Natural Resource Technology, Inc.
N R T

FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION
SHEBOYGAN, WISCONSIN

Project No: 1313

Prepared For:

Wisconsin Public Service Corporation
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May 7, 1999

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"I, Rebecca J. Koepke, 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."

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"I, Roy E. Wittenberg, 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."

ROY E. WITTENBERG
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Presented in this document is a Feasibility Study (FS) for Wisconsin Public Service Corporation's (WPS's) former coal gas facility located at Campmarina in Sheboygan, Wisconsin. This FS specifically addresses recommendations for a land based remedial program associated with manufactured gas plant (MGP) affected soil and groundwater. The objective of the FS is to present a comparison of remedial alternatives and recommendations for a selected response action for the site as required by the Wisconsin Department of Natural Resources (WDNR). The selected response action is intended to manage the environmental issues identified at the property and eliminate or control potential threats to human health, safety and welfare and the environment to the extent practicable. Remedial alternatives were selected to meet environmental management strategies ranging from a containment and migration control to reduction of contaminant mass and mobility.

The former coal gas facility is located on what is now known as Campmarina. Campmarina is located directly along the Sheboygan River and is a designated recreational vehicle parking area and boat launch. MGP affected soil and groundwater has been identified on both Campmarina and an adjacent property to the south known as the Center Avenue right-of-way. City of Sheboygan redevelopment plans for Campmarina and the right-of-way include a neighborhood park, river walk and condominiums.

Subsurface conditions generally consist of a heterogeneous mix of fill material up to depths of 14 feet below ground surface (bgs) containing ash/cinders, ceramic, glass, bricks, concrete and wood. Beneath the fill material, native alluvium soil consisting primarily of fine grained silty to clayey sand intermixed with lenses of silts and clays. This alluvium extends to a depth of approximately 18 to 23 feet bgs to a lower permeability clay unit that appears to be laterally continuous across Campmarina and the right-of-way. The lower clay unit is apparently serving as an aquitard for vertical migration of MGP residuals. The upper unsaturated soil is relatively unaffected by MGP residuals with the exception of the Center Avenue right-of-way and two localized areas in Campmarina. Lenses of phase separated coal tar have been identified in saturated soils up to a depth of approximately 21 feet bgs.

Groundwater in the upper alluvium unit ranges from approximately five to seven feet bgs and flows generally to the river. Lower groundwater identified in piezometers screened within the lower clay stratum ranges from approximately 13 to 17 feet bgs and also flows to the river. Compounds of concern in saturated soil and groundwater in the upper alluvium unit consist of benzene, ethylbenzene, toluene, and xylene (BTEX), polynuclear aromatic hydrocarbons (PAHs) and total and amenable cyanide.

Environmental media that were targeted for remedial action included surface water, unsaturated and saturated soil and upper groundwater. Key exposure pathways included leaching of MGP residuals to surface water and groundwater, and potential direct contact exposure through vapor phase migration and particulate inhalation or ingestion. Based on the proximity of the site to the river and heterogeneous subsurface conditions with intermixed lenses of coal tar, performance based standards were developed to meet remedial action objectives (RAOs). RAOs established for the site consisted of reducing the potential for direct contact exposure and reducing or preventing off-site migration of MGP residuals.

A variety of source control action (SCA) and groundwater response action (GRA) options were identified and initially screened on the basis of implementability, effectiveness and cost. SCAs initially screened included in-situ and ex-situ treatment technologies (e.g., steam enhanced vapor extraction, thermal treatment) and containment (e.g., barrier wall). GRA initially screened included passive or active treatment wall technologies, hydraulic containment and in-situ treatment technologies (e.g., oxidation, bioremediation). Based on the initial screening, selected SCAs and GRAs were assembled into alternatives that could comprehensively address the environmental media and RAOs for the site. Alternatives selected for detailed analysis consisted of the following:

- Alternative No. 1, Source Area Excavation and Off-Site Treatment by either Thermal Desorption or Cement Kiln Processing;
- Alternative No. 2A, Full Source Area Encapsulation with a Low Flow Biosparging System;
- Alternative No. 2B, Partial Source Area Encapsulation with an Interceptor Trench and a Low Flow Biosparging System; and,
- Alternative No. 3, Steam Enhanced Vapor Extraction.

Based on the results of this analysis, the recommended alternative is either Alternative 2A or 2B. These alternatives were selected on the basis of long and short-term effectiveness, ease of implementability, ability to reduce toxicity and mobility of MGP residuals and lower cost. Final selection of either alternative will be determined during the design stage.. Alternative Nos. 1 and 3 were not selected primarily on the basis of concerns with regard to long and short-term effectiveness in meeting source removal objectives and substantially higher costs associated with implementation.

1 INTRODUCTION

1.1 Overview

Presented in this document is a Feasibility Study (FS) for Wisconsin Public Service Corporation's (WPS's) former coal gas facility located at Campmarina in Sheboygan, Wisconsin (Figure 1). This FS specifically addresses recommendations for a land based remedial program associated with manufactured gas plant (MGP) affected soil and groundwater. Key requirements and data collection objectives for the FS were outlined in the December 4, 1999, *Feasibility Study Work Plan.* The FS was prepared in general accordance with United States Environmental Protection Agency (U.S. EPA), October,1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA.*

1.2 Feasibility Study Objectives

The objective of the FS is to present a comparison of remedial alternatives and recommendations for a selected land based response action as required by the Wisconsin Department of Natural Resources (WDNR). MGP affected Sheboygan River sediments along and south of Campmarina will be addressed under a separate FS to be prepared at a later date. The selected response action is intended to manage the environmental issues identified at the property and eliminate or control potential threats to human health, safety and welfare and the environment to the extent practicable. Remedial alternatives were selected to meet environmental management strategies ranging from containment and migration control to reduction of contaminant mass and mobility. Technologies were considered with proven effectiveness as well as innovative applications that may provide similar or greater effectiveness at a similar or lower cost. Planned future uses for Campmarina and properties located directly south were also considered in evaluating land based remedial response actions.

The primary steps of the FS process include:

- Establishing remedial action objectives (RAOs);
- Identifying and screening response actions and technologies that address the response actions; and,
- Developing a detailed analysis of remedial alternatives.

1.3 Project Background Information

Key FS project principals and personnel are listed as follows:

Site Owner:
City of Sheboygan
807 Center Avenue
Sheboygan, WI 53081
Contact: Mr. Bob Peterson
(920) 459-3380

Former MGP Operator:
Wisconsin Public Service Corporation
700 North Adams Street, P. O. Box 19002
Green Bay, WI 54307-9002
Contact: Ms. Connie Lawniczak
(920) 433-1140

Site Location:
732 North Water Street
Sheboygan , Wisconsin
Sheboygan County
NW ¼, SW ¼, Section 23, T15N, R23E
Refer to Figure 1

Consultant:
Natural Resource Technology, Inc.
23713 West Paul Road
Pewaukee, WI 53072
Contact: Mr. Roy E. Wittenberg
(414) 523-9000

The site is approximately 1.5 acres in size and is bounded on the north by New York Avenue, on the east by North Water Street, on the west by the Sheboygan River, and on the south by the Center Street right-of-way.

1.4 History of Former Coal Gas Operations

Two methods of coal gas production were used at the Campmariana MGP. The coal gas production method, used from 1872 to 1886, involved heating the coal in an airtight chamber (retort) which produced coke and gases containing a variety of volatilized organic constituents. The process also produced tar which was sold for beneficial reuse, including roofing, wood treatment, and paving roads. The gas was passed through purifiers to remove impurities such as sulfur, carbon dioxide, cyanide, and ammonia. Dry purifiers contained lime or hydrated iron oxide mixed with wood chips. The gas was then stored in large holders on-site prior to distribution for lighting and heating.

The carburetted water gas process, used from 1886 to 1929, involved passing air and steam over the incandescent coal in a brick-filled vessel to form a combustible gas which was then enriched by injecting a fine mist of oil over the bricks. The gas was then purified and stored in holders prior to distribution. The MGP ceased operation in 1929 and the facility was subsequently dismantled (date unknown).

1.5 Current Property Use

The former coal gas facility is located on property owned by the City of Sheboygan that is a designated recreational vehicle (RV) parking area and boat launch called Campmarina (see Plate 1). Campmarina is equipped with parking areas, electrical power and potable water for RV use. A docking area is also provided for recreational boat use on the Sheboygan River and access to Lake Michigan. The site is primarily covered with compacted gravel and an access road leads from North Water Street at the north end of the site. No aboveground MGP structures remain.

Property south of Campmarina is also owned or has been sold by the City of Sheboygan and includes the area within the Center Avenue right-of-way and the property between the right-of-way and the Pennsylvania Avenue Bridge. Redevelopment plans for these properties and Campmarina include the construction of a condominium complex, a river walk and a park. The condominium complex will consist of three buildings to be constructed south of Campmarina at the locations indicated in Plate 2. The river walk will be constructed directly along Campmarina and the future condominium complexes on an approximate 26 foot wide length of river front property to be retained by the City. The proposed park will extend north of the Center Avenue right-of-way and will encompass Campmarina and additional properties to the north purchased by the City.

2 PREVIOUS SITE INVESTIGATIONS

Previous work plans and investigations of soil, groundwater on and adjacent to the former coal gas facility are summarized below:

- Simon Hydro-Search, October 4, 1991. *Work Plan, Phase I Site Investigation, Manufactured Gas Plant Site, Sheboygan, Wisconsin*, Project No. 453114843.
- Simon Hydro-Search, June 30, 1992. *Phase I Environmental Investigation of Manufactured Gas Plant Site, Sheboygan, Wisconsin*, Project No. 453114843.
- Simon Hydro-Search, November 11, 1992. *Phase II Work Plan - Environmental Investigation Manufactured Gas Plant Site, Sheboygan, Wisconsin*, Project No. 304533034.
- Natural Resource Technology, Inc., August 31, 1995. *Sediment Sampling Work Plan, Former Manufactured Gas Plant Site - Sheboygan II, Sheboygan, Wisconsin*, Project No. 1060.
- Natural Resource Technology, Inc., June 28, 1996. *Phase II Environmental Investigation Report, Former Manufactured Gas Plant Site, North Water Street Sheboygan, Wisconsin*, Project No. 1060.
- Natural Resource Technology, Inc., September 15, 1998. Letter Report, *Site Evaluation of Sheboygan Property (Center Avenue Right-of-Way) Adjacent to the Former Sheboygan MGP Site, Sheboygan, Wisconsin*, Project No. 1313.
- Natural Resource Technology, Inc., November 24, 1998. *Additional Soil Borings and Soil laboratory Analyses, City of Sheboygan Property South of Center Avenue Right-of-Way, Sheboygan, Wisconsin*, Project No. 1313.
- Natural Resource Technology, Inc., December 4, 1998. *Feasibility Study Work Plan, Campmarina, Former Coal Gas Facility, Sheboygan, Wisconsin*, Project No. 1313.
- Natural Resource Technology, Inc., February 10, 1999. *Additional Soil Borings and Soil laboratory Analyses, South of Center Avenue Right-of-Way, Sheboygan, Wisconsin*, Project No. 1313.

Details of these environmental investigations are described below. Investigative soil boring, monitoring well, and piezometer locations are shown on Plate 1.

2.1 Simon Hydro-Search (SHS) Phase I Environmental Investigation 1991-1992

In August 1990, a City of Sheboygan construction crew discovered a “dark oily material” below the ground surface on the property during construction of a boat docking facility foundation. SHS reported “the excavation location was near the location of the former MGP tar tanks”, it is unclear which tar tanks SHS was referencing. SHS reported that personnel from the City of Sheboygan collected a "worst case" soil sample for analyses of various organic and inorganic parameters. Compounds detected included polynuclear aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylene (BTEX), total petroleum hydrocarbons (TPH), and total and amenable cyanide. Based on information obtained from the City, other test pit excavations contained "visible contamination" but were not sampled. However, SHS could not reliably determine the locations of these other test pits based on available documentation provided by the City.

SHS conducted a Phase I site investigation in 1992 which included soil sampling from thirteen of fifteen test pits, six surface soil grab samples (collected from zero to three inches bgs), and three grab groundwater samples collected from three of the test pits.

Few surface soil impacts were identified in this phase of investigation. Only PAHs were detected at very low levels in two locations and may have been due to the long-term use of the site for RV parking. Subsurface soil impacts were identified near the former gas holders and tar tanks. Investigation results indicated the presence of both coal tar and petroleum or fuel oil related impacts. Grab groundwater samples collected at the water table exhibited MGP impacts primarily in one sample (TP-707) downgradient (toward the Sheboygan River) of the former tar tanks. Cyanide was detected in all groundwater samples; however, the fate of any oxide box wastes associated with the facility was not known following the Phase I investigation. The extent and migration of MGP related impacts on the property were not fully assessed by Phase I data.

2.2 Natural Resource Technology, Inc. Phase II Environmental Investigation

The NRT 1996 report summarized site data collected from additional site investigation work performed in 1995. Ten soil borings (SB-701 through SB-710) were advanced to characterize soil type and quality. Seven water table monitoring wells (MW-701 through MW-707), one piezometer (PZ-701), and one staff gauge were constructed/installed to assess groundwater quality and groundwater flow direction.

The Phase II work confirmed MGP related soil impacts above the water table are limited in extent and are low magnitude where identified. No unsaturated source area contributing to groundwater impacts was identified. Soils beneath the site include glacial deposits intermixed with fill material in the upper 6 to 14 feet below ground surface (bgs), and predominately fine grained alluvium deposits below. Ash/cinders, bricks, glass, and wood were also found within the fill. Clay and silt dominate the soils to a depth of approximately 30 feet bgs, with discontinuous units of sand, silty sand, and trace gravel. Tar was encountered at or below the water table predominately in the southern and west-central portions of the site at depths ranging from six to 21 feet bgs. No evidence of blue/black wood chips, indicating the presence of potential purifier wastes, was observed on the site. However, a field reconnaissance of the adjacent off-site property to the south of the site revealed surficial blue wood chips as wells as blue tinted vegetation, including tree trunks and grass, indicating potential cyanide impacts.

Water level elevation measurements collected in 1995 indicated depth to groundwater ranged from 3.6 to 7.9 feet bgs in the shallow wells and between 13.6 and 16.6 feet bgs in piezometer PZ-701. Groundwater flow was generally to the west-southwest, toward the Sheboygan River.

BTEX, PAHs, and cyanide were the constituents of concern identified by the Phase II work in the shallow groundwater extending from the north central portion of the site to the southern extent of the investigation area and to the Sheboygan River. Highest groundwater concentrations were identified in the center of the site at locations MW-701, MW-702, and MW-706. This was the center of the former MGP operation, near the tar tanks, purifier, the smallest of the three gas holders, and one of the plant buildings. Elevated cyanide concentrations in groundwater extended from approximately the center of the investigation area to the southern extent of the Campmarina property. RCRA metals (arsenic, barium, cadmium, chromium, lead, selenium, and silver) were not detected in concentrations which exceed NR 140 ESs. The southern and eastern extent of groundwater impacts were not fully evaluated by the Phase II.

2.3 Natural Resource Technology, Inc., Additional Soil Borings, April 4, 1996

On April 4, 1996, six additional soil borings (SB-711 through SB-716) were advanced and soil samples were collected for analysis of total organic carbon (TOC), total solids, and TCLP benzene. None of the samples analyzed were identified as characteristic for benzene. These borings were also conducted to further assess the extent of tar on the south portion of the former MGP site.

2.4 Natural Resource Technology, Inc. Off-Site Investigations, 1998

The September 15, 1998 NRT letter report documented results of site investigative activities conducted on the vacant City of Sheboygan property located south of the former MGP site (also referenced as the Center Avenue right-of-way) on July 29, 1998.

The investigation program included the completion of six test pits (TP-701 through TP-706), four soil borings (SB-711 through SB-714), one hand auger boring (HA-701), and one surface soil sample (SS-701) (Plate 1). Field activities were conducted on July 29, 1998 to establish the lateral and vertical extent of MGP related soil impacts on the vacant property that could potentially impact development plans by the City of Sheboygan.

In general, the vacant property is overlain with layers of fill material that extend to greater than 13 feet bgs (SB-713) in the eastern upper portion of the right-of-way and to groundwater in the lower portions of the river bank (TP-705). The fill materials encountered across the area investigated are not uniform and consist of silty to gravelly sands, sandy silts, and clay and sand. These fill materials contain varying percentages of glass, brick, porcelain occasional traces of slag and other debris or rubbish.

MGP odors and coal tars were observed in test pits and borings TP-701, TP-705, SB-714, and in the river sediment at HA-701. These test pit and boring locations are in the same areas where surface impacts were previously observed and reflect MGP impacted areas. The vertical extent of these impacts appear to extend to groundwater based on the boring and test pit depths.

The investigation results delineated the vertical and lateral extent of MGP impacted soil above groundwater in the vicinity of the right-of-way. Two shallow zones (less than one foot) and one deeper zone of MGP impacted soil were identified within the right-of-way. In addition, these zones do not appear to extend to the property south of the right-of-way that is targeted for the first phase of condominium construction (Building Nos. 1 and 2). However, impacted sediments were identified beneath the river bank within the right-of-way that were not fully delineated and additional investigation was recommended to identify the southern extent.

The November 28, 1998 letter report documented the results of two additional borings (SB-721 and SB-722) that were completed within the foundation footprint for Building No. 1 of the planned condominium complex south of the Center Avenue right-of-way. The objective of the additional investigation was to identify any MGP affected river sediments beneath the proposed location of the first condominium structure (Building No. 1). Based on the analytical data and observed subsurface conditions, MGP affected river sediments do not extend beneath the river bank in the vicinity of Building No. 1.

The February 10, 1999 letter report documented the results of three additional investigative borings (SB-724 through SB-726) that were completed on City of Sheboygan property and the property for the Phase I condominium development south of the Center Avenue right-of-way on December 8 and 9, 1998. These drilling, sampling and analysis were conducted as part of the FS data collection activities discussed in Section 2.6 of this FS. Soil boring SB-724 was advanced within the foundation foot print for Building No. 2 to assess the potential presence of constituents related to the former coal gas manufacturing operations prior to construction. Soil borings SB-725 and SB-726 were advanced directly along the river bank to further delineate the extent of affected river sediments previously observed beneath the river bank within the Center Avenue right-of-way. Based on the observed subsurface conditions and analytical data, MGP affected river sediments diminish to non-detect levels directly below the river bank directly south of the Center Avenue right-of-way and no MGP affected river sediments extend beneath the foundation for Building No. 2.

2.5 Feasibility Study Data Collection Activities

2.5.1 Objectives

Supplemental investigations were performed at Campmarina and off-site to the south in late 1998 to address data collection requirements necessary for preparing this FS for a land based remedial program. The site activities were conducted in accordance with the December 4, 1998, *Feasibility Study Work Plan* and NRT's standard practices manual.

2.5.2 Scope of Activities

2.5.2.1 Investigative Borings

Eleven soil borings were advanced to further assess the extent of MGP coal tar and oils identified at several locations on the former MGP property and off-site to the south in the Center Avenue right-of-way. These borings also aided in determining potential excavation areas for the FS. The locations of the borings are shown on Plate 1. Specific activities conducted as part of the additional investigation include the following:

- SB-737, SB-738, and SB-739 were extended in the vicinity of former building foundations to the water table interface. Prior to placement of MW-709, lighter fraction MGP residuals were identified at the water table interface in SB-737 and auger refusal was encountered on former concrete foundations in SB-738 and SB-739. Therefore, the location of MW-709 was moved to the northeast in an attempt to move inland from buried river sediments.
- SB-732, SB-734, and SB-735 were extended to a maximum depth of approximately 25 feet bgs to further assess the lateral and vertical extent of coal tar impacts previously identified and obtain data for treatability assessment.
- SB-731 and SB-733 were advanced in the approximate locations of the two northern gas holders to investigate potential MGP soil and groundwater impacts remaining inside the holders. The borings were extended to a maximum depth of approximately 20 feet bgs or to the bottom of each holder.
- SB-725 and SB-726 were two shallow hand borings advanced to groundwater to further evaluate the potential for MGP impacted river sediments beneath the river bank.
- SB-724 was advanced to 28 feet bgs between the foundation foot print for Building No. 2 and Building No. 3. Indications of MGP impacts, based on visual, olfactory, and field screening determinations at SB-724, were not detected. Therefore; soil boring SB-723 was not completed.
- Discrete and/or composite soil samples were collected from each of the borings and analyzed for BTEX (U.S. EPA 8020), PAHs (U.S. EPA 8270), total lead (U.S. EPA 6010) and total cyanide (U.S. EPA 9010).

2.5.2.2 Geotechnical Soil Borings and Testing

Geotechnical borings (GB-727 through GB-730) were advanced along the river bank to establish geotechnical design parameters for the possible installation of a hydraulic barrier wall (Plate 1). The borings were performed to assess the continuity and depth of the lower clay unit. In general, borings were advanced through the unconsolidated strata to 32 to 36 feet bgs (a minimum of five feet into the native clay).

Specific field activities that were conducted to complete the geotechnical borings included the following:

- Soil samples were classified in accordance with ASTM standard D 2488 at two foot intervals from two feet below ground surface to the base of the borehole.
- One to two thin-walled sampling tubes were pushed in each geotechnical boring in accordance with ASTM D1587 at intervals deemed appropriate by the field personnel for geotechnical evaluation of the upper fill and alluvial materials and the low-permeability clay strata. In sampling locations where the fill or clay was too hard for Shelby tubes, brass or plastic core liners were inserted inside the split spoon sampler and driven to obtain relatively undisturbed samples. Split spoon samples were also collected and archived for possible further geotechnical testing.
- Geotechnical laboratory tests were conducted on both the upper fill and the low permeability native clay strata. These tests included various index properties (moisture content, unit weight, specific gravity, Atterberg Limits and gradation analyses), flex wall triaxial permeability, and undrained unconsolidated (UU) strength testing

2.5.2.3 Monitoring Wells and Piezometers

Locations of the new monitoring wells and piezometers are shown on Plate 1. Well construction logs and development forms are included in Appendix B. Monitoring well MW-708 was constructed as an up-gradient monitoring well, located northeast of MW-706 along North Water Street. Monitoring well MW-709 was constructed as a side-gradient monitoring well, located northwest of MW-703. Piezometers PZ-702 and PZ-703 are located adjacent to MW-706 and MW-707, respectively. The piezometers were constructed to aid in defining the vertical extent of groundwater contamination and to establish site wide vertical gradients. Data collected from PZ-703 was also used to support the geotechnical evaluation. The piezometers are screened from 30 to 35 feet bgs and are permanently cased to 20 and 25 feet bgs, respectively, to reduce cross contamination with MGP impacted materials located above the lower clay.

2.5.2.4 Groundwater Monitoring Sampling and Analysis

Following installation of the monitoring wells and piezometers, one round of groundwater monitoring, sampling and analysis was completed on both the existing and new wells and piezometers. The groundwater monitoring and laboratory analytical data were used to update the groundwater elevation data and contaminant distribution and for evaluating groundwater containment in the Feasibility Study. Groundwater samples were analyzed for BTEX (U.S. EPA 8020), PAHs (U.S. EPA 8310), and total, amenable (U.S. EPA 335.1), and dissociable cyanide (M-4500 CNI).

2.5.2.5 Treatability Sampling and Analysis

To assess both on-site and off-site treatability capabilities for the MGP impacted soils at the property, the following activities were conducted:

- Two composite soil samples from the borings and well installations (SB-734, SB-735, PZ-702 and PZ-703) were collected from representative soils for laboratory analysis of BTEX, PAHs, cyanide, lead, and sulfur (ASTM 0129). One composite sample was collected from the upper unsaturated fill material and one from the lower saturated coal tar impacted zone. Both composite samples were analyzed for toxicity characteristic leachate procedure (TCLP) benzene and only the composite from the lower material was analyzed for total sulfur. This data was utilized for determining average concentrations of excavated soils and assessing representative feedstock concentrations for potential thermal treatment. Additional soil samples were collected from the split spoon sampling activities and archived. Selection of samples for analysis was based on subsurface conditions encountered and field estimated contaminant distribution.
- One composite soil sample was collected from representative impacted soils in the roll-off box and submitted for laboratory analysis of Waste Management's Protocol B parameters for disposal as a non-hazardous special waste.
- One composite sample (minimum three five gallon containers) was collected for submittal for off-site cement kiln treatability evaluation and possibly thermal desorption tray testing.

3 SUMMARY OF SUBSURFACE CONDITIONS

3.1 Area Geology

Plate 2 provides geologic cross sections for the study area. On the Campmarina and Center Street right-of-way properties, subsurface soil conditions are generally heterogeneous fill material overlying predominately fine grained alluvium deposits, which overly a relatively homogeneous silty to sandy clay (diamicton).

The surface soil (upper one foot of soil) is dominated by silty organic gravel soil and fill various miscellaneous fill material. Heterogeneous fill material sampled in the upper four to 14 feet of the Campmarina and right-of-way property contained a discontinuous mixture of clay, silt, and sand with minor amounts of gravel. Miscellaneous fill material was also present in part or whole including ash/cinders, ceramic, glass, bricks, concrete, and wood.

Predominately fine grained (silty to clayey sand) native alluvium soils were encountered beneath the fill material, with discontinuous units of silts and clay. Organic soils to silt with organics were encountered at or just below the water table interface, possibly representing former flood plane or river sediment deposits. The alluvium soil extends to approximately 18 to 23 feet bgs across the site.

Beneath the alluvium deposits, silty to sandy clays (diamicton) are present to the base of all soil borings extended from 25 to 35 feet bgs. The diamicton appears to be laterally continuous across Campmarina and the right-of-way property and is a low permeability, low to medium plasticity silty clay with some sandier facies.

3.2 Soil Quality

3.2.1 Unsaturated Soil Quality

In general, MGP related affects in unsaturated fill materials are limited in extent with the exception of the Center Avenue right-of-way and two localized areas in the central portion of Campmarina. A summary of the NRT soil analytical data is provided in Tables 2 and 3. The distribution of BTEX and PAH concentrations in unsaturated soil is illustrated on Plate 5. Soil laboratory analytical reports for samples collected during the 1998 investigation are provided in Appendix C.

The investigation results delineated the vertical and lateral extent of MGP related constituents in soil above groundwater in the vicinity of the right-of-way. Two shallow zones (less than one foot) and one deeper zone of MGP impacted soil were identified within the right-of-way. In addition, these zones do not appear to extend to the property south of the right-of-way that is targeted for the first phase of condominium construction (Building Nos. 1 and 2). Affected river sediments were identified beneath the river bank within the right-of-way which extend less than 50 feet farther south of the right-of-way property along the river bank and do not extend beneath the foundation for Building No. 2.

Discontinuous surficial to near surface (less than two feet bgs) oxide box wastes (primarily Prussian-blue (cyanide) stained wood chips and affected vegetation (tree roots)) have been identified within the right-of-way property only.

In general, BETX compounds were not detected in significant quantities in soil samples collected from the unsaturated zone with the exception of within the right-of-way property. Benzene was detected in soil samples from three locations (TP-701, TP-706, and SB-720) within the right-of-way that contained concentrations above the generic residual contaminant level (RCL) established in NR 720, Wisconsin Administrative Code for groundwater pathways.

PAH concentrations that exceed proposed interim groundwater and direct contact RCLs were detected in soil samples collected on Campmarina and the right-of-way properties. Lead was detected in soil samples collected from Campmarina at concentrations above established direct contact RCLs for non-industrial properties and on the right-of-way property at concentrations above RCLs for industrial properties. Other generic screening levels for direct contact exposure are included on Tables 2 and 3 for reference. These screening levels include U.S. EPA Region 9 Preliminary Remedial Goals (PRGs) and short-term construction worker exposure values used under the State of Illinois EPA Tiered Approach to Correction Action Objectives (TACO). These values and the WDNR calculated PAH values are used as guidance only within the context of this FS.

3.2.2 Saturated Soil Quality

Analytical data for soil samples collected below the water table are summarized in Tables 2 and 3. The distribution of BTEX and PAH concentrations in saturated soil is illustrated on Plate 6 and cyanide on Plate 7. Results indicated the following:

- The majority of MGP related affects are present in soil below the water table extending up to approximately 22 feet bgs.
- BTEX and PAH impacts are present generally in saturated soils where tar and/or oil were identified. Tar was encountered in soil samples collected below the water table interface extending from the west-central to the southern portions of Campmarina and on to the right-of-way property.
- Tar and/or oil were also detected in soil samples on the northwest portion of Campmarina, within 30 to 50 feet of the current river bank. Sanborn maps as previously discussed in the prior investigation, indicate this portion of Campmarina was filled over old river sediments in the late 1800's to early 1900's and these deposits likely represent shallow, affected river sediments.
- In general, tar was identified at shallow depths (from the water table to approximately ten feet bgs) in the central and south central portions of Campmarina. Tar is present at depths from ten to 22 feet bgs in the west-central to southwest portions of the Campmarina and the right-of-way property, and adjacent to the Sheboygan River.

3.3 Hydrogeology

3.3.1 Groundwater Flow

Depth to shallow groundwater on Campmarina ranges from approximately five to seven feet bgs and approximately 13 and 17 feet bgs in the piezometers. Flow in the upper alluvium unit was generally to the west/southwest in 1995 and 1998, mimicking ground surface contours with a general flow direction toward the Sheboygan River. Plate 3 illustrates shallow groundwater flow directions based on December 21, 1998 water level measurements. Groundwater elevation measurements collected from the study area wells are summarized on Table 1.

Plate 4 illustrates piezometric surface elevations and flow directions in piezometers screened from approximately 30 to 35 feet bgs. Measurements of the December 21, 1998 contours indicate the flow direction was generally west/southwest (toward the Sheboygan River) within the lower silt/sandy clay (diamicton), consistent with the general flow direction at the water table.

Hydraulic conductivity was not re-evaluated for the FS. However, calculated hydraulic conductivity values for the previous investigations in the shallow monitoring wells ranged from 2.5×10^{-5} feet/minutes to 2.5×10^{-4} feet/minute. The calculated minimum and maximum values for average linear groundwater flow velocity in shallow groundwater for the previous investigations are approximately 3 to 63 feet per year. The higher velocities are representative of monitoring wells constructed in fill with higher hydraulic conductivity than wells set in shallow native silt and clay (diamicton) material.

3.3.2 Horizontal Groundwater Gradients

Horizontal groundwater gradients for shallow groundwater across the site on December 21, 1998 were calculated from the flow patterns depicted on Plate 3 and groundwater elevations summarized Table 1. Hydraulic gradient calculation spreadsheets are provided in Appendix G. Moderate to moderately-steep gradients of approximately 0.046 to the west to 0.078 feet/foot (ft/ft) to the southwest were calculated in the shallow zone. These calculated gradients are within the range calculated for the 1995 gradients that ranged between 0.048 ft/ft in August and 0.063 ft/ft in September.

The horizontal gradient across the lower zone of groundwater on the site was calculated from the flow patterns depicted on Plate 4 and determined to be a moderately-steep gradient of approximately 0.074 ft/ft to the west/southwest (toward the Sheboygan River).

3.3.3 Vertical Groundwater Gradients

Vertical hydraulic gradients were calculated for the three well nests (MW-701/PZ-701, MW-706/PZ-702, and MW-707/PZ-703) utilizing 1995 and 1998 groundwater elevation data. Vertical hydraulic gradient calculations are included in Appendix G.

For the MW-701/PZ-701 nest, slightly moderate to moderate downward vertical gradients were calculated in 1995 and 1998, ranging from 0.024 to 0.46 feet/foot. Calculations for the 1998 monitoring indicated a slight upward gradient of 0.019 feet/foot for the MW-706/PZ-702 nest and a moderate downward gradient of 0.11 feet/foot for the MW-707/PZ-703 nest.

3.4 Groundwater Quality

3.4.1 Shallow Groundwater

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Groundwater quality analytical data is summarized in Tables 4 and 5 and on Plates 8 and 9. In general, the highest concentrations of BTEX (340 to 31,000 µg/L benzene) and PAH (6,400 to 166,000 µg/L naphthalene) compounds were detected in the central portion of Campmarina (generally in the area tar is present at depths shallower than 10 feet bgs). Concentrations generally decrease (but not below groundwater quality standards) to the southeast and southwest (29 to 830 µg/l benzene and 22 to 3,470 µg/L naphthalene), toward the right-of-way property and the Sheboygan River.

The upgradient extent of MGP related constituents in groundwater impacted has been delineated by MW-708 and MW-705. BTEX and PAHs were not detected in samples collected from these monitoring wells. However, the groundwater sample collected from monitoring well MW-709, located north/northwest of MW-705 (and approximately down gradient of MW-705), contained low concentrations of PAHs. As discussed in Section 3.3 (Soil Quality), soils at or just below the water table are likely river sediment that were buried during the late 1800's to early 1900's. Therefore, the detection's of PAH compounds is likely represents groundwater quality in the vicinity of the buried sediments and not the side gradient migration of MGP related impacts from the central portion of Campmarina.

3.4.2 Lower Groundwater

MGP related groundwater impacts appear to diminish below approximately 25 feet bgs, below the low permeability silty/sandy clay diamicton identified in all borings sampled to 25 feet bgs or deeper. The predominantly silty clay appears to provide a barrier for vertical migration of MGP related constituents and coal tar.

Minor concentrations of BTEX and PAH constituents have been detected in the groundwater samples collected from PZ-701 in 1995 and 1998 and in PZ-702 in 1998. However, the concentrations in PZ-701 have diminished, indicating possible carry-over of shallow MGP related constituents during construction of the piezometer.

High concentrations of BTEX and minor concentrations of PAH constituents were detected in the groundwater sample collected from PZ-703 in 1998. The well was re-sampled on January 19, 1999. The 1999 groundwater sample contained considerably less benzene (a decrease in concentration of approximately 100 times) indicating cross contamination from shallow impacts during the construction of the piezometer.

4 DEVELOPMENT OF ALTERNATIVES

4.1 Contaminants of Concern and Exposure Pathways

4.1.1 Contaminants of Concern

Contaminants of Concern (COCs) associated with MGP residuals have been identified on both Campmarina and within the Center Avenue right-of-way. These COCs consist of BETX, PAHs, and total and amenable cyanide. The locations and distribution of these COCs have been influenced by historic MGP operational practices and fill depositional events that have significantly altered the river bank alignment and surface topography. Land based COCs are also generally consistent with those previously identified in river sediments along and south of Campmarina during previous sediment investigative activities.

Fill materials encountered at the site contain a mix of heterogeneous materials including ash/cinders, bricks, glass, bricks, concrete rubble, wood and other miscellaneous construction debris. These materials may contain concentrations of COCs such as PAHs and lead not related to historic MGP operations. In general, MGP related COCs in unsaturated fill materials are limited in extent with the exception of the Center Avenue right-of-way and two localized areas in the central portion of Campmarina as indicated in Figure 2. Residual amounts of coal tar have also been identified in the localized areas. The most significant MGP affects are located in the saturated zone that extends from the groundwater table to a depth of approximately 21 feet bgs.

Review of available Sanborn maps, dating back to the late 1800s, indicate that the alignment of the river bank, particularly in the northern portion of Campmarina, was substantially modified over a period of years through fill deposition. By 1903, the channel appeared to have been straightened by the placement of approximately 60 feet of fill into the river in the vicinity of New York Avenue. Center Street was also extended. The maps further indicate that the shoreline has not changed substantially since 1903. MGP affected river sediments have been identified beneath fill materials in both the northern portion of Campmarina and the right-of-way. Although MGP affected sediments are not being addressed specifically in this FS, sediments identified beneath the river bank are being included as part of the evaluation for a land based remedy.

4.1.2 Exposure Pathways

The proximity of the former coal gas facility to the Sheboygan River, shallow depth to groundwater and the proposed redevelopment plans for a future neighborhood park, condominium complex and river walk present several potential pathways that could serve as routes for exposure. Exposure pathways include direct contact through ingestion, particulate and/or vapor phase inhalation, leaching to groundwater and leaching to surface water (Sheboygan River). Environmental media for the site include unsaturated and saturated soil, shallow and deeper groundwater and surface water. Potential routes for exposure from each of the media are summarized below:

- Unsaturated Soil: The upper unsaturated fill materials are relatively unaffected by MGP residuals and do not serve as significant routes for leaching soluble components to groundwater. Of primary concern, would be potential direct contact exposure to construction and/or remediation workers excavating or managing materials at the site and vapor phase migration of BETX components along foundations for the proposed condominium complex. Generally, BETX compounds have not been detected in shallow soil, with the exception of a relatively isolated area in the central portion of Campmarina and in the right-of-way. Concentrations detected are generally below the residential and industrial guideline values discussed previously. Similarly, weak acid dissociable cyanide concentrations are below guideline values referenced previously. Although cyanide concentrations are not above published levels of concern, scattered oxide box wastes consisting primarily of Prussian-blue (complexed cyanide) stained wood chips and affected vegetation (tree roots) have been identified in near surface soil (less then two feet bgs) of the right-of-way. PAHs have been detected at concentrations that exceed established guideline values on both Campmarina and the right-of-way. Lead has been detected in several areas on Campmarina and in the right-of-way above established generic direct contact RCLs that would potentially pose concerns for particulate inhalation. Lead concentrations in soils do not suggest they are a potential source for leaching to groundwater.

- Saturated Soil and Shallow Groundwater: Shallow groundwater occurs between approximately five feet bgs to 21 feet bgs. Subsurface conditions within this zone consist of a heterogeneous mixture of glacial deposits intermixed with fill material. Intermittent and stratified lenses of higher permeability sand, silt and gravel containing stringers of coal tar have been identified up to 21 feet bgs. This saturated region contains the largest amounts of coal tar identified at the site. Lighter MGP residual hydrocarbon fractions have also been observed in sediments encountered beneath the river bank in the right-of-way. These materials would pose concerns for direct contact exposure to remediation workers and the local community if excavated. The presence of coal tar and lighter MGP residual oils containing relatively elevated concentrations of BETX and PAHs are directly contributing to shallow groundwater.

- Lower Groundwater: As discussed previously, the presence of MGP related affects apparently diminishes below approximately 21 feet bgs where a low permeability silty clay layer was identified and is apparently serving as a barrier to vertical migration of MGP coal tar. In addition, groundwater analytical data from the three piezometers (PZ- 701 through PZ-703) do not indicate the presence of MGP residuals in lower groundwater at concentrations that would suggest further downward migration of coal tar. In addition, the property is not within close proximity to a water supply aquifer. Lower groundwater is, therefore, not considered an exposure pathway for the site.

- Surface Water: The presence of coal tar and lighter phase separated MGP residuals apparently provides some direct contribution to surface water impacts in the Sheboygan River as documented by observations of intermittent hydrocarbon surface water sheen along the rivers edge and the presence of coal tar in the river bank. The extent of this contribution is not defined as coal tar previously identified in river sediments may also be influencing surface water quality. Migration of coal tar constituents into the river from Campmarina and the right-of-way will be addressed as part of a land based remedy.

4.2 Applicable or Relevant and Appropriate Requirements

Applicable or relevant and appropriate requirements (ARARS) for the former coal gas facility were evaluated in accordance with Section 121 (d) (1) of CERCLA, U.S. EPA RI/FS Guidance and specific requirements of the March 5, 1991 contract between the WDNR, City of Sheboygan and WPS regarding Campmarina. ARARs were categorized in accordance with the following:

- Chemical Specific: Chemical specific requirements are based on acceptable exposure limits such as direct contact RCLs or groundwater quality standards. These health or risked based requirements may be used to target clean up levels for COCs and discharge levels for treated effluent to the ambient environment.
- Location Specific: Location specific requirements can effect site specific restrictions for conducting certain types of activities along a water way or within a flood plain. These type of ARARS are limited to location and based on site characteristics and conditions.
- Action Specific: Action specific requirements relate to specific activities that would be conducted as a part of a selected remedy. These requirements may set certain limits or controls on a particular type of treatment and are triggered by site remedial actions.

