Investigation, Interim Remedial Action Options, and Design Report

Ashland NSP Manufactured Gas Plant Seep Area

Ashland, Wisconsin

SEH No. WIDNR9401.07

October 2001

SHORT ELLIOTT HENDRICKSON INC

Multidisciplined.
Single Source.

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architecture • engineering • environmental • transportation

October 29, 2001

RE: Investigation, Interim Remedial Action Options, and Design Report
Ashland NSP Manufactured Gas Plant
Seep Area
Ashland, Wisconsin
SEH No. WIDNR9401.07

Mr. James R. Dunn, District Hydrogeologist
Bureau of Remediation and Redevelopment
Wisconsin Department of Natural Resources
810 W. Maple Street
Spooner, WI 54801

Dear Mr. Dunn:

Short Elliott Hendrickson Inc.® (SEH) is submitting the enclosed report titled "Investigation, Interim Remedial Action Options, and Design Report – Ashland NSP Manufactured Gas Plant Seep Area."

SEH appreciates the opportunity to provide WDNR with continuing environmental services on this project. Following your review of this document, we would be happy to meet with you to discuss implementation of a remedy for this site. If you have any questions pertaining to any phase of the project completed to-date, please contact me.

Sincerely,

Cyrus W. Ingraham, P.E.
Sr. Project Manager

GGC/ls/MJB/JEG/GPW
p:\proj\widnr\9401\rep\inv. rao, design rep.doc

Investigation, Interim Remedial Action Options, and Design Report

Ashland NSP Manufactured Gas Plant Seep Area
Ashland, Wisconsin

Prepared for:
Wisconsin Department of Natural Resources
Spooner, Wisconsin

Prepared by:
Short Elliott Hendrickson Inc.
421 Frenette Drive
Chippewa Falls, WI 54729-3374
715.720.6200

I, John E. Guhl, hereby certify that I am a Hydrogeologist as that term is defined in s. NR 712.03(1) Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

John E. Guhl (signature) #120 10-29-2001

John E. Guhl, P.G. P.G. Number Date
Hydrogeologist

I, Gloria G. Chojnacki, hereby certify that I am a scientist as that term is defined in s. NR 712.03(3), Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Gloria G. Chojnacki (signature) 10/29/01

Gloria G. Chojnacki, CHMM Date
Environmental Scientist

I, Mark J. Broses, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

(signature) 31176 10/29/01

Mark J. Broses, P.E. P.E. Number Date
Project Engineer

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Executive Summary

Introduction

Short Elliott Hendrickson Inc. (SEH) has completed an investigation and interim remedial design of the Ashland NSP Manufactured Gas Plant Seep Area for the Wisconsin Department of Natural Resources (WDNR).

Site Background

The Ashland Lakefront Property was created anthropogenically in the late 1800's and early 1900's by placement of various fill materials into Chequamegon Bay. The site was owned by various lumber companies until 1936. Fill materials consist largely of wood slabs, pieces, and sawdust mixed with earthen fill. The area immediately south of the Ashland Lakefront Property consists of a railroad right-of-way and a 30-foot high bluff. A manufactured gas plant (MGP) operated at the top of the bluff from the late 1800's until approximately 1947. During the time the MGP operated, a former ravine extending from the MGP site through the bluff to the southern edge of the Ashland Lakefront Property was filled. The seep area is at the base of the bluff in Kreher Park, north of the former ravine.

Widespread volatile organic compound (VOC) and semi-volatile organic compound - polynuclear aromatic hydrocarbon (PAH) contamination has been identified at the Ashland Lakefront Property, in the up gradient ravine area, the seep area, in offshore sediments, and in a deep confined aquifer beneath the former MGP site. The MGP has been identified as a likely source of VOC and PAH contamination.

A Baseline Human Health Risk Assessment (HHRA) was conducted for the Ashland Lakefront Property and offshore sediments in 1998. The HHRA concluded that significant risks to human health are posed from direct contact with the VOC and PAH contaminants in the seep area. The seep area was subsequently fenced off to limit exposures.

Seep Investigation

In January and February 2001, SEH conducted a test pit investigation of the seep area and potential up gradient sources. The investigation included excavation of the three test pits in the vicinity of the seep. The investigation identified a 12-inch diameter clay pipe through which apparently contaminated water was flowing. This pipe is apparently the ongoing source of surficial discharges of contamination in the seep area, and is likely associated with the significant human health risks identified at this location.

Remedial Action Objectives

The following remedial action objectives were identified in order to guide the development of the remedial actions:

- Minimize potential risk to human health and the environment from exposure to contaminants;
- Implement interim action that will accommodate future remedial actions; and
- Implement remedial action that will be compatible with future activities at contiguous properties and not directly nor indirectly cause deterioration of contiguous properties.

Executive Summary (Continued)

Interim Remedial Action Options

Three options were assembled ranging in complexity from "no further action" to "complete removal" of the seep area. The options evaluated include:

- **Option A1** – Access Restriction
- **Option B1** – Thick Cap
- **Option C1 –** Excavation with Offsite Disposal

SEH recommended the WDNR proceed with Option B1 – Thick Cap.

Interim Remedial Design

It is assumed that the up gradient hydraulic source of the seep would be eliminated prior to implementation of the interim remediation.

The seep remedial design includes:

- Up gradient source control
- Fence removal
- Site grading
- Low permeability geosynthetic membrane
- Two feet clean fill
- Vegetation

Option B-1 was recommended by SEH based on comparison of overall cost and effectiveness of the three options considered.

List of Abbreviations

Abbreviations used in Feasibility Study

ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society of Testing Materials
BETX	Benzene, Ethylbenzene, Toluene, and Xylene
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
ch. NR 140	Wis. Adm. Code Chapter Natural Resources 140 - Groundwater Quality
ch. NR 720	Wis. Adm. Code Chapter Natural Resources 720 - Soil Cleanup Standards
ch. NR 722	Wis. Adm. Code Chapter Natural Resources 722 - Standards for Selecting Remedial Actions
ch. NR 724	Wis. Adm. Code Chapter Natural Resources 724 - Remedial and Interim Action Design, Implementation, Operation, Maintenance, and Monitoring Requirements
CFR	Code of Federal Regulations
CHMM	Certified Hazardous Materials Manager
CTE	Central Tendency Exposure
D&M	Dames & Moore Inc.
DCOM	Wisconsin Department of Commerce
DHFS	Department of Health and Family Services - State of Wisconsin
DNAPL	Dense Non Aqueous Phase Liquid
DW	Dry Weight
EPA	Environmental Protection Agency (USEPA)
EIS	Environmental Impact Statement
ES	ch. NR 140 Enforcement Standard
FID	Flame Ionization Detector
FS	Feasibility Study for Remedial Action Options
GLI	Great Lakes Initiative
gpm	gallons per minute
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
IRIS	Integrated Risk Information System
LNAPL	Light Non Aqueous Phase Liquid
LSDP	Lake Superior District Power Company
mg/kg	milligram/kilogram
mg/l	milligram/liter
MGP	Manufactured Gas Plant
MSL	Mean Sea Level
NAPL	Non Aqueous Phase Liquid
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NET	Northern Environmental Technologies Inc.
NOAA	National Oceanic and Atmospheric Administration
NSE	No Standard Established
NSP	Northern States Power Company

List of Abbreviations (Continued)

OMM	Operations Maintenance and Monitoring
OSHA	Occupational Safety and Health Act
PAH	Polynuclear Aromatic Hydrocarbons
PE	Professional Engineer
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PG	Professional Geologist
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
PUF	Polyurethane Foam
PVC	Polyvinyl Chloride
RAO	Remedial Action Options
RCL	ch. NR 720 Residual Contaminant Level
RCRA	Resource Conservation and Recovery Act
RME	Reasonable Maximum Exposure
RV	Recreational Vehicle
SSO	Site Safety Officer
SEH	Short Elliott Hendrickson Inc.
SHSP	Site Health and Safety Plan
SVE	Soil Vapor Extraction
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TLV	Threshold Limit Value
TOSC	Technical Outreach Services for Communities
TPAH	Total Polynuclear Aromatic Hydrocarbons
TSCA	Toxic Substances Control Act
TU	Toxic Units
µg/kg	microgram/kilogram
µg/l	microgram/liter
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WCRR	Wisconsin Central Railroad
Wis. Adm. Code	Wisconsin Administrative Code
WDNR	Wisconsin Department of Natural Resources
WDOT	Wisconsin Department of Transportation
WPDES	Wisconsin Pollution Discharge Elimination System
WRR	Waste Research & Recycling
WWTP	Wastewater Treatment Plant

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Investigation, Interim Remedial Action Options, and Design Report

Ashland NSP Manufactured Gas Plant Seep Area

Prepared for Wisconsin Department of Natural Resources

1.0 Introduction

This report was prepared for the Wisconsin Department of Natural Resources (WDNR) by Short Elliot Hendrickson Inc (SEH) in accordance with our proposal dated November 29, 2000.

1.1 Purpose

This document was developed to report the findings of the seep investigation conducted in February 2001, identify potential remedial alternatives to mitigate risks associated with contamination identified at the Ashland Lakefront Property seep area, and outline a conceptual design for the recommended interim remedial action.

2.0 Background Information

2.1 Site Location and Description

The Ashland Lakefront Property is located in Section 33, Township 48 North, Range 4 West in Ashland County, Wisconsin as shown in Figure 1, "Site Location." The latitude and longitude of the property is 46°35'41" North and 90°53'01" West. As shown on Figure 2, "Site Features," the property is located in an active community surrounded by residences, schools, hotels, and public recreation areas.

The NSP manufactured gas plant (MGP) seep area (site) is located centrally in the Ashland Lakefront Property just north of the Wisconsin Central Railroad (WCRR) line, as shown on Figure 2 and on Figure 3, "Site Limits." The site is located proximal to the mouth of a filled ravine that formerly ran through the lake bank located south of the site. The site is in approximate alignment to the north with Third Avenue.

The Ashland Lakefront Property was created anthropogenically in the late 1800's and early 1900's by placement of various fill materials into Chequamegon Bay, which extended the original shoreline out approximately 400 feet to the north. The fill materials consisted primarily of wood slabs, pieces, and sawdust mixed with earthen fill. Some solid waste fill (e.g., bottles, brick, concrete pieces) is also present at various Lakefront Property locations.

The Lakefront Property currently consists of a city park (Kreher Park), comprised predominantly of mowed grass areas. A low brushy area is present on the south side of the property, and the building and structures from a former wastewater treatment plant (WWTP) are located on the north side of the property. A miniature golf course has recently been constructed on the east side of the Lakefront Property.

A marina jetty extends to the north off the western edge of the property, and two jetties protecting a public boat landing extend to the north off the east edge of the property. These jetties form a somewhat protected embayment directly to the north of the Ashland Lakefront Property.

2.2 Upper Bluff Area

The area immediately south of the Ashland Lakefront Property consists of a railroad right of way, and a 30 foot high bluff. The property on this portion of the upper bluff historically has been occupied by residential, commercial, and industrial development. A former MGP is located at the southwest corner of the intersection of Prentice Avenue and St. Claire Street.

A ravine historically extended from the former MGP site northward through the upper bluff to the southern edge of the Ashland Lakefront Property. This was a naturally occurring drainage feature formed by flow of surface water to the north into Chequamegon Bay. The ravine was formed by erosion of surficial soils over time. The ravine was filled some time between 1901 and 1923 based on review of historical Sanborn Fire Insurance Maps.

Several utility lines lead from the upper bluff area through the Ashland Lakefront Property to the former WWTP. A significant discharge of water presently occurs from a storm water pipe at the base of the bluff on the western portion of the site.

2.3 Current and Future Land Use Conditions

Area demographic information, provided by the City of Ashland, indicates that the city population has been decreasing over the past 20 to 30 years but has stabilized recently at 8,979 residents based on January 1997 data. The area west of the lakefront property is mostly commercial with several hotels, the City marina and a power plant.

The area south and east of the lakefront property is densely residential. Homes and occupants in the neighborhood are generally older and occupancy turnover is relatively infrequent. Our Lady of the Lake, a preschool through grade 8 school exists less than three blocks to the south of the lakefront property.

At this time, the Ashland Lakefront Property site is zoned CR, Conservancy District. One of the acceptable uses for this designation is as parkland. The area is readily accessed by the public and a majority of the site is mowed and maintained for public usage. An artesian well is located near Prentice Avenue on the eastern boundary of the site. Another artesian well is located near the marina on the western boundary of the site. The artesian wells are available for the public to fill containers for drinking water. The water from the artesian wells originates from the deep (Copper Falls) confined aquifer located beneath the site. There are restriction signs posted at the seep area, the lake and former waste water treatment plant warning against entry or swimming. A fence prevents entrance to the former waste water treatment plant and seep areas. However, no physical barrier exists at the shoreline to prevent swimming or wading.

Based on the discussion with the City Engineer in 1998 and the "Ashland Wisconsin Waterfront Development Plan" (Discovery Group Ltd., undated), the City has future plans to expand the RV park which is immediately adjacent to the Ashland Lakefront Property to the east. Kreher Beach exists east of the former WWTP and boat landing and north of the RV park. Life guards are posted at Kreher Beach for seasonal swimming. Currently, a miniature golf course facility exists at the southwest intersection of Prentice Avenue and Marina Drive in Kreher Park. The City of Ashland marina immediately west of the Ashland Lakefront Property, the RV park, Kreher Beach and boat landing and the miniature golf course are heavily used during the summer months. Further recreational development of the Ashland Lakefront Property has been discussed by the City of Ashland including amenities such as parking, etc. which accompanies increased usage. The City has been opposed to commercial or residential development of the property.

Chequamegon Bay is now an important recreational resource in the northern Wisconsin region. The bay receives significant usage from pleasure boaters, fishermen, swimmers, snowmobilers, and outdoorsmen.

2.4 Site History

The Ashland Lakefront Property was created in the late 1800's and early 1900's by placement of various fill materials into Chequamegon Bay which extended the former shoreline approximately 400 feet to the north. From the late 1800's until 1936 the site was owned by various lumber companies, including Barber Mill, W. R. Sutherland Mill, Pope Lumber, and John Schroeder Lumber. Lumber processing operations on the site had ceased, for the most part, by 1930. A number of individuals interviewed recall creosote wood treatment operations historically occurring in the vicinity of the site. However, no physical evidence of wood treatment facilities (e.g., historical maps, evidence of pits or tanks), has been identified on the site to-date. Ashland County assumed ownership of the site in 1936, and the City of Ashland has since acquired the property.

As described previously, a MGP was previously located on the current NSP property on the bluff to the south of the site. The MGP plant operations began sometime prior to 1886 and ended in approximately 1947. NSP acquired the property from the Lake Superior District Power Company (LSDP) in 1982. Structures historically located on the MGP site included gas holders, aboveground and underground naphtha tanks, oil tanks, gasol storage tanks, and purifiers. Secondary by-product materials were typically generated from MGPs (i.e., coal tar, polynuclear aromatic hydrocarbons (PAHs), pitch, light oils, volatile organic compounds (VOCs), and coal gas purifier wastes). Records are incomplete pertaining to the volumes of gas manufactured as well as the disposition of the secondary by-product materials.

Prior to being filled in sometime between 1901 and 1923, a ravine historically ran from the MGP property, through the bluff, to the site. The ravine was a natural erosional feature which historically discharged surface water from the upper bluff area to Chequamegon Bay. Based on historical maps of the vicinity, the ravine was located east of North 3rd Avenue. The approximate location of the former ravine is depicted on Figure 3.

A two-inch tar pipe has been identified on an historic (1951) set of site drawings running from the former MGP property toward the Ashland Lakefront Property. The two inch pipe aligns with an historic "Waste Tar Dump" depicted at the Ashland Lakefront Property on the same set of site drawings. Additionally, a former open sewer ran across the western side of the park from 1901 until some time after 1951.

2.5 Previous Studies and Reports

Contamination was identified on the Ashland Lakefront Property during a 1989 environmental assessment of the former WWTP. Since then, several investigations have been conducted to determine the extent of contamination in the vicinity of the site. Extensive contamination has been identified at the Ashland Lakefront Property, in the adjacent sediments, and up gradient in the ravine and in the vicinity of the former MGP. Contamination of the deep confined Copper Falls aquifer has also been identified beneath the former MGP.

The following reports prepared previously by SEH and Northern Environmental Technology (NET) summarize the investigative activities at and around the site, as well as evaluations of potential risks and remedial actions:

- Environmental Assessment Report - City of Ashland WWTP Site (NET, August 1989)
- Report of Test Pits at the Ashland WWTP (NET, September 1991)
- Remedial Investigation Interim Report - Ashland Lakefront Property (SEH, July 1994)
- Existing Conditions Report - Ashland Lakefront Property (SEH, February 1995)
- Sediment Investigation Report - Ashland Lakefront Property (SEH, July 1996)
- Comprehensive Environmental Investigation Report - Ashland Lakefront Property (SEH, May 1997)
- Supplemental Investigation Report - Ashland Lakefront Property (SEH, March 1998)
- Ecological Risk Assessment: Problem Formulation - Ashland Lakefront Property Contaminated Sediments (SEH, 1998)
- Baseline Human Health Risk Assessment - Ashland Lakefront Property (SEH, June 1998)
- Ecological Risk Assessment - Ashland Lakefront Property Contaminated Sediments (SEH, October 1998)
- Remedial Action Options Feasibility Study - Ashland Lakefront Property and Contaminated Sediments (SEH, December 1998)
- Seep Investigation Work Plan - Ashland NSP Manufactured Gas Plant Site (February 2001)

The following reports were produced by Dames & Moore Inc. (D&M) for NSP to evaluate contamination in the vicinity of the site. (Note, D&M has recently been acquired by URS, and some recent documents were prepared under the URS name.)

- Final Report - Ashland Lakefront/NSP Project (D&M, March 1995)
- Draft Site Investigation Report and Remedial Action Plan for NSP (D&M, June 1995)
- Supplemental Groundwater Investigation Final Report for NSP (D&M, August 1996)

- Copper Falls Aquifer Groundwater Investigation for NSP (D&M, February, 1997)
- Remedial Action Plan - Lower Copper Falls Formation Aquifer for NSP (D&M, April 1998)
- Ecological Risk Assessment – Ashland Lakefront Property (Final Draft DEM, March 1999)
- Remedial Action Options Feasibility Study - Final Report (D&M, March 1999)
- Supplemental Facility Site Investigation & Remedial Action Options Evaluation Report (D&M, March 1999)
- 1999 Supplemental Site Investigation (D&M, March 1999)
- Bid Documents: Coal Tar Recovery System (D&M, March 2000)
- Interim Response Coal Tar Recovery System - Volume I Construction Documentation Report (URS, February 2001)
- Interim Response Coal Tar Recovery System - Volume II Operation, Maintenance and Monitoring Plan (URS, February 2001)
- Interim Response Coal Tar Recovery System - Progress Report (Report #001, URS, February 2001)

In addition, the following report was prepared by Dr. Christopher Marwood on behalf of Technical Outreach Services for Communities (TOSC) comparing ecological risk assessment (ERA) results provided by SEH and D&M.

- Review of Short Elliott Hendrickson Inc. and Dames & Moore Ecological Risk Assessments of Contaminated Offshore Sediments in Ashland, Wisconsin (TOSC, May 2001).

2.6 Physical Characteristics

2.6.1 Topography

The Ashland area is located in the Lake Superior Lowland physiographic province characterized by flat to undulating topography underlain by red glacial clay. Uplands lie to the south of Ashland and are characterized by rolling hilly topography and underlain by sand and gravel soils. Elevations in the Ashland area range from 601 feet MSL datum to approximately 700 feet MSL. Regional slope is generally to the north.

The Ashland Lakefront Property is a relatively flat terrace located below a 30 foot high lake bluff. Elevations of the terrace range from 601 MSL to approximately 610 MSL. The elevation of the upper bluff in the vicinity of the former ravine area is approximately 640 feet MSL.

2.6.2 Surface Water

The Ashland Lakefront Property is located on the shore of Chequamegon Bay. Regional surface water drainage flows to the north through Fish Creek and several small unnamed creeks and swales into Chequamegon Bay. Surface water at the site and in the upper bluff area flows either to the City of Ashland storm sewer system, or discharges directly to Chequamegon Bay.

2.6.3 Geology

Soils in the Ashland area generally consist of surficial deposits underlain by red clay and silt deposits of the Miller Creek Formation. Thickness of the Miller Creek soils in the Ashland area ranges from approximately 15 to 50 feet based on local well logs. Miller Creek soils are underlain by interbedded glacial clays, sands and gravels of the Copper Falls Formation. Thickness of the Copper Falls Formation is at least 130 feet based on local well logs.

Precambrian aged sandstone of the Oronto Group is likely the uppermost bedrock unit in the Ashland area. Thickness of the sandstone unit has not been determined. The Oronto sandstones are most likely underlain by Precambrian basalt.

Surficial soils at the site are underlain by a variety of fill materials, including wood waste (slabs and sawdust), solid waste (including concrete, bricks, bottles, glass, steel pieces, wire, and cinders), and earthen fill. Fill materials are underlain in places by a 0 to 5.5 foot thick layer of beach sand. Soils of the Miller Creek Formation are present below the fill and beach sand. The Miller Creek soils encountered at the Ashland Lakefront Property consist of clays and silts and range in thickness from 7 to 40 feet. Silty sand and gravel soils of the Copper Falls Formation are present beneath the Miller Creek soils. Thickness of the Copper Falls Formation at the site has not been determined. Bedrock has not been encountered to-date during investigation of the site.

Geology of the upper bluff area in the vicinity of the former ravine consists of earthen fill materials in the former ravine, with clay soils of the Miller Creek Formation on the flanks of the former ravine. Miller Creek clay soils are present at the base of the former ravine, however, the thickness of these soils has been measured at as little as four feet at one soil boring location. It is unknown whether the Miller Creek Formation exists along the entire base of the former ravine. Sand and gravel layers interbedded with silty clay lenses were encountered below the Miller Creek Formation.

2.6.4 Hydrogeology

A shallow saturated zone is typically found above the contact of the Miller Creek Formation and the overlying surficial soils. Thickness of this shallow saturated zone can locally be up to ten feet, but it is not commonly used as a water supply source. Three aquifers occur in the Lake Superior Basin in the vicinity of Ashland; the Pleistocene sand and gravel aquifer (referred to herein as the Copper Falls aquifer), the Precambrian sandstone aquifer, and the Precambrian basalt aquifer.

The Copper Falls aquifer occurs at approximately 25 to 55 feet below ground surface in the Ashland area. Sandy till units within the aquifer yield low volumes of water (5 to 10 gpm), while sand and gravel lenses can yield up to 100 gpm. The Copper Falls aquifer is confined by the overlying cohesive Miller Creek soils. The Miller Creek Formation functions as an aquitard or confining unit hydraulically separating the shallow saturated zones and the Copper Falls aquifer. Wells screened in the Copper Falls aquifer frequently exhibit artesian conditions in the Ashland area, particularly close to the Chequamegon Bay shoreline. Static heads of more than 30 feet above the surface of Lake Superior have been reported at some locations along the Ashland shoreline. Thickness of the Copper Falls aquifer is over 100 feet based on deep piezometer boring information from site investigation.

The Precambrian sandstone aquifer is utilized as a municipal water supply source in several nearby communities (e.g., Washburn, Bayfield). Moderate to low permeabilities exist within the sandstone aquifer. Sandstone wells in the Ashland area typically yield between 5 and 50 gpm.

The Precambrian basalt aquifer produces moderate to low yields of groundwater. Yields are typically controlled by fracture densities within the bedrock. The basalt aquifer is commonly used as a water supply source south of Ashland where the aquifer occurs closer to the surface.

A shallow saturated zone is present within the soils and fill materials overlying the Miller Creek Formation at the Ashland Lakefront Property. The hydraulic conductivity of the shallow soils and fill materials ranges from approximately 0.1 to $5x10^{-5}$ cm/sec. The higher hydraulic conductivity values are typically found in locations with saturated wood waste fill such as the seep area. The horizontal hydraulic gradient is very flat (0.001 ft/ft to the north) due to the high hydraulic conductivities in the shallow soils at the Ashland Lakefront Property. Artesian conditions are present at the site in the Copper Falls aquifer. Head levels of approximately 17 feet above ground surface have historically been measured in an artesian well located on the Ashland Lakefront Property, indicating a strong upward gradient at this location.

Artesian conditions have not been identified in the Copper Falls aquifer in the vicinity of the former ravine area or the upper bluff area. An upward hydraulic gradient is present in the Copper Falls aquifer in the northern portion of the upper bluff area, and diminishes and eventually changes to a downward gradient to the south. The general direction of flow in the Copper Falls aquifer is to the north (toward Chequamegon Bay).

Hydrogeology of the upper bluff includes low permeability conditions ($3x10^{-6}$ to $4x10^{-8}$ cm/sec) in the Miller Creek clays comprising most of the shallow saturated soil in the area. Fill soils located in the former ravine exhibit hydraulic conductivities approximately 1,000 times higher than the surrounding Miller Creek soils. Horizontal hydraulic gradient in the fill soils of the former ravine is approximately 0.09 ft/ft. Direction of groundwater flow in this location is to the north (toward the mouth of the former ravine).

Water historically flowed onto the ground surface at the base of the bluff in the proximity of the mouth of the former ravine in the form of a seep. The source of water flow had not been identified prior to the seep investigation. Early investigation of the seep area revealed a significant mound of the groundwater table at this location. Water appeared to move radially away from the seep in all directions.

Figure 4, "Seep Cross Sections" presents a conceptual illustration of the subsurface geological features in the seep area, including the upper bluff area and the area down gradient of the seep.

3.0 Seep Investigation

A seep investigation was conducted by SEH in January and February 2001 for the purpose of identifying the source of the hydrogeologic phenomenon resulting in the groundwater mound and seep discharge. Two likely explanations for these conditions included:

- Historic pipes of other conduits leading from the vicinity of the former MGP site located up gradient to the seep may be transmitting water to the seep location; or,
- An upwelling of contaminated groundwater located in the Copper Falls formation (under artesian conditions) through the Miller Creek aquitard.

3.1 Pre-Investigation Activities

Prior to performing excavation activities in the seep area, SEH performed a historical review of the site area, and performed six soil borings at the site. These activities were performed to assess subsurface conditions at the site. The historical review was performed to identify the location of subsurface structures (e.g., pipes) that could potentially create or contribute to the water discharge occurring at the site. The historical review included observing historic plan sets and reports pertaining to the site area. The locations of the subsurface structures identified during the historical review are presented on Figure 5, "Historic Pipe Locations."

