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**Superior Water Light &
Power Company
Superior, Wisconsin**



**Sediment Investigation Work
Plan for the Superior
Manufactured Gas Plant**

WDNR BRRTs # 02-16-275446

**February 2003
Project: 09413-098**



Superior Water Light & Power Company

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February 27, 2003

Ms. Danielle Lancour
Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
107 Sutliff Avenue
Rhineland, WI 54501

RE: Superior Manufactured Gas Plant – WDNR BRRTS # 02-16-275446

Dear Ms. Lancour:

Enclosed with this letter is the Sediment Investigation Work Plan for the former manufactured gas plant located near the intersection of Winter Street and Water Street in Superior, WI.

The scope of the work plan is to collect limited sediment samples from the nearby boat slip in Superior Bay and from a storm sewer that discharges into the boat slip. The samples will be analyzed for PAH and for chemical fingerprinting analysis.

The objectives of the analysis are to determine the chemical fingerprints of the shallow sediments at the head of the boat slip and to determine if the storm sewer contains sediment with PAH unrelated to the manufactured gas plant site.

ENSR International's St. Louis Park, MN office will conduct the investigation and prepare the report. The "fingerprinting" analysis will be performed by the Gas Technology Institute of Des Plaines, IL.

If you have any questions or would like additional information regarding this report, please contact me at (715) 395-6288.

Thank you.

Sincerely,

William S. Bombich
General Manager

Enc

cc: Jamie Dunn, WDNR – Spooner, WI
William Gregg, ENSR International

2915 Hill Avenue, PO Box 519, Superior, WI 54880 • (715) 394-2200

Providing Superior Service

**Superior Water Light &
Power Company
Superior, Wisconsin**

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Manufactured Gas Plant**

WDNR BRRTs # 02-16-275446

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Sediment Investigation Work Plan
Superior Manufactured Gas Plant
Superior, Wisconsin

February 2003

CERTIFICATION - PROFESSIONAL ENGINEER

I, Scott Tarmann, 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.



Scott Tarmann 2-25-03

Seal



Sediment Investigation Work Plan
Superior Manufactured Gas Plant
Superior, Wisconsin

February 2003

CERTIFICATION - HYDROGEOLOGIST

I, William Gregg, 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 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.

William M. Gregg - Project Manager
Signature and Title

February 25, 2003
Date

CONTENTS

CONTENTS	I
1.0 INTRODUCTION	1-1
1.1 Background	1-1
1.2 Site Location and Ownership	1-1
1.3 Consultant and Contractor Identification.....	1-3
2.0 OBJECTIVES AND PROJECT SCOPE	2-1
2.1 Project Scoping	2-1
2.2 Sampling Strategy.....	2-3
3.0 INVESTIGATION SCOPE OF WORK	3-1
3.1 Summary of Sampling Activities.....	3-1
3.1.1 Boat Slip Sediment Sampling	3-1
3.1.2 Storm Sewer Sediment Sampling	3-1
3.2 Decontamination Procedures	3-3
3.3 Elevation Survey	3-3
3.4 Laboratory Analyses	3-3
3.5 Quality Assurance/Quality Control Methods.....	3-3
3.5.1 Field Documentation	3-4
3.5.2 Chain of Custody Procedures.....	3-4
3.5.3 Duplicate Sample	3-4
3.6 Site Health and Safety	3-4
3.7 Reporting.....	3-4
4.0 SCHEDULE	4-1

LIST OF FIGURES

Figure 1-1 Site Location Map	1-2
Figure 1-2 Property Ownership Map.....	1-4
Figure 2-1 Municipal Drinking Water Supply Well Location Map.....	2-2
Figure 2-2 Storm and Sanitary Sewer Location Map	2-4
Figure 3-1 Proposed Sediment Sample Locations.....	3-2

