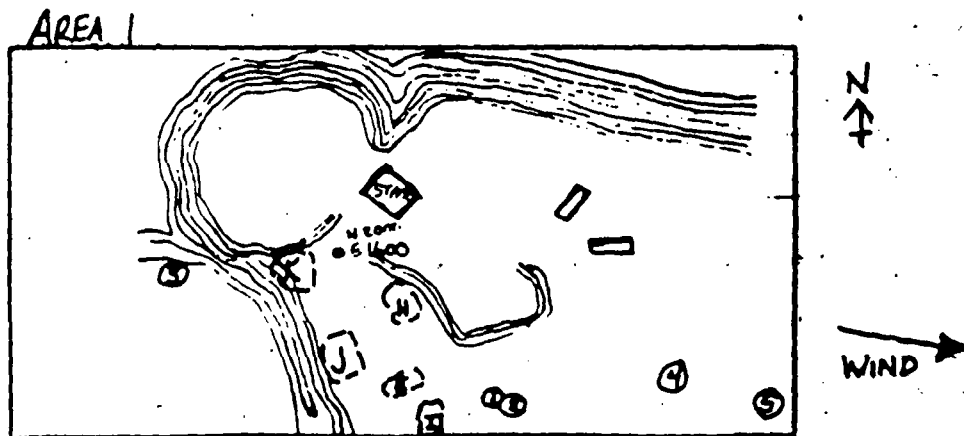
PUMP #	TIME START	TIME END	TOTAL TIME (min.)	FLOW RATE (L/min)	ANALYSIS: TOTAL HYDROCARBON n-HEXANE
D 000103	0757	1555	478	149.5	"
D 000099	0757	1555	478	148.6	"
D 000064	0800	1559	479	159.6	"
) 000050	0758	1558	480	149.8	"
) 000057	0758	1557	479	153.2	"

COMMENTS:

WEATHER CONDITIONS

TIME	WIND DIRECTION	WIND SPEED (MPH)	TEMPERATURE (°F)	GENERAL
0740	265°	7.0	27°	Cloudy
1258	270°	7.0	33°	"
1640	240°	3.5	28°	"

SAMPLING LOCATION



CLAYTON ENVIRONMENTAL CONSULTANTS, INC.

Analytical Laboratory Report

Ms. Kimberly Kesler-Arnold
Project Director
E.C. JORDAN COMPANY
17515 West Nine Mile, Suite 225
Southfield, MI 48075

Date Reported: 08-DEC-86
Date Received: 03-DEC-86
Clayton Project No.: 37742-17

Dear Ms. Kesler-Arnold:

The samples which you submitted to us have been analyzed as requested; the results are compiled in the following table.

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mg)
512600	SAMPLE #1	0.001
512601	SAMPLE #2	0.001
512602	SAMPLE #3	0.002
512603	SAMPLE #4	0.001

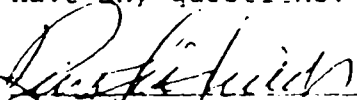
Limit of Detection: 0.001 mg
Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

The results have not been blank corrected. Please note that a blank should be submitted with each sample set.

The airborne concentrations are based on the field sampling data supplied.

It is a pleasure to be of assistance. Please contact us at (313) 344-1770 if you have any questions.


Robert Liedkfield Jr., C.I.H.
Manager, Laboratory Services
Novi, Office

CLAYTON ENVIRONMENTAL CONSULTANTS, INC.

Analytical Laboratory Report

Ms. Kimberly Kesler-Arnold
Project Director
E.C. JORDAN COMPANY
17515 West Nine Mile, Suite 225
Southfield, MI 48075

Date Reported: 08-DEC-86
Date Received: 08-DEC-86
Clayton Project No.: 37742-17

Dear Ms. Kesler-Arnold:

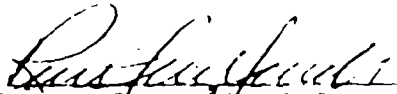
The samples which you submitted to us have been analyzed as requested; the results are compiled in the following table.

Lab Number	Sample Description	Total Hydrocarbons, as n-Hexane (mg)
513083	1;000103	<0.001
513084	2;000059	0.051
513085	3;000064	0.052
513086	4;000050	<0.001
513087	5;000057	<0.001
513088	6;	<0.001

Limit of Detection: 0.001 mg
Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

It is a pleasure to be of assistance. Please contact us at (313) 344-1770 if you have any questions.


Robert Dieckfeld Jr., C.I.H.
Manager, Laboratory Services
Novi Office

CLAYTON ENVIRONMENTAL CONSULTANTS, INC.

Analytical Laboratory Report

Ms. Kimberly Kesler-Arnold
Project Director
E.C. JORDAN COMPANY
17515 West Nine Mile, Suite 225
Southfield, MI 48075

Date Reported: 29-DEC-86
Date Received: 10-DEC-86
Clayton Project No.: 37742-17

Dear Ms. Kesler:

The samples which you submitted to us have been analyzed as requested; the results are compiled in the following tables.

Sampling Date: 12-09-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mq)
513455	SAMPLE 1; 103	0.004
513456	SAMPLE 2; 59	0.52
513457	SAMPLE 3; 64	0.48
513458	SAMPLE 4; 50	0.001
513459	SAMPLE 5; 57	<0.001
513460	SAMPLE 6 BLANK	(0.002) *

Limit of Detection: 0.001

Analytical Method: 1550, NIOSH Third Edition

* Actual value of client blank; results have been blank corrected.

Back sections were checked and showed no significant breakthrough.

E.C. JORDAN COMPANY
Clayton Project No.: 37742-17

Sampling Date: 12-10-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mg)
514076	SAMPLE 1:103	0.010
514077	SAMPLE 2:69	0.027
514078	SAMPLE 3:64	0.014
514079	SAMPLE 4:50	0.015
514080	SAMPLE 5:57	0.004
514081	SAMPLE 6 BLANK	0.001

Limit of Detection: 0.001 mg
Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

Sampling Date: 12-10-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mg)
514275	SAMPLE 1:103	0.001
514276	SAMPLE 2:59	0.037
514277	SAMPLE 3:64	0.019
514278	SAMPLE 4:50	0.014
514279	SAMPLE 5:57	0.009
514280	SAMPLE 6 BLANK	0.001

Limit of Detection: 0.001 mg
Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

E.C. JORDAN COMPANY
Clayton Project No.: 37742-17

Sampling Date: 12-11-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mg)
514664	SAMPLE 1;103	<0.001
514665	SAMPLE 2;59	0.002
514666	SAMPLE 3;64	0.001
514667	SAMPLE 4;50	0.001
514668	SAMPLE 5;57	0.002
514669	SAMPLE 6; BLANK	<0.001

Limit of Detection: 0.001 mg
Analytical Method: 1550. NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

Sampling Date: 12-12-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mg)
515465	SAMPLE 1-12-12	<0.001
515466	SAMPLE 2-12-12	0.002
515467	SAMPLE 3-12-12	0.003
515468	SAMPLE 4-12-12	0.001
515469	SAMPLE 5-12-12	0.002
515470	SAMPLE 6-12-12 BLANK	<0.001

Limit of Detection: 0.001 mg
Analytical Method: 1550. NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

E.C. JORDAN COMPANY
Clayton Project No.: 37742-17

Sampling Date: 12-16-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mg)
515851	SAMPLE 1-12-15	0.058
515852	SAMPLE 2-12-15	0.035
515853	SAMPLE 3-12-15	0.004
515854	SAMPLE 4-12-15	0.018
515855	SAMPLE 5-12-15	0.019
515856	SAMPLE 6-12-15 BLANK	<0.001

Limit of Detection: 0.001 mg
Analytical Method (NIOSH): S 90

Back sections were checked and showed no significant breakthrough.

