WISCONSIN PUBLIC SERVICE CORPORATION
GREEN BAY, WISCONSIN

SEDIMENT SAMPLING WORK PLAN

FORMER MANUFACTURED GAS PLANT SITE
SHEBOYGAN II, WISCONSIN

PROJECT NO: 1060

AUGUST 31, 1995

Natural
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Project No: 1060

Prepared For:

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1.0 INTRODUCTION

Natural Resource Technology, Inc. has been retained by Wisconsin Public Service Corporation (WPSC) to prepare this work plan to complete a Step 2 sediment investigation at the Sheboygan II Former Manufactured Gas Plant (MGP). This sediment sampling work plan has been prepared to evaluate the presence or absence of impacted sediment associated with the MGP site in the Sheboygan River. The work plan has been prepared in accordance with NR 716 and incorporates recommended investigation criteria in WDNR's draft guidance document "Assessing Sediment Quality in Water Bodies Associated with Manufactured Gas Plant Sites" (March 2, 1995). This plan is being submitted for WDNR review and approval prior to commencing field investigative activities. Field activities are planned for implementation in the late summer of 1995.

The sediment sampling project principals include the following:

- Responsible Party: Ms. Connie Lawniczak
  Wisconsin Public Service Corporation
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  Green Bay, WI 54307-9002
  414/433-1140

- Consultant: Mr. Robert Karnauskas/Ms. Susan Greenler
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  23713 W. Paul Rd.
  Pewaukee, WI 53072
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The objectives of this study include the following:

- Evaluate the presence or absence of environmental impairment of the sediments associated with the former Sheboygan II MGP site;
- Evaluate the characteristics of the river adjacent to the site;
- Evaluate the shoreline outline through time; and,
- Evaluate other industrial activities along the shoreline upstream and downstream from the site.

2.0 BACKGROUND

2.1 Location

The Sheboygan II MGP site is located at 732 N. Water Street in Sheboygan, Wisconsin on property currently owned by the City of Sheboygan. The former MGP site encompasses approximately 3 acres and is bounded on the north by New York Avenue, on the east by North Water Street, on the south by Center Street, and on the west by the Sheboygan River. The site is approximately 1 mile from Lake Michigan and is located in Section 23, T15N, R23E in Sheboygan County, Wisconsin (Figure 2-1).

2.2 Site Ownership and Land Use

Prior to 1922, the property had a variety of owners and eventually became part of the Sheboygan Gas Light Company. The MGP was acquired by WPSC in 1922 during a merger which resulted in the formation of WPSC. In 1966, the property was sold to Heileman Brewery for parking vehicles. Heileman sold the property in 1977, and it has been under ownership of three other non-manufacturing companies until the City of Sheboygan purchased the property in 1985. The property is currently used as a boat dock and RV camping area due to its accessibility to the Sheboygan River.

2.3 MGP Operations/Former Facilities

The Sheboygan II MGP operated from 1880 to 1930 and originally used the coal gas production method. As early as 1886 carburetted water gas (CWG) equipment was installed and this production method eventually replaced coal gas. The MGP ceased operation in 1930.

Former MGP-related structures at the site in 1923 included the following:

- Main gas production building and garage;
- Three gas holders (70,000 ft^3, 200,000 ft^3, and a small holder);
- Three tar tanks;
- Purifier; and
- Gas Oil Tank.

3.0 SCOPE OF INVESTIGATION

3.1 Overview

Limited previous sediment sampling data is available. Although extensive PCB sampling has been conducted in the Sheboygan River, only 15 cores were analyzed for PAHs and none were adjacent to the MGP site. Thus, the proposed sampling plan is based on the following:

- MGP Size - The MGP which operated at this location was medium sized;
- MGP Operational History - The MGP operated for at least 50 years;
- Coal Gasification Method - Both the coal gasification and the carburetted water gas methods were used at this location. By-products from this method would have included clinkers, carburetted water gas tar/water mixture, coke, and coal tar;
- River Location - The location of the MGP operational buildings is adjacent to surface water; and,
- Existing Data - MGP impacted soils were found in area of the purifier and tar tanks during the Phase I investigation. In addition, PAH's were present in a sediment sample collected by the WDNR adjacent to the MGP site. Thus, the sediment investigation will target sediments adjacent to and downstream from these areas.