A total of six soil borings were performed by SEH using power-hand auger equipment as part of the pre-investigation phase of the project. The borings were performed to provide more subsurface detail of the site area and the mouth of the former ravine. Two soil borings (Upgrad 1 and Upgrad 2) were performed to the south of the WCRR line just south and hydraulically up gradient of the site area. Both of these borings were advanced through the fill material to natural clay soils. Soil samples were collected continuously at each location using a Macrocore® sampler. The soil samples indicated the mouth of the former ravine was located to the east of an existing concrete catch basin. Apparent contamination was observed in the fill soils located just above the clay in boring Upgrad 1. A composite sample of fill soils from borings Upgrad 1 and Upgrad 2 was collected for waste characterization laboratory analysis.

A total of four soil borings (Seep 1 through Seep 4) were performed within the limits of the seep area site. The four borings were performed just outside the limits of the ponded surficial discharge water. Soils encountered in borings Seep 1 through Seep 4 consisted of fill soils overlying wood waste. Apparent soils contamination was observed at all four locations. Refusal (wood timbers and large wood pieces) was encountered at each boring location. A composite soil sample from borings Seep 1 through Seep 4 was collected for waste characterization laboratory analysis. The location of the soil borings performed during the preliminary investigation is depicted on Figure 6, "Seep Investigation Locations". Soil boring logs and borehole abandonment forms for borings performed during pre-investigation activities are presented in Appendix A, "Soil Boring Documentation."

Waste characterization soil samples were analyzed by EnChem, Inc. (Wis. Lab. Cert. No. 405132750) for concentrations of total arsenic, cadmium, chromium, lead, selenium, cyanide (reactive and total), phenolics, and free liquids, and Toxicity Characteristic Leaching Procedure (TCLP) benzene and TCLP lead. The concentrations of these parameters indicated soil cuttings to be generated during subsequent excavation activities would not be classified as characteristic hazardous waste. The analytical results from the pre-investigation phase are presented in Appendix B, "Analytical Results," and summarized on Table 1, "Soil Analytical Results."

3.2 Site Investigation

A total of three trenches were completed to investigate the seep and to attempt to eliminate the surficial discharge of contaminants. The location of the three trenches (Up Gradient Trench, Down Gradient (Seep) Trench, North Trench) is depicted on Figure 6.

3.2.1 Site Preparation

Prior to initiating the trenches, the SEH contractor (WRR Environmental Services, Co., Inc.) cleared and grubbed the work areas. Clearing included snow removal, brush removal, slope grading (south of the railroad tracks) fence removal, abandoned rail track removal, and temporary fence placement. Removal of rail ties below the abandoned track was not required in most locations because the ties were either rotted completely away, or were rotted into small pieces.

3.2.2 Up Gradient Trench

The contractor (WRR) excavated the proposed trench located just south of the WCRR line to the south of the seep area. The excavation approximately paralleled the tracks and was centered approximately 15.5 feet south of the southern rail. The trench was approximately 2 feet wide and was a total of 40 feet long beginning 10 feet east of the center of the concrete cover of the existing catch basin (reference point). The depth of the excavation was approximately 10 feet. The entire length of trench was excavated and backfilled in sections that were a maximum of 15 feet in length before the next section of trench was started.

Soils in the trench excavation generally consisted of fill soils (silty clay and sand with some gravel) mixed with some brick and debris including wire bundles. Fill soils were underlain by reddish-brown silty clay and lean clay soils. The clay soils located near the riser pipe of the groundwater collection system that is described below, was stained grey to black with a strong oily odor. Hand held monitoring equipment (PID/FID) did not indicate the release of volatile organic compounds (VOCs). A gravel layer was noted at approximately five feet in depth. Cross section of the trench are included on Figure 7, "Up Gradient Trench Details."

A total of three apparent pipes were noted near the bottom of the excavation. An approximate 24 inch diameter concrete pipe was located 37 feet east of the center of the concrete cover reference point. This pipe appeared to be intact and not compromised by the excavation activities. An approximate 12-inch diameter pipe (possibly made of wood) was located 34 feet east of the reference point. This pipe was broken during the excavation process. No visible seepage was noted from this pipe after being removed. A 12-inch diameter pipe of unidentified material (possibly clay) was located approximately 32 feet east of the reference point. Apparently contaminated water flowed into the excavation from this pipe after it was broken.

A groundwater collection system was installed in the western part of the trench after completion of excavation in this area. The system consisted of a six inch diameter slotted PVC riser pope located 39 feet east of the reference point, and an 11 foot section of perforated flexible pipe extending to the west from the riser pipe. The collection system portion of the trench was backfilled with 0.75 inch gravel to approximately 1.5 feet below ground surface (bgs). The eastern portion of the trench was filled with earthen fill from the excavation. The trench was capped with near-surface soils scraped from the ground surface adjacent to the trench. The location, details, and cross-section view of the Up Gradient Trench can be found on Figures 6 and 7.

3.2.3 Down Gradient (Seep) Trench

The contractor (WRR) excavated the proposed trench located approximately 22 feet north of the north rail and parallel to the WCRR line. The trench ran directly through the seep area. The trench was approximately 2 feet wide and was a total of 67 feet in length beginning at the SE corner of the seep fence (reference point). The depth of the excavation was approximately six to eight feet bgs. As with the up gradient trench, the entire length of trench was excavated and backfilled in sections that were a maximum of 15 feet in length before the next section of trench was started.

Soils in the trench excavation generally consisted of fill soils (silty clay and sand with some gravel) underlain by wood waste (slabs and timbers). Red clay soils were found at the bottom of the entire length of the trench. However, the wood waste was not present at the far eastern and western ends of the excavation. Where wood waste was encountered, soils were grey to black stained with an oily odor and sheen. As the trench approached the seep, water began infiltrating the trench from the south trench wall. Cross sections of the trench are included on Figure 8, "Down Gradient (Seep) Trench Details."

A total of two pipes were noted in the excavation. An approximate 24 inch diameter concrete pipe was located 40 feet west of the reference point. This pipe appeared to be intact and was not visibly compromised by excavation activities. A 12 inch diameter clay tile pipe was found 3.5 feet below the surface approximately 45 feet west of the reference point. These pipes appear to be the same as the concrete pipe and undetermined leaking pipe unearthed in the up gradient trench. Apparently contaminated water flowed freely from the clay pipe once it was unearthed and the end of the pipe was cleaned out. Subsequent measurement of the up gradient riser pipe revealed a drop in the water level in the up gradient collection system from a depth of 43 inches to 20 inches after the tile pipe in the seep trench was excavated. This appears to verify a hydraulic connection formed by the clay pipe between the up gradient and seep area trenches. In addition, the clay pipe was located in the seep and appears to have been the source of the surficial discharge of contaminated water that has been ongoing in the seep area.

A water collection system was installed in the trench consisting of two six inch slotted PVC riser pipes, 0.75 inch gravel backfill, and a 20 foot long six inch slotted PVC collection pipe extending west from the western-most (clay pipe) riser. The eastern portion of the trench (from the reference point to approximately 18 feet west of the reference point) was backfilled with excavated earthen fill that appeared uncontaminated. A PVC elbow was loosely placed over the broken end of the clay pipe on the south trench wall. The seep trench was capped with plastic overlain by sand fill. The location, details, and cross-section view of the Seep Trench can be found on Figures 6 and 8.

3.2.4 North Trench

The contractor excavated a trench extending north of the 12-inch clay pipe observed in the seep trench and perpendicular to the seep trench. This trench extended from 8 feet north to 20 feet north of the western-most riser pipe along the projected alignment of the clay pipe. The purpose of the trench was to track the extent of the clay pipe to the north. However, no evidence of the clay pipe was found in the excavation. It appears that northern-most extent of the clay pipe was in the seep area.

Soils encountered in the down gradient trench consisted of fill soils underlain by wood waste (heavy timbers and slabwood). Excavated materials were black stained, had an oily odor and a sheen. Hand held monitoring equipment (PID/FID) indicated a fluctuating increase in the release of volatile organic compounds (VOCs) above background concentration that occurred when the backhoe bucket removed apparently contaminated materials from the trench.

The excavation was approximately five feet deep and four feet wide. The excavation was backfilled with gravel and site soils. A cross section of the trench is presented on Figure 9, "North Trench Details."

3.2.5 Ambient Air Monitoring

One 6-liter Summa Canister sample was collected at each of the trench excavations for a total of three samples. Samples were collected when the trenches were fully open with standing water in the bottom. Sample collection was at approximately three feet above ground surface at the edge of the trench. The canisters were analyzed by Air Toxics Ltd. of Folsom, California for VOCs by EPA Method TO-14. If the individual chemical has a published exposure level, laboratory results indicate the VOCs are well below exposure standards (PEL or TLV). In general, ambient concentrations of VOCs increased from the up gradient trench to the down gradient trench, with the down gradient trench having the highest concentrations. The chemicals having the greatest concentrations at all three trenches were ethylbenzene and total xylenes.

One composite ambient air sample was collected from the seep trench and the down gradient trench and analyzed for PAHs by EPA Method TO-13. The sample was collected using High Volume Polyurethane Foam (PUF) sampling for a total of 45 minutes with an 8 cfm pump. Sample results indicate very low concentrations of naphthalene, 2-methylnaphthalene, and acenaphthalene well below published exposure standards. OSHA has also established occupational limits for coal tar pitch volatiles and naphthalene of 200 $\mu g/m^3$ and 50,000 $\mu g/m^3$, respectively. Ambient air concentrations of PAHs are well below the OSHA standards (PEL).

Ambient air monitoring results are summarized on Table 2, "Ambient Air Analytical Results - VOCs" and Table 3, "Air Monitoring Results – PAHs." Laboratory reports are included in Appendix B.

3.2.6 Nature and Extent of Contamination

Soil and groundwater sample analysis has historically been utilized to define the degree and extent of subsurface contamination. In addition, observations of the presence or absence of non-aqueous phase liquids (NAPLs) have been made by SEH in several monitoring wells and piezometers. Detailed discussion of the analytical results for the site are presented in the previously listed reports. This section briefly discusses those results and also includes the results of TCLP sampling conducted at the site.

3.2.6.1 <u>Soils</u>

Soils at the MGP seep area of the Ashland Lakefront Property have been impacted by a variety of contaminants, including volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and metals. The VOCs detected are comprised primarily of benzene ethylbenzene, toluene, and total xylene (BTEX) compounds with ethylbenzene and total xylenes being in the highest concentrations.

PAH compounds detected include most of the compounds analyzed on the EPA SW 846 8260 scan; however, naphthalene is the predominant compound detected. Lead, cyanide, iron, and zinc were detected in some soil samples at elevated concentrations relative to background.

SEH collected three samples from the seep area for TCLP analysis for benzene, arsenic and lead. No TCLP exceedances were identified. Two additional soil samples representing the material to be excavated from the seep area were analyzed for several additional parameters including: total lead, total arsenic, total cadmium, total chromium, total selenium, total cyanide, total recoverable phenolics, free liquids, and total benzene. In addition, a seep soil sample was analyzed for total reactive cyanide. Analytical results indicated the material in the seep area is characterized as non-hazardous.

3.2.6.2 Groundwater

Groundwater at the MGP seep area and in the Copper Falls aquifer have been impacted by a variety of contaminants. A variety of VOCs (predominantly BETX compounds), PAHs, and various metals have been detected in the seep samples and shallow groundwater samples collected from the seep area. PAH compounds detected include most of the compounds analyzed on the EPA SW 846 8310 scan; however, phenol, acenaphthene, pyrene, and naphthalene are the predominant compounds detected Numerous exceedances of ch. NR 140 groundwater standards have been identified.

It is apparent that the distribution and concentration of groundwater contaminants is influenced by the presence of NAPL in the subsurface.

3.2.6.3 Non-Aqueous Phase Liquids

Significant quantities of DNAPL were measured in monitoring well MW-7. Monitoring well MW-7 is located at the base of the bluff on the Ashland Lakefront Property. Well MW-7 is located directly down gradient of the seep area and is screened from 5 to 15 feet below ground surface in the saturated zone. Approximately 5 feet of DNAPL measured in well MW-7 was also found as a separate phase at the bottom of the well. The DNAPL sampled in this well consisted of a black, oily, low to medium viscosity (thin), highly odorous hydrocarbon material. The apparent low viscosity of the DNAPL and emulsified NAPL observed in the monitoring well MW-7 indicates the potential for significant mobility of NAPLs within the subsurface.

4.0 Risk Assessment

Baseline risk assessments were performed to evaluate the likelihood that adverse human health effects are occurring or may occur as a result of exposures to the contamination identified in the soils or groundwater at the MGP seep area.

4.1 Baseline Human Health Risk Assessment

SEH completed a baseline Human Health Risk Assessment (HHRA) (SEH, 1998b) of the seep area for the WDNR to evaluate the potential existing and future adverse health effects caused by hazardous substance releases from the site. Current risks were evaluated in the absence of any actions to control or mitigate the releases. It assumed that the source of the seep will have been addressed for future scenarios and that the seep will no longer exist. The HHRA was limited to the filled lakefront property at the seep area and considers only the upper shallow groundwater table and site soils. The HHRA did not include evaluation of contamination located in the lower Copper Falls groundwater aquifer.

4.1.1 Potentially Exposed Populations and Scenarios

The populations identified as potentially at risk to experiencing adverse health effects as a result of contamination encountered at the seep area include occupational city workers and recreational adults, children and adolescents. In addition, adolescent trespassers to posted restricted areas of the seep area have been identified as a potential adolescent subpopulation at risk.

Potential current and future exposure pathways may be completed by the following routes.

Population	Current Scenario	Future Scenario
City Worker	Seep water ingestion, inhalation, dermal absorption	Seep water ingestion, inhalation, dermal absorption
	Subsoils ingestion, inhalation, dermal absorption in seep area	
	Surface soils ingestion, inhalation, dermal absorption in seep area	Surface soils ingestion, inhalation, dermal absorption in seep area
Recreational adult, child, adolescent	Seep water ingestion, inhalation, dermal absorption.	Seep water ingestion, inhalation, dermal absorption
	Surface soils inhalation in seep area	Surface soils inhalation in seep area
Adolescent trespasser to seep area (in addition to the recreational risks)	Seep water ingestion, inhalation and dermal absorption	Seep water ingestion, inhalation and dermal absorption
	Surface soils at the seep area ingestion, inhalation, dermal absorption	Surface soils at the seep area ingestion, inhalation, dermal absorption

4.1.2 Exposure and Toxicity Assessment

Chemical specific intakes were calculated utilizing equations obtained either from USEPA guidance documents or ASTM guidance. Input variables for these formulas were either site specific data or developed in consultation with the Wisconsin Department of Health and Family Services (DHFS). The sources of toxicity information utilized in the intake equations are primarily from IRIS or HEAST (USEPA documents).

4.1.3 Risk Characterization Summary – Populations

Cumulative risk defined in ch. NR 720 specifies that the excess cancer risk may not exceed 1×10^{-5} the non-carcinogenic hazard index may not exceed one. The following table presents a summary of predicted risk for the potential exposure pathways described above. The tabulation of risk for both reasonable maximum exposure (RME) and mean (central tendency exposure - CTE) concentrations in current as well as future scenarios is also presented.

Population		Carcinogenic Risk		Non-carcinogenic Hazard Quotient	
		RME	CTE	RME	CTE
City Worker	current	8×10^{-2}	6×10^{-3}	1.6	0.14
	future	2×10^{-5}	3×10^{-4}	0.004	0.0008
Recreational adult	current	2×10^{-2}	9×10^{-4}	0.42	0.036
	future	2×10^{-8}	1×10^{-9}	0.0002	0.00003
Recreational child	current	3×10^{-2}	9×10^{-4}	2.8	0.085
	future	4×10^{-8}	3×10^{-9}	0.001	0.0001
Recreational adolescent	current	4×10^{-2}	1×10^{-3}	2.0	0.05
	future	8×10^{-8}	4×10^{-9}	0.001	0.00009
Trespassing adolescent	current	6×10^{-2}	2×10^{-3}	3.6	0.37
	future	2×10^{-4}	1×10^{-4}	0.07	0.03

4.1.4 Risk Characterization Summary

RME risk associated with specific scenarios in excess of the Wisconsin Administrative Code standards at the seep area is as follows:

-current carcinogenic risk to all exposed populations through dermal contact and incidental ingestion of seep water (8×10^{-2} to 3×10^{-5}).
-current non-carcinogenic risk to all exposed populations except recreational adults through dermal contact to seep water (1.5 to 3.1).
-current and future carcinogenic risk to trespassing adolescents through dermal contact with the surface soils (1×10^{-4} to 2×10^{-4}).

4.1.5 Risk Uncertainty and Discussion

The risk measures utilized in a HHRA are not fully probabilistic, but conditional estimates based on many assumptions about exposure and toxicity. Areas of uncertainty for the risk assessment generally include: environmental sampling and analyses, exposure point concentrations, toxicological information and exposure intake parameter selection. Because of the conservative nature of many of the risk assessment assumptions, calculated risk is generally thought to result in an overestimation of risk. However, site specific uncertainties may well underestimate the risk at this site.

Major uncertainties associated with the seep area HHRA are the lack of information regarding the immiscible tar-like organic contaminant fraction at the site. Laboratory samples may not be truly representative of the concentration of the tar-like material identified at the site. Also, a general lack of understanding of the concentration of this fraction as well as physical characteristics of the material adds to risk uncertainty. In addition, since coal tar is a mixture reported to contain over 300 compounds which are rarely consistent in type and concentration, methods which use individual chemical properties, as is used on this assessment, to calculate the site risks may not be accurate in predicting risk from exposure to the mixture.

5.0 Interim Remedial Action Options

5.1 Interim Remedial Action Objectives

Remedial action objectives are identified in order to guide the development of site specific remedial actions. The interim remedial action objectives are broadly stated to allow progressive narrowing of the remediation scope. Activities and technologies which satisfy the interim remedial action objectives will eliminate or reduce human health and environmental risks posed by exposure to the contaminants at the site. Considering the general goals of protecting public health and the environment, the following specific interim remedial action objectives have been developed.

- Minimize short-term potential risk, to human health and the environment from exposure to contaminants;
- Implement interim action that will accommodate future remedial actions; and
- Implement remedial action that will be compatible with future activities at contiguous properties and not directly nor indirectly cause deterioration of contiguous properties.

5.2 Remediation Action Boundaries

The interim remedial action will be directed at remediating the seep area in the park and offshore within the approximate limits delineated on Figure 3. The vertical limit of the remedial action will be limited to contamination identified in soils and groundwater which exist above the underlying Miller Creek aquitard.

It has been assumed that the source of the seep will be addressed prior to implementation of the interim remedial action.

5.3 Remediation Quantities

The seep area covers approximately 6,100 square feet. The depth of contamination ranges from approximately 1 to 15 feet. The impacted fill occupies a volume of approximately 3,200 cubic yards, including approximately 1,000 cubic yards of wood waste. Waste quantity calculations are provided in Appendix C, "Design Calculations."

5.4 Identification and Screening of Potential Remedial Technologies

General response actions that satisfy the remedial action objectives are identified and described. Table 4, "General Response Action – Technology Screening" presents the list of technologies under each general response action and documents the preliminary screening.

5.4.1 General Response Actions

General response actions are broad categories of activities and technologies that may be applied alone or in combination in order to accomplish the remedial action objectives. The general response actions may be applicable to one or more media at the site. Some general response actions are required only in combination with other general response actions. Therefore, not all remediation alternatives will include all of the identified general response actions. Specific activities and technologies within each general response action category are identified for evaluation and assembly into potential remedial actions. The general response actions for the Ashland Lakefront Property are:

- Institutional Controls
- Access Restrictions
- Engineering Controls
- In Situ Treatment
- Excavation
- Physical Separation.
- Solids Dewatering
- Transportation
- Ex Situ Solids Treatment
- Ex Situ Process Incorporation/Co-treatment
- Disposal
- Water Treatment
- Water Disposal
- Off-gas Treatment

5.4.1.2 Institutional Controls

Institutional controls include deed restrictions and ordinances to prevent site disturbance, restrict site usage, and discourage trespassing.

5.4.1.3 Access Restrictions

Access restrictions include physical restrictions to limit access to the site by unauthorized personnel, and may include posted warnings, security fences, security personnel, and video surveillance.

5.4.1.4 Engineering Controls

Engineering controls include technologies to prevent contact with, leaching, or migration of contaminants. Control options include physical horizontal and vertical barriers, as well as hydraulic control systems to maintain a stable hydraulic head or inward gradient within the contaminated area.

5.4.1.5 In Situ Treatment

In situ treatment allows the contaminants to be treated in place to minimize site disturbances and logistical efforts associated with removal. A variety of in situ treatment technologies are available for contaminant destruction, extraction, or mobility reduction. Technologies include volatilization, thermally enhanced volatilization or mobilization, flushing, bioremediation, or stabilization.

5.4.1.6 Excavation

Excavation removes the contaminated materials from their current location for treatment or transport to disposal. Excavation is typically conducted by backhoes or other large machinery.

5.4.1.7 Physical Separation

Physical separation processes may be utilized to separate the various fractions of the excavated or dredged materials including wood waste, fines, and coarse sands.

5.4.1.8 Solids Dewatering

Most treatment technologies are limited in their ability to handle water in soils. For these technologies, it would be necessary to remove excess water from soils prior to treatment. Optimum moisture contents will vary depending on which treatment technologies or transport and disposal methods will be utilized.

5.4.1.9 Transportation

Transportation of excavated materials offsite to treatment or disposal areas may include a variety of methods including railcars, trucks, and barges.

5.4.1.10 Ex Situ Solids Treatment

A variety of ex situ treatment technologies are available for contaminant destruction, extraction, or mobility reduction including thermal oxidation, stabilization, bioreactors, and soil washing. Several other technologies are still in development and testing and have not been discussed here.

5.4.1.11 Ex Situ Process Incorporation/Co-treatment

Wastes may be incorporated into existing processes for beneficial use and co-treatment. Processes include co-burning for fuel in utility boilers, asphalt blending, fuel blending, and brick manufacture.

5.4.1.12 Disposal

Excavated materials may be transported off site to engineered landfills. Materials may require pretreatment prior to disposal.

5.4.1.13 Water Treatment

Soils dewatering and/or treatment, and groundwater pumping hydraulic controls generate contaminated water that will require treatment. Selected treatment technologies would be required to meet applicable discharge requirements and be approved as best available technology.

5.4.1.14 Water Disposal

Treated water may potentially be discharged to the municipal sewer or to Chequamegon Bay via the storm sewer. Untreated water may be hauled offsite.

5.4.1.15 Off-Gas Treatment

Off-gases captured during removal and or treatment operations may require treatment prior to discharge to the atmosphere. Contaminants removed may include both organics and inorganic constituents. Off-gas treatment technologies that may be applied include carbon adsorption, thermal or catalytic oxidation, air scrubbing, condensation, and/or biofiltration.

5.4.2 Preliminary Screening

While several of the technologies identified under each general response action may be applicable to the site remediation, only a limited number can be evaluated as part of a combined remedial action. Therefore the technologies in each general response action were screened in Table 4 to select those technologies to be retained for further evaluation.

5.5 Evaluation of Interim Remedial Action Options

This section presents three remedial action options potentially feasible to meet the interim remedial action objectives. The options presented include various orders of complexity, site disturbance, and economic impact.

- **Option A1** – Access Restriction
- **Option B1** – Thick Cap
- **Option C1** – Excavation with Offsite Disposal

This section presents a summary of various assumptions necessary to create the options and then provides a description of each option. Table 5, "Comparison of Remedial Action Options" assesses the three options according to the following criteria.

5.5.1 Evaluation Criteria

Remedial action options are evaluated according to the technical and economic feasibility criteria outlined in s. NR 722.07(4).

The technical feasibility of an option is evaluated according to the following criteria:

- Short-term effectiveness
- Long-term effectiveness
- Implementability

The economic feasibility of an option is evaluated according to the following criteria:

- Costs

Each of the criteria are further described below.

5.5.1.2 <u>Short-Term Effectiveness</u>

Short-term effectiveness includes an assessment of potential short-term human health and ecological impacts, during implementation of the remedy. Keeping in mind the assumption that the source of the seep has been eliminated, the scenario posing significant excess risk is dermal contact with surface soils.

Short-term human health impacts include risks to the community, as well as to workers involved in the remediation during the implementation of the remedy.

Short-term ecological impacts may include risks to the local environment during implementation of the remedy, as well as potential risks to other environments during the offsite transport, treatment, or disposal of wastes.

5.5.1.3 Long-Term Effectiveness

Long-term effectiveness includes the degree to which the toxicity, mobility and volume of the contamination is reduced as well as an assessment of long-term human health and ecological impacts, after the remedy is complete.

Long-term human health impacts are those associated with the residual contamination after the remedy is complete, as well as risks associated with the final disposition of relocated wastes. Long-term ecological risks include those risks associated with residual contamination, as well as final disposition of any relocated wastes after the remedy is considered complete.

5.5.1.4 Implementability

Implementability takes into account several factors including:

- Constructability
- Availability of services and materials
- Reliability of Technology
- Monitoring Considerations
- Ease of undertaking additional remedial action
- Compliance with ARARs
- Administrative Requirements
- Community Acceptance
- Presence of Threatened or Endangered Species

5.5.1.5 Costs

Cost analysis of an option includes the following:

- Initial capital costs
- Annual operations, maintenance, and monitoring (OMM) costs

The costs analysis does not consider other less tangible factors which might be associated with either leaving the contamination unabated or with the remedial action disturbances. These factors may include impacts to tourism, future development, real estate valuation, indirect health care, or natural resource degradation.

Appendix D, "Cost Projections" provides further details on the cost estimates.

5.5.2 Option A1 – Access Restrictions

Option A1 would be directed at reducing future exposure to currently accessible contaminated media. A larger fence would be installed around the seep area to prevent direct human access (except trespassers).

Posted warnings and legal restrictions would be required to encourage use of safety equipment for any potential subsurface disturbance. Deed restrictions would be implemented to prevent the installation of future subsurface utilities or foundations.