Sampling Date: 12-16-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (mg)
516148	SAMPLE 1-12-16	0.014
516149	SAMPLE 2-12-16	0.018
516150	SAMPLE 3-12-16	<0.001
516151	SAMPLE 4-12-16	0.010
516152	SAMPLE 5-12-16	0.010
516153	SAMPLE 6-12-16 BLANK	<0.001

Limit of Detection: 0.001 mg
Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

As requested, Sample 2-12-16 was also qualitatively analyzed by gas chromatography/mass spectrometry (GC/MS). No compounds were detected.

E.C. JORDAN COMPANY
Clayton Project No.: 37742-17

Sampling Date: 12-17-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (ma)
516340	SAMPLE 1-12-17	0.13
516341	SAMPLE 2-12-17	0.11
516342	SAMPLE 3-12-17	0.005
516343	SAMPLE 4-12-17	0.010
516344	SAMPLE 5-12-17	0.014
516345	SAMPLE 6-12-17 BLANK	<0.001

Limit of Detection: 0.001 ma
Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

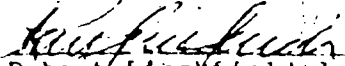
Sampling Date: 12-18-86

Lab Number	Sample Description	Total Hydrocarbons as n-Hexane (ma)
516595	SAMPLE 1-12-18	0.041
516596	SAMPLE 2-12-18	0.043
516597	SAMPLE 3-12-18	<0.001
516598	SAMPLE 4-12-18	0.003
516599	SAMPLE 5-12-18	<0.001
516600	SAMPLE 6-12-18 BLANK	<0.001

Limit of Detection: 0.001 ma
Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

It is a pleasure to be of assistance to you. Please contact me at (313) 344-1770 if you have any questions.


Robert Litchfield, Jr., C.E.H.

CLAYTON ENVIRONMENTAL CONSULTANTS, INC.

Analytical Laboratory Report

Ms. Kimberly Kesler-Arnold
 Project Director
 E.C. JORDAN COMPANY
 17515 West Nine Mile, Suite 225
 Southfield, MI 48075

Date Reported: 19 JAN-87
 Date Received: 19 DEC-86
 Clayton Project No. 37742-17

Dear Ms. Kesler:

The samples which you submitted to us have been analyzed as requested; the results are compiled in the following table.

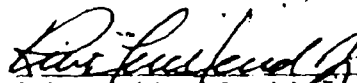
Sampling Date: 12-19-86

Lab Number	Sample Description	Total Hydrocarbons as n-hexane (mg)
516880	SAMPLE 1-12-19	0.001
516881	SAMPLE 2-12-19	0.035
516882	SAMPLE 3-12-19	0.001
516883	SAMPLE 4-12-19	0.011
516884	SAMPLE 5-12-19	0.009
516885	SAMPLE 6-12-19; BLANK	0.001

Limit of Detection: 0.001 mg
 Analytical Method: 1550, NIOSH Third Edition

Back sections were checked and showed no significant breakthrough.

It is a pleasure to be of assistance to you. Please contact me at (313) 344-1770 if you have any questions.


 Robert Lieckfield Jr., C.I.H.
 Manager, Laboratory Services
 Novi Office

APPENDIX B
DESIGN CALCULATIONS

870504
0000027.0.0.00

PROJECT META-MORPH STORAGE AREA LEGAL SOIL CONTAMINATED SOILS	COMP BY SDZ	JOB NO 4465-27
	CHK BY HC	DATE 5-5-87

STORAGE AREA

MATERIALS TO BE STORED:

1. EXCAVATED DRUMS - SLUDGES & SOLIDS LIQUIDS OFF-SITE DISPOSAL
2. CONTAMINATED SOILS SURROUNDING DRUMS
3. STAGING/DECONTAMINATION AREAS AT JOB COMPLETION

ASSUMPTIONS:

1. 7500 - 55 GAL DRUMS TO BE EXCAVATED
 2. AREA 1 - 5500 DRUMS
 3. AREA 4 - 2000 DRUMS
2. 55 GAL DRUMS ARE 75% FULL
3. 20% OF DRUMS HAVE PCBs > 50 PPM
4. DRUM CONTAINMENT CLASSIFICATION
 1. AREA 1
 - 1) 7% LIQUIDS
 - 2) 70% SLUDGE
 - 3) 57% SOLIDS
 3. AREA 4
 - 1) 13% LIQUIDS
 - 2) 52% SLUDGES
 - 3) 35% SOLIDS
5. REPACKAGE 55 GAL DRUMS IN 110 GAL CONTAINERS
6. 110 GAL CONTAINERS TO HOLD 15 GAL OF SLUDGE & SOLIDS
7. SLUDGE VOLUMES ARE INCREASED BY 50% WITH ABSORBENT MATERIAL
8. CONTAMINATED SOILS SURROUNDING DRUM IS EQUAL TO DRUM VOLUME - 55 GAL
9. REMOVE 1" OF SOIL OVER ENTIRE STAGING/DECONTAMINATION AREAS

PROJECT	1E-1024
STORAGE AREA 2007 FOR CONTAMINATED SOILS	

COMP BY	WJ	JOB NO	10-1-00
CHK BY	K	DATE	5-2-00

ASSUMPTIONS

9. 55 GAL CONTAINERS TO BE PLACED ON 4x4 PALETS - 3 PALETS
10. PALETS CAN BE DOUBLE STACKED
11. ALL LIQUID FILLED DRUMS TO BE DISPOSED OF OFF-SITE

EXCAVATED DRUM VOLUMES

TOTAL 55 GAL DRUMS - 5500

A. AREA 1 - 5500 DRUMS

1. PCB DRUMS - 500 (9%)

1) LIQUID DRUMS - 77 (7%)

$$77 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL}) = 3176 \text{ GAL OFF-SITE}$$

2) SLUDGE DRUMS - 396 (30%)

$$\frac{396 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL}) (1.5 \text{ BULKING})}{15 \text{ GAL/CONTAINER}} = 1034 \text{ CONTAINERS}$$

3) SOLID DRUMS - 1027 (57%)

$$\frac{1027 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL})}{15 \text{ GAL/CONTAINER}} = 1725 \text{ CONTAINERS}$$

B. NON-PCB DRUMS - 4400 (80%)

1) LIQUID DRUMS - 308 (7%)

$$308 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL}) = 12,705 \text{ GAL OFF-SITE}$$

PROJECT: VETAMIZ
 TANK AREA 2007, SEE DETERMINED SOLS

COMP BY: JGZ
 CHK BY:

JOB NO: 445-3
 DATE: 5/10/05

EXISTING DRUM VOLUMES

2) SPURGE DRUMS - 534 (70%)

$$\frac{534 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL}) (1.5 \text{ PACKING})}{5 \text{ GAL/CONTAINER}} = 6534 \text{ CONTAINERS}$$

3) SOLID DRUMS - 2508 (67%)

$$\frac{2508 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL})}{5 \text{ GAL/CONTAINER}} = 6897 \text{ CONTAINERS}$$

3) AREA 4 - 2000 DRUMS

4) SOLID DRUMS - 400 (20%)

1) LIQUID DRUMS - 52 (13%)

$$52 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL}) = 2145 \text{ GAL OFF-SITE}$$

2) SPURGE DRUMS - 208 (52%)

$$\frac{208 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL}) (1.5 \text{ PACKING})}{5 \text{ GAL/CONTAINER}} = 858 \text{ CONTAINERS}$$

