STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

September 29, 2006

Mr. Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (S-6J)
Chicago, Illinois 60604

Dear Mr. Karl:

SUBJECT: Waste Management Holland Lagoons (WMHL) Five-Year Review

The Michigan Department of Environmental Quality (MDEQ) has completed the Five-Year Review Report under the Cooperative Agreement V965855-01 with the United States Environmental Protection Agency (USEPA) for the above-mentioned site.

This comprehensive document was written to address all of the issues at the WMHL site, which is a State Lead Enforcement site in the National Priorities List process, and is provided to the USEPA. This final version of the document contains the September 26, 2006 editorial changes by both the USEPA and the MDEQ Compliance and Enforcement staff.

If you have any questions, please contact Ms. Cindy Fairbanks at fairbanc@michigan.gov or 517-335-4111, or you may contact me.

Sincerely,

Andrew W. Hogarth, Chief
Remediation and Redevelopment Division
517-335-1104

Attachment
cc: Ms. Wendy Carney, USEPA
Ms. Denise Boone, USEPA
Mr. David Kline, MDEQ
Mr. George Jackson, MDEQ
Mr. James Heinzman, MDEQ
Mr. William Bolio, MDEQ
Ms. Cindy Fairbanks, MDEQ
Superfund Site Files, WMHL, Ottawa County, (O1)

Five-Year Review Report

First Five-Year Review Report

for

Waste Management Holland Lagoons

Park Township

Ottawa County, Michigan

September 2006

Prepared by:

Michigan Department of Environmental Quality

Lansing, Michigan

Approved by:

Andrew W. Hogarth, Chief
Remediation and Redevelopment Division
Michigan Department of Environmental Quality

Date: 9/29/06

Concurrence:

Richard C. Karl, Director
Superfund Division
U.S. Environmental Protection Agency Region 5

Date:

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Prepared by:

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Andrew W. Hogarth, Chief
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Date: 9/25/06

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Lansing, Michigan

Approved by:

for Richard C. Karl, Director
Superfund Division, Region 5
U.S. Environmental Protection Agency

Date: 9/26/06

Five-Year Review Report
Table of Contents

Five-Year Review Report
Table of Contents (cont.)

Tables

Figures

Attachments

Five-Year Review Report
Table of Contents (cont.)

List of Acronyms

AOC	Administrative Order of Consent
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIC	Community Involvement Coordinator
EM	Electromagnetic
FS	Feasibility Study
gpm	Gallons per Minute
IC	Institutional Controls
IRA	Interim Remedial Action
MDAG	Michigan Department of Attorney General
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MW	Monitoring Well
NCR	National Contingency Plan
NPL	National Priorities List
NREPA	Natural Resources and Environmental Protection Act
O&M	Operation and Maintenance
PCOR	Preliminary Closeout Report
PM	Project Manager ppb Parts per billion
PW	Pumping Well
RAP	Remedial Action Plan
RC	Restrictive Covenant
RI	Remedial Investigation
ROD	Record of Decision
RPM	Regional Project Manager
SARA	Superfund Amendments and Reauthorization Act
SWOCLF	Southwest Ottawa County Landfill
TCE	Trichloroethylene
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UU/UE	Unrestricted Use/Unrestricted Exposure
VOC	Volatile Organic Compounds
WMHL	Waste Management Holland Lagoons
WMI	Waste Management, Inc.

Executive Summary

The remedies selected for the Waste Management Holland Lagoons (WMHL) site located in Ottawa County, Michigan included the following: source removal of wastes and contaminated soils from the six designated areas of the site; groundwater monitoring and treatment of the off-site groundwater plume by a treatment system installed west of the site as part of the remedy for the upgradient and adjacent Southwest Ottawa County Landfill (SWOCLF) Superfund site; and the development and implementation of a Restrictive Covenant as an institutional control for groundwater.

The trigger for this Five-Year Review was the signing of the Preliminary Closeout Report which was signed on September 26, 2001.

The assessment of this Five-Year Review determined that a direct soil contact threat no longer exists at the WMHL site, based on current information, and due to the removal actions conducted in the six identified source areas on the site. An additional source area may exist beneath the former office building and this potential source area may need to be evaluated and addressed as appropriate. A chain link fence encompasses the entire site and is monitored to provide for site security and protection for the on-site monitoring wells.

General degradation of the groundwater in the area has occurred from the upgradient SWOCL, as well as from past dewatering and dumping activities at the WMHL site. Waste Management, Inc. (WMI), the owner of the site since 1978, undertook soil excavation of the six identified source areas from 1994 through 2001. Post excavation soil samples from the source areas confirmed that soil contamination was removed above background screening values and Direct Contact Criteria of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 201) for constituents analyzed. A groundwater treatment system installed by Ottawa County to capture and treat the groundwater contamination is located downgradient of both sites. Groundwater downgradient of the treatment system continues to contain contaminants that exceed Part 201 Drinking Water Criteria.

WMI has not provided groundwater monitoring data to determine that the WMHL site no longer contributes to existing groundwater contamination; however, a Remedial Action Plan (RAP), required under Part 201 has been recently submitted to the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division and is currently under technical review. Any subsequent deficiencies in the RAP must be addressed by WMI to meet the requirements of Part 201 for an MDEQ approved RAP. Further, any existing or proposed Institutional Controls (IC) included in the RAP must be evaluated to ensure that all areas that do not allow for unlimited use/unrestricted exposure have effective ICs.

The remedy is protective in the short-term. There is no evidence of exposure to site-related contaminants. Furthermore, interim ICs which serve to notify the public of the areas which do not allow for unlimited use and unrestricted exposure exist until the final RAP is complete. Long-term protectiveness is dependent upon effective ICs, or additional remedial actions, if they are required by the final RAP.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from WasteLAN)*: **Waste Management Holland Lagoons**

EPA ID *(from WasteLAN)*: **MID:060179587**

Region: 5 **State: MI** **City/County: Park Township, Ottawa County**

SITE STATUS

NPL status: Final

Remediation status (choose all that apply): Complete

Multiple OUs?* YES **Construction completion date:** 9/26/2001

Has site been put into reuse? NO

REVIEW STATUS

Lead agency: State - Michigan Department of Environmental Quality

Author name: *Cindy Fairbanks*

Author title: Environmental Quality Analyst 12 **Author affiliation:** Michigan Department of Environmental Quality

Review period:** 3/20/2006 to 9/30/2006

Date(s) of site inspection: 6/20/2006

Type of review:

fl Post-SARA □ Pre-SARA □ NPL-Removal only
□Non-NPL Remedial Action Site □NPL State/Tribe-lead
□ Regional Discretion

Review number: 1 (First)

Triggering action: **Construction Completion**

□ Actual RA Onsite Construction at OU #____
□ Actual RA Start at OU#____
□ Construction Completion
□ Previous Five-Year Review Report
□ Other (specify)

Triggering action date *(from WasteLAN)*: 9/26/2001

Due date *(five years after triggering action date)*: 9/26/2006

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form (cont.)

Issues:

The following issues exist at the Waste Management Holland Lagoons (WMHL) site:

- Non compliance with the Administrative Order of Consent (AOC) requiring the completion of a Part 201 approved Remedial Action Plan (RAP). Incomplete Michigan Department of Environmental Quality (MDEQ) approved RAP which meets all the requirements of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 201).

- Waste Management, Inc. (WMI) must provide information to prove the six on-site source areas, due to the completion of past remediation activities, are no longer contributing contaminants to the groundwater plume migrating under the site and that all of the contaminants found in the groundwater plume originate from the adjacent and upgradient Southwest Ottawa County Landfill (SWOCLF) National Priorities List (NPL) site.

- Assure effective interim ICs are in place pending the final RAP.

- For the remedy to be protective in the long-term, effective Institutional Controls (ICs) may be implemented and maintained as part of the final RAP.

- A contamination source area may exist beneath the former office building.

Recommendations and Follow-up Actions:

The following recommendations and follow-up actions should be implemented:

- WMI is required to submit to the MDEQ a RAP to meet the requirements of Part 201 and the AOC.

- WMI is required to submit to the MDEQ a RAP which provides groundwater information to prove the six on-site source areas are no longer contributing contamination into the groundwater and that all the contamination detected in the groundwater plume is migrating from the adjacent and upgradient SWOCLF NPL site.

- To assure effective interim ICs are in place, USEPA will review the IC Study completed by WMI and USEPA will create IC maps.

- If required by the RAP, development of any ICs and an IC plan.

- Evaluate soils under the former office building and other areas as may be required under the RAP.

Protectiveness Statement(s):

The remedy is protective in the short-term. There is no evidence of exposure to site-related contaminants. Furthermore, interim ICs which serve to notify the public of the areas which do not allow for unlimited use and unrestricted exposure exist until the final RAP is complete. Long-term protectiveness is dependent upon effective ICs, or additional remedial actions, if they are required by the final RAP.

Other Comments:

None

Five-Year Review Report

I. Introduction

The MDEQ has conducted a Five-Year Review of the remedial actions implemented at the WMHL site located in Ottawa County, Michigan. The review was conducted from March 2006 through September 2006. This report documents the results of the Five-Year Review. The purpose of the Five-Year Review is to determine whether the remedy at the site is protective of human health and the environment. The methods, findings, and conclusions of the review are documented in the Five-Year Review Report. In addition, the Five-Year Review Report identifies issues found during the review, if any, and makes recommendations to address them.

This review is required by statute. The United States Environmental Protection Agency (USEPA) and the MDEQ perform reviews of remedies selected that result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted purposes.

The Agency is preparing this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 121 and the National Contingency Plan (NCP). CERCLA § 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with Section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; Title 40 of the Code of Federal Regulations § 300.430(f)(4)(ii) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead Agency shall review such action no less often than every five years after the initiation of the selected remedial action.

In addition, if the selected remedy does not allow for Unlimited Use and Unrestricted Exposure (UU/UE) (due to residual contamination that is present above Part 201 unrestricted residential criteria), then ICs are necessary to ensure the protectiveness of the remedy and Five-Year Reviews are required as a mechanism for evaluating the protectiveness of the remedy.

This is the first Five-Year Review for the WMHL site. The triggering action for this review is the date of the Preliminary Closeout Report (PCOR) as shown in USEPA's WasteLAN database dated September 26, 2001.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Operation of site by Jacobusse Refuse Service Company	1945-1981
Landfill operation at the site operated by Jacobusse Refuse Service Company	1957-1964
Burial of 43 55-gallon drums of chloral hydrate on site	1968
Jacobusse Refuse Service began hauling waste to the adjacent SWOCLF	1968
Truck Maintenance Facility operated on WMHL site	1968-1974
Triggering Mechanism: Initial discovery of trichloroethylene (TCE) contamination detected in the Thomas residential well, 2741 168th Avenue due west of the WMHL site	1970
Jacobusse Refuse Service Company receives license to haul and dispose of liquid industrial waste at the WMHL site; waste included cider vinegar tank settlings, solids from an organic pigment plant , calcium sulfate, aluminum hydroxides, wet mill and food processing bacterial digester sludges	1972
Issuance of stipulation of groundwater discharge permit from Michigan Department of Natural Resources (MDNR) to Jacobusse Refuse Service Company specifying allowable levels of metals and organics to be discharged into the groundwater and regulated pH levels in the lagoons	1972
Installation of four monitoring wells around the seepage lagoons as part of allowance for stipulation of groundwater discharge permit	1972
Refuse Service Inc. purchases Jacobusse	September 17, 1972
Refuse Service Company Refuse Service Inc. merged into Michigan Waste Systems Inc.	June 29, 1973
Issuance of second MDNR groundwater discharge permit superseding the 1972 permit with more stringent criteria	1976
MDNR enforced cessation of hauling liquid waste sludges to the Jacobusse Refuse Service Company site and dewatering of plating wastes via the seepage lagoons	1977
Michigan Waste Systems Inc. continued to accept liquid industrial waste, specifically tricalcium phosphate waste, at the Jacobusse Refuse Service Company site	1978-1980
Sampling by MDNR of on-site monitoring wells detected lead from 70 to 140 parts per billion (ppb)	June 1979
Removal of the 43 drums of chloral hydrate	1980
Michigan Waste Systems ceased disposal of all liquid and solid wastes on the Jacobusse site	March 1980

Table 1: Chronology of Site Events (cont'd.)

Event	Date
MDNR collects periodic groundwater samples from four lagoon monitoring wells as well as additional monitoring wells installed on the site as part of the SWOCLF monitoring well network to investigate site groundwater conditions. Soil boring investigation conducted to search for buried drums	1979-1981
MDNR informs WMI (formerly Michigan Waste Systems, Incorporated) that the department is undertaking a series of investigations to determine if buried drums or other sources of potential contamination are located on the WMHL site	January 28, 1982
MDNR grants a renewal license to remove and transport liquid waste	March 4, 1982
Preliminary Assessment completed by Ecology and Environment	June l, 1983
USEPA Potential Hazardous Waste Site Inspection Report	October 18, 1983
First documented information in site file for hook up of area residences to the expanded municipal water supply lines	1984
MDNR sampling of WMHL on-site monitoring wells	1984, 1985, 1988
Underground Storage Tank (UST) removal completed	1985
NPL Listing	June 10, 1986
State of Michigan Act 307 Listing	1996
Phase I Remedial Investigation (RI) included Electromiagnetic (EM) survey, collection of soil and groundwater samples	1992-1994
State Memorandum of Agreement between the USEPA and the MDEQ concerning State Lead enforcement sites following the Part 201 RAP process rather than the Record of Decision (ROD) with an addendum added in 1997	1993 and 1997
Michigan Environmental Response Act, 1982 PA, as amended (Act 307) replaced by Part 201	1994
Administrative Order of Consent (OC) signed	June 1994
Phase I, II, and III, RI /Removal Actions/Interim Response Actions included enclosing entire site with a fence, installation of three monitoring wells, groundwater sampling, soil boring sampling, soil excavation, and removal of debris	1994-1995
Phase I of RI Report completed	December 1995
Multi-phase RI Report submitted	January 1997
First RAF' submitted	April 1997
MDEQ Acknowledgment of Receipt of Administratively Incomplete RAP letter	April 23, 1997
Declaration of Restrictive Covenant (RC) filed	August 18, 1997
Feasibility Study (FS) and RAP submitted	January 1998

Table 1: Chronology of Site Events (cont'd.)

Event	Date
MDEQ Acknowledgement of Receipt of Administratively Incomplete RAP letter	February 17, 1998
Phase IV Groundwater Sampling conducted and report submittal	March 3, 1998 and May 7, 1998
Phase V Groundwater Sampling RI conducted and report submittal	1999
Groundwater and Soil Analytical Data Report submittal	January 27, 2000
Preliminary Closeout Report (PCOR) signed	September 26, 2001
Final FS and RAP submittal	July 2001
MDEQ Acknowledgement of Receipt of Administratively Incomplete RAP letter	October 16, 2001
MDEQ correspondence concerning requirement for WMI to submit a RAP	June 28, 2005, July 21 , 2005, December 29, 2005
WMI response letter stating a new RAP will be submitted by June 1 , 2006	January 23, 2006
Initiation of First Five-Year Review	March 2006
Submittal of Fourth RAP	June 1, 2006
Second Five-Year Review due	September 26, 2011

III. Background

Site History

The WMHL Site was operated by Jacobusse Refuse Service Company as a municipal garbage dump, liquid waste dewatering facility, and headquarters for their hauling company from the mid 1940's until 1977. The company was purchased by Refuse Services, Incorporated in 1972 and the name of the site was changed to Holland Lagoons. Refuse Service, Incorporated merged into Michigan Waste Systems, Incorporated in 1973 and Michigan Waste Systems, Incorporated subsequently changed its name to WMI.

A portion of the site was originally used for the disposal of pickle waste, apple pulp, digester sludge, barrels of spent extracts, brine, the dewatering of liquid industrial wastes, including aluminum and metal hydroxide wastes and wastewater treatment plant sludge, in up to as many as nine dewatering lagoons located in the north central area of the site. The dewatering of metallic wastes using these lagoons ceased in October 1977. Permits indicate that Jacobusse discontinued disposal of all liquid waste at the site in 1980. In addition, the southwest area of the site was used for the temporary burial of drums of chloral hydrate that were subsequently removed in 1980. Municipal refuse was hauled to a landfill located in the south central area of the site from 1957 to 1964. The landfill operated as an open burning dump. Finally the site was used as a maintenance facility for the Jacobusse fleet of trucks, focused in the northwest corner of the site.

The Thomas residential well, located due west of the site, was discovered to be contaminated with TCE in 1970. The TCE was suspected to have migrated from the WMHL site. The continued presence of elevated concentrations of TCE was confirmed in a MDNR follow-up sampling event in 1979. Park Township began to hook up residences located within the vicinity of the WMHL site, including the Thomas residence, to the expanded municipal water supply line by 1984. As part of the 2005 settlement agreement for the SWOCLF between Ottawa County and the MDEQ, both the county and township continue to hook up residences downgradient of both sites into the expanded municipal water supply system. Complete hook up of all residences is to be completed by March 2007. The MDNR continued to conduct periodic groundwater sampling events at the WMHL site in 1984, 1985, and 1988. The site was added to the NPL in June 1986, as well as the State of Michigan Act 307 list later in 1986.