5.5.2.1 Short-Term Effectiveness – Option A1

Short-term human risks of physical injury and direct contact with contaminated surface soils would be increased to workers involved in implementation of this option and trespassers during construction. Minimal ground disturbance during construction of this option would result in very little risk to the community. Short-term ecological impacts could result from animals coming into direct contact with surface soils in the area during the construction period.

5.5.2.2 Long-Term Effectiveness – Option A1

Option A1 would have no affect on the reduction of toxicity, mobility, or volume of the contamination. Long-term human health impacts would remain the same as long as the access restrictions and institutional controls were maintained. Long-term ecological risks would also remain the same to animals encountering the surface soils or burrowing within the fenced area.

5.5.2.3 Implementability – Option A1

There are no significant concerns regarding constructability, availability, reliability, monitoring, or ease of undertaking additional remedial action. There are no known endangered or threatened species present.

5.5.2.4 Costs – Option A1

The preliminary projection of total initial capital costs for this option is approximately $21,000. The projection includes costs for design data collection, and remedial action implementation. A detailed breakdown of the cost projection calculation is provided in Appendix D.

Annual operations, maintenance, and monitoring (OMM) costs are projected to be approximately $1,000 per year. OMM costs include sampling the surface material annually and general site maintenance.

5.5.3 Option B1 – Thick Cap

Option B1 would be directed at reducing current and future exposures, minimizing the potential for future migration, and minimizing the potential for disturbance from anthropogenic or natural events.

The fence would be removed and the seep area would be cleared and grubbed. The entire seep area would be covered with six inches of clean sand followed by an impermeable synthetic geomembrane barrier. The barrier would extend approximately 20 feet beyond the seep area and boots would be installed around groundwater monitoring wells and utility pole. The geomembrane would serve to reduce infiltration of storm water runoff, and limit the future exposure to the subsurface contaminants.

The geomembrane would be covered with 18 inches of clean fill, revegetated, and landscaped for future recreational use.

The filled in area could be potentially be used as a community park. Institutional controls would limit the potential for subsurface disturbances which might disrupt the geomembrane layer. Long-term monitoring would be utilized to detect any potential breaches in the containment system.

5.5.3.1 Short-Term Effectiveness – Option B1

With the exception of trespassers during construction, short-term human health risks from exposure to contaminants would be reduced by preventing access to the contamination. Short-term human risks of physical injury would be increased associated with the construction activities. The construction activities would not cause significant ground disturbance or increase exposures of the community or workers to the contamination. Short-term impacts could result from animals coming into direct contact with soils during the disruption period.

5.5.3.2 Long-Term Effectiveness

Option B1 would have little affect on the reduction of the toxicity, mobility, or volume of the contamination. Long-term human health impacts would be reduced significantly because the exposure routes would no longer exist as long as the cap and institutional controls were maintained. Long-term ecological risks would also be reduced significantly to animals due to elimination of the exposure route.

5.5.3.3 Implementability – Option B1

There are no significant concerns regarding constructability, availability, reliability, ease of undertaking further remedial action, or monitoring. There are no known endangered or threatened species present.

5.5.3.4 Costs – Option B1

The preliminary projection of total initial capital costs for this option is approximately $125,000. The projection includes costs for design data collection, and remedial action implementation. A detailed breakdown of the cost projection calculation is provided in Appendix D.

Annual operations, maintenance, and monitoring (OMM) costs are projected to be approximately $1,000 per year. OMM costs include general site maintenance.

5.5.4 Option C1 – Excavation with Offsite Disposal

Option C1 would be directed at removing and disposing of the contaminated materials offsite at a licensed landfill. The contaminated soils would be removed, stabilized with lime, and transported via railcar to a landfill for disposal.

Soils and wood materials in the seep area would be excavated to approximately four feet deep. Excavation would be done under in conjunction with an automatic continuous perimeter ambient air monitoring system to minimize the potential for airborne emissions to the surrounding community. Soils and wood materials would be stabilized, loaded onto trucks, and transported to an offsite landfill.

Waters from the dewatering process would be treated with equipment in a temporary trailer. NAPLs would be separated out via a coalescing separator and skimming device. The water would be pumped through a filter bag, an air stripper and granular activated carbon before being discharged to the sanitary sewer. Off-gas would be treated prior to discharge to the atmosphere.

The excavated area would be lined with an impermeable geosynthetic liner and backfilled with clean fill. Institutional controls would limit the potential for subsurface disturbances which might penetrate the underlying Miller Creek aquitard.

5.5.4.1 Short-Term Effectiveness – Option C1

Short-term human health risks would be increased during implementation of the remedy due to physical hazards and increased potential for exposure to the contaminants. A larger area of the community would be exposed to risks due to the transportation of the contaminated materials offsite. However, onsite excavation activities would be monitored through automatic continuous ambient air monitors to limit increased community exposure during construction. Engineering controls and safety measures would be utilized to limit the potential for increased exposures for both workers and the community. Short-term ecological impacts could result from animals entering the area during the construction period.

5.5.4.2 Long-Term Effectiveness – Option C1

This option would reduce the toxicity, mobility, and volume of the contamination as well as eliminating the route of exposure. After completion of the remedy, human health and environmental risks would be reduced in the shallow seep area, but not in the underlying or adjacent areas.

5.5.4.3 Implementability – Option C1

This option would be acceptable to the WDNR because after completion of the remedy it will be protective human health and the environment. The community may object to this option because of numerous site disruptions associated with increased traffic, noise, and activity.

There may be difficulties associated with other communities not accepting the large volume of waste to be disposed into their nearby landfills.

There are no significant concerns regarding constructability, availability, ease of undertaking further remedial action, or monitoring. There are no known endangered or threatened species present.

5.5.4.4 Costs – Option C1

The preliminary projection of total initial capital costs for this option is approximately $465,000. The projection includes costs for design data collection, and remedial action implementation. A detailed breakdown of the cost projection calculation is provided in Appendix D.

Annual operations, maintenance, and monitoring (OMM) costs are projected to be approximately $1,000 per year. OMM costs include general site maintenance.

5.6 Comparison of Remedial Action Options

Table 5 summarizes the evaluation of each option and utilizes a numerical scoring system for each evaluation criteria. The scoring system provides a balanced system to give equal weight to the technical and economic criteria. Rating for each criteria category was based upon the previous discussion for each option.

Scoring was based upon each options' relative rating when compared to the other options. A score of 1 to 10 was possible for each criteria. Low scoring indicates the best options in the criteria category.

5.6.1 Short-Term Effectiveness

Option A1 was rated poor because short-term risks to trespassers or non-human species which might be directly exposed to the contaminants during construction would not be reduced. Option C1 was rated very poor because the potential for risk exposures would be reduced in a relatively short time frame, but the disturbances of the contaminants could result in higher short-term risks to the community, workers, and area wildlife from exposure.

Option B1 was rated good because the potential for exposure to the contaminants would be reduced in a short time frame with the placement of the thick cap and membrane.

5.6.2 Long-Term Effectiveness

Option A1 was rated very poor because the option would not reduce long-term risks to trespassers, or non-human species. In addition, the contaminant toxicity or volume would not be reduced.

Option B1 was rated good because the potential for exposure to the contaminants would be reduced for both humans and non-humans, and the relatively thick cap would not easily be breached. However, the contaminant mass would not be reduced and potential long-term cap disruption could result in exposures.

Option C1 was rated good because the potential for exposure to the contaminants would be reduced for both humans and non-humans. However, the contamination would remain in the adjacent soils and underlying groundwater.

5.6.3 Implementability

Option A1 was rated medium because it is not protective of human health or the environment, and would not be accepted by the community of state. Option B1 was rated good because it is technically implementable and reduces short-term and long-term risks. Option C1 was rated poor because the Ashland community may object to the disturbance, and the receiving community might object to the large volume waste disposal.

5.6.4 Costs

Scores for cost were selected based upon the options cost relative to the other options. Option A1 presented the lowest cost option. Options B1 presents the next lowest cost options. Option C1 was the highest cost option.

5.7 Recommendation

Overall, Option B1 received the best total score. SEH recommends that the WDNR consider Option B1 for implementation at this site.

6.0 Remedial Design

The remedial action selected to address the seep area will include a barrier system. Components of the remedial design include: up gradient source removal; fence removal; site grading; grading layer; geomembrane barrier; cap layer; and vegetation. The remedial action will help reduce current and future exposures, minimize potential for future migration, and minimize disturbances from anthropogenic or natural events.

6.1 Up Gradient Source Control

It is assumed that the WDNR will address the source of the seep by the time the remedial action is implemented. However, if needed, an up gradient pump and treat system will be installed and operated to reduce the source of the seep area contamination. The pumping system would be applied to an existing trench located approximately 60 feet south of the seep area. Liquids removed from the trench would be pumped through a water treatment system including an oil/water separator, bag filter, air stripper, and granular activated carbon before being discharged to the sanitary sewer.

NAPLs removed during the oil/water separation process would be disposed of at a licensed oil reclamation facility. Treatment system effluent would be treated to meet the requirements of the City of Ashland sanitary system. The treatment system would be equipped with flow meters and sample ports to measure flow rates and monitor influent and effluent concentrations.

6.2 Fence Removal

Prior to construction activities, the existing chain-link security fence will be removed to access the seep area. Approximately 250 feet of fence will be dismantled and removed from the site. Temporary construction barricades and/or fencing will be installed during the remedial construction activities until the cap has been constructed and graded in accordance with the construction specifications.

6.3 Site Clearing/Initial Grading

The remedial action will cover an area of approximately 1,350 square yards (0.3 acre) as shown on Figure 10, "Remedial Cap – Plan View." Existing trees and brush will be cleared and stripped from the area of construction. Materials removed during clearing activities will be hauled offsite.

Once the construction area has been cleared, the grading layer will be placed and graded to a uniform slope. Slopes will be maintained to match existing drainage patterns and adjacent grades while preventing erosion of the proposed cap material.

The grading layer will consist of six inches of imported, clean sand as shown on Figure 11, "Remedial Cap Cross Sections." Approximately 200 cubic yards of sand will be placed and compacted directly over the existing ground surface. The grading layer will provide some level of protection from human contact until the geomembrane and cap layers are constructed. Also, this layer provides a level surface to place the geomembrane barrier.

6.4 Geomembrane Barrier

A flexible geomembrane will be installed above the grading layer as shown on Figure 11. The geomembrane will be constructed of 40-mil thick high-density polyethylene (HDPE) or polyvinyl chloride (PVC) and will be extend approximately 20 feet beyond the seep area of concern identified during the investigation. The geomembrane will cover approximately 1,350 square yards and will provide an impermeable barrier to limit any upward transport of contamination to the ground surface.

The geomembrane will be constructed to meet applicable American Society of Testing and Materials (ASTM) standards. Geomembrane seam welding and testing will be conducted in accordance with industry accepted manufacturing tolerances and ch. NR 504.

6.5 Cap Layer

After the geomembrane has been placed and tested, a soil cap layer consisting of 18 inches of imported clean fill will be placed over the entire area as shown on Figure 11. Approximately 700 cubic yards of fill will be placed, compacted, and graded over the geomembrane. The cap layer will be graded to provide positive drainage off the cap. Slopes will be maintained at no greater than 3:1 (H:V).

6.6 Vegetation

The entire remedial action area will be revegetated. The vegetation layer will consist of four inches of imported topsoil, seed, and fertilizer as shown on Figure 11. Type B fertilizer as defined in Section 629.2.1.3 Wisconsin Department of Transportation (WDOT) Standard Specifications for Highway and Structure Construction will be applied to the remedial action area at a rate of 3.5 kg/100m^2 of surface area. Seed mixtures will meet the requirements for Seed Mixture No. 10 as defined in the Section 630, WDOT Standard Specifications for Highway and Structure Construction. This seed mixture consists of:

- 40% Kentucky Bluegrass
- 25% Red Fescue
- 5% Red Top
- 20% Perennial Rye Grass
- 10% White Clover

The vegetation layer will provide a surface that will blend into the surrounding natural landscape and prevent erosion and deterioration of the protective cap.

7.0 Construction Health and Safety Monitoring

7.1 Air Monitoring

SEH will provide a full-time Site Safety Officer (SSO) at the site during all construction activities. Based on ambient air data collected during the seep investigation, relatively low levels of VOCs and PAHs may be encountered during invasive soil procedures. The SSO will be responsible for the performance of air monitoring activities and enforcement of the SHSP. The SHSP will specify emergency procedures, personal protective equipment required, and health and safety monitoring. Continuous ambient air monitoring will be performed in the field during periods of soil disturbance such as during grubbing operations.

8.0 Permits, Licenses, and Application

A brief summary of the applicable or relevant and appropriate requirements (ARARs) that may apply to Option B1 activities at the site is included in this section. The summary includes chemical-specific, location-specific-, and action-specific requirements. Applicable regulations are included in Table 6, "Review of ARARs and Information To Be Considered."

8.1 Chemical-Specific Requirements

Chemical-specific ARARs are requirements that regulate the release or presence of specific chemical constituents in the environment. These requirements generally establish risk-based concentration levels or discharge limits for specific chemicals. The concentration levels generally are determined based on human health risks.

In Wisconsin, target cleanup levels for specific chemicals in soil are established in ch. NR 720 Wisconsin Administrative Code. For instance, generic residual cleanup levels (RCLs) for specific chemicals are listed in ch. NR 720. If the RCL for specific chemicals are not relevant or appropriate to the site or published values are not available for specific chemicals, RCLs may need to be calculated for contaminants in an effort to protect public health, safety and welfare, and the environment. Chemical-specific ARARs (both State and Federal) that may apply during potential remediation of the soil at the site are included in Table 6.

8.2 Location-Specific Requirements

Location-specific ARARs are requirements that relate to the geographic location or features of the site. These requirements may affect the remedial action choices or may impose constraints on specific remedial alternatives.

The site may be considered a filled lakebed and be subject to laws pertaining to waters of the State of Wisconsin and regulations pertaining to the Coastal Zone Management Act. The GLI may also have significant criteria potentially regulating remedial actions at the site.

The site is located in the immediate vicinity of a residential neighborhood. Local ordinances may dictate maximum working noise levels, hours of operation, and traffic patterns. Local building or grading permits may be required for excavation work. Certain hazardous waste handling activities may be prohibited.

A railroad is located adjacent to the site. If construction activities are determined to be necessary within railroad right-of-way these activities may also be subject to specific requirements of the railroad. Specific ARARs that may apply to the site due to its location are included in Table 6.

8.3 Action-Specific Requirements

Specific remedial activities selected to accomplish site cleanup are regulated or controlled by action-specific ARARs. Action-specific requirements regulate how a selected alternative must be accomplished. Example action-specific ARARs are discussed as they may pertain to Option B1 activities

The Federal Occupation Safety and Health Act (OSHA) includes several regulations regarding remediation, excavation, and construction activities. Several State of Wisconsin Administrative Code regulations may apply to B1 actions implemented at this site, particularly those enforced by the WDNR and the Department of Commerce (DCOM). These regulations include, but are not limited to, the ch. NR 400 series on air quality, the ch. NR 500 series for solid waste handling, the ch. NR 700 series on environmental remediation, and DCOM building safety requirements.

9.0 Permits, Licenses, and Application

Option B1 will not require obtaining any federal or state permits, licenses or variances. The City of Ashland will be notified of the proposed activities. The contractor performing the interim action will be required to complete the project in accordance with all federal, state and local regulations and ordinances. A summary of regulations that may apply to Option B1 activities is found on Table 6.

10.0 Standard of Care

The conclusions and recommendations contained in this report were arrived at in accordance with generally accepted professional engineering practice at this time and location. Other than this, no warranty is implied or intended.

GGC/ls/MJB/JEG/GPW

11.0 References and Resources

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Tables

Table 1
Soil Analytical Results

Analytical Parameters	Boring No./Depth (ft)/Date	
	Up Gradient Borings	Seep Borings
	0-8	0-8
	1/19/01	
Total Cyanide (mg/kg)	<0.16	1.3
Total Reactive Cyanide (mg/kg)	--	<2.5
Total Phenolics (mg/kg)	<0.56	8.3
PVOCs (µg/kg)		
Benzene	<25	280
TCLP (mg/l)		
Benzene	<0.005	0.012
Lead	<0.2	<0.2
RCRA Total Metals (mg/kg)		
Mercury	--	--
Arsenic	0.51	1.1
Barium	--	--
Cadmium	0.18	0.24
Chromium	4.1	3.7
Lead	20	25
Selenium	0.076	0.32
Silver	--	--
Free Liquids (Paint Filter)	0.0%	0.0%

-- = Not analyzed for
Compiled by: JEG Checked by: DRR

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Table 2
Ambient Air Analytical Results - VOCs

Analytical Parameters	OSHA PEL Exposure Standard ($\mu g/m^3$)	Sample Location/Sample No./Sampling Date/units					
		Up Gradient		Seep		Down Gradient	
		001		002		003	
		2/20/01		2/21/01		2/22/01	
		ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3
VOCs[1]							
Acetone	2,400,000	4.8	12	<3.0	<7.2	4.7	11
Benzene	3,250	2.5	8.2	12	41	14	45
2-Butanone (Methyl Ethyl Ketone)	590,000	0.7	2.1	<3.0	<8.9	<3.1	<9.3
Chloromethane	105,000	0.67	1.4	<0.74	<1.6	<0.78	<1.6
Ethylbenzene	435,000	5	22	18	78	28	130
4-Ethyltoluene	N/E	7.7	38	13	67	21	100
Toluene	375,000	0.97	3.7	1.8	6.9	11	42
1,2,4-Trimethylbenzene	125,000	5.5	28	7.1	36	8.1	40
1,3,5-Trimethylbenzene	125,000	2.1	10	2.9	14	3.4	17
Total Xylenes	435,000	5.4	23.8	19.3	85	39	168

-- = Not analyzed for

[1] = VOC list is not complete; VOCs not listed are below laboratory detection limit

N/E = Not established

Compiled by: GGC Checked by: MJB

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Table 3
Air Monitoring Results - PAHs

Analytical Parameters	OSHA PEL Exposure Standard ($\mu g/m^3$)	Sample Location/Sample No./Sampling Date/units	
		Seep-Down Gradient	
		001	
		2/21/2001 & 2/22/01	
		ppbv	ug/m^3
PAHs[1]			
Naphthalene	50,000	7.37	39.25
2-Methylnaphthalene	N/E	1.66	9.81
Acenaphthene	N/E	0.18	1.18

[1] = PAH list is not complete; PAHs not listed are below laboratory detection limit

N/E = Not established

Compiled by: GGC Checked by: MJB

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Table 4: General Response Actions - Technology Screening

General Response Action	Technology	Implementability	Relative Cost	Status
Institutional Controls	Deed Restrictions	No significant issues	Low	Retained
	Legal Restrictions	No significant issues	Low	Not Retained
	Trespassing Prosecution	May be difficult to enforce	Medium	Not Retained
Access Restrictions	Posted Warnings	No significant issues	Low	Retained
	Fence	No significant issues	Low	Retained
	Fence - Barbed	Safety issue in Public Area	Low	Possible later addition
	Fence - Electrified	Safety issue in Public Area	Medium	Not retained
	Security Guard	No significant issues	Medium	Possible later addition
	Video Surveillance	No significant issues	Medium	Possible later addition
Engineering Controls -Landside	Sheet Pile	Possible vibration/penetration Issues	Medium	Not Retained
	Slurry Wall	Insufficient area for installation	Medium	Not Retained
	Grout Wall	No significant issues	Medium	Not Retained
	Geomembrane	No significant issues	Medium	Retained
	Soil Cover	May not be sufficient alone	Low	Retained
	Hydraulic Cutoff Trench	No significant issues	Medium	Retained
	Internal Gradient Pumping	No significant issues	Medium	Not Retained
In situ Treatment	Soil Vapor Extraction	Would primarily address VOCs	Low	Not Retained
	Air Sparging / Biosparging	Would primarily address VOCs	Low	Not Retained
	Steam Stripping	No significant issues	Medium	Not Retained
	Radio Frequency Heating	No significant issues	Medium	Not Retained
	Hot Water Flushing	No significant issues	Medium	Not Retained
	Surfactant Flushing	No significant issues	Medium	Not Retained
	Alcohol Flushing	No significant issues	Medium	Not Retained
	Oxidation (Fenton's Reagent)	Free NAPL must be removed first	Medium	Not Retained
	In situ Soil Mixing	Inefficient due to wood slabs	Medium	Not Retained
	In situ Solidification	Inefficient due to wood slabs	Medium	Not Retained
	Enhanced Microbial Bioremediation	Require pretreatment of long chain PAHs	Low	Not Retained
	White Rot Fungi Remediation	Require pretreatment of long chain PAHs	Low	Not Retained
	Phytoremediation	Good polishing technology	Low	Not Retained
Excavation - Landside	Single Season - Major Excavation	Large volume would make logistics difficult	Medium	Retained
Physical Separation	Trommel	Tar may be an issue	Medium	Not Retained
	Gravity Separator	Tar may be an issue	Medium	Not Retained
Solids Dewatering	Drying Beds	No significant issues	Low	Not Retained
	Vacuum Belt/Drum Filtration	Tar may be an issue	High	Not Retained
	Filter Press	No significant issues	Medium	Not Retained
	Drying Agents	No significant issues	Low	Not Retained
	Solar Drying	Not feasible in cold region	Low	Not Retained
	Kiln Drying	Not available	High	Not Retained
Transportation	Railroad	No significant issues	Medium	Possible VE alternative
	Truck	No significant issues	Medium	Retained
	Barge	No significant issues	Medium	Not Retained
	Pipeline	Difficult for slab woods	Medium	Not Retained
Ex situ Solids Treatment	Solidification/Stabilization	No significant issues	Medium	Retained
	Soil Washing	No significant issues	Medium	Not Retained
	Thermal Desorption	No significant issues	Medium	Not Retained
	Bioreactors	Would not treat long chain PAHs	Medium	Not Retained
	Landfarming	Volume too large, long chain PAHs, NIMBY	Low	Not Retained
Ex situ Process Incorporation/ Co Treatment	Asphalt Batch Plant	Wood wastes unacceptable	Medium	Not Retained
	Utility Boiler Co-burning	Good for Wood waste	Medium	Not Retained
	Brick or Cement Kiln	Not available	High	Not Retained
	Fuel Blending (NAPLs)	Good for NAPLs	Low	Not Retained
Disposal	Existing Landfills	May be unacceptable to receiving community	Medium	Retained
	Dedicated Landfill	May be unacceptable to receiving community	Medium	Possible VE alternative
	Confined Disposal Facility	None available in Chequamegon Bay	Low	Not Retained
Water Treatment				
- NAPL Separation	Oil/Water Separators	No significant issues	Medium	Retained
	Dissolved Air Flotation	No significant issues	High	Not Retained
	Centrifugation	No significant issues	High	Not Retained
- Suspended Solids Removal	Gravity Settling	No significant issues	Medium	Not Retained
	Flocculent Settling	No significant issues	Medium	Not Retained

TABLE 5: Comparison of Remedial Action Options

Project: Ashland Lakefront Property Investigation, Interim RAO, and Design Report
SEH# WIDNR9401
CALC'D 'BY: GPW 29-Oct-01
CHECKED BY: MJB

Remedial Action Options:	Option A1 Access Restriction		Option B1 Thick Cap		Option C1 Excavation with Offsite Disposal	
Evaluation Criteria	*Rating	**Score	*Rating	**Score	*Rating	**Score
Technical Feasibility						
Long Term Effectiveness	very poor rating	5	good rating	2	good rating	2
Short Term Effectiveness	poor rating	4	good rating	2	very poor rating	5
Implementability	medium rating	3	good rating	2	poor rating	4
Economic Feasibility						
Projected Initial Capital Costs	$21,000	1	$125,000	3	$465,000	5
Projected Annual Operation, Maintenance and Monitoring (OMM) Costs	$1,000	1	$1,000	1	$1,000	1
***Total Score:		14		10		17

Options presented only pertain to the area within site limits below:
South limit = northern boundary of railroad right-of-way
North limit = northwest to approximately 80 feet from railroad right-of-way
West limit = approximately 50 feet southwest of seep area
East limit = approximately 60 feet northeast of seep area

*** Rating System**
Ratings for specific evaluation criteria take into account several factors as required in WAC NR722.07(4)

****Scoring System:**
1 = best rating for specific evaluation criteria, 5 = worst rating for specific evaluation criteria (very good, good, medium, poor, very poor)

*****The lowest total score is considered the best score, and therefore may be the best option.**
5 is lowest possible total score. 25 is highest possible total score.

Table 6
Review of ARARs and Information To Be Considered

Standard, Requirement, Criteria, or Limitation	Citation	Description	Comments
FEDERAL REQUIREMENTS			
CLEAN WATER ACT (Federal Water Pollution Control Act)	33 U.S.C.A. 1251-1387 40 CFR 407, 122	Discharges to municipal sewers; discharges from pretreatment processes, storm water, etc.	Potential action and location specific ARAR.
Construction Activities Dredge or Fill Requirements	CWA Sections 401, 404 40 CFR 230, 33 CFR 320-330	Requires coordination with the U.S. Army Corps of Engineers and permits to conduct activities that are located near navigable waters. Protection of wetlands is a primary goal of the dredge and fill permit program.	Potential action and location specific ARAR.
EXECUTIVE ORDER ON PROTECTION OF FLOODPLAINS	Executive Order 11988 40 CFR 6, Appendix A	Requires federal agencies to take action to avoid adversely impacting floodplains, to minimize floodplain destruction, and to preserve the value of floodplains.	Potential action and location specific ARAR.
NATIONAL ARCHAEOLOGICAL HISTORICAL PRESERVATION ACT	16 U.S.C.A. 469a-1	Requires any federal construction project or federally approved project to preserve significant scientific, prehistorical, or archeological data.	Potential action and location specific ARAR.
ENDANGERED SPECIES ACT	16 U.S.C.A. Sections 1531-144 59 CFR 17, 81, 222, 225, 402, 50-453	Action to conserve endangered species or threatened species.	Potential action and location specific ARAR.
COASTAL ZONE MANAGEMENT ACT	16 U.S.C.A. 1451-1464	Dredging, in situ capping, and any construction within a coastal zone.	Potential action and location specific ARAR.
RESOURCE CONSERVATION AND RECOVERY ACT (Solid Waste Disposal Act)	42 U.S.C.A. 6901-6992k		
Definition of Hazardous Waste	40 CFR 261	Defines threshold levels and criteria to determine whether material is hazardous waste.	Potential ARAR for actions that involve management and land disposal of wastes.