3) SOLID DRUMS - 140 (35%)

$$\frac{140 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL})}{5 \text{ GAL/CONTAINER}} = 286 \text{ CONTAINERS}$$

3) NON-PEB DRUMS - 1000 (80%)

1) LIQUID DRUMS - 208 (13%)

$$208 \text{ DRUMS } (55 \text{ GAL/DRUM}) (75\% \text{ FULL}) = 8580 \text{ GAL OFF-SITE}$$

PROJECT METACRA	COMP BY STC	JOB NO 4405
STORAGE AREA FOR CONTAMINATED SOILS	CHK BY -	DATE 5.2.81

26 - 81

EXCAVATED SOIL VOLUMES:

WEDGE DRUMS - 332 (520)

$$\frac{332 \text{ DRUMS} \times 55 \text{ GAL/DRUM} \times 1.5 \text{ BURKINA}}{15 \text{ GAL/CONTAINER}} = 2432 \text{ CONTAINERS}$$

SOLID DRUMS - 500 (500)

$$\frac{500 \text{ DRUMS} \times 55 \text{ GAL/DRUM} \times 1.5 \text{ BURKINA}}{15 \text{ GAL/CONTAINER}} = 1540 \text{ CONTAINERS}$$

TOTAL CONTAINERS FROM EXCAVATED SOILS:

- 1. PCB CONTAINERS - 4500 (+ 5360 GAL LIQUID)
- 2. NON-PCB CONTAINERS - 8,400 (+ 2,310 GAL LIQUID)
- TOTAL = 12,900 (+ 26,670 GAL LIQUID)

CONTAINERS FROM CONTAMINATED SOILS SURROUNDING DRUMS:

$$\frac{270 \text{ DRUMS} \times 55 \text{ GAL/DRUM}}{15 \text{ GAL/CONTAINER}} = 27,500 \text{ CONTAINERS}$$

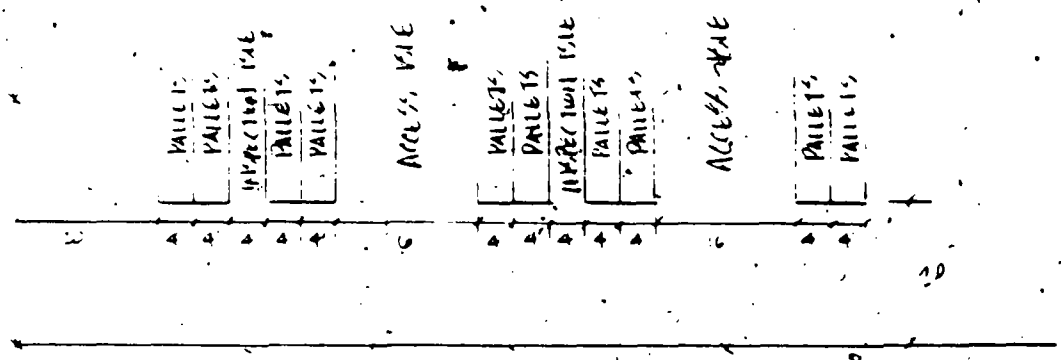
CONTAINERS FROM CONTAMINATED SOILS OF STAGING AREAS:

$$\frac{((20 \times 10 \times 1) + (20 \times 12.5 \times 1)) \times 7.481 \text{ GAL/FT}^3}{15 \text{ GAL/CONTAINER}} = 552 \text{ CONTAINERS}$$

TOTAL CONTAINERS = 125,588 (+ 26,670 GAL LIQUID)

PROJECT	EST 4022	COMP BY	JOB NO
ESTIMATE NO	2007 2007 2007 2007 2007 2007	CHK BY	DATE

ARRANGEMENT C



ASSUME 200 ROWS OF PALLETS & 200 ROWS
 200 ROWS ⇒ 200 ROWS - 3 + - 12 16 100 + 100 x 200 + 10
200 x 200 = 40000

200 SENCE + 200 DATE

APPENDIX C

USEPA OFF-SITE DISPOSAL POLICY

870504
0000028.0.0.00

9834

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 17 1987
EMERGENCY -
REMEDIATION -
RESPONSE BRANCH

November 13, 1987

NOV 16 1987

U.S. EPA REGION 5
OFFICE OF REGIONAL ADMINISTRATOR
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Revised Procedures for Planning and Implementing
Off-site Response Actions
FROM: *Winston Porter*
Winston Porter
Assistant Administrator
TO: Regional Administrators
Regions I-X

With this memo I am transmitting the revised procedures for planning and implementing off-site response actions (the "off-site policy"). These procedures should be observed when a response action under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Section 7003 of the Resource Conservation and Recovery Act (RCRA) involves off-site treatment, storage or disposal of CERCLA waste.

This policy incorporates all of the mandates of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA) and expands several of the more stringent requirements when applying them to wastes resulting from CERCLA decision documents signed, and RCRA section 7003 actions initiated, after the enactment of SARA. This revised policy also reinterprets the original off-site policy, issued in May 1985, as it applies to CERCLA wastes resulting from decision documents signed, and RCRA section 7003 actions initiated, before the enactment of SARA.

This revised policy is effective immediately upon issuance. It is considered to be an interim final policy as key elements of the policy will be incorporated in a proposed rule to be published in the Federal Register. As part of that rulemaking, the policy will be subject to public comment. Comments received during that period may cause additional revisions to the policy.

O. RA/RF (Fed Dtp)
5844634622
cc: W/D MEMO ONLY

can REMEDIAL ACTION

If you have comments regarding this revised policy,
please contact Gene Lucero, Director, Office of Waste Programs
Enforcement.

cc: Waste Management Division Directors
Regions I-X

Distributed 11/17/87
From: B. G. Constantelos
To: V. Thomas FYI
W. Miner FYI
W. Muno (original)
M. Gade FYI



DIRECTIVE NUMBER: 9834.11

TITLE: Revised Procedures for Implementing Off-Site
Response Actions

APPROVAL DATE: November 13, 1987

EFFECTIVE DATE: November 13, 1987

ORIGINATING OFFICE: Office of Waste Programs
Enforcement

FINAL (Interim)

DRAFT

LEVEL OF DRAFT

- A** - Signed by AA or DAA
- B** - Signed by Office Director
- C** - Review & Comment

REFERENCE (other documents):

WER OSWER OSWER
DIRECTIVE DIRECTIVE DI



OSWER Directive Initiation Request

Directive Number
9834.11

2. Originator Information

Name of Contact Person NANCY BROWNE	Mail Code 68-527	Office DM 2970	Telephone Code 475-9726
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3. Title
Revised Procedures for Implementing Off-Site Response Actions

4. Summary of Directive (include brief statement of purpose)
This Directive describes procedures that should be observed when a response action under CERCLA or Section 7003 of RCRA involves the off-site treatment, storage or disposal of CERCLA waste.

5. Keywords
Off-Site Policy, Off-Site Waste, CERCLA Waste, Off-Site Management of Waste

6a. Does This Directive Supersede Previous Directive(s)? No Yes

6b. Does It Supplement Previous Directive(s)? No Yes

What directive (number, title)
 1) Procedures for Planning & Impl. off-site Response Actions.
 2) Providing Notice to Facilities (9330.2-5)
 3) Eligibility of Facilities in Assessment Monitoring (9330.2-6)

Draft Level

A - Signed by AA/CAA B - Signed by Office Director C - For Review & Comment D - In Development

8. Document to be distributed to States by Headquarters? Yes No

This Request Meets OSWER Directives System Format Standards.