3.2 Step 1 - Records Search

A records search will be conducted to complement the historic, hydrologic and geologic information already included in the Phase I investigation report (HSI(1), 1992). Information to be compiled will be that discussed in Section 4.1 through 4.3 of the March 2, 1995 draft guidance and includes:

- Location and configuration of the Sheboygan River shoreline adjacent to and downgradient (south) of the MGP site through time;
- Dredging and filling activities along the shoreline adjacent to the MGP site;

- Location of other industrial activities along the shoreline which have the potential to discharge contaminants similar in character to those associated with MGP operations;
- Documentation or any report of oily sheens or seeps adjacent to the site; and,
- Characteristics of the river adjacent to the site.

Federal and state agencies and databases as well as regional planning commissions will be consulted to obtain historical maps, industry locations, and hydrologic information. This information will be included as part of the sediment sampling investigation report.

3.3 Step 2 - Evaluate the Presence or Absence of Environmental Impairment Associated with the Former MGP Site

3.3.1 Sample Locations

Five transects will be completed as shown on Figure 3-1. Transects will extend out from shore for an approximate distance of 120 feet, and, in general, will not extend beyond the center of any dredged portion of the river channel. Exact transect length will be determined during the records search and will be based on dredging activities and field observations.

The number of core samples collected along each transect will be based on field observations and PID response of the samples. At a minimum, one core sample will be collected within 20 feet of shore. Additional core samples will be collected until two clean samples have been obtained along a transect. Cores will be collected from the area with the thickest sediments within each third-transect. A background sampling point will be established approximately 125 feet upstream adjacent to New York Avenue.

A sounding pole will be used to establish the depth and thickness of sediments below the water surface. The transect will be divided into thirds and sediment depths will be probed in at least two locations within each third-transect to determine the location of the thickest sediments for

core collection. A transducer will be used to establish the bottom characteristics and to choose an exact sampling location which avoids rocks and other obstructions.

3.3.2 Sample Equipment

A Ponar™ Grab dredge sampler, and an Ogeechee™ sand corer will be used. The dredge sampler will be used to collect samples from the sediment/water interface, which is usually the biologically active zone. The corer will be used to collect samples from below the sediment/water interface, and it has the ability to collect a 4 foot core.

3.3.3 Sampling Method

Sediment samples will be collected using the dredge and core samplers off the side of a boat. This will minimize disturbance to the sediment from wading in shallow water to collect samples. NRT will attempt to collect a 3 foot core; however, the actual thickness of the core will be dependent on the consolidation of the sediments and obstructions encountered. Cores will be a maximum of 4 feet in length. A minimum of one and a maximum of four core samples will be collected along each of the five transects, and at the background sampling location previously described. If bottom conditions prohibit core collection, an attempt will be made to collect a dredge sample. Consistent with Section 5.3 of the WDNR March 2, 1995 guidance document, a total of three dredge samples will be collected along each transect.

To locate the transects, two posts will be placed temporarily on-shore and perpendicular to the shoreline. These posts will be visually aligned from the boat to assure that the samples are properly located along the transect line. A measured rope will be staked on the ground and used to determine the exact distances from shore.

3.3.4 Sample Screening

The cores will be visually inspected for physical characteristics, including color, odor, texture, structure, and presence of oil sheens or visible oils. The core will then be divided into homogeneous segments as follows:

> 0 - 0.5 ft from core top (approximately): Biologically active and well mixed sediments;
>
> 0.5 - 2.5 ft from core top (approximately): Less disturbed sediments; most likely to contain contaminants; and
>
> 2.5 ft (approximately) to core bottom: Third homogeneous section; less disturbed, possibly more compacted than layer above.

The number of segments per core will be based on visual inspection of the core. Most cores will likely contain a maximum of two segments. Each segment will be screened for PID response by the headspace method and one sample will be selected from each core for PAH immunoassay analysis. Segment selection for immunoassay testing will be based on PID response and physical characteristics, and will include samples with a wide range of impacts. A minimum of one third of the immunoassay tested soils from the transects, plus the background sample will be submitted for laboratory analysis.