Table 6 (Continued)
Review of ARARs and Information To Be Considered (TBC)

Standard, Requirement, Criteria, or Limitation	Citation	Description	Comments
Treatment, Storage, and Disposal Facility Requirements	40 CFR 262, 264, 268	Defines prohibitions on storage, treatment, and disposal of hazardous wastes.	Potential ARAR for actions that involve the management of wastes.
CLEAN AIR ACT	42 U.S.C.A. 7401-7642		
National Ambient Air Quality Standards	CAA Section 109	Establishes ambient air quality standards for chemicals and particulates for certain sources.	Potential ARAR for actions that generate air emissions.
Hazardous Air Pollutants Program (NESHAP)	CAA Section 112	Requires EPA to promulgate standards for categories of sources of toxic air contaminants, using maximum achievable control technology (MACT) and residual risk standards.	Potential ARAR for specific remedial actions that generate air emissions including, but not limited to asbestos containing materials (ACM).
OCCUPATIONAL SAFETY AND HEALTH ACT	29 U.S.C. Section 651 et. seq.; 55 FR 45654 29 CFR 1900.120	Defines health and safety standards for employees engaged in hazardous waste operations.	Potential ARAR for any activity at contaminated sites.
	29 U.S.C.A. Section 651 et. seq., 29 CFR 1910	Requires a formal hazard analysis of the site and development of a site-specific plan for worker protection	Applicable to all field activities.
STATE REQUIREMENTS			
WISCONSIN STATE ENVIRONMENTAL PROTECTION - GENERAL	WAC NR 102-106, 207	Water quality based effluent limits designed to protect fish and aquatic life, wild and domestic animals, and human health.	Potential action and location specific ARAR.
Wisconsin's Shoreland Management Program	WAC NR 115	Establishes protection of wetlands and other sensitive areas within designated shoreline areas.	Potential action and location specific ARAR.
Wisconsin's Floodplain Management Program	WAC NR 116	Requires the State to take action to avoid adversely impacting floodplains, to minimize floodplain destruction, and to preserve the value of floodplains.	Potential action and location specific ARAR.
Wisconsin's City and Village Shoreland-Wetland Protection Program	WAC NR 117	Establishes minimum standards to accomplish State shoreland protection objectives.	Potential action and location specific ARAR.

Table 6 (Continued)
Review of ARARs and Information To Be Considered (TBC)

Standard, Requirement, Criteria, or Limitation	Citation	Description	Comments
WISCONSIN ENVIRONMENTAL POLICY ACT	WAC NR 150	Evaluation criteria to ascertain the effects of major projects on the environment.	Potential action and location specific ARAR.
WISCONSIN STATE ENVIRONMENTAL PROTECTION - AIR POLLUTION CONTROL REGULATIONS	WAC NR 400-	Establishes concentration levels, by chemical, for new sources.	Potential action-specific ARAR for removal, treatment, and disposal of VOC, PAH, metals contaminated sediments, soil, and groundwater. Potential ARAR for asbestos demolition and disposal.
WISCONSIN STATE ENVIRONMENTAL PROTECTION - SOLID AND HAZARDOUS WASTE MANAGEMENT	WAC NR 500-	Provides definitions, submittal requirements, exemptions and other general information relating to solid waste facilities which are subject to regulations under s. 289.01 to 289.97 Wis. Stats.	Potential action-specific ARAR.
WISCONSIN STATE ENVIRONMENTAL PROTECTION - HAZARDOUS WASTE MANAGEMENT	WAC NR 600-	Provides definitions, general permit application information, incorporation by reference citations and general information concerning the hazardous waste management program. Applies to those who generate, transport, recycle, store, treat or dispose of solid waste under NR 605.04	Potential action-specific ARAR.
WISCONSIN STATE ENVIRONMENTAL PROTECTION - INVESTIGATION AND REMEDIATION	WAC NR 700-	Establishes standards and procedures that allow for site-specific flexibility, pertaining to the identification, investigation, and remediation of sites and facilities which are subject to regulation under s. 292.11, 292.15, 292.31, or 292.41 Wis. Stats	Potential action and location specific ARAR.
Soil Cleanup Standards	WAC NR 720	Establishes residual contaminant levels based on protection of groundwater and protection of human health from direct contact with contaminated soil.	Potential ARAR for contaminated soils.

Table 6 (Continued)
Review of ARARs and Information To Be Considered (TBC)

Standard, Requirement, Criteria, or Limitation	Citation	Description	Comments
Interim Guidance for Soil Cleanup levels for Polycyclic Aromatic Hydrocarbons (PAHs)	WDNR PUBL RR-519-97	Provides interim guidance on suggested soil cleanup levels for PAHs.	Potential ARAR for contaminated soils.
Standards for Selecting Remedial Actions	WAC NR 722	Establishes minimum standards for identifying and evaluating remedial action options and selecting remedial actions.	Potential ARAR.
City Requirements	**Citation**	**Description**	**Comments**
Ashland City Ordinances	Ordinance #202	Noise Regulations	Potential action-specific ARAR.
	Ordinance #781.18	Zoning Regulations	Potential location specific ARAR.
	Ordinance #462	Shoreland-Wetland Regulations	Potential location specific ARAR.
	Ordinance #502	City Streets Regulations	Potential location and action specific ARAR.
	Ordinance #503	Heavy Traffic Regulations	Potential location and action specific ARAR.

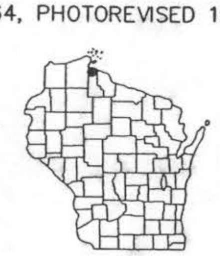
Figures

REPRODUCED FROM

USGS ASHLAND WEST QUADRANGLE

WISCONSIN – ASHLAND CO. 7.5 MINUTE SERIES

1964, PHOTOREVISED 1975



N

SCALE IN FEET

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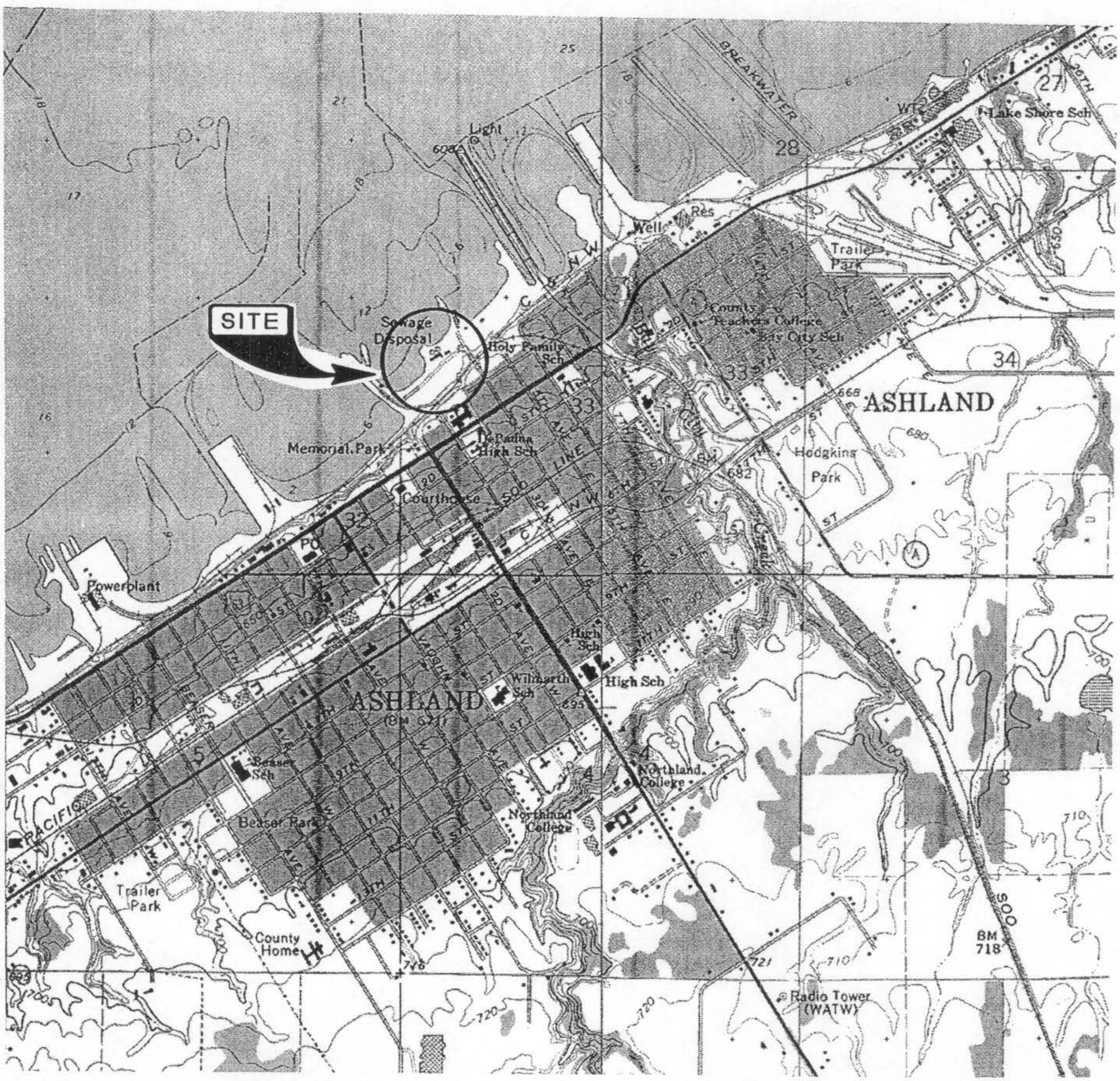

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2	10/15/01	FINAL TO WDNR							MJB	10/15/01

SEH

ASHLAND NSP MGP-
SEEP AREA INVESTIGATION, RAO
AND DESIGN REPORT

FIGURE 1
SITE LOCATION

PROJ. NO. WIDNR9401.07

DATE October 2001

1

11

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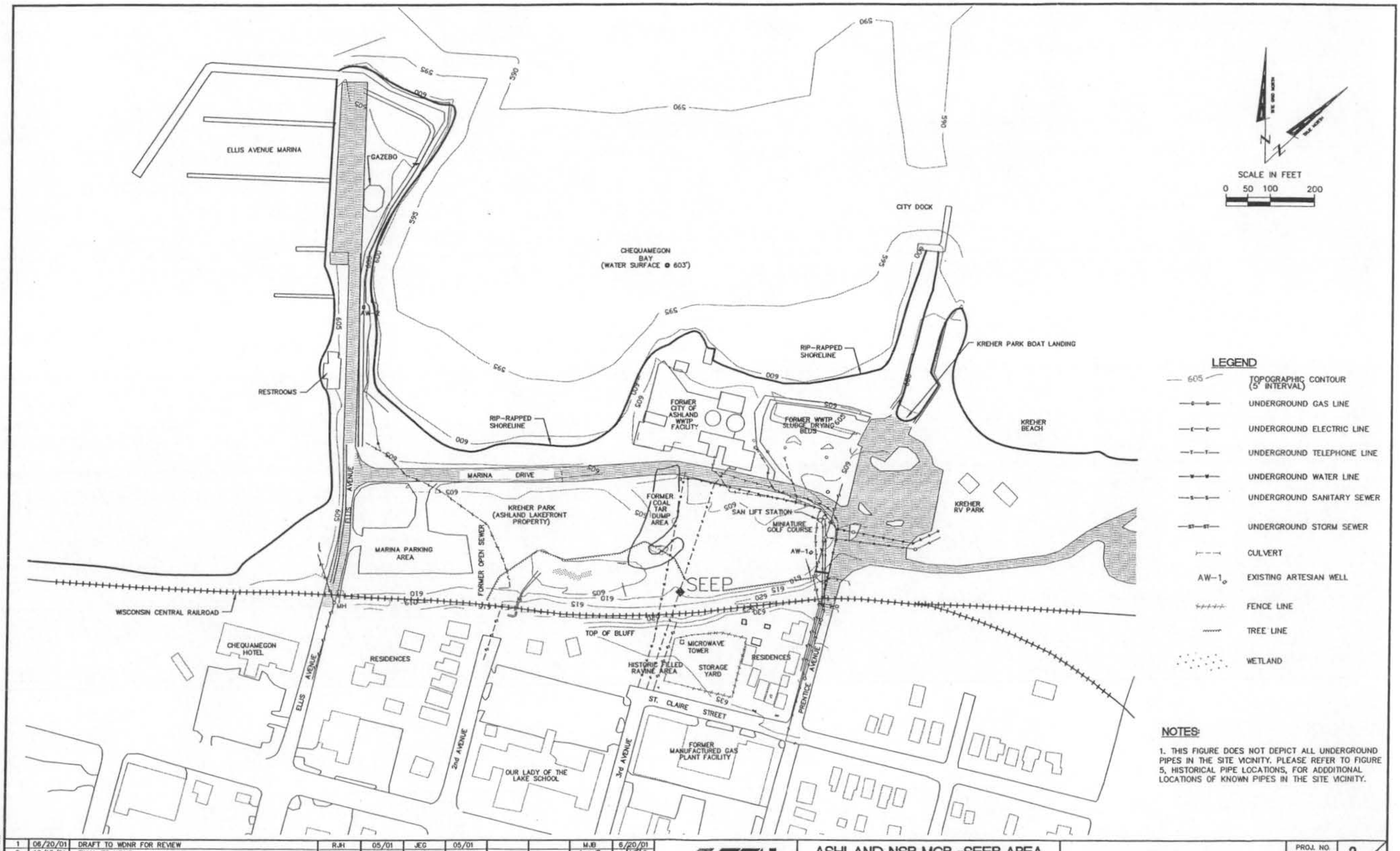

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2	10/15/01	FINAL TO WDNR							MJB	10/15/01

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ASHLAND NSP MGP -SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 2
SITE FEATURES

PROJ. NO. WDNR9401.07
DATE October 2001
2 / 11

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DRAWING DIRECTORY: E:\WASTE\WDNR\9401.07\RAO
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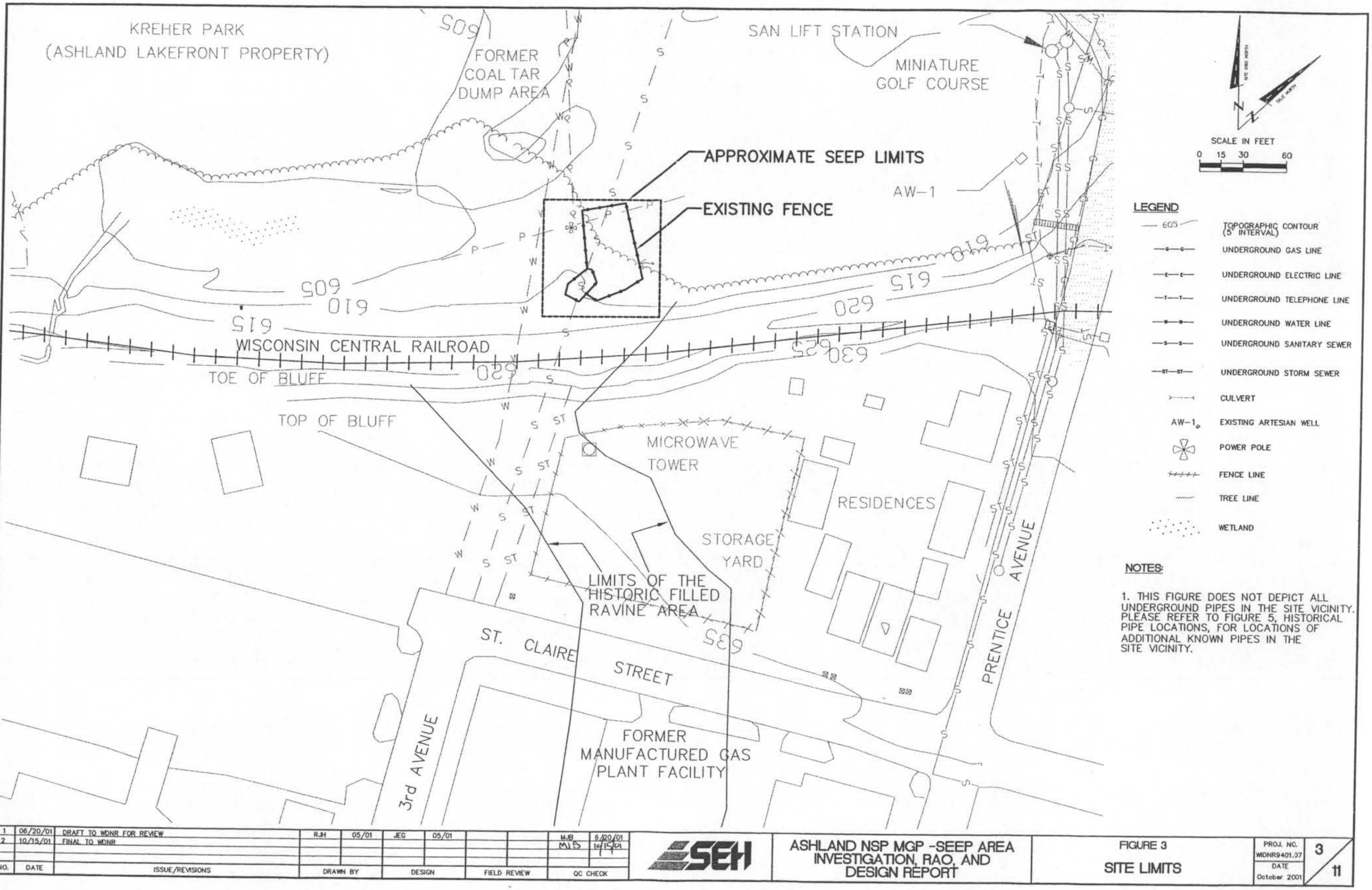
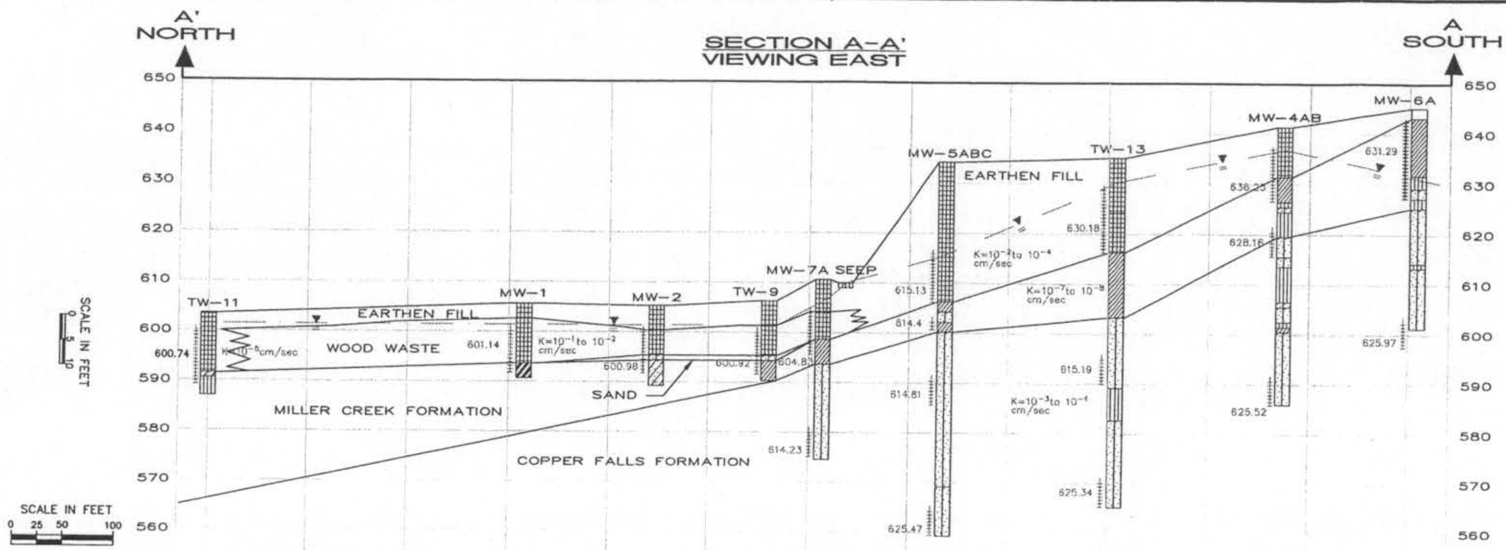
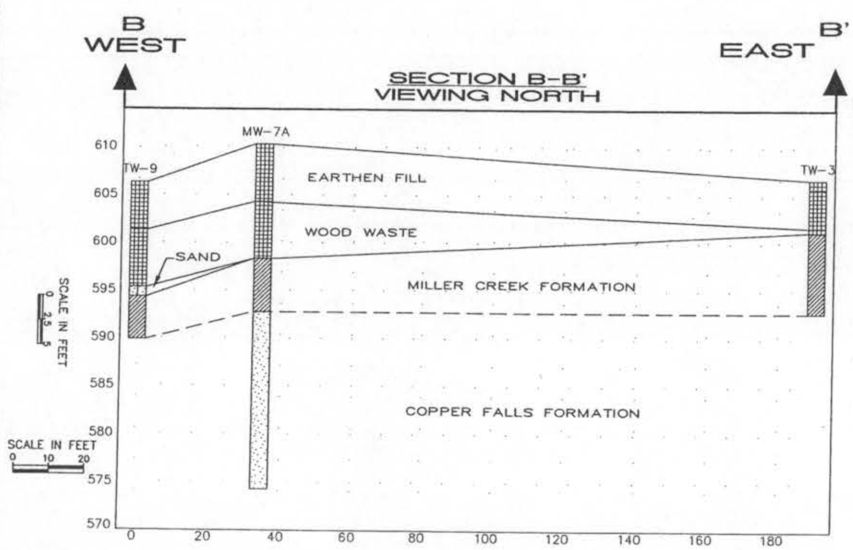

KREHER PARK
(ASHLAND LAKEFRONT PROPERTY)
FORMER
COAL TAR
DUMP AREA
SAN LIFT STATION
MINIATURE
GOLF COURSE
APPROXIMATE SEEP LIMITS
EXISTING FENCE
AW–1
605
610
615
620
625
630
635
WISCONSIN CENTRAL RAILROAD
TOE OF BLUFF
TOP OF BLUFF
MICROWAVE
TOWER
RESIDENCES
STORAGE
YARD
LIMITS OF THE
HISTORIC FILLED
RAVINE AREA
ST. CLAIRE
STREET
3rd AVENUE
PRENTICE
AVENUE
FORMER
MANUFACTURED GAS
PLANT FACILITY
SCALE IN FEET
0 15 30 60
LEGEND
TOPOGRAPHIC CONTOUR (5' INTERVAL)
UNDERGROUND GAS LINE
UNDERGROUND ELECTRIC LINE
UNDERGROUND TELEPHONE LINE
UNDERGROUND WATER LINE
UNDERGROUND SANITARY SEWER
UNDERGROUND STORM SEWER
CULVERT
EXISTING ARTESIAN WELL
POWER POLE
FENCE LINE
TREE LINE
WETLAND
NOTES:
1. THIS FIGURE DOES NOT DEPICT ALL UNDERGROUND PIPES IN THE SITE VICINITY. PLEASE REFER TO FIGURE 5, HISTORICAL PIPE LOCATIONS, FOR LOCATIONS OF ADDITIONAL KNOWN PIPES IN THE SITE VICINITY.
1 06/20/01 DRAFT TO WDNR FOR REVIEW
2 10/15/01 FINAL TO WDNR
NO. DATE ISSUE/REVISIONS
RJH 05/01 DRAWN BY
JEG 05/01 DESIGN
FIELD REVIEW
MJB 6/20/01
MJS 10/15/01
QC CHECK
SEH
ASHLAND NSP MGP -SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT
FIGURE 3
SITE LIMITS
PROJ. NO. WDNR9401.07
DATE October 2001
3
11

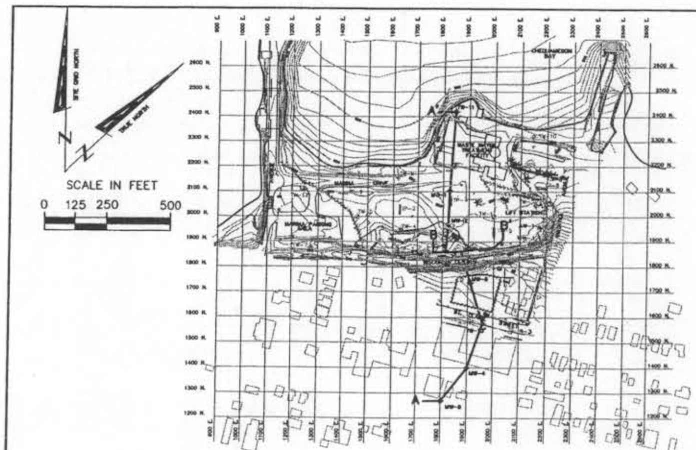
ORIGIN X=-0.20,Y=-0.20





LEGEND

- = FILL AND WOOD WASTE
- =CL LEAN CLAY
- =ML SILT
- =SM SILTY SAND
- =SP SAND
- =CH FAT CLAY
- 600.98 WELL SCREEN INTERVAL AND STATIC GROUNDWATER ELEVATION
- K=10^{-5}cm/sec ESTIMATED HYDRAULIC CONDUCTIVITY
- SHALLOW GROUNDWATER SURFACE
- 605 GROUNDWATER EQUIPOTENTIAL CONTOURS AND ELEVATIONS



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NO.	DATE	ISSUE/REVISIONS	DRAWN BY		DESIGN	FIELD REVIEW	QC CHECK	
1	06/20/01	DRAFT TO WDNR FOR REVIEW	RJH	06/01			MJB	06/20/01
2	10/15/01	FINAL TO WDNR					MJB	10/15/01

SEH
ENGINEERS ■ ARCHITECTS ■ PLANNERS

ASHLAND NSP MGP -SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 4
SEEP CROSS SECTIONS

PROJ. NO. WDNR9401
DATE October 2001

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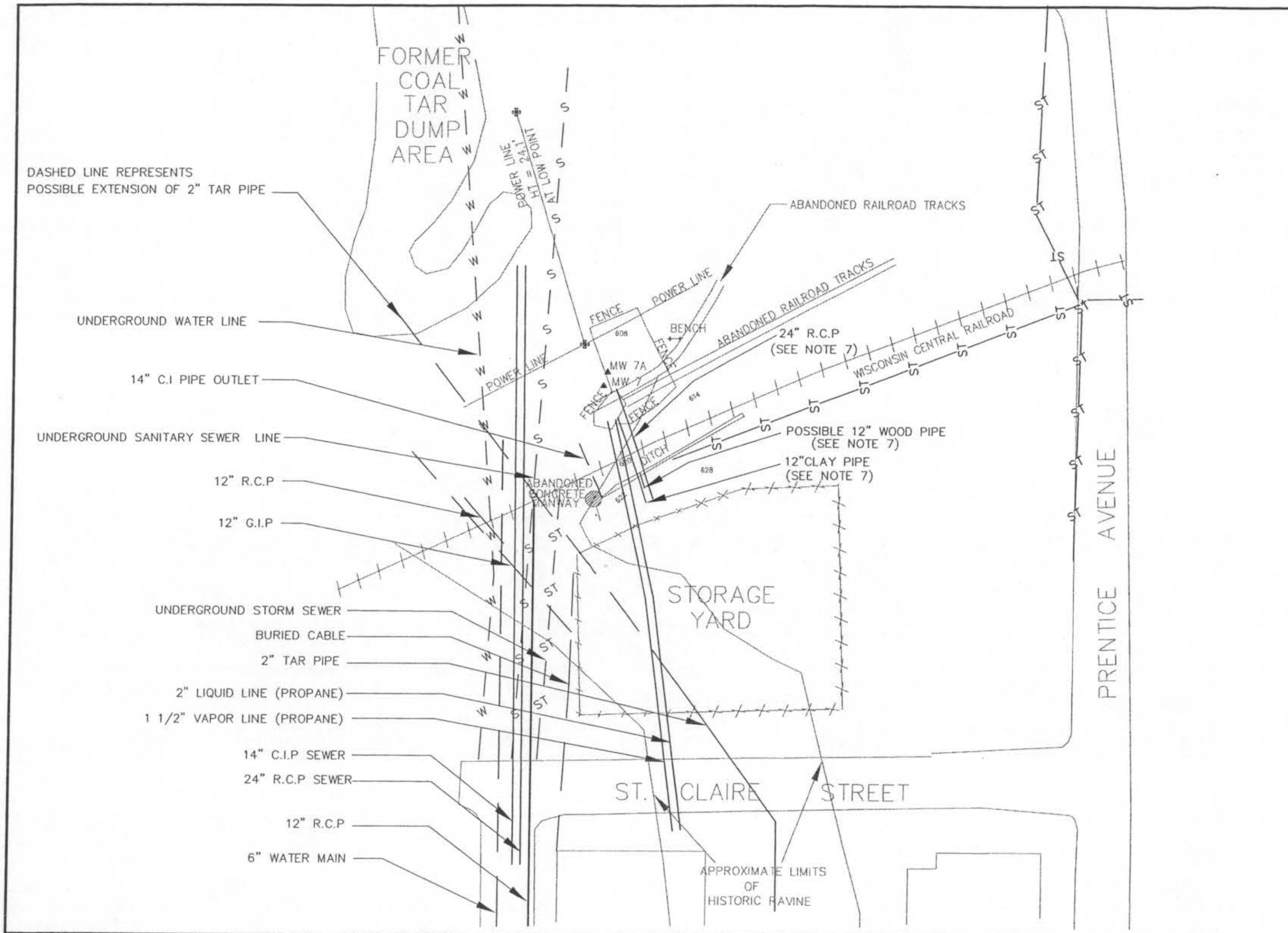


NOTES:

1. LOCATIONS OF PIPES, BUILDINGS AND OTHER LANDMARKS ARE APPROXIMATE.

2. LOCATIONS FOR 14" AND 24" SEWER PIPES TAKEN FROM DRAWING PROVIDED BY COOPER ENGINEERING

3. LOCATIONS FOR NEW PROPOSED SEWER LINE, UNDERGROUND STORM SEWER, SANITARY SEWER, WATERLINE, AND 2" TAR PIPE PROVIDED BY SEH SITE VICINITY MAP.