9. Signature of Lead Office Directives Coordinator *Dorine M. Williams* Date *11/13/87*

10. Name and Title of Approving Official *John A. ...* Date *11/13/87*

EPA Form 1075-17 (Rev. 5-87) Previous editions are obsolete.

SWER OSWER OSWER O

DIRECTIVE DIRECTIVE DIRECTIVE

REVISED PROCEDURES FOR IMPLEMENTING OFF-SITE RESPONSE ACTIONS

I. INTRODUCTION

The off-site policy describes procedures that should be observed when a response action under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Section 7003 of RCRA involves off-site storage, treatment or disposal of CERCLA waste. The procedures also apply to actions taken jointly under CERCLA and another statute.

The purpose of the off-site policy is to avoid having CERCLA wastes contribute to present or future environmental problems by directing these wastes to facilities determined to be environmentally sound. It is EPA's responsibility to ensure that the criteria for governing off-site transfer of CERCLA waste result in decisions that are environmentally sensible and that reflect sound public policy. Therefore, in developing acceptability criteria, the Agency has applied environmental standards and other sound management practices to ensure that CERCLA waste will be appropriately managed.

EPA issued the original off-site policy in May 1985. See "Procedures for Planning and Implementing Off-Site Response Actions", memorandum from Jack W. McGraw to the Regional Administrators. That policy was published in the Federal Register on November 5, 1985. The 1986 amendments to CERCLA, the Superfund Amendments and Reauthorization Act (SARA), adopted EPA's policy for off-site transfer of CERCLA wastes, with some modifications. CERCLA §121(d)(3) requires that hazardous substances, pollutants or contaminants transferred off-site for treatment, storage or disposal during a CERCLA response action be transferred to a facility operating in compliance with §§3004 and 3005 of RCRA and other applicable laws or regulations. The statute also requires that receiving units at land disposal facilities have no releases of hazardous wastes or hazardous constituents. Any releases from other units at a land disposal facility must also be controlled by a RCRA or equivalent corrective action program. While the original policy required compliance with RCRA and other applicable laws, SARA goes beyond the original policy, primarily by prohibiting disposal at units at a land disposal facility with releases, rather than allowing the Agency to judge whether the releases constituted environmental conditions that affected the satisfactory operation of a facility.

The off-site policy has been revised in light of the mandates of SARA. This revised policy also extends the SARA concepts to certain situations not specifically covered by the statute. These requirements apply to CERCLA decision documents signed, and RCRA §7003 actions taken, after enactment of SARA. Specifically, this policy covers:

- o Extending SARA's "no release" requirement to all RCRA units receiving CERCLA waste, not just units at RCRA land disposal facilities;
- o Expanding SARA's release prohibition to include releases of CERCLA hazardous substances, in addition to releases of RCRA hazardous waste and hazardous constituents;
- o Addressing releases from other units at RCRA treatment and storage facilities; and
- o Addressing off-site transfer to non-RCRA facilities.

The revised policy also reinterprets the May 1985 policy as it now applies to CERCLA decision documents signed, and RCRA §7003 actions taken, prior to the enactment of SARA.

The revised off-site policy is effective immediately upon issuance. It is considered to be an interim policy as key elements of the policy will be incorporated in a proposed rule to be published in the Federal Register. As part of that rulemaking, the policy will be subject to public comment. Comments received during that period may cause additional revisions to the policy. The final rule will reflect the final policy under CERCLA §121(d)(3) and EPA will issue a revised implementation policy memorandum if necessary.

II. APPLICABILITY

There are a number of variables which will determine whether and how the off-site policy applies: waste type, authority, funding source, and whether the decision document or order supporting the clean-up was signed before or after the enactment of SARA (i.e., before or after October 17, 1986). In order to determine which elements of the policy apply to a specific CERCLA cleanup each factor must be considered.

The first factor to consider is the type of waste to be transferred. The revised policy applies to the off-site treatment, storage or disposal of all CERCLA waste. CERCLA wastes include RCRA hazardous wastes and other CERCLA hazardous substances, pollutants and contaminants. RCRA hazardous wastes are either listed or defined by characteristic in 40 CFR Part 261. CERCLA hazardous substances are defined in 40 CFR 300.6.

Because RCRA permits and interim status apply to specific wastes and specific storage, treatment or disposal processes, the Remedial Project Manager (RPM) or On-Scene Coordinator (OSC) must determine that the facility's permit or interim

status authorizes receipt of the wastes that would be transported to the facility and the type of process contemplated for the wastes. Therefore, it is important that facility selection be coordinated with RCRA personnel.

A CERCLA hazardous substance that is not a RCRA hazardous waste or hazardous constituent (i.e., non-RCRA waste) may be taken to a RCRA facility if it is not otherwise incompatible with the RCRA waste, even though receipt of that waste is not expressly authorized under interim status or in the permit. Non-RCRA wastes can also be managed at non-RCRA facilities. Criteria applicable to CERCLA wastes that can be disposed of at non-Subtitle C facilities are discussed later in this revised policy.

The second factor to consider in determining whether this revised policy applies is the statutory authority for the action. This revised off-site policy applies to any remedial or removal action involving the off-site transfer of any hazardous substance, pollutant, or contaminant under any CERCLA authority or under RCRA §7003. This policy also applies to response actions taken under §311 of the Clean Water Act, except for cleanups of petroleum products. The policy also covers cleanups at Federal facilities under §120 of SARA.

The third factor to assess is the source of funding. The revised policy applies to all Fund-financed response actions, whether EPA or the State is the lead agency. The policy does not apply to State-lead enforcement actions (even at NPL sites) if no CERCLA funds are involved. It does apply to State-lead enforcement actions where EPA provides any site-specific funding through a Cooperative Agreement or Multi-Site Cooperative Agreement, even though the State may be using its own enforcement authorities to compel the cleanup. Similarly, non-NPL sites are covered by this policy only where there is an expenditure of Fund money or where the cleanup is undertaken under CERCLA authority.

The final factor that affects how this revised policy applies is the date of the decision document. As noted earlier, there are two classes of actions subject to slightly different procedures governing off-site transfer: first, those actions resulting from pre-SARA decision documents or RCRA §7003 orders issued prior to October 17, 1986, are subject to the May 1985 policy as updated by this revised policy; and second, those actions resulting from post-SARA decision documents or RCRA §7003 orders issued after October 17, 1986, are subject to the requirements of SARA as interpreted and expanded by this revised policy. Although the procedures in this policy are similar for these two classes of actions, there are important differences (e.g., the requirements pertaining to

releases from other units at a facility) that will be highlighted throughout this document.

Compliance with the revised procedures is mandatory for removal and remedial actions. However, there is an emergency exemption for removals if the OSC determines that the exigencies of the situation require off-site treatment, storage or disposal without following the requirements. This exception may be used when the OSC believes that the threat posed by the substances makes it imperative to remove the substances immediately and there is insufficient time to observe these procedures without endangering public health, welfare or the environment. In such cases, the OSC should consider temporary solutions (e.g., interim storage) to allow time to locate an acceptable facility. The OSC must provide a written explanation of his or her decision to use this emergency exemption to the Regional Administrator within 60 days of taking the action. In Regions in which authority to make removal decisions has not been fully delegated by the Regional Administrator to the OSC, the decisions discussed above must be made by the Regional official to whom removal authority has been delegated. This emergency exemption is also available to OSC's taking response actions under §111 of the Clean Water Act.