1.0 INTRODUCTION

ENSR International (ENSR) has been contracted by Superior Water Light and Power Company (SWL&P) to conduct sediment investigations at the former Manufactured Gas Plant (MGP), located at the intersection of Winter and Water Street in Superior, Wisconsin (Site). The Site location is shown in Figure 1-1. ENSR completed a Phase I Site Assessment in October 2001, an initial Phase II Site Investigation in January 2002, and a Phase II Part II Site Investigation in February 2003. The prior work has indicated the presence of typical MGP chemicals in portions of the soil and groundwater in the vicinity of the site, and the presence of chemicals that may reflect a solvent spill on or near the Site. Typical MGP chemicals found at the Site include benzene, toluene, ethyl benzene, and xylene (BTEX) and various polynuclear aromatic hydrocarbons (PAH). The solvent consisted primarily of benzene and toluene. Chemical fingerprints have been established for both types of chemical source materials found at the site. This work plan presents the anticipated scope of work to collect limited sediment samples from the nearby boat slip in Superior Bay, and from a storm sewer that discharges into the boat slip. The samples will be analyzed for PAH and for chemical fingerprinting analyses.

1.1 Background

The Wisconsin Department of Natural Resources (WDNR) collected sediment samples at six locations in the boat slip near the MGP in September 2000. The analytical results of WDNR's sampling indicated total PAH concentrations ranging from less than 10 parts per million to over 360 parts per million. The highest concentrations were found close to the four-foot diameter storm sewer outfall pipe located at the head of the boat slip. Based on the higher total PAH concentrations, a higher proportion of low molecular weight PAH, and the shallower occurrence of the PAH, the storm sewer appeared to be a likely conduit for PAH to enter the boat slip.

The geology on the southern half of the Site consists of a low permeability red clay beneath a thin layer of topsoil and/or fill. Closer to the shoreline the top of the clay drops in elevation and the thickness of fill increases. Three wells, MW-5, MW-6 and MW-7, installed in a line parallel to the original Superior Bay shoreline, encountered an average of 12 feet of fill overlying the red clay. These wells have screens that intersect both the fill and clay soil, and the wells produce ample water for purging and sampling. Four wells, MW-1 through MW-4, were screened in the red clay, and took several months to accumulate enough water to collect a groundwater sample. Groundwater is assumed to flow toward the lake. The red clay layer is assumed to continue to drop in elevation toward Superior Bay.

1.2 Site Location and Ownership

The former Superior MGP Site is located in the vicinity of the intersection of Winter and Water Streets in Superior, Wisconsin. The Site occupies a portion of the northeast quarter of the northwest quarter of Section 9, Township 49 North and Range 14 West (SW $\frac{1}{4}$, NW $\frac{1}{4}$ of Sec. 13, T49N, R14W). The Site location is depicted on Figure 1-1.



SOURCE: USGS 7½ Minute Topographic Quadrangle from DeLorme Superior, Wisconsin, 1993

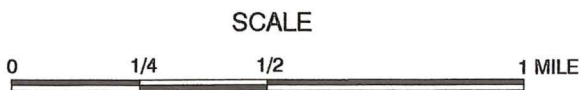


FIGURE 1-1
SITE LOCATION MAP
Superior Water Light & Power MGP
Superior, Wisconsin

PREPARED BY: CMB:

DATE: Feb 2003

PROJECT NO:
09413-098

REV:
0

FILE NO.: FIG1-1.DOC

CHECKED: WMG

Portions of the former MGP property are now owned by SWL&P, the City of Superior, the U.S. Department of Transportation, and CLM, Inc. Figure 1-2 is a color-coded map indicating property ownership in the vicinity of the MGP Site.

The owner contact is:

Bill Bombich
Superior Water Light and Power Company
2915 Hill Avenue
Superior, Wisconsin 54880
(715) 395-6288

1.3 Consultant and Contractor Identification

The Site investigation activities will be conducted by:

ENSR International
Attn: William M. Gregg
4500 Park Glen Road, Suite 210
St. Louis Park, MN 55416
(952) 924-0117 - phone
(952) 924-0317 – fax

Subcontractors anticipated to provide services for this project are identified below. The subcontractors selected to conduct the work may change due to availability or changes in the scope of work.