ARARS that are being considered for Campmarina and the Center Avenue right-of-way are listed in Table 6.

4.3 Remedial Action Objectives

Environmental media specific remedial action objectives (RAOs) were identified for protecting human health and the environment with respect to the COCs, exposure pathways and preliminary remediation goals. CERCLA RI/FS guidance recommends RAOs for protection of human health identify both a contaminant level and exposure pathway whereas RAOs for environmental receptors be expressed in terms of the environmental media of interest and a target cleanup objective.

Surface Water

The preliminary remediation goal will be to control potential discharges from the site, consistent with the surface water quality standards stipulated under NR102 thorough NR 105. The presence of MGP affected sediments in direct contact with the river bank preclude the practicality of stipulating a numerical standard as a RAO. The primary exposure pathway for surface water is leaching of phase separated MGP residuals into the river from soil along the river bank. RAOs for surface water are based on performance standards and are listed below:

- Human Health: Reduce the potential for direct contact exposure to phase separated MGP residuals on surface water.
- Environmental Protection: Prevent leaching of phase separated MGP residuals to surface water and underlying sediments.

Unsaturated Soil

The preliminary remediation goal for surface soil will be reducing exposure consistent with the process stipulated under NR 720. Primary exposure pathways consist of direct contact exposure, leaching to groundwater and run-off to surface water. Although the distribution of MGP residuals appears to be limited and some removal may be warranted, particularly in the vicinity of the Center Avenue right-of-way, remedial requirements will be gauged with respect to the selected remedial recommendations for saturated soil and groundwater. As such, RAOs for unsaturated soil are based on the use of performance standards as provided under NR720.19 and are listed below:

- Human Health: Reduce the potential for direct contact exposure to MGP residuals.
- Environmental Protection: Prevent leaching and run-off of MGP residuals to groundwater and the river, respectively.

Saturated Soil and Groundwater

The presence of phase separated coal tar poses a challenge with respect to establishing an appropriate preliminary remediation goal for saturated soil. In general, NR 700 standards do not apply to saturated soil. However, given that the primary exposure pathway for saturated soil would be potential direct contact exposure during excavation to effect source removal of phase separated coal tar, a preliminary remediation goal similar to that established for unsaturated soil and consistent with NR 720 would be appropriate.

The preliminary remediation goal for groundwater would be to reduce the migration of groundwater affected with MGP residuals above NR 140 standards to the river. However, given the presence of phase separated coal tar that could effectively eliminate the possibility of meeting NR 140 standards, a performance based preliminary remediation goal consistent with NR 700 requirements may be more appropriate.

Based on these considerations, RAOs for the saturated soil and groundwater are based on the performance standards as provided for under NR 720.19 and conditional closure requirements under NR 726, respectively, as listed below:

- Human Health: Reduce the potential for direct contact exposure to MGP residuals.
- Environmental Protection: Reduce the migration of dissolved phase MGP residuals to the Sheboygan River.

4.4 Response Actions

4.4.1 Response Selection Criteria

Response actions were identified that could potentially meet the RAOs and are divided into two categories consisting of source control actions (SCAs) and groundwater response actions (GRAs). Appropriate SCAs and GRAs were selected to address each of the environmental media targeted for remedial action. In addition, process technology options were identified for each SCA or GRA for possible further evaluation as part of the initial screening discussed in Section 5. Process technology options reflect specific processes such as thermal desorption, chemical oxidation or bioremediation. It is anticipated a combined SCA and GRA will be required to meet the RAOs established for surface water.

Criteria for the selection of the response actions included the following:

- Treatment that would reduce the toxicity, mobility or volume of MGP residuals;
- Treatment that would reduce or mitigate the need for long-term management;

- Containment of MGP residuals that does not include treatment as a principle element but is protective of human health and the environment;
- Innovative technologies that could potentially achieve a greater level of remediation without unacceptable cost penalties as compared with more conventional or demonstrated approaches; and,
- Technologies that could restore groundwater to NR 140 standards within certain time frames.

Under CERCLA RI/FS guidance, a No Action response action is recommended for inclusion in the evaluation process to provide a base line for comparison against other types of response actions. In a No Action scenario, no remedial action would be taken and any changes in the affect of MGP residuals on environmental media would be the result of natural processes such as dispersion, dilution and natural attenuation. No protection would be provided for direct contact exposure other than incidental capping and/or containment by future development such as placement of fill or construction of pavement or building structures over the site. This response action was eliminated for further evaluation in the FS screening process based on the following considerations:

- The presence of phase separated MGP residuals are directly contributing to reductions in groundwater and surface water quality along the Sheboygan River;
- MGP residuals identified in the Center Avenue right-of-way will require management with regard to the potential for direct contact exposure to condominium construction workers and future residents; and,
- Future plans for redevelopment of Campmarina as a neighborhood park.

4.4.2 Source Control Actions

SCAs and associated process technology options selected for initial consideration are summarized below:

- Excavation and Off-Site Disposal: MGP affected soil could be excavated and transported as a non-hazardous special waste for landfilling.

- Excavation and Off-Site Treatment: MGP affected soil could be excavated and treated off-site by cement kiln for recycling, thermal desorption for reuse as backfill or co-burning by blending with coal feed stock for utilities.

- Containment: MGP residuals could be encapsulated or contained using a vertical barrier wall and engineered cap. Barrier wall approaches could include full encapsulation of the site with a barrier wall or partial encapsulation using a barrier wall enhanced with hydraulic containment such as an interceptor trench.

- Excavation and Aboveground On-Site Treatment: MGP residuals could be excavated and treated using aboveground chemical oxidation whereby soil would be mixed in a slurry reactor using hydrogen peroxide and ferrous iron. Treated soil would be reused as backfill.

- In-Situ Bioremediation: Bioremediation could be conducted using fracture enhanced foam injection that would be supplemented with nutrients, oxygen and surfactants.

- In-Situ Treatment: Process technology options could include steam enhanced vapor extraction (SEVE), chemical oxidation and an innovative technology called six phase soil heating with vapor extraction. SEVE would consist of a combination of steam injection and soil vapor/groundwater extraction. The steam would accelerate mobilizing MGP residuals. Chemical oxidation would consist of injecting a combination of hydrogen peroxide and ferrous iron that would oxidize the MGP residuals. Six phase soil heating would use six electrical heating elements each with a different electrical phase to heat groundwater into steam and mobilize MGP residuals that would be removed using conventional vapor extraction technology.

- In-Situ Stabilization/Solidification: MGP residual leaching mobility would be reduced TCLP characteristic concentrations using stabilizing agents such as cement additives.

Each of the SCAs identified above were included for initial screening in Section 5.

4.4.3 Groundwater Response Actions

GRAs and associated process technology options selected for initial consideration are summarized below:

- Passive or Active Treatment Wall Technologies: These innovative technologies could consist of a permeable treatment wall installed along the edge of the river between Campmarina that would passively or actively treat affected groundwater before it reaches the river. Pilot studies have been conducted using slow release oxygen compounds and activated carbon for passive treatment of hydrocarbons. An example of an active approach could be a line of sparging wells that would effectively create a "biofence" to treat the groundwater by enhancing natural attenuation processes.

- Hydraulic Containment: This approach could consist of a series of wells or an interceptor trench to effectively create a hydraulic barrier along the river between Campmarina and the Center Avenue right-of-way. Hydraulic containment could be integrated with physical containment using a slurry or sheet pile wall.

- In-Situ Treatment: Process technology options could include chemical oxidation or bioremediation. Application of chemical oxidation for a GRA would be conducted in the same manner as in-situ chemical oxidation for a SCA as discussed above. A mixture of hydrogen peroxide and ferrous iron would be injected into groundwater to oxidize the MGP residuals. Bioremediation would rely on a nutrient and oxygen injection system using sparge wells for delivery to enhance indigenous bacterial growth.

- Pump and Treat Technologies: These could consist of conventional and/or dual phase pumping technologies to extract MGP residuals for above ground treatment using air stripping and/or activated carbon. Treated effluent would be discharged to the river under a WPDES permit or to the City of Sheboygan sanitary sewer system.

- Natural Attenuation: Natural attenuation is not considered a viable primary GRA for the site due to the extent and distribution of MGP residual coal tar. It is anticipated that natural attenuation will be a component of a more aggressive GRA combined with a selected SCA(s). A monitoring plan for natural attenuation will be implemented as part of a final remedial program. It is also being included as part of the initial screening of alternatives to provide a comparative basis with other GRAs.

Each of the GRAs identified above were included for initial screening in Section 5.

4.5 Remedial Considerations

4.5.1 Existing Structures and Underground Utilities

Campmarina and the Center Avenue right-of-way contain several underground structures and abandoned utilities related to the former coal gas facility that would potentially require decommissioning prior to implementing a final remedy for the site. These underground structures and utilities include the following:

- Foundations for Former Gas Holders: The gas holders at the facility were above ground structures (Plate 1). These structures were previously removed but the foundations remain and have been encountered during previous investigative activities. Removal of some of these foundations may be required to facilitate the installation of a vertical barrier wall or active in-situ treatment system.
- Tar Well Structures: It is suspected that two tar well structures located in the central portion of Campmarina were not fully removed and may need to be demolished for the same reasons as the foundations for the former gas holders.
- MGP Related Underground Utilities: At least one former storm sewer line related to the former coal gas operations has been identified in the southern portion of Campmarina (Plate 1). Additional lines may traverse the site and/or discharge in the northern portion of Campmarina. These former drain lines would be removed or capped, if encountered, to eliminate them as exposure pathways prior to remedy implementation.
- Active Underground Utilities: Campmarina contains several active underground utilities that include water, electrical and storm sewers that would require decommissioning.

4.5.2 Unsaturated and Saturated Soil

The approximate extents of MGP affected unsaturated and saturated soil are indicated in Figure 2. As indicated, only three zones have been identified in the unsaturated zone that would be considered for remedial action. The largest and of most concern is the area located in the Center Avenue right-of-way. Affected soil in the right-of-way is located in the direct vicinity of the proposed location for the Building No.3 of the proposed condominium complex. Although less affected, it is anticipated that the remainder of the unsaturated soil, if removed from the site, would likely be managed as a special waste. If the soil were to remain on-site, reuse as backfill would be recommended as part of an excavation program. The approximate lateral extent of affected saturated soil encompasses the entire area for Campmarina and approximately the same area as the affected unsaturated zone in the right-of-way. Key remedial parameters for the unsaturated and saturated zones include the following:

- The depth of the affected unsaturated soil zones in Campmarina extend to approximately four feet bgs. The depth of the zone in the Center Avenue right-of-way is greater than the zones in Campmarina and has been estimated to extend up to approximately 15 feet bgs due to the steep river bank and the buildup of fill material.
- The estimated bank tonnage of affected unsaturated soil in the Center Avenue right-of-way is approximately 5,400 tons. The estimated tonnage in Campmarina is approximately 1,500 tons.
- For the saturated zone, the total estimated bank tonnage of affected soils is approximately 61,100 tons. This is assuming a total depth of approximately 20 feet bgs less four feet for the unsaturated zone.

4.5.3 Surface Water and Groundwater

A key consideration for surface water is to address migration of coal tar residuals from the river bank to the river. The portion of the river that would be addressed includes the entire length of Campmarina and the Center Avenue right-of-way. This distance reflects approximately 700 lineal feet of river bank. Key remedial considerations for groundwater include the following:

- Hydraulic gradients across Campmarina are relatively steep and the direction of the shallow MGP affected groundwater is directly towards the river. Groundwater gradients through the lower unaffected groundwater are lower than the shallow groundwater but the groundwater flow direction is also to the river.

- The total depth of affected groundwater is approximately 20 feet bgs to where the clay aquitard is identified. This would be the minimum depth for hydraulic containment or a vertical barrier wall.
- The available hydraulic conductivity data do not suggest that groundwater extraction would be effective do to possible low recovery rates. Although, the subsurface conditions indicate primarily alluvium sand and gravel, the saturated zone is highly stratified with heterogeneous intermixed lenses of silt and clay that could preclude the effectiveness of groundwater pumping. In addition, MGP residual coal tar is stratified through the shallow zone.

4.5.4 Treatability Evaluation

Treatability evaluations were conducted on representative composite samples of soil from the site to assess the following:

- On or off-site thermal desorption;
- Landfilling of soil at a Waste Management Recycling and Disposal facility; and,
- Processing at the Lafarge Corporation Cement Kiln in Davenport, Iowa.

Analytical data are summarized in Tables 7 and 8. Composite-1 reflects soil quality data for the upper unsaturated zone and Composite-3 reflects soil quality data for the saturated zone.

Thermal Desorption

For thermal treatment, composite analyses were conducted for BTEX, PAHs, total cyanide, total lead, and total sulfur. Composite sample analytical data indicate organic compound concentrations fall within the limit of 10,000 mg/kg. An example of limits are included below for reference (as derived for operations permit for a thermal treatment plant at a Stevens Point, Wisconsin MGP site operated in 1998):

- Benzene 300 pounds/year;
- Sulfur dioxide 100 tons/year;

- PAHs 250 pounds/year; and,
- Total organics as 10,000 mg/kg.

Based on the past experience with thermal treatment operations at Stevens Point, the limiting factor can be one of the any of the above compounds or the destruction removal efficiency (DRE) of the thermal treatment plant. As an example of limits, the Stevens Point averages included:

- Total PAH of 230 mg/kg;
- Throughput of 25 tons of soil per hour; and,
- DRE of 99 percent.

Maximum benzene influent concentration could not exceed 277 mg/kg, and sulfur could not exceed 0.093 percent by weight. Based on this information, sulfur results in Composite-1 may be high and results of Composite-2 approach the threshold for influent sulfur concentration. Otherwise, results seem within the example limits set for the Stevens Point MGP site.

Landfilling

For landfilling, TCLP benzene was also analyzed as an additional parameter to obtain disposal approval. The excess soil cuttings generated from investigation activities at the site were profiled with the analytical data provided in Tables 7 and 8, and were subsequently disposed at a Waste Management Recycling and Disposal facility as a non-hazardous special waste. Therefore, it is likely that soils affected by MGP residuals at the site could be profiled using the existing analytical data and that the current profile could be utilized to facilitate disposal approval for the soils removed during remedial excavation. In addition, it is not anticipated that the soil would meet the recently enacted Phase IV land disposal restrictions (LDRs) stipulated under 40 CFR 268.

Cement Kiln

For cement kiln recycling, additional analytical requirements included total petroleum hydrocarbons (TPH by U.S. EPA method 418.1). Suitability for cement kiln recycling includes the following material requirements:

- Material may not be classified as RCRA hazardous waste;
- Material shall contain less than 2,100 mg/kg TPH; and,
- Material shall have an acceptable chemistry for incorporation in the cement kiln.

Additional analytical testing was conducted for TPH and amenability for kiln chemistry. The sample results of TPH and kiln chemistry were within the acceptable limits for the cement kiln.

4.5.5 Geotechnical Engineering Parameters

Geotechnical testing results are provided in Appendix F. Geotechnical boring logs (GB-727 through GB-730 and PZ-703) with corresponding standard penetration test (SPT) data are provided in Appendix A. Relatively undisturbed and disturbed soil samples were submitted for geotechnical testing to identify preliminary engineering parameters for a vertical barrier wall and/or interceptor trench, general excavation and slope stabilization. The results of the field and laboratory testing indicate the following:

- Flex wall triaxial permeability testing yielded low vertical hydraulic conductivities in the lower clay stratum ranging from 4 x 10^{-7} centimeters per second (cm/sec) in PZ-703 to 8.6 x 10^{-9} cm/sec in GB-703.
- A review of the standard penetration test (SPT) results indicate that the subsurface conditions up to approximately 15 to 24 feet bgs are consist of relatively unconsolidated materials. Low SPT blow counts were typically in the range of 3 to 10 that are indicative of very soft to soft conditions for the more cohesive materials and very loose conditions for sands. Stratification of these low strength clays and sands were evident in each of the geotechnical borings and would pose significant concern with regard to excavation stability. These blow counts correlate to published low values (NAVFAC, 1982) for undrained shear strengths

for the clays in the range of 500 to 750 pounds per square foot (psf) and low relative densities for the sands in the range of 30 to 40 percent.

- From approximately 20 to 24 feet bgs, SPT blow counts increased to values ranging from approximately 25 to 44 where the silty to sandy clay stratum was identified during drilling. These blow counts are indicative of stiff to very stiff conditions and generally correspond to undrained shear strength test data discussed below.
- Deviator stresses obtained from undrained unconsolidated (UU) shear strength triaxial tests for the low permeability silty clay stratum ranged from approximately 1,170 pounds per square foot (psf) at PZ-703 to 4,622 psf at GB-727. These values reflect strengths several times greater than those estimated for the upper unconsolidated materials.
- Liquid Limits (LLs) and Plasticity Indices (PIs) obtained from Atterberg Limit tests and gradation analyses conducted on selected samples from the lower clay stratum indicate silty to sandy clays of low to medium plasticity that classify primarily as CL material under USCS. These results generally correspond to field log descriptions of the material encountered during drilling.

Based on the testing results, geotechnical engineering considerations for construction of a vertical barrier wall and/or for deep excavating include the following:

- Excavation of relatively unconsolidated saturated materials would require extensive shoring. Shoring such as sheet piling or H-piles and lagging could be extended into the lower clay stratum to a minimum depth of approximately 25 to 30 feet bgs. If excavation were to extend deeper than 10 to 15 feet bgs, tie backs would likely be required. Additional, stability evaluations would be required for the relatively steep slopes along Water Street and in the vicinity of the Center Avenue right-of-way to assess development of active earth pressures for shoring and tie back design.
- The low permeability clay layer appears to be laterally continuous and could serve as a suitable key for a vertical barrier wall. The depth of this wall would be keyed to a minimum depth of approximately 30 feet bgs.
- Subsurface conditions associated with the upper relatively unconsolidated soil appear to be generally conducive to a sheet pile installation. The results of the gradation analyses and the field observations of the subsurface conditions encountered during drilling do not indicate, with the possible exception of portions of the Center Avenue right-of-way, the presence of deleterious

subsurface conditions such as construction rubble or debris that could cause lateral drifting or separation of sheet piling.

5 INITIAL SCREENING OF ALTERNATIVES

5.1 Screening Criteria and Approach

Initial screening of process technology options for selected SCAs and GRAs were evaluated on the basis of the following criteria:

- Implementability: Implementability refers to the feasibility and/or availability of a given process technology option for the site. Feasibility is further delineated on the basis of technical and/or administrative considerations. Technical feasibility refers to the ability of the technology to adequately treat the COCs given site-specific conditions. Certain technologies may be able to adequately address the COCs but cannot be implemented due to such factors as space limitations and unacceptable subsurface conditions. Administrative feasibility refers to the ability of the technology to meet such factors as local and state permitting requirements and regulatory reviews for approval. Availability refers to such factors as the geographic location of the technology with respect to the site (e.g., cement kiln or co-burning facilities) and the extent to which the technology is commercially available.

- Effectiveness: Effectiveness refers to three criteria consisting of: 1) the extent the technology would be protective of human health and the environment; 2) the level of treatment that could be achieved; and, 3) the extent to which the technology has been demonstrated at other MGP sites. Protection of human health and the environment refers to both the construction and implementation (short-term) and operation and maintenance (long-term) considerations for reducing the toxicity and mobility of the COCs to be addressed. Level of treatment refers to the degree to which the technology reduces the mass of COCs. Demonstrated effectiveness refers to the extent the technology has successfully been applied at other MGP sites. This criterion would consider such factors as to whether or not the technology is considered innovative and if the application has moved beyond pilot and/or bench scale studies.

- Cost: Costs refer to general cost ranges for each of the process technology options that include utilization of available published cost data from similar projects, vendor data and engineering judgment. As such, costs are for general comparative purposes and were not used singly as a screening tool unless substantial cost differentials were identified that would immediately preclude the technology from further consideration.

Of the three initial screening criteria identified above, the most crucial is implementability. If a technology failed this criterion, than it was not considered for further evaluation. Therefore, in order of priority, the criteria of effectiveness and cost are secondary and were generally evaluated in comparison to implementability unless substantial concerns in either criterion were identified that would clearly eliminate the process option.

At this stage of the evaluation process, the initial screening criteria were applied to the suitability of specific process technologies for either source control or groundwater. Following completion of the initial screening process, selected SCAs and GRAs were assembled into combinations that would potentially address the RAOs for the environmental media under consideration. Combinations of SCAs and GRAs were then selected for the detailed analysis of alternatives presented in Section 6. The results of the initial screening and assembly of alternatives for detailed analysis are discussed in the following sections.

5.2 Source Control Actions

The results of the initial screening of SCAs are provided in Table 9. The table is divided into two general source control categories consisting of ex-situ and in-situ control actions. SCAs selected for further evaluation consist of the following:

- Cement Kiln for Cement Manufacturing;
- Thermal Desorption;
- Steam Enhanced Vapor Extraction; and,
- Source Containment (consisting of a combination of capping with a cut-off wall).

Each of the SCAs identified above met the three initial screening criteria as indicated in Table 9. SCAs that were not selected for further evaluation and the basis for their elimination from further consideration are indicated below:

- <u>Co-Burning</u>: Use of MGP residual affected soils for co-burning in permitted utility steam generating boilers was eliminated from further consideration on the basis of cost. Co-burning is a technically and administratively feasible alternative with demonstrated effectiveness at other MGP sites. However, it's substantially higher unit cost ($100 to $220 per ton) as compared to thermal desorption ($70 to $110 per ton) or cement kiln ($70 to $120 per ton) makes this option not cost effective for large quantity applications. This option could be considered for limited hot spot removal actions with relatively low quantities.

- <u>Disposal (i.e.. Landfilling)</u>: This option met the criteria for implementability and cost but failed for effectiveness. The primary reason this option was eliminated is potential future liability associated with landfilling large quantities of MGP residual affected soil. Landfilling of some small quantities of MGP residual affected soil and/or debris may be acceptable on a case by case basis or as part of a larger remedial program but not as a primary SCA.

- <u>Ex-Situ Oxidation:</u> This option met the criteria for implementability but failed for effectiveness and cost. Technical feasibility of oxidation using a hydrogen peroxide and ferrous iron slurry to mix with excavated soils has been demonstrated and is commercially available in Wisconsin. However, effectiveness of this approach has not been demonstrated at other MGP sites and extensive pilot testing would be required. In addition, costs associated with this option could range as high as $200 to 250 per ton which are considerably higher than those for cement kiln and thermal desorption.

- <u>Fracture Enhanced In-Situ Foam Bioremediation:</u> This option did not meet the criteria for implementability and effectiveness: This approach reflects an innovative technology that is currently being researched for technical feasibility at other MGP sites. Although commercially available, extensive pilot and bench scale testing would be required to demonstrate an adequate level of treatment and WDNR approval may require extensive negotiation due to microfracturing where phase separated MGP residuals are present.

- <u>In-situ Oxidation</u>: This option did not meet the criteria for implementability and cost. This option is not technically feasible given unfavorable subsurface conditions consisting of intermixed lenses of silty clays and coal tar lenses to depths greater than 21 feet bgs. These heterogeneous subsurface conditions would make effective engineering control of the oxidation-destruction reaction process difficult and could require extensive regulatory negotiation to obtain approval for implementation. This option poses the same higher cost considerations as were identified for ex-situ oxidation.

- In-Situ Stabilization: This option did not meet the criteria for implementability. Stabilization of soil intermixed with phase separated coal tar may not be technically feasible due to concerns associated with meeting leachability requirements for benzene. Stabilization process would also unacceptably increase overall volume of materials that would require on-site management due to space limitations. Pilot testing would be required to demonstrate effectiveness.

- Six-Phase Soil Heating with Vapor Extraction: This option did not meet the criteria for effectiveness. This option reflects an innovative technology that holds promise for future MGP applications and is particularly suited to heterogeneous subsurface conditions such as those present at the site. However, the effectiveness of this approach has not been demonstrated at MGP sites and could pose site specific hazards associated with the use of high voltage that could require unacceptably extensive health and safety controls.

5.3 Groundwater Response Actions

The results of the initial screening of SCAs are provided in Table 10. GRAs selected for further evaluation consist of the following:

- Hydraulic Containment
- Bioremediation

Each of these GRAs met the three initial screening criteria as indicated in Table 10. GRAs that were not selected for further evaluation and the basis for their elimination from further consideration are indicated below:

- Dual Phase Extraction ("Pump and Treat"): This option did not meet the criteria for implementability, effectiveness or cost due to the heterogeneous subsurface conditions and presence of coal tar to depths greater than 20 feet bgs. Demonstration of effectiveness would require pilot testing and the success of dual phase technologies is not well documented at other MGP sites. Long-term operation and maintenance would likely be required that could lead to unacceptably high overall project costs.

- In-Situ Oxidation: This option did not meet the criteria for implementability and cost for the same reasons that oxidation failed as an SCA.
- In-Situ Treatment Wall: This option did not meet the criteria for implementability and effectiveness. The technical feasibility would be questionable given the heterogeneous subsurface conditions at the site and limited availability of treatment options. Treatment options would likely rely on such applications as in-well air stripping and air sparging to create a "biofence" that would eliminate migration of MGP residuals into the river. Demonstration of effectiveness would require extensive pilot studies and the use of permeable wall approaches is not well documented at other MGP sites.
- Natural Attenuation Monitoring: This option did not meet the criteria for implementability or effectiveness due to the presence of phase separated coal tar and the immediate proximity of the former coal gas facility to the river. However, this option will be a component of a comprehensive alternative to be determined for the site.

5.4 Assembly of Alternatives

Possible combinations of selected SCAs and GRAs are provided in the decision matrix in Table 11. Key objectives associated with the selection of appropriate combinations for detailed analysis of alternatives consisted of the following:

- Meeting the RAOs for each of the environmental media (i.e., surface water, soil (unsaturated and saturated) and groundwater);
- Compatibility of SCAs and GRAs; and,
- Section 121 of CERCLA and Sections 300.430(a)(i), (ii) and (e) of the NCP.

For those SCAs involving source removal, no GRA (i.e., hydraulic containment or bioremediation) would be required with the exception of long-term groundwater monitoring (i.e., natural attenuation monitoring). As indicated in the decision matrix, these source removal options consist of cement kiln, thermal desorption and steam enhanced vapor extraction (SEVE). For source containment (i.e., capping with a partial cutoff wall), RAOs for surface water and groundwater may not be fully met if hydraulic mounding and/or incidental leakage occurs through the cap or cutoff wall. As such, source containment could be combined with the GRA for hydraulic containment to fully address the RAOs. Finally, the bioremediation GRA alone could not fully meet the RAOs but could be implemented to enhance the performance of an alternative that would meet the RAOs. Therefore, bioremediation could be integrated with source containment and hydraulic containment with the benefit of also reducing the toxicity, mobility or volume through treatment of the MGP residuals. Remedial alternatives that were selected for detailed analysis are listed below:

- Alternative 1, Source Area Excavation and Off-Site Treatment;
- Alternative 2, Source and Hydraulic Containment Combined with Bioremediation; and,
- Alternative 3, Steam Enhanced Vapor Extraction (SEVE).

6 DETAILED ANALYSIS OF ALTERNATIVES

6.1 Analysis Criteria and Approach

Criteria for the detailed analysis of alternatives and selection of a remedy for the site are grouped into three general categories consisting of threshold, primary balancing, and modifying factors that are listed as follows:

Threshold

- Overall Protective of Human Health and the Environment
- Compliance with ARARs

Primary Balancing

- Long-term Effectiveness and Permanence
- Reductions in Toxicity, Mobility, and Volume Through Treatment
- Short-term Effectiveness
- Implementability
- Cost

Modifying

- State Acceptance
- Community Acceptance

These nine specific criteria reflect a general extension of the evaluation process that was initiated with the general screening criteria consisting of implementability, effectiveness and cost. Implementability and cost are carried through directly to the detailed analysis. Effectiveness is extended to the threshold factors and three of the primary balancing factors consisting of: 1) long-term effectiveness and permanence; 2) reductions in toxicity, mobility and volume through treatment; and, 3) short-term effectiveness.

The threshold factors refer to regulatory requirements that are to be met as part of the remedy selection. The primary balancing factors form the key criteria for conducting the detailed analysis of alternatives. Assembled alternatives are first compared to the two threshold criteria. If the alternatives meet the threshold regulatory requirements, they are then evaluated on the basis of the five primary balancing criteria. The modifying factors relate to regulatory and community acceptance following public comment to the FS and are therefore not a part of this stage of the evaluation.

The approach for conducting the detailed analysis consisted of the following steps:

- A technical description of each of the alternatives was prepared that included identification of the waste management strategy and key ARARs;
- Each of the alternatives were then assessed individually against the first seven criteria (threshold and primary balancing) listed above;
- Following the individual evaluation, the alternatives were compared relative to each others performance under the primary balancing criteria; and,
- Recommendations were then developed for a final remedy for the site.

6.2 Individual Analysis of Alternatives

6.2.1 Introduction

A general description and remedial assumptions for each of the remedial alternatives are provided in Table 12. Key considerations and clarifications for the evaluation of each of the alternatives include the following:

- Alternative No. 1, Source Excavation and Off-Site Treatment costs are divided into two sub-alternatives to address treatment using both off-site cement kiln and off-site thermal desorption options. These two sub-alternatives are not evaluated separately against the seven criteria with the exception of the costs. The two options are similar with respect to implementation with the exception of the final treatment technology. Separate costs were developed to clarify the differences in the anticipated unit rates associated with the two treatment technologies.

- Alternative No. 2, Source and Hydraulic Containment Combined with Bioremediation has been divided into two distinct sub-alternatives that consist of: 2A) Full Source Area Encapsulation with Low Flow Biosparging; and, 2B) Partial Source Area Encapsulation with and Interceptor Trench and Low Flow Biosparging. These two sub-alternatives reflect distinct technical approaches and are evaluated separately because each poses an independent set of issues for evaluation under the seven criteria.

- Each of the alternatives includes a vertical barrier wall along the river between Campmarina and the right-of way. The necessity for the wall varies depending on the alternative. For source removal, it would be required for excavation shoring, for source containment, it would be required for a barrier against migration of MGP residuals to surface water and groundwater. For SEVE, it would be required to provide a treatment barrier to prevent hydraulic and vapor phase communication with affected sediments during remediation of affected soil and groundwater.

- Each of the alternatives includes provisions for conducting long-term monitoring for natural attenuation. The estimated duration of the monitoring varies depending on the alternative.

- Each of the alternatives assumes interim remedial action will be conducted for affected unsaturated soil in the Center Avenue right-of-way. This would be required to prepare the area for the future construction of Building No. 3 for the proposed condominium complex prior to final remedy implementation. This interim action would consist of the excavation and transportation of approximately 4,300 tons of affected soil for off-site cement kiln treatment.

- Each of the alternatives includes final decommissioning of the former coal gas facility to remove and/or properly abandon former MGP structures present on Campmarina. This final decommissioning would be required to prepare the site for final remedy implementation and to eliminate possible exposure pathways posed by the former underground utilities.

- Finally, each of the alternatives includes institutional controls. These controls would identify deed restrictions for access to subsurface soils, groundwater usage and long term maintenance requirements.

Each of the alternatives were evaluated based on expected duration of operation or monitoring and net present worth using an interest rate of nine percent and a rate of inflation of three percent. Preliminary costs are summarized in Table 13. Detailed preliminary cost summaries are provided in Appendix H. Each alternative includes a number of planning and design tasks indicated below:

- Remedial action planning, permitting and agency negotiation;
- Pilot or pump testing planning, oversight and evaluation;
- Preparation of design plans, specifications and bid documents;
- Contractor bidding and selection;
- Construction management and installation oversight;
- Operation and maintenance; and,
- Remedial documentation reporting.

The results of the individual analyses for each of the remedial alternatives are provided in Table 14. As indicated in the table, each of the alternatives meet the threshold criteria for overall protection of human health and the environment and compliance with the ARARs and are combined with the primary balancing criteria for individual analysis.

6.2.2 Alternative No. 1, Source Area Excavation and Off-Site Treatment or Disposal

Alternative Description

This alternative would consist of excavating both unsaturated and saturated source areas and transporting the excavated materials off-site for treatment. Estimated unsaturated and saturated source areas and a proposed location for a barrier wall are indicated in Figure 3. Key objectives of this approach would be to restore the site to relatively unrestricted site use and remove a sufficient amount of MGP affected soil to allow for natural attenuation of residual MGP affected groundwater.

Source area excavation would include removal of affected soil to a depth of approximately 21 feet bgs. Given this depth and site constraints associated with the proximity to the river, and steep banks located on the east and south sides of the site, shoring consisting possibly of steel sheeting anchored into the lower stiff clay stratum and reinforced with tie backs would be required along the east, west and south sides of the site. During the excavation operations, water accumulated during excavation dewatering operations would be treated on-site using WPS's mobile activated carbon treatment system and routed to the City of Sheboygan's sanitary sewer system. Following completion of the excavation and backfilling operations, steel sheeting along the river would be left in-place to serve as a barrier wall between the remediated land based source areas and affected river sediments. The estimated duration for this project would be approximately 5 months and would be conducted during the Fall and Winter season to minimize concerns associated with vapor phase migration and direct contact exposure.

The presence of a vertical barrier would separate land based remediated source areas from contact with affected sediments located in the river. It is not anticipated that migration of MGP residual coal tar in affected sediment could migrate inland given steep hydraulic gradients identified across Campmarina. Future hydraulic fluctuations in the river level and flow velocities could lead to resuspension and redeposition of affected sediments that the barrier would provide a measure of protection to the river bank.

Off-site treatment could be conducted using either thermal desorption or cement kiln processing for reuse in cement products. Due to the limited space availability and proximity of residences, it is not anticipated that a thermal treatment plant could be mobilized on-site. An off-site location would be secured and for the purposes of this discussion it has been assumed that a thermal unit could be set up on WPS's (Wildwood Street) facility located in Sheboygan. For cement kiln processing, excavated materials would be shipped by rail to the Lafarge facility located in Davenport, Iowa which is permitted to accept MGP affected materials for recycling. Thermally treated soil would be reused as backfill at the site. Imported backfill would be required for kiln processing since excavated material could not be reused for backfill. Under either option, unsaturated soil not identified as possible MGP source material would be excavated, stockpiled and reused as backfill. Preliminary costs provided in Table 13 indicate that cement kiln processing would be approximately $1,700,000 greater than thermal treatment. The higher cost is primarily associated with higher unit costs associated with the treatment technology and requirements for importing backfill. For preliminary costing purposes, a minimum groundwater monitoring period of approximately 10 years has been estimated.

Alternative Analysis

Key conclusions of the individual analysis of the threshold and primary balancing criteria provided in Table 14 indicate the following:

- If substantially complete source removal could be accomplished, overall protection of human health and the environment would be met and the site could potentially be used with no restrictions pending successful demonstration of natural attenuation. However, stringers of coal tar to depths up to 21 feet bgs across Campmarina and the stratification of lenses of sand and gravel with silt and clay could make complete removal unachievable.
- Compliance with ARARS would be contingent on meeting cleanup objectives for soil and groundwater without the application of performance standards as provided under NR720. 19(2). Performance standards would require the use of engineered barriers to reduce the potential for direct contact exposure or leaching of MGP residuals to surface water or groundwater.
- Excavation operations would pose concerns for direct contact exposure to excavation personnel and the community in the direct vicinity of the site (e.g., condominium complex to the south and residences to the east).
- The estimated cost for this alternative is high and should be weighed against the risk of not achieving sufficient source removal.

6.2.3 Alternative No. 2A, Full Source Area Encapsulation With Low Flow Biosparging System

This alternative would consist of fully encapsulating the site using a vertical barrier wall that would extend around the entire perimeter of the site including the Center Avenue right-of-way and an engineered cap. Natural attenuation of MGP affected soil and groundwater would be enhanced by a low flow biosparging system that would provide a continuous source of oxygen within the encapsulated zone. A conceptual plan for the locations of the barrier wall, engineered cap and low flow biosparging system is provided in Figure 4.

A number of innovative options are available for the barrier wall that include the use of polyvinyl chloride (PVC) sheet piling and high density polyethylene (HDPE) chemically resistant materials. These walls can be installed with sealed interlocks to provide a continuous low permeability vertical barrier. It is anticipated that the wall would be installed to a depth of approximately 30 feet bgs into the lower low permeability clay stratum. Another option could be use of a cement bentonite slurry wall. However, this approach would require the excavation and off-site treatment of substantial amounts of affected soil, although the overall cost differential between this approach and a sheet pile type of barrier wall are not anticipated to be significant.

The engineered cap could either consist of a low permeability clay or a flexible membrane cover such as HDPE or a combination of both depending on final design requirements. The cap would be constructed to positively drain surface water to the river and would be elevated above estimated historic high groundwater levels. Surface water infiltration should be minimal with a low permeability barrier and groundwater mounding or unacceptable hydraulic flux within the encapsulated zone should not be a concern.

Bioremediation using biosparging has been implemented at other MGP sites with various degrees of success. A low flow system would be installed to serve as an enhancement for natural biodegradation processes and would not be relied upon as a primary SCA. Based on results from previous studies, substantial reductions in hydrocarbons such as BTEX and naphthalene can be achieved. Less success has been observed with heavier end hydrocarbons but these are also generally less mobile and would pose less of concern for on-going contribution to groundwater affects. Low flow air injection would be maintained to facilitate MGP residual biodegradation and minimize volatilization of BTEX compounds. It is anticipated that the installation and operation maintenance would be relatively low cost over a period of years. Pilot testing would be required to properly design the system for the site specific conditions. A minimum groundwater monitoring period of approximately 30 years has been estimated for costing purposes.

Alternative Analysis

Key conclusions of the individual analysis of the threshold and primary balancing criteria provided in Table 14 indicate the following:

- Overall protection of human health and the environment would be contingent on maintaining engineered barrier controls;
- Compliance with the ARARs for unsaturated and saturated soil and groundwater would be dependent on the application of performance standards consistent with the provisions provided for under NR 720 and conditional closure requirements under NR 726;
- With regard to surface water, the proximity of the former coal gas facility to the river with the presence of coal tar affected sediments in direct contact with the river bank pose significant challenges with regard to demonstrating compliance with chemical specific surface water quality standards as identified in NR 102 through 105. In addition, historic manufacturing operations in the vicinity of the former coal gas facility have included a tannery, toy factory and brewery that may have contributed to surface water quality affects. Given these considerations, compliance with the ARARs would be performance based and would rely on engineered barriers to prevent leaching of phase separated MGP residuals to the river;
- Heterogeneous subsurface conditions and presence of phase separated coal tar could inhibit long-term effectiveness of biosparging. In addition, oxygen and nutrient transport could be limited by such factors as channeling along preferential pathways and iron precipitation that could lead to plugging. However, reductions in contaminant toxicity and mobility could potentially be achieved over an extended period. Pilot testing would be required to demonstrate viability;
- This alternative is relatively non-intrusive since excavation of affected soil could be limited to unsaturated zone soil in the right-of-way and Campmarina as required to facilitate construction of the engineered cap. Encapsulation would pose marginal short-term risks for direct contact exposure to remediation workers and the community during construction; and,
- The estimated cost associated with this alternative is relatively low even if monitoring and operation and maintenance of biosparging were conducted for 30 years.