III. DEFINITIONS

A. Release

For the purposes of this policy, the term "release" is defined here as it is defined by §101(22) of CERCLA, which is repeated in 40 CFR 300.6 of the NCP, and the RCRA §3008(h) guidance ("Interpretation of Section 3008(h) of the Solid Waste Disposal Act", memorandum from J. Winston Porter and Courtney M. Price to the Regional Administrators, et al, December 16, 1985). To summarize, a release is any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injection, escaping, leaching, dumping or disposing to the environment. This includes releases to surface water, ground water, land surface, soil and air.

A release also includes a substantial threat of a release. In determining whether a substantial threat of release exists, both the imminence of the threat and the potential magnitude of the release should be considered. Examples of situations where a substantial threat of a release may exist include a weakened or inadequately engineered dike wall at a surface impoundment, or a severely rusted treatment or storage tank.

De minimis releases from receiving units are exempt; that is, they are not considered to be releases under the off-site

policy. De minimis releases are those that do not adversely affect public health or the environment, such as releases to the air from temporary opening and closing of bungs, releases between landfill liners of 1 gallon/acre/day or less, or stack emissions from incinerators not otherwise subject to Clean Air Act permits. Releases that need to be addressed by implementing a contingency plan would not normally be considered de minimis releases.

Federally-permitted releases, as defined by CERCLA § 101(10) and 40 CFR 100.6, are also exempt. These include discharges or releases in compliance with applicable permits under RCRA, the Clean Water Act, Clean Air Act, Safe Drinking Water Act, Marine Protection, Research and Sanctuaries Act, and Atomic Energy Act or analogous State authorities.

For purposes of this policy, an interim status unit in RCRA ground-water assessment monitoring (under 40 CFR 265.91) or a permitted unit in compliance monitoring (under 40 CFR 264.99) is not presumed to have a release. EPA will evaluate available information, including the data which led to a determination of the need for assessment or compliance monitoring, data gathered during assessment monitoring, and any other relevant data, including that gathered from applicable compliance inspections. A determination of unacceptability should be made when information will support the conclusion that there is a probable release to ground water from the receiving unit. Finding a release can happen at any time before, during or after an assessment or compliance monitoring program.

On the other hand, it is not necessary to have actual sampling data to determine that there is a release. An inspector may find other evidence that a release has occurred, such as a broken dike or feed line at a surface impoundment. Less obvious indications of a release might also be adequate to make the determination. For example, EPA could have sufficient information on the contents of a land disposal unit, the design and operating characteristics of the unit, or the hydrogeology of the area in which the unit is located to conclude that there is or has been a release to the environment.

B. Receiving Unit

The receiving unit is any unit that receives off-site CERCLA waste:

- (1) for treatment using BDAT, including any pre-treatment or storage units used prior to treatment;
- (2) for treatment to substantially reduce its mobility,

toxicity or persistence in the absence of a defined BDAT; or

- (3) for storage or ultimate disposal of waste not treated to the previous criteria.

Note that the acceptability criteria may vary from unit to unit, and that the receiving unit may vary from transfer to transfer.

C. Other Units

Other units are all other regulated units and solid waste management units (SWMU's) at a facility that are not receiving units.

D. Controlled Release

In order to be considered a controlled release, the release must be addressed by a RCRA corrective action program (incorporated in a permit or order) or a corrective action program approved and enforceable under another applicable Federal or delegated State authority.

E. Relevant Violations

Relevant violations include Class I violations as defined by the RCRA Enforcement Response Policy (December 21, 1984, and subsequent revisions) at or affecting a receiving unit. A Class I violation is a significant deviation from regulations, compliance order provisions or permit conditions designed to:

- o Ensure that hazardous waste is destined for and delivered to authorized facilities;
- o Prevent releases of hazardous waste or constituents to the environment;
- o Ensure early detection of such releases; or
- o Compel corrective action for releases.

Recordkeeping and reporting requirements (such as failure to submit the biennial report or failure to maintain a copy of the closure plan at the facility) are generally not considered to be Class I violations.

Violations affecting a receiving unit include all ground-water monitoring violations unless the receiving unit is outside the waste management area which the ground-water monitoring system was designed to monitor. Facility-wide Class I violations (such as failure to comply with financial

responsibility requirements, inadequate closure plan, inadequate waste analysis plan, inadequate inspection plan, etc.) that affect the receiving unit are also relevant violations.

Violations of State or other Federal laws should also be examined for relevance, considering the significance of the requirement that is being violated; the extent of deviation from the requirement; and the potential or actual threat to human health or the environment.

F. Relevant Release

A relevant release under this revised policy includes:

- o Any release or significant threat of release of a hazardous substance (defined in 40 CFR 300.6) not previously excluded (i.e., de minimis releases or permitted releases) at all units of a RCRA Subtitle C land disposal facility and at receiving units of a RCRA Subtitle C treatment or storage facility; and
- o Environmentally significant releases of any hazardous substance not previously excluded at non-receiving units at RCRA subtitle C treatment and storage facilities and at all units at other facilities.

G. Relevant Conditions

Relevant conditions include any environmental conditions (besides a relevant violation) at a facility that pose a significant threat to public health, welfare or the environment or that otherwise affect the satisfactory operation of the facility.

H. Responsible Agency

Determinations of acceptability to receive an off-site transfer of CERCLA waste will be made by EPA or by States authorized for corrective action under §3004(u) of RCRA. References in this document to the "responsible Agency" refer only to EPA Regions or to States with this authority.

I. Responsible Government Official

The responsible government official is that person authorized in the responsible Agency to make acceptability determinations under this revised policy.

IV. ACCEPTABILITY CRITERIA

A. Acceptability Criteria for Wastes Generated Under Pre-SARA Decision Documents

CERCLA wastes from actions resulting from pre-SARA decision documents and pre-SARA RCRA §7003 orders may go to a facility meeting the following criteria:

- o There are no relevant violations at or affecting the receiving unit; and
- o There are no relevant conditions at the facility (i.e., other environmental conditions that pose a significant threat to public health, welfare or the environment or otherwise affect the satisfactory operation of the facility).

In order to determine if there is a relevant violation, an appropriate compliance inspection must be conducted no more than six months before the expected date of receipt of CERCLA waste. This inspection, at a minimum, must address all regulated units. This inspection may be conducted by EPA, a State or an authorized representative. When a State conducts the inspection, it should determine the facility's compliance status. Where a violation or potential violation comes to EPA's attention (e.g., through a citizen complaint or a facility visit by permit staff), the Region or State is expected to investigate whether a violation occurred as soon as is reasonably possible.

The May 1985 policy does not refer specifically to releases. Rather, a corrective action plan is required for relevant conditions. Therefore, in some cases, a facility receiving CERCLA wastes from an action subject to a pre-SARA decision document may not need to institute a program to control releases. Releases will be evaluated by the responsible Agency to determine whether such releases constitute relevant conditions under this policy.

The activities related to determining acceptability, providing notice to facilities, regaining acceptability and implementation procedures are discussed in the "Implementation" section of this document, and apply to off-site transfers of waste generated under pre-SARA and post-SARA decision documents.

B. Acceptability Criteria for Wastes Generated Under Post-SARA Decision Documents

Under this revised policy, there are three basic criteria that are used to determine the acceptability of a facility to receive off-site transfers of CERCLA waste generated under a post-SARA decision document or post-SARA RCRA §7003 cleanup. The criteria are:

- o There must be no relevant violations at or affecting the receiving unit;
- o There must be no releases from receiving units and contamination from prior releases at receiving units must be addressed as appropriate; and
- o Releases at other units must be addressed as appropriate.

The last two criteria are applied somewhat differently, depending on the type of facility. These differences are described below.