PAH and VOC Lab Services

EnChem, Inc.
Attn: Laurie Woelfel
1795 Industrial Dr.
Green Bay, WI 54302
(800) 736-2436 – phone
(414) 469-8827 – fax
(WDNR Certification 405132750)

“Finger Printing” Lab Services

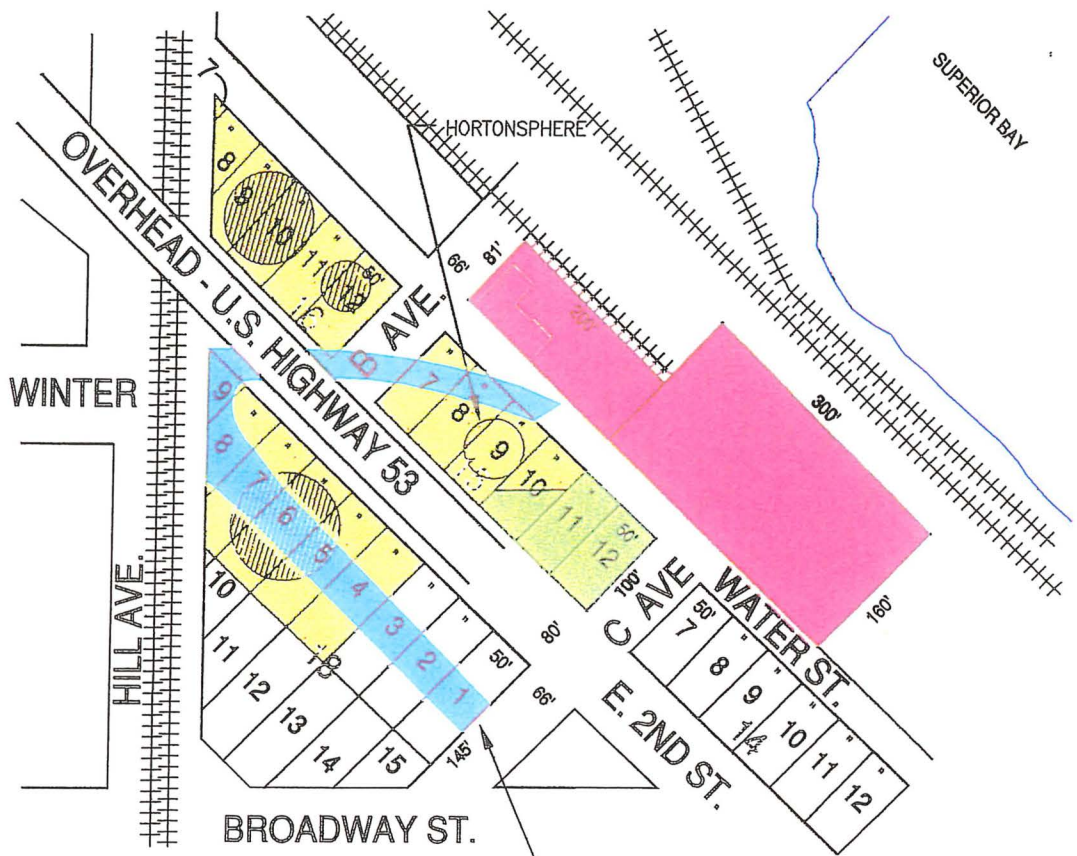
Gas Technology Institute
Attn: Diane Saber
1700 South Mount Prospect Road
Des Plaines, Illinois 60018-1864
(847) 768-0500 - phone
(847) 768-0501 - fax

Sediment Sampling

Twin Ports Testing
Attn: Gary Hage
1301 North Third Street
Superior, WI 54880
(715) 392-7114 – phone
(715) 392-7163 – fax

Surveying

Salo Engineering
Attn: Dale Berntsen
15 East First Street
Duluth, MN 55802
(218) 727-8796 – phone
(218) 727-0216 – fax



NOTE: City street on SWL&P Co. land -
No recorded easement as of 1/2/81

ROY'S ADDITION TO THE
CITY OF SUPERIOR



- DEEDED TO STATE
- OWNED BY SWL&P CO.
- OWNED BY CLM

FORMER GAS HOLDERS

PROPERTY OWNED BY
SUPERIOR WATER, LIGHT & POWER
SUPERIOR, WI

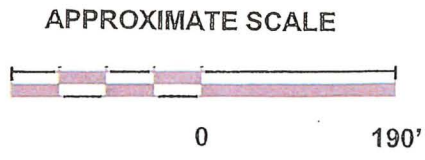


Figure 1-2
PROPERTY OWNERSHIP MAP
SUPERIOR MGP

Source: SWL&P Co. Records

PREPARED BY: AJT	DATE: SEP 2001	PROJECT NO: 9413-098	REV: 0
FILE NO.: Property.DOC	CHECKED: WMG		

2.0 OBJECTIVES AND PROJECT SCOPE

The objectives of this investigation include the following:

1. Determine the chemical fingerprint(s) of the shallow sediments in the head of the boat slip.
2. Determine if the storm sewer contains sediment with PAH unrelated to the MGP site.