If no PID response or other physical characteristic impacts are apparent, the upper foot of sample will be prepared for total PAH analysis using an immunoassay test kit. If the total PAHs are close to or below detection, no sample from that core will be submitted for laboratory analysis. To maintain flexibility, the above criteria for selecting immunoassay and laboratory samples will be modified if warranted based on field observations. Professional judgement will be used to evaluate the physical characteristics and PID response in selecting samples for quantitative immunoassay and laboratory analyses.

3.3.5 Laboratory Analysis

The objective of this sampling plan is to evaluate the presence or absence of MGP related constituents in the sediments. The chemical parameters of interest for this investigation are those which are specifically indicative of MGP related activities. Thus, the samples submitted to a laboratory will be tested for PAHs, BETX, total phenols, cyanide species and TOC. The methods to be used and the anticipated detection limits are shown on Table 3-1.

4.0 QUALITY ASSURANCE

4.1 Investigation Procedures

NRT has developed numerous technical Standard Practices to provide documentation of the use of widely recognized protocols and standards in the performance of field operations. The list of Standard Practices and source documents are provided in Appendix A. Copies of these standard technical practices for relevant aspects of the field investigation can be provided to the WDNR if review of these practices is necessary for approval of this work plan. NRT's Standard Practice 07-09-01 entitled "Surface Water and Sediment Sampling" contains a section which specifically discusses sediment sampling with a corer (Section 3.3.2).

4.2 Equipment Decontamination

Equipment decontamination is addressed in NRT Standard Practice 07-04-05. Sampling equipment (including core and dredge samplers, sampling spatulas, etc.) will be cleaned by washing in Alconox detergent followed by triple rinses with distilled water prior to the collection of each sample. If necessary, an isopropyl alcohol rinse will be performed to remove tar or PAH residues. Decontamination wash and alcohol rinsate will be containerized in drums for future treatment and/or disposal.

4.3 Laboratory Quality Assurance

4.3.1 Laboratory Analysis

Analysis of environmental media samples will be performed by a laboratory certified by the WDNR under NR 149. Analytical parameters and methods for the different media are listed on Table 3-1.

4.3.2 Sample Identification

WPSC is conducting site investigations at each of the former MGP sites. In order to minimize the potential for confusion of data from different sites, the sample identifiers assigned to the Sheboygan II MGP are as follows:

Number Series:	701 through 799
Sediment Sample Prefix:	SD-
Core Locator Suffix:	A, B, C (top, middle, and bottom of core)

Thus, the top portion of the first core sample collected would be labeled as SD-701A. This system will assure that sample results will not be confused with sediments being analyzed at other sites in the WPSC program.

4.3.3 Quality Control Samples

Quality Control (QC) samples typically include trip blanks, duplicates and field blanks in order to evaluate the possible introduction of contamination during the sampling process and to verify reproducibility of results. These samples are not required for soil samples under Chapter 716.13(11)(b) and thus none are proposed as part of this sediment sampling plan.

4.4 Waste Management Plan

The waste management plan will follow NRT Standard Practice 06-07 for the handling and minimization of wastes. Investigative waste will be containerized in DOT approved drums until disposal arrangements are made. NRT staff will segregate impacted waste based on field screening to reduce the volume of waste which must be treated or disposed of off-site.

4.5 Health and Safety Plan

NRT has developed a separate Health and Safety Plan for personnel working at the Sheboygan II MGP site during all field activities. This plan is a separate document and is available upon request if WDNR review of the document is required. Personnel will read and be familiar with the plan and an on-site health and safety plan briefing will be conducted prior to the commencement of field work.

5.0 DATA ANALYSIS AND REPORT PRESENTATION

Following completion of the field investigation and receipt of analytical results, a report will be prepared which documents all of the sediment sampling activities conducted at the site. The report narrative will follow the format and requirements of NR716.15. The major topics to be addressed include the following:

- Project Objectives
- General Site Information
- Historical Shoreline Information
- Waterbody Characteristics
- MGP Operations History
- Investigation Results
- Conclusions
- Recommendations

Analytical results will be summarized on tables showing the parameters detected and observed concentrations. As appropriate, these results will be compared with background levels from other portions of the river or other appropriate environmental standards.

Graphical presentations will be used to supplement the report narrative, to clarify complex technical narrative, and to support interpretative conclusions. Drawings will conform to those required in NR716.15(3), will supplement drawings previously presented in the Phase I report, and will illustrate the following:

- River channel detailing the area of investigation;
- Locations of facility boundaries, shoreline, and all field sampling locations;
- Areas of impacts; and

- Isoconcentrations showing the distribution of appropriate parameters.