4. LOCATIONS FOR 12" REINF. CONCRETE PIPE AND 6" WATER MAIN PROVIDED BY ASHLAND ENGINEERING DEPARTMENT CIRCA 1955

5. LOCATIONS FOR 2" LIQUID PROPANE AND 1 1/2" VAPOR LINE PROVIDED FROM LAKE SUPERIOR DISTRICT POWER CO.

6. LOCATIONS OF RAILROAD, MONITORING WELLS, POWERLINES, FENCED AREA AND TOPOGRAPHIC LINES PROVIDED BY NELSON SURVEYING, KREHER PARK MAP.

7. THE PIPES SHOWN WITH LABELS TO THE RIGHT SIDE OF THE FIGURE WERE UNEARTHED DURING THE MARCH EXCAVATION. THE LOCATION OF THESE PIPES ARE APPROXIMATE.

DRAWING FILENAME: 9401FZE2
DRAWING DIRECTORY: E:\WASTE\WDNR\9401.07\RAO
XREF FILENAME:

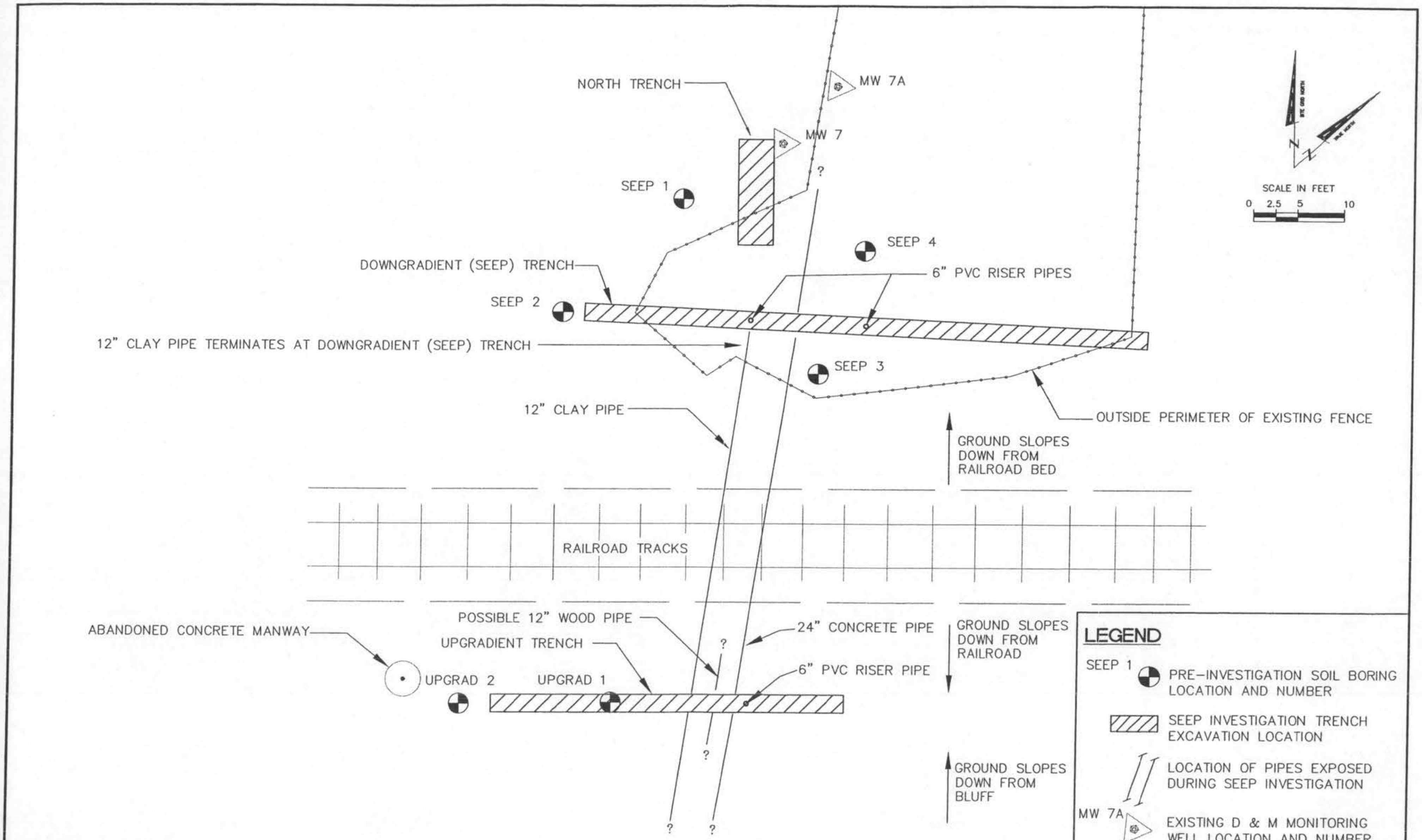
NO.	DATE	ISSUE/REVISIONS	DRAWN BY		DESIGN	FIELD REVIEW	QC CHECK	
1	06/20/01	DRAFT TO WDNR FOR REVIEW	RJH	06/06/01			MJB	6/20/01
2	10/15/01	FINAL TO WDNR					WJB	10/15/01

SEH

ASHLAND NSP MGP - SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 5
HISTORICAL PIPE LOCATIONS

PROJ. NO. WDNR9401.07
DATE October 2001
5
11



NO.	DATE	ISSUE/REVISIONS	DRAWN BY		DESIGN		FIELD REVIEW		QC CHECK	
1	06/20/01	DRAFT TO WDNR FOR REVIEW	RJH	06/06/01	JEG	06/06/01			MJB	6/20/01
2	10/15/01	FINAL TO WDNR							MJB	10/15/01

SEH

ASHLAND NSP MGP - SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 6
SEEP INVESTIGATION LOCATIONS

PROJ. NO. WDNR9401.07
DATE October 2001

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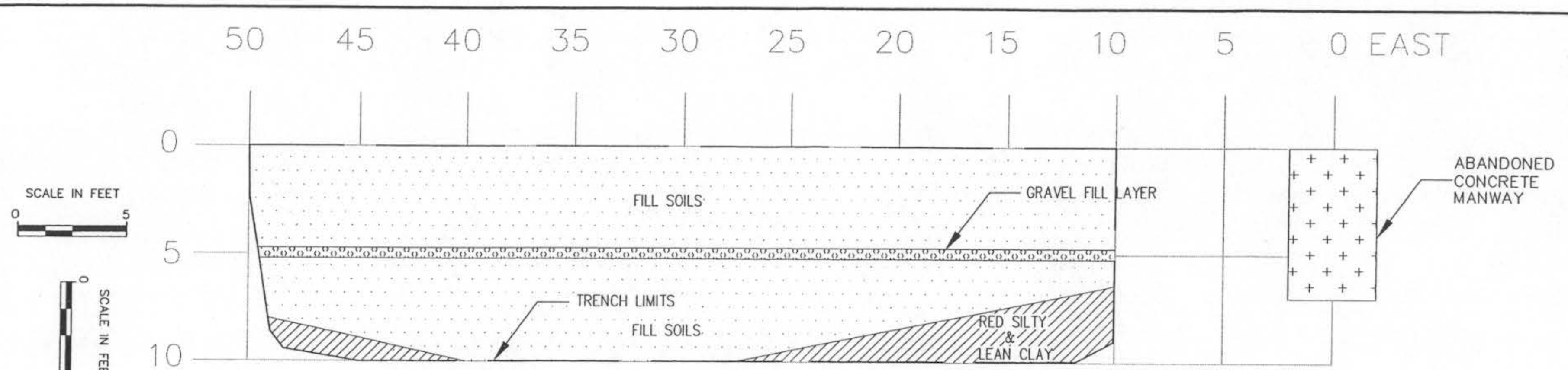
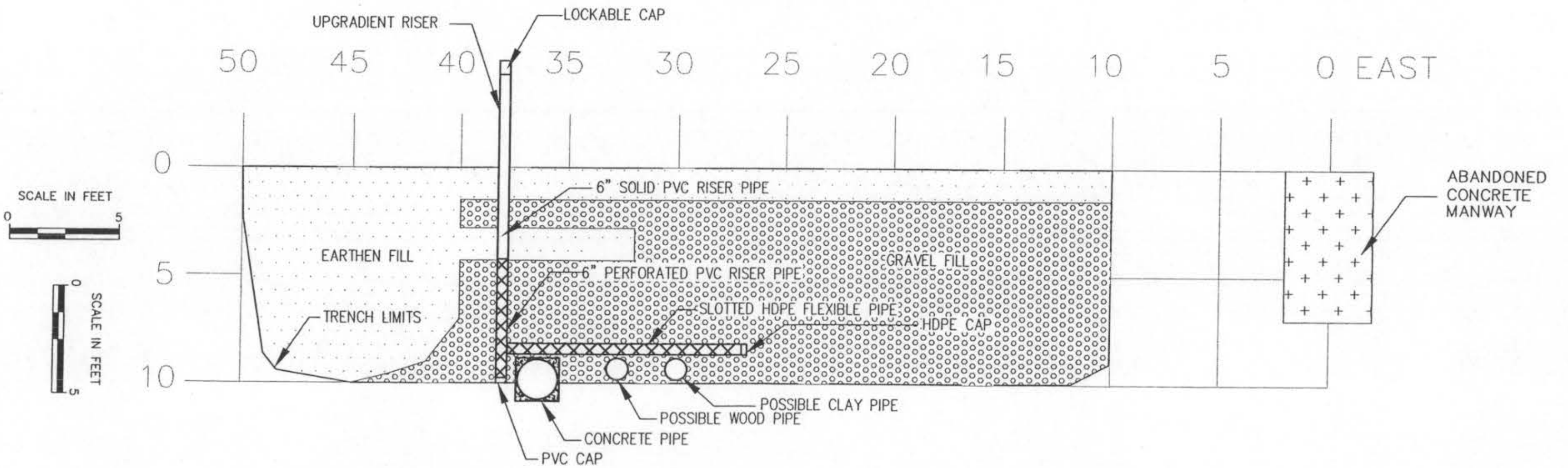


UPGRADIENT TRENCH - SUBSURFACE SOIL CONDITION
(LOOKING SOUTH)



UPGRADIENT TRENCH -SUBSURFACE PIPES AND COLLECTION SYSTEM CONSTRUCTION/ EXISTING PIPE LOCATIONS
(LOOKING SOUTH)

NO.	DATE	ISSUE/REVISIONS
1	06/20/01	DRAFT TO WDNR FOR REVIEW
2	10/15/01	FINAL TO WDNR

DRAWN BY: RJH 06/06/01 — DESIGN: JEG 06/06/01 — FIELD REVIEW — QC CHECK: MJB 6/20/01

SEH

ASHLAND NSP MGP - SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 7
UPGRADIENT TRENCH DETAILS

PROJ. NO. WIDNR9401.07
DATE October 2001

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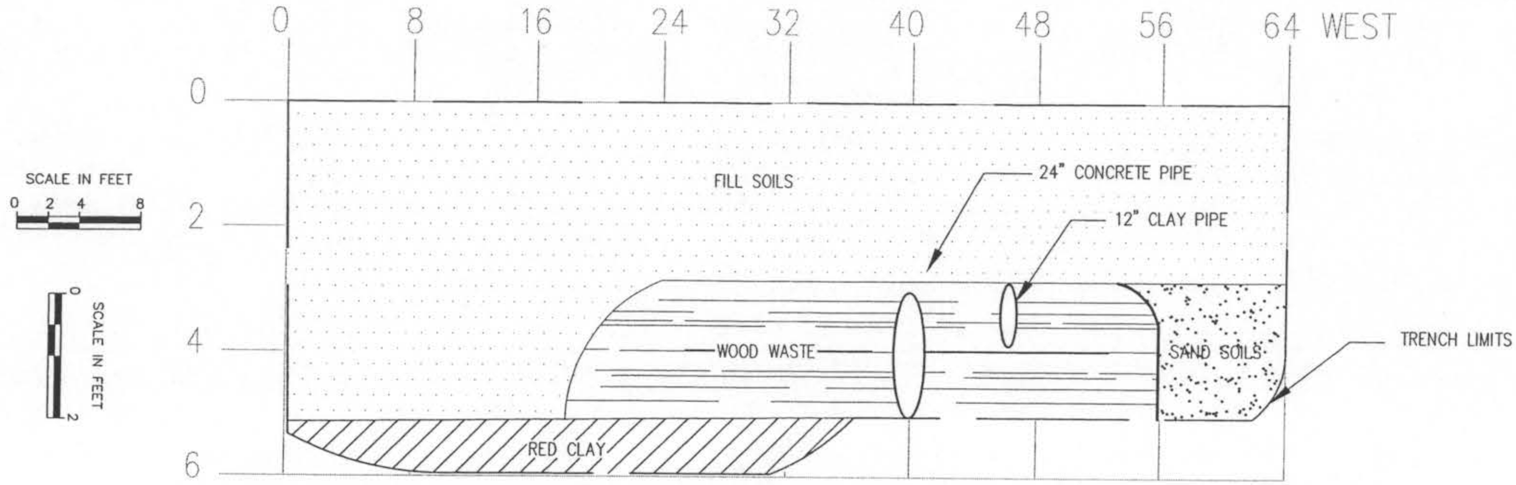
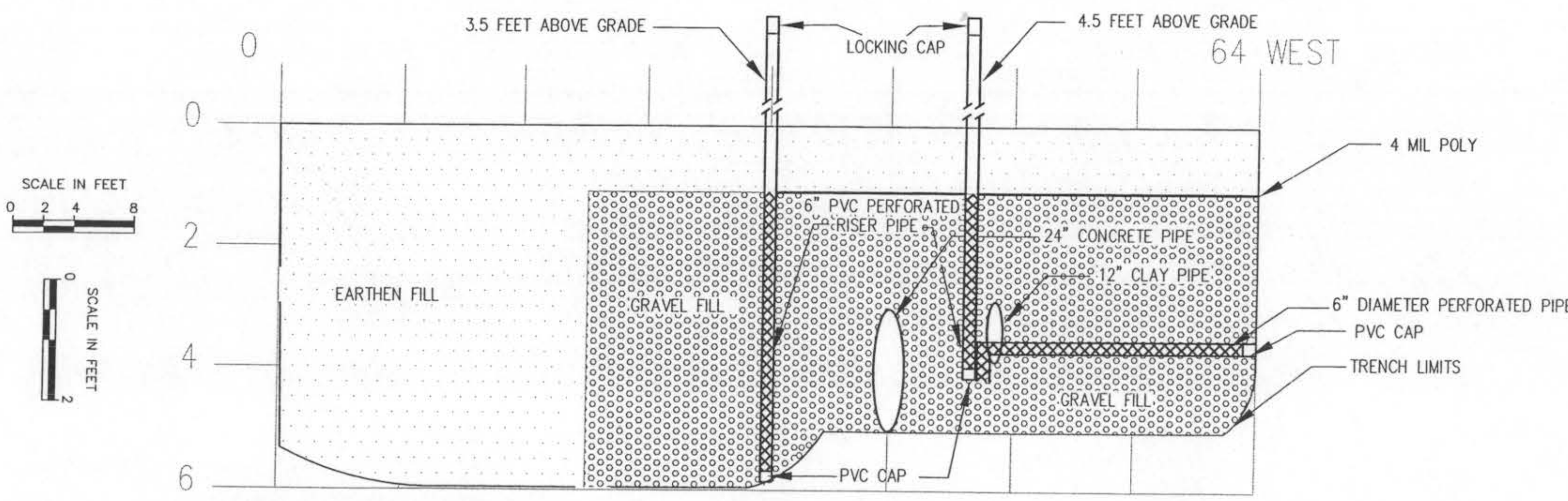


DOWNGRADIENT (SEEP) TRENCH - SUBSURFACE SOIL CONDITION (LOOKING SOUTH)



SUBSURFACE PIPES AND COLLECTION SYSTEM CONSTRUCTION (LOOKING SOUTH)

NO.	DATE	ISSUE/REVISIONS
1	06/20/01	DRAFT TO WDNR FOR REVIEW
2	10/15/01	FINAL TO WDNR

DRAWN BY		DESIGN		FIELD REVIEW		QC CHECK	
RJH	06/06/01	JEG	06/06/01			MJB	6/20/01
						MJB	10/15/01

SEH

ASHLAND NSP MGP -SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 8
DOWNGRADIENT (SEEP) TRENCH DETAILS

PROJ. NO. WDNR9401.07
DATE October 2001
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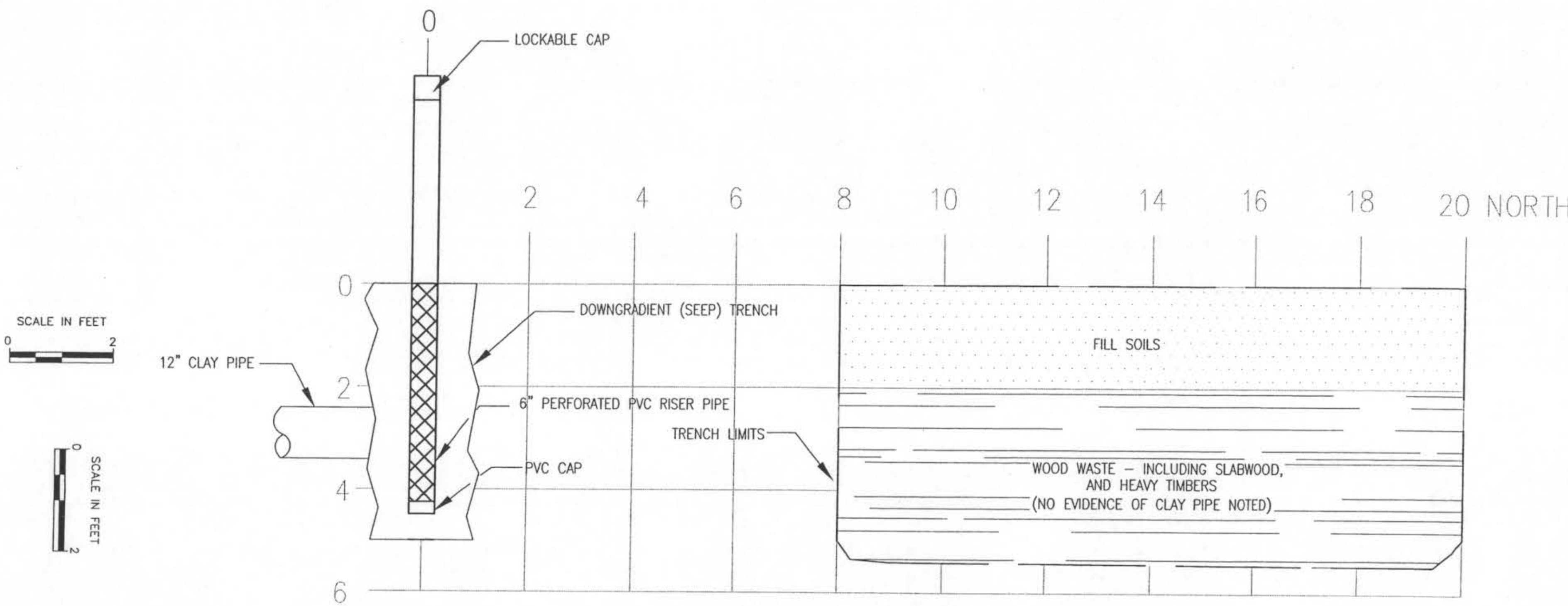

NORTH TRENCH (LOOKING WEST)

NO.	DATE	ISSUE/REVISIONS	DRAWN BY		DESIGN		FIELD REVIEW		QC CHECK	
1	06/20/01	DRAFT TO WDNR FOR REVIEW	RJH	06/06/01	JEG	06/06/01			MJB	6/20/01
2	10/15/01	FINAL TO WDNR							MJB	10/15/01

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ASHLAND NSP MGP - SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 9
NORTH TRENCH DETAILS

PROJ. NO. WDNR9401.07
DATE October 2001

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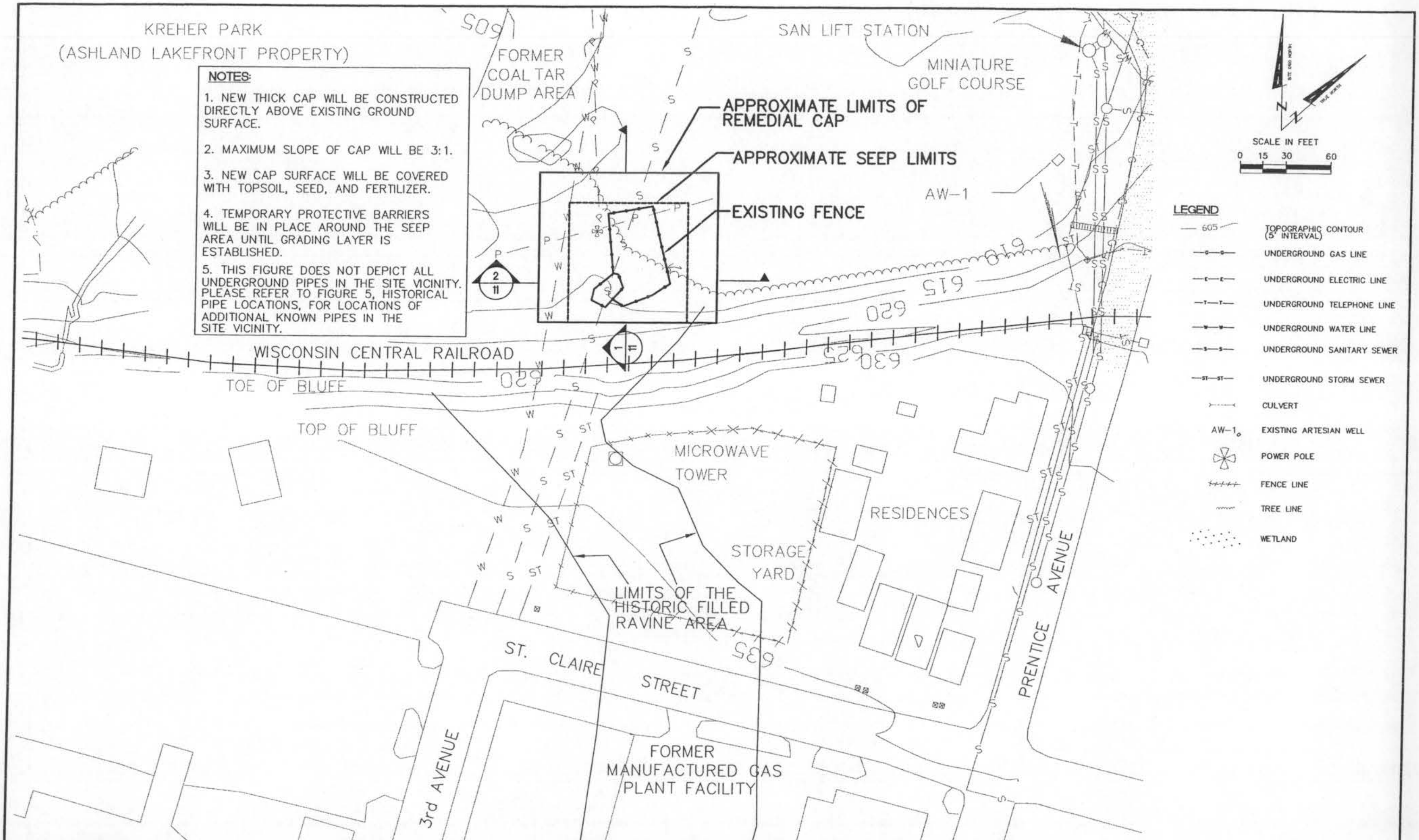