The investigation will consist of the completion of three sediment cores from Superior Bay installed using hand-operated equipment, and the investigation and collection of three sediment samples from the storm-sewer. Sediment samples will be collected and analyzed for parameters of concern, as described in Section 3 of this work plan. Upon receipt of the sample results, the data will be evaluated and, if required, recommendations for further actions at the Site will be made. The methodologies to be utilized during the investigation are described in Section 3.

2.1 Project Scoping

To the extent practical, the scope of the project was defined in consideration of the criteria listed in NR 716.07, as follows:

- Site Use: The only operations currently conducted on the Site are associated with the brick building owned by CLM, Inc. According to Mr. Dana Stone, Vice President of Operations for CLM, Inc., the building is only used for storage. One of the three rooms in the building at the subject property is being leased by Lakehead Cement Co, and is used for storage of sand, lime, cement, and miscellaneous materials related to Lakehead's adjacent ready-mix plant. This sediment investigation will focus on areas that contained relatively high concentrations of PAH, as determined by WDNR's previous sediment investigation.
- Type and Amount of Impact: Impacts to the sediment have not been fully identified or characterized. The fingerprinting analysis will indicate if the MGP is a source of the PAH found in the sediment samples.
- Environmental Media Potentially Affected: Soil, sediment and groundwater are affected.
- Other Environmental Investigations/Findings: WDNR performed a sediment investigation in 2000, as summarized in Section 1.1. ENSR performed Phase I and Phase II investigations to characterize the chemical fingerprints of source materials at the Site, but has not done any prior sediment sampling.
- Potential Receptors: Groundwater discharges to Superior Bay. There are no known groundwater users in the area. The municipal drinking water supply is obtained from Lake Superior via horizontal wells installed in the bed of the lake as illustrated in Figure 2-1. The nearest surface water body is Superior Bay.



SOURCE: USGS 7½ Minute Topographic Quadrangle from DeLorme Superior, Wisconsin, 1993, and SLW&P Well Location Maps

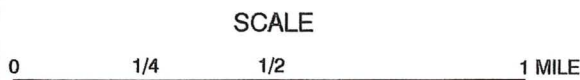


Figure 2-1
**MUNICIPAL DRINKING WATER SUPPLY WELL
 LOCATION MAP**
 Superior, Wisconsin

PREPARED BY: CMB	DATE: Feb 2003	PROJECT NO: 09413-098	REV: 0
FILE NO.: FIG 2-1.doc	CHECKED: WMG		

- Significant Resources: Any impacts identified at the Site will be evaluated with respect to threatened or endangered species, sensitive habitats, wetlands and/or resource waters.
- Potential Remedial Actions: At this time, an evaluation of potential remedial actions to address potentially impacted media on the Property is premature. The information needed to determine the most appropriate remedial response, if any, includes the lateral and vertical boundaries of potential groundwater, soil, and sediment impacts, and the location of any source materials at the Site.

2.2 Sampling Strategy

The sampling strategy was developed to further delineate the nature and extent of the PAH found in boat slip sediments by the WDNR. The sampling locations were selected based on the locations of WDNR's samples, and the location of the storm sewer outfall. The following Site characteristics are provided for reference.