From 1993 though 1997, both the USEPA and the MDEQ (formerly a part of MDNR), held discussions to allow NPL sites given a State Lead Enforcement designation to follow the Part 201 RAP process rather than the NPL ROD process. A Memorandum of Agreement was signed by the two Agencies in 1997. During this negotiation period, WMHL was designated as a State Lead Enforcement Site. (See Attachment A - Memorandum of Agreement).

In 1994, Michigan's Environmental Response Act 307 was replaced by Part 201. Previous to this time, any contaminant concentrations detected on the WMHL site were compared to the Act 307 criteria. However, because decision documents related to the clean up of the site post-date the enactment of Part 201, Part 201 provides the standards for the clean up. (See Attachment B - Act 307 and Part 201).

General degradation of the groundwater in the area occurred from another nearby NPL site, the SWOCLF, as well as from dewatering and dumping activities on the WMHL site. The plumes from the two sites were intermingled. Groundwater contamination above the Part 201 Residential Drinking Water Criteria included benzene, ethylbenzene, xylene, TCE, chlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, and methylene chloride. Inorganic contamination in the groundwater above the Part 201 Residential Drinking Water Criteria included aluminum, antimony, beryllium, cadmium, iron, lead, manganese, vanadium, and zinc.

In 1994, the state and WMI entered into an AOC for WMI to undertake a RI/FS at the WMHL site. A multi-phase RI of the WMHL site was conducted from 1994 through 1995. Phase I of the RI included enclosing of the entire site by a chain link fence, conducting an electromagnetic (EM) survey, sampling visually contaminated soils, and collecting groundwater samples from the on-site monitoring wells. Phase II of the RI involved additional soil and groundwater sampling, test pit excavation, and Interim Response Actions (IRA) to eliminate impacts identified in the Phase I portion of the RI. This included the removal of drums and other surface debris to prevent direct contact hazards. The soil excavations were on-going and contaminated soil from the identified source areas were removed and completed by the end of 2000. The exception is the potentially contaminated soils which underlie the former office building currently leased to a sign business or other unidentified source areas. These soils will be analyzed and, if needed, removed, whenever the building is demolished. Phase III of the RI involved the collection of additional groundwater samples from on-site monitoring wells. A final groundwater investigation, identified as Phase V, which included the collection of designated background groundwater samples, was completed in 1999. Additional soil sampling was conducted on the site in 2001. Sample analytical data indicated no contaminants existed in concentrations exceeding Part 201 Direct Contact Criteria.

WMI submitted the initial RAP, which included the multiphase RI report and a Baseline Risk Assessment report to the MDEQ for review in April 1997. The MDEQ's review of the document determined that it did not address all the requirements of Part 201. An Acknowledgement of Receipt of an Administratively Incomplete RAP letter was sent to WMI, listing the items required, in April 1997. Subsequent RAP submittals were received in January 1998 and July 2001. Upon review, the documents were determined to be insufficient in meeting the requirements of Part 201. Administratively Incomplete RAP letters were sent for these documents on February 17, 1998, and October 16, 2001. The MDEQ notified WMI in a June 28, 2005, letter that WMI is not in compliance with the AOC and needs to perform an MDEQ approved Part 201 approved RAP. Recent communications between the MDEQ and WMI resulted in a letter sent by WMI, dated January 23, 2006, notifying the MDEQ they would complete and submit a RAP by June 1, 2006. The latest RAP submittal was received by the due date; however, the MDEQ will not complete the review of the latest RAP until after this Five-Year Review Report has been completed. The MDEQ is evaluating the proposed remedy including the need for ICs in the on-going RAP process that will address the potentially contaminated soils under the building and the groundwater plume.

Physical Characteristics

The WMHL site is located in an unincorporated area of Park Township in Ottawa County, Michigan approximately one mile east of Lake Michigan. (See Figure 1 - Site Location Map). The site is located on the east side of 168th Street and north of James Street. The site address is 2700 North 168th Street and the legal description is the north ½ of the southwest 1/4 of Section 15, Township 5 north, Range 16 west of the Michigan Meridian. The WMHL site is approximately 80-acres in size within an area characterized as mixed residential, wooded, and agricultural lands. (See Figure 2 - Adjoining Property Map) Properties adjoining the WMHL site include Riley Road Recreational Area, several small subdivisions of homes and privately held parcels, and a blueberry field to the southeast. The SWOCLF NPL site is located adjacent, northeast, and upgradient of the WMHL site. A groundwater plume migrating from the SWOCLF site impacts the groundwater southwest and downgradient of the landfill which includes the WMHL site. Groundwater contamination from the WMHL site intermingles with the SWOCLF plume before migrating westward toward the SWOCLF treatment system then Lake Michigan.

Land and Resource Use

The land area surrounding the WMHL site is zoned for residential, recreational, and agricultural use. (See Figure 3 - Park Township Zoning Map). As part of the RAP development for the site, a RC, covering only the area of the site, was filed with Ottawa County on August 18, 1997. The RC restricts use of the groundwater under the site for any purpose and limits residential use to uses consistent with the RC. As part of the on going RAP review process, the MDEQ has not accepted the RC as written. ICs that may be included in a final RAP will include a groundwater restriction for any use, address any future residential land use as subject to that groundwater restriction, as well as addressing any remaining contaminated soils, including potential soil contamination located under the site building when it is demolished. (See Attachment C - Restrictive Covenant).

The Ottawa County Environmental Code, Article VII, Section C-7 stipulates that the County Health Department has the authority to deny a permit to install a private water supply well if the water does not meet National Primary Drinking Water Regulations. The groundwater plume migrating from the

SWOCLF site does not meet these regulations, and therefore, the County Health Department will not issue a permit to install a well in the area of the SWOCLF groundwater plume. This area includes the WMHL site. (See Attachment D - Ottawa County Health Code).

As part of the March 2005 settlement agreement between the MDEQ and Ottawa County for the SWOCLF, the county is to implement an area wide groundwater use restriction by March 2007. This groundwater restriction will include the WMHL site. In addition, all private wells within the restricted area are to be identified and properly abandoned. All area residents will be able to access the expanded municipal water supply within the area of the groundwater plume for drinking water, thus greatly reducing the exposure risk to groundwater contamination. (See Figure 4 - Municipal Line Map).

History of Contamination

The western half of the site was originally used for the disposal of pickle waste, apple pulp, digester sludge, barrels of spent extracts, brine, and municipal waste in an open burning landfill, and for the dewatering of liquid industrial wastes by means of several dewatering lagoons, including aluminum and metal hydroxide wastes and wastewater treatment plant sludge at the site. In addition, the area was used for the temporary burial of drums of chloral hydrate that were subsequently removed in 1980. Finally the site was used as a maintenance facility for the Jacobusse fleet of trucks, focused in the northwest corner of the site. (See Figure 5 - Site Features Map). The site was added to the NPL in June 1986.

Basis for Taking Action

The Thomas residential well, located west of the site along 168th Street, was discovered to be contaminated with TCE in 1970. The MDNR's follow-up investigations in the area focused on both the WMHL site and the SWOCLF site as the potential sources for the TCE.

Initial Response

In 1977, the MDNR enforced cessation of hauling of liquid disposal wastes and sludges to the dewatering lagoons located on the Jacobusse site. The hauling and disposal finally terminated in 1980.

In 1979, four monitoring wells were installed around the dewatering lagoons. The MDNR began to sample these four monitoring wells and nine residential wells located along James Street and 168th Street that same year. The on-site monitoring wells showed lead levels of 70 to 140 ppb. The residential well sampling detected the continued presence of TCE in the Thomas well which was reconfirmed in July 1979 with TCE defected at 50 ppb. TCE however was not detected in any other on-site WMHL monitoring or residential well sampled. (See Attachment E - MDNR 1979 Groundwater Report).

In 1980, the buried drums of chloral hydrate were subsequently removed and Jacobusse informed the MDNR that it would no longer dispose of any liquid or solid waste at the WMHL site.

In 1981, the MDNR conducted a remedial soil boring investigation to locate additional alleged buried drums on the site. Results of this investigation did not locate additional buried drums. (See Attachment F - MDNR 1981 Soil Boring Report).

The MDNR continued to monitor the on-site wells and the Thomas residential well in a sampling event in 1984. (See Attachment G - MDNR Sampling Report 1984). Review of the data found copper at 30 ppb, lead at 190 ppb, and zinc ranging from 110 to 4100 ppb. TCE continued to be detected in the Thomas well with the highest concentration of 67 ppb until the residence was connected to the city of Holland Municipal Water Supply by Park Township around 1984. Additional MDNR sampling events were conducted in 1985 and 1988. (See Attachments H - MDNR Sampling Report 1985 and I - MDNR Sampling Report 1988). Lead and TCE were detected in the analytical results from 1985 at 100 ppb and 10 ppb, respectively.

The MDNR requested that WMI inspect, evaluate, remove, and dispose of four known USTs at the site. The investigation was conducted in 1985. (See Attachment J - Report on the Tank Removal Operation at the Former Jacobusse Site). Two of the USTs were located near the northwest corner of the building and two were located near the southwest corner of the building. Approximately three cubic yards of contaminated soil were removed from around the tank located near the northwest corner of the building. The analysis of the tank contents detected benzene, ethylbenzene, toluene, xylene, and 1,1,1 trichloroethane.

The WMHL site was listed to the NPL on June 10, 1986. The basis for the NPL listing was the potential groundwater impacts to area population from the intermingled contamination plume migrating from both the WMHL and SWOCLF sites. The NPL process was initiated in 1983 with the development of the following two reports:

- USEPA Field Investigation Team investigation report dated June 1, 1983.
- USEPA Hazard Ranking System score of the WMHL site on December 1, 1983.

By 1992, approximately twenty monitoring wells had been installed on the WMHL site by the Ottawa County Road Commission's contractor, Prein and Newhof. These wells were installed as part of the groundwater monitoring network for the SWOCLF. (See Figure 6 - SWOCLF Monitoring Well Locations from 1992 and Figure 6A - Current Monitoring Well Locations).

In 1993, a well point was located as part of an additional investigation on the site for suspected USTs. No USTs were found. The well point and surrounding soil was removed. Post removal soil sampling analysis indicated that the removed soil was not impacted with contamination above Act 307 Type B Criteria Risk Based Criteria for Unrestricted Residential Use. (See Attachment K - Well Point Removal Report).

Remedial Investigation

A Phase I RI was conducted at the site beginning in 1992 with the creation of the work plans. The primary objectives of the Phase I RI were to delineate both areas and contaminants of concern on the site, initiate both ecological and health risk assessments, and identify data gaps to be addressed in the Phase II and Phase III portion of the RI. In 1995 and 1996, the multi-phased RI was conducted on the site.

Phase I of the investigation involved a geophysical investigation, a preliminary hydrogeological assessment, soil sampling and analysis, and groundwater sampling and analysis.

Phase II involved additional soil and groundwater sampling and analysis, test pit excavation, the initiation of the IRA, which was performed concurrently with Phase II and III of the RI to eliminate impacts identified in the Phase I investigation.

Phase III involved collecting additional groundwater samples.

Included in the RI was an EM survey which was completed in September 1993 and soil and groundwater samples were collected in the summer of 1994. Selected monitoring wells were re-sampled for volatile organics compounds (VOCs) in August 1994 and again in January 1995.

Three new monitoring wells (MW) MW-4, MW-5, and MW-6 were installed on the WHML site in July 1995. A total of 11 MWs were sampled.

On July 10, 1995, six soil borings (B-03 through B-08) were drilled in the area of the former dewatering lagoons to a maximum depth of 10 feet below ground surface (bgs). Four hand auger soil borings (F-1 through F-4) were also collected.

The December 1995 Phase I Report Summary of the results of the Phase I RI includes the following:

- The EM survey found an anomaly that corresponded with the area that had previously been used as the landfill. A bermed area approximately 50 feet by 100 feet was found to contain several 55 gallon drums. No anomaly was associated with the former dewatering lagoon area and no other large anomalies were discovered that would indicate disposal of waste materials in areas not already identified in historical records. Five other anomalies were evaluated with test pits for the presence of buried drums. None were found. (See Attachment L - Electromagnetic Survey Investigation October 1993).

- The preliminary hydrogeological assessment of the WMHL site determined the area to be underlain by approximately 90 feet of sand which overlies glacial till. The water table in the sand is approximately five to 12 feet bgs but can be as much as 40 feet bgs. The groundwater flows toward the west-southwest with a gradient of approximately one foot in 350 feet. Hydraulic conductivity values for the sand average about 3x10-1cm/s and the average linear velocity of the groundwater is calculated to be approximately 1300 feet/year.

- The soil sampling results determined that the WMHL site had areas of surface soils with detections of heavy metals above Act 307 Type A Cleanup Criteria. The soil sampling analytical results from the Phase I Investigation found detections of heavy metal contaminants in the soils above Part 201 Criteria. (See Figure 7 - Site Areas of Concern and Figure 8 - 1994 Soil Sample Locations and Analytical Results). Smaller areas of suspected impacted soil, of less than 100 square feet, were located at the site entrance and the central part of the landfill. An area of bluish green soil was found on the haul road between the former dewatering lagoons and the SWOCLF site. All of the organic soil sampling results were below Act 307 Type B Cleanup Criteria.

- Review of the groundwater analytical results collected from some of the groundwater monitoring wells, including monitoring wells upgradient of any of the identified former

disposal areas, detected inorganic and organic contaminants above Act 307 Type B Cleanup Criteria. Elevated concentrations of lead and arsenic were detected in several upgradient monitoring wells, while aluminum, arsenic, iron, lead, and manganese were detected in several downgradient wells. Upgradient wells also had elevated concentrations of acetone, benzene, and heptachlor, while downgradient wells had elevated detections of acetone, benzene, 1,2 dichloroethane, chrysene, benzo(k) fluoranthene, and heptachlor. Groundwater sample results detected heavy metals, pesticides, and volatiles above Part 201 Residential Cleanup Criteria. (See Figure 10 - Phase I Groundwater Sample Locations and Analytical Results).

The RI identified six areas of concern. (See Figure 7 - Areas of Concern). A discussion of the major identified Areas of Concern follows.

Area A: Entrance

This area encompassed the area north of the site entrance and the driveway, approximately 96,000 square feet. Several sources of contamination were noted including the following: four USTs; oil-stained soil in the driveway; white powder substance on the ground surface north of the building; well point north of the building and abandoned in April 1993; EM anomalies identified during the EM Survey in September 1993; and a trench located south of the building.

Area B: Former Dewatering Lagoons,

This area covers approximately 110,400 square feet and is located in the north central section of the WMHL site. The dewatering lagoons were abandoned in 1980 and the sludges from the bottom of the lagoons were excavated and hauled to SWOCLF for disposal. The lagoons were then backfilled with sand from the nearby Barrow Pit Area, located north of the site.

Area C: Former Landfill

This area encompasses approximately 123,200 square feet. The eastern half of the landfill was used for disposal of household refuse which was also commonly burned. The EM survey of the western half discovered several buried drums. The former landfill was used to dispose of the remains of burned municipal refuse which was hauled to the site from 1945 to 1964. The ash and other non-burnable materials such as cans and bottles were then buried in the trenches.

Area D: Haul Road leading to the SWOCLF Site

The haul road, approximately 49,000 square feet, extended from the former dewatering lagoons to the SWOCLF site and was used to haul sludge from the dewatering lagoons to the landfill for disposal. A bluish green substance was found on the road surface which was assumed to be spilled sludge from the hauling process.

Area E: Former Drum Disposal Area

This is the area where the 43 drums of chloral hydrate were disposed in April 1968 under a permit issued by the MDNR. The drums were subsequently removed from this area in 1980 under the direction

of the MDNR. The drums were removed intact and no evidence of chloral hydrate released to the environment was recorded. The area covers approximately 22,500 square feet.

Area F: Eastern Half of the Site, 1,820,000 square feet

The Eastern half of the site is not known to have been used for waste disposal during the operation of the WMHL. Background soil boring samples were collected from this area during the Phase I Investigation and additional soil borings were collected during the Phase II Investigation. No contaminants were found in the investigation above either Act 307 Type B or Part 201 criteria. (See Figure 8 - 1994 Soil Sample Locations and Analytical Results).

Groundwater Sampling Phase I RI

Prior to groundwater sampling in Phase I of the RI, three new MWs were installed to replace existing wells that could not be sampled. MW-01 and MW-02 were installed as a nest near the site entrance to replace MW-50 and a new MW-02. MW-03 was installed near W-43 which was partially filled with silt and could not be sampled. Two groundwater resampling events were conducted to collect VOCs from selected MWs on the WMHL site. The first resampling event took place on August 18,1994 and involved collecting groundwater for VOC analysis from W-26, W-34, and W-48. The second resampling took place from January 3 through January 5, 1994, and involved collecting VOC samples from MW-01, MW-03, W-23, W-24, W-34, W-42, W-46, W-48, and W-51. (See Figure 9 - Groundwater Sample Results Above Act 307 Type B Criteria).

Acetone concentrations detected in both the upgradient (upgradient of the Areas of Concern) and downgradient monitoring wells (downgradient of the Areas of Concern) during the original RI sample event were not reproduced in the resampling events.