1. Criteria Applicable to All RCRA Subtitle C Treatment, Storage and Disposal Facilities. The first criterion that applies to all Subtitle C facilities is that there can be no relevant violations at or affecting the receiving unit. As discussed earlier, this determination must be based on an inspection conducted no more than six months prior to receipt of CERCLA waste.

A second element that applies to all Subtitle C facilities is that there must be no releases at receiving units. Releases from receiving units, except for de minimis releases and State- and Federally-permitted releases, must be eliminated and any prior contamination from the release must be controlled by a corrective action permit or order under Subtitle C, as described in the next section.

The final criterion that applies to all Subtitle C facilities, is that the facility must have undergone a RCRA Facility Assessment (RFA) or equivalent facility-wide investigation. This investigation addresses EPA's affirmative duty under CERCLA §121(d)(3) to determine that there are no releases at the facility.

Releases of RCRA hazardous waste or hazardous constituents and CERCLA hazardous substances are all included under the policy. While the RFA need not focus on identifying releases of hazardous substances that are not RCRA hazardous wastes or hazardous constituents, to the extent such releases are discovered in an RFA or through other means, they will be

considered the same as a release of hazardous waste or hazardous constituents.

o Additional Criteria Applicable to RCRA Subtitle C Land Disposal Facilities. Land disposal facilities must meet additional requirements imposed by SARA and this policy. The term "land disposal facility" means any RCRA facility at which a land disposal unit is located, regardless of whether the land disposal unit is the receiving unit. Land disposal units include surface impoundments, landfills, land treatment units and waste piles. .

As stated earlier, there must be no releases at or from receiving units. In addition, releases from other units at a land disposal facility must be controlled under a corrective action program. The RFA will help determine whether there is a release. In addition, land disposal facilities must have received a comprehensive ground-water monitoring evaluation (CME) or an operation and maintenance (O&M) inspection within the last year.

Units at RCRA Subtitle C land disposal facilities receiving CERCLA waste that is also RCRA hazardous waste must meet the RCRA minimum technology requirements of RCRA §3004(c). Only where a facility has been granted a waiver can a land disposal unit not meeting the minimum technology requirements be considered acceptable for off-site disposal of CERCLA waste that is RCRA hazardous waste.

o Criteria Applicable to Subtitle C Treatment and Storage Facilities. The criterion for controlling releases from other units does not apply to all releases at treatment and storage facilities, as it does at land disposal facilities. Releases from other units at treatment and storage facilities must be evaluated for environmental significance and their effect on the satisfactory operation of the facility. If determined by the responsible Agency to be environmentally significant, releases must be controlled by a corrective action program under an applicable authority. Releases from other units at treatment and storage facilities determined not to be environmentally significant do not affect the acceptability of the facility for receipt of CERCLA waste.

2. Criteria Applicable to RCRA Permit-by-Rule Facilities. This revised policy is also applicable to facilities subject to the RCRA permit-by-rule provisions in 40 CFR 270.60. These include ocean disposal barges or vessels, injection wells and publicly owned treatment works (POTWs). Permit-by-rule facilities receiving RCRA hazardous waste must have a RCRA permit or RCRA interim status. RCRA permit-by-rule facilities must also receive an inspection for compliance with applicable RCRA permit or interim status requirements. In addition, these

facilities (and other non-RCRA facilities) should be inspected by the appropriate inspectors for other applicable laws.

In general, except for POTWs (discussed below), these facilities will be subject to the same requirements as RCRA treatment and storage facilities. That is, there can be no releases of hazardous waste, hazardous constituents or hazardous substances from receiving units. There also can be no relevant violations at or affecting the receiving unit, as confirmed by an inspection conducted no more than six months prior to the receipt of CERCLA waste. Releases from other units determined by the responsible Agency to be environmentally significant must be controlled by an enforceable agreement under the applicable authority.

Criteria for discharge of wastewater from CERCLA sites to POTWs can be found in a memorandum titled, "Discharge of Wastewater from CERCLA Sites into POTWs," dated April 15, 1986. That memorandum requires an evaluation during the RI/FS process for the CERCLA site to consider such points as:

- o the quantity and quality of the CERCLA wastewater and its compatibility with the POTW;
- o the ability of the POTW to ensure compliance with applicable pretreatment standards;
- o the POTW's record of compliance with its NPDES permit; and
- o the potential for ground-water contamination from transport to or impoundment of CERCLA wastewater at the POTW.

Based on a consideration of these and other points listed in the memorandum, the POTW may be deemed appropriate or inappropriate for receipt of CERCLA waste.

3. Criteria Applicable to Non-Subtitle C Facilities. In some instances, it may be appropriate to use a non-Subtitle C facility for off-site transfer: for example, PCB disposal is regulated under the Toxic Substances Control Act (TSCA); nonhazardous waste disposal is regulated under Subtitle D of RCRA and applicable State laws; and disposal of radionuclides is regulated under the Atomic Energy Act. At such facilities, all releases are treated in the same manner as releases from other units at Subtitle C treatment and storage facilities. That is, the responsible Agency should make a determination as to whether the release is environmentally significant and, if so, the release should be controlled by a corrective action program under the applicable Federal or State authority.

Requirements for the disposal of PCBs are established in 40 CFR 761.60. Generally, these regulations require that whenever disposal of PCBs is undertaken, they must be incinerated, unless the concentrations are less than 50 ppm. If the concentrations are between 50 and 500 ppm, the rule provides for certain exceptions that provide alternatives to the incineration requirements. The principal alternative is disposal in a TSCA-permitted landfill for PCBs. If a TSCA landfill is the receiving unit for PCBs, then that facility is subject to the same criteria applicable if a RCRA land disposal unit is the receiving unit: i.e., no relevant violations, no releases at the receiving unit and controlled releases at other units. PCBs at levels less than 50 ppm may be transported to acceptable Subtitle D facilities as discussed previously.

V. IMPLEMENTATION

A. Determining Acceptability

Acceptability determinations under the off-site policy will be made by EPA or by States authorized for corrective action under §3004(u) of RCRA. Where States have such authority, the State may make acceptability determinations for facilities in the State in consultation with EPA. Regardless of a State's authorization status, the Region and States should establish, in the Superfund Memorandum of Agreement, mechanisms to ensure timely exchange of information, notification of facilities and coordination of activities related to the acceptability of facilities and potential selection of facilities for off-site transfer. The Regions and States also need to establish or enhance coordination mechanisms with their respective RCRA program staffs in order to ensure timely receipt of information on inspections, violations and releases. These agreements can be embodied in State authorization Memoranda of Agreement, State grant agreements, or State-EPA enforcement agreements.

The responsible government official in the Region or State in which a hazardous waste facility is located will determine whether the facility has relevant violations or releases which may preclude its use for off-site transfer of CERCLA wastes. Each Region and State should have a designated off-site coordinator responsible for ensuring effective communication between CERCLA response program staff and RCRA enforcement staff within the Regional Offices, with States, and with other Regions and States.

The off-site coordinator should maintain a file of all information on the compliance and release status of each commercial facility in the Region or State. This information should be updated based on the results of State- or

EPA-conducted compliance inspections or other information on these facilities.

CERCLA response program staff should identify potential off-site facilities early in the removal action or the remedial design process and check with the appropriate Regional and/or State off-site coordinator(s) regarding the acceptability status of the facilities. If one or more facilities is identified that has not received an inspection within the last six months, the Regional off-site coordinator(s) should arrange to have such inspection(s) conducted within a timeframe dictated by the project schedule. The CERCLA REM/FIT contractor may conduct the inspection under the direction of the Deputy Project Officer. If contractor personnel are used, the Region should ensure that such personnel are adequately trained to conduct the inspections.