6.2.4 Alternative No. 2B, Partial Source Area Encapsulation With Interceptor Trench and Low Flow Biosparging

This alternative would consist of partially encapsulating the site with a combination vertical barrier wall and interceptor trench and an engineered cap. Natural attenuation of MGP affected soil and groundwater would be enhanced by a low flow biosparging system that would provide a continuous source of oxygen within the encapsulated zone. A conceptual plan for the locations of the barrier wall, engineered cap and low flow biosparging system is provided in Figure 5.

The key difference between this alternative and Alternative 2A for full encapsulation is the use of an interceptor trench to control hydraulic mounding along the alignment of the barrier wall and prevent flow of affected groundwater around the barrier wall. Installation of the trench would require removal and management of affected soil. Recovered groundwater would be routed to a dedicated on-site treatment system consisting of an air stripper and/or activated carbon. Treated effluent would be discharged to the river under a WPDES permit. Long-term operation and maintenance of the treatment system would be required.

Alternative Analysis

Key conclusions of the individual analysis of the threshold and primary balancing criteria provided in Table 14 indicate the following:

- Compliance with the threshold criteria would be the same as for Alternative 2A;
- Seasonal high fluctuations in river or flooding could reduce long-term effectiveness of interceptor trench; and,
- Estimated cost is relatively low even with projected operation and maintenance costs of 30 years.

6.2.5 Steam Enhanced Vapor Extraction

This alternative would consist of active soil and groundwater remediation by steam enhanced dual phase extraction (SEVE) of groundwater and soil vapor. This is a process in which subsurface injection of superheated steam accelerates the volatilization of phase separated MGP residuals saturated conditions. The mobilized contaminants are then removed by soil vapor and groundwater extraction in conventional dual-purpose extraction wells. A conceptual plan for the placement of steam injection and dual phase extraction wells is provided in Figure 6. A barrier sheet pile wall is included to provide separation of the estimated treatment zone from the affected river sediments. As with Alternative No. 1, key objectives of this approach would be to restore the site for relatively unrestricted site use and remove a sufficient amount of MGP source material to allow for natural attenuation of residual MGP affected groundwater.

Pilot tests would be performed to assess operational and performance characteristics for the SEVE that would include evaluation of anticipated steam and vacuum radius of influence and rates and quantities of MGP residual removal. These data would be used to optimize injection and dual phase extraction well geometry. In addition, the data would be used to perform an engineering evaluation of potential migration pathways that would need to be addressed prior to startup of the system operations.

Steam/air injection and liquid/vapor recovery would be routed to a process trailer equipped with a steam boiler and a steam stripper for the removal of MGP residuals from the recovered liquids. It is not anticipated that vapor phase treatment would be required. Discharge of vapor phase would be maintained below WDNR regulatory limits for total volatile organic emissions. However, the need for vapor phase treatment requirements for odor control would be assessed with regard to the potential impacts to residents on the basis of the proposed pilot tests. Treated water would be discharged to the river under an approved WPDES discharge permit.

Performance of the SEVE operations would require approximately two years to complete. Periodic monitoring of the system would be conducted to assess the effectiveness of the contaminant removal operations. In addition, soil vapor monitoring probes would be installed in key areas of concern for vapor phase migration to assess adequate vapor phase capture. For preliminary costing purposes, a minimum monitoring period of approximately 10 years was estimated.

Alternative Analysis

Key conclusions of the individual analysis of the threshold and primary balancing criteria provided in Table 14 indicate the following:

- Compliance with threshold criteria would be the same as for Alternative 1;
- As with biosparging, long-term effectiveness could be unacceptably influenced by heterogeneous subsurface conditions and stringers of phase separated coal tar. Pilot testing would be required to demonstrate viability;
- Operation and maintenance period (two years) would pose risk for direct contact exposure to site workers; and,
- Relatively high cost should be weighed against risk associated with achieving sufficient source removal to demonstrate natural attenuation.

6.3 Comparison of Alternatives

A comparative evaluation of each of the alternatives with respect to the primary balancing criteria is provided in Table 14 and is summarized below:

- Alternative No. 1, Source Area Excavation and Off-Site Treatment: This alternative would rank the highest with respect to long-term effectiveness if sufficient source material could be removed to rely on natural attenuation. Regardless, it would rank the highest with respect to reduction in total volume of MGP source material. It would pose the greatest risk for possible direct contact exposure with respect to short-term effectiveness during excavation. Implementability would be the most difficult due to extensive shoring and excavation dewatering requirements. Finally, with a cost greater than $6,000,000, this alternative is two to three times higher than the other alternatives.

- Alternative No. 2A, Full Source Area Encapsulation with Low Flow Biosparging: This alternative could potentially provide long-term effectiveness with a lower cost risk than Alternative Nos. 1 and 3, if adequate monitoring and inspection were maintained. This alternative would also pose substantially lower risks for direct contact exposure with respect to short-term effectiveness. Implementability would be the least intrusive because very limited excavation of affected soil would be required. Cost is substantially lower than Alternative Nos. 1 and 3.

- Alternative No. 2B, Partial Source Area Encapsulation with Interceptor Trench and Low Flow Biosparging: This alternative could also potentially provide long-term effectiveness with a lower cost risk than Alternative Nos. 1 and 3, if adequate monitoring and inspection were maintained. Long-term effectiveness could potentially be lower than Alternative No. 2A due to possible concerns associated with the reduced effectiveness of the interceptor trench during river flooding or high groundwater levels. Cost is the lowest of any of the three other alternatives but is in the same range as Alternative No 2A. Short-term effectiveness would pose slightly greater concerns for direct contact exposure to site workers due to excavation for the interceptor trench.

- Alternative No. 3, Steam Enhanced Vapor Extraction (SEVE): Greater uncertainty is associated with the long-term effectiveness of this alternative because performance would be contingent on pilot testing. Cost is higher than either Alternative No. 2A or 2B and also more uncertain given concerns with the depth of coal tar and heterogeneous subsurface conditions. Reduction in volume of MGP source material would not be potentially as great as for Alternative No. 1 because SEVE operations may not be able to fully mobilize lower heavy hydrocarbons. Cost could increase depending on length of the performance period to achieve sufficient source removal. Short-term effectiveness would pose some concern for worker direct contact exposure during SEVE operation.

6.4 Recommended Remedial Strategy

Alternative No. 1 consisting of Source Area Excavation and Off-Site Treatment is not recommended as a primary remedy on the basis of concerns associated with achieving full source removal (Long-Term Effectiveness). The extent of saturated source area essentially extends across the entire site to depths up to 21 feet bgs and into the river along the length of Campmarina and the right-of-way. Deep excavation would require extensive shoring that could not potentially fully encompass the source area such that source removal could not be effectively accomplished. If substantially complete source removal could be achieved, coal tar affected sediments would still remain directly along the river bank. These remaining affects would likely require continued institutional controls that would diminish the benefits associated with removal of the MGP affected soil. In addition, the anticipated high cost would not be warranted in the event, following source removal operations, reductions in groundwater concentrations were not realized.

Excavation would also pose significant concerns associated with the potential for direct contact exposure to the local community (Short-Term Effectiveness). Source removal operations could not likely be initiated prior to completion of the proposed condominium complex south of Campmarina and possibly before planned residential development directly north of Campmarina. The close proximity of these developments coupled with the anticipated horizontal and vertical extent of the excavation operations could make control of vapor phase and particulate migration difficult even during winter months.

Alternative No. 3 consisting of Steam Enhanced Vapor Extraction (SEVE) is also not recommended as a primary remedy based on concerns associated with achieving sufficient source removal (Long-Term Effectiveness). The stratification of intermixed stringers of coal tar with lenses of clay up to depths of approximately 21 feet bgs would pose substantial technical challenges with respect to effective SEVE operation with depth across the site. Extensive pilot testing would be required before a final determination could be made on the effectiveness of this alternative. Heterogeneous subsurface conditions could lead to extended operational requirements beyond the preliminary estimate of approximately two years which could substantially increase the overall project cost. If source removal was not successful, then as with the Alternative No. 1, the relatively high cost would not be warranted if essentially no change in the status of the site was realized.

Based on the comparative evaluation of the source removal options discussed above, either **Alternative No. 2A, Full Source Area Encapsulation with Low Flow Biosparging or 2B, Partial Source Area Encapsulation with an Interceptor Trench and Low Flow Biosparging** is recommended as a final land based remedy for the site. This recommendation is based on the following:

- The installation of an engineered vertical barrier wall could demonstrate long-term effectiveness with adequate inspection and monitoring. The use of engineered barriers at other MGP sites has been well demonstrated. The presence of a low permeability clay layer at a relatively shallow depth (less than 30 feet bgs) makes the site very well suited for barrier wall technology. Planned future use for Campmarina is as a neighborhood park. The design for an engineered cap could effectively be integrated with this type of planned land use;
- Reduction in toxicity and mobility would be achieved through containment;
- Gradual reduction in the overall volume of MGP related source material would be achieved through long-term low flow biosparging although the viability of this approach would need to be demonstrated through pilot testing;
- Short-term effectiveness would be enhanced because excavation and management of MGP affected soils would be limited and highly controlled;
- A variety of installation techniques and innovative materials are available for barrier wall systems and engineered caps that facilitate the implementability of this approach; and,
- Both alternatives offer lower cost approaches even with extended monitoring requirements.

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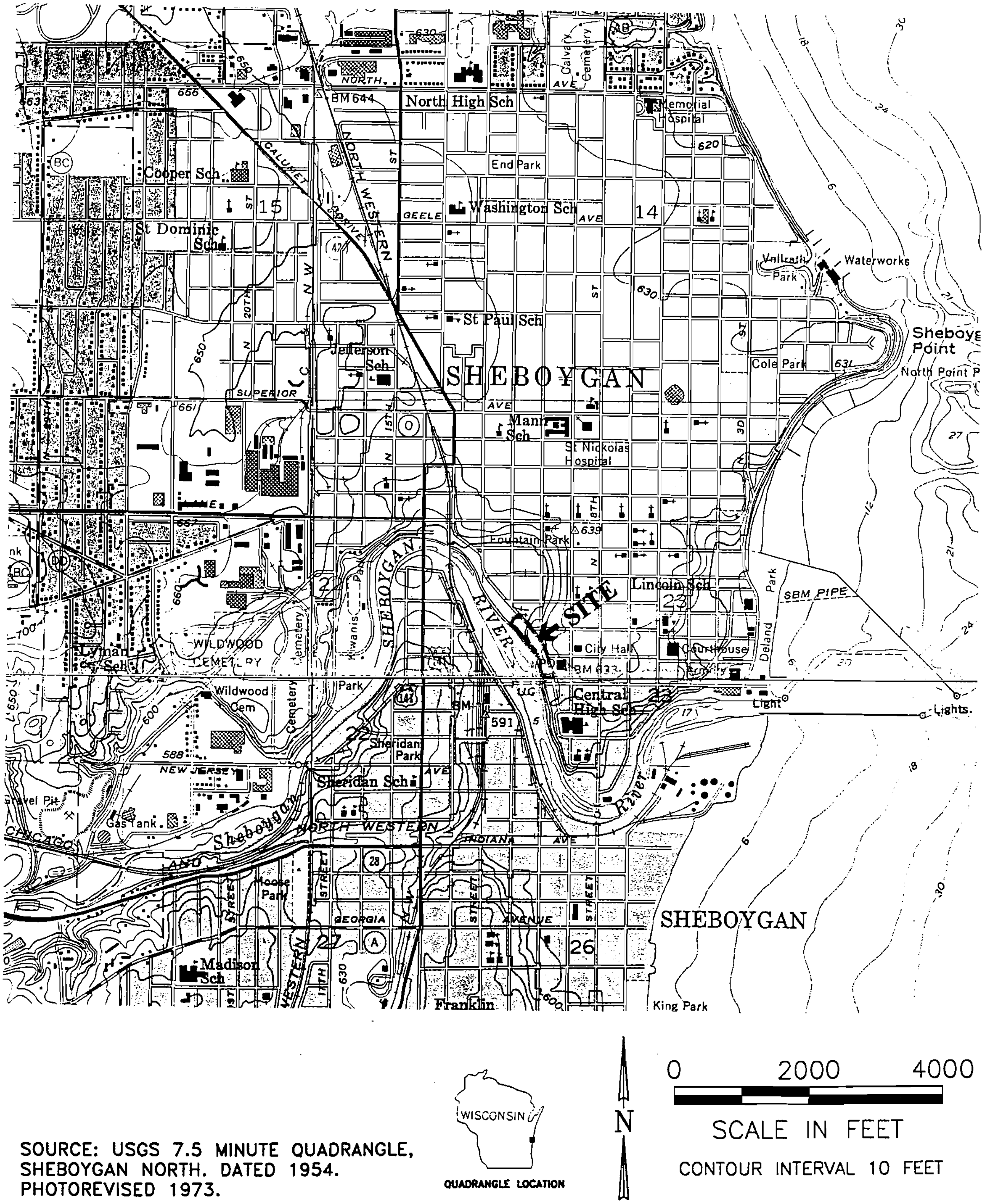
Wisconsin Department of Natural Resources, October 1995. *Sheboygan River Remedial Action Plan - A Plan to Clean Up Sheboygan Area Rivers and Harbor* (Sheboygan River RAP)

FIGURES



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

Natural Resource Technology

N R T

SITE LOCATION MAP

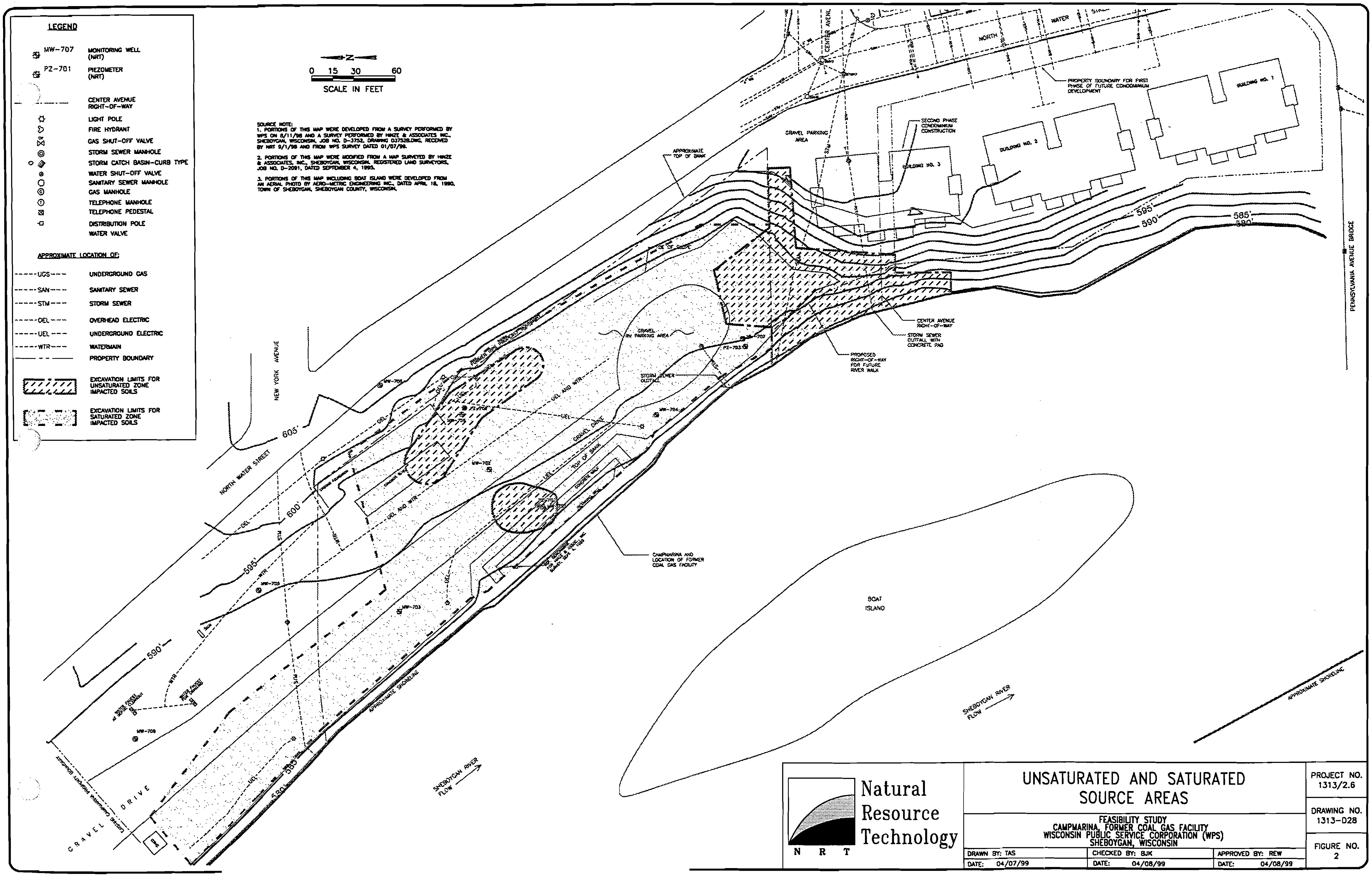
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPSC)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS
APPROVED BY:
DATE:

PROJECT NO.
1313

DRAWING NO.
1313-A01

FIGURE NO.
1



SOURCE NOTE:

1. PORTIONS OF THIS MAP WERE DEVELOPED FROM A SURVEY PERFORMED BY WPS ON 8/11/98 AND A SURVEY PERFORMED BY HINZE & ASSOCIATES INC., SHEBOYGAN, WISCONSIN, JOB NO. D-3752, DRAWING D3752B.DWG, RECEIVED BY NRT 9/1/98 AND FROM WPS SURVEY DATED 01/07/99.

2. PORTIONS OF THIS MAP WERE MODIFIED FROM A MAP SURVEYED BY HINZE & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN, REGISTERED LAND SURVEYORS, JOB NO. D-2091, DATED SEPTEMBER 4, 1995.

3. PORTIONS OF THIS MAP INCLUDING BOAT ISLAND WERE DEVELOPED FROM AN AERIAL PHOTO BY AERO-METRIC ENGINEERING INC., DATED APRIL 18, 1990, TOWN OF SHEBOYGAN, SHEBOYGAN COUNTY, WISCONSIN.

Natural
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UNSATURATED AND SATURATED SOURCE AREAS

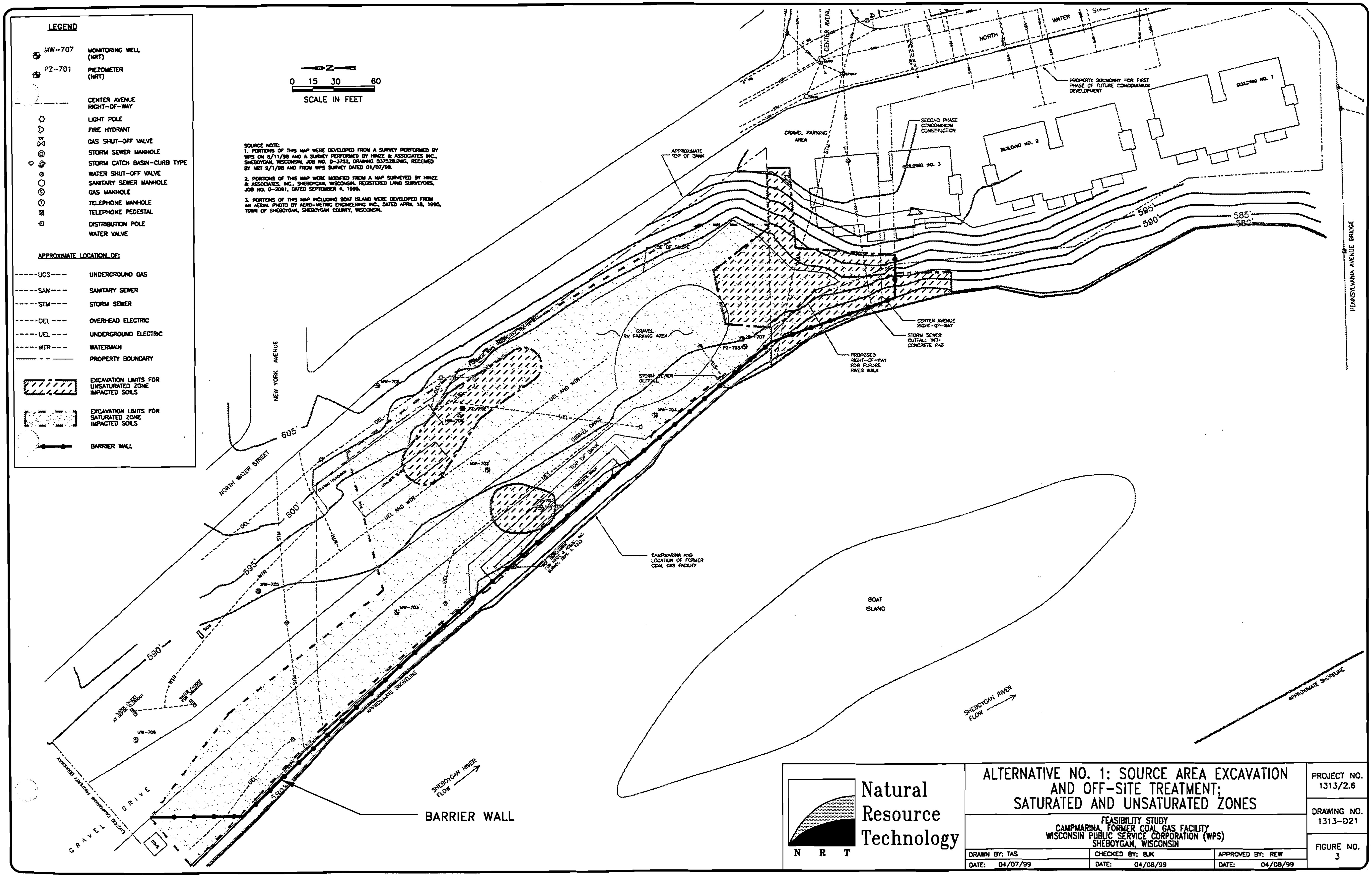
FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPS)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	CHECKED BY: BJK	APPROVED BY: REW
DATE: 04/07/99	DATE: 04/08/99	DATE: 04/08/99

PROJECT NO. 1313/2.6

DRAWING NO. 1313-028

FIGURE NO. 2



LEGEND

MW-707	MONITORING WELL (NRT)
PZ-701	PIEZOMETER (NRT)
‒ · ‒ · ‒	CENTER AVENUE RIGHT-OF-WAY
☼	LIGHT POLE
	FIRE HYDRANT
⋈	GAS SHUT-OFF VALVE
◎	STORM SEWER MANHOLE
	STORM CATCH BASIN-CURB TYPE
⊗	WATER SHUT-OFF VALVE
○	SANITARY SEWER MANHOLE
Ⓢ	GAS MANHOLE
Ⓣ	TELEPHONE MANHOLE
⊠	TELEPHONE PEDESTAL
	DISTRIBUTION POLE
	WATER VALVE

APPROXIMATE LOCATION OF:

-----UGS---	UNDERGROUND GAS
-----SAN---	SANITARY SEWER
-----STM---	STORM SEWER
-----OEL---	OVERHEAD ELECTRIC
-----UEL---	UNDERGROUND ELECTRIC
-----WTR---	WATERMAIN
——— - - ———	PROPERTY BOUNDARY
▨	EXCAVATION LIMITS FOR UNSATURATED ZONE IMPACTED SOILS
░	EXCAVATION LIMITS FOR SATURATED ZONE IMPACTED SOILS
—●—●—	BARRIER WALL

SOURCE NOTE:

1. PORTIONS OF THIS MAP WERE DEVELOPED FROM A SURVEY PERFORMED BY WPS ON 8/11/98 AND A SURVEY PERFORMED BY HINZE & ASSOCIATES INC., SHEBOYGAN, WISCONSIN, JOB NO. D-3752, DRAWING D3752B.DWG, RECEIVED BY NRT 9/1/98 AND FROM WPS SURVEY DATED 01/07/99.

2. PORTIONS OF THIS MAP WERE MODIFIED FROM A MAP SURVEYED BY HINZE & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN. REGISTERED LAND SURVEYORS, JOB NO. D-2091, DATED SEPTEMBER 4, 1995.

3. PORTIONS OF THIS MAP INCLUDING BOAT ISLAND WERE DEVELOPED FROM AN AERIAL PHOTO BY AERO-METRIC ENGINEERING INC., DATED APRIL 18, 1990, TOWN OF SHEBOYGAN, SHEBOYGAN COUNTY, WISCONSIN.

Natural
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ALTERNATIVE NO. 1: SOURCE AREA EXCAVATION AND OFF-SITE TREATMENT; SATURATED AND UNSATURATED ZONES

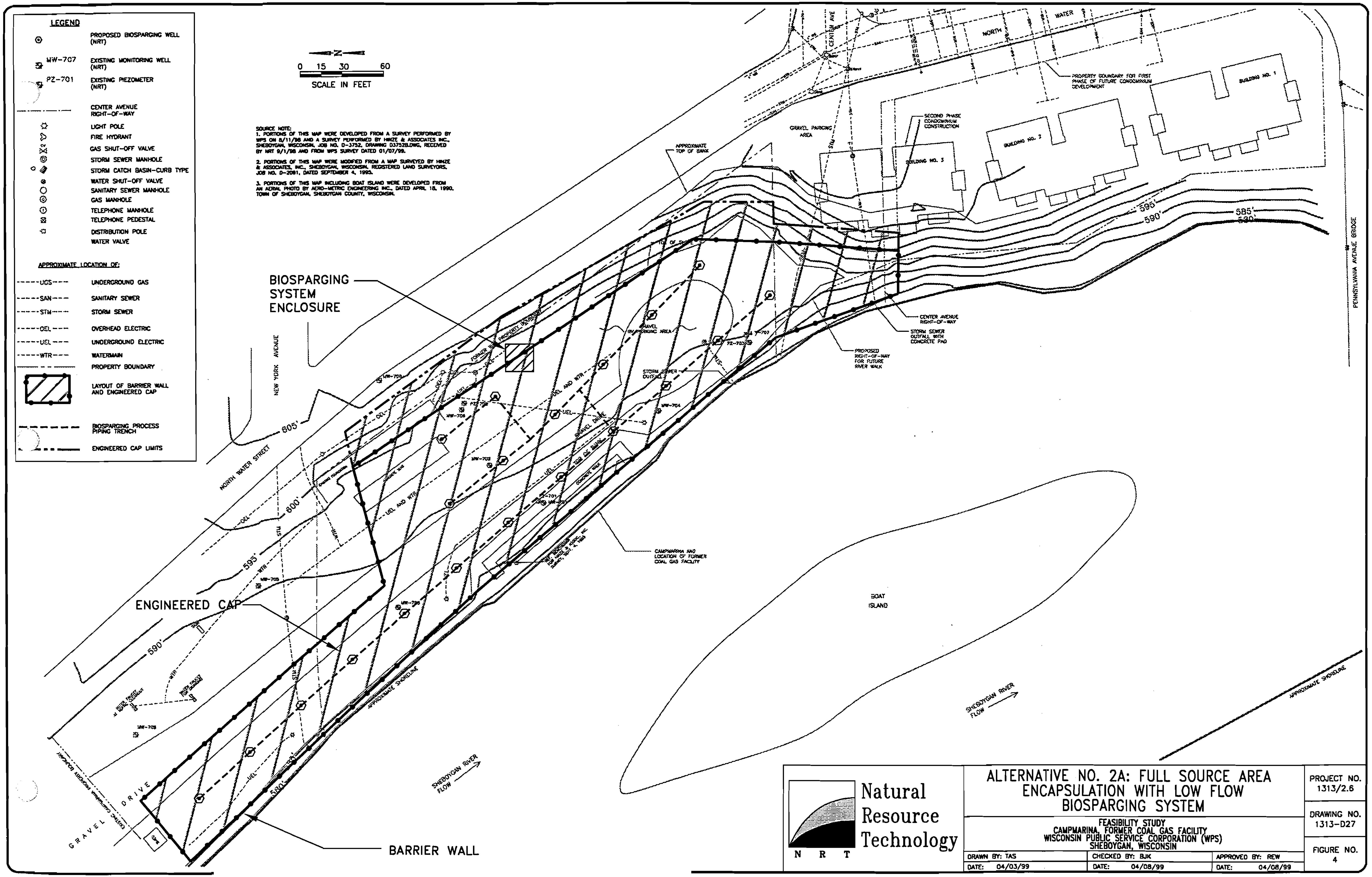
FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPS)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	CHECKED BY: BJK	APPROVED BY: REW
DATE: 04/07/99	DATE: 04/08/99	DATE: 04/08/99

PROJECT NO.
1313/2.6

DRAWING NO.
1313-D21

FIGURE NO.
3



SOURCE NOTE:

1. PORTIONS OF THIS MAP WERE DEVELOPED FROM A SURVEY PERFORMED BY WPS ON 8/11/98 AND A SURVEY PERFORMED BY HINZE & ASSOCIATES INC., SHEBOYGAN, WISCONSIN, JOB NO. 0-3752, DRAWING 03752BLDWG, RECEIVED BY NRT 9/1/98 AND FROM WPS SURVEY DATED 01/07/99.

2. PORTIONS OF THIS MAP WERE MODIFIED FROM A MAP SURVEYED BY HINZE & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN, REGISTERED LAND SURVEYORS, JOB NO. 0-2081, DATED SEPTEMBER 4, 1995.

3. PORTIONS OF THIS MAP INCLUDING BOAT ISLAND WERE DEVELOPED FROM AN AERIAL PHOTO BY AERO-METRIC ENGINEERING INC., DATED APRIL 18, 1990. TOWN OF SHEBOYGAN, SHEBOYGAN COUNTY, WISCONSIN.

Natural Resource Technology
N R T

ALTERNATIVE NO. 2A: FULL SOURCE AREA ENCAPSULATION WITH LOW FLOW BIOSPARGING SYSTEM

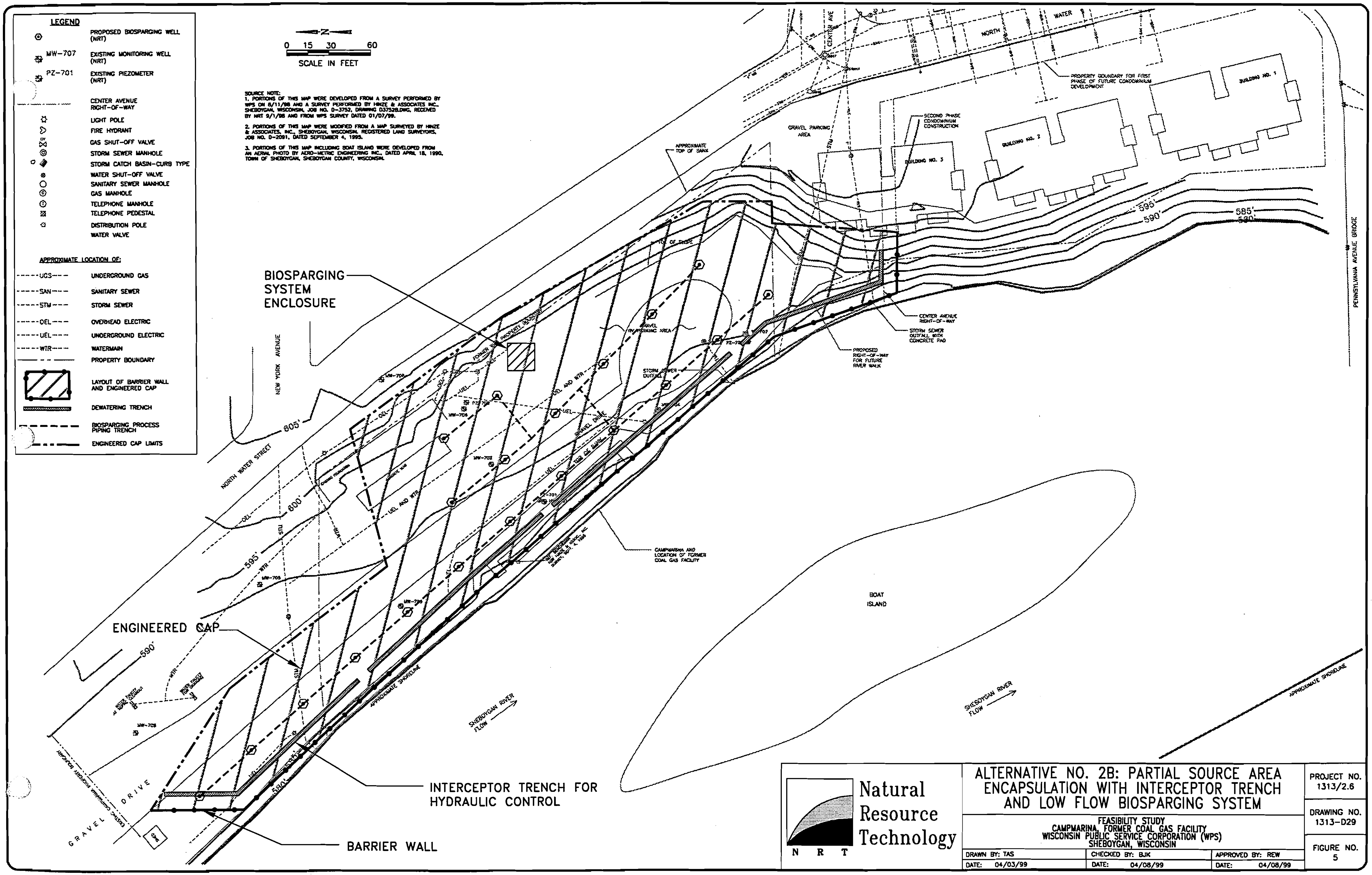
FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPS)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	CHECKED BY: BJK	APPROVED BY: REW
DATE: 04/03/99	DATE: 04/08/99	DATE: 04/08/99

PROJECT NO. 1313/2.6

DRAWING NO. 1313-D27

FIGURE NO. 4



SOURCE NOTE:
1. PORTIONS OF THIS MAP WERE DEVELOPED FROM A SURVEY PERFORMED BY WPS ON 8/11/98 AND A SURVEY PERFORMED BY HINZE & ASSOCIATES INC., SHEBOYGAN, WISCONSIN, JOB NO. 0-3752, DRAWING D3752B.DWG, RECEIVED BY NRT 9/1/98 AND FROM WPS SURVEY DATED 01/07/99.

2. PORTIONS OF THIS MAP WERE MODIFIED FROM A MAP SURVEYED BY HINZE & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN. REGISTERED LAND SURVEYORS, JOB NO. 0-2091, DATED SEPTEMBER 4, 1995.

3. PORTIONS OF THIS MAP INCLUDING BOAT ISLAND WERE DEVELOPED FROM AN AERIAL PHOTO BY AERO-METRIC ENGINEERING INC., DATED APRIL 18, 1990, TOWN OF SHEBOYGAN, SHEBOYGAN COUNTY, WISCONSIN.

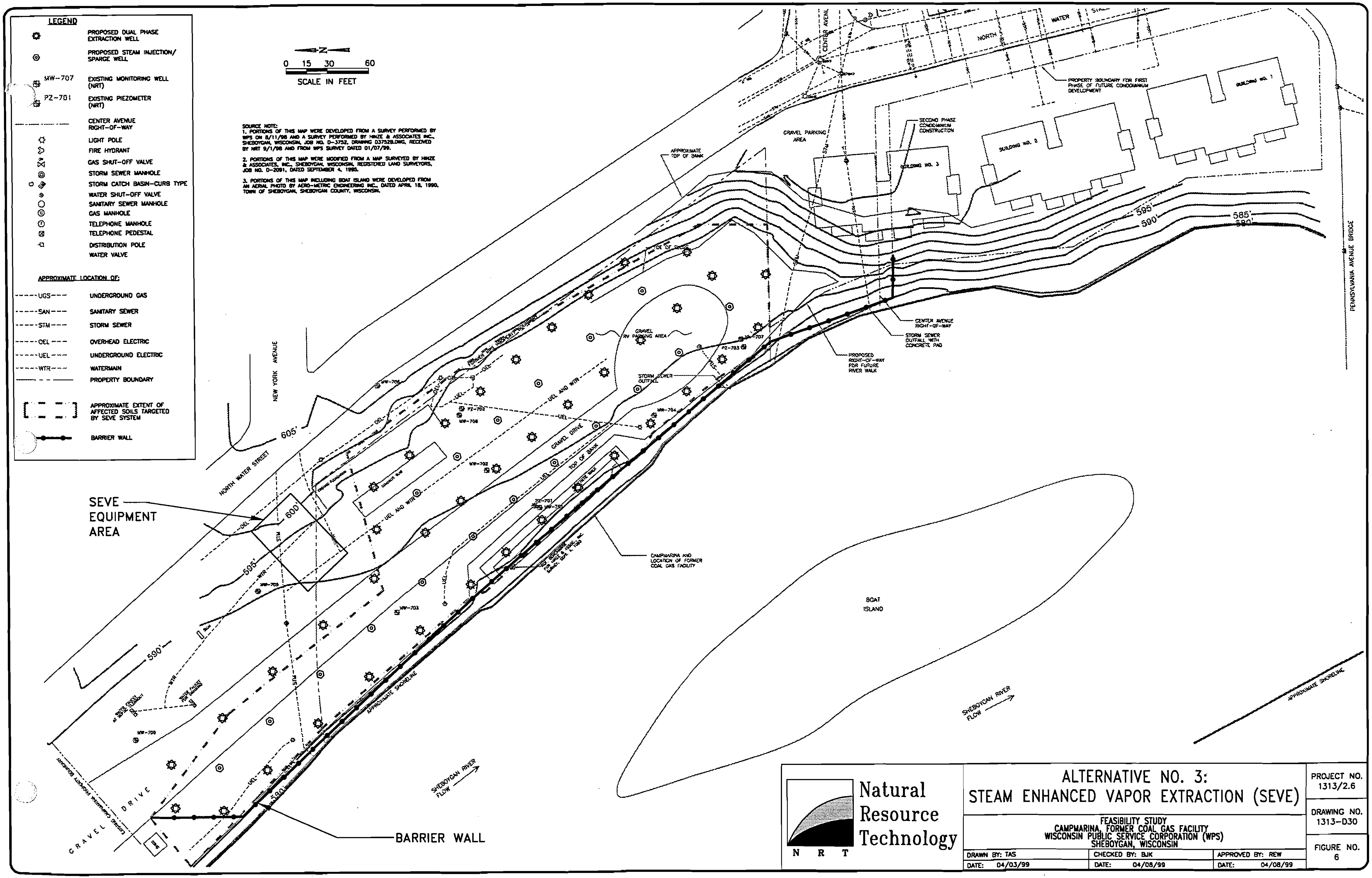
Natural Resource Technology
N R T

ALTERNATIVE NO. 2B: PARTIAL SOURCE AREA ENCAPSULATION WITH INTERCEPTOR TRENCH AND LOW FLOW BIOSPARGING SYSTEM

FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPS)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	CHECKED BY: BJK	APPROVED BY: REW
DATE: 04/03/99	DATE: 04/08/99	DATE: 04/08/99

PROJECT NO. 1313/2.6
DRAWING NO. 1313-D29
FIGURE NO. 5



LEGEND

✪	PROPOSED DUAL PHASE EXTRACTION WELL
◎	PROPOSED STEAM INJECTION/ SPARGE WELL
MW-707	EXISTING MONITORING WELL (NRT)
PZ-701	EXISTING PIEZOMETER (NRT)
— - — - —	CENTER AVENUE RIGHT-OF-WAY
☼	LIGHT POLE
	FIRE HYDRANT
	GAS SHUT-OFF VALVE
◎	STORM SEWER MANHOLE
	STORM CATCH BASIN-CURB TYPE
	WATER SHUT-OFF VALVE
○	SANITARY SEWER MANHOLE
Ⓖ	GAS MANHOLE
Ⓣ	TELEPHONE MANHOLE
⊠	TELEPHONE PEDESTAL
	DISTRIBUTION POLE
	WATER VALVE

APPROXIMATE LOCATION OF:

-----UGS---	UNDERGROUND GAS
-----SAN---	SANITARY SEWER
-----STM---	STORM SEWER
-----OEL---	OVERHEAD ELECTRIC
-----UEL---	UNDERGROUND ELECTRIC
-----WTR---	WATERMAIN
——— - — -	PROPERTY BOUNDARY
[— — —]	APPROXIMATE EXTENT OF AFFECTED SOILS TARGETED BY SEVE SYSTEM
—●—●—	BARRIER WALL

SOURCE NOTE:
1. PORTIONS OF THIS MAP WERE DEVELOPED FROM A SURVEY PERFORMED BY WPS ON 8/11/98 AND A SURVEY PERFORMED BY HINZE & ASSOCIATES INC., SHEBOYGAN, WISCONSIN, JOB NO. D-3752, DRAWING D3752B.DWG, RECEIVED BY NRT 9/1/98 AND FROM WPS SURVEY DATED 01/07/99.