Several detections of benzene, however were noted in downgradient monitoring wells which were above the Act 307 Type B Criteria. Benzene was detected in W-46 and W-48.

The results of the groundwater investigation indicate that the groundwater was contaminated by several organic and inorganic contaminants at concentrations above Act 307 Type B Criteria. (See Figure 10 - Phase I Groundwater Sample Locations and Analytical Results).

The results of the Phase I of the RI were incorporated into an RI report submitted in late 1995 and also included in the RAP submittal by WMI for the WMHL site, dated January 1997, (see Attachment M).

IV. Remedial Actions

Remedy Selection

Phase II Investigation

After the Phase I Investigation was completed, the data was reviewed and gaps in the data which were needed for the Risk Assessment and FS were identified. The scope of work for the Phase II Investigation involved the following tasks:

- Drilling and sampling six borings in the former dewatering lagoon areas, including collecting a soil boring sample below the water table at three of the six locations. (See Figure 11 - Phase II Soil Sample Results and Locations).
- Collecting four soil borings from the eastern half of the site to determine if this area was used for waste disposal.
- Installing three new MWs to collect groundwater samples at specific locations where there had previously been no existing MWs.
- Collecting groundwater samples from wells located on and around the site and having the samples analyzed to determine background, anthropogenic backgrounds, and site groundwater conditions. (See Figure 12 - Phase II Groundwater Sample Locations and Results).
- Excavating five test pit areas in the locations of anomalies found during the EM survey conducted during the Phase I Investigation.
- Conduct an IRA to eliminate environmental liabilities at the site which were identified in the Phase I Investigation.

Removal Actions and IRA

Phase II Test Pit and Excavations

As part of the RI, several locations on the WMHL site were excavated between July 10 and July 31, 1995. These excavated areas included the haul road and test pit areas A-1, A-2, and C-1, along with two drum storage areas (C-2 and C-3). During these activities, stained soils were removed and disposed of off-site. Following the completion of each excavation, soil scraping samples were collected from the side walls and floor. (See Figure 13 - Phase II Test Pit Locations, Figure 14 - Phase II Soil Excavation Locations, and Figure 15 - Phase II Soil Scraping Locations).

The haul road was scraped and excavated as needed to remove any blue-green stained soils. Over 1,400 cubic yards of soil were removed.

Test pits A-1 and A-2 did not locate any metal debris, but a one to two-foot thick layer of dark blue-green burned debris was uncovered just below the ground surface. Approximately 200 cubic yards of stained soil were excavated from this area and disposed of off-site.

Test Pit C-1 uncovered miscellaneous burned debris including bottles and metal scraps. The layer of debris ranged from near the ground surface to approximately five feet bgs. More than 1,600 cubic yards were removed and disposed of off-site.

The final two test pits, C-2 and C-3, were located near a bermed area which contained several partially buried, empty 55-gallon drums. No additional buried drums were discovered during the excavation. (See Figure 16 - Phase II Drum Removal). Blue-green stained soil was detected from just below the surface to an approximate four-foot depth. Approximately 225 cubic yards of soil was excavated and removed and disposed of off-site along with the empty drums. A second drum storage area located south of the site building was excavated and approximately 40 cubic yards of soil were excavated and removed from this area and disposed of off-site.

Thirteen additional test pits requested by the MDNR were located adjacent to and south of the former dewatering lagoons. No stained soils were observed and no soil was removed.

During the RI in 1995, the site was fenced, obviously contaminated soils were sampled and excavated, and drums and other surface debris were removed to prevent direct contact hazards. The soil excavations were completed by the end of 2000. Additional soil sampling was conducted on the site in 2001. Sample analytical data indicated no contaminants existed in concentrations exceeding Part 201 Direct Contact Criteria.

After completion of the RI, the IRA involved excavating impacted soils, removing several empty drums, and conducting a general site cleanup which included the removal of four abandoned cars. Soil was removed from seven areas of the site based on either the results of the Phase I soil sampling or on a visual observation of impacted soil. Approximately 3,930 cubic yards of soil was excavated and disposed of off-site. Twenty-eight shallow soil scrapings were excavated from the surface of the former lagoon area and visually inspected to ensure that all of the soil impacted by the haul road was found and excavated. Six empty drums were also removed, crushed, and disposed of off-site.

Soil Boring Sampling Phase II and IRA

Soil samples were collected from the six identified Areas of Concern during the Phase I of the RI. Soil sampling results for each Area of Concern are discussed below. Background soil boring samples were also collected. All background soil boring samples were below Act 307 Type A default background concentrations for inorganic contaminants.

Area A Site Entrance

Soil boring samples were collected and analyzed for inorganic parameters. Arsenic was found above both background and Act 307 Type B Risk Based Criteria for Unrestricted Residential Use (Act 307 Type B Criteria) in soil boring A1. Lead and zinc were also detected in soil boring A5. Several other inorganic parameters were also detected in the A2 boring but they were not above Act 307 Type B Criteria or the background values. The white powder found on the ground surface north of the site building appeared to be lime based on the elevated calcium level which was, however, below the background concentration in the sample collected at soil boring A3. No organic contaminants were detected above background or Act 307 Type B Criteria.

A trench approximately 80 feet by 10 feet was discovered during the Phase I Investigation in an area south of the building. A soil boring was collected and analysis detected lead and zinc at concentrations above background. The impacted soil was excavated, approximately 40 cubic yards, during the IRA. Verification samples show the soil that remained is below the background concentrations for the analytes tested.

Area B Former Dewatering Lagoon Area

Analysis of the soil boring samples collected from the former dewatering lagoon area did not detect any organic or inorganic contaminants above background or Act 307 Type B Criteria. The results of the soil borings and analysis from the Phase I and Phase II Investigations demonstrate that the lagoons were properly abandoned.

Area C Former Landfill Area

Analysis of the soil boring samples collected from the former landfill area did not detect any organic or inorganic contaminants above background or Act 307 Type B Criteria. The ash, metal cans, and glass bottles in the former landfill area were excavated during the IRA for disposal off-site. Approximately 1,855 cubic yards of material was removed from the area. Results of the analysis of verification samples showed there were two small areas with levels of inorganic parameters exceeding the background concentration. An additional 40 cubic yards of soil were removed during the interim response and disposed of off-site.

A bermed drum area was located in the south end of the former landfill. The berm was 70 by 30 feet and contained six old, rusted drums. These drums were removed during the IRA along with 224 cubic feet of bluish-green stained soil found at the bottom of the bermed area.

Area D Haul Road

The results of the soil boring sampling from the haul road indicated that the bluish-green soil found at the ground surface along parts of the road was contaminated with heavy metals. Analysis of the D1 soil sample detected chromium, copper, lead, nickel, selenium, zinc, and cyanide above their background values. The soil boring sample collected at the water table at D1 detected chromium, copper, and nickel above their background values. Sample D2 had concentrations of selenium above the background value. Impacted soil which was identified in the previous phased investigations was removed during the IRA. A 400 feet by 70 feet by 1.5 feet area was excavated, removing approximately 1,433 cubic yards of soil. Verification samples indicated the soil that remained was not impacted above background concentrations for heavy metals. An additional 30 cubic yards of soil were removed from the adjacent Ottawa County property.

Area E Former Drum Burial Area

Analysis of the soil boring samples collected from the former drum burial area did not detect any organic or inorganic contaminants above background or Act 307 Type B Criteria.

Area F Eastern Half of Site

The investigation of this area of concern involved collecting two soil samples from four boring locations. An additional four borings were collected from along the eastern edge of the area for background analysis. The results of the Phase I background borings and the Phase II borings indicated no contaminants were detected above the Part 201 Residential Criteria. No environmental hazard was found in the eastern half of the site.

The results of the soil boring sampling indicate that there is no widespread soil contamination on this portion of the WMHL site.

UST Additional Investigation

A review of the 1985 UST report did not indicate that the four USTs had been removed.

During the Phase I Investigation, a soil boring sample was collected from the area of the former UST #1 at the northeast corner of the building. A second soil boring sample was collected from the UST #4 location. The results of these soil boring samples did not detect any petroleum hydrocarbon contaminants above Part 201 Residential Criteria.

During Phase II, an additional investigation was conducted to determine if UST #3 and #4 located near the southwest corner of the building were removed. The investigation involved searching the area with an EM detector to determine if there were any buried large metal objects in the area. The results of the EM investigation detected no buried metal objects. Therefore, it was concluded that all four of the USTs had been removed and that no environmental impacts were associated with the former USTs.

Phase III Groundwater Sampling

In May 1996, Phase III groundwater samples were collected and analyzed to better establish the nature of the groundwater at the site. Groundwater samples were collected from 21 existing wells and analyzed for VOCs and heavy metals. (See Figure 17 - Phase III Groundwater Sample Locations and Results, Figure 17A - Aluminum, Figure 17B - Manganese, Figure 17C - Zinc, and Figure 17D - Total VOCs [benzene]). Review of the analytical data detected benzene above Part 201 Criteria in five of the monitoring wells, and heavy metals: aluminum, cadmium, lead, manganese, and zinc in numerous monitoring wells.

Phase IV Groundwater Sampling

The Phase IV groundwater sampling event was conducted at the request of the MDEQ to address total metals concentrations in groundwater at monitoring wells MW-02, MW-03, W-42, and W-48. These wells were sampled to provide additional information about concentrations of the metals mentioned in the MDEQ letter dated February 17, 1998. Groundwater samples were collected and analyzed for chromium, vanadium, and beryllium. The only exceedance was for cadmium in W-42. (See Attachment P - Phase IV Groundwater Sampling Results, May 7, 1998).

Five test pits were excavated to investigate several EM survey anomalies for the presence of buried drums. No drums were found in any of the test pits.

Phase V Groundwater and Soil Sampling

Additional groundwater and soil confirmation samples were also collected from the WMHL site in late 1999. Groundwater samples were collected from selected groundwater monitoring wells. Review of the groundwater analytical concluded that benzene continues to be found in the same wells in which it was detected in the past. The total heavy metals analytical results were also similar to past sampling events. For inorganics, aluminum, antimony, beryllium, lead, manganese, vanadium, and zinc were detected in concentrations which exceed Generic Residential Cleanup Criteria in one or more of the MWs located on the site. Of these, aluminum, antimony, lead, manganese, and zinc were also found in background or anthropogenic background wells (anthropogenic background levels are determined by analysis of groundwater that has already been impacted from an upgradient source such as the SWOCLF). However, these were found in several of the monitoring wells and at concentrations that are only slightly above the Generic Residential Cleanup Criteria.

For organics, benzene was the only contaminant detected in the on-site MWs above Part 201 criteria. Benzene has been detected in several of the on-site monitoring wells during the previous sampling events conducted on the WMHL site. All of these detections were found in wells located southwest of the site. Benzene was also found in one of the anthropogenic background wells at similar concentrations.

Selected locations and samples were designated as background samples. Background concentrations from these locations are those common to the groundwater that has not been impacted in any way from any source that is not natural. (See Figure 18 - Phase V Groundwater Sample Locations and Results and Attachment N - Phase III Groundwater Sampling Report, May 6,1996).

An additional 540 cubic yards of soil was excavated from the haul road area and disposed of off-site. Soil confirmation sample analysis detected chromium, copper, lead, nickel, and zinc. Two additional soil samples were collected from the white powder material located on the northern side of this excavation. Analysis detected chromium, barium, copper, and zinc at concentrations which exceeded Part 201 Direct Contact Criteria. (See Figure 19 - Phase V Additional Soil Excavation Locations). In 2001, two soil samples were collected from the same location as the previous sample A-3 collected during the RI and consisted mostly of the white powder material. Analysis detected no inorganic at concentrations which exceeded Part 201 Direct Contact Criteria.

All of the additional investigations noted above were included in the Final FS and RAP report submitted to the MDEQ in July 2001. (See Attachment Q - Phase V Ground Water and Soil Analytical Data, January 27, 2000).

The initial RAP was submitted to the MDEQ for review in April 1997. Review of the document determined it to be insufficient. An Acknowledgement of Receipt of an Administratively Incomplete RAP letter was sent to WMI, listing the items required, on April 23,1997. Subsequent RAP submittals were received in January 1998 (see Attachment O) and July 2001, (see Attachment R). Upon review by the MDEQ, both documents were determined to be insufficient. Administratively Incomplete RAP letters were sent for both documents on April 23, 1997, February 17, 1998, and the latter on October 16, 2001. (See Attachment S- MDEQ RAP Non acceptance letters 1997, 1998, and 2001).

Based upon discussions held between the MDEQ and WMI in 2005, WMI has agreed to submit a RAP by June 1, 2006, which will incorporate all the previous site remedial actions and investigations along with additional groundwater information as was required by the PCOR and Part 201. The latest RAP submittal was received on June 1, 2006. Per the requirements of Part 201, MDEQ staff has until December 2006 to determine if the latest RAP submittal is sufficient and complete. Therefore, information from this latest RAP submittal will not be included in this Five-Year Review Report.

Remedy Implementation

The IRA involved excavating impacted soil, removing several empty drums, and conducting a general Site Cleanup. Soil was removed from seven areas of the site, based on either the results of the Phase I and Phase II soil sampling or on visual observations of impacted soil. Approximately 3,930 cubic yards of soil was excavated and disposed of off-site. Twenty eight shallow soil scrapings were excavated from the surface of the former lagoon area and visually inspected to ensure that all of the soil impacted by the haul road was found and excavated. (See Figure 15 - Soil Scraping Locations). Six empty drums were

also removed, crushed, and disposed of off-site. The confirmation samples were collected from the excavated areas and analyzed according to MDEQ guidance. Based upon the results of the verification samples, four areas continued to exceed Part 201 Cleanup Criteria. Additional soil was excavated and the new confirmation samples collected demonstrated that the remaining soil met the Part 201 Generic Cleanup Criteria as well as background screening values for the inorganic contaminants.

Surface debris, including four abandoned cars, were also collected and disposed of off-site.

The groundwater extraction system installed to collect the impacted groundwater plume originating and migrating from the SWOCLF NPL site is also currently the primary discharge area for the groundwater migrating from beneath the WMHL site. The system was originally designed with seven extraction wells intended to pump approximately 1000 gallons per minute (gpm), a treatment system with a capacity of 700 gpm, and a National Pollution Discharge Elimination System permit allowing for up to 750 gpm. In 1990, an additional extraction well, (i.e., pumping well [PW]) PW8 was installed between wells PW3 and PW4 to capture groundwater that was not being captured by the two extraction wells. In 1992, additional enhancements were made to the treatment system. These enhancements included: additional extraction wells, and additional monitoring wells to monitor the effectiveness of the pump and treat/purge system.

The extraction system consists of four extraction wells (PW6, PW7, PW9, and PW10) located along James Street and three extraction wells (PW3, PW4, and PW8) located west of 168th Street and both of the NPL sites. (See Figure 20 - SWOCLF Groundwater Extraction Treatment System). The treatment facility is also located west of 168th Street. The treatment facility treats the water for iron and for organics using carbon adsorption. The treated groundwater is discharged to an unnamed tributary of Lake Macatawa located south of Lakewood Boulevard and between 106th and 168th Street. The treatment system will continue to operate until any groundwater contamination detected beyond the treatment system is below Part 201 Residential Drinking Water Criteria. Currently, the treatment system continues to operate both the carbon adsorption and the chemical oxidation and filtration system with limited efficiency.

More than 130 monitoring wells have been installed in the area of the WMHL site and the SWOCLF sites to monitor the water quality and determine the extent of the groundwater plume. Several of these wells have been installed on the WMHL site and are sampled annually by Ottawa County's consultant, Prein and Newhoff, as part of the remedy for the SWOCLF.

In addition, an institutional control in the form of a RC was implemented to prevent the installation of private wells to access the area groundwater on the WMHL site proper and to limit residential use. As part of the March 2005 Settlement Agreement between the MDEQ and Ottawa County for the SWOCLF in the matter of the Attorney General of the State of Michigan, ex rel Michigan Department of Environmental Quality v County of Ottawa; Waste Management of Michigan, Inc., et al. (Michigan Department of Attorney General [MDAG] v Ottawa County), an area wide land and resource use restriction is to be implemented by March 2007.

Annual System Operations/Operation and Maintenance Costs

Annual System Operations and Maintenance (O&M) costs have not been provided by WMI nor has the annual system cost to Ottawa County to operate the treatment system been provided. WMI has reported

that it costs up to $10,000 to implement the RC on the WMHL site.

When the RAP process is completed, and if ICs are necessary as part of the final RAP, then MDEQ will require WMI to provide an O&M plan. The plan will include regular inspection of the ICs at the site, a communication plan, and annual certification to the USEPA and the MDEQ that the ICs are in place and effective.

V. Progress Since the Last Review

This is the first Five-Year Review Report to be written for the WMHL site.

VI. Five-Year Review Process

Administrative Components of the Five-Year Review Process

The MDEQ Project Manager (PM), Cindy Fairbanks, notified the USEPA and WMI of the initiation of the Five-Year Review process in a letter dated March 14, 2006. The PM headed the Five-Year Review Team and was assisted by the MDEQ Geologist, William Bolio, the USEPA Regional Project Manager (RPM), Denise Boone, the USEPA Attorney, Ann Coyle, and the USEPA Community Involvement Coordinator (CIC), Robert Paulson.