- Site Topography: Based on the USGS Superior, Wisconsin 7.5-minute topographic map (1993), the Site is located at approximately 613 feet above mean sea level in an area of gently sloping topography. The topography in the area of the subject property is relatively flat. The boat slip is dredged to maintain a depth of approximately 23 to 25 feet along the dock wall. The water depth at the head of the slip, where this investigation will take place, is expected to be less than 10 feet
- Surface Water Drainage: On-site storm water runoff is generally sheet-flow toward Superior Bay. No known storm sewer system exists on the Site. A storm sewer grate was observed near boring B-3 during the previous Phase II, however, it did not appear to be maintained, and it is not shown on the sewer map obtained from the City of Superior (Figure 2-2). The nearest storm sewer runs southeast of the Site through the Lakehead Cement Company property to the head of the boat slip. As shown in Figure 2-2, two sanitary sewer lines traverse the property and connect with the nearby wastewater treatment plant.
- Site Geology: Based on Site investigation data from prior studies, soils at the Site consist predominantly of native red clay with varying amounts of fill overlying the clay. Sandstone bedrock (Keweenaw Formation) is encountered beneath the unconsolidated soils. Depth to bedrock is estimated to be from 100 to 200 feet below ground surface. Based on the proximity to Lake Superior (elevation approximately 601 feet above mean sea level) groundwater is assumed to flow north towards the lake. Groundwater is approximately 10 feet below ground surface.

Potential Migration Pathways: Potential migration pathways include vertical migration through the unsaturated zone with percolating precipitation and lateral migration with local topography and anticipated groundwater flow. The storm sewer system services a wide area of the City of Superior.



SOURCE: Aerial Photo with sanitary and storm sewer locations obtained from SWL&P.

EXPLANATION:

- Green Line is sanitary sewer
- Red Line is the storm sewer



FIGURE 2-2
STORM AND SANITARY SEWER LOCATION MAP
 Superior Water Light & Power Company
 Former MGP
 Superior, Wisconsin

DRAWN: CMB	DATE: Feb 2003	PROJECT NO: 09413-098	REV: 0
FILE NO.: FIG2-2.DOC	CHECKED: WMG		

3.0 INVESTIGATION SCOPE OF WORK

This Supplemental Site Investigation will be conducted to characterize sediment in the boat slip and the storm sewer that discharges into the boat slip. The scope will include sediment sampling at three locations in the boat slip, and three sediment samples from the storm sewer, using hand operated equipment. All activities will be conducted in accordance with the WDNR WAC Chapters NR 716. Figure 3-1 presents the anticipated sampling locations for this investigation.