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NO.	DATE	ISSUE/REVISIONS	DRAWN BY		DESIGN		FIELD REVIEW		QC CHECK	
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2	10/15/01	FINAL TO WDNR							MJB	10/15/01

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ASHLAND NSP MGP -SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 10
REMEDIAL CAP
- PLAN VIEW

PROJ. NO. WIDNR9401.07
DATE October 2001
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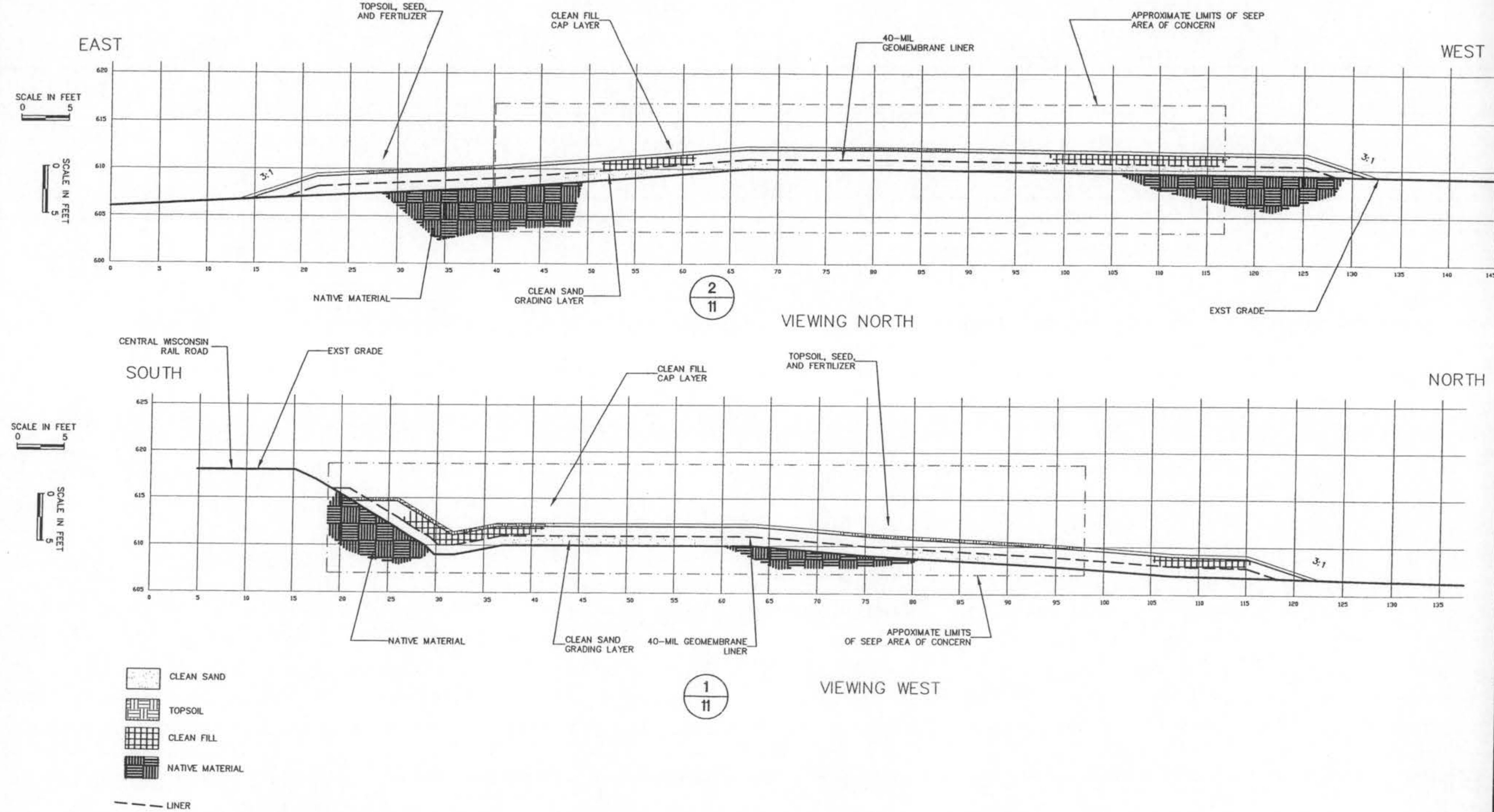

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1	06/20/01	DRAFT TO WDNR FOR REVIEW	RJH	06/01	JEG	06/01			MJB	6/20/01
2	10/15/01	FINAL TO WDNR							MJB	10/15/01

SEH

ASHLAND NSP MGP -SEEP AREA INVESTIGATION, RAO, AND DESIGN REPORT

FIGURE 11
REMEDIAL ACTION CROSS-SECTION

PROJ. NO. WIDNR9401.07
DATE October 2001
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Appendix A

Soil Boring Documentation

State of Wisconsin
Department of Natural Resources

Route To:
- ☐ Solid Waste
- ☐ Emergency Response
- ☐ Wastewater
- ☐ Haz. Waste
- ☐ Underground Tanks
- ☐ Water Resources
- ☐ Other

Soil Boring Log Information

Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Ashland Lakefront Property		SEEP 1

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Chris Haller / SEH	1/19/01	1/19/01	Macrocore

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 Inches

Boring Location
State Plane N, E
1/4 of 1/4 of Section 33 T 48 N,R 4
Lat 46° 53' 49"
Long 90° 52' 59"

Local Grid Location (If applicable)
Feet ☐ N ☐ S Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
Ashland		Ashland

Sample Number	Sample Length (in) Recovered	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
1	14		0–3	FILL: Black Silt and Clay Mixed With Sand, Some Wood Pieces										
			3	Refusal (Wood Waste) @ 3.0 ft. End of Boring @ 3.0 ft.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: John E. Guhl

Firm: SEH

SEH 421 Frenette Drive
Chippewa Falls, WI. 54729
Tel: 715-720-6200, Fax: 715-720-6300

This form is authorized by Chapters 144, 147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

State of Wisconsin
Department of Natural Resources

Route To:
- ☐ Solid Waste
- ☐ Emergency Response
- ☐ Wastewater
- ☐ Haz. Waste
- ☐ Underground Tanks
- ☐ Water Resources
- ☐ Other

Soil Boring Log Information
Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Ashland Lakefront Property		SEEP 2

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Chris Haller / SEH	1/19/01	1/19/01	Macrocore

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	3.0 Inches

Boring Location		Local Grid Location (If applicable)
State Plane N, E 1/4 of 1/4 of Section 33 T 48 N,R 4	Lat 46° 53' 49" Long 90° 52' 59"	Feet ☐ N ☐ S Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
Ashland		Ashland

Sample Number	Length (in) Recovered	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/Comments
1	14		0–2	FILL: Black Clay and Silt Mixed With Sand, Some Wood Pieces										
			2	Refusal (Wood Waste) @ 2.0 ft. End of Boring @ 2.0 ft.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: John E. Guhl (signed)

Firm: SEH
SEH 421 Frenette Drive
Chippewa Falls, WI. 54729
Tel: 715-720-6200, Fax: 715-720-6300

State of Wisconsin
Department of Natural Resources

Route T
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Other

Soil Boring Log Information
Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number	
Ashland Lakefront Property		SEEP 3	
Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Chris Haller / SEH	1/19/01	1/19/01	Macrocore

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 Inches

Boring Location
State Plane N, E — Lat 46° 53' 49" — Long 90° 52' 59"
1/4 of 1/4 of Section 33 T 48 N,R 4
Local Grid Location (If applicable) ☐ N ☐ S Feet ☐ E ☐ W Feet

County	DNR County Code	Civil Town/City/ or Village
Ashland		Ashland

Sample Number	Length (in) Recovered	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
1	30		0–6	FILL: Black Silt and Clay Mixed With Sand, Some Wood Pieces										
2	25													
			6–8	Medium Reddish-Brown Silty CLAY, Some Fine Sand (CL-ML)	CL ML									1.25 T[illegible]
			8	End of Boring @ 8.0 ft.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: John E. Guhl

Firm: SEH
SEH 421 Frenette Drive
Chippewa Falls, WI. 54729
Tel: 715-720-6200, Fax: 715-720-6300

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State of Wisconsin
Department of Natural Resources

Route T:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Other

Soil Boring Log Information
Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Ashland Lakefront Property		SEEP 4

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Chris Haller / SEH	1/19/01	1/19/01	Macrocore

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 Inches

Boring Location		Local Grid Location (If applicable)
State Plane N, E	Lat 46° 53' 49"	☐ N ☐ E
1/4 of 1/4 of Section 33 T 48 N,R 4	Long 90° 52' 59"	Feet ☐ S Feet ☐ W

County	DNR County Code	Civil Town/City/ or Village
Ashland		Ashland

Sample Number	Length (in) Recovered	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
1	24		0–1	FILL: Black Silt and Clay, Little Sand										
			1.5–4	FILL: Fill Soils Mixed With Wood Pieces										
2	4		4–5	FILL: Wood Waste										
			5	Refusal (Wood Waste) @ 5.0 ft. End of Boring @ 5.0 ft.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: John E. Guhl

Firm: SEH
SEH 421 Frenette Drive
Chippewa Falls, WI. 54729
Tel: 715-720-6200, Fax: 715-720-6300

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State of Wisconsin
Department of Natural Resources

Route T
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Other

Soil Boring Log Information
Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number	
Ashland Lakefront Property		UPGRAD 1	
Boring Drilled By (Firm name and name of crew chief)	**Date Drilling Started**	**Date Drilling Completed**	**Drilling Method**
Chris Haller / SEH	1/19/01	1/19/01	Macrocore

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 Inches

Boring Location
State Plane N, E
1/4 of 1/4 of Section 33 T 48 N,R 4
Lat 46° 53' 49"
Long 90° 52' 59"

Local Grid Location (If applicable)
☐ N ☐ E
Feet ☐ S Feet ☐ W

County	DNR County Code	Civil Town/City/ or Village
Ashland		Ashland

Sample Number	Length (in) Recovered	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
1	30		0–6.5	FILL: Brown to Black Clay and Silt Mixed With Sand, Small Brick Pieces and Cinders										
2	28													
			6.5–8	Medium Reddish-Brown Silty CLAY, Some Fine Sand (CL-ML)	CL ML									1.25 TS
			8	End of Boring @ 8.0 ft.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: John E. [signature]

Firm: SEH
SEH 421 Frenette Drive
Chippewa Falls, WI. 54729
Tel: 715-720-6200, Fax: 715-720-6300

State of Wisconsin
Department of Natural Resources

Route T
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Other

Soil Boring Log Information

Form 4400-122 7-9

Facility/Project Name	License/Permit/Monitoring Number	Boring Number	
Ashland Lakefront Property		**UPGRAD 2**	
Boring Drilled By (Firm name and name of crew chief)	**Date Drilling Started**	**Date Drilling Completed**	**Drilling Method**
Chris Haller / SEH	1/19/01	1/19/01	Macrocore

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 Inches

Boring Location		Local Grid Location (If applicable)
State Plane N, E 1/4 of 1/4 of Section 33 T 48 N,R 4	Lat 46° 53' 49" Long 90° 52' 59"	☐ N ☐ E Feet ☐ S Feet ☐ W

County	DNR County Code	Civil Town/City/ or Village
Ashland		Ashland

Sample Number	Sample Length (in) Recovered	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
1	28		0–1	FILL: Brown to Black Clay and Silt Mixed With Sand										
			1–4	Medium Reddish-Brown Silty CLAY, Some Sand (CL-ML)	CL ML									1.25
			4	End of Boring @ 4.0 ft.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: John E. Gull

Firm: SEH

SEH 421 Frenette Drive
Chippewa Falls, WI. 54729
Tel: 715-720-6200, Fax: 715-720-6300

This form is authorized by Chapters 144, 147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 330[illegible]W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location — County: Ashland

___ 1/4 of ___ 1/4 of Sec. 33 ; T. 48 N; R. 4 ☐ E ☐ W

(If Applicable)

___ Gov't Lot ___ Grid Number

Grid Location

___ ft. ☐ N. ☐ S., ___ ft. ☐ E. ☐ W.

Civil Town Name

Street Address of Well: Kreher Park

City, Village: Ashland

(2) FACILITY NAME Ashland Lakefront Property

Original Well Owner (If Known): WDNR

Present Well Owner: WDNR

Street or Route: 810 Maple St.

City, State, Zip Code: Spooner, WI 54801

Facility Well No. and/or Name (If Applicable): SEEP 1

WI Unique Well No.:

Reason For Abandonment: Boring Completed

Date of Abandonment: 01/19/2001

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) ___

☐ Monitoring Well
☐ Water Well
☐ Drillhole
☒ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Macrocore

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) ___ Casing Diameter (ins.) ___
(From groundsurface)

Casing Depth (Ft.) N/A

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? N/A Feet

(4) Depth to Water (Feet) ___
Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No
If No, Explain Borehole Only

Was Casing Cut Off Below Surface? ☐ Yes ☒ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7)

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
Chipped Bentonite	Surface	3.0	3 lbs	

(8) Comments ___

(9) Name of Person or Firm Doing Sealing Work
SEH Short Elliott Hendrickson Inc.

Signature of Person Doing Work: [signature]
Date Signed: 1-23-01

Street or Route: 421 Frenette Drive
Telephone Number: (715)720-6200

City, State, Zip Code: Chippewa Falls, WI 54729

(10) FOR DNR OR COUNTY USE ONLY	
Date Received/Inspected	District/County
Reviewer/Inspector	
Follow-up Necessary	

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 330^ ^W
11

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location — County: Ashland

___ 1/4 of ___ 1/4 of Sec. 33 ; T. 48 N; R. 4 ☐ E ☐ W
(If Applicable)

___ Gov't Lot ___ Grid Number

Grid Location
___ ft. ☐ N. ☐ S., ___ ft. ☐ E. ☐ W.

Civil Town Name:

Street Address of Well: Kreher Park

City, Village: Ashland

(2) FACILITY NAME Ashland Lakefront Property

Original Well Owner (If Known): WDNR

Present Well Owner: WDNR

Street or Route: 810 Maple St.

City, State, Zip Code: Spooner, WI 54801

Facility Well No. and/or Name (If Applicable): SEEP 2

WI Unique Well No.:

Reason For Abandonment: Boring Completed

Date of Abandonment: 01/19/2001

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) ___

☐ Monitoring Well
☐ Water Well
☐ Drillhole
☒ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Macrocore

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) ___ (From groundsurface) Casing Diameter (ins.) ___

Casing Depth (Ft.) N/A

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? N/A Feet

(4) Depth to Water (Feet) ___

Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No
If No, Explain Borehole Only

Was Casing Cut Off Below Surface? ☐ Yes ☒ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only:
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7)

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
Chipped Bentonite	Surface	2.0	2 lbs	

(8) Comments ___

(9) Name of Person or Firm Doing Sealing Work
SEH Short Elliott Hendrickson Inc.

Signature of Person Doing Work: John E. [signature]
Date Signed: 01-23-2001

Street or Route: 421 Frenette Drive
Telephone Number: (715)720-6200

City, State, Zip Code: Chippewa Falls, WI 54729

(10) FOR DNR OR COUNTY USE ONLY
Date Received/Inspected | District/County
Reviewer/Inspector
Follow-up Necessary

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 330C-W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location — County: Ashland

____ 1/4 of ____ 1/4 of Sec. 33; T. 48 N; R. 4 ☐ E ☐ W

(If Applicable)

________ Gov't Lot ________ Grid Number

Grid Location: ______ ft. ☐ N. ☐ S., ______ ft. ☐ E. ☐ W.

Civil Town Name:

Street Address of Well: Kreher Park

City, Village: Ashland

(2) FACILITY NAME Ashland Lakefront Property

Original Well Owner (If Known): WDNR

Present Well Owner: WDNR

Street or Route: 810 Maple St.

City, State, Zip Code: Spooner, WI 54801

Facility Well No. and/or Name (If Applicable): SEEP 3

WI Unique Well No.:

Reason For Abandonment: Boring Completed

Date of Abandonment: 01/19/2001

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) ________

☐ Monitoring Well
☐ Water Well
☐ Drillhole
☒ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Macrocore

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) ______ Casing Diameter (ins.) ______

Casing Depth (Ft.) N/A

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? N/A Feet

(4) Depth to Water (Feet) ______

Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No
If No, Explain Borehole Only

Was Casing Cut Off Below Surface? ☐ Yes ☒ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7)

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
Chipped Bentonite	Surface	8.0	8 lbs	

(8) Comments ________

(9) Name of Person or Firm Doing Sealing Work
SEH Short Elliott Hendrickson Inc.

Signature of Person Doing Work: [signature]
Date Signed: 01-23-2001

Street or Route: 421 Frenette Drive
Telephone Number: (715)720-6200

City, State, Zip Code: Chippewa Falls, WI 54729

(10) FOR DNR OR COUNTY USE ONLY
Date Received/Inspected | District/County
Reviewer/Inspector
Follow-up Necessary

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 33__ SW

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location — County: Ashland

___ 1/4 of ___ 1/4 of Sec. 33 ; T. 48 N; R. 4 ☐ E ☐ W
(If Applicable)

___ Gov't Lot ___ Grid Number

Grid Location: ___ ft. ☐ N. ☐ S., ___ ft. ☐ E. ☐ W.

Civil Town Name:

Street Address of Well: Kreher Park

City, Village: Ashland

(2) FACILITY NAME Ashland Lakefront Property

Original Well Owner (If Known): WDNR

Present Well Owner: WDNR

Street or Route: 810 Maple St.

City, State, Zip Code: Spooner, WI 54801

Facility Well No. and/or Name (If Applicable): SEEP 4

WI Unique Well No.:

Reason For Abandonment: Boring Completed

Date of Abandonment: 01/19/2001

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) ___

☐ Monitoring Well
☐ Water Well
☐ Drillhole
☒ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Macrocore

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) ___ (From groundsurface) Casing Diameter (ins.) ___

Casing Depth (Ft.) N/A

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? N/A Feet

(4) Depth to Water (Feet) ___

Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No
If No, Explain: Borehole Only

Was Casing Cut Off Below Surface? ☐ Yes ☒ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only:
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7)

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
Chipped Bentonite	Surface	5.0	5 lbs	

(8) Comments ___

(9) Name of Person or Firm Doing Sealing Work: SEH Short Elliott Hendrickson Inc.

Signature of Person Doing Work: [signature] John E. Goff
Date Signed: 01-23-2001

Street or Route: 421 Frenette Drive
Telephone Number: (715)720-6200

City, State, Zip Code: Chippewa Falls, WI 54729

(10) FOR DNR OR COUNTY USE ONLY
Date Received/Inspected | District/County
Reviewer/Inspector
Follow-up Necessary

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 330[illegible]W 11-89

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location — County: Ashland

___ 1/4 of ___ 1/4 of Sec. 33 ; T. 48 N; R. 4 ☐ E ☐ W
(If Applicable)

___ Gov't Lot ___ Grid Number

Grid Location
___ ft. ☐ N. ☐ S., ___ ft. ☐ E. ☐ W.

Civil Town Name

Street Address of Well: Kreher Park

City, Village: Ashland

(2) FACILITY NAME Ashland Lakefront Property

Original Well Owner (If Known): WDNR

Present Well Owner: WDNR

Street or Route: 810 Maple St.

City, State, Zip Code: Spooner, WI 54801

Facility Well No. and/or Name (If Applicable): UPGRAD 1 | WI Unique Well No.:

Reason For Abandonment: Boring Completed

Date of Abandonment: 01/19/2001

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) ___

☐ Monitoring Well
☐ Water Well
☐ Drillhole
☒ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Macrocore

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) ___ Casing Diameter (ins.) ___
(From groundsurface)

Casing Depth (Ft.) N/A

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? N/A Feet

(4) Depth to Water (Feet) ___

Pump & Piping Removed?	☐ Yes	☐ No	☒ Not Applicable
Liner(s) Removed?	☐ Yes	☐ No	☒ Not Applicable
Screen Removed?	☐ Yes	☐ No	☒ Not Applicable
Casing Left in Place?	☐ Yes	☒ No	

If No, Explain Borehole Only

Was Casing Cut Off Below Surface?	☐ Yes	☒ No
Did Sealing Material Rise to Surface?	☒ Yes	☐ No
Did Material Settle After 24 Hours?	☐ Yes	☒ No
If Yes, Was Hole Retopped?	☐ Yes	☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7)

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
Chipped Bentonite	Surface	8.0	8 lbs	

(8) Comments ___

(9) Name of Person or Firm Doing Sealing Work
SEH Short Elliott Hendrickson Inc.

Signature of Person Doing Work: John E. [signature] | Date Signed: 01-23-2001

Street or Route: 421 Frenette Drive | Telephone Number: (715)720-6200

City, State, Zip Code: Chippewa Falls, WI 54729

(10) FOR DNR OR COUNTY USE ONLY
Date Received/Inspected | District/County
Reviewer/Inspector
Follow-up Necessary

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 33" SW 11-

All abandonment work shall be performed in accordance with the provisions of Chapters NR 111, NR 112 or 141, Wis. Admin. Code, whichever is applicable. Also, see instructions on back.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location — County: Ashland

___ 1/4 of ___ 1/4 of Sec. 33 ; T. 48 N; R. 4 ☐ E ☐ W
(If Applicable)

___ Gov't Lot ___ Grid Number

Grid Location
___ ft. ☐ N. ☐ S., ___ ft. ☐ E. ☐ W.

Civil Town Name:

Street Address of Well: Kreher Park

City, Village: Ashland

(2) FACILITY NAME Ashland Lakefront Property

Original Well Owner (If Known): WDNR

Present Well Owner: WDNR

Street or Route: 810 Maple St.

City, State, Zip Code: Spooner, WI 54801

Facility Well No. and/or Name (If Applicable): UPGRAD 2

WI Unique Well No.:

Reason For Abandonment: Boring Completed

Date of Abandonment: 01/19/2001

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) ___

☐ Monitoring Well
☐ Water Well
☐ Drillhole
☒ Borehole

Construction Report Available? ☒ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Macrocore

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) ___ Casing Diameter (ins.) ___

Casing Depth (Ft.) N/A

Was Well Annular Space Grouted? ☐ Yes ☒ No ☐ Unknown
If Yes, To What Depth? N/A Feet

(4) Depth to Water (Feet) ___

Pump & Piping Removed?	☐ Yes	☐ No	☒ Not Applicable
Liner(s) Removed?	☐ Yes	☐ No	☒ Not Applicable
Screen Removed?	☐ Yes	☐ No	☒ Not Applicable
Casing Left in Place?	☐ Yes	☒ No	

If No, Explain: Borehole Only

Was Casing Cut Off Below Surface?	☐ Yes	☒ No
Did Sealing Material Rise to Surface?	☒ Yes	☐ No
Did Material Settle After 24 Hours?	☐ Yes	☒ No
If Yes, Was Hole Retopped?	☐ Yes	☐ No

(5) Required Method of Placing Sealing Material
☒ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only:
☐ Bentonite Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7)

Sealing Material Used	From (Ft.)	To (Ft.)	No. Yards, Sacks Sealant or Volume	Mix Ratio or Mud Weight
Chipped Bentonite	Surface	4.0	4 lbs	

(8) Comments ___

(9) Name of Person or Firm Doing Sealing Work
SEH Short Elliott Hendrickson Inc.

Signature of Person Doing Work: [signature] John E. Guelf
Date Signed: 01-23-2001

Street or Route: 421 Frenette Drive
Telephone Number: (715)720-6200

City, State, Zip Code: Chippewa Falls, WI 54729

(10) FOR DNR OR COUNTY USE ONLY
Date Received/Inspected | District/County
Reviewer/Inspector
Follow-up Necessary

DNR/COUNTY

Appendix B

Analytical Results

(Please Print Legibly)

Company Name: Short Elliott Hendrickson Inc

Branch or Location: Chippewa Falls, WI

Project Contact: John Guhl

Telephone: (715) 720-6225

Project Number: WIDNR9401.07

Project Name: ASHLAND LAKEFRONT PROPERTY

Project State: WISCONSIN

Sampled By (Print): JOHN E. GUHL

EN CHEM INC.