2. PORTIONS OF THIS MAP WERE MODIFIED FROM A MAP SURVEYED BY HINZE & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN, REGISTERED LAND SURVEYORS, JOB NO. D-2091, DATED SEPTEMBER 4, 1995.

3. PORTIONS OF THIS MAP INCLUDING BOAT ISLAND WERE DEVELOPED FROM AN AERIAL PHOTO BY AERO-METRIC ENGINEERING INC., DATED APRIL 18, 1990, TOWN OF SHEBOYGAN, SHEBOYGAN COUNTY, WISCONSIN.

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ALTERNATIVE NO. 3:
STEAM ENHANCED VAPOR EXTRACTION (SEVE)

FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPS)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	CHECKED BY: BJK	APPROVED BY: REW
DATE: 04/03/99	DATE: 04/08/99	DATE: 04/08/99

PROJECT NO.
1313/2.6

DRAWING NO.
1313-D30

FIGURE NO.
6

TABLES

Table 1 - Well Construction and Groundwater Elevation Data
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

Monitoring Location	Ground Surface Elevation (feet, MSL)	Top of PVC Elevation (feet, MSL)	Total Well Depth (feet)	Screen Length (feet)	Top of Screen Elevation (feet, MSL)	Monitoring Date	Depth to Water (feet)	Groundwater Elevation (feet, MSL)
MW-701	588.97	588.51	13.4	10	585.11	08/14/95	5.51	583.00
						08/20/95	5.63	582.88
						09/25/95	5.58	582.93
						12/21/98	5.72	582.79
PZ-701	589.28	588.89	33.80	5	560.09	08/14/95	13.27	575.62
						08/20/95	15.15	573.74
						09/25/95	16.26	572.63
						12/21/98	6.70	582.19
MW-702	590.39	590.09	13.40	10	586.69	08/14/95	4.86	585.23
						08/20/95	4.69	585.40
						09/25/95	4.88	585.21
						12/21/98	4.83	585.26
MW-703	589.16	588.80	13.46	10	585.34	08/14/95	5.63	583.17
						08/20/95	5.69	583.11
						09/25/95	5.74	583.06
						12/21/98	5.7	583.10
MW-704	589.43	589.05	13.20	10	585.85	08/14/95	5.93	583.12
						08/20/95	5.96	583.09
						09/25/95	6.00	583.05
						12/21/98	5.63	583.42
MW-705	590.22	589.91	13.45	10	586.46	08/14/95	6.95	582.96
						08/20/95	6.07	583.84
						09/25/95	6.09	583.82
						12/21/98	6.14	583.77
MW-706	591.51	591.34	13.4 *	10	587.94	08/14/95	3.5 *	587.8 *
						08/20/95	3.4 *	587.9 *
						09/25/95	3.6 *	587.7 *
						12/21/98	3.34	588.00
PZ-702	591.62	591.16	35 *	5	561.2	12/21/98	2.61	588.55
MW-707	590.29	590.08	13.35	10	586.73	08/14/95	7.48	582.60
						08/20/95	7.71	582.37
						09/25/95	7.67	582.41
						12/21/98	6.65	583.43
PZ-703	589.85	589.22	35 *	5	559.2	12/21/98	8.63	580.59
							8.96	580.26
MW-708	606.45	606.09	19.65	15	601.44	12/10/98	16.39	589.70
						12/21/98	16.78	589.31
MW-709	588.51	587.95	12.50	10	585.45	12/21/98	7.27	580.68
SG-701	na	582.02	na	na	na	08/14/95	2.00	580.02
						08/20/95	2.33	579.69
						09/25/95	2.49	579.53
SG-702	na	581.37	an	na	na	12/21/98	2.33	579.04

(O-BJK/DVP-02/05/99)

Notes:
Elevations are referenced to United States Geologic Survey Geodetic Sea Level Datum.
Estimated value.

Table 2 - Soil Analytical Results - Lead, Cyanide, Phenol, and BTEX
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

			mg/kg				µg/kg				
Sampling Location	**Sampling Depth (feet below ground surface)**	**Sampling Date**	**Lead, total**	**Cyanide, total**	**Cyanide, weak acid dissociable**	**Phenolics, total recoverable**	**Benzene**	**Ethylbenzene**	**Toluene**	**Total Xylenes**	**Total BETX**
Soil Samples Collected from the Unsaturated Zone											
HA-701	2	07/29/98	350	89	46	2,380	130	<25	140	110	380
SS-701	0.5	07/29/98	410	17 *	3.2	342	<25	<25	<25	36	36
TP-701	2-8	07/29/98	540	78	17	2,990	230	38	270	330	868
	8-9	07/29/98	17	0.68	<0.19	142 *	<25	<25	<25	72	72
TP-702	2-7	07/29/98	110	3.8	<0.18	2,270	<25	<25	<25	<25	nd
	7-10	07/29/98	12	0.85	<0.20	114 *	<25	<25	<25	<25	nd
TP-703	4-6	07/29/98	260	23	0.83	557	<25	<25	<25	<25	nd
	9-10	07/29/98	<3.6	0.4 *	<0.18	102 *	<25	<25	<25	<25	nd
TP-704	3-4	07/29/98	8.5 *	1.2	0.66	58 *	<25	<25	<25	39	39
	7-8	07/29/98	20	5.6	0.31 *	<52	<25	<25	<25	<25	nd
TP-705	5	07/29/98	980	2,300	260	5,110	110	<25	89 *	62 *	261
TP-706	1-8	07/29/98	530	22	1.9	709	<25	<25	<25	<25	nd
SB-717	11-11.5	07/29/98	110	<0.18	<0.18	760	<25	<25	<25	<25	nd
SB-718	13-13.5	07/29/98	280	3.7	<0.18	98 *	<25	<25	<25	<25	nd
SB-719	11-11.5	07/29/98	190	6.6	0.330 *	230	<25	<25	<25	<25	nd
SB-720	10-10.5	07/29/98	400	120	42	3,130	500 *	<310	440 *	<310	940
SB-721	12-14	10/27/98	na	na	na	na	<25	<25	<25	<50	nd
SB-722	10-12	10/27/98	na	na	na	na	<25	<25	<25	<50	nd
Groundwater Pathway RCL			ne	ne	ne	ne	5.5	2,900	1,500	4,100	ne
Direct Contact Pathway-Non-industrial RCL			50	ne	ne	ne	ne	ne	ne	ne	ne
Direct Contact Pathway-Industrial RCL			500	ne	ne	ne	ne	ne	ne	ne	ne
US EPA Residential PRGs			400	ne	1,300	39,000	630	230,000	790,000	320,000	ne
US EPA Industrial PRGs			1,000	ne	1,400	100,000	1,400	230,000	880,000	320,000	ne
TACO - Construction Worker SRO			400	4,100	ne	120,000	2,100,000	58,000,000	42,000,000	410,000,000	ne

Table 2, continued - Soil Analytical Results - Lead, Cyanide, Phenol, and BTEX
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

			mg/kg				µg/kg				
Sampling Location	**Sampling Depth (feet below ground surface)**	**Sampling Date**	**Lead, total**	**Cyanide, total**	**Cyanide, weak acid dissociable**	**Phenolics, total recoverable**	**Benzene**	**Ethylbenzene**	**Toluene**	**Total Xylene**	**Total BETX**
				Soil Samples Collected from the Saturated Zone							
SB-724	**26-28**	12/09/98	**5.7**	<0.023	na	na	<9.0	<4.5	<4.2	<28	nd
SB-725	**5-6**	12/08/98	**11**	**0.15**	na	na	<9.0	<4.5	<4.2	<28	nd
SB-726	**11-12**	12/09/98	**61**	**380**	na	na	**27 ***	<4.5	<4.2	<28	**27**
SB-732	**12-14**	12/10/98	**5.2**	**0.049 ***	na	na	**300**	**2521**	**43**	**1,681**	**4,588**
SB-733	**10-12**	12/09/98	**5.0 ***	**0.12**	na	na	**25,700**	**5,490**	**55,400**	**49,900**	**136,490**
SB-734	**12-14**	12/09/98	**20**	**2.5**	na	na	**309**	**370**	**177**	**387**	**1,243**
SB-735	**10-12**	12/10/98	**10**	**164**	na	na	**172**	**7,070**	**1,150**	**13,460**	**21,852**
SB-736	**6-8**	12/08/98	**19**	**1.2**	na	na	**314**	**255**	<4.2	**228**	**797**
SB-739	**6-8**	12/09/98	**634**	**0.13**	na	na	<9.0	**1,810**	**156**	**6,020**	**7,986**
PZ-702	**14-16**	12/09/98	**3.3 ***	**0.024 ***	na	na	**259,000**	**168,000**	**572,000**	**599,000**	**1,598,000**
PZ-703	**16-18**	12/08/98	**3.8 ***	**0.024 ***	na	na	**1,490**	**10,600**	**82**	**2,900**	**15,072**

SAG/BJK/DVP-02/17/99

Notes:

1) * - Parameter detected above the limit of detection (LOD) but below the limit of quantitation (LOQ).
2) TACO - Illinois Tiered Approach to Cleanup Objectives.
3) TACO total cyanide SRO shown is for amenable species.
4) SRO - Soil remediation objectives for inhalation (BTEX) and ingestion (lead, cyanide, phenolics).
5) Concentrations which attain or exceed an NR 720 Direct Contact Pathway-Non-industrial RCL are boxed.
6) Concentrations which attain or exceed NR 720 Groundwater Pathway RCLs and/or Direct Contact Pathway-Industrial RCLs have been boxed and shaded.
7) ne - not established.
8) Bold numbers indicate detected concentrations.
9) nd - not detected.
10) < - Parameter was not detected above the indicated detection limit.
11) PRG = US EPA Region 9 Preliminary Remediation Goals for direct contact.
12) PRGs assume all dissociable cyanide as free cyanide.
13) Concentrations which attain or exceed PRGs and/or TACO SROs are underlined.

Table 3 - Soil Analytical Results - PAHs
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

			POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs) (mg/kg)																				
Sampling Location	Sampling Depth (feet)	Sampling Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) fluoranthene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Total PAHs
Soil Samples Collected from the Unsaturated Zone																							
HA-701	2	07/29/98	<1.4	12	3.8	49	17	56	25	32	58	13	72	<1.5	25	3 *	4.3 *	10	47	60	487
SS-701	0.5	07/29/98	0.54	1.4	1.4	7.2	4.5	7.3	2.8	7.1	8.2	1.9	14	0.68 *	3.2	0.39 *	0.56 *	0.62 *	7.1	11	79.9
TP-701	2-8	07/29/98	<0.770	4.3	3.0	25	19	56	18	36	34	11	23	1 *	23	0.950 *	1.7 *	4.3	11	20	291
	8-9	07/29/98	<0.015	0.04	0.046	0.51	0.56	0.57	0.3	0.35	0.46	0.16	0.67	<0.015	0.31	<0.016	<0.015	0.034 *	0.16	0.51	4.7
TP-702	2-7	07/29/98	22	<2.4	29	40	36	27	18	28	39	10	110	21	18	4.5 *	7.5	13	140	71	634
	7-10	07/29/98	<0.015	0.073	0.12	0.65	0.71	0.71	0.52	0.56	0.59	0.22	1.1	0.043 *	0.5	<0.017	0.022 *	0.071	0.48	0.78	7.1
TP-703	4-6	07/29/98	0.2 *	0.84	1.9	6.2	5.1	6.8	2.8	2.9	5.6	1.4	11	1	3	<0.160	0.2 *	0.41 *	5.2	8.1	62.7
	9-10	07/29/98	<0.014	<0.016	<0.015	<0.016	<0.014	<0.016	<0.017	<0.016	<0.016	<0.017	<0.015	<0.015	<0.017	<0.016	<0.014	<0.017	<0.013	<0.016	nd
TP-704	3-4	07/29/98	<0.014	<0.016	<0.015	0.1	0.13	0.098	0.12	0.094	0.11	0.041 *	0.13	<0.014	0.083	<0.015	0.014 *	<0.017	0.069	0.14	1.1
	7-8	07/29/98	<0.015	0.093	0.047 *	0.66	1	0.81	0.8	0.59	0.67	0.29	0.6	<0.015	0.61	<0.016	0.05	0.052 *	0.19	0.67	7.1
TP-705	5	07/29/98	<2.4	10	5.3	100	43	190	57	120	140	32	47	<2.5	77	<2.7	3.3 *	19	14	45	903
TP-706	1-8	07/29/98	2.5	<0.67	4.7	13	11	11	8.2	9.8	13	3.6	29	2.2	7.6	<0.65	<0.58	1.1 *	27	21	165
SB-717	11-11.5	07/29/98	<0.046	<0.053	0.094 *	0.38	0.37	0.36	0.37	0.24	0.39	<0.055	0.74	<0.048	0.29	<0.052	0.064 *	<0.057	0.49	0.73	4.5
SB-718	13-13.5	07/29/98	0.77	<0.130	0.99	2.4	2.2	2.3	1.2	1.5	2.2	0.55	5.6	0.64	1.2	0.160 *	0.290 *	0.210 *	5.7	4.1	32.0
SB-719	11-11.5	07/29/98	0.6	0.18	1.1	3.5	3.2	3.5	1.2	2.3	3.6	0.68	7.3	0.57	1.5	0.160 *	0.210 *	0.360 *	6.5	6	42.5
SB-720	10-10.5	07/29/98	<5.6	9 *	<6	76	15 *	82	24	49	93	15 *	250	<5.8	30	150	140	170	310	170	1,583
SB-721	12-14	10/27/98	<0.016	<0.018	<0.017	<0.018	<0.016	<0.018	<0.019	<0.018	<0.018	<0.019	<0.017	<0.017	<0.019	<0.018	<0.016	<0.020	<0.015	<0.018	nd
SB-722	10-12	10/27/98	<0.015	<0.018	<0.017	<0.017	<0.015	<0.017	<0.018	<0.017	<0.017	<0.018	<0.016	<0.016	<0.018	<0.017	<0.015	<0.019	<0.015	<0.017	nd
**Groundwater Pathway RCL			38	0.7	3,000	17	48	360	6,800	870	37	38	500	100	680	23	20	0.4	1.8	8,700	ne
**Direct Contact Pathway-Non-industrial RCL			900	18	5,000	0.088	0.0088	0.088	1.8	0.88	8.8	0.0088	600	600	0.088	1,100	600	20	18	500	ne
**Direct Contact Pathway-Industrial RCL			60,000	360	300,000	3.9	0.39	3.9	39	39	390	0.39	40,000	40,000	3.9	70,000	40,000	110	390	30,000	ne
US EPA Residential PRGs			110	ne	5.7	0.61	0.061	0.61	ne	6.1	7.2	0.061	2,600	90	0.61	ne	ne	240	ne	100	ne
US EPA Industrial PRGs			110	ne	5.7	2.6	0.26	2.6	ne	26	7.2	0.26	27,000	90	2.6	ne	ne	240	ne	100	ne
TACO - Construction Worker SRO			120,000	ne	610,000	170	17	170	ne	1,700	17,000	17	82,000	82,000	170	ne	ne	8,200	ne	61,000	ne
Soil Samples Collected from the Saturated Zone																							
SB-724	26-28	12/09/98	<0.059	<0.055	0.015	0.035	0.027 *	0.034	0.066	0.011	0.034	<0.011	0.04	<0.0023	0.018	<0.039	<0.038	0.063 *	0.042	0.06	0.4
SB-725	5-6	12/08/98	<0.064	<0.059	<0.0047	<0.0047	0.017 *	0.013 *	<0.010	<0.010	<0.0041	<0.011	<0.010	<0.0025	0.0075 *	<0.042	<0.041	<0.033	0.0056 *	0.024 *	0.1
SB-726	11-12	12/09/98	<0.577	<0.539	0.289	3.46	0.622	2.65	1.18	1.35	4.86	<0.104	9.99	<0.023	1.86	<0.385	<0.373	<0.296	5.65	15	46.9
SB-732	12-14***	12/10/98***	0.222	0.122	0.146	0.076	0.046	0.031	<0.0088	0.017 *	0.051	0.016 *	0.163	0.231	0.0066 *	0.201	0.051	0.699	0.549	0.583	3.2
	12-14***	12/10/98***	0.068 *	0.300	0.048	<0.0047	<0.0095	0.0064 *	<0.010	<0.010	0.0068 *	<0.0012	0.106	0.152	<0.0052	0.245	0.061 *	1.3	0.256	0.219	2.8
SB-733	10-12	12/09/98	<0.567	65.7	42.4	34.6	14.8	9.03	4.99	3.71	15.1	10.0	66.2	<0.022	6.91	70.4	48.7	309	130	179	1,011
SB-734	12-14	12/09/98	11.8	<0.516	16.2	32.5	14.3	10.7	6.32	3.65	13.9	9.47	41.1	20.1	8.49	7.24	<0.357	5.85	44.9	66.4	313
SB-735	10-12	12/10/98	<0.586	87	36.3	39.7	16.2	9.4	6.24	3.76	14.3	10.9	54.8	54.5	8.11	68.5	50.1	268	101	123	952
SB-736	6-8	12/08/98	9.95	2.56	12.6	5.23	4.64	1.77	1.56	1.58	1.54	<0.012	14.8	7.01	1.97	5.21	<0.044	3.56	30.4	38.6	143
SB-739	6-8	12/09/98	<0.085	<0.079	0.626	0.972	1.22	1.14	0.909	0.463	1.54	<0.015	2.28	0.422	0.581	0.084 *	<0.055	1.68	2.32	3.05	17.3
PZ-702	14-16	12/09/98	503	479	159	133	47.8	44.5	15.8	12.4	60.2	39.9	243	<0.023	24	264	226	1,400	543	729	4,924
PZ-703	16-18	12/08/98	1.04	<0.065	0.031	<0.0051	0.045	0.045	0.039	0.026 *	<0.0045	<0.013	0.122	<0.0027	0.053	0.697	1.81	10.7	0.116	0.126	14.9

SAG/BJK/DVP-02/17/99

Notes:
1) * - Parameter detected above the limit of detection (LOD) but below the limit of quantitation (LOQ).
2) TACO - Illinois Tiered Approach to Cleanup Objectives.
3) SRO - Soil remediation objectives for ingestion.
4) PRG - US EPA Region 9 Preliminary Remediation Goals for direct contact.
5) Concentrations which attain or exceed residential PRGs are boxed.
6) < - Parameter was not detected above the indicated detection limit.
7) *** - The laboratory surrogate recovery was below laboratory limits. The sample was re-extracted past hold time and analyzed. Both results are reported.
8) ** - RCLs for polynuclear aromatic hydrocarbon compounds reflect interim standards proposed in the WDNR publication RR-519-97, dated April, 1997.
9) Bold numbers indicate detected concentrations.
10) ne - not established.
11) nd - not detected.

Table 4 - Groundwater Analytical Results - Cyanide and BTEX
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

		Cyanide (mg/L)			BTEX (µg/L)				
Sampling Location	**Sampling Date**	**Cyanide (amenable)**	**Cyanide (dissociable)**	**Cyanide, total (dissolved)**	**Benzene**	**Ethylbenzene**	**Toluene**	**Total Xylene**	**Total BETX**
MW-701	08/15/95	<0.0050	**0.025**	**0.11**	**10,000**	**880**	**96**	**820**	**11,796**
	09/25/95	<0.0050	**0.020**	**0.088**	**12,000**	**780**	**53**	**680**	**13,513**
	12/21/98	**0.05**	**0.11**	**0.17**	**10,200**	**818**	**77 ***	**717**	**11,812**
PZ-701	08/17/95	**0.02**	<0.0050	**0.02**	**5**	**3.6**	**6.3**	**11**	**25.9**
	09/25/95	**0.014**	<0.0050	**0.014**	**2.2**	**1.7**	**6.6**	**6.8**	**17.3**
	12/21/98	--	--	--	**0.96 ***	**1.1 ***	**1.8 ***	**4.2 ***	**8.1**
MW-702	08/15/95	<0.0050	**0.043**	**0.20**	**5,900**	**1,500**	**2,300**	**1,600**	**11,300**
	09/25/95	<0.0050	**0.032**	**0.072**	**6,100**	**1,400**	**2,100**	**1,400**	**11,000**
MW-703	08/15/95	<0.0050	**0.039**	**0.12**	**1,300**	**980**	**29**	**430**	**2,739**
	09/25/95	<0.0050	**0.028**	**0.14**	**1,300**	**1,100**	**23**	**450**	**2,873**
	12/21/98	**0.05**	**0.074**	**0.20**	**1,190**	**973**	**9.2 ***	**408**	**2,580**
MW-704	08/15/95	<0.0050	**0.056**	**0.31**	**340**	**280**	**200**	**430**	**1,250**
[MW-799]	08/15/95^{A}	**0.190**	**0.022**	**0.29**	**310**	**280**	**190**	**440**	**1,220**
	09/25/95	<0.0050	**0.062**	**0.28**	**1,100**	**670**	**380**	**970**	**3,120**
[MW-799]	09/25/95^{A}	**0.02**	**0.041**	**0.36**	**1,100**	**610**	**360**	**900**	**2,970**
	12/21/98	**0.22**	**0.017**	**0.31**	**29**	**13**	**1.6 ***	**11.3**	**55**
[MW-B]	12/21/98^{A}	**0.29**	**0.023**	**0.29**	**22**	**9.5**	**1.2 ***	**8.7 ***	**41**
MW-705	08/15/95	<0.0050	<0.0050	<0.0050	<1.0	<1.0	<1.0	<3.0	nd
	09/25/95	<0.0050	<0.0050	<0.0050	<0.50	<1.0	<1.0	<3.0	nd
	12/21/98	<0.001	<0.001	<0.001	<0.50	<0.60	<0.60	<2.2	nd
[MW-A]	12/21/98^{A}	<0.001	**0.004**	<0.001	<0.50	<0.60	<0.60	<2.2	nd
MW-706	08/15/95	<0.0050	<0.0050	<0.0050	**34,000**	**560**	**13,000**	**7,900**	**55,460**
	09/25/95	<0.0050	<0.0050	<0.0050	**31,000**	<2,500	**12,000**	**7,700**	**50,700**
PZ-702	12/21/98	<0.002	<0.002	<0.002	<0.50	<0.60	**1.5 ***	<2.2	**1.5**
MW-707	08/15/95	**0.210**	**0.042**	**0.38**	**1,500**	**3,600**	**190**	**1,400**	**6,690**
	09/25/95	<0.0050	**0.058**	**0.44**	**1,200**	**3,500**	**130**	**1,200**	**6,030**
	12/21/98	**0.13**	**0.033**	**0.64**	**830**	**3,110**	**82 ***	**990 ***	**5,012**
PZ-703	12/21/98**	**0.002 ***	**0.002 ***	**0.002 ***	**960 ****	**429 ****	**26 ****	**301 ****	**1716 ****
	12/21/98***	--	--	--	**1170 *****	**527 *****	**26 *****	**299 *****	**2022 *****
	01/19/99	--	--	--	**71**	**12**	**9.6**	**15.2**	**108**
MW-708	12/21/98	<0.001	<0.001	<0.001	<0.50	<0.60	<0.60	<2.2	nd
MW-709	12/21/98	**0.03**	**0.014**	**0.03**	<0.50	<0.60	<0.60	<2.2	nd
Wisconsin Groundwater Quality Standards (NR 140)									
Preventive Action Limit		ne	0.04	ne	0.5	140	68.6	124	ne
Enforcement Standard		ne	0.2	ne	5	700	343	620	ne

Notes:

1.) * - Parameter detected above the limit of detection (LOD) but below the limit of Quantitation (LOQ).
2.) < - Parameter not detected above the indicated detection limit.
3.) Concentrations which attain or exceed a preventive action limit (PAL) have been boxed.
4.) Concentrations which attain or exceed an enforcement standard (ES) have been boxed and shaded.
5.) ** - The original analysis contained concentrations above the calibration curve.
6.) *** - The sample was reanalyzed past hold time, concentrations were within the calibration curve.
7.) "--" - analysis was not performed
8.) nd - not detected.
9.) ne - not established.
10.) A - Field duplicate sample
11.) [MW-799] - Field identification for a duplicate sample
12.) Detected concentrations are shown in bold.

Table 5 - Groundwater Analytical Results - PAHs
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

		POLYNUCLEAR AROMATIC HYDROCARBONS - PAHs (µg/L)																		
Sampling Location	**Sampling Date**	**Acenaphthene**	**Acenaphthylene**	**Anthracene**	**Benzo (a) anthracene**	**Benzo (a) pyrene**	**Benzo (b) fluoranthene**	**Benzo (ghi) perylene**	**Benzo (k) fluoranthene**	**Chrysene**	**Dibenzo (a,h) anthracene**	**Fluoranthene**	**Fluorene**	**Indeno (1,2,3-cd) pyrene**	**1-Methylnaphthalene**	**2-Methylnaphthalene**	**Naphthalene**	**Phenanthrene**	**Pyrene**	**Total PAHs**
MW-701	08/15/95	**800**	<2.0	**23**	**3.4**	**1.8**	**0.6**	**1.2**	**0.54**	**1.7**	**0.25**	**49**	**130**	**0.76**	n/a	n/a	**220**	**100**	**20**	**1,352**
	09/25/95	**680**	**1,100**	**17**	**2**	**1**	**0.24**	**0.67**	**0.3**	**1.0**	**0.4**	**29**	**100**	**0.36**	n/a	n/a	**3,800**	**81**	**11**	**5,824**
	12/21/98	**420**	<1.3	**32**	**15**	**7.7**	**5.4**	**4.5**	**2.5**	**7.6**	**6.7**	**56**	**92**	**4.3**	**367**	**188**	**3,740**	**129**	**98**	**5,176**
PZ-701	08/17/95	<1.0	<2.0	**1.5**	**0.89**	**0.43**	**0.21**	**0.24**	**0.18**	**0.61**	<0.10	**3.3**	**1.0**	<0.10	n/a	n/a	<1.0	**6.6**	**2.1**	**17.1**
	09/26/95	<1.0	<2.0	**0.25**	**0.13**	<0.20	<0.050	<0.10	<0.050	**0.13**	<0.10	**0.70**	<0.40	<0.10	n/a	n/a	<1.0	**0.8**	**0.77**	**2.8**
	12/21/98	<1.4	<1.3	**0.23 ***	**0.25 ***	<0.21	<0.12	<0.23	<0.23	<0.092	<0.25	**0.60 ***	**0.42**	<0.11	<0.94	<0.92	**7.3**	**0.80**	**1.1 ***	**10.7**
MW-702	08/15/95	**390**	<2.0	**19**	**2.9**	**1.4**	**0.32**	**0.93**	**0.48**	**1.5**	**0.23**	**41**	**150**	**0.55**	n/a	n/a	**7,300**	**96**	**35**	**8,039**
	09/25/95	**400**	**1,400**	**17**	**3.7**	**1.8**	**0.66**	**1.6**	**0.73**	**1.9**	**0.28**	**32**	**140**	**0.76**	n/a	n/a	**6,400**	**90**	**13**	**8,503**
MW-703	08/15/95	**180**	<2.0	**17**	**1.4**	**0.46**	**0.1**	**0.24**	**0.16**	**0.55**	**0.17**	**28**	**70**	**0.16**	n/a	n/a	**2,400**	**74**	**9.2**	**2,781**
	09/25/95	**220**	**430**	**14**	**1.2**	**0.37**	**0.05**	**0.34**	**0.12**	**0.51**	**0.23**	**19**	**54**	**0.19**	n/a	n/a	**2,700**	**58**	**5.9**	**3,504**
	12/21/98	**262**	<1.3	**5.9**	**8.7**	**2.4**	**1.7**	**1.6**	**0.91**	<0.092	<0.25	**10**	**45**	**1.4**	**408**	<0.92	**3,080**	**24**	**16**	**3,868**
MW-704	08/15/95	**770**	<2.0	**44**	**26**	**22**	**8.9**	**17**	**7.9**	**19**	<0.10	**150**	**180**	**10**	n/a	n/a	**5,200**	**220**	**56**	**6,731**
[MW-799]	08/15/95^A	**660**	<2.0	**44**	**25**	**21**	**8.7**	**16**	**7.3**	**19**	<0.10	**140**	**190**	**9.2**	n/a	n/a	**3,600**	**220**	**55**	**5,015**
	09/25/95	**440**	**1,400**	**20**	**5.0**	**3.1**	**2.7**	<0.10	**2.3**	**3.5**	<0.10	**36**	**120**	<0.10	n/a	n/a	**4,200**	**120**	**13**	**6,366**
[MW-799]	09/25/95^A	**420**	**1,100**	**64**	**46**	**38**	**14**	**31**	**15**	**31**	**3.2**	**210**	**170**	**20**	n/a	n/a	**3,100**	**310**	**83**	**5,655**
	12/21/98	**1.6 ***	**5.9**	**6.0**	**8.9**	**9.5**	**8.1**	**7.0**	**3.5**	**4.4**	<0.25	**21**	**10**	**7.7**	**14**	**3.6**	**22**	**19**	**26**	**178**
[MW-B]	12/21/98^A	**1.6 ***	<1.3	**4.9**	**6.6**	**7.6**	**6.0**	**5.3**	**2.4**	**3.0**	<0.25	**16**	**6.8**	**5.8**	**9.5**	<0.92	**17**	**16**	**20**	**129**
MW-705	08/15/95	<1.0	<2.0	<0.20	<0.050	<0.20	<0.050	<0.10	<0.050	<0.10	<0.10	<0.20	<0.40	<0.10	n/a	n/a	<1.0	<0.40	<0.20	nd
	09/25/95	<1.0	<2.0	<0.20	<0.050	<0.20	<0.050	<0.10	<0.050	<0.10	<0.10	<0.20	<0.40	<0.10	n/a	n/a	<1.0	<0.40	<0.20	nd
	12/21/98	<1.4	<1.3	<0.10	<0.10	<0.21	<0.12	<0.23	<0.23	<0.092	<0.25	<0.23	<0.056	<0.11	<0.94	<0.92	<0.73	<0.11	<0.39	nd
[MW-A]	12/21/98^A	<1.4	<1.3	<0.10	<0.10	<0.21	<0.12	<0.23	<0.23	<0.092	<0.25	<0.23	<0.056	<0.11	<0.94	<0.92	<0.73	<0.11	<0.39	nd
MW-706	08/15/95	**197,000**	**1,480,000**	**177,000**	**129,000**	**83,000**	**31,000**	**62,000**	**29,000**	**82,000**	**13,000**	**266,000**	**640,000**	**32,000**	n/a	n/a	**1,900,000**	**730,000**	**142,000**	**5,993,000**
	09/25/95	**9,400**	**82,000**	**15,000**	**11,000**	**6,700**	**2,400**	**4,900**	**980**	**5,400**	<10	**8,400**	**57,000**	**2,700**	n/a	n/a	**166,000**	**56,000**	**9,700**	**437,580**
PZ-702	12/21/98	<1.4	<1.3	**0.44**	**0.90**	<0.21	**0.20 ***	<0.23	<0.23	**0.27 ***	<0.25	**1.5**	**0.50**	<0.11	<0.94	<0.92	**1.2 ***	**1.5**	**2.3**	**8.8**
MW-707	08/15/95	**430**	<2.0	**12**	**2.2**	**1.6**	**0.38**	**1.3**	**0.52**	**1.3**	**0.25**	**27**	**93**	**0.74**	n/a	n/a	**3,100**	**60**	**12**	**3,742**
	09/25/95	**240**	**1,400**	**10**	**0.4**	**0.66**	**0.23**	**0.83**	**0.19**	**0.64**	**0.40**	**21**	**81**	**0.35**	n/a	n/a	**3,400**	**60**	**5**	**5,221**
	12/21/98	**221**	<1.3	**15**	<0.10	**2.1**	<0.12	**1.7**	**0.76**	**2.2**	<0.25	**28**	**64**	**1.3**	**454**	<0.92	**3,470**	**69**	**58**	**4,387**
PZ-703	12/21/98	<1.4	<1.3	**0.20 ***	**0.22 ***	<0.21	<0.12	<0.23	<0.23	<0.092	<0.25	**0.25 ***	**0.44**	<0.11	**2.8 ***	<0.92	**86**	**0.53**	**0.64 ***	**91.1**
MW-708	12/21/98	<1.4	<1.3	<0.10	<0.10	<0.21	<0.12	<0.23	<0.23	<0.092	<0.25	<0.23	<0.056	<0.11	<0.94	<0.92	<0.73	<0.11	<0.39	nd
MW-709	12/21/98	**3.4 ***	<1.3	**2.9**	**1.3**	**0.30 ***	**0.51**	<0.23	<0.23	**0.66**	<0.25	**6.6**	**3.3**	<0.11	<0.94	<0.92	**4.6**	**8.4**	**10**	**42.0**
		Wisconsin Groundwater Quality Standards (NR 140)																		
Preventive Action Limit		ne	ne	600	ne	0.02	0.02	ne	ne	0.02	ne	80	80	ne	ne	ne	8	ne	50	ne
Enforcement Standard		ne	ne	3,000	ne	0.2	0.2	ne	ne	0.2	ne	400	400	ne	ne	ne	40	ne	250	ne

SAG/BJK/DVP-02/17/99

Notes:

1.) * - Parameter detected above the limit of detection (LOD) but below the limit of Quantitation (LOQ).
2.) < - Parameter not detected above the indicated detection limit.
3.) Concentrations which attain or exceed a preventive action limit (PAL) have been boxed.
4.) Concentrations which attain or exceed an enforcement standard (ES) have been boxed and shaded.
5.) nd - not detected.
6.) ne - not established.
7.) A - Field duplicate sample
8.) *[MW-799]* - Field identification for a duplicate sample
9.) Detected concentrations are shown in bold.

Table 6 - Applicable or Relevant and Appropriate Requirements (ARARs)
Feasibility Study for Campmarina Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

REQUIREMENTS	SOURCE	STANDARDS	ARAR TYPE	APPLICATION
State of Wisconsin (Wisconsin Administrative Code (WAC))				
Surface Water Quality	NR 102 - 105	Identifies surface water quality standards for protection of public health and enjoyment and protection and propagation of fish, shellfish, and wildlife.	Chemical Action	Applicable for migration of MGP residuals to river.
Groundwater Quality	NR 140	Identifies groundwater quality enforcement standards and preventive action limits	Chemical Action	Applicable for leaching of MGP residuals to groundwater.
Wisconsin Pollutant Discharge Elimination System	NR 200	Identifies standards for discharge to storm sewers and surface water	Chemical Action	Potentially applicable for implementation of a given remedial alternative.
Hazardous Waste Management	NR 600	Identifies standards for management of hazardous waste	Action Location	Applicable for removal, transport, and disposal of MGP affected soil or groundwater.
Identification and Listing of Hazardous Waste	NR 605	Identifies standards for determining if a waste is hazardous	Chemical Action	Applicable for removal, transport, and disposal of affected soil or groundwater.
Land Disposal Restrictions	NR 675	Identifies land disposal restrictions for landfills	Chemical Action	Applicable for off-site disposal
Wisconsin's General Permit Program for Certain Water Regulatory Permits	WAC NR 322	Identifies permitting standards for erosion control protection along a navigable water way.	Action	Applicable for modifying the river bank or conducting excavation
Solid and Hazardous Waste Management	NR 500-520	Identifies standards for the design construction and operation and maintenance for landfills	Action	Potentially applicable for implementation of a given remedial alternative.
Investigation and Remediation of Environmental Contamination	NR 700	Identifies standards and procedures that allow for site-specific flexibility, pertaining to the identification, investigation, and remediation of sites and facilities.	Action	Potentially applicable for implementation of a given remedial alternative.
Local Permits such as for heavy equip. traffic and san. sewer	Local Ordinances	As identified by local City and County ordinance for conducting remedial actions	Action Location	To be considered for implementation of a given remedial alternative.
Grading Permit	Wis. Stats. Ch. 30	Identifies permitting requirements for minimizing adverse affects when doing work along navigable waterways	Action Location	Applicable for work performed in navigable waterways
Federal				
Phase IV, Land Disposal Restrictions	40 CFR 268	Identifies land disposal restrictions and universal treatment standards for MGP affected soil and groundwater	Chemical Action	Applicable for off-site landfilling of MGP affected materials

Table 7 - Composite Soil Analytical Summary, BTEX, TCLP Benzene & Inorganics
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

			BETX (µg/kg)					TCLP (mg/L)	Inorganics (mg/kg)		
Sampling Location	**Sampling Zone**	**Sampling Date**	**Benzene**	**Ethylbenzene**	**Toluene**	**Total Xylene**	**Total BTEX**	**TCLP Benzene**	**Lead, total**	**Cyanide, total**	**Sulfur**
COMPOSITE-1	**Unsaturated**	12/10/98	**183**	116	247	412	958	5.41 p	38	7.1	1,200
COMPOSITE-3	**Saturated**	01/07/99	**1,830**	**11,500**	**6,150**	**21,030**	40,510	34.60	9.3	21	900
Groundwater Pathway RCL			5.5	2,900	1,500	4,100	ne	ne	ne	ne	ne
Direct Contact Pathway-Non-industrial RCL			ne	ne	ne	ne	ne	ne	50	ne	ne
Direct Contact Pathway-Industrial RCL			ne	ne	ne	ne	ne	ne	500	ne	ne
TACO - Construction Worker SRO			2,100	58,000	42,000	410,000	ne	ne	400	4,100	ne

O-CAR/ROW(04/07/99)

Notes:

1) * - Parameter detected above the limit of detection (LOD) but below the limit of quantitation (LOQ).
2) TACO - Illinois Tiered Approach to Cleanup Objectives.
3) TACO cyanide SRO shown is for amenable species.
4) SRO - Soil remediation objectives for inhalation (BTEX) and ingestion (lead, cyanide, phenolics, PAHs)
5) Concentrations which attain or exceed an NR 720 Direct Contact Pathway-Non-industrial RCL are boxed.
6) Concentrations which attain or exceed NR 720 Groundwater Pathway RCLs and/or Direct Contact Pathway-Industrial RCLs have been boxed and shaded.
7) Concentrations which attain or exceed TACO - Construction Worker SRO are underlined.
8) ne - not established.
9) nd - not detected.
10) < - Parameter was not detected above the indicated detection limit.
11) p - reported result is less than the Practical Quantitation Limit (PQL)

Table 8 - Composite Soil Analytical Summary, PAHs
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

			POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs) (mg/kg)																			
Sampling Location	**Sampling Zone**	**Sampling Date**	**Acenaphthene**	**Acenaphthylene**	**Anthracene**	**Benzo (a) anthracene**	**Benzo (a) pyrene**	**Benzo (b) fluoranthene**	**Benzo (g,h,i) perylene**	**Benzo (k) fluoranthene**	**Chrysene**	**Dibenzo (a,h) fluoranthene**	**Fluoranthene**	**Fluorene**	**Indeno (1,2,3-cd) pyrene**	**1-Methyl-naphthalene**	**2-Methyl-naphthalene**	**Naphthalene**	**Phenanthrene**	**Pyrene**	**Total PAHs**
Soil Samples Collected from the Unsaturated Zone																						
COMPOSITE-1	**Unsaturated**	12/10/98	ND	ND	9.68	45.50	17.20	16.20	6.82	5.70	18.10	ND	38.30	ND	11.60	1.78	ND	3.15	26.10	50.50	250.63
COMPOSITE-3	**Saturated**	01/07/99	15.70	8.29	23.20	39.80	13.50	10.30	5.99	3.81	12.60	8.51	44.40	22.40	7.85	13.40	4.19	79.40	57.70	66.60	437.64
Groundwater Pathway RCL			38	0.7	3,000	17	48	360	6,800	870	37	38	500	100	680	23	20	0.4	1.8	8,700	ne
Direct Contact Pathway-Non-industrial RCL			900	18	5,000	0.088	0.0088	0.088	1.8	0.88	8.8	0.0088	600	600	0.088	1,100	600	20	18	500	ne
Direct Contact Pathway-Industrial RCL			60,000	360	300,000	3.9	0.39	3.9	39	39	390	0.39	40,000	40,000	3.9	70,000	40,000	110	390	30,000	ne
TACO - Construction Worker SRO			120,000	ne	610,000	170	17	170	ne	1,700	17,000	17	82,000	82,000	170	ne	ne	8,200	ne	61,000	ne

O-CAR/ROW(04/07/99)

Notes:

1) * - Parameter detected above the limit of detection (LOD) but below the limit of quantitation (LOQ).
2) TACO - Illinois Tiered Approach to Cleanup Objectives.
3) TACO cyanide SRO shown is for amenable species.
4) SRO - Soil remediation objectives for inhalation (BTEX) and ingestion (lead, cyanide, phenolics, PAHs)
5) Concentrations which attain or exceed an NR 720 Direct Contact Pathway-Non-industrial RCL are boxed.
6) Concentrations which attain or exceed NR 720 Groundwater Pathway RCLs and/or Direct Contact Pathway-Industrial RCLs have been boxed and shaded.
7) Concentrations which attain or exceed TACO - Construction Worker SRO are underlined.
8) ne - not established.
9) nd - not detected.
10) < - Parameter was not detected above the indicated detection limit.