Other appropriate illustrations which may be appended to the report include historical aerial photographs, maps, and photographs.

All raw data from field collection activities will be included in order to document the work performed. This data will be appended to the report and will include the following:

- Coring logs which classify the sediment soil types observed;
- Field immunoassay test results including quality assurance samples and calibrations;
- Analytical laboratory reports;
- Photoionization detector readings and calibration logs; and,
- Geotechnical laboratory test results.

Appendices will also include relevant analytical data from previous investigations which support interpretations or conclusions.

6.0 SCHEDULE

The project duration will be approximately 14 weeks from WDNR approval of the work plan. This includes:

- 3 weeks - Pre-mobilization;
- 2 weeks - Field investigation;
- 3 weeks - Laboratory analysis; and
- 6 weeks - Draft and final report preparation.

7.0 REFERENCES

1. Gas Research Institute. 1987. Management of Manufactured Gas Plant Sites, Volume 1, Wastes and Chemicals of Interest, Publication GRI-87/0260.1, 82 pages.

2. Natural Resource Technology. April 28, 1995. Sediment Sampling Work Plan - Former Manufactured Gas Plant Site - Marinette, Wisconsin, Project No. 1033.

3. Simon Hydro-Search (1). June 30, 1992. Phase I Environmental Investigation - Manufactured Gas Plant Site, Sheboygan, Wisconsin, Project No. 453114843.

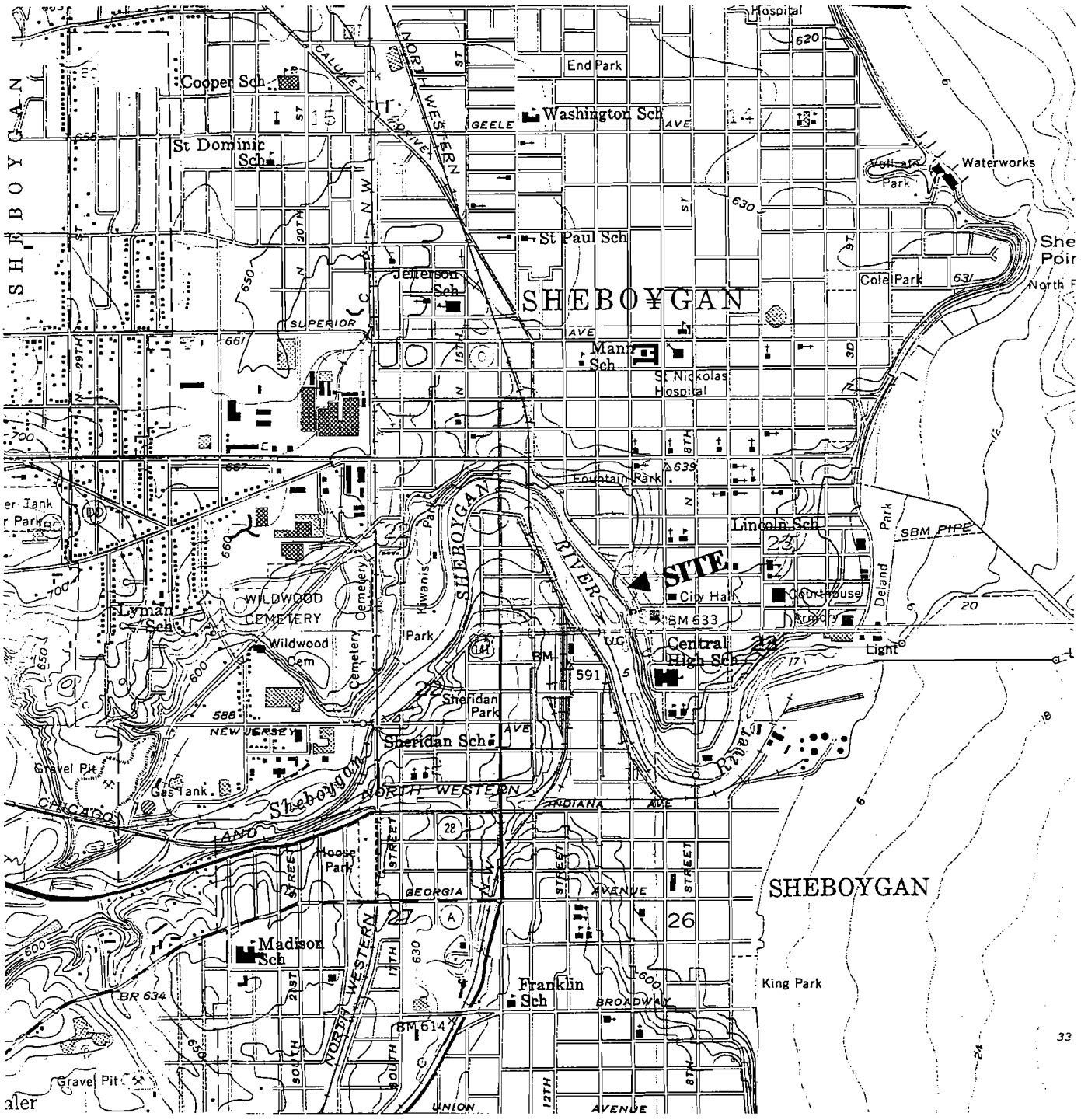
4. Simon Hydro-Search (2). November 11, 1992. Phase II Work Plan - Environmental Investigation of Manufactured Gas Plant Site, Sheboygan, Wisconsin, Project No. 304533034.