☐ 1241 Bellevue St., Suite 9, Green Bay, WI 54302, 920-469-2436, FAX 920-469-8827

☑ 525 Science Drive, Madison, WI 53711, 608-232-3300, FAX: 608-233-0502

CHAIN OF CUSTODY

59066

Page 1 of 1

P.O. # ____ Quote # ____

Mail Report To: JOHN GUHL

Company: Short Elliott Hendrickson

Address: 421 Frenette Drive, Chippewa Falls, WI 54729

Invoice To: SAME

Company:

Address:

Mail Invoice To:

*Preservation Codes: A=None B=HCL C=H2SO4 D=HNO3 E=EnCore F=Methanol G=NaOH H = Sodium Bisulfate Solution I = Other

Data Package Options (please circle if requested)
- Results Only
- EnChem Level III (Subject to Surcharge)
- EnChem Level IV (Subject to Surcharge)

Regulatory Program: UST, RCRA, SDWA, NPDES, CERCLA

Matrix Codes: W=Water, S=Soil, A=Air, C=Charcoal, B=Biota, Sl=Sludge

ANALYSES REQUESTED

					TCLP BENZENE	TCLP LEAD	TOTAL SB, PB, AS, Cd, Cr,	TOTAL CYANIDES / RCRA	TOTAL PHENOLICS	PAINT FILTER	TOTAL BENZENE	TOTAL # OF BOTTLES SENT	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)
FILTERED? (YES/NO)					No	No	No	No	No	No	No			
PRESERVATION (CODE)*					A	A	A	A	A	A	F			
LABORATORY ID (Lab Use Only)	FIELD ID	DATE	TIME	MATRIX										
-001	UPGRADIENT BORINGS 0-8'	1/19/01	11:00	SOIL	✓	✓	✓	✓	✓	✓	✓	6	If total cyanide detected, analyze sample for total reactive cyanide.	2-4oz 1-2oz M
-002	SEEP BORINGS 0-8'	1/19/01	1:00 pm	SOIL	✓	✓	✓	✓ ①	✓	✓	✓	6	Hold samples for potential additional parameters.	↓
① ~~-003~~	~~SEEP WATER~~	1/19/01	1:00 pm	WATER	✓	✓						1		

① sample cancelled per Tim N. LB 1/29/01

① Added RCRA per John TN 1/30/01

Rush Turnaround Time Requested (TAT) - Prelim (Rush TAT subject to approval/surcharge)

Date Needed:

Transmit Prelim Rush Results by (circle): Phone (Fax) E-Mail

Phone #:

Fax #: 715 720-6300

E-Mail Address:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
John E. Guhl	1/22/01 11:00a	Dunham	
Dunham	1/23/01 09:10	[signature]	1/23/01 09:10
[signature]	1/23/01		
Dunham	1/24/01 8:00	[signature]	1/24/01 8:00

EnChem Project No. 810251

Sample Receipt Temp. 1°C ROI / ROI

Sample Receipt pH (Wet/Metals): NA

Cooler Custody Seal: Present / (Not Present)

Intact / Not Intact

VLT

FILE No.971 01/31 '01 15:20 ID:ENCHEM FAX:9204698827 PAGE 2/ 4

En Chem Inc.

1795 Industrial Drive
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827

- Analytical Report -

Project Name : ASHLAND LAKE FRONT PROPERTY

Project Number : WIDNR9401.01 **Client :** SEH

Field ID : UPGRADIENT BORINGS 0-8' **Report Date :** 1/31/01

Lab Sample Number : 810251-001 **Collection Date :** 1/19/01

WI DNR LAB ID : 405132750 **Matrix Type :** SOIL

Inorganic Results

Test	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method	Analys
Arsenic	0.51	0.016	0.051		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Cadmium	0.18	0.016	0.051		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Chromium	4.1	0.068	0.22		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Lead	20	0.071	0.23		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Selenium	0.076	0.051	0.16		mg/Kg	Q	1/30/01	SW846 3050B	SW846 6020	dms
Cyanide, total	< 0.16	0.16	0.51		mg/kg		1/25/01	SW846 9012	SW846 9012	*MD
Lead - TCLP	< 0.20			0.20	mg/L		1/25/01	SW846 3015	SW846 6010B	*MD
Phenolics, total recoverable	< 0.56	0.56	1.8		mg/kg		1/26/01	EPA 420.2	EPA 420.2	*MD
Free liquids (paint filter)	0.0				%		1/25/01	SW846 9095	SW846 9095	DJB
Solids, percent	79.7				%		1/25/01	SM2540G	SM2540G	DJB

Organic Results

BENZENE - METHANOL PRESERVED SOIL **Prep Method:** SW846 5030B **Prep Date:** 1/25/01 **Analyst:** TLT

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8	110				%Recov		1/25/01	SW846 8260B
Dibromofluoromethane	109				%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene	101				%Recov		1/25/01	SW846 8260B
Benzene	< 25	25	60		ug/kg		1/25/01	SW846 8260B

Organic Results

BENZENE - TCLP **Prep Method:** SW846 5030B **Prep Date:** **Analyst:** *MD

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8	107			1.0	%Recov		1/25/01	SW846 8260B
Dibromofluoromethane	99			1.0	%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene	109			1.0	%Recov		1/25/01	SW846 8260B
Benzene	< 0.0050			0.0050	mg/L		1/25/01	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

En Chem Inc.

1795 Industrial Drive
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827

- Analytical Report -

Project Name : ASHLAND LAKE FRONT PROPERTY
Project Number : WIDNR8401.01 **Client :** SEH
Field ID : SEEP BORINGS 0-8' **Report Date :** 1/31/01
Lab Sample Number : 810251-002 **Collection Date :** 1/19/01
WI DNR LAB ID : 405132760 **Matrix Type :** SOIL

Inorganic Results

Test	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method	Analys
Arsenic	1.1	0.021	0.067		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Cadmium	0.24	0.021	0.067		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Chromium	3.7	0.085	0.27		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Lead	25	0.090	0.29		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Selenium	0.32	0.065	0.21		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Cyanide, reactive	< 2.5			2.5	g/kg as		1/31/01	SW - 7.3.3.2	SW - 7.3.3.2	*MD
Cyanide, total	1.3	0.21	0.67		mg/kg		1/25/01	SW846 9012	SW846 9012	*MD
Lead - TCLP	< 0.20			0.20	mg/L		1/25/01	SW846 3015	SW846 6010B	*MD
Phenolics, total recoverable	8.3	0.71	2.3		mg/kg		1/26/01	EPA 420.2	EPA 420.2	*MD
Free liquids (paint filter)	0.0				%		1/25/01	SW846 9095	SW846 9095	DJB
Solids, percent	63.4				%		1/25/01	SM2540G	SM2540G	DJB

Organic Results

BENZENE - METHANOL PRESERVED SOIL Prep Method: SW846 5030B Prep Date: 1/25/01 Analyst: TLT

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8	97				%Recov		1/25/01	SW846 8260B
Dibromofluoromethane	94				%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene	89				%Recov		1/25/01	SW846 8260B
Benzene	280	39	94		ug/kg		1/25/01	SW846 8260B

Organic Results

BENZENE - TCLP Prep Method: SW846 5030B Prep Date: Analyst: *MD

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8	108			1.0	%Recov		1/25/01	SW846 8260B
Dibromofluoromethane	105			1.0	%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene	110			1.0	%Recov		1/25/01	SW846 8260B
Benzene	0.012			0.0050	mg/L		1/25/01	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

En Chem Inc.

1795 Industrial Drive
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827

- Analytical Report -

Project Name : ASHLAND LAKE FRONT PROPERTY
Project Number : WIDNR9401.01
Client : SEH
Field ID : UPGRADIENT BORINGS 0-8'
Report Date : 1/31/01
Lab Sample Number : 810261-001
Collection Date : 1/19/01
WI DNR LAB ID : 405132750
Matrix Type : SOIL

Inorganic Results

Test		Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method	Analys
Arsenic		0.51	0.016	0.051		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Cadmium		0.18	0.016	0.051		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Chromium		4.1	0.068	0.22		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Lead		20	0.071	0.23		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Selenium		0.076	0.051	0.16		mg/Kg	Q	1/30/01	SW846 3050B	SW846 6020	dms
Cyanide, total	<	0.16	0.16	0.51		mg/kg		1/25/01	SW846 9012	SW846 9012	*MD
Lead - TCLP	<	0.20			0.20	mg/L		1/25/01	SW846 3015	SW846 6010B	*MD
Phenolics, total recoverable	<	0.56	0.56	1.8		mg/kg		1/26/01	EPA 420.2	EPA 420.2	*MD
Free liquids (paint filter)		0.0				%		1/25/01	SW846 9095	SW846 9095	DJB
Solids, percent		79.7				%		1/25/01	SM2540G	SM2540G	DJB

Organic Results

BENZENE - METHANOL PRESERVED SOIL **Prep Method:** SW846 5030B **Prep Date:** 1/25/01 **Analyst:** TLT

Analyte		Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8		110				%Recov		1/25/01	SW846 8260B
Dibromofluoromethane		109				%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene		101				%Recov		1/25/01	SW846 8260B
Benzene	<	25	25	60		ug/kg		1/25/01	SW846 8260B

Organic Results

BENZENE - TCLP **Prep Method:** SW846 5030B **Prep Date:** **Analyst:** *MD

Analyte		Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8		107			1.0	%Recov		1/25/01	SW846 8260B
Dibromofluoromethane		99			1.0	%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene		109			1.0	%Recov		1/25/01	SW846 8260B
Benzene	<	0.0050			0.0050	mg/L		1/25/01	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

En Chem Inc.

1795 Industrial Drive
Green Bay, WI 54302
920-469-2436
800-7-ENCHEM
Fax: 920-469-8827

- Analytical Report -

Project Name : ASHLAND LAKE FRONT PROPERTY
Project Number : WIDNR8401.01
Client : SEH
Field ID : SEEP BORINGS 0-8'
Report Date : 1/31/01
Lab Sample Number : 810251-002
Collection Date : 1/19/01
WI DNR LAB ID : 405132750
Matrix Type : SOIL

Inorganic Results

Test	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method	Analys
Arsenic	1.1	0.021	0.067		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Cadmium	0.24	0.021	0.067		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Chromium	3.7	0.085	0.27		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Lead	25	0.090	0.29		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Selenium	0.32	0.065	0.21		mg/Kg		1/30/01	SW846 3050B	SW846 6020	dms
Cyanide, reactive	< 2.5			2.5	g/kg as		1/31/01	SW - 7.3.3.2	SW - 7.3.3.2	*MD
Cyanide, total	1.3	0.21	0.67		mg/kg		1/25/01	SW846 9012	SW846 9012	*MD
Lead - TCLP	< 0.20			0.20	mg/L		1/25/01	SW846 3015	SW846 6010B	*MD
Phenolics, total recoverable	8.3	0.71	2.3		mg/kg		1/26/01	EPA 420.2	EPA 420.2	*MD
Free liquids (paint filter)	0.0				%		1/25/01	SW846 9095	SW846 9095	DJB
Solids, percent	63.4				%		1/25/01	SM2540G	SM2540G	DJB

Organic Results

BENZENE - METHANOL PRESERVED SOIL Prep Method: SW846 5030B Prep Date: 1/25/01 Analyst: TLT

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8	97				%Recov		1/25/01	SW846 8260B
Dibromofluoromethane	94				%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene	89				%Recov		1/25/01	SW846 8260B
Benzene	280	39	94		ug/kg		1/25/01	SW846 8260B

Organic Results

BENZENE - TCLP Prep Method: SW846 5030B Prep Date: Analyst: *MD

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Toluene-d8	108			1.0	%Recov		1/25/01	SW846 8260B
Dibromofluoromethane	105			1.0	%Recov		1/25/01	SW846 8260B
4-Bromofluorobenzene	110			1.0	%Recov		1/25/01	SW846 8260B
Benzene	0.012			0.0050	mg/L		1/25/01	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

(Please Print Legibly)

Company Name: Short Elliott Hendrickson Inc

Branch or Location: Chippewa Falls, WI

Project Contact: John Guhl

Telephone: (715) 720-6225

Project Number: WIDNR9401.07

Project Name: ASHLAND LAKEFRONT PROPERTY

Project State: WISCONSIN

Sampled By (Print): JOHN E. GUHL

EN CHEM INC.

☐ 1241 Bellevue St., Suite 9, Green Bay, WI 54302, 920-469-2436, FAX 920-469-8827

☑ 525 Science Drive, Madison, WI 53711, 608-232-3300, FAX: 608-233-0502

CHAIN OF CUSTODY

59066

Page 1 of 1

P.O. #___ Quote #___

Mail Report To: JOHN GUHL

Company: Short Elliott Hendrickson

Address: 421 Frenette Drive, Chippewa Falls, WI 54729

Invoice To: SAME

Company:

Address:

Mail Invoice To:

*Preservation Codes: A=None B=HCL C=H2SO4 D=HNO3 E=EnCore F=Methanol G=NaOH H = Sodium Bisulfate Solution I = Other

Data Package Options (please circle if requested)
- Results Only
- EnChem Level III (Subject to Surcharge)
- EnChem Level IV (Subject to Surcharge)

Regulatory Program: UST, RCRA, SDWA, NPDES, CERCLA

Matrix Codes: W=Water, S=Soil, A=Air, C=Charcoal, B=Biota, SI=Sludge

ANALYSES REQUESTED

	TCLP BENZENE	TCLP LEAD	TOTAL Pb, As, Cd, Cr	TOTAL CYANIDES / PAH	TOTAL PHENOLICS	PAINT FILTER	TOTAL BENZENE
FILTERED? (YES/NO)	No	No	No	No	No	No	No
PRESERVATION (CODE)*	A	A	A	A	A	A	F

LABORATORY ID (Lab Use Only)	FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	TOTAL # OF BOTTLES SENT	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)
-001	UPGRADIENT BORINGS 0-8'	1/19/01	11:00	SOIL	6	If total cyanide	2-4oz 1-2oz M
-002	SEEP BORINGS 0-8'	1/19/01	1:00 pm	SOIL	6	detected, analyze	↓
① ~~-003~~	~~SEEP WALL WATER~~	~~1/19/01~~	~~1:00 pm~~	~~WATER~~	1	sample for	
						total reactive	
						cyanide.	
	① sample cancelled per JohnN. 2B 1/24/01					Hold samples	
						for potential	
						additional	
						parameters.	

① Added PAH per John JN 1/30/01

Rush Turnaround Time Requested (TAT) - Prelim

(Rush TAT subject to approval/surcharge)

Date Needed:

Transmit Prelim Rush Results by (circle): Phone (Fax) E-Mail

Phone #:

Fax #: 715 720-6300

E-Mail Address:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By	Date/Time	Received By	Date/Time
John E. Guhl	1/22/01 11:00	Dunham	
Dunham	1/23/01 09:10	[signature]	1/23/01 09:10
[signature]	1/23/01		
Dunham	1/24/01 8:00	[signature]	1/24/01 8:00

En Chem Project No. 810251

Sample Receipt Temp.: 1°C ROI / ROI

Sample Receipt pH (Wet/Metals): NA

Cooler Custody Seal: Present / (Not Present)

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0102429

Work Order Summary

CLIENT:	Ms. Gloria Chojnacki Short Elliot Hendrickson, Inc. 6418 Normandy Lane Suite 100 Madison, WI 53719	**BILL TO:**	Ms. Gloria Chojnacki Short Elliot Hendrickson, Inc. 6418 Normandy Lane Suite 100 Madison, WI 53719
PHONE:	608-270-5368	**P.O. #**	
FAX:	608-274-2026	**PROJECT #**	WIDNR9401.07 Ashland MGP
DATE RECEIVED:	2/23/01		
DATE COMPLETED:	3/7/01		

FRACTION #	NAME	TEST
01A	001	TO-13
02A	LCS	TO-13
03A	Lab Blank	TO-13

CERTIFIED BY: [signature] for: DATE: 3.7.01

Laboratory Director

Certification numbers: CA ELAP - 1149, NY ELAP - 11291, UT ELAP - E-217, AZ ELAP - AZ0567

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
TO-13
Short Elliot Hendrickson, Inc.
Workorder# 0102429

One PUF/XAD Cartridge sample was received on February 23, 2001. The laboratory performed the analysis via Modified EPA Method TO-13 using GC/MS in the full scan mode. The soxhlet extraction and extract concentration to 1.0mL were performed via modified method 3540. See the data sheets for the reporting limits for each compound.
Duplicate extraction cannot be performed on PUF/XAD2 media, therefore duplicate results are derived from analyzing the extract twice.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

Naphthalene was detected in the Laboratory Blank. Due to the nature of PUF/XAD2 extraction it is not possible to re-extract the associated samples. Associated results are "B" flagged.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
E - Exceeds instrument calibration range.
Q - Exceeds quality control limits.
S - Saturated peak.
J - Estimated value.
B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
U - Compound analyzed for but not detected above the reporting limit.
N - The identification is based on presumptive evidence.

AIR TOXICS LTD.

SAMPLE NAME: 001

ID#: 0102429-01A

EPA METHOD TO-13 GC/MS FULL SCAN

File Name:	k030517	Date of Collection: 2/21/01
Dil. Factor:	4.00	Date of Analysis: 3/5/01
		Date of Extraction: 2/26/01

Compound	Rpt. Limit (ug)	Amount (ug)
Naphthalene	4.0	400 B
2-Methylnaphthalene	4.0	100
2-Chloronaphthalene	4.0	Not Detected
Acenaphthylene	4.0	Not Detected
Acenaphthene	4.0	12
Fluorene	4.0	Not Detected
Phenanthrene	4.0	Not Detected
Anthracene	4.0	Not Detected
Fluoranthene	4.0	Not Detected
Pyrene	4.0	Not Detected
Chrysene	4.0	Not Detected
Benzo(a)anthracene	4.0	Not Detected
Benzo(b)fluoranthene	4.0	Not Detected
Benzo(k)fluoranthene	4.0	Not Detected
Benzo(a)pyrene	4.0	Not Detected
Indeno(1,2,3-c,d)pyrene	4.0	Not Detected
Dibenz(a,h)anthracene	4.0	Not Detected
Benzo(g,h,i)perylene	4.0	Not Detected

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: PUF/XAD Cartridge

Surrogates	%Recovery	Method Limits
2-Fluorobiphenyl	34	15-98
Terphenyl-d14	51	19-162

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0102429-02A

EPA METHOD TO-13 GC/MS FULL SCAN

[illegible]	k030107	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/1/01
		Date of Extraction: 2/28/01

Compound	Rpt. Limit (ug)	%Recovery
Naphthalene	1.0	Not Spiked
2-Methylnaphthalene	1.0	Not Spiked
2-Chloronaphthalene	1.0	Not Spiked
Acenaphthylene	1.0	Not Spiked
Acenaphthene	1.0	60
Fluorene	1.0	Not Spiked
Phenanthrene	1.0	Not Spiked
Anthracene	1.0	Not Spiked
Fluoranthene	1.0	Not Spiked
Pyrene	1.0	71
Chrysene	1.0	Not Spiked
Benzo(a)anthracene	1.0	Not Spiked
Benzo(b)fluoranthene	1.0	Not Spiked
Benzo(k)fluoranthene	1.0	Not Spiked
Benzo(a)pyrene	1.0	Not Spiked
Indeno(1,2,3-c,d)pyrene	1.0	Not Spiked
Dibenz(a,h)anthracene	1.0	Not Spiked
Benzo(g,h,i)perylene	1.0	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
2-Fluorobiphenyl	44	15-98
Terphenyl-d14	69	19-162

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0102429-03A

EPA METHOD TO-13 GC/MS FULL SCAN

File Name:	K030108	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/1/01
		Date of Extraction: 2/26/01

Compound	Rpt. Limit (ug)	Amount (ug)
Naphthalene	1.0	3.6
2-Methylnaphthalene	1.0	Not Detected
2-Chloronaphthalene	1.0	Not Detected
Acenaphthylene	1.0	Not Detected
Acenaphthene	1.0	Not Detected
Fluorene	1.0	Not Detected
Phenanthrene	1.0	Not Detected
Anthracene	1.0	Not Detected
Fluoranthene	1.0	Not Detected
Pyrene	1.0	Not Detected
Chrysene	1.0	Not Detected
Benzo(a)anthracene	1.0	Not Detected
Benzo(b)fluoranthene	1.0	Not Detected
Benzo(k)fluoranthene	1.0	Not Detected
Benzo(a)pyrene	1.0	Not Detected
Indeno(1,2,3-c,d)pyrene	1.0	Not Detected
Dibenz(a,h)anthracene	1.0	Not Detected
Benzo(g,h,i)perylene	1.0	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
2-Fluorobiphenyl	52	15-98
Terphenyl-d14	63	18-162

AIR TOXICS LTD.

SAMPLE NAME: 001

ID#: 0102429-01A

EPA METHOD TO-13 GC/MS FULL SCAN

File Name:	k030617	Date of Collection:	2/21/01
Dil. Factor:	4.00	Date of Analysis:	3/5/01
		Date of Extraction:	2/26/01

Compound	Rpt. Limit (ug)	Amount (ug)	ug/10.19 m³
Naphthalene	4.0	400 B	39.25
2-Methylnaphthalene	4.0	100	9.81
2-Chloronaphthalene	4.0	Not Detected	
Acenaphthylene	4.0	Not Detected	
Acenaphthene	4.0	12	1.18
Fluorene	4.0	Not Detected	
Phenanthrene	4.0	Not Detected	
Anthracene	4.0	Not Detected	
Fluoranthene	4.0	Not Detected	
Pyrene	4.0	Not Detected	
Chrysene	4.0	Not Detected	
Benzo(a)anthracene	4.0	Not Detected	
Benzo(b)fluoranthene	4.0	Not Detected	
Benzo(k)fluoranthene	4.0	Not Detected	
Benzo(a)pyrene	4.0	Not Detected	
Indeno(1,2,3-c,d)pyrene	4.0	Not Detected	
Dibenz(a,h)anthracene	4.0	Not Detected	
Benzo(g,h,i)perylene	4.0	Not Detected	

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: PUF/XAD Cartridge

Surrogates	%Recovery	Method Limits
2-Fluorobiphenyl	34	15-98
Terphenyl-d14	51	19-162

SAMPLE VOLUME

PUF #1 30 min

#2 15 min

45 min @ 8 cfm = 360 cft $\times \frac{m^3}{35.31 ft^3}$ = 10.19 m³

Units Conversion Calculator

Amount	Units	Compounds	Molecular Weight
1.18	ug/m3	Acenaphthene	154.21

Calculate Clear

ppbv	.1840665
ppmv	0.0001841
ug/L	0.00118
ug/m^3	1.18
mg/m^3	0.00118
%	0

Units Conversion Calculator

Amount	Units	Compounds	Molecular Weight
9.81	ug/m3	2-Methylnaphthalene	142.2

Calculate Clear

ppbv	1.66
ppmv	0.0016595
ug/L	0.00981
ug/m^3	9.81
mg/m^3	0.00981
%	2e-7

Units Conversion Calculator

Amount	Units	Compounds	Molecular Weight
39.25	ug/m3	Naphthalene	128.16

Calculate Clear

ppbv	7.37
ppmv	0.007367
ug/L	0.03925
ug/m^3	39.25
mg/m^3	0.03925
%	7e-7

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0103035

Work Order Summary

CLIENT:
Ms. Gloria Chojnacki
Short Elliot Hendrickson, Inc.
6418 Normandy Lane
Suite 100
Madison, WI 53719

BILL TO:
Ms. Gloria Chojnacki
Short Elliot Hendrickson, Inc.
6418 Normandy Lane
Suite 100
Madison, WI 53719

PHONE: 608-270-5368

P.O. #

FAX: 608-274-2026

PROJECT # WIDNR9401.07 Ashland MGB

DATE RECEIVED: 3/1/01

DATE COMPLETED: 3/15/01

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	001	TO-14	0.6 psi
02A	002	TO-14	3.0 "Hg
03A	003	TO-14	4.0 "Hg
04A	Lab Blank	TO-14	NA

CERTIFIED BY: Nathan Bthof for: Laboratory Director

DATE: 3.15.01

Certification numbers: CA ELAP - 1149, NY ELAP - 11291, UT ELAP - E-217, AZ ELAP - AZ0567

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
TO-14
Short Elliot Hendrickson, Inc.
Workorder# 0103035

Three 6 Liter Summa Canister samples were received on March 01, 2001. The laboratory performed analysis via EPA Method TO-14 using GC/MS in the full scan mode. The method involves concentrating up to 0.5 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis. See the data sheets for the reporting limits for each compound.

During the five point calibration, two low-level standards are used. The low-level standard for TO-14 compounds is spiked at 0.5 ppbv and represents the reporting limit for these compounds. The low-level standard for the non-TO-14 compounds is spiked at 2.0 ppbv and represents the reporting limit for these compounds. The TO-14 compounds are present in both standards but are excluded from reporting in the 2.0 ppbv standard since a lower level is already included in the curve.

Method modifications taken to run these samples include:

Requirement	*TO-14*	*ATL Modifications*
Internal standard retention times.	Not specified.	Within 0.50 minutes of most recent daily CCV internal standards
Internal standard recoveries.	Not specified.	Within 40% of the daily CCV internal standard area for blanks and samples.
Internal standard retention times.	Not specified.	Within 0.50 minutes of most recent daily CCV internal standards
Internal calibration criteria.	Not specified.	RSD of 30% or less for standard compounds, 40% or less for non-standard and polar compounds
Continuing calibration verification criteria	Not specified.	70 - 130% for at least 90% of standard compounds, 60 - 140% for at least 80% of non-standard and polar compounds
Response factor for quantitation.	Average response factor (ICAL).	Average response factor (ICAL).

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit(background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit.
N - The identification is based on presumptive evidence.

AIR TOXICS LTD.

SAMPLE NAME: 001

ID#: 0103035-01A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030505	Date of Collection: 2/20/01
Dil. Factor:	1.29	Date of Analysis: 3/5/01

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Freon 12	0.64	3.2	Not Detected	Not Detected
Freon 114	0.64	4.6	Not Detected	Not Detected
Chloromethane	0.64	1.4	0.67	1.4
Vinyl Chloride	0.64	1.7	Not Detected	Not Detected
Bromomethane	0.64	2.5	Not Detected	Not Detected
Chloroethane	0.64	1.7	Not Detected	Not Detected
Freon 11	0.64	3.7	Not Detected	Not Detected
1,1-Dichloroethene	0.64	2.6	Not Detected	Not Detected
Freon 113	0.64	5.0	Not Detected	Not Detected
Methylene Chloride	0.64	2.3	Not Detected	Not Detected
1,1-Dichloroethane	0.64	2.6	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.64	2.6	Not Detected	Not Detected
Chloroform	0.64	3.2	Not Detected	Not Detected
1,1,1-Trichloroethane	0.64	3.6	Not Detected	Not Detected
Carbon Tetrachloride	0.64	4.1	Not Detected	Not Detected
Benzene	0.64	2.1	2.5	8.2
1,2-Dichloroethane	0.64	2.6	Not Detected	Not Detected
Trichloroethene	0.64	3.5	Not Detected	Not Detected
1,2-Dichloropropane	0.64	3.0	Not Detected	Not Detected
cis-1,3-Dichloropropene	0.64	3.0	Not Detected	Not Detected
Toluene	0.64	2.5	0.97	3.7
trans-1,3-Dichloropropene	0.64	3.0	Not Detected	Not Detected
1,1,2-Trichloroethane	0.64	3.6	Not Detected	Not Detected
Tetrachloroethene	0.64	4.4	Not Detected	Not Detected
Ethylene Dibromide	0.64	5.0	Not Detected	Not Detected
Chlorobenzene	0.64	3.0	Not Detected	Not Detected
Ethyl Benzene	0.64	2.8	5.0	22
m,p-Xylene	0.64	2.8	3.4	15
o-Xylene	0.64	2.8	2.0	8.8
Styrene	0.64	2.8	Not Detected	Not Detected
1,1,2,2-Tetrachloroethane	0.64	4.5	Not Detected	Not Detected
1,3,5-Trimethylbenzene	0.64	3.2	2.1	10
1,2,4-Trimethylbenzene	0.64	3.2	5.5	28
1,3-Dichlorobenzene	0.64	3.9	Not Detected	Not Detected
1,4-Dichlorobenzene	0.64	3.9	Not Detected	Not Detected
Chlorotoluene	0.64	3.4	Not Detected	Not Detected
1,2-Dichlorobenzene	0.64	3.9	Not Detected	Not Detected
1,2,4-Trichlorobenzene	0.64	4.9	Not Detected	Not Detected
Hexachlorobutadiene	0.64	7.0	Not Detected	Not Detected
Propylene	2.6	4.5	Not Detected	Not Detected
1,3-Butadiene	2.6	5.8	Not Detected	Not Detected
Acetone	2.6	6.2	4.8	12

AIR TOXICS LTD.