3.1 Summary of Sampling Activities

3.1.1 Boat Slip Sediment Sampling

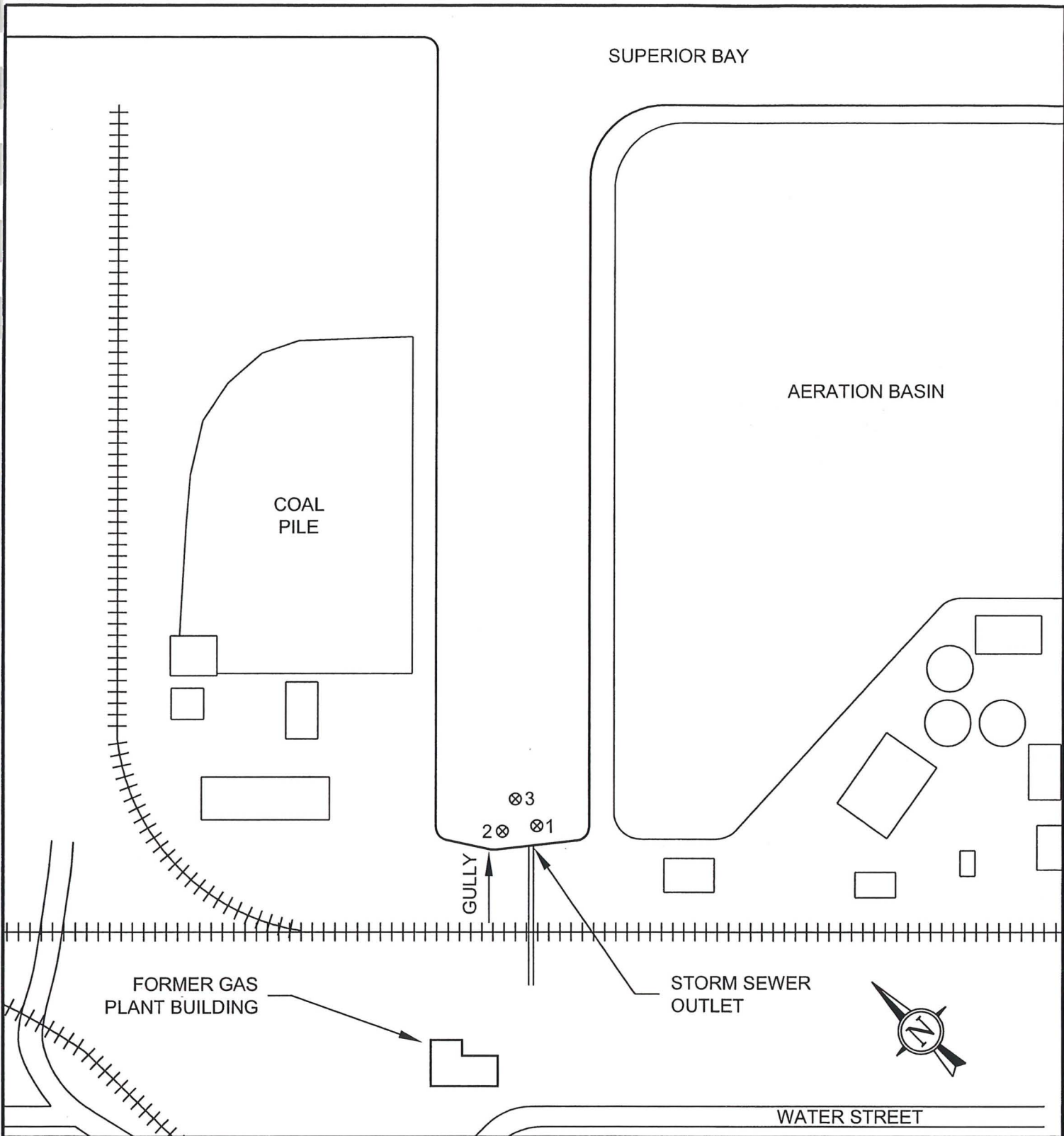
Three cores will be installed to a depth of approximately two feet below the sediment surface using a split spoon and drill rod hand-pushed into the sediment. If necessary, the tools will be hand-hammered to achieve the two-foot depth. The two-foot cores will be divided in half to yield two samples: one from the top foot of sediments, and one from a depth of approximately one to two feet. The samples will be field screened with a PID using a headspace screening technique. The sediment samples will be transferred directly from the split spoon into laboratory-supplied containers. The samples will be placed in an ice filled cooler and shipped overnight under chain-of-custody to the laboratory. One sediment sample will be replicated for QA/QC purposes by splitting the core longitudinally in half, with each half representing the replicate sample. A total of seven sediment samples will be collected from the boat slip for laboratory analysis.

Three samples that have the highest PID screening results, or otherwise appear to contain the most PAH, will be analyzed by Gas Technology Institute to determine the chemical fingerprint of the samples. Analyses include gas chromatography with flame ionization detection (GC/FID by EPA Method 8100) and gas chromatography with mass spectrometry (GC/MS by EPA Method 8270). The remaining samples, including the replicate, will be analyzed by EnChem for PAH by EPA Method 8270.

3.1.2 Storm Sewer Sediment Sampling

The presence of sediment in the four-foot diameter storm sewer pipe is not known at this time, although it can reasonably be expected that sediment will be present. If there is sediment present within the pipe near the outfall, the sediment will be sampled to represent the sediment "contribution" of the storm sewer unaffected by other sources to the boat slip. This sediment may be sampled using a long-handled shovel, or other hand tools as appropriate.

Manholes and or catch basins in the storm sewer upstream from the MGP site will be identified using the City of Superior sewer maps. These locations will be explored using appropriate hand tools (e.g., decontaminated long-handled shovels) to collect sediment. Two sediment samples will be collected from the upstream storm



SUPERIOR BAY

AERATION BASIN

COAL PILE

⊗3
⊗2 ⊗1

GULLY

STORM SEWER
OUTLET

FORMER GAS
PLANT BUILDING

WATER STREET

Explanation:

⊗ WDNR Sediment Sampling Location (9/19/00)

Approximate Scale
1 inch = 200 feet



Figure 3-1
PROPOSED SEDIMENT SAMPLE LOCATIONS
Superior Water Light & Power Company
Former MGP
Superior, Wisconsin

DRAWN: C. Boehm

DATE: Jan 2003

PROJECT No.:

FILE No.: Prop Sed.dwg

CHECKED: WMG

09413-098



sewer locations for laboratory analysis. Sediment samples from the storm sewer will be handled in the same manner as the boat slip sediment samples. The samples will be submitted to Gas Technology Institute for fingerprinting and to EnChem for PAH analysis.