Table 9 - Initial Screening of Remedial Alternatives Summary - Source Control Actions (SCAs)
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

Technology	Description	Implementability		Effectiveness			Cost	Technology Selected for Further Alternative Evaluation
		Technical / Administrative Feasibility	Availability	Level of Treatment	Protective of Human Health & Environment	Proven Effective at MGP Sites		
Ex-Situ Source Control Action								
Cement Kiln / Cement Manufacture	Excavated impacted MGP soils are blended w/ cement ingredients and fed into cold end (feed) of cement kiln. As MGP soils progress through kiln, MGP residuals are thermally destroyed at temperatures approaching 2,500^0 F.	Excavation of MGP site residuals is feasible. Removal of most heavily impacted source areas would likely have a positive effect on impacted groundwater at the site / WDNR approval likely.	Facility in Davenport, Iowa (Lafarge).	Complete destruction of MGP site residuals (> 99.99% Destruction).	Would have to secure site; issues w/ excavation including vapors, and construction worker and community exposure.	WELL DEMONSTRATED, to date > 10,000 tons of MGP residuals have been treated.	**$70 - $120/ton** - Relatively cost effective; Transportation & Pre-processing of site residuals could significantly increase costs.	**YES**, Technology meets criteria for Implementability, Effectiveness and Cost.
Co-Burning	Excavated impacted MGP soils are blended w/ coal feedstock at ratios ranging from 5 to 10% in utility steam-generating boilers. The MGP residuals are burned simultaneously (co-burned) w/ the coal feedstock and thermally destroyed.	Excavation of MGP site residuals is feasible. Removal of most heavily impacted source areas would likely have a positive effect on impacted groundwater at the site / WDNR approval likely.	Facility in Baldwin, Illinois (Illinova).	Complete destruction of MGP site residuals (> 99.99% Destruction).	Would have to secure site; issues w/ excavation including vapors, and construction worker and community exposure.	WELL DEMONSTRATED, several utilities have processed MGP residuals in their boilers.	**$100 - $220/ton** - Higher treatment costs; Transportation & Pre-processing of site residuals could significantly increase costs.	NO, Technology does not meet criteria for Cost, when compared to similar technology (i.e. Cement Kiln / Cement Manufacture).
Disposal (i.e. Landfilling)	Impacted MGP soils are excavated, transported and disposed at an approved landfill facility.	Excavation of MGP site residuals is feasible. Removal of most heavily impacted source areas would likely have a positive effect on impacted groundwater at the site / WDNR approval likely, potential future RCRA cradle to grave liability.	Several landfill facilities throughout WI will take MGP contaminated soils as non-hazardous special waste.	No treatment; Bioremediation at landfill not yet viable for heavily concentrated MGP residuals.	Would have to secure site. RCRA cradle to grave liability would apply if disposed soil are not treated; Future liability risk.	WELL DEMONSTRATED, excavation and disposal has been performed at other MGP sites.	**$40 - $80/ton**: assumed non-hazardous; cost could increase up to 10 times for hazardous MGP soils.	NO. Technology does not meet criteria for Effectiveness, due to potential future liability.
Ex-Situ Oxidation	Chemical oxidation of contaminated MGP soils is performed in an above ground liquid/solid slurry reactor. Hydrogen peroxide (H_2O_2) and ferrous iron (Fe^{2+}) are added to the reactor to create Fenton's reagent which oxidizes and destroys MGP residuals.	Excavation of MGP site residuals is feasible. Site has adequate space to set up above ground liquid/slurry reactor and treatment process / WDNR approval likely.	Technology commercially available in Wisconsin.	Contaminant reduction: > 95% for VOCs, 90% - 95% for PAHs, 10% - 50% for Cyanides. Not as effective for soils as for GW.	Would have to secure site; issues w/ excavation as previously described.	SOME DEMONSTRATION, field pilot-scale demonstrations have yielded mixed results.	**$200 - $250/ton**; Mid-range capital costs; High O & M costs (i.e. oxidizing chemicals).	NO, Technology does not meet criteria for Effectiveness and Cost. Effectiveness questionable due to mixed results of pilot studies at MGP sites.
Thermal Desorption	Impacted MGP soils are excavated and fed into a thermal desorber. MGP residuals are volatized from the soils by heating to temperatures as high as 850^0 F and either destroyed (via combustion) or vented to the atmosphere.	Excavation of MGP site residuals is feasible. Removal of most heavily impacted source areas would likely have a positive effect on impacted groundwater at the site / WDNR approval high based on past experience.	Would need to locate a centralized facility w/ adequate space for setup of thermal desorption plant.	Contaminant reduction > 99% for VOCs and PAHs. Cyanide Reduction > 85%.	Would have to secure site; issues w/ excavation and treatment, especially vapors and direct contact exposure.	WELL DEMONSTRATED, Thermal treatment utilized to successfully remediate WPSC-Stevens Point MGP site.	**$70 - $110/ton** - Relatively cost effective; Transportation to off-site thermal plant could significantly increase costs.	**YES**, Technology meets criteria for Implementability, Effectiveness and Cost.
In-Situ Source Control Action								
Fracture Enhanced In-Situ Foam Bioremediation	This technology uses high-conductivity fractures to enhance the delivery of foams containing surfactants, nutrients, oxygen, etc. to low-conductivity geologic formations. Thus, nutrient distribution and bioremediation of MGP residuals is enhanced.	Technology may be feasible w/ microfracturing due to clay stringers in soil matrix; free product may be recalcitrant to bioremediation/WDNR approval questionable; in-situ microfracturing may not be approvable when free product (i.e. coal tar) is present.	Technology commercially available throughout U.S.	Pilot and/or bench scale studies would be required.	Would have to protect workers from contaminant exposure.	NOT DEMONSTRATED, technology has not been implemented at a MGP site. GRI is currently researching technical feasibility; early studies look promising.	Not evaluated since technology fails Implementability evaluation.	NO, Technology does not meet Implementability criteria. Micro-fracturing not administratively feasible; high potential for WDNR opposition to technology implementation. Technical data gaps.
In-Situ Oxidation	Chemical oxidation of contaminated MGP soils is performed by injecting a mixture of hydrogen peroxide (H_2O_2), ferrous iron ($Fe^{2+)}$ and water via a groundwater injection and extraction system which oxidizes and destroys MGP residuals.	Injection end extraction system for in-situ oxidation may be significantly limited by site-specific geology (i.e. soils w/ clay stringers); difficult to control oxidation-destruction reaction in-situ / May require extensive regulatory negotiation.	Technology commercially available in Wisconsin.	Contaminant reduction: > 90% for VOCs, 90% for PAHs, 10% - 50% for Cyanides. Not as effective for soils as for GW.	Would have to design adequate extraction or barriers to limit spreading of contamination. Protect workers from chemical exposure.	FEW FULL-SCALE FIELD APPLICATIONS, employed at an MGP site for removal of iron from groundwater, no data available on in-situ oxidation of soils.	**$200 - $250/ton**; High capital costs; High O & M costs (i.e. oxidizing chemicals).	NO, Technology does not meet criteria for Implementability and Cost; not technically feasible due to site-specific geology and high costs to implement at this site.
In-Situ Stabilization	In-Situ stabilization reduces MGP contaminant mobility through physical and/or chemical means. Stabilizing agents are either directly applied to surficial soils or are injected and mixed into the soil matrix with specialized equipment.	Stabilization process would result in substantial volume increase; site-specific space restrictions could inhibit implementability. Soils saturated w/ free-phase coal tar may be resistant to stabilizing agents / WDNR approval possible w/ conditions.	Several vendors exist in U.S. Vendor would likely require pretesting time to determine ideal mix.	Viable option for metals; more data needed for stabilization of organics; Georgia MGP site results look favorable; Unknown for cyanides.	Would have to protect workers, during reagent mixing. Issues with vapor monitoring during mixing would need to be addressed.	SOME DEMONSTRATION, successfully utilized at one MGP site in Georgia. Several demonstrations performed at other sites, some partially successful.	**$90 - $150/ton**; High materials costs, Results of groundwater monitoring could significantly increase costs.	NO, Technology does not meet criteria for Implementability. Substantial volume increase and site-specific space restrictions could significantly inhibit implementability.
Six-Phase Soil Heating w/ Vapor Extraction	Removal of MGP residuals from the subsurface is performed with conventional soil vapor extraction technology which is enhanced by heating the soils w/ six-phase electrical soil heating.	Technology especially suited to site's heterogeneous soil containing low permeability layers (i.e. clay stringers). Can be designed to target vadose and saturated zone soils / Would likely require higher levels of regulatory negotiation.	Technology is patented by Batelle Pacific Northwest Laboratory. Licenses for use are available.	Contaminant reduction: > 99% for VOCs; > 95% for SVOCs; unknown for cyanides. Especially effective in soils with low permeability layers.	Engineered barriers to protect workers from high voltages; buried metal objects may present a safety hazard; GPR survey required.	NOT DEMONSTRATED; no known applications at MGP sites; unknown effectiveness on phase-separated coal tar.	**$90 - $200/ton**; High capital costs; High O & M costs (i.e. electrical requirements).	NO, Technology does not meet criteria for Effectiveness. Technology could pose site specific hazards due to unknown quantities of metal debris in subsurface. Application not demonstrated on large scale.
Source Containment (i.e. Soil Capping w/ Cut off Wall)	Containment of contaminated MGP soils using surficial encapsulation and/or cut-off walls. Purpose of source containment would be to limit exposure to a particular receptor(s) (i.e. direct contact and Sheboygan River).	Various technologies would be feasible for source containment; both capping and cut-off walls. Ex: Sheet piling, slurry walls, and asphalt or concrete caps. / WDNR approval likely w/ appropriate design, long-term groundwater monitoring may be required.	Various materials for source containment commercially available. Specific product availability could be an issue.	No treatment; Long-term groundwater monitoring likely required. Could be readily combined with other technologies.	Source containment designed to protect sensitive receptors (i.e. human health and environment).	WELL DEMONSTRATED, source containment structures have been installed at many MGP sites.	NO PER TON COST; High capital costs, medium to low O & M costs, Likely to be least expensive option.	**YES**, Technology meets criteria for Implementability, Effectiveness and Cost.
Steam Enhanced Vapor Extraction	Removal of MGP residuals from the subsurface is performed with conventional soil vapor extraction technology which is enhanced by heating the soils via steam injection.	Technology likely feasible at site. Target zones are typically below the water table; however, technology would represent a soil and groundwater solution. Would have to route conveyance piping underground. / Would likely require WDNR variance.	Technology commercially available throughout U.S.	Demonstrated effectiveness for VOCs. Likely effective for PAHs. On-going coal-tar recovery project looks favorable	Would have to design adequate extraction or barriers to limit spreading of contamination via steam injection.	SOME FIELD SUCCESS, On-going coal tar recovery project is showing favorable results.	**$60 - $150/ton**, High Capital costs, High O & M costs.	**YES**, Technology meets criteria for Implementability, Effectiveness and Cost.

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Notes:

WDNR = Wisconsin Department of Natural Resources

GRI = Gas Research Institute

NA = Not Analyzed since technology could not be implemented at site.

GPR = Ground penetrating radar

SCA = Source Control Action

Table 10 - Initial Screening of Remedial Alternatives Summary - Groundwater Response Actions (GRAs)
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

Technology	Description	Implementability		Effectiveness			Cost	Technology Selected for Further Alternative Evaluation
		Technical / Administrative Feasibility	Availability	Level of Treatment	Protective of Human Health & Environment	Proven Effective at MGP Sites		
Groundwater Response Action								
Bioremediation	This technology enhances natural biodegradation processes to treat contaminated MGP groundwater. Bioremediation systems can be designed to passively or actively optimize biodegradation of MGP residuals via injection of nutrients, bacteria, oxygen etc.	Bioremediation system may be limited by heterogeneous site geology w/ clay stringers. Extensive areas of free-phase coal-tar, would be difficult to treat. Extensive monitoring may be required. / WDNR approval possible w/ appropriate application.	Can be implemented w/ standard pump and treat technology. Bioremediation bacteria cultures, nutrients etc. are readily available throughout U.S.	Site-specific, pilot testing or bench scale modeling would be required; 0%-99% treatment for various contaminants; better degradation of VOCs, less effective for PAHs; on-site extensive source areas and coal-tar would be recalcitrant to RNA.	Would have to protect workers from contaminant exposure. MGP residuals may not sufficiently degrade prior to reaching the Sheboygan River.	UNDER RESEARCH, Many variations on the bioremediation theme are currently under investigation by GRI and IGT. More full-scale applications would be necessary to prove effectiveness at MGP sites.	**Low to Medium cost GW response action.** Low to Medium capital, O & M, materials etc. (i.e. passive vs. active system).	**YES**, Technology meets criteria for Implementability; questionable for Effectiveness and Cost criteria. Not enough full scale applications at MGP sites. Site-specific geology and extensive coal-tar could limit effectiveness.
Dual-Phase Extraction ("Pump & Treat")	Dual-phase Extraction (DPE) technology uses pumps to apply high vacuums (> 20 in. Hg) to the subsurface. The purpose is to extract MGP residuals from the soil and contaminated groundwater in the same vapor/water stream via a downhole extraction tube.	Implementability questionable as complete GW solution due to heterogeneous site geology w/ clay stringers and coal-tar / WDNR approval questionable.	DPE pump and treat technology is readily available throughout Wisconsin.	Site-specific, pilot testing or bench scale modeling would be required. Depending on application: > 90% treatment for GW treated above ground; less effective as in-situ remedial solution.	Protective of Human Health & Environment w/ appropriate application.	NOT WELL DEMONSTRATED, Proven effective at various sites as groundwater response and source control action. Little demonstration of effectiveness at MGP sites.	**Medium to High cost GW response action.** Low to High capital cost, Low to High O & M cost depending on application; large volumes and long-term operation can significantly increase costs.	**NO,** Technology does not meet criteria for Implementability, Effectiveness and Cost; May be considered further for implementation in a hydraulic containment system. Potential for implementation w/ SEVE system.
Hydraulic Containment	Containment of contaminated MGP groundwater using pumps or cut-off walls. Purpose of hydraulic containment would be to limit exposure to sensitive receptor(s) (i.e. direct contact via groundwater ingestion and the Sheboygan River).	Various technologies would be feasible for hydraulic containment; Ex: interceptor trench or wells w/ pumps to control groundwater flow. / WDNR approval likely w/ appropriate design, long-term GW monitoring may be required.	Various materials for hydraulic containment commercially available. Specific product availability could be an issue.	No treatment; Long-term groundwater monitoring likely required. Could be readily combined with other technologies.	Hydraulic containment designed to protect sensitive receptors (i.e. human health and environment)	WELL DEMONSTRATED, hydraulic containment structures and systems have been installed at many MGP sites.	**Less expensive option than other GW response actions.** High capital costs, medium to low O & M costs.	**YES**, Technology meets criteria for Implementability, Effectiveness and Cost.
In-Situ Oxidation	Chemical oxidation of contaminated MGP GW is performed by injecting a mixture of hydrogen peroxide (H_2O_2), ferrous iron ($Fe^{2+)}$) and water via a groundwater injection and extraction system which oxidizes and destroys MGP residuals.	Injection and extraction system for in-situ oxidation would be significantly limited by site-specific geology (i.e. clay soils); increased difficulty in controlling oxidation-destruction reaction in-situ / May require extensive regulatory negotiation.	Technology commercially available in Wisconsin	Extensive site-specific, pilot testing or bench scale modeling would be required; potential contaminant reduction: > 90% for VOCs, 90% for PAHs, 10% - 50% for Cyanides.	Would have to design adequate extraction system or barriers to limit spreading of contamination. Protect workers from chemical exposure.	FEW FULL-SCALE FIELD APPLICATIONS, employed at an MGP site for removal of iron from groundwater.	**Higher cost GW response action.** High capital costs; High O & M costs (i.e. oxidizing chemicals). Low long-term GW monitoring costs.	NO, Technology does not meet criteria for Implementability and Cost; not technically feasible due to site-specific geology and high costs to implement at this site.
In-Situ Treatment Wall	This technology would remediate contaminated MGP water by actively or passively treating GW as it passes through a permeable treatment wall. Walls can be designed as permeable treatment trench systems or consist of a "gated" design.	Installation of permeable treatment wall probably not feasible. Treatment feasibility questionable w/ existing treatment methods (i.e. in-well air-strippers, enhanced bioremediation, etc.) / Medium to high level of regulatory negotiation required.	Various materials for treatment walls commercially available; however, available materials may not be adequately remediate MGP residuals. Specific product availability could be an issue.	Treatment method specific; MGP residuals are more resistant to in-situ treatment than more aggressive ex-situ treatment.	Questionable, would be protective of Sheboygan river if adequate treatment system could be designed.	NOT WELL DEMONSTRATED; use of an in-situ treatment wall not well documented at MGP sites.	**Higher cost GW response action.** High capital costs; Potential for High O & M costs. Extensive pilot testing would be necessary to prepare a final design.	NO, Technology does not meet criteria for Implementability and Effectiveness; use of in-situ treatment wall not well documented at MGP sites.
Natural Attenuation Monitoring (RNA Monitoring)	This technology monitors contaminant concentration trends and several natural attenuation (RNA) over time. The purpose of RNA monitoring is to demonstrate that a contaminant plume will be remediated by natural chemical and biological processes with time.	RNA monitoring alone is not feasible at the site. Extensive areas of free-phase coal-tar, which are recalcitrant to natural biodegradation processes, would contribute to much contaminant mass input to groundwater w/o treatment./WDNR approval not likely.	Many laboratories state wide provide analysis of GW and RNA parameters.	Site-specific; 0%-99% treatment for various contaminants; on-site extensive source areas and coal-tar would be recalcitrant to RNA.	Site-specific; over time RNA can be protective of human health and environment. RNA alone would not be an adequate protective measure at the site.	DEMONSTRATED, Proven effective at sites when implemented w/ other GW response actions	**Lowest cost GW response action.** Medium to low capital (i.e. GW monitoring network), medium to low O & M costs (i.e. long term GW monitoring).	NO, Technology does not meet criteria for Implementability and Effectiveness. Possible integration w/ another GRA.

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Notes:
WDNR = Wisconsin Department of Natural Resources
GRI = Gas Research Institute
RNA = Remediation via Natural Attenuation
GW = Groundwater
POTW = Publicly Owned Treatment Works
SEVE = Steam Enhanced Vapor Extraction
IGT = Institute of Gas Technology

Table 11 - Decision Matrix for Combinations of Source Control & Groundwater Response Actions
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

	Groundwater Response Actions (GRAs)	
Source Control Actions (SCAs)	**Hydraulic Containment**	**Bioremediation**
Cement Kiln / Cement Manufacture	**Hydraulic containment would not be required but may complement the Cement Kiln SCA.**	Would not be necessary w/ source removal.
Source Containment (i.e. Soil Capping w/ Cut-off Wall)	**Hydraulic containment would be implemented w/ source containment.**	**Combine w/ source containment to remediate lighter fraction VOCs (i.e. benzene) to lower levels during design life of containment structure (30 to 100 years).**
Thermal Desorption	**Hydraulic containment would not be required but may complement the Thermal Desorption SCA.**	Would not be necessary w/ source removal.
Steam Enhanced Vapor Extraction (SEVE)	**Hydraulic containment would not be required but may complement the SEVE SCA.**	Since SEVE represents a comprehensive soil and groundwater solution, bioremediation would not be necessary.

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Notes:
SCA and GRA combinations considered for further evaluation are bolded.
Shaded boxes indicate SCA and GRA combinations not considered for further evaluation.

Table 12 - Remedial Alternatives Description & Cost Assumptions
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

Remedial Alternative	Technology Description	Estimated Quantities		Key Assumptions
REMEDIAL ALTERNATIVE 1 - Source Area Excavation and Off-Site Treatment	Source Area Excavation and Off-site Treatment includes excavation of all source areas associated with the former coal gas facility operations including off-site areas in the Center Avenue right-of-way (ROW).	71,000 TN	Excavation and Off-site Thermal Treatment	- Excavation of both unsaturated and saturated affected soils to address direct contact and groundwater migration pathways. Includes 9,700 tons of unsaturated and saturated soil from the Center Avenue right-of-way.
		11,200 SF	Excavation of Overburden	- Estimate for non-affected soils situated above the impacted saturated soils which would have to be excavated.
		21,600 SF	Vertical Barrier Wall	- Installation of vertical barrier wall along the Sheboygan River, 720 feet in length and 30 feet deep as a physical containment measure.
		12,000 SF	Excavation Shoring	- Shoring required for excavation along Water Street and Center Avenue ROW, assumed steel sheet pile 480 feet long x 25 feet deep.
		1,000,000 GAL	Excavation	- Estimate approximately 1,000,000 gallons of dewatering during excavation activities.
		1,500 TN/DAY	Excavation Rate	- Estimate an excavation rate of 1,500 tons/day.
		5 MONTHS	Project Duration	- Estimate project completion within a 5 month time frame (20 weeks).
		Off-site Thermal Treatment Specific Assumption		
		4,320 TN/WK	Thermal Treatment	- Estimate a thermal treatment rate of 30 tons/hour, 6 days a week, 24 hours a day; w/ either 1 or 2 thermal desorption plants.
REMEDIAL ALTERNATIVE 2A - Full Source Area Encapsulation With Low Flow Biosparging System	A vertical barrier surrounds the entire source area to minimize contaminant migration to the Sheboygan River; and an impermeable engineered cap minimizes human direct contact exposure. A biosparging system ensures continuing RNA of on-site MGP residuals.	45,750 SF	Vertical Barrier Wall	- Installation of vertical barrier wall surrounding the entire source area, 1,525 feet in length and 30 feet deep as a physical containment measure.
		4,300 TN	Excavation of contaminated media in Center Avenue ROW	- Excavation and treatment/disposal of unsaturated contaminated soil in the Center Avenue right-of-way to address direct contact exposure pathways.
		6,000 SY	Engineered Cap Installation	- Installation of impermeable geomembrane cap and geotextile fabric (for drainage) to address direct contact exposure pathways. Includes 1 foot of subbase (engineered fill).
		20 WELLS	Biosparging Wells	- Installation of biosparging wells to enhance natural attenuation of MGP residuals inside the source containment area. Designed 20 wells spaced on 50 foot centers with 2 low flow air sparge blowers.
		3 MONTHS	Project Duration	- Estimate project completion within a 3 month time frame (24 weeks). Estimate 30 days to install vertical barrier wall, 30 days to install biosparging system and 10 days to install engineered cap.
REMEDIAL ALTERNATIVE 2B - Partial Source Area Encapsulation w/ Interceptor Trench & Low Flow Biosparging System	Includes a vertical barrier w/ interceptor trench to minimize contaminant migration to the Sheboygan River and an impermeable engineered cap to minimize human direct contact exposure. A biosparging system ensures continuing RNA of on-site MGP residuals.	17,280 SF	Vertical Barrier Wall & Interceptor Trench	- Installation of a continuously trenched vertical barrier wall w/ interceptor trench along the Sheboygan River, 720 feet in length and 24 feet deep as a physical containment measure.
		2,180 TN	Continuous Trench Spoil	- Estimation of material for off-site disposal or treatment from continuous trench installation.
		4,300 TN	Excavation of contaminated media in Center Avenue ROW	- Excavation and treatment/disposal of unsaturated contaminated soil in the Center Avenue right-of-way to address direct contact migration pathways.
		6,000 SY	Engineered Cap Installation	- Installation of impermeable geomembrane cap to address direct contact migration pathways.
		20 WELLS	Biosparging Wells	- Installation of biosparging wells to enhance natural attenuation of MGP residuals inside the source containment area.
		3 MONTHS	Project Duration	- Estimate project completion within a 3 month time frame (23 weeks). Estimate 25 days to install vertical barrier wall, interceptor trench and equipment; 30 days to install biosparging system; and 10 days to install engineered cap.
		1 LS	Interceptor Trench Equipment	- Installation of interceptor trench equipment adequate to maintain hydraulic containment of groundwater flow at the site so that MGP residuals do not breach the vertical barrier wall (designed to dewater at approximately 2 gpm).
REMEDIAL ALTERNATIVE 3 - Steam Enhanced Vapor Extraction (SEVE)	SEVE includes installation of steam injection wells and vapor recovery wells to mobilize and remove volatile MGP residuals from the subsurface designed to target all affected saturated and unsaturated soils.	21,600 SF	Vertical Barrier Wall	- Installation of vertical barrier wall along the Sheboygan River, 720 feet in length and 30 feet deep as a physical containment measure.
		4,300 TN	Excavation of contaminated media in Center Avenue ROW	- Excavation and treatment/disposal of unsaturated contaminated soil in the Center Avenue right-of-way to address direct contact exposure pathways.
		18 WELLS	Steam Injection Wells	- To mobilize more volatile tar fractions, dry steam alternated with air sparging in source areas.
		40 WELLS	Dual Phase Extraction Wells	- Extract groundwater, coal tar and vapor in source areas. Extracted vapors to be treated and discharged to atmosphere. Extracted groundwater to be pre-treated and discharged to sanitary sewer. Extracted coal-tar to be disposed off-site.
		2 YEARS	Project Duration	- Estimate system operation for a 2 year timeframe.

O-CAR/REW (03/08/99)

Notes:
SF = Square Feet
TN = Tons
SY = Square Yards

LS = Lump Sum
GAL = Gallons
WK = Week

Table 13 - Remedial Alternatives Cost Summary
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

Remedial Alternative	Capital Costs	Annual Costs		Closure Costs	Duration	Total Net Present Worth (10 yrs., 9% cost of capital, 3% inflation)
		First 2 Years	Remaining 8 Years			
REMEDIAL ALTERNATIVE 1 - Source Area Excavation and Off-Site Treatment (Off-site Thermal Treatment)	$6,050,081	$27,508	$6,877	$26,450	**10 years**	**$6,151,460**
REMEDIAL ALTERNATIVE 1 - Source Area Excavation and Off-Site Treatment (Off-site Treatment @ Cement Kiln)	$7,755,301	$27,508	$6,877	$26,450	**10 years**	**$7,856,680**
		Each Year for 30 Years				
REMEDIAL ALTERNATIVE 2A - Full Source Area Encapsulation With Low Flow Biosparging System	$2,024,029	$13,869		$26,450	**30 years**	**$2,217,730**
REMEDIAL ALTERNATIVE 2B - Partial Source Area Encapsulation w/ Interceptor Trench & Low Flow Biosparging	$1,799,762	$23,357		$26,450	**30 years**	**$2,122,659**
		First 2 Years	Remaining 8 Years			
REMEDIAL ALTERNATIVE 3 - Steam Enhanced Vapor Extraction (SEVE)	$2,843,134	$27,508	$6,877	$26,450	**10 years**	**$2,944,512**

O-CAR/REW (03/08/99)

Notes: 1. Refer to Preliminary Cost Estimates for breakdown of costs.

Table 14 - Remedial Alternatives Evaluation Criteria Summary
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

CRITERIA	Alternative 1 Source Area Excavation and Off-Site Treatment or Disposal	Alternative 2A Full Source Area Encapsulation With Low Flow Biosparging System	Alternative 2B Partial Source Area Encapsulation w/ Interceptor Trench & Low Flow Biosparging System	Alternative 3 Steam Enhanced Vapor Extraction (SEVE) w/ Barrier Wall	Evaluation Criteria Summary
THRESHOLD CRITERIA					
Overall Protection of Human Health & the Environment	Human health & the environment would be protected via source removal, thus, eliminating exposure to any potential receptor as long as the majority of source material is removed from the site.	Human health & the environment would be protected via source encapsulation, thus, preventing exposure to any potential receptors (i.e. human direct contact exposure, eliminating contaminant input to the Sheboygan River).	Human health & the environment would be protected via source encapsulation, thus, preventing exposure to any potential receptors (i.e. human direct contact exposure, eliminating contaminant input to the Sheboygan River).	Human health & the environment would be protected via source treatment, thus, eliminating exposure to any potential receptor. However, system performance will determine level of source treatment and protection of human health and environment.	Each Alternative would be protective of human health and the environment.
Compliance with ARARs	YES, this Alternative meets or exceeds the established ARARs.	YES, this Alternative meets or exceeds the established ARARs.	YES, this Alternative meets or exceeds the established ARARs.	YES, this Alternative meets or exceeds the established ARARs.	Each Alternative meets or exceeds the ARARs.
PRIMARY BALANCING CRITERIA					
Long-Term Effectiveness	Source Area excavation would effectively reduce soil and groundwater MGP constituent concentrations. Any remaining MGP residuals would be remediated via natural attenuation within a time frame of a minimum of 5 to 10 years.	Encapsulation would minimize off-site migration of mobile contaminants and potential for direct contact exposure. Biosparging would enhance attenuation of MGP residuals. Extended ground water monitoring would be required.	Essentially, same long term effectiveness as Alternative 2A. However, seasonal high fluctuations in river level could reduce effectiveness of interceptor trench in preventing loss of hydraulic control. Hydraulic modeling would be required.	SEVE would effectively reduce soil and ground water MGP constituent concentrations. However, rebounding could occur if SEVE removal efficiencies are not adequate. Extensive pilot testing would be required.	Each Alternative would provide long-term effectiveness. Alternatives 1 and 3's long-term effectiveness contingent on sufficient source removal. Each Alternative would require extended long-term monitoring.
Reduction of Toxicity, Mobility & Volume Through Treatment	Excavation would meet criterion through reduction in total volume. Off-site treatment would be irreversible. Barrier wall would minimize re-contamination with affected sediments from the Sheboygan River.	Physical containment would restrict off-site migration of MGP residuals to river. Biosparging would reduce contaminant toxicity and volume over an extended period and enhance natural attenuation processes.	Essentially, same as Alternative 2a with the exception of a slightly higher risk for mobility if hydraulic control could not be maintained.	SEVE process would reduce mobility and volume of MGP residuals, particularly more mobile fractions. Greater risk for untreated residuals to remain that would not reduce toxicity. Barrier wall would minimize re-contamination with affected sediments.	Alternatives 1 and 3 would reduce toxicity, mobility and volume through treatment. Alternatives 2A ad 2B would reduce mobility through containment; reduction in toxicity and volume would be achieved over an extended period.
Short-Term Effectiveness	Excavation would pose a higher risk to community and workers for direct contact exposure. Time to achieve remedial response objectives would be limited to duration of excavation and site restoration.	Encapsulation would pose marginal risk to community and workers for direct contact exposure. Time to achieve remedial response objectives would correspond to completion of encapsulation.	Partial encapsulation would pose slightly higher risk for direct contact exposure than Alternative 2A due to installation of interceptor trench. Time to achieve remedial response objectives would be similar to Alternative 2A.	Minimum estimated two year operating period frame would pose extended risk for direct contact exposure to workers. Time to achieve remedial response objectives would be dependent on system performance.	Alternative 1 would pose the highest risk for direct contact exposure. Alternatives 2A, 2B & 3 would have lower risks for direct contact exposure. Alternative 3 would require longest timeframe to achieve remediation objectives.
Implementability	Thermal Desorption or cement kiln are demonstrated and available technologies for MGP residuals. Excavation would require extensive shoring and dewatering. Limited site access would also make excavation difficult.	Full encapsulation could be readily constructed at the site. Least intrusive of all of the alternatives. Variety of demonstrated materials and vendors for construction available. Installation could require approval by Corps of Army Engineers.	Partial encapsulation could be readily constructed at the site. Slightly more intrusive than full encapsulation alternative. Approval from City required for long term discharge of treated effluent to sanitary sewer. Other factors similar to 2A.	Initial mobilization, construction and operation of the SEVE system is feasible. May interfere with the intended future use of the site (i.e. park) during system operation for 2 years due to substantial above-ground equipment.	Alternative 2A, 2B & 3 would be the least intrusive with a variety of materials & contractors available for construction. Alternative 1 poses the greatest challenge due to site-specific logistics. Alternative 3 is the least demonstrated MGP technology.
Cost	Highest cost remedial alternative. 2 to 3 times more expensive than other remedial alternatives.	Lower cost remedial alternative. Medium risk for additional costs if encapsulation technology is not properly maintained.	Lower cost remedial alternative. Medium risk for additional costs if encapsulation technology is not properly maintained.	Cost higher than source encapsulation alternatives. Moderately high risk for additional costs depending on treatment goals and actual system performance.	Alternatives 2A and 2B would be the lowest cost alternatives for the site. Alternative 1 would be two to three times more costly than the other alternatives and Alternative 3 has the greatest risk for increased cost based on system performance.

APPENDIX A

SOIL BORING LOGS AND BOREHOLE ABANDONMENT FORMS

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

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Page 1 of 2

Facility/Project Name SC - Vacant City Property South of Campmarina
License/Permit/Monitoring Number
Boring Number SB-724

Boring Drilled By (Firm name and name of crew chief)
Boart Longyear
Brian Loveland
Date Drilling Started 12/9/98
Date Drilling Completed 12/9/98
Drilling Method 3 1/4" HSA

DNR Facility Well No.
WI Unique Well No.
Common Well Name
Final Static Water Level Feet MSL
Surface Elevation 613.46 Feet MSL
Borehole Diameter 6.25 inches

Boring Location
State Plane Feet N Feet E
Lat
Long
Local Grid Location (If applicable) 4438.9 feet ☒ N ☐ S 5541.2 feet ☒ E ☐ W

County Sheboygan
DNR County Code 60
Civil Town/City/ or Village Sheboygan

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				Earth Drilled to 2' BGS										
SB724 (3)	4	9,5 7,6	2	2'-10' FILL SILTY SAND W/GRAVEL, brown, fine grained, some medium and coarse grained sand, some fine and coarse gravel, firm-dry, no odor.	Fill			10.8						
SB724 (5)	10	3,3 4,3	4	At 4' BGS, SILTY SAND, little clay, little fine and medium grained sand, few fine gravel, stiff-slightly moist.				31.2						
24 (7)	4	4,4 6,4	6	At 6' BGS, few clay, few slag				1.6						
SB724 (9)	4	4,6 4,5	8	Moist at 8' BGS				2.4						
SB724 (11)	16	3,5 4,4	10	10'-24' SILTY SAND, light yellowish brown (10YR 6/4),poorly graded, fine to coarse grained, predominantly fine, little silt, few medium and coarse grained sand, firm-slightly moist, no odor.	SM			2.0						
SB724 (13)	16	5,4 4,5	12	little medium and coarse grained sand				3.8						
SB724 (15)	18	6,5 7,6	14					2.0						
SB724 (17)	18	6,6 7,4	16					1.8						
SB724 (19)	20	7,6 7,7	18	few silt, some medium and coarse sand, some fine gravel	SP			1.2						
SB724 (21)	10	5,3 5,6	20	little silt, few clay, loose-moist	SM			1.9						
SB724 (23)	4	5,5 4,3	22	2" lense fine and medium grained sand, light gray, some silt				1.3						

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

Signature

Firm **Natural Resource Technology**

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.

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comm
SB724 (25)	19	5,5 6,2	26	8" lense fine sand, dark gray to black, some silt and clay, firm- moist to very moist	SM	▨		1.1						
SB724 (27)	15	5,5 6,5	28	Wet at 26'BGS				4.6						analytical sample at 26'-28'
			30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62	End of Boring at 28' BGS										

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

l/Drillhole/Borehole ation: SB-724

County: Shebovgan

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

(If Applicable)

____ Gov't Lot ____ Grid Number

Grid Location

____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.

Civil Town Name: City of Sheboygan

Street Address of Well: 732 North Water Street

City, Village: Shebovgan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation

Present Well Owner

Street or Route: P.O. Box 19800

City, State, Zip Code: Green Bay, WI

Facility Well No. and/or Name (If Applicable): SB-724

WI Unique Well No.