5. Wisconsin Department of Natural Resources. Chapters 105, 347, 716, Wisconsin Administrative Code.

6. Wisconsin Department of Natural Resources. December 5, 1994. Comments on NRT Sediment Sampling Work Plan Addenda for the Green Bay and Two Rivers Coal Gas Sites.

7. Wisconsin Department of Natural Resources. March 2, 1995. Assessing Sediment Quality in Water Bodies Associated with Manufactured Gas Plant Sites, WDNR Sediment Management and Remediation Techniques Program and Environmental Repair Program.

FIGURES



SOURCE: USGS 7.5 MINUTE QUADRANGLE, SHEBOYGAN NORTH. DATED 1954. PHOTOREVISED 1973.

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SITE LOCATION MAP

FORMER SHEBOYGAN II MGP – WPSC
SHEBOYGAN, WISCONSIN

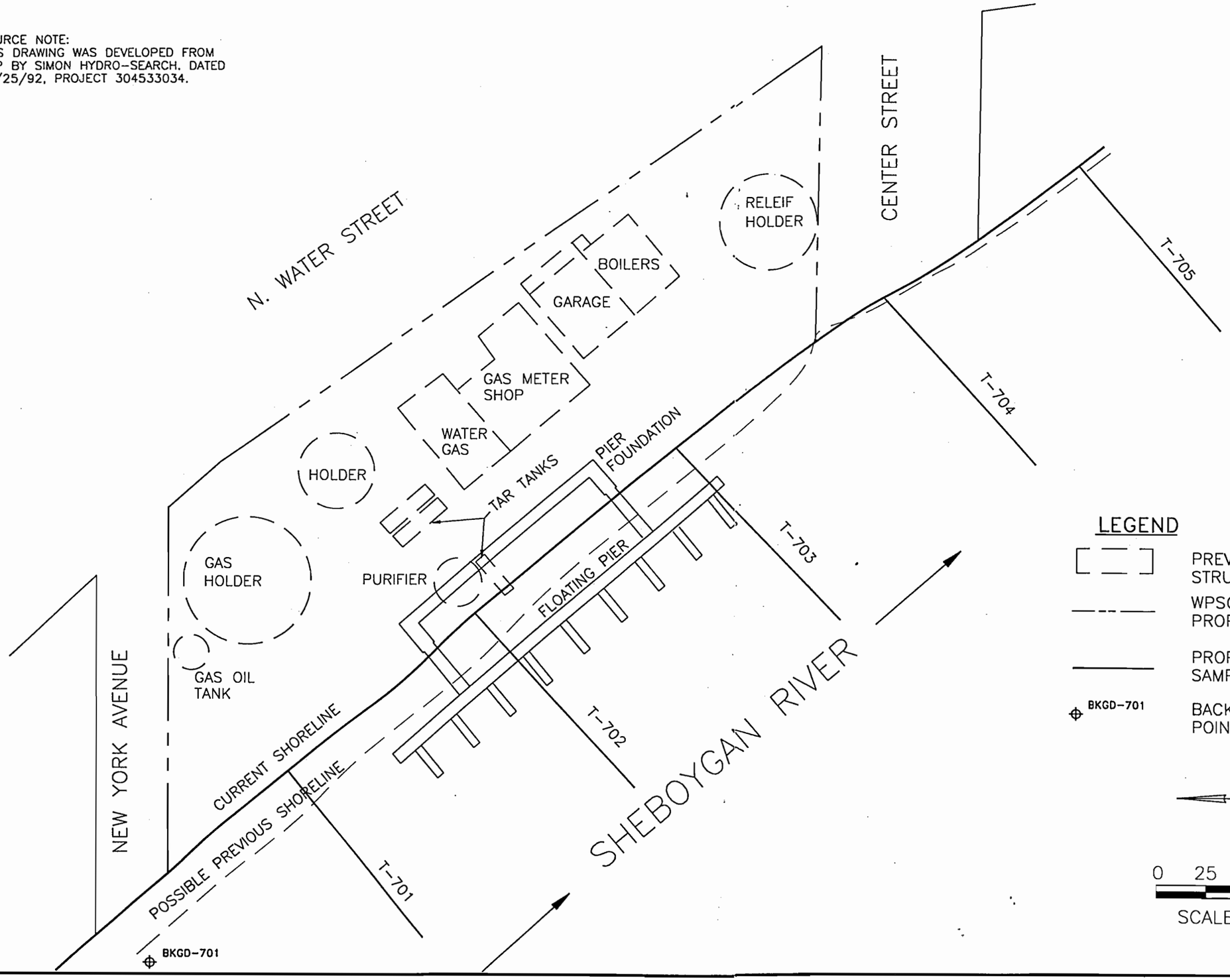
DRAWN BY: TAS APPROVED BY: SAG DATE: 8/15/95