The review schedule included the following components:

- Community Notification
- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report Development and Review.

Community Notification and Involvement

In March 2006, both the MDEQ PM and the USEPA RPM discussed the need to notify the community of the upcoming Five-Year Review with Robert Paulson. The need to complete the USEPA site file, as well as the site archive, was also discussed. Copies of the missing file information were made by the MDEQ and sent to the USEPA in April 2006. The USEPA ensured the site file archive located at the Herrick District Library, 300 S. River Avenue, Holland, Michigan was complete and up to date. In June 2006, the USEPA's Public Affairs Office placed an ad in the local newspaper announcing that the Five-Year Review was in progress and requesting that any interested parties contact either USEPA and/or MDEQ personnel for additional information. A copy of the newspaper notice is included in Appendix B. Since the announcement notice has been issued, no member of the community has notified the USEPA or the MDEQ of any interest in the Five-Year Review.

Document Review

The Five-Year Review consisted of a review of relevant documents including the following:

- 2003 Investigation Report for the Southwest Ottawa County Landfill Site, Park Township, Ottawa County, Michigan Volume I and II, prepared for the MDEQ, Remediation and Redevelopment Division, by Weston Solutions of Michigan Inc., September 2004

- Additional Groundwater Sample Results, Waste Management Holland Lagoons Letter with attachment, from WMI to MDEQ May 7, 1998

- Baseline Risk Assessment, Waste Management Holland Lagoons, Rust Environmental and Infrastructure January 1997

- Feasibility Study and Remedial Action Plan, Waste Management Holland Lagoons Volume I and Volume II, Rust Environmental and Infrastructure December 1995

- Feasibility Study and Remedial Action Plan, Waste Management Holland Lagoons, Rust Environmental and Infrastructure January 1998

- Final Feasibility Study and Remedial Action Plan, Waste Management Holland Lagoons, Earth Tech July 2001

- Groundwater and Soil Analytical Data, Waste Management Holland Lagoons Superfund Site, Earth Tech January 27, 2000

- Groundwater Profile MDNR 1981

- Groundwater Sampling Results Phase IV May 7, 1998

- Groundwater Sampling, Waste Management Holland Lagoons Superfund Site letter from WMI to MDEQ May 6, 1996

- Lime Deposits Waste Management Holland Lagoons Superfund Site letter from WMI to MDEQ March 20, 2001

- Report on the Tank Removal Operation at the Former Jacobusse site for Waste Management Incorporated October 1985

- Soil Analytical Data, Waste Management Holland Lagoons Superfund Site letter from Earth Tech to MDEQ August 19, 1999 Technical Memorandum for Oversight of Remedial Activities at the Holland Lagoons site December 27, 1995

- Metals Analysis for Soil Samples at Location A3, Waste Management Holland Lagoons site letter from Earth Tech to MDEQ July 31, 2001

- MDNR Groundwater Sampling Investigations from 1984, 1985, and 1988

- Phase I Remedial Investigation Report Waste Management Holland Lagoons Volume I and Volume II, Rust Environmental and Infrastructure December 1995

- Phase I Remedial Investigation Work Plan Volume I Waste Management Holland Lagoons Remedial Investigation/Feasibility Study, Rust Environmental and Infrastructure February 1993

- Phase I Remedial Investigation Work Plan Volume I of IV, Waste Management Holland Lagoons, Holland, Michigan May 1995

- Phase II Remedial Investigation Work Plan Work Plan Volume I and II, Waste Management Holland Lagoons, Holland, Michigan May 1995

- Remedial Investigation Report Waste Management Holland Lagoons Volume I and II, Rust Environmental and Infrastructure January 1997

- Report on the Tank Removal Operation at the Former Jacobusse site for Waste Management Incorporated October 1985

- Soil Analytical Data, Waste Management Holland Lagoons Superfund Site letter from Earth Tech to MDEQ August 19, 1999

- Technical Memorandum for Oversight of Remedial Activities at the Holland Lagoons site December 27, 1995

- USEPA Field Investigation Team Investigation Report, June 1,1983

- USEPA Hazard Ranking System Score for the WMHL Site, December 1, 1983

Data Review

Data included in the following documents were reviewed and discussed in this Five-Year Review Report:

- MDNR Groundwater Sampling Investigations from 1984,1985, and 1988

- Phase I Remedial Investigation Report, WMHL, Holland, Michigan, prepared for WMI by Rust Environmental and Infrastructure December 1995

- Remedial Investigation Report, WMHL, Holland, Michigan, prepared for WMI by Rust Environmental and Infrastructure January 1997

- Baseline Risk Assessment, WMHL, Holland, Michigan, prepared for WMI by Rust Environment and Infrastructure January 1997

- 2003 Investigation Report for the Southwest Ottawa County Landfill Site, Park Township, Ottawa County, Michigan Volume I and II, prepared for the MDEQ, Remediation and Redevelopment Division, by Weston Solutions of Michigan Inc., September 2004

- Final FS and RAP, WMHL, Holland, Michigan, prepared for WMI by Earth Tech, Inc., July 2001

Site Inspection

The Five-Year Review site inspection of the WMHL site was conducted on June 20, 2006. The site inspection team included Cindy Fairbanks and William Bolio from the MDEQ, Denise Boone from the USEPA, and James Forney from WMI. The inspection included a walk-about of the site as well as the treatment system. The site inspection check list can be found in Appendix A.

Interviews

There were no interviews conducted or necessary during the Five-Year Review period as the community interest in this site is minimal.

Institutional Controls

ICs are non-engineered instruments, such as administrative and legal controls that help to minimize the potential for exposure to contamination and that protect the integrity of the remedy. ICs are required to assure long-term protectiveness for any areas which do not allow for UU/UE.

The groundwater currently does not allow for UU/UE. Until a final RAP is adopted by the MDEQ, the following interim ICs are effect:

Governmental ICs have been enacted for the site via the Ottawa County Environmental Code. Article VII, Section C-7 of the code stipulates that the County Health Department has the authority not to issue a permit to install a private water supply well if the water does not meet National Primary Drinking Water Regulations. The groundwater plume migrating from the SWOCLF site does not meet these regulations, and therefore, the County Health Department will not issue a permit to install a well in the area of the SWOCLF groundwater plume. This area includes the WMHL site. (See Attachment D).

To assure that the County Health Department is aware of the WMHL site specific concerns including use restrictions, and progress with site remediation, the MDEQ recommends that a communication plan be developed by WMI as part of the IC Plan if it is determined that ICs are required in the final RAP.

Included in the Part 201 RAP process, a RC was filed with Ottawa County on August 18, 1997. The following restrictions are identified in the RC:

- restricts the use of the property to those uses compatible with the limited residential land use criteria as defined in Section 20120a(1)(f) of Part 201.

- prohibits groundwater well installation and groundwater use within the property boundary for all domestic, commercial, and industrial uses.

- prohibits the construction of groundwater fed impoundments.

- prohibits excavation of soil beyond the saturated zone.

- requires soil sampling if existing structure is razed and 30-days notice to MDEQ.

As part of the March 2005 settlement agreement between the MDAG v Ottawa County for the SWOCLF, the county is to implement an area wide groundwater use restriction by March 2007. This groundwater restriction will include the WMHL site. In addition, all private wells within the restricted area are to be identified and properly abandoned. All area residents will be able to access the expanded municipal water supply within the area of the groundwater plume for drinking water, thus greatly reducing the exposure risk to groundwater contamination. (See Figure 4 - Municipal Line Map).

For this Five-Year Review, a request from the USEPA, in a letter dated April 18, 2006, was made to WMI to conduct a study of the status of implementing the RC. The Institutional Controls report can be found in Appendix C. The USEPA is providing comments on the IC study to WMI and expects the study to be finalized by April 1, 2007. To assist the MDEQ, after review of the IC Study, U. S EPA will provide comments for the MDEQ's consideration in the final RAP. Additionally, IC maps which depict areas which do not allow for UU/UE will be created by USEPA and placed on the USEPA's Superfund Data Management System (SDMS) as an additional information institutional control by April 1, 2007.

VII. Technical Assessment

- *Question A: Is the remedy functioning as intended by the decision documents?*

Since the RAP for the site has not yet been finalized, it is not possible at the time of writing this Five-Year Review Report to ascertain if the final remedy is functioning as intended.

Remedial Action Performance

The removal of all known contaminated soils from the identified areas of concern, as well as removal of buried drums, other surface debris, and the enclosure of the site by a chain link fence has mitigated the Direct Contact threat on the site to Part 201 Residential Criteria. Remaining areas of potential concern are the soils underlying the site building. Those soils will be investigated at a future time after building demolition.

The expansion of the municipal water supply in the area and active participation of Ottawa County to hook up area residents to the water supply has reduced the threat of drinking the contaminated groundwater. WMI, however, must provide information in the RAP to support that contamination from the known areas of concern are no longer contributing to the groundwater plume originating from the adjacent and upgradient SWOCLF and migrating off-site.

- *Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?*

Yes. However, since the June 2006 draft RAP for the site has not yet been reviewed, it is not possible at the time of writing this Five-Year Review Report to ascertain if the final remedial action objectives are still functional and protective as intended.

Changes in Standards

When the WMHL site was listed on the NPL, the standards for cleanup were embodied in Act 307. Part 201 replaced Act 307 in 1994, at which point no decision documents related to the WMHL site yet had been issued. Cleanup standards for the WMHL site must comply with current Part 201 requirements and criteria in effect at the time the decision documents are issued.

Changes in Exposure Pathways, Toxicity, and Risk Assessment Methods

There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. Compliance with State of Michigan Applicable or Relevant and Appropriate Requirements (ARARs) ensured compliance with Federal ARARs as the State ARARs are developed in accordance with the Federal requirements. Based upon the review of the ARARs which were identified for the WMHL site, the substantive requirements of the State ARARs address the substantive requirements of the corresponding Federal ARARs.

- *Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No, not at this time. However, since the June 2006 draft RAP for the site has not yet been reviewed, it is not possible at the time of writing this Five-Year Review Report to ascertain if the final remedy is functional and protective as intended.

Technical Assessment Summary

According to the review of entire data set, ARARs, risk assumptions and the results of the Site Inspection and the intensive soil and debris removal actions conducted during the IRA, known soil contamination in excess of Part 201 criteria, including direct contact criteria, has been removed. Until WMI provides the necessary groundwater information required by the Part 201 RAP process and the PCOR, it cannot be determined as to whether the site continues to have contamination migration into the groundwater to intermingle with the groundwater plume originating from the SWOCLF and whether the SWOCLF current pump and treatment system is adequate in addressing that contamination. However, with the implementation of the RC and the placement of area residents on the municipal water supply line, the risk of exposure to contaminated groundwater has been reduced.

VIII. Issues

Table 2: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Non compliance with the Administrative Order of Consent (AOC) requiring the completion of a Part 201 approved Remedial Action Plan (RAP). Incomplete Michigan Department of Environmental Quality (MDEQ) approved RAP which meets all the requirements of Part 201 , Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 201).	Y	Y
Waste Management, Inc. (WMI) must provide information to prove the six on-site source areas, due to the completion of past remediation activities, are no longer contributing contaminants to the groundwater plume migrating under the site and that all of the contaminants found in the groundwater plume originate from the adjacent and upgradient Southwest Ottawa County Landfill (SWOCLF) National Priorities List (NPL) site.	Y	Y
Assure effective interim ICs are in place pending the final RAP.	N	Y
For the remedy to be protective in the long-term, effective ICs may be implemented and maintained as part of the final RAP.	N	Y
A contamination source area may exist beneath the former office building.	Y	Y

IX. Recommendations and Follow-up Actions

Table 3: Recommendations and Follow-up Actions

	Recommendations	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
AOC and RAP	WMI is required to submit to the MDEQ a RAP to meet the requirements of Part 201 and the AOC.	PRP	MDEQ	April 2007	Y	Y

	Recommendations	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Groundwater	WMI is required to submit to the MDEQ a RAP which provides groundwater information to prove the six on-site source areas are no longer contributing contamination into the groundwater and that all the contamination detected in the groundwater plume is migrating from the adjacent and upgradient SWOCLF NPL site.	PRP	MDEQ	April 2007	Y	Y
Interim ICs	To assure effective interim ICs are in place, USEPA will review the IC Study completed by WMI and US EPA will create IC maps.	PRP	MDEQ	April 2007	N	Y
ICs	If required by the RAP, development of any ICs and an IC plan.	PRP	MDEQ	April 2008	N	Y
Former Office Building	Evaluate soils under the former office building and other areas as may be required under the RAP.	PRP	MDEQ	April 2008	Y	Y

X. Protectiveness Statement(s)

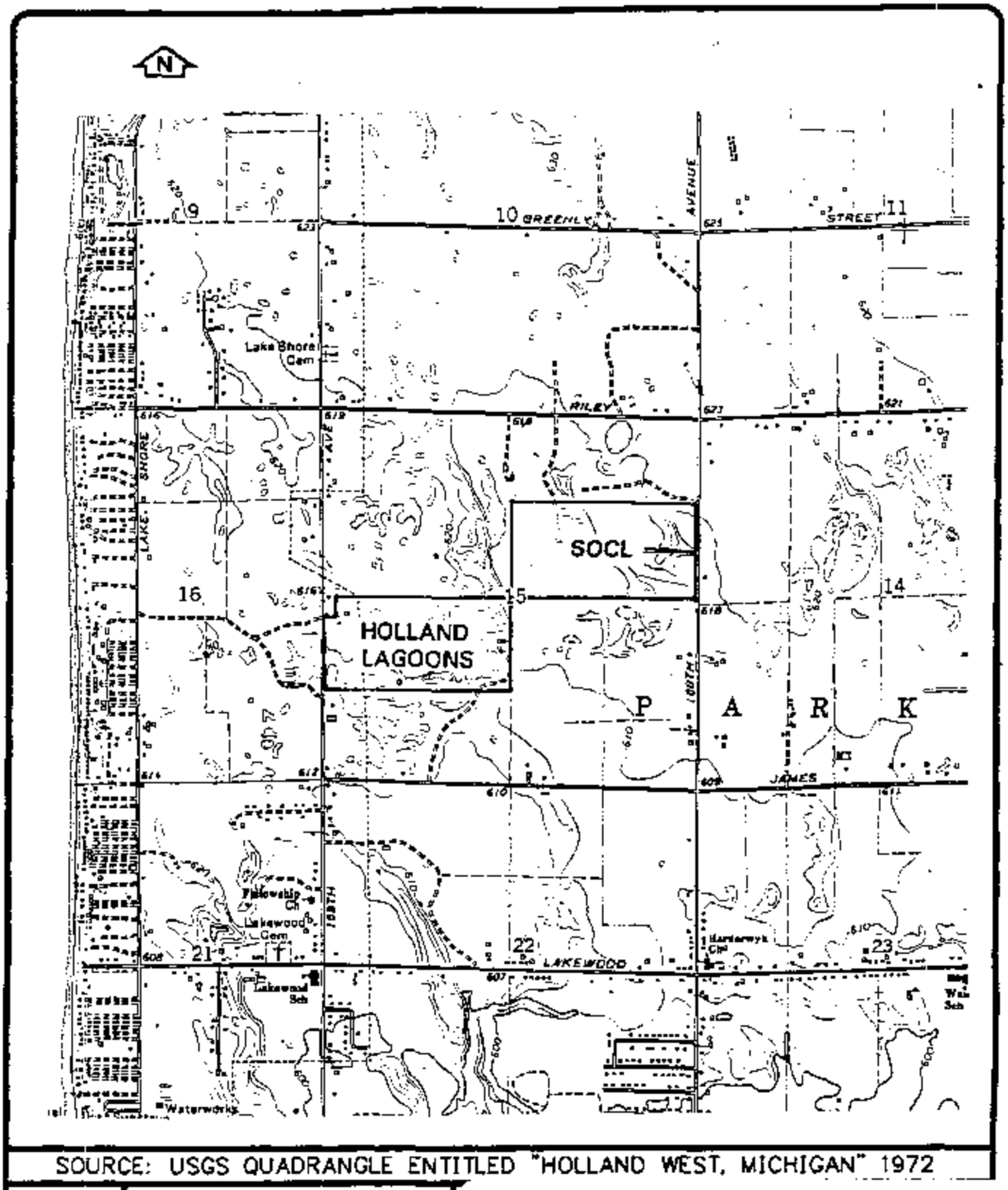
Protectiveness deferred:

The remedy is protective in the short-term. There is no evidence of exposure to site-related contaminants. Furthermore, interim ICs which serve to notify the public of the areas which do not allow for unlimited use and unrestricted exposure exist until the final RAP is complete. Long-term protectiveness is dependent upon effective ICs, or additional remedial actions, if they are required by the final RAP.

XI. Next Review

The next Five-Year Review for the WMHL Superfund site is required by September 26, 2011, five years from the date of this review.