3.2 Decontamination Procedures

Sampling equipment will be decontaminated before and between sampling events to prevent potential cross contamination between sediment. All sampling equipment will be clean or new prior to use at each location. Sampling equipment, including split spoons and shovels, will be decontaminated prior to each use with a detergent wash followed by a potable water rinse. A clean pair of latex gloves will be used during collection of each sample to minimize the potential for cross-contamination of samples.

3.3 Elevation Survey

The locations of the sediment cores, and the elevation of the ice surface will be measured by a licensed surveyor (Salo Engineering).

3.4 Laboratory Analyses

Sediment samples will be submitted for analysis of PAH using SW-846 Method 8270 by EnChem, Inc, a certified Wisconsin laboratory. Sediment samples will be submitted to Gas Technology Institute for "fingerprinting" using a variety of methods as appropriate, depending on the nature of the samples. State-of-the-art analytical methods and rigorous quality control will be used for GC/FID fingerprinting (EPA method 8100, ASTM D 3328-90) and PAH, alkylated PAH, and petroleum biomarkers (modified EPA method 8270, ASTM D 5739-95).

3.5 Quality Assurance/Quality Control Methods

The following quality assurance/quality control measures will be implemented during the Site investigation activities:

- Decontamination procedures and measures to minimize the potential for cross-contamination of samples will be followed as specified in Section 3.2 above.
- All Site activities will be recorded in a bound field notebook (Section 3.5.1).
- Stringent chain-of-custody procedures will be followed (Section 3.5.2).
- Sample duplicates and blanks will be collected and analyzed (Section 3.5.3).

3.5.1 Field Documentation

All Site activities will be documented in a bound field notebook. Included in the daily documentation are:

- Procedures for sampling and other routine activities associated with the Site investigation;
- Personnel working on the Site; and
- Chronological log of Site activities.

3.5.2 Chain of Custody Procedures

Chain-of-custody forms will be completed to the extent possible prior to sample shipment. Included on the form will be the sample identification (sample location identification, depth of sample and date of sample collection), sample type, sample container (type and number of containers), analytical method to be performed, preservatives, and name of sampler. The forms will be filled out in a legible manner, using blue or black waterproof ink.

A chain-of-custody document will accompany each sample shipment. The sampler will relinquish custody of the samples to the courier, retaining one copy of the record for the project file. Samples will be transported to the laboratory in containers that meet applicable state and federal standards for safe shipment.

3.5.3 Duplicate Sample

As described in Section 3.1, one duplicate sample will be collected for this sampling event and submitted for analysis of all parameters analyzed in the original sample.

3.6 Site Health and Safety

The protection of Site personnel and the general public is a primary concern. All reasonable measures will be taken to protect the health and safety of the project personnel and general public. A Site Health and Safety Plan that meets or exceeds the standards found in 29 CFR 1910.120 has been prepared and is available for review. A copy will be on-Site during all sediment sampling activities. A tailgate health and safety meeting will be conducted prior to beginning field work each day. The Health and Safety Plan identifies a minimum ice thickness of 12 inches to conduct the sediment sampling work in the boat slip.

3.7 Reporting

Upon receipt of the laboratory reports, a report detailing the investigative activities and results will be prepared. The report will be submitted to the WDNR not later than 60 days following receipt of the laboratory reports, unless otherwise directed by the WDNR or pending further investigative activities if the objectives of the Site investigation are not met.

4.0 SCHEDULE

The investigation activities at the Superior MGP are anticipated to commence in late February 2003. Laboratory results for the fingerprinting test may be available within four to six weeks after sample receipt. The draft investigation report is anticipated to be completed within 60 days following receipt of the laboratory reports.