PROJECT NO. 1060/4

DRAWING NO. 1060–A1

FIGURE NO. 2–1

SOURCE NOTE:
THIS DRAWING WAS DEVELOPED FROM MAP BY SIMON HYDRO-SEARCH, DATED 09/25/92, PROJECT 304533034.



LEGEND

- PREVIOUSLY EXISTING STRUCTURE
- WPSC GAS WORKS PROPERTY BOUNDARY
- PROPOSED SEDIMENT SAMPLING TRANSECTS
- BKGD-701 BACKGROUND SAMPLING POINT

N

0 25 50 100
SCALE IN FEET

PROPOSED SEDIMENT SAMPLING TRANSECTS

FORMER SHEBOYGAN II MGP - WPSC
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	DATE: 8/14/95	
CHECKED BY: SAG	DATE: 8/30/95	
APPROVED BY: SAG	DATE: 8/30/95	
AUTOCAD FILE: 1060-B01		

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DRAWING NO. 1060-B01

FIGURE NO. 3-1

TABLE

TABLE 3-1
SHEBOYGAN II MGP SITE
ANALYTICAL PARAMETERS AND METHODS

Media	Parameter	Analytical Method	Anticipated Detection Limit
Sediment	BETX	USEPA 8020	100 µg/kg
	PAHs	USEPA 8310	50 µg/kg
	Total Phenol	USEPA 420.1	660 µg/kg
	Total Cyanide	USEPA 9010	2.5 mg/kg
	Cyanide Amenable to Chlorination	USEPA 9010	2.5 mg/kg
	TOC	USEPA 9060	5 mg/kg

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APPENDIX A

NRT STANDARD PRACTICES
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PRACTICE TITLE **REFERENCE DOCUMENTS**

07-06 SUBSURFACE EXPLORATION METHODS (Cont'd)