FIGURES



SOURCE: USGS QUADRANGLE ENTITLED "HOLLAND WEST, MICHIGAN" 1972

RUST ENVIRONMENT & INFRASTRUCTURE

MICHIGAN

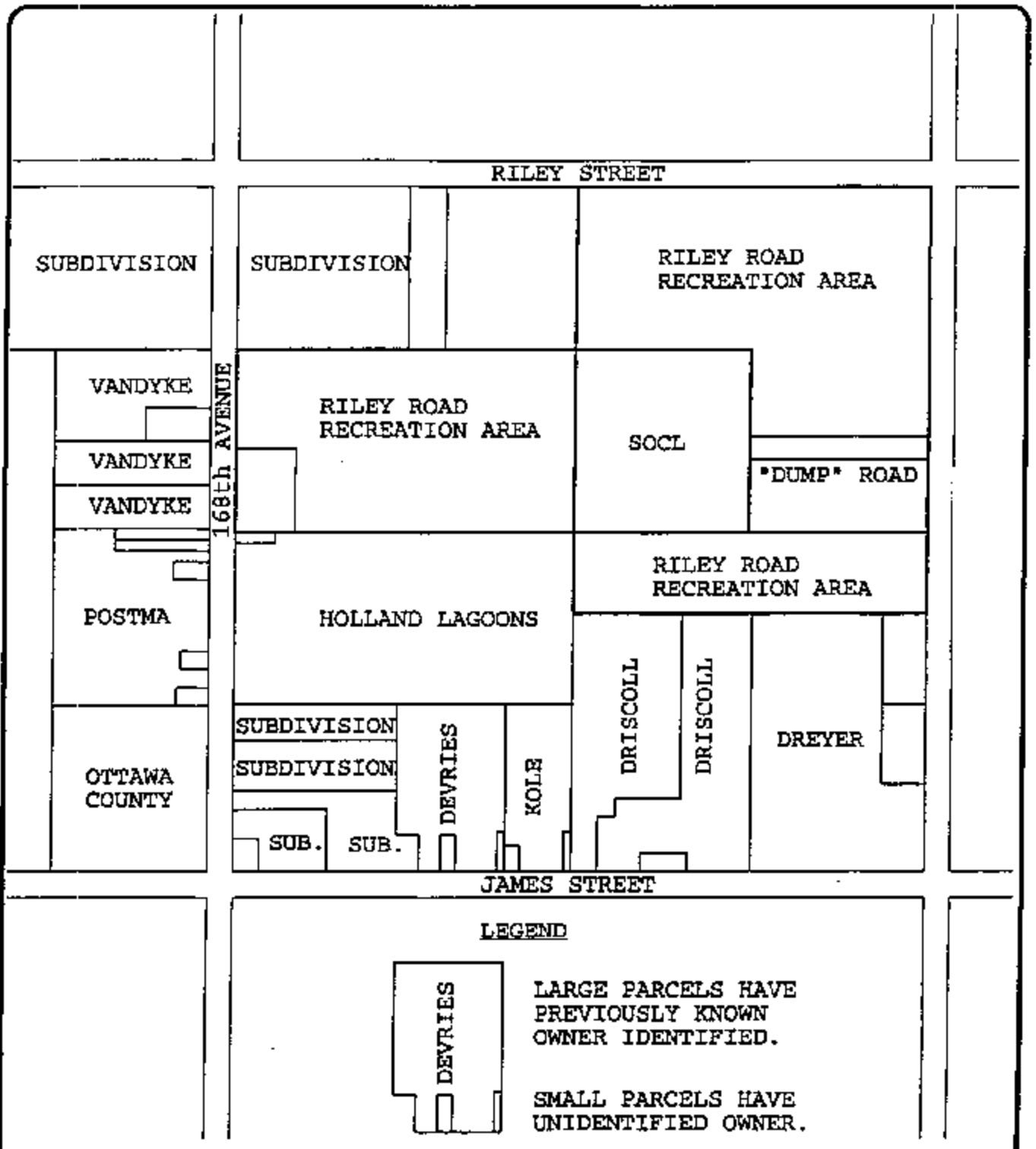
0 2000ft

DATE 10/04/92 JOB NO M2302

CAD FILE NO. M2302FIG1

SITE LOCATION MAP

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 1



SOURCE: LAND ATLAS AND PLOT BOOK
OTTAWA COUNTY, MICHIGAN
1993

ADJOINING PROPERTY MAP

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 2

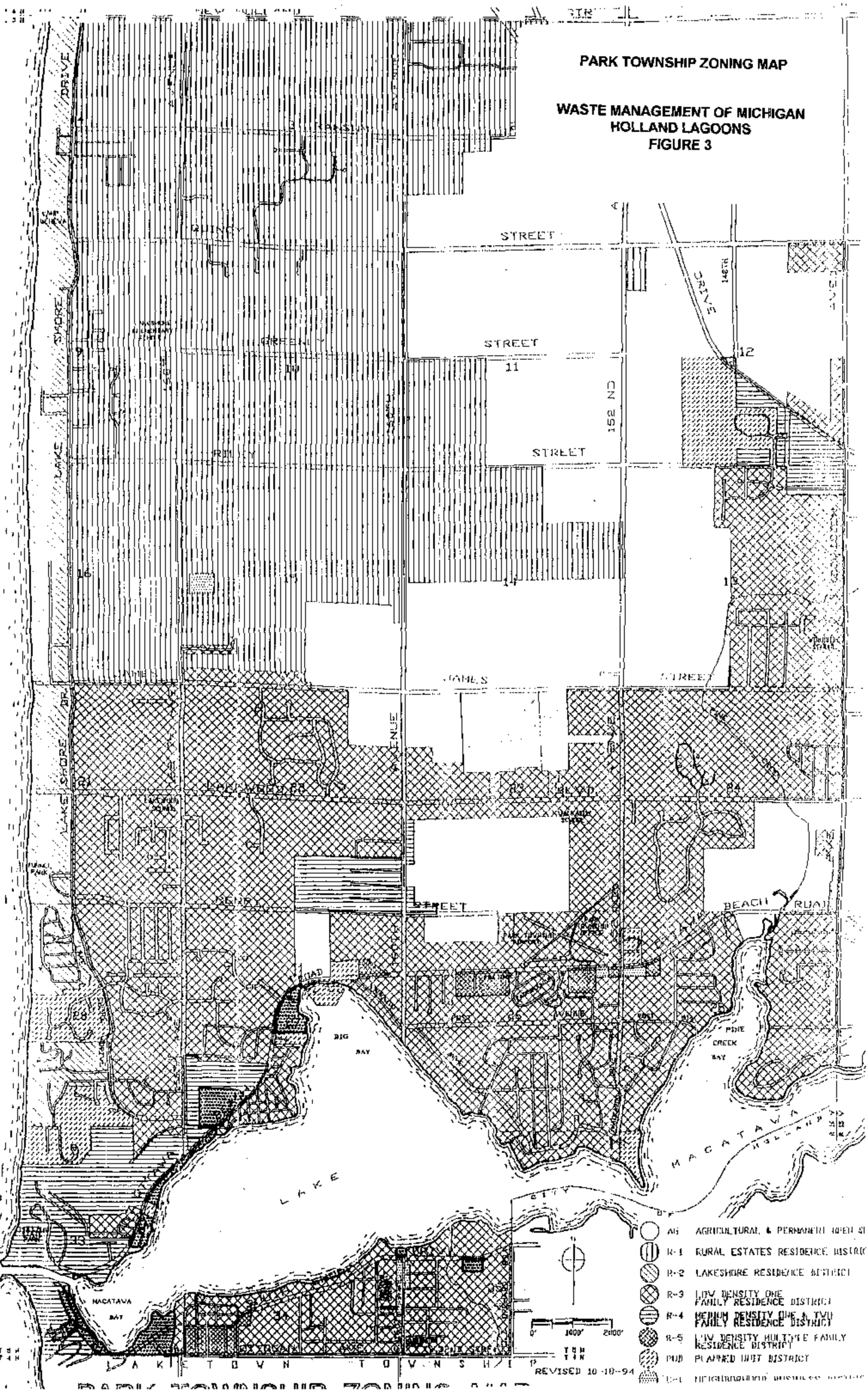
PRINT SCALE: 1"=1'
PEN TABLE: 042_ACAD
PRINT DATE: 07/09/96

DWG SIZE: 8.5x11
RUST OFFICE: OAK BROOK
FILENAME: 70691\ERA_1-2.DWG

ACAD REF FILES

PARK TOWNSHIP ZONING MAP

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 3



REVISED 10-10-94

SDMS US EPA Region V

Imagery Insert Form

Document ID: 263851

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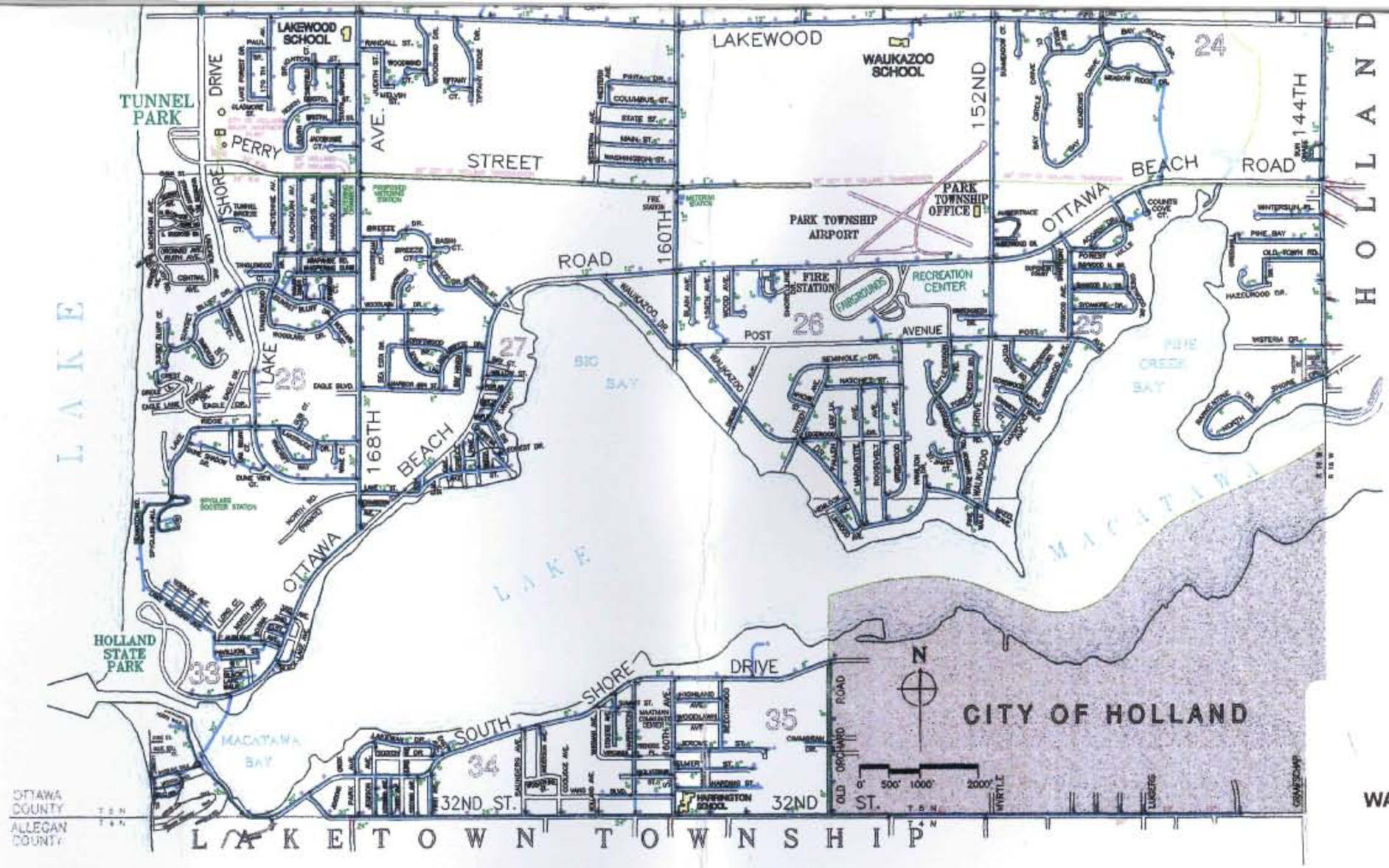
Due to certain scanning equipment capability limitations, the document page(s) is not available in SDMS. The original ~~document is available for viewing at the Superfund Records center.~~ is with the RPM.

Specify Type of Document(s) / Comments:

FIGURE 4 - MUNICIPAL LINE MAP - PARTIALLY SCANNED

☐ Document is available at the EPA Region 5 Records Center.

Specify Type of Document(s) / Comments:



LEGEND

- EXISTING WATER MAIN
- LINE VALVE & VALVE NUMBER
- HYDRANT
- FUTURE WATERMAIN
- EXISTING WATER MAIN (CITY OF HOLLAND, HOLLAND TOWNSHIP & LAKETOWN TOWNSHIP)
- EXISTING TRANSMISSION (CITY OF HOLLAND)
- EXISTING TRANSMISSION (CITY OF WYOMING)

WATER SUPPLY SYSTEM

MUNICIPAL LINE MAP

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 4

PARK TOWNSHIP
OTTAWA COUNTY, MICHIGAN

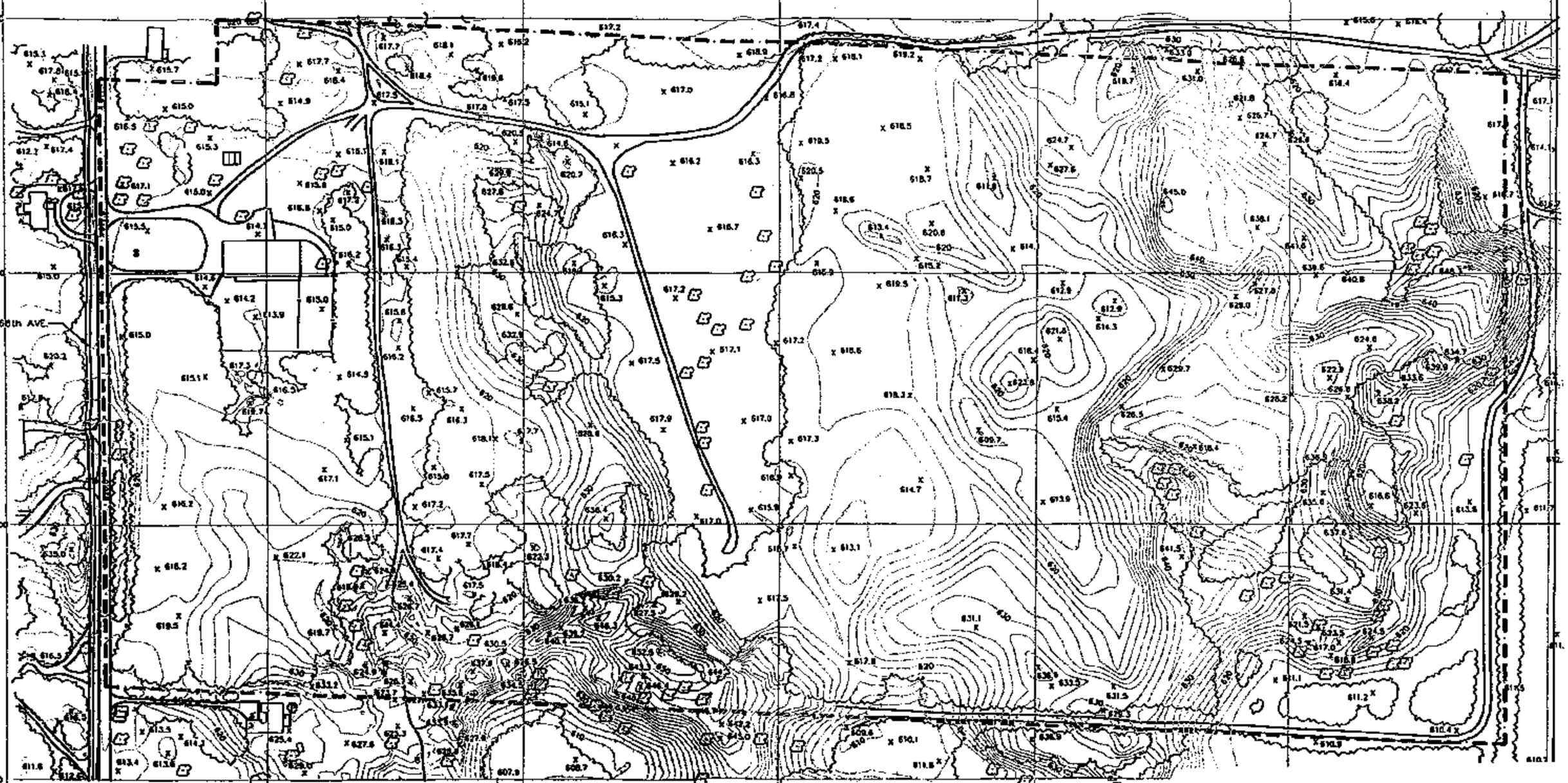
PREIN & NEWHOF
CONSULTING ENGINEERS
HOLLAND - MICHIGAN

FEBRUARY 1999

E 12632000 E 12632500 E 12633000 E 12633500 E 12634000 E 12634500 E 12635000

N 486000 N 485500 N 485000 N 484500

160th AVE.



LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- -620- GROUND SURFACE ELEVATION CONTOUR LINE

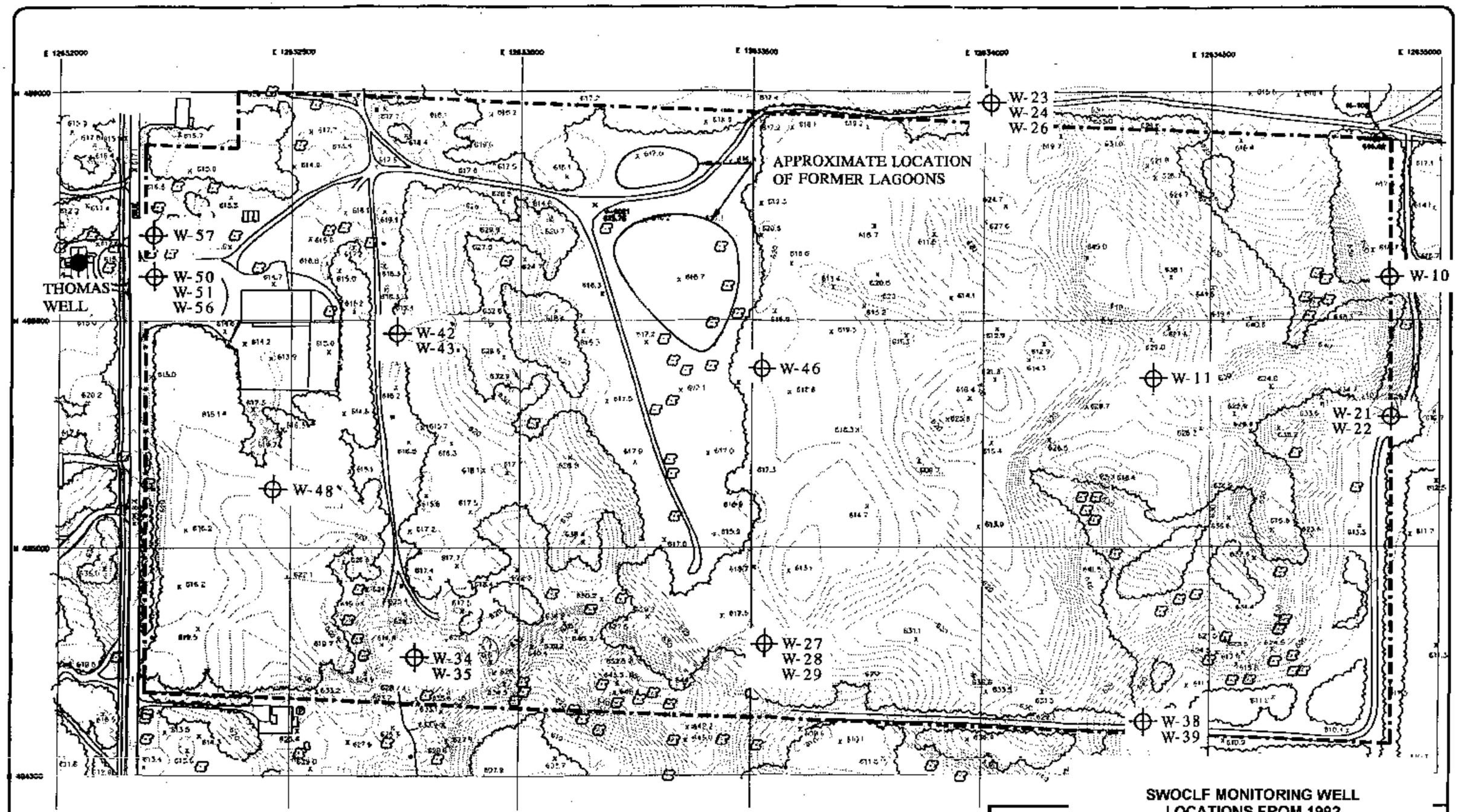
SITE FEATURES MAP

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 5

ROAD REFERENCES

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: HF0_2

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 01/26/96

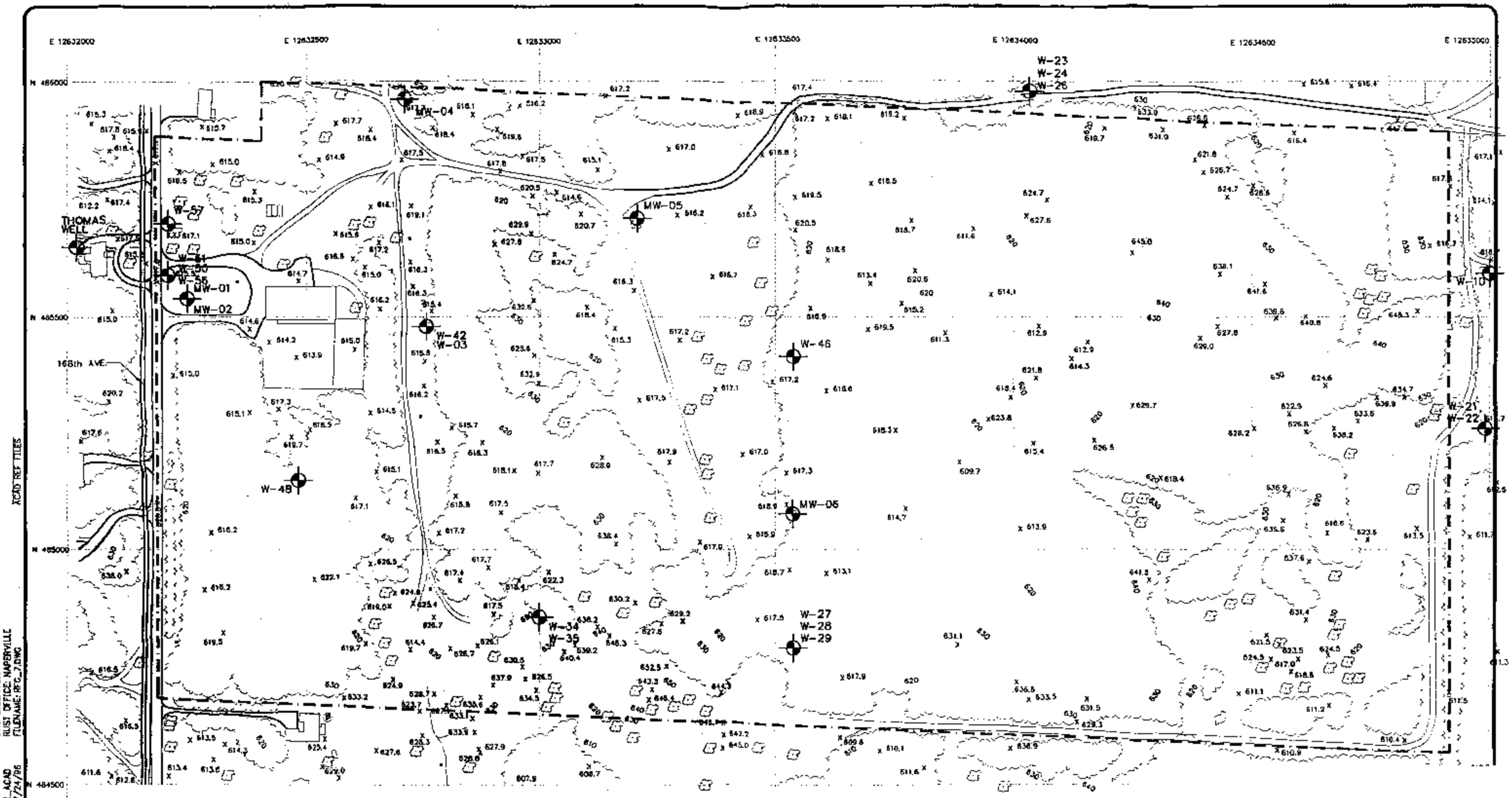


SWOCLF MONITORING WELL LOCATIONS FROM 1992

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 6

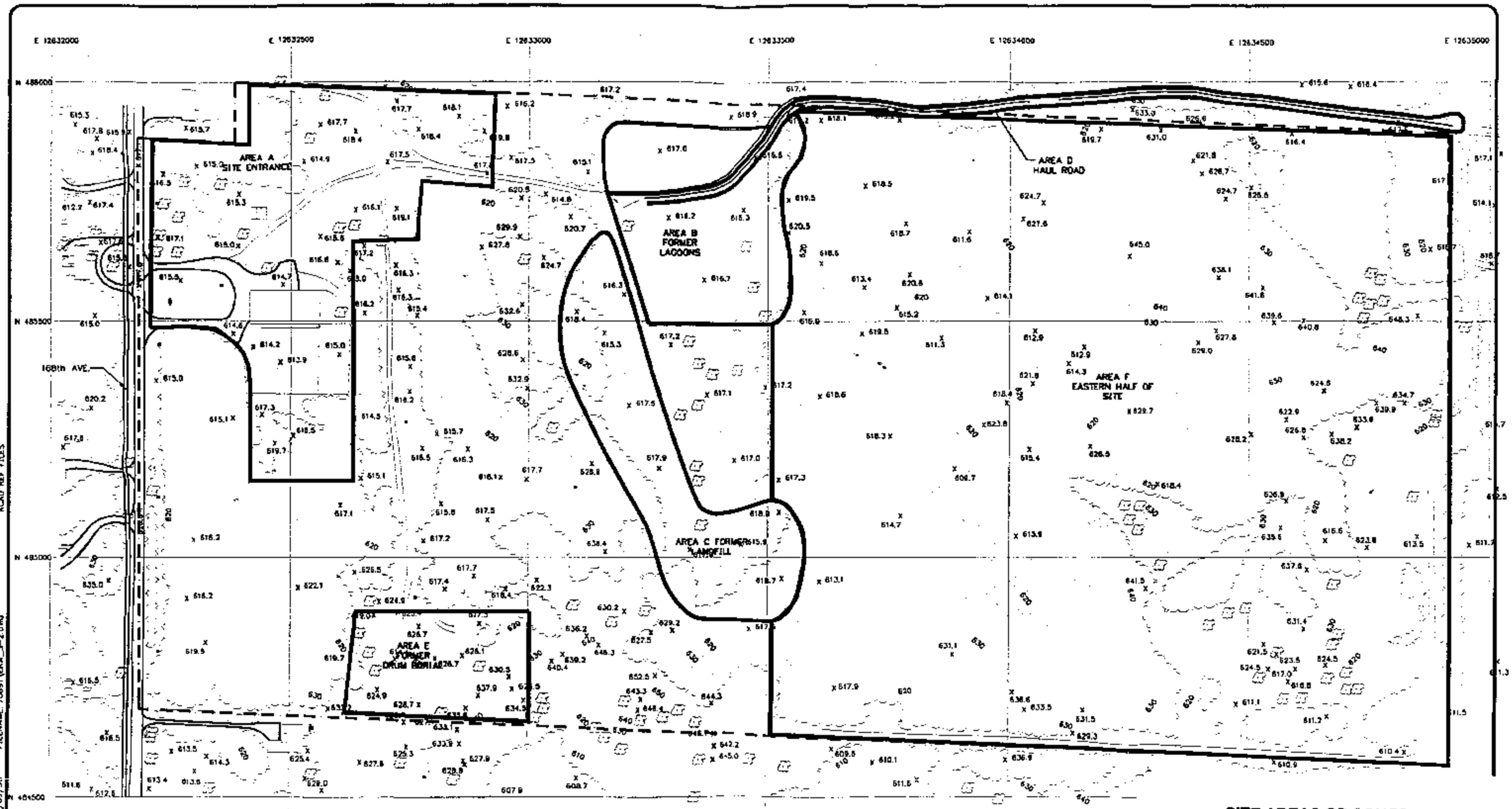
SEC

DATE 11/23/9
CAD FILE NO. 2



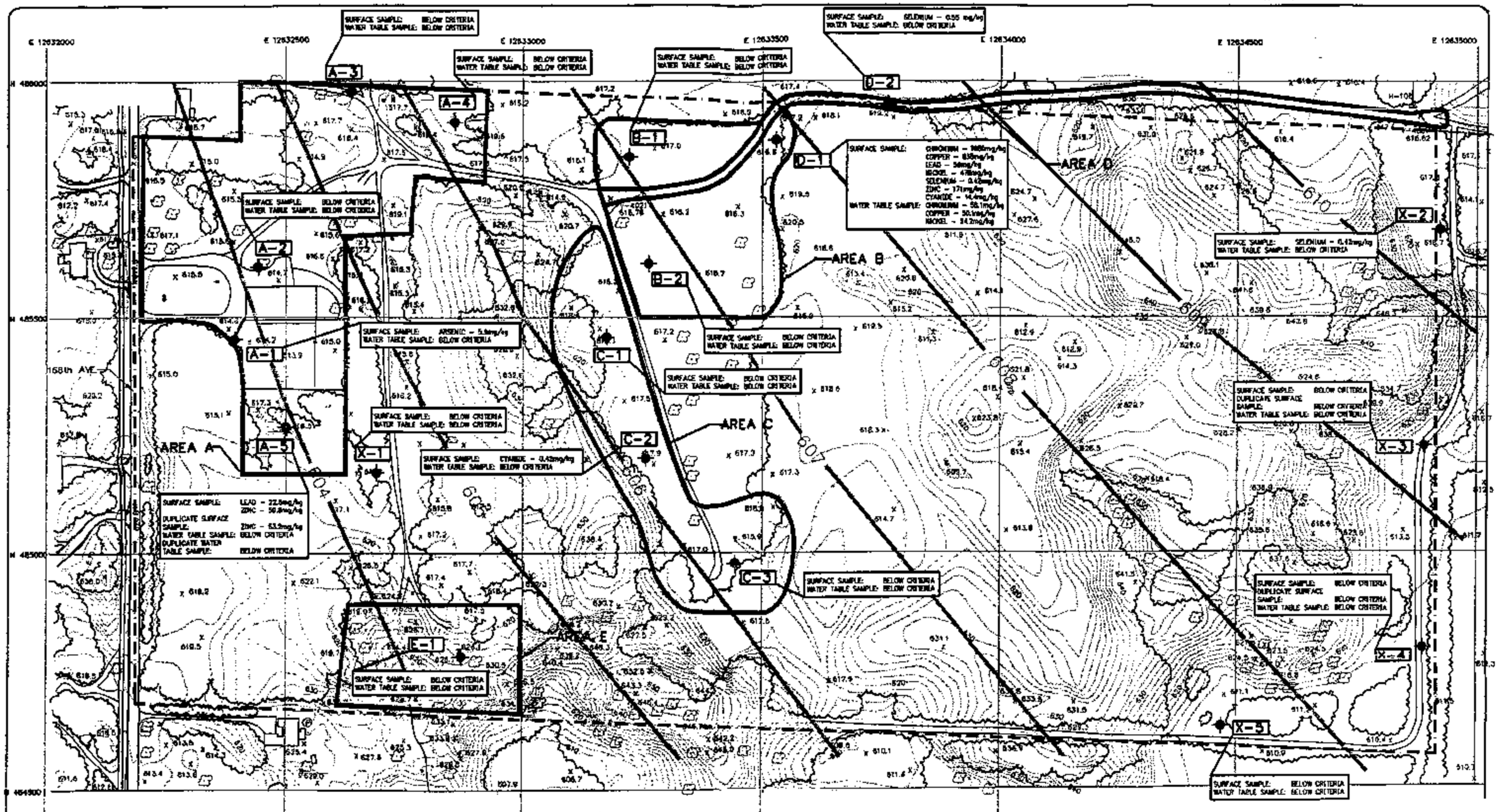
CURRENT MONITORING WELL LOCATIONS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 6A



SITE AREAS OF CONCERN

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 7



NOTES:

1) BELOW CRITERIA INDICATES:
   INORGANICS: RESULTS WERE BELOW BACKGROUND CRITERIA FOR DEFAULT TYPE A.
   ORGANICS: RESULTS WERE BELOW TYPE B CLEANUP OBJECTIVES.

LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- 620 GROUND SURFACE ELEVATION CONTOUR LINE
- 607 WATER TABLE ELEVATION CONTOUR LINE
- AREAS OF CONCERN

SURFACE SAMPLE: BELOW CRITERIA / WATER TABLE SAMPLE: BELOW CRITERIA — SOIL SAMPLING RESULTS

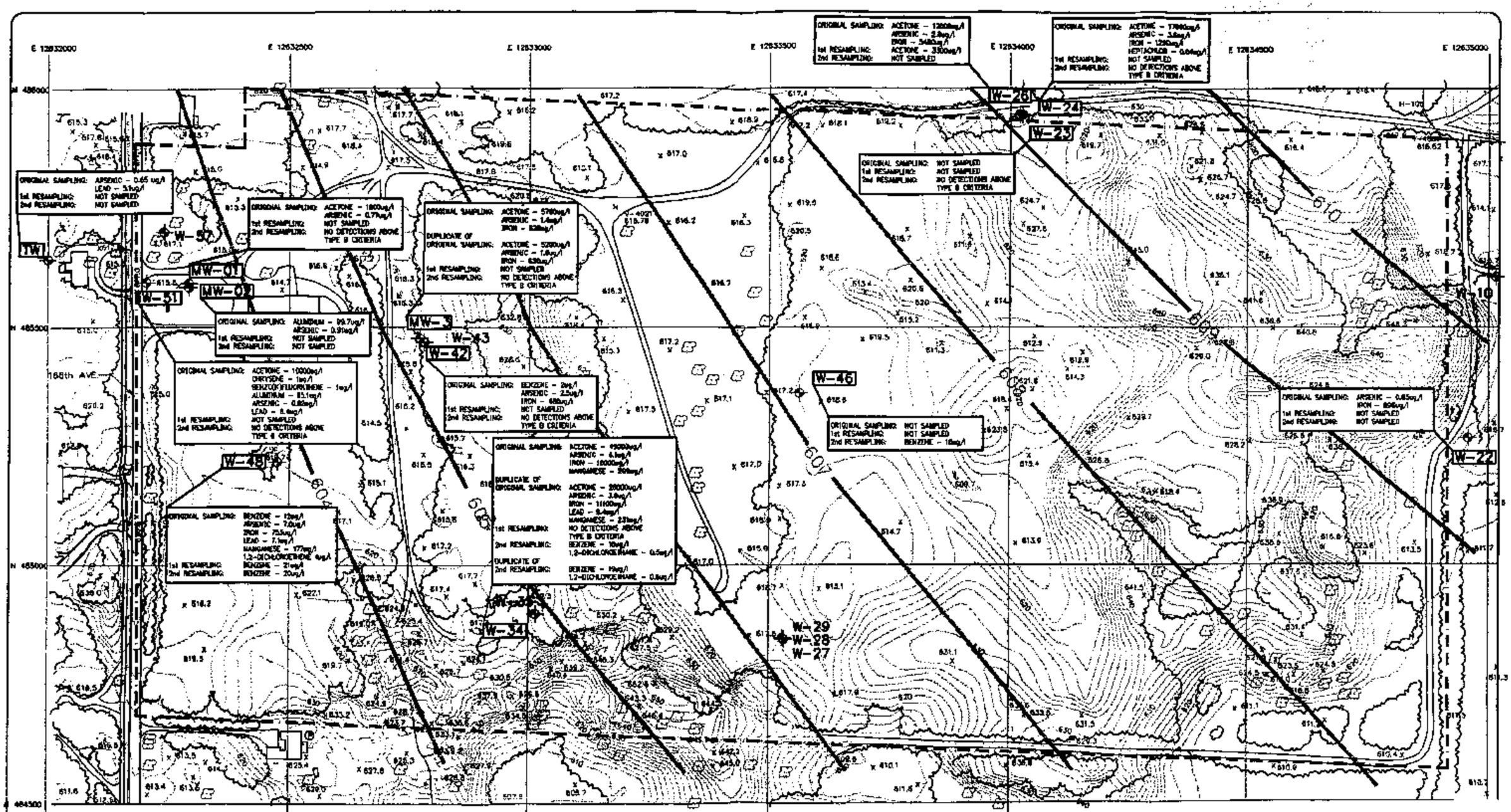
C-3 — SOIL BORING

DATE:
CAD

1994 SOIL SAMPLE LOCATIONS AND RESULTS

WASTE MANAGEMENT OF MICHIGAN HOLLAND LAGOONS

FIGURE 8



LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- GROUND SURFACE ELEVATION CONTOUR LINE
- 607 WATER TABLE ELEVATION CONTOUR LINE
- W-34 GROUNDWATER MONITORING WELL

GROUNDWATER SAMPLING RESULTS ABOVE TYPE B CRITERIA

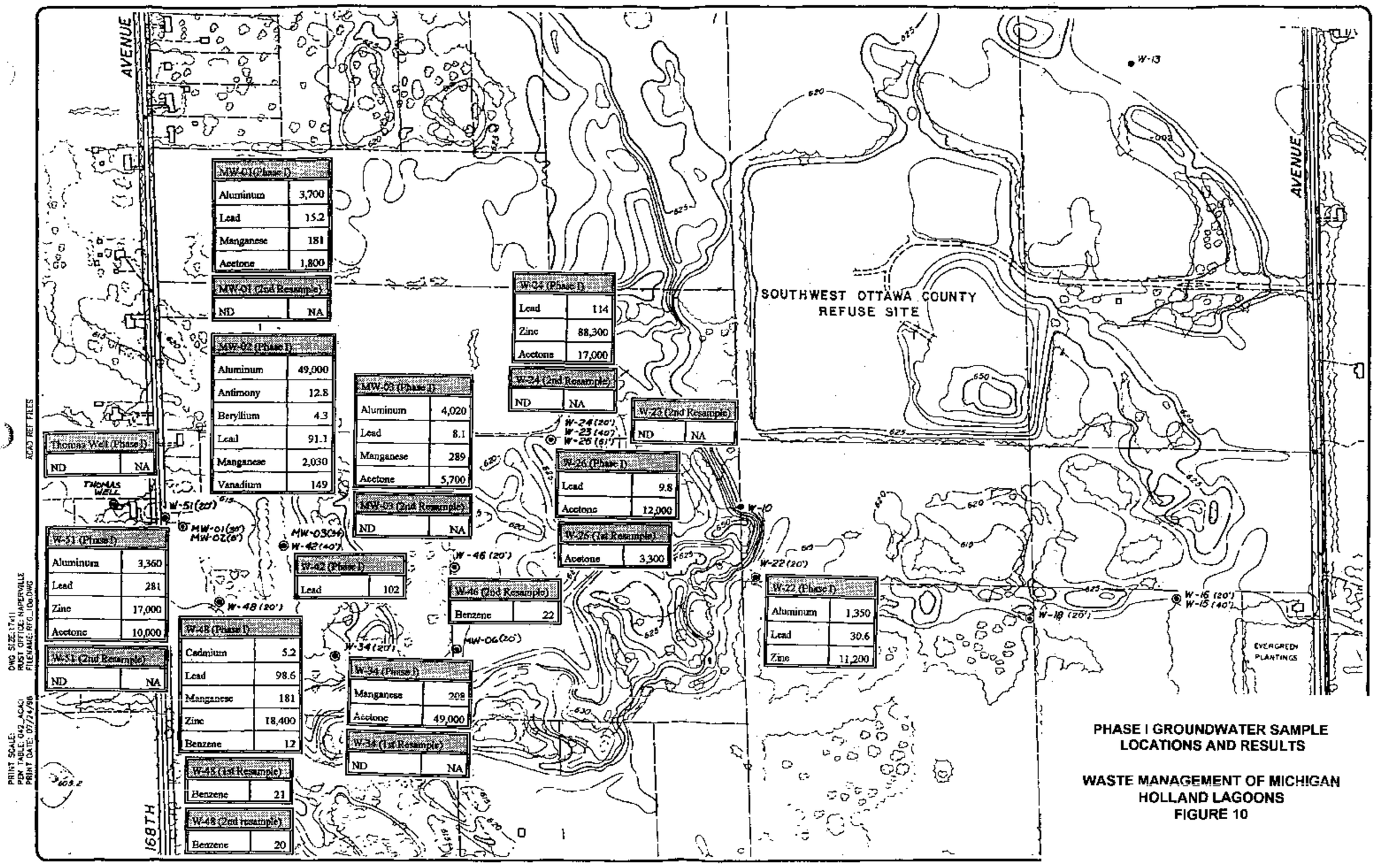
NOTES:

1) THE ORIGINAL SAMPLING WAS PERFORMED IN JULY 1994. VOLATILES, SEMIVOLATILES, METALS AND PESTICIDES WERE SAMPLED.
2) THE 1st RESAMPLING WAS PERFORMED IN AUGUST 1994. VOLATILES WERE SAMPLED.
3) THE 2nd RESAMPLING WAS PERFORMED IN JANUARY 1995. VOLATILES WERE SAMPLED.

GROUNDWATER SAMPLING RESULTS ABOVE TYPE B CRITERIA

WASTE MANAGEMENT OF MICHIGAN HOLLAND LAGOONS

FIGURE 9



PHASE I GROUNDWATER SAMPLE LOCATIONS AND RESULTS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 10

HL-SS-A1-1	
Arsenic	5.9
Beryllium	0.15

HL-SS-A2-1	
Beryllium	0.63

HL-SS-A5-1	
Lead	22.8
Zinc	59.8

HL-SS-D1-1	
Chromium	1,080
Copper	838
Lead	59.0
Nickel	478
Zinc	171
Cyanide	14.4

HL-SS-D1-2	
Chromium	58.1
Copper	50.1
Nickel	24.2

LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- 820 GROUND SURFACE ELEVATION CONTOUR LINE
- C-3 SOIL BORING

PHASE II SOIL SAMPLE LOCATIONS AND RESULTS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 11

PRINT SCALE:
PEN TABLE: 042_ICAD
PRINT DATE: 01/25/96
DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: RFG_2-6
ACAD REF FILES

AVENUE

AVENUE

8TH

W-88 (Phase II)	
Antimony	11.2
Lead	6.8
Heptachlor	0.57
Aldrin	0.50
Dieldrin	1.3
Endrin	1.7
Aroclor-1254	2.2

W-13 (Phase II)	
Antimony	8.2

MW-04 (Phase II)	
Antimony	6.1

MW-05 (Phase II)	
Manganese	195

W-46 (Phase II)	
Antimony	10.0
Lead	4.2
Manganese	291

MW-06 (Phase II)	
Manganese	306
Benzene	14

W-49 (Phase II)	
Aluminum	1,800
Antimony	8.5
Lead	12.0
Sodium	197,000
Zinc	4,210
Benzene	19
Aldrin	0.10

W-16 (Phase II)	
ND	NA

W-15 (Phase II)	
ND	NA

W-18 (Phase II)	
ND	NA

HWEST OTTAWA COUNTY
REFUSE SITE

MW-04(20')
MW-05(20')
W-24(20')
W-23(40')
W-26(61')
W-88(40')
W-89(40')
THOMAS WELL
W-51(20')
MW-01(30')
MW-02(8')
MW-03(34')
W-42(40')
W-46(20')
W-48(20')
MW-06(20')
W-34(20')
W-16(20')
W-15(40')
W-18(20')

ACAD REF FILES

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: RFG_10K.DWG

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 07/24/98

PHASE II GROUNDWATER SAMPLE LOCATIONS AND RESULTS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 12

E 12632000 E 12632500 E 12633000 E 12633500 E 12634000 E 12634500 E 12635000

N 486000 N 485500 N 485000 N 484500

MW-04 MW-05 W-46

A1 A2

C2 C3

168th AVE.

LEGEND

SITE PROPERTY BOUNDARY

TRAILS

FOREST

620 GROUND SURFACE ELEVATION CONTOUR LINE

C2 TEST PIT LOCATIONS

PHASE II
TEST PIT LOCATIONS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 13

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 01/25/96

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: RFG_11.DWG

XCAD REF FILES

E 12632000 E 12632500 E 12633000 E 12633500 E 12634000 E 12634500 E 12635000

N 486000 N 485500 N 485000 N 484500

ASH AREA NORTH OF BUILDING

HAUL ROAD AREA OFF-SITE

HAUL ROAD AREA ON-SITE

C4 AREA

C5 AREA

C1A AREA

168th AVE.

TRENCH SOUTH OF BUILDING

BERMED DRUM AREA

LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- 620 GROUND SURFACE ELEVATION CONTOUR LINE
- AREA OF SOIL EXCAVATION

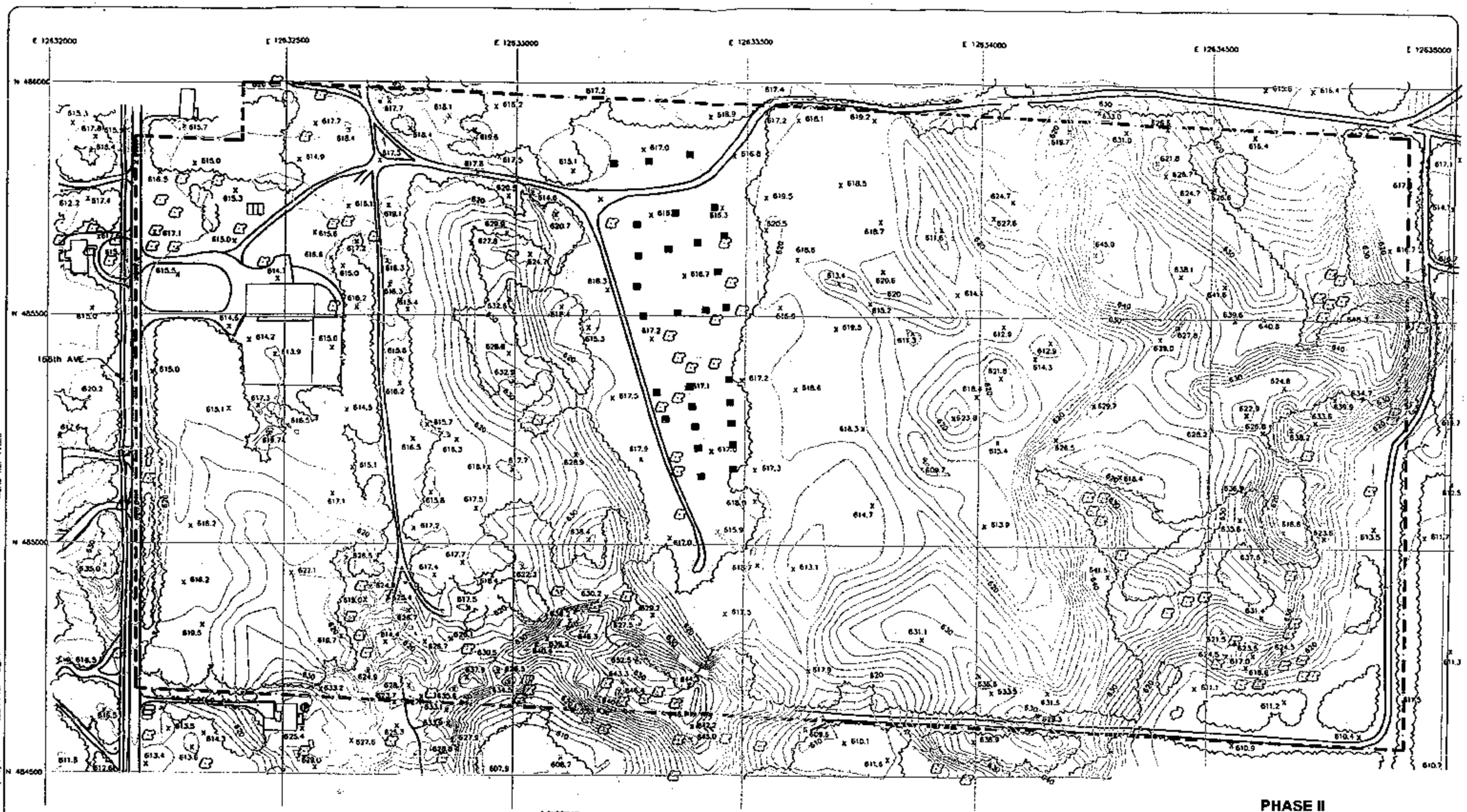
PHASE II
SOIL EXCAVATION LOCATIONS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 14

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 01/25/96

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: FIG_12

XCAD REF FILES



LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- 620 GROUND SURFACE ELEVATION CONTOUR LINE
- SOIL SCRAPING LOCATION

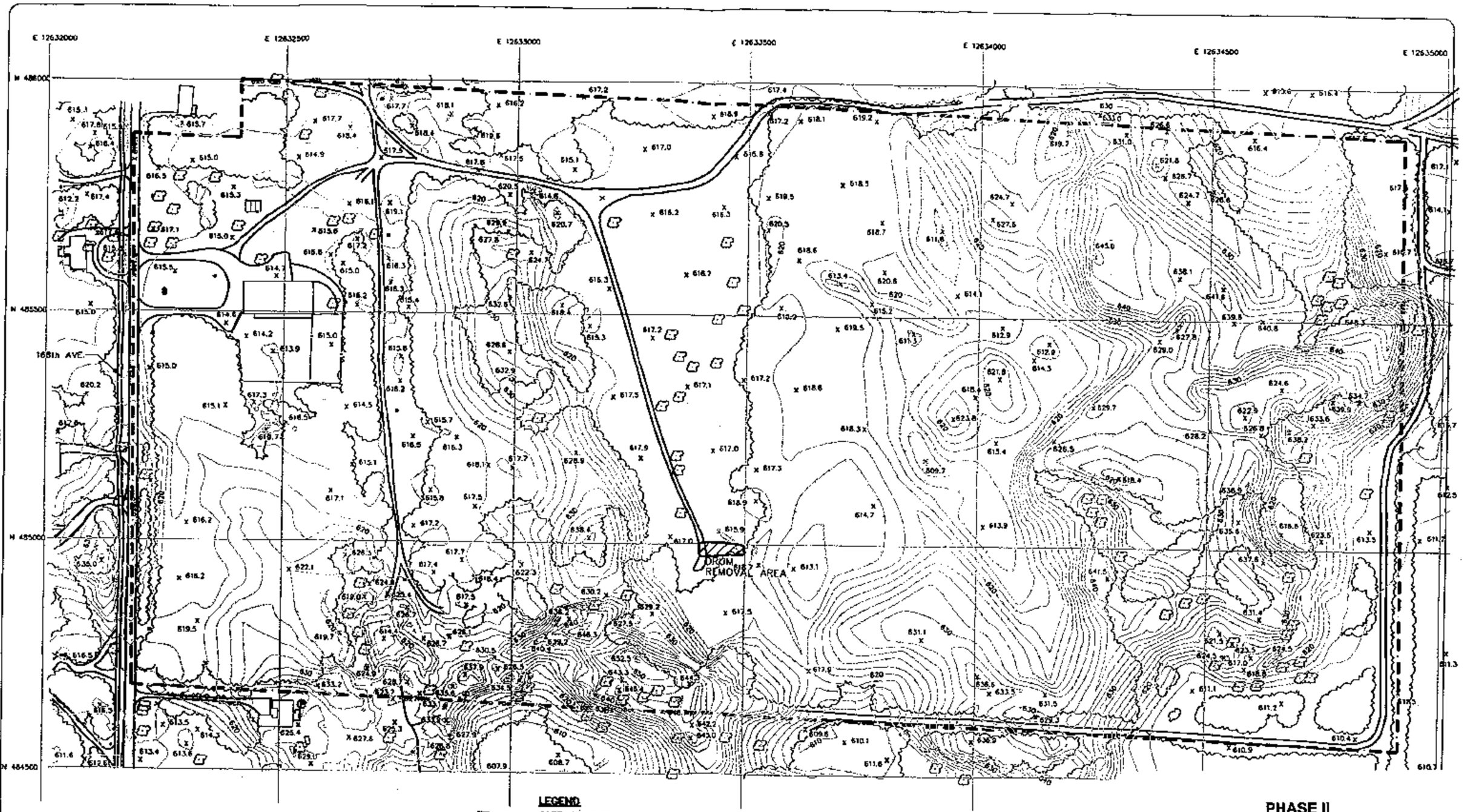
PHASE II
SOIL SCRAPING LOCATIONS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 15