Reason For Abandonment: Test Boring

Date of Abandonment: 12/09/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/09/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A

Casing Diameter (in.) N/A

Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown

If Yes, To What Depth? ____ Feet

(4) Depth to Water (Feet) ~26

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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	28.0	3 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY

ure of Person Doing Work

Date Signed: 12-22-98

Street or Route: 101 ALDERSON ST., P.O. BOX 109

Telephone Number: 715-359-7090

City, State, Zip Code: SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected	District/County
Reviewer/Inspector	☐ Complying Work ☐ Noncomplying Work
Follow-up Necessary	

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

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Facility/Project Name *WPSC - Vacant City Property South of Campmarina*	**License/Permit/Monitoring Number**	**Boring Number** *SB-725*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear*	**Date Drilling Started** *12/8/98*	**Date Drilling Completed** *12/8/98*	**Drilling Method** *Hand Auger*

DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *584.37 Feet MSL*	**Borehole Diameter** *4 inches*

Boring Location **State Plane** Feet N Feet E	**Lat** **Long**	**Local Grid Location (If applicable)** *4375.3 feet* ☒ *N* ☐ *S* *5496.2 feet* ☒ *E* ☐ *W*

County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
SB725 (1)	10			0'-3' FILL SILTY SAND, brown, fine grained, some medium grained sand, few coarse grained sand, soft-slightly moist, no odor.	SM			10.6						
SB725 (3)	12			3'-6' CLAYEY SAND, brown (10YR 5/3), fine grained, little silt, few medium and coarse grained sand, few fine gravel, few **wood debris**, soft-moist, no odor. Wet at 3.5' BGS At 5' BGS, CLAYEY SAND, dark gray, medium grained, few **wood debris**, little fine and coarse grained sand, few fine gravel, few silt, soft-wet, no odor. grades to brown CLAYEY SAND	SC			4.9						
SB725 (4.5)	12							4.3						
SB725 (5.5)	12							15.0						ana[illegible]l sam[illegible] 5'-6'
				End of Boring at 6' BGS										

Depth in Feet: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22

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

Signature

Firm **Natural Resource Technology**

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 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location 58-725
County: Sheboygan
____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W
(If Applicable)
Gov't Lot ____ Grid Number ____
Grid Location
____ ft. ☐ N. ☐ S.. ____ ft. ☐ E. ☐ W.
Civil Town Name: City of Sheboygan
Street Address of Well: 732 North Water Street
City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation
Present Well Owner:
Street or Route: P.O. Box 19800
City, State, Zip Code: Green Bay,WI
Facility Well No. and/or Name (If Applicable): 58-725
WI Unique Well No.:
Reason For Abandonment: Test Boring
Date of Abandonment: 12/08/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/08/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____
Lower Drillhole Diameter (in.) N/A
Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ____ Feet

(4) Depth to Water (Feet) ~3.5
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: Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	6		

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work: BOART LONGYEAR COMPANY
Signature of Person Doing Work:
Date Signed: 12-22-98
Street or Route: 101 ALDERSON ST., P.O. BOX 109
Telephone Number: 715-359-7090
City, State, Zip Code: SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

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Facility/Project Name *WPSC - Vacant City Property South of Campmarina*	**License/Permit/Monitoring Number**	**Boring Number** *SB-726*	
Boring Drilled By (Firm name and name of crew chief) *Boart Longyear*	**Date Drilling Started** *12/8/98*	**Date Drilling Completed** *12/9/98*	**Drilling Method** *Hand Auger*
DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	
Final Static Water Level *Feet MSL*	**Surface Elevation** *586.48 Feet MSL*	**Borehole Diameter** *4 inches*	
Boring Location **State Plane** **Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4507.6 feet* ☒ *N* ☐ *S* *5484.6 feet* ☒ *E* ☐ *W*	
County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*	

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
SB726 (1)	10			0'-11' FILL SAND, brown, poorly graded, fine to coarse, predominantly fine, little organics, little medium and coarse grained sand, little **metal and glass debris**, loose-dry, no odor.	SP			5.4						
SB726 (3)	12		2	little **slag**				6.0						
SB726 (5)	12		4	little fine and coarse gravel				4.9						
SB726 (7)	12		6	slightly moist, some **slag**				10.2						
SB726 (9)	10		8	At 8' BGS, FILL SAND, poorly graded, fine to coarse, predominantly medium, little fine and coarse sand, few fine and coarse gravel, little **slag and glass**.	SP			2.7						
SB726 (10.5)	12		10	little clay, soft-moist				3.9						
SB726 (11.5)	12		12	11'-12' SAND W/GRAVEL, brown, well graded, predominantly fine to medium, some coarse sand, little fine gravel, little silt, soft-wet, no odor.	SW			0.6						analytical sample at 11'-12'
			14 16 18 20 22	End of Boring at 12' BGS										

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

Signature

Firm **Natural Resource Technology**

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 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

ell/Drillhole/Borehole ocation SB-726

County Shebovgan

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

(If Applicable)

Gov't Lot ____ Grid Number ____

Grid Location

____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.

Civil Town Name: City of Shebovgan

Street Address of Well: 732 North Water Street

City, Village: Shebovgan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation

Present Well Owner

Street or Route: P.O. Box 19800

City, State, Zip Code: Green Bay,WI

Facility Well No. and/or Name (If Applicable): SB-726

WI Unique Well No.

Reason For Abandonment: Test Boring

Date of Abandonment: 12/09/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/09/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A

Casing Diameter (in.) N/A

Casing Depth (ft.)

Lower Drillhole Diameter (in.) N/A

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

(4) Depth to Water (Feet) ~11

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: Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	12		

(8) Comments

(9) Name of Person or Firm Doing Sealing Work: BOART LONGYEAR COMPANY

ature of Person Doing Work

Date Signed: 12-22-98

Street or Route: 101 ALDERSON ST., P.O. BOX 109

Telephone Number: 715-359-7090

City, State, Zip Code: SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected

District/County

Reviewer/Inspector

☐ Complying Work
☐ Noncomplying Work

Follow-up Necessary

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 2

Facility/Project Name *WPSC - Vacant City Property South of Campmarina*		**License/Permit/Monitoring Number**	**Boring Number** *GB-727*	
Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Brian Loveland*		**Date Drilling Started** *12/10/98*	**Date Drilling Completed** *12/11/98*	**Drilling Method** *4 1/4" HSA / ROTARY MUD*
DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *590.86 Feet MSL*
				Borehole Diameter *8.25/6 inches*
Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4577.8 feet* ☒ **N** ☐ **S**	*5474.1 feet* ☒ **E** ☐ **W**
County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*		

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
GB727 (1)	10	1,1 3,4	2	0'-3.5' FILL CLAYEY SILT, black, some fine sand, few coarse sand, **little wood and brick debris**, few organics, soft-moist, **some blue staining**, no odor.	FILL			16.4						
GB727 (3)	12	1,3 2,3	4					0.8						
GB727 (5)	16	2,4 4,5	6	3.5'-5' CLAYEY SAND, brown, fine to medium, few coarse sand, soft -slightly moist, no odor. 5'-11.5' SILTY CLAY, brown (7.5YR 5/4), some fine and medium sand seams, little coarse sand, few fine gravel, soft-moist, no odor.	SC			3.4						
GB727 (7)	16	1,2 2,1	8					48.1						
GB727 (9)	10	1,1 2,2	10	Wet at 9'.	CL			143						
GB727 (11)	6	1,1 1,2	12					641						
GB727 (13)	9	1,3 3,4	14	11.5'-15.5' GRAVELLY SAND, black (2.5Y 2.5/1), well graded, fine to coarse, some fine and coarse gravel, very loose-wet, **tar, stong odor**.	SP			1014						
GB727 (15)	14	2,2 2,3	16	At 14', little brown silty clay.				246						
GB727 (17)	24	pushed	18	15.5'-23.5' SAND, black, fine to medium, little coarse sand, little silt, few clay, soft-wet, **strong odor, visual staining**.	SP			NS						Shelby Tube 16' - 18'
GB727 (19)	10	1,1 2,2	20	At 18', SAND, black (Chart 1 for Gley 2.5/N), predominantly fine sand, little medium sand, trace coarse sand, few silt and silty clay, soft-wet, **strong odor, visual staining**.				327						
GB727 (21)	12	2,2 4,2	22		SP			356						
GB727 (23)	24	10,20 22,24			CL			32.7						

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

Signature	Firm **Natural Resource Technology**

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.

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
N and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
GB727 (25)	20	12,14 16,18		23.5'-33' <u>SILTY CLAY</u>, brown (10YR 5/3), few fine sand, trace coarse sand, very stiff-wet to moist, no odor.		▨		8.1						
GB727 (27)	24	pushed	26	At 24', few clayey fine sand seams, no odor.		▨		NS						Auger to 28' Shelby Tube 26' - 28'
GB727 (29)	22	10,15 20,23	28	At 28.2', 2" fine grained sandy clay lense, hard-slightly moist, no odor.	CL	▨		0.0						
GB727 (31)	22	8,15 19,24	30			▨		0.0						
GB727 (33)	NR	pushed	32			▨		NS						Brass Core Samples 32' - 34'
GB727 (35)	22	10,12 18,25	34	33'-36' <u>CLAY</u>, grayish brown (10YR 5/2) to dark grayish brown (10YR 4/2), few silt, trace coarse sand, hard-slightly moist, no odor. At 34', trace medium sand.	CL	▨		NS						
			36	<u>End of Boring at 36' BGS</u>										
			38											
			40											
			42											
			44											
			46											
			48											
			50											
			52											
			54											
			56											
			58											
			60											
			62											

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location GB-727
County: Sheboygan

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

(If Applicable)
____ Gov't Lot ____ Grid Number

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

Civil Town Name: City of Sheboygan

Street Address of Well: 732 North Water Street

City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation

Present Well Owner:

Street or Route: P.O. Box 19800

City, State, Zip Code: Green Bay, WI

Facility Well No. and/or Name (If Applicable): GB-727

WI Unique Well No.:

Reason For Abandonment: Test Boring

Date of Abandonment: 12/11/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/11/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

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

(4) Depth to Water (Feet) ~9

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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	36.0	7 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY

Signature of Person Doing Work
Date Signed 12-22-98

Street or Route: 101 ALDERSON ST., P.O. BOX 109
Telephone Number: 715-359-7090

City, State, Zip Code: SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 2

Facility/Project Name *C-Sheboygan Water Street Feasibility Study*

License/Permit/Monitoring Number

Boring Number *GB-728*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear Environmental Drilling, Inc.*
Randy Radke

Date Drilling Started *12/10/98*

Date Drilling Completed *12/10/98*

Drilling Method *HSA and Mud Rotary*

DNR Facility Well No.

WI Unique Well No.

Common Well Name

Final Static Water Level *Feet MSL*

Surface Elevation *585.82 Feet MSL*

Borehole Diameter *8.25 / 6 inches*

Boring Location
State Plane Feet N
Feet E

Lat
Long

Local Grid Location (if applicable) *4714.0 feet* ☒ *N* ☐ *S* *5347.7 feet* ☒ *E* ☐ *W*

County *Sheboygan*

DNR County Code *60*

Civil Town/City/ or Village *Sheboygan*

Sample									Soil Properties						
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
GB728 (1)	7	2/2 2/2		0'-4.5' FILL, ORGANIC SILT, granular, slightly moist, no odor.	OL			6.4						
GB728 (3)	24	pushed	2					ns						Shelby Tube 2' - 4'
GB728 (5)	11	4/2 2/6	4	soft, very moist. 4.5'-6' CLAY, olive gray (5Y 5/2), trace to 5% silt, trace very fine sand, little organics, soft to firm.	CL SC			17.8						
28 (7)	8	3/4 5/6	6					21.8						
GB728 (9)	18	3/4 4/6	8	grades to CLAYEY SAND.	CL			68.9						
GB728 (11)	15	2/3 3/4	10	6'-12' CLAY WITH SILT, dark grayish brown (10YR 4/2), firm to hard, medium plasticity, moist, no odor, with fine seams of fine to coarse CLAYEY SAND and subround SILTY SAND, compact, wet, no odor.				211						
GB728 (13)	20	2/4 4/7	12	soft to firm, **odor**.	SC			462						
GB728 (15)	19	5/8 13/17	14	**tar in seams, strong odor**.	SP			1238						
GB728 (17)	21	6/8 20/24	16	12'-17.5' CLAYEY SAND WITH SILT, dark gray (2.5Y 4/1), poorly graded, interbedded fine to coarse, predominantly coarse, subangular to subround, compact, **tar concentrated in coarse lenses**, wet, **sheen, strong odor**.				641						
GB728 (19)	15	12/8 15/18	18		CL			841						
GB728 (21)	24	pushed	20	SAND, very dark gray (5Y 3/1), poorly graded, medium to coarse, predominantly coarse, subround to round, 5 to 10% fine subround gravel, compact, wet, **tar entire sample, strong odor**.				ns						Shelby Tube 20' - 22'
GB728 (23)	21	2/2 2/4	22	grades to predominantly medium sand with no gravel	CL			243						

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

Signature

Firm **Natural Resource Technology**

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.

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Com
GB728 (25)	19	10/5 5/5		17.5'-22' CLAY WITH SILT, dark gray (5Y 4/1), hard, slightly moist @ 18' few fine sand seams, no tar.	CL	▨		142						
GB728 (27)	24	pushed	26	@ 21' with coarse sand seams, tar in seams, soft, very moist to wet, **strong odor**.		▨		ns						Shelby Tube 26' - 28'
GB728 (29)	23	15/14 28/34	28	22'-28' CLAY, brown (7.5YR 5/3), 5 to 10% silt, trace sand and gravel, few very fine silt seams, medium plasticity, soft, very moist, **slight odor**.	CL	▨		4.1						
GB728 (31)	24	pushed	30			▨		ns						Shelby Tube 30' - 32'
			32	@ 24' brown (10YR 5/3), few sand and gravel seams, firm, very moist, **slight odor**.										
			34	28'-32' CLAY, reddish brown (5YR 4/3), 5 to 10% silt, trace fine gravel, medium to high plasticity, hard to very hard,slightly moist, no odor										
			36	varves of CLAY, CLAY WITH SILT, and SILT.										
			38	*End Of Boring @ 32'*										
			40											
			42											
			44											
			46											
			48											
			50											
			52											
			54											
			56											
			58											
			60											
			62											

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole cation: GB-728
County: Sheboygan

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

____ Gov't Lot ____ Grid Number

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

Civil Town Name: City of Sheboygan

Street Address of Well: 732 North Water Street

City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation

Present Well Owner:

Street or Route: P.O. Box 19800

City, State, Zip Code: Green Bay,WI

Facility Well No. and/or Name (If Applicable): GB-728

WI Unique Well No.:

Reason For Abandonment: Test Boring

Date of Abandonment: 12/10/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/10/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

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

(4) Depth to Water (Feet) ~6

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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	32.0	7 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY

Signature of Person Doing Work

Date Signed 12-22-98

et or Route: 101 ALDERSON ST., P.O. BOX 109

Telephone Number: 715-359-7090

City, State, Zip Code: SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 2

Facility/Project Name *WPSC - Vacant City Property South of Campmarina*	**License/Permit/Monitoring Number**	**Boring Number** *GB-729*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Randy Radtke*	**Date Drilling Started** *12/14/98*	**Date Drilling Completed** *12/15/98*	**Drilling Method** *4 1/4" HSA-ROTARY MUD*

DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *586.13 Feet MSL*	**Borehole Diameter** *8.25 / 6 inches*

Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4779.2 feet* ☒ **N** ☐ **S** *5287.6 feet* ☒ **E** ☐ **W**

County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample									Soil Properties						
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
GB729 (1)	10	4,3 6,6	2	Grassy surface w/ associated top soil to 2' BGS (clayey sand, fine grained, some silt, little medium sand, roots, soft-moist).	SC			5.4						
GB729 (3)	12	3,3 4,4	4	2'-5' <u>FILL</u> SAND, brown and black, fine to medium, **some cinders** , little coarse sand and fine gravel, little silt and clay, loose- moist, no odor.	FILL			16.3						
GB729 (5)	14	4,5 5,5	6	**Tar at 4' BGS.**	SP SM			16.3						
GB729 (7)	18	4,3 5,4	8	5'-16.5' <u>SAND</u>, black, well graded, predominantly fine and medium, some coarse sand, little silt, few fine gravel, loose-wet, ar, strong odor. **Tar present to 27.8'**	SP			22.1						
GB729 (9)	16	NR	10	6', 6" lense of <u>SILTY SAND</u>, fine grained.				38.0						
GB729 (11)	24	NR	12	7', some organics. 9', little terrestrial gastropod shells.	SM			38.0						
GB729 (13)	24	pushed	14	At 10', 1' layer of <u>SILTY SAND</u>, very dark gray (Chart 1 for Gley 3/N), soft-moist, **slight odor**, no tar.	SP			NS						Shelby Tube 12' - 14'
GB729 (15)	1	7,10 10,6	16					38.0						
GB729 (17)	18	4,5 14,16	18	16.5'-21.2' <u>SILTY SAND</u>, dark gray (2.5Y 4/1), fine grained, few medium sand, trace coarse sand, little organics and terrestrial gastropod shells, very stiff-wet, **tar, strong odor**.	SM			81.5						
GB729 (19)	10	7,14 10,10	20					81.5						
GB729 (21)	24	4,6 10,12	22	21.2'-22' <u>SANDY CLAY</u>, grayish brown (10YR 5/2), some silt, few medium and coarse sand, very stiff-moist, **slight odor**.	CL			81.5						
GB729 (23)	24	12,12 13,13			CL			27.1						

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

Signature	Firm **Natural Resource Technology**

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.

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Nu and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
GB729 (25)	24	pushed	26	22'-26' SILTY CLAY, grayish brown (10YR 5/2), few fine sand, trace medium sand, very stiff-moist, no odor.	CL	▨		NS						Shelby Tube 24' - 26' Augered to 26' BGS.
GB729 (27)	24	7,7 12,15	28	26'-34' CLAY, dusky red and grayish brown (2.5YR 4/2 and 10YR 5/2), trace coarse sand and fine gravel, very stiff-slightly moist, no odor.	CL	▨		81.5						
GB729 (29)	24	8,10 10,10	30	At 27.8', **tar in clay fracture, slight odor.** At 28.5', grades to CLAY, grayish brown, few silt, trace coarse sand and fine gravel, very stiff-slightly moist, no odor.		▨		16.3						
GB729 (31)	24	10,13 15,16	32	Wet from 30'-31.5'.		▨		70.6						
GB729 (33)	24	12,15 15,7	34	At 32', grades to CLAY, dusky red and graish brown, few light gray clayey silt seams, very stiff-slightly moist, no odor.		▨		16.3						
			36	End of Boring at 34' BGS										
			38 40 42 44 46 48 50 52 54 56 58 60 62											

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location: GB-729
County: Sheboygan

____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W
(If Applicable)
____ Gov't Lot ____ Grid Number

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

Civil Town Name: City of Sheboygan
Street Address of Well: 732 North Water Street
City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation
Present Well Owner:
Street or Route: P.O. Box 19800
City, State, Zip Code: Green Bay, WI
Facility Well No. and/or Name (If Applicable): GB-729
WI Unique Well No.:
Reason For Abandonment: Test Boring
Date of Abandonment: 12/15/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well Drillhole/Borehole Construction Completed On (Date) 12/14/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ____ 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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	34.0	6.5 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY
Signature of Person Doing Work
Date Signed 12-22-98
Street or Route: 101 ALDERSON ST., P.O. BOX 109
Telephone Number: 715-359-7090
City, State, Zip Code: SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 2

Facility/Project Name *[illegible] - Vacant City Property South of Campmarina*	**License/Permit/Monitoring Number**	**Boring Number** *GB-730*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Randy Radtke*	**Date Drilling Started** *12/14/98*	**Date Drilling Completed** *12/14/98*	**Drilling Method** *4 1/4" (ID) HSA / ROTAR*

DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *588.66 Feet MSL*	**Borehole Diameter** *8.25 / 6 inches*

Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4863.2 feet* ☒ *N* ☐ *S* *5231.3 feet* ☒ *E* ☐ *W*

County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
GB730 (1)	9	10,11 11,12		Grassy surface w/ associated top soil to 1' BGS (sand, fine and medium grained, some organics)	SP			0.0						
GB730 (3)	14	4,5 5,6	2	1'-3' <u>FILL</u> SILTY CLAY, reddish brown (5YR 5/4), few medium sand, stiff-dry, no odor. .in=3 3'-6' <u>FILL</u> SAND, dark gray, fine grained, **some cinders**, little silt and clay, loose-dry, no odor.	FILL			8.1						
GB730 (5)	0	11,13 18,7	4	NO RECOVERY 4'-6' BGS.				NR						
[illegible] (7)	10	3,2 3,1	6	6'-19' <u>SAND W/ SILT</u>, dark gray (5Y 4/1), little coarse sand and fine gravel, soft-moist to very moist, **minor tar, visual staining, strong odor.**	SM			16.3						
GB730 (9)	16	3,1 1,1	8	**Minor tar and strong odors continue to 10' BGS**	SW			32.7						
GB730 (11)	0	pushed	10	Wet at 9' At 9.5', 4" lense of <u>SAND</u>, well graded, predominanty fine to medium, some coarse sand, **slight odor.**	SM			NR						Shelby Tube 10' - 12'
GB730 (13)	18	1,1 1,3	12	SHELBY TUBE SAMPLE 10'-12' NO RECOVERY				24.5						Shelby Tube 12' - 14'
GB730 (15)	20	1,1 1,1	14	SHELBY TUBE SAMPLE 12'-14' NO RECOVERY, drove 2" split spoon	SW			40.9						
GB730 (17)	18	1,1 1,1	16	At 12.5', some lenses of <u>SAND</u>, well graded, predominantly fine to medium, some coarse sand, **slight odor.**	SM			40.9						
GB730 (19)	20	5,5 10,17	18	At 14.5', 6" lense of <u>SAND</u> as at 9.5'. At 15', little organics, few medium sand, trace coarse sand, **slight odor.**				24.5						
GB730 (21)	18	7,7 7,13	20	At 16'-19', lenses of <u>SAND</u> as at 12.5', little clay.	CL			8.1						
GB730 (23)	24	pushed	22					NS						Shelby Tube 22' - 24'

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

Signature	Firm **Natural Resource Technology**

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.

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
GB730 (25)	24	7,12 19,22	26	19'-25' <u>SILTY CLAY</u>, dark grayish brown (10YR 4/2), few medium sand, trace coarse sand and fine gravel, stiff-moist to slightly moist,no odor. SHELBY TUBE SAMPLE COLLECTED FROM 22'-24' BGS. At 24.6', 2" lense clayey silt, light gray (10YR 7/2).	CL CL	▨		8.1						Augered to 24' bgs
GB730 (27)	24	5,10 10,10	28		SP	○		8.1						
GB730 (29)	20	pushed	30		CL	▨		NS						
GB730 (31)	24	10,11 13,10	32	25'-32' <u>CLAY</u>, dark grayish brown and dusky red (10YR 4/2 and 2.5YR 4/4), few silt, trace coarse sand, hard-slightly moist, no odor. At 26', some clayey silt seams, light gray. At 26.6', 6" lense of <u>GRAVELLY SAND</u>, coarse grained sand, fine gravel, little clay, loose-wet. At 27.2', grades to <u>CLAY</u>, dark grayish brown (10YR 4/2), few silt, trace coarse sand and fine gravel, very stiff-slightly moist, no odor.		▨		8.1						
			34 36 38 40 42 44 46 48 50 52 54 56 58 60 62	<u>End of Boring at 32' BGS</u>										

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole ꞏcation GB-730
County Sheboygan
____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W
(If Applicable)
____ Gov't Lot ____ Grid Number
Grid Location
____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.
Civil Town Name
City of Sheboygan
Street Address of Well
732 North Water Street
City, Village
Sheboygan

(2) FACILITY NAME Camp Marina
Original Well Owner (If Known)
Wisconsin Public Service Corporation
Present Well Owner
Street or Route
P.O. Box 19800
City, State, Zip Code
Green Bay, WI
Facility Well No. and/or Name (If Applicable)
GB-730
WI Unique Well No.
Reason For Abandonment
Test Boring
Date of Abandonment
12/14/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On
(Date) 12/14/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ____ 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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	32.0	6.5 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY
Signature of Person ~~Doing~~ Work
Date Signed 12-22-98
Street or Route
101 ALDERSON ST., P.O. BOX 109
Telephone Number
715-359-7090
City, State, Zip Code
SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected	District/County
Reviewer/Inspector	☐ Complying Work ☐ Noncomplying Work
Follow-up Necessary	

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 1

Facility/Project Name *WPSC-Sheboygan Water Street Feasibility Study*	**License/Permit/Monitoring Number**	**Boring Number** *SB-731*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear Environmental Drilling, Inc.* *Randy Radke*	**Date Drilling Started** *12/10/98*	**Date Drilling Completed** *12/10/98*	**Drilling Method** *HSA and Mud Rotary*

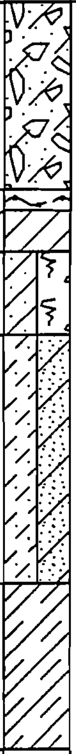
DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *590.70 Feet MSL*	**Borehole Diameter** *inches*

Boring Location **State Plane** **Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4889.6 feet* ☒ *N* ☐ *S* *5298.2 feet* ☒ *E* ☐ *W*

County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample: Number and Type	Sample: Length Att. & Recovered (In)	Blow Counts	Depth In Feet	USCS	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB731 (1)	10	4/4 6/8	2	FILL		1.0						
SB731 (3)	14	5/3 6/8	4			3.4						
SB731 (5)	21	3/4 4/4	6	PEAT CL		21						
SB731 (7)	0	2/4 6/5	8	CL		ns						
SB731 (9)	19	5/5 6/9	10	SM		5.6						
SB731 (11)	15	4/6 7/4	12			4.3						
SB731 (13)	19	3/4 4/4	14			3.1						
SB731 (15)	17	4/7 16/20	16	CL		6.8						
SB731 (17)	22	6/10 15/17	18			4.7						
			20 22									

Graphic Log



Soil/Rock Description And Geologic Origin For Each Major Unit

0'-4.5' FILL, SILTY GRAVEL WITH SAND, light yellowish brown (10YR 6/4), poorly graded, fine to coarse subround sand - predominantly medium, fine to medium subangular gravel - predominantly medium, compact, slightly moist, no odor.

mixed with organics, **trace cinders, red brick fragments**, CLAY WITH SILT, and SILTY SAND, compact, moist, no odor.

4.5'-5' PEAT.

grading to CLAY, greenish gray (5GY 5/1), trace organics, trace silt and very fine sand, high plasticity, soft, wet, no odor.

grading to SANDY CLAY WITH ORGANICS

8'-14' SILTY SAND WITH CLAY, olive gray (5Y 5/2), poorly graded, very fine to medium sand, predominantly fine, fine laminations throughout with varying amounts of silt and clay, soft, wet, no odor.

trace to no clay

14'-18' CLAY WITH SILT, dark reddish gray (5YR 4/2), trace to 5% fine subangular to subround gravel, medium plasticity, very hard, slightly moist, no odor.

few very fine to fine laminations of silt and fine to medium sand.

End Of Boring @ 18'

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

Signature	Firm **Natural Resource Technology**

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 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole ation: SB-731
County: Sheboygan

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

(If Applicable)
________ Gov't Lot ________ Grid Number

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

Civil Town Name: City of Sheboygan

Street Address of Well: 732 North Water Street

City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation

Present Well Owner:

Street or Route: P.O. Box 19800

City, State, Zip Code: Green Bay,WI

Facility Well No. and/or Name (If Applicable): SB-731

WI Unique Well No.:

Reason For Abandonment: Test Boring

Date of Abandonment: 12/10/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/10/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface): N/A
Casing Diameter (in.): N/A
Casing Depth (ft.): ________

Lower Drillhole Diameter (in.): N/A

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

(4) Depth to Water (Feet) ~5

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: Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	18.0	3 Bags	

(8) Comments ________

(9) Name of Person or Firm Doing Sealing Work: BOART LONGYEAR COMPANY

Signature of Person Doing Work:
Date Signed: 12-22-98

Street or Route: 101 ALDERSON ST., P.O. BOX 109
Telephone Number: 715-359-7090

City, State, Zip Code: SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected:
District/County:
Reviewer/Inspector:
☐ Complying Work
☐ Noncomplying Work
Follow-up Necessary:

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

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Page 1 of 1

Facility/Project Name *WPSC - Campmarina, Feasibility Study*	**License/Permit/Monitoring Number**	**Boring Number** *SB-732*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Brian Loveland*	**Date Drilling Started** *12/10/98*	**Date Drilling Completed** *12/10/98*	**Drilling Method** *3 1/4" HSA*

DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *591.1 Feet MSL*	**Borehole Diameter** *6.25 inches*

Boring Location **State Plane** **Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4879.1 feet* ☒ ***N*** ☐ ***S*** *5338.0 feet* ☒ ***E*** ☐ ***W***

County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
SB732 (1)	NS	NS	2	Earth Drilled to 2' BGS; 4" concrete surface with associated sand and gravel base 1'-5.5' FILL SILTY SAND, light brown, little coarse sand and fine gravel, little clay, stiff-dry, no odor.				NA						
SB732 (3)	12	5,5 6,7	4		FILL			7.3						
SB732 (5)	13	10,11 13,14	6					18.9						
SB732 (7)	22	10,10 11,12	8	5.5'-8' SANDY CLAY, brownish gray, little fine sand and silt, few coarse sand and fine gravel, very stiff-slightly moist, **slight odor**.	CL			61.7						
SB732 (9)	2	9,9 10,12	10	8'-10'SAND W/ GRAVEL, brown, well graded, fine to coarse, some fine gravel, little silt, firm-slightly moist, no odor.	SP			17.6						
SB732 (11)	22	9,10 13,14	12	10'-20' SILTY CLAY, light gray and brown, few fine and medium sand seams, few coarse sand and fine gravel, very stiff-wet to moist, **slight odor**.				112						
SB732 (13)	24	5,7 7,7	14	At 12', grades to SILTY CLAY, brown, little fine sand, little coarse sand, trace fine gravel, stiff-wet, no odor.				144						analytical sample at 12'-14'
SB732 (15)	20	5,7 7,7	16	At 14', few fine and medium grained sand seams, **slight odor**.	CL			25.2						
SB732 (17)	8	5,3 4,4	18	No odor at 16'.				12.3						
SB732 (19)	12	4,4 5,6	20	At 19.5' BGS, grades to SILTY CLAY, reddish brown, few medium and coarse sand, trace fine gravel, very stiff-moist, no odor.				12.7						
			22	End of Boring at 20' BGS										

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

Signature	Firm **Natural Resource Technology**

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 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location: SB-732

County: Sheboygan

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

(If Applicable)

____ Gov't Lot ____ Grid Number

Grid Location

____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.

Civil Town Name: City of Sheboygan

Street Address of Well: 732 North Water Street

City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation

Present Well Owner:

Street or Route: P.O. Box 19800

City, State, Zip Code: Green Bay, WI

Facility Well No. and/or Name (If Applicable): SB-732

WI Unique Well No.:

Reason For Abandonment: Test Boring

Date of Abandonment: 12/10/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/10/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A

Casing Diameter (in.) N/A

Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown

If Yes, To What Depth? ____ 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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	20.0	6 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work: BOART LONGYEAR COMPANY

Signature of Person Doing Work:

Date Signed: 12-22-98

Street or Route: 101 ALDERSON ST., P.O. BOX 109

Telephone Number: 715-359-7090

City, State, Zip Code: SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected:

District/County:

Reviewer/Inspector:

☐ Complying Work
☐ Noncomplying Work

Follow-up Necessary:

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 2

Facility/Project Name *WPSC – Campmarina, Feasibility Study*	**License/Permit/Monitoring Number**	**Boring Number** *SB-733*	
Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Brian Loveland*	**Date Drilling Started** *12/9/98*	**Date Drilling Completed** *12/9/98*	**Drilling Method** *3 1/4" HSA*

DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *590.5 Feet MSL*	**Borehole Diameter** *6.25 inches*

Boring Location **State Plane** Feet N Feet E	**Lat** **Long**	**Local Grid Location (If applicable)** *4841 feet* ☒ **N** ☐ **S** *5358 feet* ☒ **E** ☐ **W**
County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample									Soil Properties						
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB733 (1)	NS	NS		Earth Drilled to 2' BGS; 4" concrete surface with associated sand and gravel base				NA						
SB733 (3)	14	4,4 6,16	2	1'-7' FILL, WELL GRADED SAND, brown, fine to coarse, little fine and coarse gravel, little **bricks**, few silt, trace clay, stiff- moist, **strong odor and visual staining**.	FILL			627						
SB733 (5)	4	14,18 7,6	4	No odor or visual stains at 4.5' BGS.				7.4						
SB733 (7)	14	5,8 10,15	6	7'-8' SILTY CLAY, black, little fine to coarse sand, little **brick**, stiff-moist, **strong odor and visual staining**.	CL			718						
SB733 (9)	14	5,6 6,7	8	8'-10' SAND, light brown, poorly graded, fine to medium, stiff- moist to wet, **strong odor, tar**.	SP			233						
SB733 (11)	24	4,5 6,8	10	10'-11' SILTY CLAY, light brown, stiff-wet, **strong odor, tar**.	CL			843						analytical sample at 10'-12'
SB733 (13)	24	7,7 7,7	12	11'-17.5' SANDY CLAY, light brown, fine sand, little medium and coarse sand, little fibne gravel, stiff-wet, **strong odor, tar**.	CL			431						
SB733 (15)	12	3,5 6,7	14	At 13', 1' of SILTY CLAY, light brown, stiff-wet to moist, **strong odor, tar**.				421						
SB733 (17)	24	6,7 7,7	16					419						
SB733 (19)	24	5,7 9,10	18	17.5'-20' SILTY CLAY, brown, some lenses of sandy clay, little medium and coarse sand, stiff-wet to slightly moist, **slight odor, tar to 18' BGS**.	CL			157						
SB733 (21)	24	6,6 6,7	20	At 18'-20', **tar concentrated in fine grained materials**.				52.5						
SB733 (23)	24		22					117						

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

Signature	Firm **Natural Resource Technology**

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.

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Num and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
SB733 (25)	24	8,8 7,6	26	20'-26' SILTY CLAY, reddish brown, little medium and coarse sand, few fine gravel, stiff-slightly moist, light odor.	CL	▨		47.5						
			28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62	*End of Boring at 26' BGS*										

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location: SB-733
County: Sheboygan

____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W
(If Applicable)
____ Gov't Lot ____ Grid Number
Grid Location
____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.

Civil Town Name: City of Sheboygan
Street Address of Well: 732 North Water Street
City, Village: Shebovgan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation
Present Well Owner:
Street or Route: P.O. Box 19800
City, State, Zip Code: Green Bay,WI
Facility Well No. and/or Name (If Applicable): SB-733
WI Unique Well No.:
Reason For Abandonment: Test Boring
Date of Abandonment: 12/09/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On
(Date) 12/09/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

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

(4) Depth to Water (Feet) ~9
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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	26.0	6 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY
Signature of Person Doing Work
Date Signed 12-22-98
Street or Route: 101 ALDERSON ST., P.O. BOX 109
Telephone Number: 715-359-7090
City, State, Zip Code: SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 1

Facility/Project Name: *C - Campmarina, Feasibility Study*

License/Permit/Monitoring Number:

Boring Number: *SB-734*

Boring Drilled By (Firm name and name of crew chief): *Boart Longyear*
Brian Loveland

Date Drilling Started: *12/9/98*

Date Drilling Completed: *12/9/98*

Drilling Method: *3 1/4" HSA*

DNR Facility Well No.:

WI Unique Well No.:

Common Well Name:

Final Static Water Level: *Feet MSL*

Surface Elevation: *591.37 Feet MSL*

Borehole Diameter: *6.25 inches*

Boring Location State Plane: Feet N Feet E

Lat
Long

Local Grid Location (If applicable): *4779.1 feet* ☒ **N** ☐ **S** *5395.7 feet* ☒ **E** ☐ **W**

County: *Sheboygan*

DNR County Code: *60*

Civil Town/City/ or Village: *Sheboygan*

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
SB734 (1)	NS	NS	2	Earth Drilled to 2' BGS; 12" fine and coarse gravel surface 1'-9' FILL WELL GRADED SAND, brown, fine to coarse, some fine and coarse gravel, ome brick, firm-dry, no odor.	FILL			NA						
SB734 (3)	4	6,6 7,7	4					28.9						
SB734 (5)	4	50/.3	6					61.2						
4 (7)	4	50/.1	8					55.9						
SB734 (9)	16	15,12 10,9	10	9'-12' SILTY CLAY, light brown, few medium and coarse sand, very stiff-moist, **slight odor.**	CL			54.2						
SB734 (11)	16	8,7 9,10	12					23.9						
SB734 (13)	4	7,6 8,6	14	12'-14' SAND, brown, well graded, fine to coarse, some fine gravel, little silt, few clay, very loose-wet, **slight odor.** At 13', 4"-8" lense tained black w/ tar.	SW			27.0						analytical sample at 12'-14'
SB734 (15)	21	8,6 6,7	16	14'-20' SILTY CLAY, grayish brown, trace fine gravel, stiff-moist, **slight odor.** At 16', few laminations of silt, stiff to medium stiff-slightly moist, **slight odor.**	CL			7.4						
SB734 (17)	14	4,3 4,3	18					7.1						
SB734 (19)	15	4,3 4,5	20					2.7						
			22	End of Boring at 20' BGS										

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

Signature

Firm **Natural Resource Technology**

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 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location: SB-734
County: Sheboygan
____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W
(If Applicable)
____ Gov't Lot ____ Grid Number
Grid Location
____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.
Civil Town Name: City of Sheboygan
Street Address of Well: 732 North Water Street
City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation
Present Well Owner:
Street or Route: P.O. Box 19800
City, State, Zip Code: Green Bay, WI
Facility Well No. and/or Name (If Applicable): SB-734
WI Unique Well No.:
Reason For Abandonment: Test Boring
Date of Abandonment: 12/09/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12|09|98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____
Lower Drillhole Diameter (in.) N/A
Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ____ 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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	20.0	6 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY
Signature of Person ~~Doing~~ Work
Date Signed 12-22-98
Street or Route: 101 ALDERSON ST., P.O. BOX 109
Telephone Number: 715-359-7090
City, State, Zip Code: SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected	District/County
Reviewer/Inspector	☐ Complying Work ☐ Noncomplying Work
Follow-up Necessary	

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 5-92

Page 1 of 1

Facility/Project Name *C - Campmarina, Feasibility Study*	**License/Permit/Monitoring Number**	**Boring Number** *SB-735*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Brian Loveland*	**Date Drilling Started** *12/10/98*	**Date Drilling Completed** *12/10/98*	**Drilling Method** *3 1/4" HSA*

DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *590.49 Feet MSL*	**Borehole Diameter** *6.25 inches*

Boring Location **State Plane**	**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4712.2 feet* ☒ *N* ☐ *S* *5401.6 feet* ☒ *E* ☐ *W*

County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB735 (1)	NA	NA		Earth Drilled to 2' BGS; 12" fine and coarse gravel surface				NA						
SB735 (3)	8	4,5 5,6	2	1'-15' <u>FILL</u> SAND, brown to dark gray, fine to medium, **some debris (brick, cinders)**, little fine and coarse gravel, little silt and clay, loose-moist, no odor.				6.3						
SB735 (5)	14	4,3 4,5	4	At 5', trace clay, slightly moist, no odor.				0.0						
35 (7)	8	1,1 1,1	6	At 7.5'-15', black, **strong odor, tar.**				21.6						
SB735 (9)	8	1,1 1,1	8	Very soft-moist to wet	FILL			149						
SB735 (11)	18	2,2 1,2	10	At 10', few coarse sand and coarse gravel.				787						analytical sample at 10'-12'
SB735 (13)	12	1,1 1,1	12	At 13', **little wood debris.**				656						
SB735 (15)	18	2,3 2,3	14	15'-20' <u>SILTY CLAY</u>, brown, mottled, little medium and coarse sand, trace fine gravel, medium stiff-moist, **slight odor.**				318						
SB735 (17)	18	2,4 3,3	16		CL			73.4						
SB735 (19)	16	2,2 3,2	18					124						
			20 22	<u>End of Boring at 20' BGS</u>										

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

Signature	Firm **Natural Resource Technology**

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 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location SB-735
County Sheboygan
____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W
(If Applicable)
____ Gov't Lot ____ Grid Number
Grid Location
____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.
Civil Town Name City of Sheboygan
Street Address of Well 732 North Water Street
City, Village Sheboygan

(2) FACILITY NAME Camp Marina
Original Well Owner (If Known) Wisconsin Public Service Corporation
Present Well Owner
Street or Route P.O. Box 19800
City, State, Zip Code Green Bay, WI
Facility Well No. and/or Name (If Applicable) SB-735
WI Unique Well No.
Reason For Abandonment Test Boring
Date of Abandonment 12/10/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/10/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.)
Lower Drillhole Diameter (in.) N/A
Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ____ 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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	20.0	4 Bags	

(8) Comments

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY
Signature of Person Doing Work
Date Signed 12-22-98
Street or Route 101 ALDERSON ST., P.O. BOX 109
Telephone Number 715-359-7090
City, State, Zip Code SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

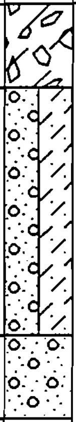
Route To:
☐ Solid Waste
☐ Emergency Response
☐ Wastewater
☐ Superfund
☐ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other:

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 1

Facility/Project Name *C - Campmarina, Feasibility Study*	**License/Permit/Monitoring Number**	**Boring Number** *SB-736*	
Boring Drilled By (Firm name and name of crew chief) *Boart Longyear Environmental Drilling* *Brian Loveland*	**Date Drilling Started** *12/08/98*	**Date Drilling Completed** *12/08/98*	**Drilling Method** *4-1/4" (ID) HSA*
DNR Facility Well No. / **WI Unique Well No.** / **Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *588.45 Feet MSL*	**Borehole Diameter** *8.25 inches*
Boring Location **State Plane** **Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (if applicable)** *4919.2 feet* ☒ *N* ☐ *S*	*5200.6 feet* ☒ *E* ☐ *W*
County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*	

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB736 (1)	NS	NS		SILTY GRAVEL	GM									
SB736 (3)	15	5/5 6/6	2	2'-10' SAND with GRAVEL, brownish black and SILTY SAND, brown	SP SM									
SB736 (5)	16	3/5 5/6	4	**trace of fine hair**										
6 (7)	24	3/4 3/4	6	fiberous hair with brown and black CLAY, moist to wet, **possible tar, odor.**										
SB736 (9)	6	4/5 5/5	8	little silt, wet, **strong odor.**	SP									
			10	*End of Boring @ 10'*										
			12											
			14											
			16											
			18											
			20											
			22											

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

Signature

Firm **Natural Resource Technology**

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 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location SB-736
County Sheboygan
____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W
(If Applicable)
____ Gov't Lot ____ Grid Number
Grid Location
____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.
Civil Town Name City of Sheboygan
Street Address of Well 732 North Water Street
City, Village Sheboygan

(2) FACILITY NAME Camp Marina
Original Well Owner (If Known) Wisconsin Public Service Corporation
Present Well Owner
Street or Route P.O. Box 19800
City, State, Zip Code Green Bay, WI
Facility Well No. and/or Name (If Applicable) SB-736
WI Unique Well No.
Reason For Abandonment Test Boring
Date of Abandonment 12/08/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/08/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____
Lower Drillhole Diameter (in.) N/A
Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ____ Feet

(4) Depth to Water (Feet) ~8
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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	10.0	3 Bags	

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY
Signature of Person Doing Work
Date Signed 12-22-98
Street or Route 101 ALDERSON ST., P.O. BOX 109
Telephone Number 715-359-7090
City, State, Zip Code SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 1

Facility/Project Name *C - Campmarina, Feasibility Study*

License/Permit/Monitoring Number

Boring Number *SB-737*

Boring Drilled By (Firm name and name of crew chief)
Boart Longyear Environmental Drilling
Brian Loveland

Date Drilling Started *12/08/98*

Date Drilling Completed *12/08/98*

Drilling Method *4-1/4" (ID) HSA*

DNR Facility Well No.