SAMPLE NAME: 001

ID#: 0103035-01A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030505	Date of Collection:	2/20/01
Dil. Factor:	1.29	Date of Analysis:	3/5/01

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Carbon Disulfide	2.6	8.2	Not Detected	Not Detected
2-Propanol	2.6	6.4	Not Detected	Not Detected
trans-1,2-Dichloroethene	2.6	10	Not Detected	Not Detected
Vinyl Acetate	2.6	9.2	Not Detected	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.6	7.7	0.70	2.1
Hexane	2.6	9.2	Not Detected	Not Detected
Tetrahydrofuran	2.6	7.7	Not Detected	Not Detected
Cyclohexane	2.6	9.0	Not Detected	Not Detected
1,4-Dioxane	2.6	9.4	Not Detected	Not Detected
Bromodichloromethane	2.6	18	Not Detected	Not Detected
4-Methyl-2-pentanone	2.6	11	Not Detected	Not Detected
2-Hexanone	2.6	11	Not Detected	Not Detected
Dibromochloromethane	2.6	22	Not Detected	Not Detected
Bromoform	2.6	27	Not Detected	Not Detected
4-Ethyltoluene	2.6	13	7.7	38
Ethanol	2.6	4.9	Not Detected	Not Detected
Methyl tert-Butyl Ether	2.6	9.4	Not Detected	Not Detected
Heptane	2.6	11	Not Detected	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	114	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	89	70-130

AIR TOXICS LTD.

SAMPLE NAME: 002

ID#: 0103035-02A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030509	Date of Collection:	2/21/01
Dil. Factor:	1.49	Date of Analysis:	3/5/01

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Freon 12	0.74	3.7	Not Detected	Not Detected
Freon 114	0.74	5.3	Not Detected	Not Detected
Chloromethane	0.74	1.6	Not Detected	Not Detected
Vinyl Chloride	0.74	1.9	Not Detected	Not Detected
Bromomethane	0.74	2.9	Not Detected	Not Detected
Chloroethane	0.74	2.0	Not Detected	Not Detected
Freon 11	0.74	4.2	Not Detected	Not Detected
1,1-Dichloroethene	0.74	3.0	Not Detected	Not Detected
Freon 113	0.74	5.8	Not Detected	Not Detected
Methylene Chloride	0.74	2.6	Not Detected	Not Detected
1,1-Dichloroethane	0.74	3.1	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.74	3.0	Not Detected	Not Detected
Chloroform	0.74	3.7	Not Detected	Not Detected
1,1,1-Trichloroethane	0.74	4.1	Not Detected	Not Detected
Carbon Tetrachloride	0.74	4.8	Not Detected	Not Detected
Benzene	0.74	2.4	12	41
1,2-Dichloroethane	0.74	3.1	Not Detected	Not Detected
Trichloroethene	0.74	4.1	Not Detected	Not Detected
1,2-Dichloropropane	0.74	3.5	Not Detected	Not Detected
cis-1,3-Dichloropropene	0.74	3.4	Not Detected	Not Detected
Toluene	0.74	2.8	1.8	6.9
trans-1,3-Dichloropropene	0.74	3.4	Not Detected	Not Detected
1,1,2-Trichloroethane	0.74	4.1	Not Detected	Not Detected
Tetrachloroethene	0.74	5.1	Not Detected	Not Detected
Ethylene Dibromide	0.74	5.8	Not Detected	Not Detected
Chlorobenzene	0.74	3.5	Not Detected	Not Detected
Ethyl Benzene	0.74	3.3	18	78
m,p-Xylene	0.74	3.3	13	57
o-Xylene	0.74	3.3	6.3	28
Styrene	0.74	3.2	Not Detected	Not Detected
1,1,2,2-Tetrachloroethane	0.74	5.2	Not Detected	Not Detected
1,3,5-Trimethylbenzene	0.74	3.7	2.9	14
1,2,4-Trimethylbenzene	0.74	3.7	7.1	36
1,3-Dichlorobenzene	0.74	4.6	Not Detected	Not Detected
1,4-Dichlorobenzene	0.74	4.6	Not Detected	Not Detected
Chlorotoluene	0.74	3.9	Not Detected	Not Detected
1,2-Dichlorobenzene	0.74	4.6	Not Detected	Not Detected
1,2,4-Trichlorobenzene	0.74	5.6	Not Detected	Not Detected
Hexachlorobutadiene	0.74	8.1	Not Detected	Not Detected
Propylene	3.0	5.2	Not Detected	Not Detected
1,3-Butadiene	3.0	6.7	Not Detected	Not Detected
Acetone	3.0	7.2	Not Detected	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: 002

ID#: 0103035-02A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030609	Date of Collection:	2/21/01
Dil. Factor:	1.49	Date of Analysis:	3/6/01

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Carbon Disulfide	3.0	9.4	Not Detected	Not Detected
2-Propanol	3.0	7.4	Not Detected	Not Detected
trans-1,2-Dichloroethene	3.0	12	Not Detected	Not Detected
Vinyl Acetate	3.0	11	Not Detected	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.0	8.9	Not Detected	Not Detected
Hexane	3.0	11	Not Detected	Not Detected
Tetrahydrofuran	3.0	8.9	Not Detected	Not Detected
Cyclohexane	3.0	10	Not Detected	Not Detected
1,4-Dioxane	3.0	11	Not Detected	Not Detected
Bromodichloromethane	3.0	20	Not Detected	Not Detected
4-Methyl-2-pentanone	3.0	12	Not Detected	Not Detected
2-Hexanone	3.0	12	Not Detected	Not Detected
Dibromochloromethane	3.0	26	Not Detected	Not Detected
Bromoform	3.0	31	Not Detected	Not Detected
4-Ethyltoluene	3.0	15	13	67
Ethanol	3.0	5.7	Not Detected	Not Detected
Methyl tert-Butyl Ether	3.0	11	Not Detected	Not Detected
Heptane	3.0	12	Not Detected	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	117	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	89	70-130

AIR TOXICS LTD.

SAMPLE NAME: 003

ID#: 0103035-03A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030507	Date of Collection: 2/22/01
Dil. Factor:	1.55	Date of Analysis: 3/5/01

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Freon 12	0.78	3.9	Not Detected	Not Detected
Freon 114	0.78	5.5	Not Detected	Not Detected
Chloromethane	0.78	1.6	Not Detected	Not Detected
Vinyl Chloride	0.78	2.0	Not Detected	Not Detected
Bromomethane	0.78	3.0	Not Detected	Not Detected
Chloroethane	0.78	2.1	Not Detected	Not Detected
Freon 11	0.78	4.4	Not Detected	Not Detected
1,1-Dichloroethene	0.78	3.1	Not Detected	Not Detected
Freon 113	0.78	6.0	Not Detected	Not Detected
Methylene Chloride	0.78	2.7	Not Detected	Not Detected
1,1-Dichloroethane	0.78	3.2	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.78	3.1	Not Detected	Not Detected
Chloroform	0.78	3.8	Not Detected	Not Detected
1,1,1-Trichloroethane	0.78	4.3	Not Detected	Not Detected
Carbon Tetrachloride	0.78	5.0	Not Detected	Not Detected
Benzene	0.78	2.5	14	45
1,2-Dichloroethane	0.78	3.2	Not Detected	Not Detected
Trichloroethene	0.78	4.2	Not Detected	Not Detected
1,2-Dichloropropane	0.78	3.6	Not Detected	Not Detected
cis-1,3-Dichloropropene	0.78	3.6	Not Detected	Not Detected
Toluene	0.78	3.0	11	42
trans-1,3-Dichloropropene	0.78	3.6	Not Detected	Not Detected
1,1,2-Trichloroethane	0.78	4.3	Not Detected	Not Detected
Tetrachloroethene	0.78	5.3	Not Detected	Not Detected
Ethylene Dibromide	0.78	6.0	Not Detected	Not Detected
Chlorobenzene	0.78	3.6	Not Detected	Not Detected
Ethyl Benzene	0.78	3.4	29	130
m,p-Xylene	0.78	3.4	28	120
o-Xylene	0.78	3.4	11	49
Styrene	0.78	3.4	Not Detected	Not Detected
1,1,2,2-Tetrachloroethane	0.78	5.4	Not Detected	Not Detected
1,3,5-Trimethylbenzene	0.78	3.9	3.4	17
1,2,4-Trimethylbenzene	0.78	3.9	8.1	40
1,3-Dichlorobenzene	0.78	4.7	Not Detected	Not Detected
1,4-Dichlorobenzene	0.78	4.7	Not Detected	Not Detected
Chlorotoluene	0.78	4.1	Not Detected	Not Detected
1,2-Dichlorobenzene	0.78	4.7	Not Detected	Not Detected
1,2,4-Trichlorobenzene	0.78	5.8	Not Detected	Not Detected
Hexachlorobutadiene	0.78	8.4	Not Detected	Not Detected
Propylene	3.1	5.4	Not Detected	Not Detected
1,3-Butadiene	3.1	7.0	Not Detected	Not Detected
Acetone	3.1	7.5	4.7	11

AIR TOXICS LTD.

SAMPLE NAME: 003

ID#: 0103035-03A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030507	Date of Collection:	2/22/01
Dil. Factor:	1.55	Date of Analysis:	3/5/01

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Carbon Disulfide	3.1	9.8	Not Detected	Not Detected
2-Propanol	3.1	7.7	Not Detected	Not Detected
trans-1,2-Dichloroethene	3.1	12	Not Detected	Not Detected
Vinyl Acetate	3.1	11	Not Detected	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.1	9.3	Not Detected	Not Detected
Hexane	3.1	11	Not Detected	Not Detected
Tetrahydrofuran	3.1	9.3	Not Detected	Not Detected
Cyclohexane	3.1	11	Not Detected	Not Detected
1,4-Dioxane	3.1	11	Not Detected	Not Detected
Bromodichloromethane	3.1	21	Not Detected	Not Detected
4-Methyl-2-pentanone	3.1	13	Not Detected	Not Detected
2-Hexanone	3.1	13	Not Detected	Not Detected
Dibromochloromethane	3.1	27	Not Detected	Not Detected
Bromoform	3.1	32	Not Detected	Not Detected
4-Ethyltoluene	3.1	15	21	100
Ethanol	3.1	5.9	Not Detected	Not Detected
Methyl tert-Butyl Ether	3.1	11	Not Detected	Not Detected
Heptane	3.1	13	Not Detected	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	120	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	87	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0103035-04A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030504	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 3/5/01	

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Freon 12	0.50	2.5	Not Detected	Not Detected
Freon 114	0.50	3.6	Not Detected	Not Detected
Chloromethane	0.50	1.0	Not Detected	Not Detected
Vinyl Chloride	0.50	1.3	Not Detected	Not Detected
Bromomethane	0.50	2.0	Not Detected	Not Detected
Chloroethane	0.50	1.3	Not Detected	Not Detected
Freon 11	0.50	2.8	Not Detected	Not Detected
1,1-Dichloroethene	0.50	2.0	Not Detected	Not Detected
Freon 113	0.50	3.9	Not Detected	Not Detected
Methylene Chloride	0.50	1.8	Not Detected	Not Detected
1,1-Dichloroethane	0.50	2.0	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.50	2.0	Not Detected	Not Detected
Chloroform	0.50	2.5	Not Detected	Not Detected
1,1,1-Trichloroethane	0.50	2.8	Not Detected	Not Detected
Carbon Tetrachloride	0.50	3.2	Not Detected	Not Detected
Benzene	0.50	1.6	Not Detected	Not Detected
1,2-Dichloroethane	0.50	2.0	Not Detected	Not Detected
Trichloroethene	0.50	2.7	Not Detected	Not Detected
1,2-Dichloropropane	0.50	2.3	Not Detected	Not Detected
cis-1,3-Dichloropropene	0.50	2.3	Not Detected	Not Detected
Toluene	0.50	1.9	Not Detected	Not Detected
trans-1,3-Dichloropropene	0.50	2.3	Not Detected	Not Detected
1,1,2-Trichloroethane	0.50	2.8	Not Detected	Not Detected
Tetrachloroethene	0.50	3.4	Not Detected	Not Detected
Ethylene Dibromide	0.50	3.9	Not Detected	Not Detected
Chlorobenzene	0.50	2.3	Not Detected	Not Detected
Ethyl Benzene	0.50	2.2	Not Detected	Not Detected
m,p-Xylene	0.50	2.2	Not Detected	Not Detected
o-Xylene	0.50	2.2	Not Detected	Not Detected
Styrene	0.50	2.2	Not Detected	Not Detected
1,1,2,2-Tetrachloroethane	0.50	3.5	Not Detected	Not Detected
1,3,5-Trimethylbenzene	0.50	2.5	Not Detected	Not Detected
1,2,4-Trimethylbenzene	0.50	2.5	Not Detected	Not Detected
1,3-Dichlorobenzene	0.50	3.0	Not Detected	Not Detected
1,4-Dichlorobenzene	0.50	3.0	Not Detected	Not Detected
Chlorotoluene	0.50	2.6	Not Detected	Not Detected
1,2-Dichlorobenzene	0.50	3.0	Not Detected	Not Detected
1,2,4-Trichlorobenzene	0.50	3.8	Not Detected	Not Detected
Hexachlorobutadiene	0.50	5.4	Not Detected	Not Detected
Propylene	2.0	3.5	Not Detected	Not Detected
1,3-Butadiene	2.0	4.5	Not Detected	Not Detected
Acetone	2.0	4.8	Not Detected	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0103035-04A

EPA METHOD TO-14 GC/MS FULL SCAN

File Name:	r030504	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 3/5/01	

Compound	Rpt. Limit (ppbv)	Rpt. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Carbon Disulfide	2.0	6.3	Not Detected	Not Detected
2-Propanol	2.0	5.0	Not Detected	Not Detected
trans-1,2-Dichloroethene	2.0	8.0	Not Detected	Not Detected
Vinyl Acetate	2.0	7.2	Not Detected	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	6.0	Not Detected	Not Detected
Hexane	2.0	7.2	Not Detected	Not Detected
Tetrahydrofuran	2.0	6.0	Not Detected	Not Detected
Cyclohexane	2.0	7.0	Not Detected	Not Detected
1,4-Dioxane	2.0	7.3	Not Detected	Not Detected
Bromodichloromethane	2.0	14	Not Detected	Not Detected
4-Methyl-2-pentanone	2.0	8.3	Not Detected	Not Detected
2-Hexanone	2.0	8.3	Not Detected	Not Detected
Dibromochloromethane	2.0	17	Not Detected	Not Detected
Bromoform	2.0	21	Not Detected	Not Detected
4-Ethyltoluene	2.0	10	Not Detected	Not Detected
Ethanol	2.0	3.8	Not Detected	Not Detected
Methyl tert-Butyl Ether	2.0	7.3	Not Detected	Not Detected
Heptane	2.0	8.3	Not Detected	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	116	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	78	70-130

Appendix C

Design Calculations

JOB Ashland RAO-Seep	
SHEET NO. 1	OF 1
CALCULATED BY gpw	DATE 05/24/2001
CHECKED BY MJB	DATE 5/29/01
SUBJECT Remediation Quantities	

1. Area of Remediation Limits

From AutoCAD:

$A = 6{,}090\ sf \sim \underline{6{,}100\ sf}$

2. Depth of Contamination

$d = 14\ ft$ [1-15' bg]

3. Volume of Contamination

$V = A \times d = 6{,}100\ sf \times 14\ ft$

$V = 85{,}400\ cf \times \frac{cy}{27\ cf}$

$V = 3{,}163 \sim \underline{3{,}200\ cy}$

4. Wood Waste Volume

$V_w = V \times w(\%)$

$w(\%) = 30\%$ (from investigative observations)

$V_w = 3{,}200\ cy \times 0.30$

$\underline{V_w = 960\ cy}$

ESEH

JOB Ashland RAO - Seep

SHEET NO. 1 OF 2

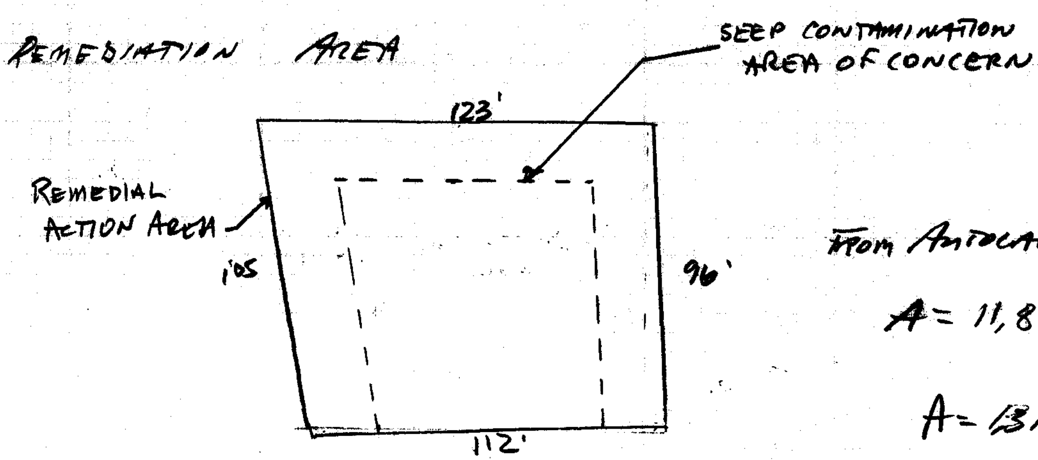
CALCULATED BY gpw DATE 05/28/2001

CHECKED BY MJB DATE 5/9/01

SUBJECT Design Calculations - B1

Design Calculations for RAO - B1 Thick Cap

1. Remediation Area



From AutoCAD:

$A = 11{,}834 sf \times \frac{sy}{9 sf}$

$A = 1315 sy \sim \underline{1{,}350 sy}$

$= \underline{0.27 acre}$

2. Remove Existing Fence

From AutoCAD:

$\underline{L = 250 ft}$

3. Temporary Barriers / Controls:

$L = \text{Perimeter} = 123' + 96' + 112' + 105'$

$L = 436' \sim \underline{440 ft}$

4. Clearing & Grubbing

A = Remediation Area

$\underline{A = 0.3 acre}$

ESEH

JOB: Ashland RAP-SEEP
SHEET NO. 2 OF 2
CALCULATED BY: GPW DATE: 05/28/01
CHECKED BY: DATE:
SUBJECT: Design Calculations - B1

5. Sand Grading Layer

$V = A \times d$

A = Remediation Area = 11,834 sf

d = 0.5 ft

$V = 11{,}834\ sf \times 0.5\ ft = 5917\ cf \times \frac{cy}{27\ cf}$

V = 220 cy

6. Fill Cap Layer

$V = A \times d$

A = Remediation Area = 11,834 sF

d = 1.5 ft

$V = 11{,}834\ sf \times 1.5\ ft = 17{,}751\ cf \times \frac{cy}{27\ cf}$

V = 657 cy ~ **700 cy**

7. Geomembrane

A = Remediation Area

A = 1,350 sy

8. Topsoil & Seed

A = Remediation Area

A = 1,350 sy

Appendix D

Cost Projections

Remedial Action Option #A1: Access Restriction

Project: Ashland Lakefront - Investigation, Interim RAO, Design Report
SEH# WIDNR9401

CALC'D 'BY: GPW
CHECKED BY: MJB June 18, 2001

PRELIMINARY COST PROJECTION SUMMARY - RAO#A-1

Remedial Action Initial Capital Costs:

Remove Existing Fence		$	630	
Construct New Security Fence		$	11,380	
Warning Signs		$	240	
Subtotal:		$	12,250	
Contingency	25%		$3,063	
Subtotal:			$15,313	
Planning and Permitting:	20%		$3,063	
Engineering	10%		$1,531	
Construction Oversight	10%		$1,531	
Subtotal, Remedial Action Initial Capital Costs:				$21,438
Subtotal,Initial Capital Costs:				**$21,438**

Long Term Operations, Maintenance, and Monitoring Costs:

Annual Site Monitoring & Maintenance		$	1,000.00
Subtotal:			$1,000
Contingency	0%		$0
Subtotal Annual OM&M Costs:			**$1,000**

Capitalized Costs:

Long Term Operation Period, n (years)	40	years
Average Net Interest Rate, i	5%	
Present Worth Factor (i, n)	17.159	
Annual OM&M Costs:	$1,000	
Present Worth Long Term OM&M Costs	$17,159	
Initial Capital Costs:	$21,438	
Capitalized Total Costs:	**$38,597**	

Annualized Costs:

Long Term Operation Period, n (years)	40	years
Average Interest Rate, i	5%	
Amortization Factor (i, n)	0.058	
Initial Capital Costs:	$21,438	
Amortized Capital Costs:	$1,249	
Annual OM&M Costs:	$1,000	
Annualized Total Costs:	**$2,249**	

Remedial Action Option #B1: Thick Cap

Project: Ashland Lakefront - Investigation, Interim RAO, Design Report
SEH# WIDNR9401

CALC'D 'BY: GPW October 29, 2001
CHECKED BY:

PRELIMINARY COST PROJECTION SUMMARY - RAO#B-1

Remedial Action Initial Capital Costs:

Remove Existing Fence		$	1,000	
Temporary Barriers/Controls		$	4,400	
Clearing and Grubbing		$	450	
Remove/Replace OH Electrical		$	5,000	
Import Clean Sand (sublayer)		$	3,300	
Import Clean Fill (Cap)		$	5,600	
Place and Compact Sand Sublayer		$	2,640	
Install Geomembrane		$	36,450	
Place and Compact Fill Cap		$	10,500	
Grading		$	1,350	
Import, Place, and Prepare Topsoil		$	5,400	
Seed		$	680	
Subtotal:		$	76,770	
Contingency	30%		$23,031	
Subtotal:			$99,801	
Planning and Permitting:	5%		$4,990	
Engineering	10%		$9,980	
Construction Oversight	10%		$9,980	
Subtotal, Remedial Action Initial Capital Costs:				$124,751
Subtotal,Initial Capital Costs:				**$124,751**

Long Term Operations, Maintenance, and Monitoring Costs:

Annual Site Maintenance		$	1,000.00
Subtotal:			$1,000
Contingency	25%		$250
Subtotal Annual OM&M Costs:			**$1,250**

Capitalized Costs:

Long Term Operation Period, n (years)	40	years
Average Net Interest Rate, i	5%	
Present Worth Factor (i, n)	17.159	
Annual OM&M Costs:	$1,250	
Present Worth Long Term OM&M Costs	$21,449	
Initial Capital Costs:	$124,751	
Capitalized Total Costs:	**$146,200**	

Annualized Costs:

Long Term Operation Period, n (years)	40	years
Average Interest Rate, i	5%	
Amortization Factor (i, n)	0.058	
Initial Capital Costs:	$124,751	
Amortized Capital Costs:	$7,270	
Annual OM&M Costs:	$1,250	
Annualized Total Costs:	**$8,520**	

Remedial Action Option #C1: Excavation with Offsite Disposal

Project: Ashland Lakefront - Investigation, Interim RAO, Design Report
SEH# WIDNR9401

CALC'D BY: GPW October 29, 2001
CHECKED BY: MJB

PRELIMINARY COST PROJECTION SUMMARY - RAO#C-1

Remedial Action Initial Capital Costs:

Remove Existing Fence		$ 630	
Temporary Barriers/Controls		$ 3,150	
Remove/Replace OH Electrical		$ 3,000	
Excavation		$ 50,000	
Wood/Soil Stabalization		$ 20,000	
Transport and Disposal		$ 65,000	
Off-Gas Treatment System		$ 20,000	
Continuous Air Monitoring		$ 31,000	
Dewatering		$ 20,000	
Install Geomembrane		$ 50,000	
Place and Compact Bacfill Material		$ 12,000	
Grading		$ 700	
Import, Place, and Prepare Topsoil		$ 5,600	
Seed		$ 350	
Decontamination and Decommissioning		$ 5,000	
Subtotal:		$ 286,430	
Contingency	30%	$85,929	
Subtotal:		$372,359	
Planning and Permitting:	5%	$18,618	
Engineering	10%	$37,236	
Construction Oversight	10%	$37,236	
Subtotal, Remedial Action Initial Capital Costs:			$465,449
Subtotal,Initial Capital Costs:			**$465,449**

Long Term Operations, Maintenance, and Monitoring Costs:

Annual Site Maintenance		$ 1,000.00
Subtotal:		$1,000
Contingency	0%	$0
Subtotal Annual OM&M Costs:		**$1,000**

Capitalized Costs:

Long Term Operation Period, n (years)	40 years
Average Net Interest Rate, i	5%
Present Worth Factor (i, n)	17.159
Annual OM&M Costs:	$1,000
Present Worth Long Term OM&M Costs	$17,159
Initial Capital Costs:	$465,449
Capitalized Total Costs:	**$482,608**

Annualized Costs:

Long Term Operation Period, n (years)	40 years
Average Interest Rate, i	5%
Amortization Factor (i, n)	0.058
Initial Capital Costs:	$465,449
Amortized Capital Costs:	$27,125
Annual OM&M Costs:	$1,000
Annualized Total Costs:	**$28,125**