Responsible Agencies should base their acceptability determinations on an evaluation of a facility's compliance status and, as appropriate, whether the facility has releases or other environmental conditions that affect the satisfactory operation of the facility. States not authorized for HSWA corrective action may assist EPA in making the acceptability determination by determining a facility's compliance status (based on a State inspection) and providing this information to EPA. Regions and States should use the following types of information to make acceptability determinations:

- o State- or EPA-conducted inspections. EPA will continue to assign high priority to conducting inspections at commercial land disposal, treatment and storage facilities. Facilities designated to receive CERCLA waste must be inspected within six months of the planned receipt of the waste. In addition, land disposal facilities must have received a comprehensive ground-water monitoring inspection (CME) or an operation and maintenance (O&M) inspection within the last year, in accordance with the timeframes specified in the RCRA Implementation Plan (RIP).
- o RCRA Facility Assessments (RFAs). To be eligible under this policy, a RCRA Subtitle C facility must have had an RFA or equivalent facility-wide investigation. The RFA or its equivalent must be designed to identify existing and potential releases of hazardous waste and hazardous constituents from solid waste management units at the facility.
- o Other data sources. Other documents such as the facility's permit application, permit, Ground Water Task Force report, ground-water monitoring data or

ground-water assessment report can contain information on violations, releases or other conditions. Relevant information from these documents should also be used to determine a facility's acceptability to receive waste under the off-site policy.

B. Notice Procedures

EPA expects that Regions and States will take timely and appropriate enforcement action on determining that a violation has occurred. Where a responsible Agency performs an inspection that identifies a relevant violation at a commercial facility likely to accept CERCLA wastes, within five working days of the violation determination, the responsible Agency must provide written notice to the facility of the violation and the effects of applying this policy. States not authorized for HSWA corrective action should inform EPA of the violation so that EPA can notify the facility of the effect of the violation under this policy. (See RCRA Enforcement Response Policy for a discussion of appropriate enforcement responses and timeframes for Class I violations.)

When the responsible Agency determines that a relevant release has occurred, or that relevant conditions exist, the responsible Agency must notify the facility in writing within five working days of that determination. The notice must also state the effect of the determination under this policy. A copy of any notice must also be provided to the non-issuing Region or State in which the facility is located. States not authorized for HSWA corrective action should provide EPA with information on releases so that EPA can determine whether a relevant release has occurred.

Private parties conducting a response action subject to this policy will need to obtain information on the acceptability of commercial facilities. The responsible Agency must respond with respect to both pre-SARA and post-SARA wastes. In addition, the responsible Agency should indicate whether the facility is currently undergoing a review of acceptability and the date the review is expected to be completed. No enforcement sensitive or predecisional information should be released.

A facility may submit a bid for receipt of CERCLA waste during a period of unacceptability. However, a facility must be acceptable in order to be awarded a contract for receipt of CERCLA waste.

Scope and Contents of the Notice. The responsible Agency must send the notice to the facility owner/operator by certified and first-class mail, return receipt requested. The

certified notice, if not acknowledged by the receipt return card, will be considered to have been received by the addressee if properly sent by first-class mail to the last address known to the responsible Agency. The notice should contain the following:

- o A finding that the facility may have conditions that render it unacceptable for receipt of off-site waste, based upon available information from an RFA, an inspection, or other data sources;
- o A description of the specific acts, omissions or conditions that form the basis of the findings;
- o Notice that the facility owner/operator has the opportunity to request an informal conference with the responsible government official to discuss the basis for the facility's unacceptability determination under this revised policy, provided that such a request is made within 10 calendar days from the date of the notice. The owner/operator may submit written comments within 30 calendar days from the date of the notice in lieu of holding the conference.
- o Notice that failure to request an informal meeting or submit written comments will result in no further consideration of the determination by the responsible Agency during the 60 calendar days after issuance of the notice. The responsible Agency will cease any transport of CERCLA waste to the facility on the 60th calendar day after issuance of the notice.
- o Notice that the owner/operator may request, within 10 calendar days of hearing from the responsible government official after the informal conference or the submittal of written comments, a reconsideration of the determination by the Regional Administrator or appropriate State official. The Regional Administrator or State official may agree to review the determination at his or her discretion; and
- o Notice that such a review by the Regional Administrator or appropriate State official, if agreed to, will be conducted within 60 calendar days of the initial notice, if possible, but that the review will not stay the determination.

~~The facility may continue to receive CERCLA waste for 60~~
calendar days after issuance of the initial notice. As indicated above, facility owners or operators may request an informal conference with the responsible government official

within 10 calendar days from the date of issuance of the notice, to discuss the basis for a violation or release determination and its relevance to the facility's acceptability to receive CERCLA wastes. Any such meeting should take place within 30 calendar days of the date the initial notice is issued. If unacceptability is based on a State inspection or enforcement action, a representative of the State should attend the meeting. If the State does not attend, EPA will notify the State of the outcome of the meeting. The owner/operator may submit written comments within 30 calendar days from the date of the notice in lieu of holding the conference. If the responsible Agency does not find that the information submitted at the informal conference or in comments is sufficient to support a finding of acceptability to receive CERCLA wastes, it should so inform the facility orally or in writing.

Within 10 calendar days of hearing from the responsible government official after the informal conference or the submittal of written comments, the facility owner or operator may request a reconsideration of the determination by the Regional Administrator or appropriate State official. The Regional Administrator or appropriate State official may use his or her discretion in deciding whether to conduct a review of the determination. Such a review, if granted, should be conducted within the 60 day period (originating with the notice) to the extent possible. The review will not stay the determination.

The RPM, OSC or equivalent site manager must stop transfer of waste to a facility on the 60th calendar day after issuance of a notice. The facility then remains unacceptable until such time as the responsible Agency notifies the owner or operator otherwise. The off-site coordinator and the OSC/RPM should maintain close coordination throughout the 60-day period.

In limited cases, the responsible Agency may use its discretion to extend the 60 day period if it requires more time to review a submission. The facility should be notified of any extension, and it remains acceptable during any extension.

The responsible Agency may also use its discretion to determine that a facility's unacceptability is immediately effective upon receipt of a notice to that effect. This may occur in situations such as, but not limited to, emergencies (e.g., fire or explosion) or egregious violations (e.g., criminal violations or chronic recalcitrance) or other situations that render the facility incapable of safely handling CERCLA waste.

Implementation of this notice provision does not relieve the Regions or States from taking appropriate enforcement action under RCRA or CERCLA.

C. Procedures for Facilities with Outstanding Unacceptability Determinations

Under the original May 1985 off-site policy, facilities determined to be unacceptable to receive CERCLA wastes were provided with written notice and were generally afforded informal opportunities to comment on the determination (the latter step was not required by the policy). Although the Agency believes that these steps represented adequate procedural safeguards for facilities seeking to receive CERCLA wastes, EPA has decided to provide an additional opportunity for review, in light of this revised policy, for facilities with unacceptability determinations already in place on the effective date of the revised policy.

Any such facility that wishes to meet with the responsible Agency to discuss the basis for a violation or release determination and its relevance to the facility's ability to receive CERCLA wastes, may request an informal conference with, or submit written comments to the responsible Agency at any point up to the 60th day after the publication of the proposed rule on the off-site policy in the Federal Register. Such a meeting should take place within 30 calendar days of the request. If the responsible government Agency does not find the information presented to be sufficient to support a finding of acceptability to receive CERCLA wastes, then it should inform the facility orally or in writing that the unacceptability determination will continue to be in force. The facility may, within 10 calendar days of hearing from the responsible government official after the informal conference or submittal of written comments, petition the EPA Regional Administrator or appropriate State official for reconsideration. The Regional Administrator or State official may use his or her discretion in deciding whether to grant reconsideration.