PLOT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 01/25/06

OWG SIZE:17x11
RUST OFFICE: NAPERVILLE
FILENAME: RFE_14

ACAD REF FILES



PHASE II
DRUM REMOVAL

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 16

AVENUE

AVENUE

168TH

SOUTHWEST OTTAWA COUNTY
REFUSE SITE

W-42 (Phase III)	
Aluminum	4,290
Cadmium	11.0
Lead	342
Manganese	272
Zinc	48,000

MW-04 (Phase III)	
Aluminum	546
Lead	6.5U

MW-04 (20')

W-24 (Phase III)	
ND	NA

W-23 (Phase III)	
ND	NA

W-24 (20')
W-23 (40')
W-26 (61')

W-26 (Phase III)	
Manganese	258

W-88 (Phase III)	
ND	NA

W-88 (40')
W-89 (40')

W-89 (Phase III)	
Sodium	168,000
Benzene	16

W-13

W-13 (Phase III)	
Lead	18.7
Zinc	4,300

W-51 (Phase III)	
Lead	7.7U

W-51 (20')

MW-01 (30')
MW-02 (6')

MW-03 (34')
W-42 (40')

MW-05 (40')

MW-05 (Phase III)	
Manganese	224

MW-01 (Phase III)	
ND	NA

MW-03 (Phase III)	
ND	NA

W-46 (20')

W-46 (Phase III)	
Manganese	294
Benzene	24

MW-02 (Phase III)	
Aluminum	15,500
Lead	41.8
Manganese	887

W-48 (20')

W-48 (Phase III)	
Manganese	212
Benzene	10

W-34 (20')

W-34 (Phase III)	
Manganese	238
Benzene	18

MW-06 (20')

MW-06 (Phase III)	
Aluminum	622
Manganese	449
Benzene	28

W-22 (20')

W-22 (Phase III)	
Lead	5.1

W-16 (Phase III)	
Lead	122
Zinc	30,500

W-16 (20')
W-15 (40')

W-18 (20')

W-18 (Phase III)	
Lead	158
Zinc	46,900

W-15 (Phase III)	
Lead	63.4
Zinc	12,800

REEN
INGS

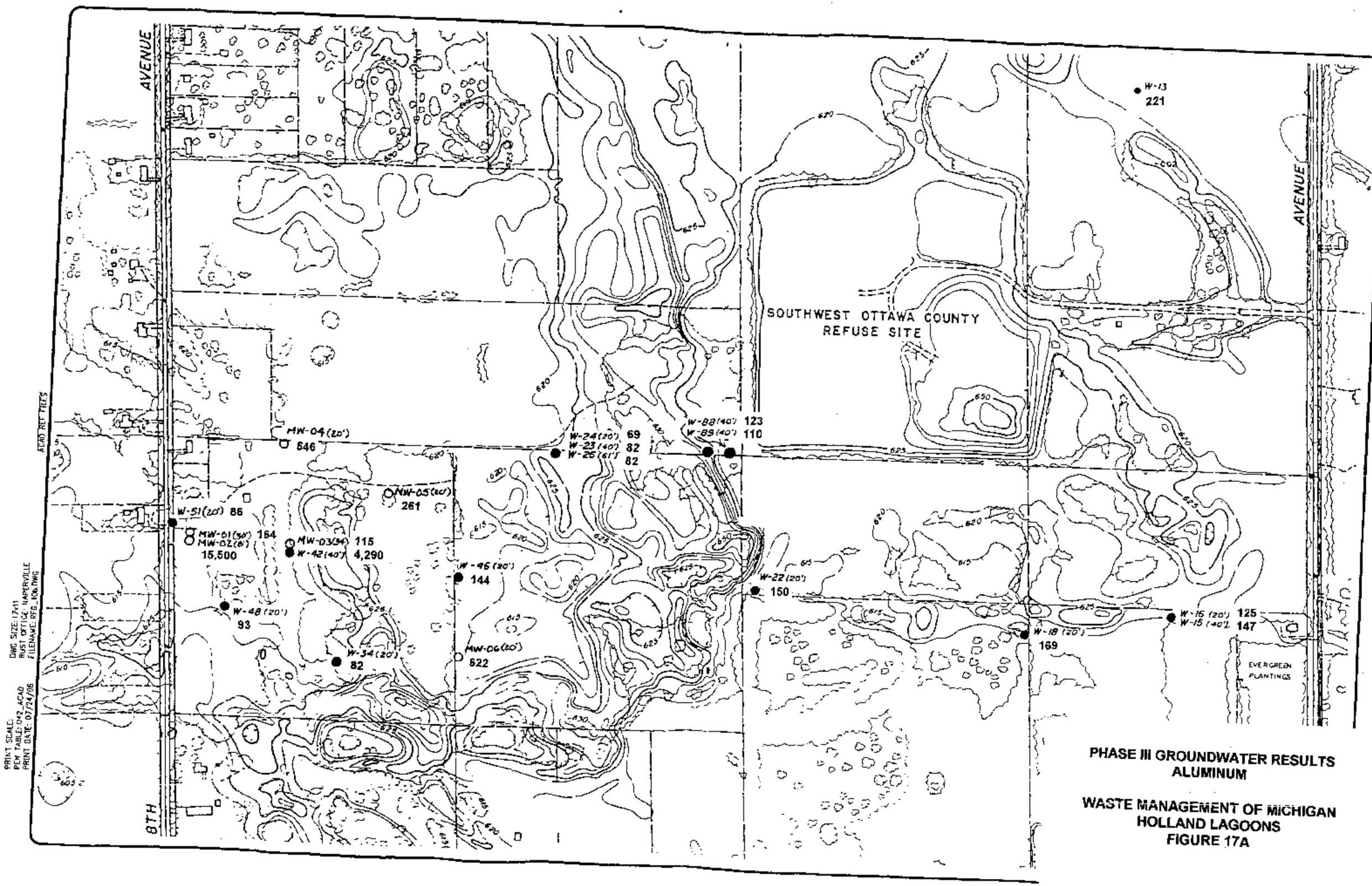
PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 07/24/96

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: RFG_10c.DWG

ACAD REF FILES

PHASE III GROUNDWATER SAMPLE LOCATIONS AND RESULTS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 17



PHASE III GROUNDWATER RESULTS
ALUMINUM

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 17A

AVENUE

AVENUE

SOUTHWEST OTTAWA COUNTY
REFUSE SITE

W-13
30

W-88(40') 113
W-89(40') 178

W-24(20') 108
W-23(40') 110
W-26(61') 258

MW-04(20')
119

MW-05(20')
224

W-51(20') 12

MW-01(30') 80
MW-02(8') 887

MW-03(34') 272
W-42(40') 105

W-46(20')
294

W-22(20')
141

W-48(20')
212

W-34(20')
238

MW-06(20')
449

W-16(20') 102
W-15(40'L 92

W-18(20')
12

EVERGREEN
PLANTINGS

8TH

ACAD REF FILES

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: RFG_10b.DWG

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 07/24/96

PHASE III GROUNDWATER RESULTS
MANGANESE

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 17B

AVENUE

AVENUE

8TH

SOUTHWEST OTTAWA COUNTY
REFUSE SITE

W-13
4,300

W-88(40') 1,080
W-89(40') 275

W-24(20') 60
W-23(40') 50
W-26(61') 325

MW-04(20')
26

MW-05(20')
21

W-51(20') 343

MW-01(30') 23
MW-02(8') 82

MW-03(36') 49
W-42(40') 48,000

W-46(20')
72

W-48(20')
334

W-34(20')
850

MW-06(20')
20

W-22(20')
1,310

W-16(20') 30,500
W-15(40') 12,800

W-18(20')
46,000

EVERGREEN
PLANTINGS

ROAD/RR TIES

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: RTG_10b.DWG

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 07/24/96

PHASE III GROUNDWATER RESULTS
ZINC

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 17C

AVENUE

AVENUE

8TH

SOUTHWEST OTTAWA COUNTY
REFUSE SITE

W-13
ND

MW-04(20')
ND

W-24(20') 11
W-23(40') ND
W-26(61') 265

W-88(40') 6.5
W-89(40') 26

MW-05(20')
2.4

W-51(20') ND

MW-01(50') ND
MW-02(6') ND

MW-03(54') 2.7
W-42(40') 8.2

W-46(20')
24

W-48(20')
10

W-34(20')
27

MW-06(20')
28

W-22(20')
ND

W-16(20') 1.3
W-15(40') 1.7

W-18(20')
3.8

EVERGREEN
PLANTINGS

ROAD RIGHT OF WAY

DWG SIZE: 17x11
R/ST OFFICE: NAPERVILLE
FILENAME: RFG_106.DWG

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 07/24/96

PHASE III GROUNDWATER RESULTS
TOTAL VOCs (Benzene)

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 17D

E 12632000 E 12632500 E 12633000 E 12633500 E 12634000 E 12634500 E 12635000

N 486000 N 485500 N 485000 N 484500

ASH AREA NORTH OF BUILDING

HAUL ROAD AREA OFF-SITE

HAUL ROAD AREA ON-SITE

Area of additional Soil Excavation

C4 AREA

C5 AREA

C1A AREA

158th AVE.

TRENCH SOUTH OF BUILDING

BERMED DRUM AREA

LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- 620 GROUND SURFACE ELEVATION CONTOUR LINE
- AREA OF SOIL EXCAVATION IN 1995

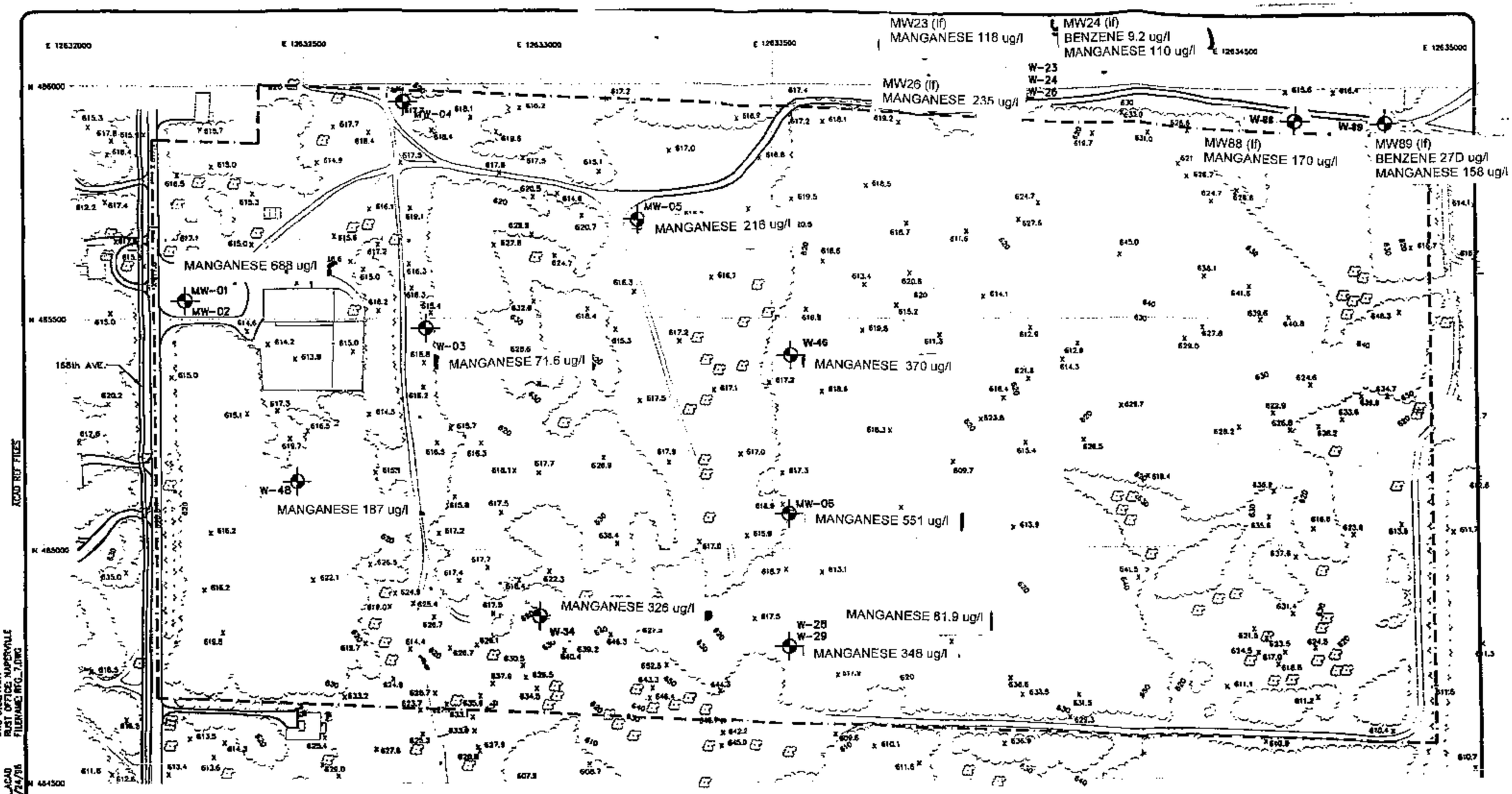
PHASE V ADDITIONAL SOIL EXCAVATION LOCATIONS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 19

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 01/25/96

DWG SIZE: 17x11
RUST OFFICE: NAPERVILLE
FILENAME: FIG_12

ACAD REF FILES



LEGEND

- SITE PROPERTY BOUNDARY
- TRAILS
- FOREST
- 620 GROUND SURFACE ELEVATION CONTOUR LINE
- W-XX EXISTING MONITORING WELLS

PART 201 RES DRINKING WATER CRITERIA

BENZENE 5 ug/l
MANGANESE 50 ug/l

PHASE V GROUNDWATER SAMPLE LOCATIONS

WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 18

PRINT SCALE:
PEN TABLE: 042_ACAD
PRINT DATE: 07/24/98

DWG SIZE: 11x17
RUST OFFICE: NAPERVILLE
FILENAME: RFG_7.DWG

XCAD REF FILES

N

SCALE : 1" = 800'

LEGEND

⊙ MW (40')	MONITORING WELL
● PW	PURGE WELL
———	PURGE WELL PIPING
———	DISCHARGE PIPING
Ⓐ	CONE OF INFLUENCE WELLS
Ⓑ	UPGRADIENT & INTERMEDIATE WELLS
Ⓒ	PERIMETER WELLS (DOWNGRADIENT)

RILEY STREET

AVENUE

160TH

SOUTHWEST OTTAWA COUNTY LANDFILL

ASHLEY PINES SUB.

TREATMENT FACILITY

TIFFANY SHORES SUBDIVISION

WOODWIND SUBDIVISION

TIFFANY RIDGE SUBDIVISION

LAKEWOOD BOULEVARD

JAMES STREET

LAKE MICHIGAN DRIVE

KARDUX AVENUE

LAKE SHORE AVENUE

168TH

MW-100 (40') (REMOVED IN 2001)

SWOCLF GROUNDWATER EXTRACTION SYSTEM
WASTE MANAGEMENT OF MICHIGAN
HOLLAND LAGOONS
FIGURE 20

PREIN & NEWHOF
CONSULTING ENGINEERS
GRAND RAPIDS, MICHIGAN
79049

T:/Land Projects/79049/Fig1-00.dwg

Attachments and Appendix sections of this Five-Year Review are available by placing a request using the Customized CERCLIS/RODS Report Order Form.

http://www.epa.gov/superfund/sites/phonefax/rods.htm