WI Unique Well No.

Common Well Name

Final Static Water Level *Feet MSL*

Surface Elevation *587.44 Feet MSL*

Borehole Diameter *8.25 inches*

Boring Location
State Plane Feet N Feet E

Lat
Long

Local Grid Location (If applicable)
4980.3 feet ☒ *N* ☐ *S* *5155.2 feet* ☒ *E* ☐ *W*

County *Sheboygan*

DNR County Code *60*

Civil Town/City/ or Village *Sheboygan*

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			2	Auger refusal at 3' - concrete, possible old foundation										
			4	*End of Boring @ 3'*										
			6											
			8											
			10											
			12											
			14											
			16											
			18											
			20											
			22											

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

Signature

Firm **Natural Resource Technology**

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State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location 58-737
County: Sheboygan

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

(If Applicable)
____ Gov't Lot ____ Grid Number

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

Civil Town Name: City of Sheboygan

Street Address of Well: 732 North Water Street

City, Village: Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known): Wisconsin Public Service Corporation

Present Well Owner:

Street or Route: P.O. Box 19800

City, State, Zip Code: Green Bay,WI

Facility Well No. and/or Name (If Applicable): 58-737

WI Unique Well No.:

Reason For Abandonment: Test Boring

Date of Abandonment: 12/08/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/08/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

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

(4) Depth to Water (Feet) 73

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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	3		

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY

Signature of Person Doing Work
Date Signed 12-22-98

Street or Route: 101 ALDERSON ST., P.O. BOX 109
Telephone Number: 715-359-7090

City, State, Zip Code: SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected
District/County
Reviewer/Inspector
☐ Complying Work
☐ Noncomplying Work
Follow-up Necessary

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 1

Facility/Project Name [illegible] - *Campmarina, Feasibility Study*

License/Permit/Monitoring Number

Boring Number *SB-738*

Boring Drilled By (Firm name and name of crew chief)
Boart Longyear Environmental Drilling
Brian Loveland

Date Drilling Started *12/08/98*

Date Drilling Completed *12/08/98*

Drilling Method *4-1/4" (ID) HSA*

DNR Facility Well No.

WI Unique Well No.

Common Well Name

Final Static Water Level *Feet MSL*

Surface Elevation *587.49 Feet MSL*

Borehole Diameter *8.25 inches*

Boring Location
State Plane Feet N
Feet E

Lat
Long

Local Grid Location (if applicable)
4990.9 feet ☒ ***N*** ☐ ***S***
5148.7 feet ☒ ***E*** ☐ ***W***

County *Sheboygan*

DNR County Code *60*

Civil Town/City/ or Village *Sheboygan*

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			2	Auger refusal at 3' - concrete, possible old foundation										
			4	*End of Boring @ 3'*										
			6											
			8											
			10											
			12											
			14											
			16											
			18											
			20											
			22											

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

Signature

Firm **Natural Resource Technology**

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State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location SB-738
County Shebovgan

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

(If Applicable)
____ Gov't Lot ____ Grid Number

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

Civil Town Name
City of Sheboygan

Street Address of Well
732 North Water Street

City, Village
Shebovgan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known)
Wisconsin Public Service Corporation

Present Well Owner

Street or Route
P.O. Box 19800

City, State, Zip Code
Green Bay,WI

Facility Well No. and/or Name (If Applicable) SB-738
WI Unique Well No.

Reason For Abandonment
Test Boring

Date of Abandonment
12/08/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/08/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ____

Lower Drillhole Diameter (in.) N/A

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

(4) Depth to Water (Feet) 73'

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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	3		

(8) Comments ____

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY

Signature of Person Doing Work
Date Signed 12-22-98

Street or Route
101 ALDERSON ST., P.O. BOX 109

Telephone Number
715-359-7090

City, State, Zip Code
SCHOFIELD, WI 54476

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

DNR/COUNTY

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 1

Facility/Project Name *C - Campmarina, Feasibility Study*			**License/Permit/Monitoring Number**		**Boring Number** *SB-739*
Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Brian Loveland*			**Date Drilling Started** *12/9/98*	**Date Drilling Completed** *12/9/98*	**Drilling Method** *4 1/4" HSA*
DNR Facility Well No.	**WI Unique Well No.**	**Common Well Name**	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *587.71 Feet MSL*	**Borehole Diameter** *8.25 inches*
Boring Location **State Plane**		**Feet N** **Feet E**	**Lat** **Long**	**Local Grid Location (If applicable)** *4970.9 feet* ☒ **N** ☐ **S** *5161.2 feet* ☒ **E** ☐ **W**	
County *Sheboygan*		**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*		

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
SB739 (1)	NA	NA		Earth Drilled to 2' BGS; 12" fine and coarse gravel surface				NA						
SB739 (3)	16	2,4 4,5	2	1'-8' FILL SAND W/ SILT, dark gray to black, well graded, fine to coarse, predominantly fine, little fine to coarse gravel, **little glass and brick debris**, loose-dry, no odor.	FILL			49.4						
SB739 (5)	8	3,3 5,4	4					9.9						
9 (7)	15	1,2 2,3	6	Wet at 6'. **Tar at 7.5', visual staining, strong odor.**				94.3						
			8	End of Boring at 8' BGS										
			10											
			12											
			14											
			16											
			18											
			20											
			22											

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

Signature	Firm **Natural Resource Technology**

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State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5B Rev. 4-97

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION

Well/Drillhole/Borehole Location 58-739
County Sheboygan

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

(If Applicable)
___ Gov't Lot ___ Grid Number

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

Civil Town Name
City of Sheboygan

Street Address of Well
732 North Water Street

City, Village
Sheboygan

(2) FACILITY NAME Camp Marina

Original Well Owner (If Known)
Wisconsin Public Service Corporation

Present Well Owner

Street or Route
P.O. Box 19800

City, State, Zip Code
Green Bay,WI

Facility Well No. and/or Name (If Applicable) 58-739
WI Unique Well No.

Reason For Abandonment
Test Boring

Date of Abandonment
12/09/98

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) 12/09/98

☒ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☒ Yes ☐ No

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

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From groundsurface) N/A
Casing Diameter (in.) N/A
Casing Depth (ft.) ___

Lower Drillhole Diameter (in.) N/A

Was Well Annular Space Grouted? N/A ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? ___ 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 Drill Casing Removed

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.)		Mix Ratio or Mud Weight
Bentonite Chips 3/8"	Surface	8		

(8) Comments

(9) Name of Person or Firm Doing Sealing Work
BOART LONGYEAR COMPANY

Signature of Person Doing Work
Date Signed 12-22-98

Street or Route
101 ALDERSON ST., P.O. BOX 109
Telephone Number
715-359-7090

City, State, Zip Code
SCHOFIELD, WI 54476

(10) FOR DNR OR COUNTY USE ONLY

Date Received/Inspected
District/County
Reviewer/Inspector
☐ Complying Work
☐ Noncomplying Work
Follow-up Necessary

DNR/COUNTY

APPENDIX B

MONITORING WELL BORING LOGS, CONSTRUCTION DETAILS, INFORMATION AND DEVELOPMENT FORMS

State of Wisconsin
Department of Natural Resources

GROUNDWATER MONITORING WELL INFORMATION FORM
Chapter 281 and 289, Wis. Stats.
Form 4400-89 7-98

Facility Name 732 N. WATER STREET WPSC - CAMPMARINA

Facility ID Number

License, Permit or Monitoring No

Date 02/14/99

Completed By (Name and Firm) REBECCA J. KOEPKE / NATURAL RESOURCE TECHNOLOGY, INC

WI Unique Well No	Well Name	DNR Well ID Number	Well Location	Dir. N E	Dir. S W	Date Established	Well Casing Diam	Well Casing Type	Elevations Top of Well Casing	Elevations Ground Surface	Reference MSL (✓)	Reference Site Datum (✓)	Depths Screen Top	Depths Initial Groundwater	Depths Well Depth	Screen Length	Well Type	Well Status	Enf. Stds.	Gradient	Distance to Waste
	MW-701		4759.4 5321.6	N E	— —	07/18/95	2	P	588.51	588.97	✓		3.5	5.72	13.5	10	11/mw	A	✓	D	
	PZ-701		4763.5 5322.5	N E	— —	07/18/95	2	P	588.89	589.28	✓		28.8	6.70	33.8	5	12/pz	A	✓	D	
	MW-702		4798.1 5348.4	N E	— —	07/19/95	2	P	590.09	590.39	✓		3.4	4.83	13.4	10	11/mw	A	✓	D	
	MW-703		4864.4 5245.7	N E	— —	07/19/95	2	P	588.80	589.16	✓		3.5	5.70	13.5	10	11/mw	A	✓		
	MW-704		4677.2 5387.4	N E	— —	07/19/95	2	P	589.05	589.43	✓		3.2	5.63	13.2	10	11/mw	A	✓		
	MW-705		4966.2 5361.2	N E	— —	07/19/95	2	P	589.91	590.22	✓		3.5	6.14	13.5	10	11/mw	A	✓		
	MW-706		4817.8 5388.9	N E	— —	07/18/95	2	P	591.34	591.51	✓		3.4	3.34	13.4	10	11/mw	A	✓	D	
JQ773	PZ-702		4816.4 5393.3	N E	— —	12/10/98	2	P	591.16	591.62	✓		30	2.61	35.0	5	12/pz	A	✓	D	
	MW-707		4613.4 5442.7	N E	— —	07/19/95	2	P	590.08	590.29	✓		3.4	6.65	13.4	10	11/mw	A	✓	D	
JQ774	PZ-703		4611.5 5437.1	N E	— —	12/09/98	2	P	589.22	589.85	✓		30	8.63	35.0	5	12/pz	A	✓	D	
JQ775	MW-708		4878.0 5409.9	N E	— —	12/08/98	2	P	606.09	606.45	✓		9.65	16.78	19.65	15	11/mw	A	✓	U	
JQ772	MW-709		5056.6 5154.6	N E	— —	12/10/98	2	P	587.95	588.51	✓		2.5	7.27	12.50	10	11/mw	A	✓	S	

Location Coordinates Are:

☐ State Plane Coordinate
  ☐ Northern
  ☐ Central
  ☐ Southern

■ Local Grid System

Grid Origin Location: (Check if estimated: ■)

Lat. ____ ° ____ ' ________ " Long. ____ ° ____ ' ________ " or

St. Plane ____________ ft. N. ____________ ft. E. S/C/N Zone

Remarks:

Completion of this form is mandatory under s. NR 507.14 and NR 110.25 Wis. Adm. Code. Failure to file this form may result in forfeiture of not less than $10 nor more than $5,000 for each day of violation. Personally identifiable information provided is intended to be used by the Department for the purposes related to the waste management program

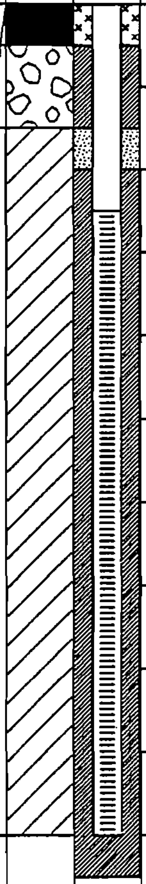
State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 5-92

Page [illegible] of 1

Facility/Project Name *WPSC-Sheboygan II/1060/ Site Investigation*
License/Permit/Monitoring Number
Boring Number *MW-708*
Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Brian Loveland*
Date Drilling Started *12/08/98*
Date Drilling Completed *12/08/98*
Drilling Method *HSA 4 1/4" (ID)*
DNR Facility Well No.
WI Unique Well No. *JQ 775*
Common Well Name *MW-708*
Final Static Water Level *Feet MSL*
Surface Elevation *606.45 Feet MSL*
Borehole Diameter *8.25 inches*
Boring Location State Plane Feet N Feet E
Lat **Long**
Local Grid Location (If applicable) *4878.0 feet* ☒ *N* ☐ *S* *5409.9 feet* ☒ *E* ☐ *W*
County *Sheboygan*
DNR County Code *60*
Civil Town/City/ or Village *Sheboygan*



Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				Asphalt and Concrete	Asph Conc							
			2	GRAVEL and CLAY fill	GP							
MW708 (3)	6	3/4 4/4				4.5						
MW708 (5)	0	3/3 4/5	4	4'-21' CLAY WITH SILT, grayish brown (10YR 5/2), trace very fine sand, medium to high plasticity, trave very fine silt laminations, hard, slightly moist, no odor.		nr						
MW708 (7)	24	6/7 7/7	6	moist, trace to 5% very fine sand, very hard		3.3						
MW708 (9)	10	6/6 7/7	8			5.1						
MW708 (11)	24	5/5 6/7	10	no sand, hard, moist	CL	6.8						
MW708 (13)	24	10/12 13/14	12	moist to very moist		4.2						
MW708 (15)	24	11/10 19/20	14	very moist		3.2						
MW708 (17)	24	9/9 10/10	16	wet at 16'		2.8						
MW708 (19)	24	11/13 15/16	18			2.9						
			20									
			22	*EOB @ 21 FEET*								

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

Signature

Firm **Natural Resource Technology**

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: Watershed/Wastewater ☐ Remediation/Redevelopment ☒ Waste Management ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 6-97

Facility/Project Name: PSC-Camp Marina Feasibility Study

Local Grid Location of Well: 4878.0 ft. ■ N. ☐ S. 5409.9 ft. ■ E. ☐ W.

Well Name: MW-708

Facility License, Permit or Monitoring No.

Grid Origin Location (Check if estimated: ☐)
Lat. ___° ___' ___" Long. ___° ___' ___" or
St. Plane ___ ft. N, ___ ft. E. S/C/N

Wis. Unique Well No: JQ775

DNR Well Number

Facility ID

Date Well Installed: 12/08/1998

Section Location of Waste/Source
___ 1/4 of ___ 1/4 of Sec. ___ T. ___ N, R. ___ ☐ E ☐ W

Type of Well
Well Code 11/mw

Well Installed By: (Person's Name and Firm
Bryan Loveland
Boart Longyear

Distance Well Is From Waste/Source Boundary ___ ft.

Location of Well Relative to Waste/Source
u ☐ Upgradient s ☐ Sidegradient
d ☐ Downgradient n ☐ Not Known

A. Protective pipe, top elevation 606.45 ft. MSL

B. Well casing, top elevation 606.09 ft. MSL

C. Land surface elevation 606.45 ft. MSL

D. Surface seal, bottom 605.45 ft. MSL or 1.0 ft.

12. USC classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ☒ 4 1
Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☒ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe N/A

17. Source of water (attach analysis):
N/A

E. Bentonite seal, top ___ ft. MSL or ___ ft.

F. Fine sand, top 603.45 ft. MSL or 3.0 ft.

G. Filter pack, top 602.45 ft. MSL or 4.0 ft.

H. Screen joint, top 601.45 ft. MSL or 5.0 ft.

I. Well bottom 586.45 ft. MSL or 20.0 ft.

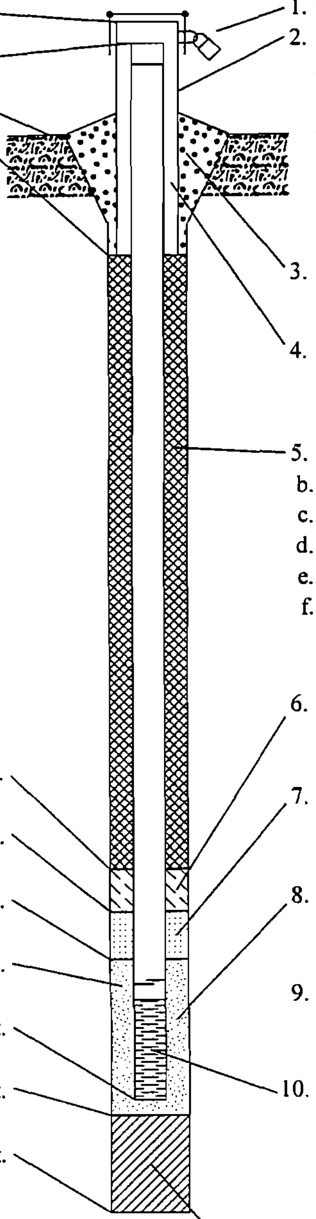
J. Filter pack, bottom 585.45 ft. MSL or 21.0 ft.

K. Borehole, bottom 585.45 ft. MSL or 21.0 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 2.06 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 9.0 in.
b. Length: 1.0 ft.
c. Material: Steel ☒ 0 4
Other ☐
d. Additional protection? ☐ Yes ☒ No
If yes, describe:

3. Surface seal: Bentonite ☐ 3 0
Concrete ☒ 0 1
Other ☐

4. Material between well casing and protective pipe:
Bentonite ☐ 3 0
Sand Other ☒

5. Annular space seal: a. ~~Granular~~ Chipped Bentonite ☒ 3 3
b. ___ Lbs/gal mud weight . Bentonite-sand slurry ☐ 3 5
c. ___ Lbs/gal mud weight . . . Bentonite slurry ☐ 3 1
d. ___ % Bentonite . . . Bentonite-cement grout ☐ 5 0
e. ___ Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8

6. Bentonite seal: a. Bentonite granules ☒ 3 3
b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 3 2
c. ___ Other ☐

7. Fine sand material: Manufacturer, product name and mesh size
a. #7 Badger
b. Volume added ___ ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. #30 American Material
b. Volume added ___ ft^3

9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
Other ☐

10. Screen material: PVC
a. Screen Type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
Other ☐
b. Manufacturer Boart Longyear
c. Slot size: 0.010 in.
d. Slotted length: 15.0 ft.

11. Backfill material (below filter pack): None ☒ 1 4
Other ☐

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

Signature

Firm BOART LONGYEAR COMPANY
101 ALDERSON ST., P.O. BOX 109 SCHOFIELD, WI 54476
Tel: 715-359-7090
Fax: 715-355-5715

Please complete both Forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and condut involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐ ______

Facility/Project Name: WPSC-Camp Marina Feasibility Study
County Name: Sheboygan
Well Name: MW-708
Facility License, Permit or Monitoring Number:
County Code: 60
Wis. Unique Well Number: JQ 775
DNR Well ID Number: ___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
- surged with bailer and bailed ☐ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed and pumped ☐ 70
- compressed air ☐ 20
- bailed only ☐ 10
- pumped only ☐ 51
- pumped slowly ☒ 50
- Other Bailed ☒

3. Time spent developing well: 60 min.

4. Depth of well (from top of well casing): 19.7 ft.

5. Inside diameter of well: 1.9 in.

6. Volume of water in filter pack and well casing: ____ gal.

7. Volume of water removed from well: 25 gal.

8. Volume of water added (if any): 0.0 gal.

9. Source of water added: N/A

10. Analysis performed on water added? N/A ☐ Yes ☐ No
(If yes, attach results)

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	16.91 ft.	DRY ft.
Date	b.	12/08/1998	12/08/1998
		mm dd yyyy	mm dd yyyy
Time	c.	__:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☐ 25
		(Describe) BROWN	(Describe) LIGHT BROWN SLIGHTLY TURBID

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: CHRIS Last Name: ROBB
Firm: NATURAL RESOURCE TECHNOLOGY, INC.

17. Additional comments on development:

Name and Address of Facility Contact/Owner/Responsible Party
First Name: Connie Last Name: Lawniczak
Facility/Firm: Wisconsin Public Service Corporation
Street: P.O. Box 19800
City/State/Zip: Green Bay, WI 54303

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature:
Print Name: REBECCA J. KOEPKE
Firm: Natural Resource Technology, Inc.

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 1

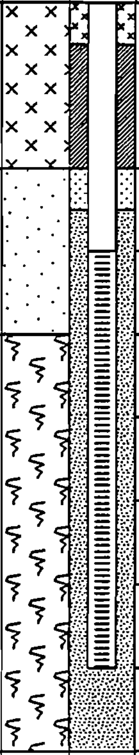
ity/Project Name *C - Campmarina, Feasibility Study*	**License/Permit/Monitoring Number**	**Boring Number** *MW-709*

Boring Drilled By (Firm name and name of crew chief) *Boart Longyear* *Brian Loveland*	**Date Drilling Started** *12/10/98*	**Date Drilling Completed** *12/10/98*	**Drilling Method** *HSA 4 1/4"*

DNR Facility Well No.	**WI Unique Well No.** *JQ772*	**Common Well Name** *MW-709*	**Final Static Water Level** *Feet MSL*	**Surface Elevation** *588.51 Feet MSL*	**Borehole Diameter** *8.25 inches*

Boring Location **State Plane** Feet N Feet E	**Lat** **Long**	**Local Grid Location (If applicable)** *5056.6 feet* ☒ *N* ☐ *S* *5154.6 feet* ☒ *E* ☐ *W*

County *Sheboygan*	**DNR County Code** *60*	**Civil Town/City/ or Village** *Sheboygan*

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			2	GRAVEL FILL FOR DRIVE Earth Drilled to 4' BGS, FILL, **mostly concrete and boulders.**	FILL									
MW-709 (5)	6	6,6 5,4	4	4'-8' SAND, light brown, poorly graded, fine and medium grained, some fine and coarse gravel, firm-slightly moist, no odor.	SP			0.0						
MW-709 (7)	4	10,8 9,12	6	At 5.6', 5" lense of SILTY CLAY, reddish brown, mottled, some fine sand, few coarse sand and fine gravel, stiff-moist, no odor.				3.5						
MW-709 (9)	17	8,6 5,5	8	8'-18', ORGANIC SILT, dark gray to black, some clayey fine sand, stiff-moist to wet, no odor.				1.3						
MW-709 (11)	0	5,4 7,7	10					NR						
MW-709 (13)	2	4,4 3,3	12	At 12', some SILTY CLAY, reddish brown, few coarse sand and fine gravel, medium stiff-very moist, no odor.	OL			11.3						
MW-709 (15)	16	4,4 3,2	14	At 14', **very slight odor.**				12.3						
MW-709 (17)	18	5,4 3,4	16					2.6						
			18	End of Boring at 18' BGS										
			20											
			22											

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

ature

Firm **Natural Resource Technology**

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: Watershed/Wastewater ☐ Remediation/Redevelopment ☒ Waste Management ☐ Other ☐

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 6-97

Facility/Project Name: WPSC-Camp Marina Feasibility Study

Local Grid Location of Well: 5056.6 ft. ■ N. ☐ S. 5154.6 ft. ■ E. ☐ W.

Well Name: MW-709

Facility License, Permit or Monitoring No.

Grid Origin Location (Check if estimated: ☐)
Lat. ___° ___' ___" Long. ___° ___' ___" or
St. Plane _____ ft. N. _____ ft. E. S/C/N

Wis. Unique Well No: JQ772

DNR Well Nu

Facility ID

Date Well Installed: 12/10/1998

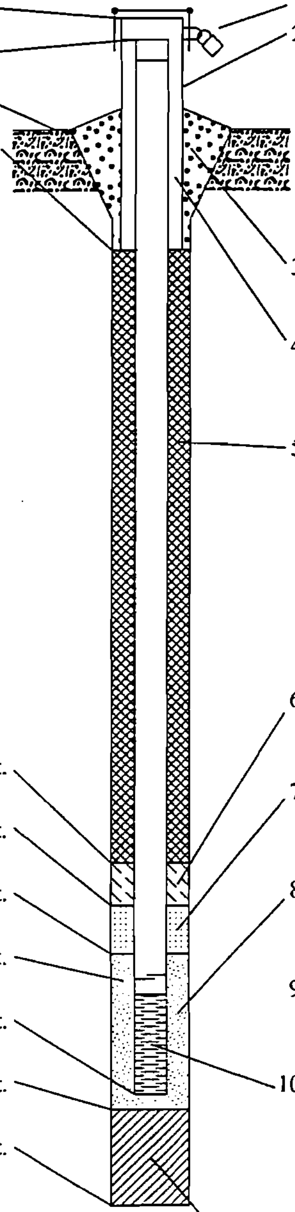
Section Location of Waste/Source
___1/4 of___ 1/4 of Sec.___ T.___ N. R. ___ ☐ E ☐ W

Type of Well
Well Code 11/mw

Well Installed By: (Person's Name and Firm
Bryan Loveland
Boart Longyear

Distance Well Is From Waste/Source Boundary ___ ft.

Location of Well Relative to Waste/Source
u ■ Upgradient s ☐ Sidegradient
d ☐ Downgradient n ☐ Not Known



A. Protective pipe, top elevation 588.51 ft. MSL

B. Well casing, top elevation 587.95 ft. MSL

C. Land surface elevation 588.51 ft. MSL

D. Surface seal, bottom 586.95 ft. MSL or 1.0 ft.

12. USC classification of soil near screen:
GP ☐ GM☐ GC ☐ GW☐ SW☐ SP ☐
SM☐ SC ☐ ML☐ MH☐ CL ☐ CH☐
Bedrock☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ☒ 4 1
_____ Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☒ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe N/A

17. Source of water (attach analysis):
N/A

E. Bentonite seal, top _____ ft. MSL or _____ ft.

F. Fine sand, top 583.95 ft. MSL or 4.0 ft.

G. Filter pack, top 582.95 ft. MSL or 5.0 ft.

H. Screen joint, top 581.95 ft. MSL or 6.0 ft.

I. Well bottom 571.95 ft. MSL or 16.0 ft.

J. Filter pack, bottom 569.95 ft. MSL or 18.0 ft.

K. Borehole, bottom 569.95 ft. MSL or 18.0 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 2.06 in.

1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
   a. Inside diameter: 9.0 in.
   b. Length: 1.0 ft.
   c. Material: Steel ☒ 0 4
   _____ Other ☐
   d. Additional protection? ☐ Yes ☒ No
   If yes, describe:_____

3. Surface seal: Bentonite ☐ 3 0
   Concrete ☒ 0 1
   _____ Other ☐

4. Material between well casing and protective pipe:
   Bentonite ☐ 3 0
   Sand Other ☒

5. Annular space seal: a. ~~Granular~~ Chipped Bentonite ☒ 3 3
   b. ___Lbs/gal mud weight . Bentonite-sand slurry ☐ 3 5
   c. ___Lbs/gal mud weight . . . Bentonite slurry ☐ 3 1
   d. ___% Bentonite . . . Bentonite-cement grout ☐ 5 0
   e. ___Ft^3 volume added for any of the above
   f. How installed: Tremie ☐ 0 1
   Tremie pumped ☐ 0 2
   Gravity ☒ 0 8

6. Bentonite seal: a. Bentonite granules ☐ 3 3
   b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 3 2
   c. _____ Other ☐

7. Fine sand material: Manufacturer, product name and mesh siz
   a. #7 Badge
   b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name and mesh si
   a. #30 American Material
   b. Volume added _____ ft^3

9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3
   Flush threaded PVC schedule 80 ☐ 2 4
   _____ Other ☐

10. Screen material: PVC
   a. Screen Type: Factory cut ☒ 1 1
   Continuous slot ☐ 0 1
   _____ Other ☐
   b. Manufacturer Boart Longyear
   c. Slot size: 0.010 in.
   d. Slotted length: 10.0 ft.

11. Backfill material (below filter pack): None ☒ 1 4
   _____ Other ☐

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

Signature

Firm BOART LONGYEAR COMPANY
101 ALDERSON ST., P.O. BOX 109 SCHOFIELD, WI 54476
Tel: 715-359-7090
Fax: 715-355-5715

Please complete both Forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and condut involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐ ____________

Facility/Project Name: WPSC-Camp Marina Feasibility Study
County Name: Shebovgan
Well Name: MW-709
Facility License, Permit or Monitoring Number:
County Code: 60
Wis. Unique Well Number: JQ 772
DNR Well ID Number: ___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☒	50
Other Bailed	☒	

3. Time spent developing well: 60 min.

4. Depth of well (from top of well casing): 12.5 ft.

5. Inside diameter of well: 1.9 in.

6. Volume of water in filter pack and well casing: ___.__ gal.

7. Volume of water removed from well: 36 gal.

8. Volume of water added (if any): 0.0 gal.

9. Source of water added: N/A

10. Analysis performed on water added? N/A ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 7.68 ft.	DRY ft.
Date	b. 12/11/1998 (m m / d d / y y y y)	12/11/1998 (m m / d d / y y y y)
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.__ inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe) LIGHT GRAY SLIGHTLY TURBID	Clear ☒ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	_____.__ mg/l	_____.__ mg/l
15. COD	_____.__ mg/l	_____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: REBECCA Last Name: KOEPKE
Firm: NATURAL RESOURCE TECHNOLOGY, INC.

17. Additional comments on development:

Name and Address of Facility Contact/Owner/Responsible Party
First Name: Connie Last Name: Lawniczak
Facility/Firm: Wisconsin Public Service Corporation
Street: P.O. Box 19800
City/State/Zip: Green Bay, WI 54303

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

Signature:
Print Name: REBECCA J. KOEPKE
Firm: Natural Resource Technology, Inc.

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page [illegible] 2

Facility/Project Name *WPSC-Sheboygan Water Street, Campmarina*

License/Permit/Monitoring Number

Boring Number *PZ-702*

Boring Drilled By (Firm name and name of crew chief)
Boart Longyear Environmetnal Drilling
Randy Radke

Date Drilling Started *12/09/98*

Date Drilling Completed *12/11/98*

Drilling Method *3-1/4" HSA and 6" Mud R*

DNR Facility Well No.

WI Unique Well No. *JQ773*

Common Well Name *PZ-702*

Final Static Water Level *Feet MSL*

Surface Elevation *591.62 Feet MSL*

Borehole Diameter *8.5 inches*

Boring Location
State Plane Feet N Feet E

Lat
Long °

Local Grid Location (if applicable)
4816.4 feet ☒ *N* ☐ *S* *5393.3 feet* ☒ *E* ☐ *W*

County *Sheboygan*

DNR County Code *60*

Civil Town/City/ or Village *Sheboygan*

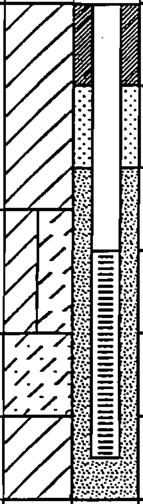
Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
PZ702 (1)	7	3/5 7/10	2	0'-6' <u>FILL</u>, overall brown (7.5YR 5/3), mix of CLAYEY SAND, CLAY SILT, SILTY GRAVEL, granular, moist **SLIGHT ODOR**	FILL			7.5						
PZ702 (3)	6	3/5 5/5	4	little clay, few **yellow brick fragments, slight odor**, slightly moist.	FILL			9.5						
PZ702 (5)	8	6/10 19/29	6	very moist, **odor**.				180						
PZ702 (7)	24	1/2 2/2	8	6'-14' <u>SANDY CLAY WITH SILT</u>, gray to grayish brown (10YR 5/1-2), interbedded SILTY SAND, CLAYEY SAND, SANDY CLAY, CLAY WITH SILT/CLAYEY SILT, laminations evident at 7', **tar throughout – concentrated in sandier portions**, very moist to wet, **strong odor**.	CL			551						
PZ702 (9)	21	1/2 3/3	10					328						
PZ702 (11)	9	1/1 1/1	12	no laminations, wet	SC/CL			160						
PZ702 (13)	7	1/1 1/1	14	predominantly CLAYEY SAND and CLAY WITH SILT, trace organics in clay (**tar concentrated around organics**).	ML/CL			384						
PZ702 (15)	8	4/3 3/3	16	grayish brown (10YR 5/2) CLAYEY SILT / SILTY CLAY WITH SAND, **tar concentrated with sandier lenses**, clay hard – slightly moist, silt firm – very moist to wet.	SC			914						
PZ702 (17)	13	1/3 6/10	18	14'-16' <u>CLAYEY SAND WITH SILT</u>, poorly grraded, fine to medium, predominantly fine, round, soft, **tar throughout**, wet, **strong odor**.	CL			165						
PZ702 (18)	12	4/6 6/3	20	16'-20'<u>CLAY WITH SILT</u>, grayish brown, 5% very fine sand, hard, medium to high plasticity, few silt and very fine sand laminations, **tar in laminations**, moist, **odor**.				167						
PZ702 (19)	8	2/3 3/4	22		SM			140						
PZ702 (21)	12	4/10 16/28		with sand and **little tar** approximately 18'-18.5', very moist.	CL			68.7						

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

Signature

Firm **Natural Resource Technology**

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.



Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Numb and Ty	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
PZ702 (23)	11	6/7 6/9		20'-22' SILTY SAND WITH CLAY, grayish brown (10YR 5/2)m soft, no tar, wet, **odor**.				101						
PZ702 (25)	22	11/29 30/21	26	22'-29' CLAY, dark reddish gray (5YR 4/2), trace to 5% very fine to fine subround gravel, little silt, medium to high plasticity, very hard, slightly moist, **no to slight odor**.	CL			12.1						
PZ702 (27)	23	10/12 18/50	28	@ 24' trace gravel, few very fine lamionations light gray (10YR 7/2) silt, slightly moist.				15.8						
PZ702 (29)	22	14/11 12/14	30	reddish brown (5YR 4/3), 5-10% silt, trace fine to coarse subangular gravel	CL/ML			6.3						
PZ702 (31)	11	15/11 12/11	32	grades to SILT WITH SAND, light olive gray (5Y 6/2), very fine sand, firm, no plasticity, wet, no odor.	SM			2.9						
PZ702 (33)	22	16/15 14/18	34	interbedded CLAY and SILT	CL			7.4						
			36 38 40 42 44 46 48 50 52 54 56 58 60 62	grades to SILTY SAND CLAY as 22' to 29' *End Of Boring @ 36'*										

State of Wisconsin
Department of Natural Resources

Route To: Watershed/Wastewater ☐ Remediation/Redevelopment ☒ Waste Management ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 6-97

Facility/Project Name: WPSC-Camp Marina Feasibility Study

Local Grid Location of Well: 4816.4 ft. ■ N. ☐ S. 5393.3 ft. ■ E. ☐ W.

Well Name: PZ-702

Facility License, Permit or Monitoring No.

Grid Origin Location (Check if estimated: ☐)
Lat. ____° ____' ____" Long. ____° ____' ____" or
St. Plane ____ ft. N, ____ ft. E. S/C/N

Wis. Unique Well No: JQ 773

DNR Well Nu

Facility ID

Date Well Installed: 12/10/1998

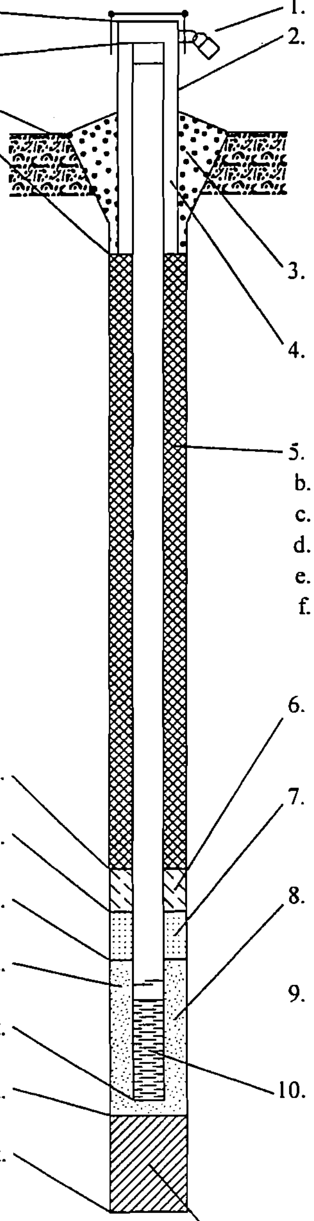
Type of Well: Well Code 12/pz

Section Location of Waste/Source: ____1/4 of____ 1/4 of Sec.____ T.____ N, R.____ ☐ E ☐ W

Well Installed By: (Person's Name and Firm
Randy Radke
Boart Longyear

Distance Well Is From Waste/Source Boundary ____ ft.