These procedures for review of unacceptability determinations that were already in place on the effective date of this revised policy will not act to stay the effect of the underlying unacceptability determinations during the period of review.

D. Re-evaluating Unacceptability

An unacceptable facility can be reconsidered for management of CERCLA wastes whenever the responsible Agency finds that the facility meets the criteria described in the "Acceptability Criteria" section of this policy.

For the purposes of this policy, releases will be considered controlled upon issuance of an order or permit that

initiates and requires completion of one or more of the following: a facility-wide RCRA Facility Investigation (RFI); a Corrective Measures Study (CMS); or Corrective Measures Implementation (CMI). The facility must comply with the permit or order to remain acceptable to receive CERCLA waste. At the completion of any such phase of the corrective action process, the responsible Agency should again review the facility for acceptability under the off-site policy using the criteria listed in this document, and as necessary and appropriate, make new acceptability determinations, and issue additional orders or modify permit conditions to control identified releases. Releases that require a determination of environmental significance will be considered controlled upon issuance of an order or permit to conduct an RFI, CMS or CMI, or upon completion of an RFI which concludes that the release is not environmentally significant. Again, the facility must comply with the permit or order to remain acceptable to receive CERCLA waste.

If the facility is determined to be unacceptable as a result of relevant violations at or affecting the receiving unit, the State (if it made the initial determination) or EPA must determine that the receiving unit is in full physical compliance with all applicable requirements. Where a State not authorized for HSWA corrective action makes this determination, it should notify EPA immediately of the facility's return to compliance, so that the Agency can expeditiously inform the facility that it is once again acceptable to receive CERCLA wastes.

The responsible Agency will notify the facility of its return to acceptability by certified and first-class mail, return receipt requested.

E. Implementation Procedures

All remedial decision documents must discuss compliance with this policy for alternatives involving off-site management of CERCLA wastes. Decision documents for removal actions also should include such a discussion.

Provisions requiring compliance with this policy should be included in all contracts for response action, Cooperative Agreements with States undertaking Superfund response actions, and enforcement agreements. For ongoing projects, these provisions will be implemented as follows, taking into consideration the differences in applicable requirements for pre- and post-SARA decision documents:

- o RI/IS: The Regions shall immediately notify Agency contractors and States that alternatives for off-site

management of wastes must be evaluated against the provisions of this policy.

- o Remedial Design: The Regions shall immediately notify Agency contractors, the States, and the U.S. Army Corps of Engineers that all remedies that include off-site disposal of CERCLA waste must comply with the provisions of this policy.
- o Remedial Action: The Regions shall immediately assess the status of compliance, releases and other environmental conditions at facilities receiving CERCLA waste from ongoing projects. If a facility is found not to be acceptable, the responsible Agency should notify the facility of its unacceptability.
- o Enforcement: Cleanups by responsible parties under enforcement actions currently under negotiation and all future actions must comply with this policy. Existing agreements need not be amended. However, EPA reserves the right to apply these procedures to existing agreements, to the extent it is consistent with the release and reopener clauses in the settlement agreement.

If the response action is proceeding under a Federal lead, the Regions should work with the Corps of Engineers or EPA Contracts Officer to negotiate a contracts modification to an existing contract, if necessary. If the response action is proceeding under a State lead, the Regions should amend the Cooperative Agreement.

APPENDIX D

ONSITE BORROW GRADATION RESULTS

870504.
000029.0.0.00



analysis of aggregate report

Project: _____ Date 7-15-87 SME Job No. E 10721
 Architect/Engineer: E.C. Jordan Report No. _____
 Contractor: _____ Supplier: _____

Sample Source N 1600 E 2000 Date Sampled 7-11-87 10:30 am
 Sample Identification MDOT Class I or II Submitted By _____
 Intended Use: _____

Sieve Size or Number	Weight Retained	% Retained	% Passing	Class I Class II	
				Project Specifications	
2"	0	0.0	100.0	100	
1"	0	0.0	100.0		60-100
3/4"	42.7	3.8	96.2	45-85	
#4	117.1	10.5	89.5	20-85	
#30	241.8	21.8	78.2	5-30	
#100	714.9	64.3	35.7		0-30
#200	874.4	78.7	21.3		
Pan	1111.0	100.0			
	885.2				
W/L		79.7	20.3	0-5	0-10

- Sample meets specified gradation
 Sample does not meet specified gradation for Class I or II

Physical Lab Data

Loss By Washing 20.3% Fineness Modulus _____
 Percent Absorption _____ Organic Matter _____
 Specific Gravity _____ Coal & Lignite _____
 Dry Rodded Weight _____ Clay Lumps _____
 Chert _____ Soft Particles _____

Remarks _____

Reviewed By Richard O. Anderson



analysis of aggregate report

Project _____ Date 7-15-87 SME Job No. E 10731
 Architect/Engineer E. C. Jordan Report No. _____
 Contractor _____ Supplier _____
 Sample Source N 1400 and N 1600 E2200 Date Sampled 7-11-87
 Sample Identification MDOT Class I or II Submitted By _____
 Intended Use _____

Sieve Size or Number	Weight Retained	% Retained	% Passing	Class I		Class II	
				Project Specifications			
2"	0	0.0	100.0	100			
1"	97.6	5.7	94.3		60-100		
3/4"	364.3	21.3	78.7	45-85			
#4	555.7	32.5	67.5	20-85			
#30	820.7	48.0	52.0	5-30			
#100	1240.9	72.6	27.4		0-30		
#200	1335.6	78.1	21.9				
Pan	1710.4	100.0					
W/L	1343.5	78.5	93.3	21.5	22.7	0-5	0-10

1612.8

- Sample meets specified gradation
 Sample does not meet specified gradation for Class I or II

Physical Lab Data

Loss By Washing 21.5% Class I 22.7% Class II Fineness Modulus _____
 Percent Absorption _____ Organic Matter _____
 Specific Gravity _____ Coal & Lignite _____
 Dry Rodded Weight _____ Clay Lumps _____
 Chert _____ Soft Particles _____

Remarks 6' W of E 2200 Line 7

Reviewed By Richard O. Anderson



analysis of aggregate report

Project: _____ Date: 7-15-87 SME Job No: AE 1073C
 Architect/Engineer: F.C. Jordan Report No: _____
 Contractor: _____ Supplier: _____
 Sample Source: N 1400 E 1800 Date Sampled: 7-11-87
 Sample Identification: MDOT Class II or III Submitted By: _____
 Intended Use: _____

Sieve Size or Number	Weight Retained	% Retained	% Passing	Project Specifications	
2"	0	0.0	100.0	100	
1"	256.2	13.4	86.6		60-100
3/4"	468.8	24.5	75.5	45-85	
#4	709.0	37.0	63.0	20-85	
#30	1071.0	56.0	44.0	5-30	
#100	1718.6	89.8	10.2		0-30
#200	1797.5	93.9	6.1		
Pan	1913.7	100.0			
W.L.	1809.6	94.6	5.4	6.3	0-5 0-10

- Sample meets specified gradation for Class II
 Sample does not meet specified gradation for Class I

Physical Lab Data

Loss By Washing: 5.4% Class I - 6.3% Class II Fineness Modulus: _____
 Percent Absorption: _____ Organic Matter: _____
 Specific Gravity: _____ Coal & Lignite: _____
 Dry Rodded Weight: _____ Clay Lumps: _____
 Chert: _____ Soft Particles: _____

Remarks: _____

Reviewed By: Richard C. Anderson