07-07 SOIL SAMPLING AND MEASUREMENT PROCEDURES

07-08 GROUND-WATER SAMPLING AND MEASUREMENT PROCEDURES

PRACTICE TITLE **REFERENCE DOCUMENTS**

07-08 GROUND-WATER SAMPLING AND MEASUREMENT PROCEDURES

07-08-06 Field Procedure for Instantaneous Change in Head (Slug Tests) for Determining Hydraulic Properties in Aquifers . . . . . ASTM D4044
07-08-07 Field Procedure for Withdrawal and Injection Well Tests for Determining Hydraulic Properties of Aquifer Systems . . ASTM D4050
07-08-08 Analytical Procedure for Determining Transmissivity of Nonleaky Confined Aquifers by Over-damped Well Response to Instantaneous Change in Head (Slug Tests) . . . ASTM D4104
07-08-09 Analytical Procedure for Determining Transmissivity and Storage Coefficient of Nonleaky Confined Aquifers by the Modified Theis Nonequilibrium Method . . . . . ASTM D4105
07-08-10 Analytical Procedure for Determining Transmissivity and Storage Coefficient of Nonleaky Confined Aquifers by the Theis Nonequilibrium Method . . . . . ASTM D4106
07-08-11 Determining Transmissivity and Storativity of Low Permeability Rocks by In-Situ Measurements Using the Constant Head Injection Test . . . . . ASTM D4630
07-08-12 Determining Transmissivity and Storativity of Low Permeability Rocks by In-Situ Measurements Using the Pressure Pulse Technique . . . . . ASTM D4631
07-08-13 Determining Transmissivity of Nonleaky Confined Aquifers by the Theis Recovery Method . . . . . ASTM D5269
07-08-14 Determining Transmissivity and Storage Coefficient of Bounded, Nonleaky, Confined Aquifers . . . . . ASTM D5270
07-08-15 Test Method for Determining Specific Capacity and Estimating Transmissivity at Control Well . . . . . ASTM D5472
07-08-16 Test Method (Analytical Procedure) for Analyzing the Effects of Partial Penetration of Control Well and Determining the Horizontal and Vertical Hydraulic Conductivity in a Nonleaky Confined Aquifer . . . . . ASTM D5473
07-08-15 Ground-Water Elevation Measurement-Solonist . . . 17, 4 (ASTM D4750)

07-09 SURFACE WATER/SEDIMENT SAMPLING AND MEASUREMENT PROCEDURES

07-09-01 Surface Water/Sediment Sampling 1, 2
07-09-02 Stage Discharge Determination in Small Streams 1, 2

PRACTICE TITLE **REFERENCE DOCUMENTS**

07-10 AIR SAMPLING PROCEDURES

07-13 FIELD ANALYTICAL PROCEDURES

07-14 FIELD PHYSICAL MEASUREMENTS

07-15 LABORATORY ANALYTICAL PROCEDURES

PRACTICE TITLE **REFERENCE DOCUMENTS**

07-15 LABORATORY ANALYTICAL PROCEDURES (Cont'd)

07-16 GEOPHYSICAL SURVEYS

07-17 GROUND-WATER MODELING

07-18 DATA ANALYSIS, REDUCTION AND VALIDATION

REFERENCE DOCUMENTS

1. Natural Resource Technology, Inc., 1994.

2. Modified from: U.S.EPA Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, February 1, 1991 (ECBSOPQAM).

3. Modified from: U.S.EPA, Performance of Remedial Response Activities at Uncontrolled Hazardous Waste Sites (REM II), U.S.EPA Contract No. 68-01-6939, 1984.

4. American Society for Testing and Materials, 1994 Annual Book of ASTM Standards, Vols. 4.08 and 4.09

5. Wisconsin Department of Natural Resources, Groundwater Sampling Procedures, Publ-WR-168 87, September 1987.

6. Wisconsin Department of Natural Resources, Chapter NR 141, W.A.C.

7. Wisconsin Department of Natural Resources, Leaking Underground Storage Tank Program, Field Screening Procedures, Publ-SW-176-92.

8. Wisconsin Department of Natural Resources, General Interim Guidelines for the Management of Investigative Wastes, January 14, 1993

9. Personal Communication, Layne-Northwest Co., Pewaukee, WI

10. Cole-Parmer Model 01481-61 Conductivity Meter Manual

11. Photovac Microtip IS-3000 User's Manual

12. Cole-Parmer Models 5996-50,60,70,80 pH Meter Instruction Manual

13. American Society for Testing and Materials, Proposed Standard Guide, W. Teasdale, February 5, 1994

14. AMS Vapor Probe Instruction Manual

15. Bouwer and Rice, 1976. "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells". Water Resources Research, Vol.12, No.3.

16. U.S.EPA, Laboratory Data Validation-Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

17. Solinist Water Level Indicator Instruction Manual

Document assigned to: _____

Document number: _____