Location of Well Relative to Waste/Source
u ☐ Upgradient s ☐ Sidegradient
d ☐ Downgradient n ☐ Not Known



A. Protective pipe, top elevation 591.62 ft. MSL
B. Well casing, top elevation 591.16 ft. MSL
C. Land surface elevation 591.62 ft. MSL
D. Surface seal, bottom 590.12 ft. MSL or 1.5 ft.

12. USC classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☒ 5 0
Hollow Stem Auger ☒ 4 1
____ Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☒ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe N/A

17. Source of water (attach analysis):
N/A

E. Bentonite seal, top ____ ft. MSL or ____ ft.
F. Fine sand, top 565.62 ft. MSL or 26.0 ft.
G. Filter pack, top 563.62 ft. MSL or 28.0 ft.
H. Screen joint, top 561.62 ft. MSL or 30.0 ft.
I. Well bottom 556.62 ft. MSL or 35.0 ft.
J. Filter pack, bottom 555.62 ft. MSL or 36.0 ft.
K. Borehole, bottom 555.62 ft. MSL or 36.0 ft.
L. Borehole, diameter 8.0 in.
M. O.D. well casing 2.37 in.
N. I.D. well casing 2.06 in.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 9.0 in.
b. Length: 1.0 ft.
c. Material: Steel ☒ 0 4
____ Other ☐
d. Additional protection? ☐ Yes ☒ No
If yes, describe: ____
3. Surface seal: Bentonite ☐ 3 0
Concrete ☒ 0 1
____ Other ☐
4. Material between well casing and protective pipe:
Bentonite ☐ 3 0
Sand Other ☒
5. Annular space seal: a. ~~Granular~~ Chipped Bentonite ☒ 3 3
b. ____Lbs/gal mud weight . Bentonite-sand slurry ☐ 3 5
c. ____Lbs/gal mud weight . . . Bentonite slurry ☐ 3 1
d. ____% Bentonite . . . Bentonite-cement grout ☐ 5 0
e. ____Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8
6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 3 2
c. ____ Other ☐
7. Fine sand material: Manufacturer, product name and mesh siz
a. #7 Badger
b. Volume added ____ ft³
8. Filter pack material: Manufacturer, product name and mesh si
a. #30 American Material
b. Volume added ____ ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
____ Other ☐
10. Screen material: PVC
a. Screen Type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
____ Other ☐
b. Manufacturer Boart Longyear
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☒ 1 4
____ Other ☐

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

Signature

Firm BOART LONGYEAR COMPANY
101 ALDERSON ST., P.O. BOX 109 SCHOFIELD, WI 54476
Tel: 715-359-7090
Fax: 715-355-5715

Please complete both Forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and condut involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐ ______

Facility/Project Name: WPSC-Camp Marina Feasibility Study
County Name: Shebovgan
Well Name: PZ-702
Facility License, Permit or Monitoring Number:
County Code: 60
Wis. Unique Well Number: JQ 773
DNR Well ID Number: ___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☒	50
Other Bailed	☒	▨

3. Time spent developing well 60 min.

4. Depth of well (from top of well casing) 35.0 ft.

5. Inside diameter of well 1.9 in.

6. Volume of water in filter pack and well casing ___ gal.

7. Volume of water removed from well 48. gal.

8. Volume of water added (if any) 0.0 gal.

9. Source of water added N/A

10. Analysis performed on water added? N/A ☐ Yes ☐ No (If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 4.31 ft.	DRY ft.
Date	b. 12/11/1998 (mm/dd/yyyy)	12/11/1998 (mm/dd/yyyy)
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___ inches	___ inches
13. Water clarity	Clear ■ 10 Turbid ☐ 15 (Describe)	Clear ■ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	___ mg/l	___ mg/l
15. COD	___ mg/l	___ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: REBECCA Last Name: KOEPKE
Firm: NATURAL RESOURCE TECHNOLOGY, INC

17. Additional comments on development:

Name and Address of Facility Contact/Owner/Responsible Party
First Name: Connie Last Name: Lawniczak
Facility/Firm: Wisconsin Public Service Corporation
Street: P.O. Box 19800
City/State/Zip: Green Bay, WI 54303

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature:
Print Name: REBECCA J. KOEPKE
Firm: Natural Resource Technology, Inc.

NOTE: ... including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

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

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Page 1 of 2

Facility/Project Name: WPSC-Sheboygan / Water Street, Campmarina
License/Permit/Monitoring Number:
Boring Number: PZ-703

Boring Drilled By (Firm name and name of crew chief): Boart Longyear Environmetnal Drilling
Randy Radke
Date Drilling Started: 12/08/98
Date Drilling Completed: 12/09/98
Drilling Method: 3-1/4" HSA & 6" Mud Rot

DNR Facility Well No.:
WI Unique Well No.: JQ774
Common Well Name: PZ-703
Final Static Water Level: Feet MSL
Surface Elevation: 589.85 Feet MSL
Borehole Diameter: 6.5 inches

Boring Location
State Plane **Feet N** **Feet E**
Lat
Long
Local Grid Location (if applicable): 4611.5 feet ☒ N ☐ S 5437.1 feet ☒ E ☐ W

County: Sheboygan
DNR County Code: 60
Civil Town/City/ or Village: Sheboygan

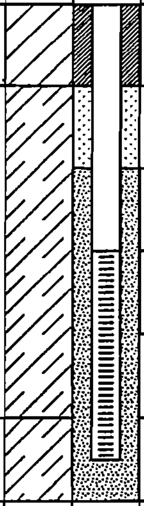
Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
PZ703 (1)	6	2/3 3/6		0'-6' FILL, **Cinders, yellow brick fragments,** gravel, clayey sand, moist, no odor.	FILL			1.3						
PZ703 (3)	8	1/2 2/2	2	with grayish brown CLAY WITH SILT and medium subround sand				38.3						
PZ703 (5)	17	4/3 2/2	4	predominantly CLAY WITH SILT, soft to firm, moist, **slight odor**				71.8						
PZ703 (7)	14	2/1 1/1	6	6'-8' SILTY CLAY WITH SAND, brown (7.5YR 4/2), fine to medium sand, predominantly fine, trace fine subround gravel, medium plasticity, soft to firm, very moist, **slight odor.**	CL			548						
PZ703 (9)	22	2/1	8	SANDY CLAY WITH GRAVEL, fine to coarse subround sand, fine subround gravel, soft, no to low plasticity, trace organics, very moist to wet, **slight odor.**	CL			233						
PZ703 (11)	11	1/1 1/1	10		CL			254						
PZ703 (13)	21	1/1 1/2	12	10'-36' CLAY WITH SILT, grayish brown (10YR 5/2), trace to 5% very fine sand, trace organics, medium plasticity, soft, very moist to wet, **slight odor.**	CL			271						
PZ703 (15)	22	2/2 2/1	14					1225						
PZ703 (17)	11	1/1 1/1	16	SANDY CLAY, grayish brown (10YR 5/2), fine to medium sand, predominantly fine, trace very fine gravel, soft, 5% silt, 1.5" black sand seam (medium, subround) lower 5"	SC			1267						
PZ703 (19)	21	1/1 1/1	18	CLAYEY SAND, poorly graded, fine, trace to 5% silt, trace organics, **trace tar, sheen,** wet, **slight odor.**	SC SM			604						
PZ703 (21)	20	1/2 2/1	20	with silt, no tar, **sheen uppar 5", odor.**				284						
PZ703 (23)	18	2/5 3/1	22	CLAY, brown (7.5YR 4/2), 5% silt, trace very fine sand, firm to hard, medium to high plasticity, moist, **slight odor.**	CL			185						

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

Signature
Firm: **Natural Resource Technology**

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.

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Numb and Ty	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
PZ703 (25)	24	7/4 6/11		@ 22' hard, slightly moist, no odor.	CL									
PZ703 (27)	24	3/4 6/10	26	5 to 10% silt, trace very fine subround gravel, very hard, medium to high plasticity, no dilatency, moist, no odor.	CL			46.8						
PZ703 (29)	23	11/14 15/16	28	mottled reddish brown (5YR 4/3) and gray (7.5YR 5/1), slightly moist.				12.8						
PZ703 (31)	22	4/8 11/14	30					nr						
PZ703 (33)	23	115/14 14/14	32	predominantly reddish brown, trace very fine laminations gray silt and/or sand, moist.				11.5						
PZ703 (35)	23	14/18 18/26	34	Interbedded CLAY WITH SILT / CLAYEY SILT, reddish brown (5YR 4/3), firm to hard, most to wet, low to medium plasticity, low dilatency, no odor.	CL ML			7.6						
			36	*END OF BORING @ 36'*										
			38											
			40											
			42											
			44											
			46											
			48											
			50											
			52											
			54											
			56											
			58											
			60											
			62											



State of Wisconsin
Department of Natural Resources

Route To: Watershed/Wastewater ☐ Remediation/Redevelopment ☒ Waste Management ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 6-97

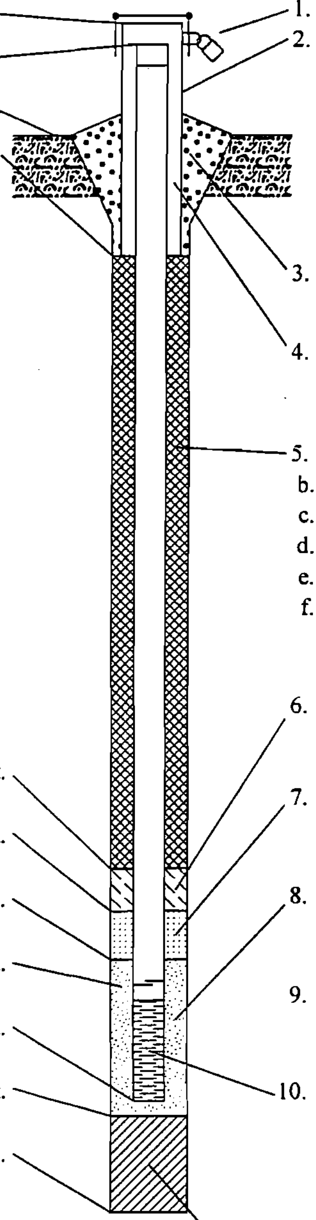
Facility/Project Name: WPSC-Camp Marina Feasibility Study
Local Grid Location of Well: 4611.5 ft. ■ N. ☐ S. 5437.1 ft. ■ E. ☐ W.
Well Name: PZ-703

Facility License, Permit or Monitoring No.
Grid Origin Location (Check if estimated: ☐)
Lat. ___° ___' ___" Long. ___° ___' ___" or
St. Plane _____ ft. N, _____ ft. E. S/C/N
Wis. Unique Well No: JQ 774
DNR Well N[illegible]r

Facility ID
Section Location of Waste/Source
___1/4 of ___ 1/4 of Sec. ___ T. ___ N, R. ___ ☐ E ☐ W
Date Well Installed: 12/09/1998

Type of Well: Well Code 12/pz
Well Installed By: (Person's Name and Firm
Randy Radke
Boart Longyear

Distance Well Is From Waste/Source Boundary ___ ft.
Location of Well Relative to Waste/Source
u ☐ Upgradient s ☐ Sidegradient
d ■ Downgradient n ☐ Not Known



A. Protective pipe. top elevation 589.85 ft. MSL
B. Well casing, top elevation 589.22 ft. MSL
C. Land surface elevation 589.85 ft. MSL
D. Surface seal, bottom 587.72 ft. MSL or 1.5 ft.

12. USC classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐
13. Sieve analysis attached? ☐ Yes ☐ No
14. Drilling method used: Rotary ☒ 5 0
Hollow Stem Auger ☒ 4 1
_____ Other ☐ __
15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☒ 9 9
16. Drilling additives used? ☐ Yes ☒ No
Describe N/A
17. Source of water (attach analysis):
N/A

E. Bentonite seal, top ___ ft. MSL or ___ ft.
F. Fine sand, top 563.22 ft. MSL or 26.0 ft.
G. Filter pack, top 561.22 ft. MSL or 28.0 ft.
H. Screen joint, top 559.22 ft. MSL or 30.0 ft.
I. Well bottom 554.22 ft. MSL or 35.0 ft.
J. Filter pack, bottom 553.22 ft. MSL or 36.0 ft.
K. Borehole, bottom 553.22 ft. MSL or 36.0 ft.
L. Borehole, diameter 8.0 in.
M. O.D. well casing 2.37 in.
N. I.D. well casing 2.06 in.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 9.0 in.
b. Length: 1.0 ft.
c. Material: Steel ☒ 0 4
_____ Other ☐ ▨
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 3 0
Concrete ☒ 0 1
_____ Other ☐ ▨
4. Material between well casing and protective pipe:
Bentonite ☐ 3 0
Sand Other ☒ ▨
5. Annular space seal: a. ~~Granular~~ Chipped Bentonite ☒ 3 3
b. ___Lbs/gal mud weight . Bentonite-sand slurry ☐ 3 5
c. ___Lbs/gal mud weight . . . Bentonite slurry ☐ 3 1
d. ___% Bentonite . . . Bentonite-cement grout ☐ 5 0
e. ___Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8
6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 3 2
c. _____ Other ☐ ▨
7. Fine sand material: Manufacturer, product name and mesh siz
a. #7 Badger ▨
b. Volume added ___ ft³
8. Filter pack material: Manufacturer, product name and mesh si
a. #30 American Material ▨
b. Volume added ___ ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
_____ Other ☐ ▨
10. Screen material: PVC ▨
a. Screen Type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
_____ Other ☐ ▨
b. Manufacturer Baort Longyear
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☒ 1 4
_____ Other ☐ ▨

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

Signature

Firm BOART LONGYEAR COMPANY
101 ALDERSON ST., P.O. BOX 109 SCHOFIELD, WI 54476
Tel: 715-359-7090
Fax: 715-355-5715

Please complete both Forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and condut involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐ ________

Facility/Project Name: WPSC-Camp Marina Feasibility Study
County Name: Sheboygan
Well Name: PZ-703
Facility License, Permit or Monitoring Number:
County Code: 60
Wis. Unique Well Number: JQ 774
DNR Well ID Number: ___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
- surged with bailer and bailed ☐ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed and pumped ☐ 70
- compressed air ☐ 20
- bailed only ☐ 10
- pumped only ☐ 51
- pumped slowly ☒ 50
- Other Bailed ☒

3. Time spent developing well 60 min.

4. Depth of well (from top of well casing) 35.0 ft.

5. Inside diameter of well 1.9 in.

6. Volume of water in filter pack and well casing ___.__ gal.

7. Volume of water removed from well 57.__ gal.

8. Volume of water added (if any) 0.0 gal.

9. Source of water added N/A

10. Analysis performed on water added? N/A ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 9.14 ft.	DRY ft.
Date	b. 12/11/1998 (mm/dd/yyyy)	12/11/1998 (mm/dd/yyyy)
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.__ inches	___.__ inches
13. Water clarity	Clear ■ 10 Turbid ☐ 15 (Describe)	Clear ■ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: REBECCA Last Name: KOEPKE
Firm: NATURAL RESOURCE TECHNOLOGY

17. Additional comments on development:

Name and Address of Facility Contact/Owner/Responsible Party
First Name: Connie Last Name: Lawniczak
Facility/Firm: Wisconsin Public Service Corporation
Street: P.O. Box 19800
City/State/Zip: Green Bay, WI 54303

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature:
Print Name: REBECCA J. KOEPKE
Firm: Natural Resource Technology, Inc.

APPENDIX C

SOIL LABORATORY ANALYTICAL REPORTS

Robert E. Lee & Associates, Inc.

Engineering, Surveying, Laboratory Services
2825 S. Webster Ave.
P.O. Box 2100
Green Bay, WI 54306-2100
Phone: (920) 336-6338
Fax: (920) 336-9141
E-Mail: rel@netnet.net

Milwaukee Area
830 Armour Rd.
Oconomowoc, WI 53066
Phone: (414)569-8893 1-800-775-8893
Fax: (414)569-7995
Wisconsin Certification Number: 405043870

DEC 1 6 1998

ROY WITTENBURG
NATURAL RESOURCE TECHNOLOGY
23713 W PAUL RD
PEWAUKEE WI 53702

MASTER FILE COPY
PROJECT # 1313
CO: Octa

Phone:	(414)523-9000
Fax:	(414)523-9001
Client ID:	003604
Contact ID:	3489

Sample Information

Report Date:	12/15/1998
Chain Number:	59418
Project No:	1313
Project Name:	WPSC-CAMP MARINA
Receive Date:	12/09/1998
Sample Date:	12/09/1998

Attest: ____________________

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59418
Report Date: 12/15/1998

Method Lab No.	Parameter Name Collect Date Sample ID	Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
98REL023581	**12/09/1998 SB-724 (27)**							
SW-846-9012A	Cyanide-Total	<0.023	mg/Kg		0.023	0.077	12/11/1998	CLW
SW-846-6010B	Total Lead ICP	5.7	mg/Kg		1.7	5.7	12/10/1998	DLB
	Metal Preparation	Complete					12/10/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/11/1998	TMS
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/10/1998	GLB
SW-846-8021B	Volatile Organic Analysis	See Attached					12/10/1998	TO
SM-2540G	Total Solids	86	%		0.010	0.033	12/10/1998	DJN

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/09/98
DATE EXTRACTED: 12/10/98
DATE ANALYZED: 12/11/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023581
SAMPLE NAME: SSB–724(27)

ANALYTE	MDL ug/kg	PQL ug/kg	RESULT ug/kg	
ACENAPHTHENE	59	196	ND	
ACENAPHTHYLENE	55	183	ND	
ANTHRACENE	4.3	14	15	
BENZO(A)ANTHRACENE	4.3	14	35	
BENZO(A)PYRENE	8.6	29	27	(p)
BENZO(B)FLUORANTHENE	5.1	17	34	
BENZO(G,H,I)PERYLENE	9.4	31	66	
BENZO(K)FLUORANTHENE	9.4	31	11	(p)
CHRYSENE	3.8	13	34	
DIBENZO(AH)ANTHRACENE	11	35	ND	
FLUORANTHENE	9.4	31	40	
FLUORENE	2.3	7.7	ND	
INDENO(1,2,3–CD)PYRENE	4.7	16	18	
1–METHYLNAPHTHALENE	39	130	ND	
2–METHYLNAPHTHALENE	38	126	ND	
NAPHTHALENE	30	100	63	(p)
PHENANTHRENE	4.7	16	42	
PYRENE	16	53	60	

MDL and results based on amount of sample used and percent solids.

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Heraly

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59418

NARRATIVE

This narrative is relevant to sample SB-724(27).

The sample was analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /a7C

Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59418

NARRATIVE

This narrative is relevant to sample SB-724(27).

The sample was analyzed for polynuclear aromatic hydrocarbons following SW-846 Method 8310.

The sample used for the matrix spikes is not listed above. The following is a summary of the quality control results:

1. The reported compounds were not detected in the method blank.
2. The precision between the matrix spike recovery and the matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
3. The matrix spike recovery was within laboratory limits for each of the reported compounds.
4. The matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
5. The surrogate recovery was within laboratory limits.
6. The initial and final check standards verified the calibration curve for each of the reported compounds.

Steve Heraly

Steve Heraly
Laboratory Coordinator
tms

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–724(27)
REL SAMPLE NUMBER: 98REL023581

DATE SAMPLED: 12/09/98
DATE ANALYZED: 12/10/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	ND	9.0	30
ETHYLBENZENE	ND	4.5	15
TOLUENE	ND	4.2	14
m,p–XYLENE	ND	19	63
o–XYLENE	ND	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%)........... 101

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

Robert E. Lee & Associates, Inc.
Engineering, Surveying, Laboratory Services
2825 S. Webster Ave. • Box 2100 • Green Bay, WI 54306-2100
Green Bay Office 920.336.6338 FAX 920.336.9141
Milwaukee Office 414.569.8893 FAX 414.569.7995

To ensure the proper handling of samples, please see the back for instructions.

CHAIN OF CUSTODY RECORD

COC # 59418 Mol

Client: [redacted] NATURAL RESOURCE TECHNOLOGY, INC
Project Name: WPSC-[redacted] CAMP MARINA
Project Number: 1313
Project Address: 723 WATER STREET, SHEBOYGAN, WI
PO #: 1313
BID #:

Environmental Program:
☐ LUST ☐ SDWA ☐ WPDES ☐ RCRA ☒ OTHER

Requested Turnaround Time
☐ Normal (10-15 DAYS) ☒ Rush
Date Needed: 3 DAY TURN
Rushes accepted only w/prior notification

Check Delivery Method
☐ In Person ☐ Mail
☐ Common Courier ☐ Courier Service
☐ Other

Sampler: CHRIS ROBB

Report To: ROY WITTENBURG
Company: NATURAL RESOURCE TECH
Address: 23713 W. PAUL ROAD
PEWAUKEE, WI 53072
Telephone: 414-523-9000
Fax: 414-523-9001

Invoice To: JANET SGARLATA
Company: SAME
Address:
Telephone:
Fax:

Analyses Required: (Note special detection limits or methods)

Sample ID	Date	Time	Comp	Grab	Filtered Y/N	Sample Description	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Air, Other	No. of Containers	Preservation Type (see key below)	BETX	PAHs	TOTAL LEAD	TOTAL CYANIDE					REL Sample No.	Remarks:
SB-724(27)	12/9/98	A P		X		SB-724/26'-28'		4	M/U	X	X	X	X					23581	No Odor/ PID 7.6
		A P																	25.809
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	

	Relinquished By	Date	Time	Received By	Date	Time
1)		12/9/98	11:10 A/P	Marguerite DeBoom	12/9	11:15 A/P
2)	Marguerite DeBoom	12/9/98	2:00 A/[✓ P]			A/P
3)			A/P			A/P

Received by Lab 12/9/98 1400P

A = AM P = PM

Laboratory Receiving Notes
Temperature of Contents: on ice °C
Custody Seal Intact
Sample Condition
Sample pH

Preservation K003604
N = Nitric Acid
H = Hydrochloric Acid
M = Methanol
O = Sodium Hydroxide
U = Unpreserved
S = Sulfuric Acid

WISCONSIN DNR CERTIFICATION NUMBER 405043870

MASTER FILE COPY
PROJECT # 1313
Data

Robert E. Lee & Associates, Inc.

Engineering, Surveying, Laboratory Services
2825 S. Webster Ave.
P.O. Box 2100
Green Bay, WI 54306-2100
Phone: (920) 336-6338
Fax: (920) 336-9141
E-Mail: rel@netnet.net

Milwaukee Area
830 Armour Rd.
Oconomowoc, WI 53066
Phone: (414)569-8893 1-800-775-8893
Fax: (414)569-7995
Wisconsin Certification Number: 405043870

ROY WITTENBURG
NATURAL RESOURCE TECHNOLOGY
23713 W PAUL RD
PEWAUKEE WI 53702

Phone:	(414)523-9000
Fax:	(414)523-9001
Client ID:	003604
Contact ID:	3489

Sample Information

Report Date:	12/23/1998
Chain Number:	59419
Project No:	1313
Project Name:	WPSC-CAMP MARINA
Receive Date:	12/09/1998
Sample Date:	12/09/1998

Attest: ____________________

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59419
Report Date: 12/23/1998

Method	Parameter Name	Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
Lab No.	Collect Date	Sample ID						
98REL023603	**12/08/1998**	**PZ-703(17)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/10/1998	GLB
SW-846-9012A	Cyanide-Total	0.024	mg/Kg	13	0.024	0.080	12/11/1998	CLW
SW-846-6010B	Total Lead ICP	3.8	mg/Kg	13	1.7	5.7	12/10/1998	DLB
	Metal Preparation	Complete					12/10/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/10/1998	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					12/15/1998	TO
SM-2540G	Total Solids	83	%		0.010	0.033	12/10/1998	DJN
98REL023604	**12/08/1998**	**SB-736 (7)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/10/1998	GLB
SW-846-9012A	Cyanide-Total	1.2	mg/Kg		0.026	0.087	12/11/1998	CLW
SW-846-6010B	Total Lead ICP	19	mg/Kg		1.9	6.3	12/10/1998	DLB
	Metal Preparation	Complete					12/10/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/10/1998	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					12/16/1998	TO
SM-2540G	Total Solids	78	%		0.010	0.033	12/10/1998	DJN
98REL023605	**12/08/1998**	**SB-725 (5.5)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/10/1998	GLB
SW-846-9012A	Cyanide-Total	0.15	mg/Kg		0.025	0.083	12/11/1998	CLW
SW-846-6010B	Total Lead ICP	11	mg/Kg		1.8	6.0	12/10/1998	DLB
	Metal Preparation	Complete					12/10/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/10/1998	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					12/17/1998	TO
SM-2540G	Total Solids	80	%		0.010	0.033	12/10/1998	DJN
98REL023606	**12/09/1998**	**SB-739 (7)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/10/1998	GLB
SW-846-9012A	Cyanide-Total	0.13	mg/Kg		0.032	0.11	12/11/1998	CLW
SW-846-6010B	Total Lead ICP	634	mg/Kg		2.3	7.7	12/10/1998	DLB
	Metal Preparation	Complete					12/10/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/11/1998	TMS

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59419
Report Date: 12/23/1998

Method	Parameter Name		Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
Lab No.	**Collect Date**	**Sample ID**							
SW-846-8021B	Volatile Organic Analysis		See Attached					12/17/1998	TO
SM-2540G	Total Solids		63	%		0.010	0.033	12/10/1998	DJN

Robert E. Lee & Associates. Inc.

Quality Control Report - Description of Flags

Flag	Section	Description
13	**L**	The reported result is less than the practical quantitation limit (PQL).

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59419

NARRATIVE

This narrative is relevant to samples PZ-703(17), SB-736(7), SB-725(5.5) and SB-739(7).

The samples were analyzed for polynuclear aromatic hydrocarbons following SW-846 Method 8310.

The sample used for the matrix spikes is not listed above. The following is a summary of the quality control results:

1. The reported compounds were not detected in the method blank.
2. The precision between the matrix spike recovery and the matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
3. The matrix spike recovery was within laboratory limits for each of the reported compounds.
4. The matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
5. The surrogate recovery for all samples was within laboratory limits.
6. The initial and final check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /a7L

Steve Heraly
Laboratory Coordinator
tms

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/08/98
DATE EXTRACTED: 12/10/98
DATE ANALYZED: 12/10/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023603
SAMPLE NAME: PZ–703(17)

ANALYTE	MDL ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	69	232	1040
ACENAPHTHYLENE	65	216	ND
ANTHRACENE	5.1	17	31
BENZO(A)ANTHRACENE	5.1	17	ND
BENZO(A)PYRENE	10	34	45
BENZO(B)FLUORANTHENE	6.0	20	45
BENZO(G,H,I)PERYLENE	11	37	39
BENZO(K)FLUORANTHENE	11	37	26 (p)
CHRYSENE	4.5	15	ND
DIBENZO(AH)ANTHRACENE	13	42	ND
FLUORANTHENE	11	37	122
FLUORENE	2.7	9.1	ND
INDENO(1,2,3–CD)PYRENE	5.6	19	53
1–METHYLNAPHTHALENE	46	154	697
2–METHYLNAPHTHALENE	45	150	1810
NAPHTHALENE	357	1190	10700 *
PHENANTHRENE	5.6	19	116
PYRENE	19	63	126

MDL and results based on amount of sample used and percent solids.
* = THIS SAMPLE WAS DILUTED 1:10 FOR THIS COMPOUND AND ANALYZED ON 12/11/98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Heraly

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/08/98
DATE EXTRACTED: 12/10/98
DATE ANALYZED: 12/10/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023604
SAMPLE NAME: SB–736(7)

ANALYTE	MDL ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	476	1590	9950 *
ACENAPHTHYLENE	190	635	2560 **
ANTHRACENE	150	499	12600 ***
BENZO(A)ANTHRACENE	35	116	5230 *
BENZO(A)PYRENE	30	100	4640 **
BENZO(B)FLUORANTHENE	18	59	1770 **
BENZO(G,H,I)PERYLENE	11	36	1560
BENZO(K)FLUORANTHENE	11	36	1580
CHRYSENE	4.4	15	1540
DIBENZO(AH)ANTHRACENE	12	41	ND
FLUORANTHENE	326	1090	14800 ***
FLUORENE	19	62	7010 *
INDENO(1,2,3–CD)PYRENE	16	54	1970 **
1–METHYLNAPHTHALENE	136	453	5210 **
2–METHYLNAPHTHALENE	44	147	ND
NAPHTHALENE	105	349	3560 **
PHENANTHRENE	163	544	30400 ***
PYRENE	558	1860	38600 ***

MDL and results based on amount of sample used and percent solids.
* = THIS SAMPLE WAS DILUTED 1:7 FOR THESE COMPOUNDS AND ANALYZED ON 12/11/98
** = THIS SAMPLE WAS DILUTED 1:3 FOR THESE COMPOUNDS AND ANALYZED ON 12/11/98
*** = THIS SAMPLE WAS DILUTED 1:30 FOR THESE COMPOUNDS AND ANALYZED ON 12/11/98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 - 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/08/98
DATE EXTRACTED: 12/10/98
DATE ANALYZED: 12/10/98
ANALYZED BY: TMS

PROJECT: WPSC-CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023605
SAMPLE NAME: SB-725(5.5)

ANALYTE	MDL ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	64	212	ND
ACENAPHTHYLENE	59	198	ND
ANTHRACENE	4.7	16	ND
BENZO(A)ANTHRACENE	4.7	16	ND
BENZO(A)PYRENE	9.3	31	17 (p)
BENZO(B)FLUORANTHENE	5.5	18	13 (p)
BENZO(G,H,I)PERYLENE	10	34	ND
BENZO(K)FLUORANTHENE	10	34	ND
CHRYSENE	4.1	14	ND
DIBENZO(AH)ANTHRACENE	11	38	ND
FLUORANTHENE	10	34	ND
FLUORENE	2.5	8.4	ND
INDENO(1,2,3-CD)PYRENE	5.1	17	7.5 (p)
1-METHYLNAPHTHALENE	42	142	ND
2-METHYLNAPHTHALENE	41	137	ND
NAPHTHALENE	33	109	ND
PHENANTHRENE	5.1	17	5.6 (p)
PYRENE	17	58	24 (p)

MDL and results based on amount of sample used and percent solids.

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E LEE & ASSOCIATES, INC.
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GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/09/98
DATE EXTRACTED: 12/10/98
DATE ANALYZED: 12/11/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023606
SAMPLE NAME: SB–739(7)

ANALYTE	MDL ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	85	282	ND
ACENAPHTHYLENE	79	263	ND
ANTHRACENE	6.2	21	626
BENZO(A)ANTHRACENE	6.2	21	972
BENZO(A)PYRENE	12	41	1220
BENZO(B)FLUORANTHENE	7.3	24	1140
BENZO(G,H,I)PERYLENE	14	45	909
BENZO(K)FLUORANTHENE	14	45	463
CHRYSENE	5.5	18	1540
DIBENZO(AH)ANTHRACENE	15	51	ND
FLUORANTHENE	27	90	2280 *
FLUORENE	3.3	11	422
INDENO(1,2,3–CD)PYRENE	6.8	23	581
1–METHYLNAPHTHALENE	56	188	84 (p)
2–METHYLNAPHTHALENE	55	182	ND
NAPHTHALENE	43	145	1680
PHENANTHRENE	14	45	2320 *
PYRENE	46	154	3050 *

MDL and results based on amount of sample used and percent solids.
* = THIS SAMPLE WAS DILUTED 1:2 FOR THESE COMPOUNDS

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59419

NARRATIVE

This narrative is relevant to samples PZ-703(17) and SB-736(7).

The samples were analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery for all samples was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly | GJS

Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: PZ–703(17)
REL SAMPLE NUMBER: 98REL023603

DATE SAMPLED: 12/08/98
DATE ANALYZED: 12/15/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	1490	9.0	30
ETHYLBENZENE	10600*	45	150
TOLUENE	82	4.2	14
m.p–XYLENE	1480	19	63
o–XYLENE	1420	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 103

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

* = TESTED 12/17/98
DILUTION FACTOR FOR 12/17/98: 1 TO 10

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.
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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–736(7)
REL SAMPLE NUMBER: 98REL023604

DATE SAMPLED: 12/08/98
DATE ANALYZED: 12/16/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	314	9.0	30
ETHYLBENZENE	255	4.5	15
TOLUENE	ND	4.2	14
m,p–XYLENE	101	19	63
o–XYLENE	127	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%)........... 101

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59419

NARRATIVE

This narrative is relevant to samples SB-725(5.5) and SB-739(7).

The samples were analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery for all samples was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly | a7L
Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–725(5.5)
REL SAMPLE NUMBER: 98REL023605

DATE SAMPLED: 12/08/98
DATE ANALYZED: 12/17/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	ND	9.0	30
ETHYLBENZENE	ND	4.5	15
TOLUENE	ND	4.2	14
m.p–XYLENE	ND	19	63
o–XYLENE	ND	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 100

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
ND = COMPOUND NOT DETECTED
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy | GTS

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
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GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–739(7)
REL SAMPLE NUMBER: 98REL023606

DATE SAMPLED: 12/09/98
DATE ANALYZED: 12/17/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	ND	9.0	30
ETHYLBENZENE	1810	4.5	15
TOLUENE	156	4.2	14
m,p–XYLENE	ND	19	63
o–XYLENE	6020	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
ND = COMPOUND NOT DETECTED
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy /GTS

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

Robert E. Lee & Associates, Inc.
Engineering, Surveying, Laboratory Services
2825 S. Webster Ave. • Box 2100 • Green Bay, WI 54306-2100
Green Bay Office 920.336.6338 FAX 920.336.9141
Milwaukee Office 414.569.8893 FAX 414.569.7995

To ensure the proper handling of samples, please see the back for instructions.

CHAIN OF CUSTODY RECORD

COC # 59419MA

Client: NATURAL RESOURCE TECHNOLOGY, INC.
Project Name: WPSC - CAMMARINA
Project Number: 1313
Project Address: 723 WATER STREET, SHEBOYGAN WI
PO #: 1313
BID #:

Environmental Program:
☐ LUST ☐ SDWA ☐ WPDES ☐ RCRA ☒ OTHER

Requested Turnaround Time
☒ Normal (10-15 DAYS) ☐ Rush
Date Needed:
Rushes accepted only w/prior notification

Check Delivery Method
☐ In Person ☐ Mail
☐ Common Courier ☐ Courier Service
☐ Other

Sampler: REBECCA J. KOEPKE / JULIE A. ZIMDARS
CHRIS A. ROBB

Report To: ROY WITTENBURG
Company: NATURAL RESOURCE TECH
Address: 23713 W. PAUL ROAD
PEWAUKEE WI 53072
Telephone: 414-523-9000
Fax: 414-523-~~9000~~ 9001

Invoice To: JANET SGARLATA
Company: SAME
Address:
Telephone:
Fax:

Analyses Required: (Note special detection limits or methods)

Sample ID	Date	Time	Comp	Grab	Filtered Y/N	Sample Description	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Air, Other	No. of Containers	Preservation Type (see key below)	BETX	PAH	TOTAL LEAD	TOTAL CYANIDE						REL Sample No.	Remarks:
~~PZ-703(7)~~	~~12/08/98~~	A/P		~~X~~		~~PZ-703 (6-8)~~	~~SOIL~~	~~5~~	~~M/U~~	~~X~~	~~X~~	~~X~~	~~X~~							~~ODOR / PID 348~~
PZ-703(17)	12/08/98	A/P		X		PZ-703(16-18)	SOIL	5	M/U	X	X	X	X						23603	STRONG ODOR / PID 1267
SB-736(7)	12/08/98	A/P		X		SB-736(6-8)	SOIL	5	M/U	X	X	X	X						23604	ODOR /
SB-725(5.5)	12/8/98	A/P		X		SB-725(5'-6')	SOIL	3	M/U	X	X	X	X						23605	NO ODOR / PID 15.C
SB-739(7)	12/9/98	A/P		X		SB-739(6'-8')	SOIL	3	M/U	X	X	X	X						23606	STRONG ODOR / TAR?
		A/P																		
		A/P																		
		A/P																		
		A/P																		
		A/P																		
		A/P																		
		A/P																		

	Relinquished By	Date	Time	Received By	Date	Time
1)		12/09/98	11:11 [✓ A]/P	Manfred DeBoom	12/9	11:11 [✓ A]/P
2)	Manfred DeBoom	12/9/98	2:00 A/[✓ P]			A/P
3)			A/P			A/P
Received by Lab		12/9/98	1400 P			A = AM P = PM

Laboratory Receiving Notes
Temperature of Contents: on ice °C
Custody Seal Intact
Sample Condition
Sample pH

WISCONSIN DNR CERTIFICATION NUMBER 405043870

Preser Key
N = Nitric Acid
H = Hydrochloric Acid
M = Methanol
= Sodium Hydroxide
U = Unpreserved
S = Sulfuric Acid

Robert E. Lee & Associates, Inc.

Engineering, Surveying, Laboratory Services

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Milwaukee Area
830 Armour Rd.
Oconomowoc, WI 53066
Phone: (414)569-8893 1-800-775-8893
Fax: (414)569-7995
Wisconsin Certification Number: 405043870

MASTER FILE COPY
PROJECT # 13B
CO: Data

ROY WITTENBURG
NATURAL RESOURCE TECHNOLOGY
23713 W PAUL RD
PEWAUKEE WI 53702

Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Contact ID: 3489

Sample Information

Report Date: 1/07/1999
Chain Number: 59417
Project No: 1313
Project Name: WPSC-CAMP MARINA
Receive Date: 12/10/1998
Sample Date: 12/10/1998

Attest: ______________________

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59417
Report Date: 1/07/1999

Method	Parameter Name	Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
Lab No.	Collect Date	Sample ID						
98REL023760	**12/09/1998**	**PZ-702 (15)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/14/1998	GLB
SW-846-9012A	Cyanide-Total	0.024	mg/Kg	13	0.024	0.080	12/18/1998	CLW
	Metal Preparation	Complete					12/14/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/23/1998	TMS
ASTM D129-64	Sulfur	0.058	%		0.014	0.047	12/14/1998	DEY
SW-846-6010B	Total Lead ICP	3.3	mg/Kg	13	1.7	5.7	12/15/1998	DLB
SM-2540G	Total Solids	84	%		0.010	0.033	12/11/1998	DJN
SW-846-8021B	Volatile Organic Analysis	See Attached					12/16/1998	TO
98REL023761	**12/09/1998**	**SB-726 (11.5)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/14/1998	GLB
SW-846-9012A	Cyanide-Total	380	mg/Kg		1.2	4.0	12/18/1998	CLW
	Metal Preparation	Complete					12/14/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/23/1998	TMS
SW-846-6010B	Total Lead ICP	61	mg/Kg		1.7	5.7	12/15/1998	DLB
SM-2540G	Total Solids	84	%		0.010	0.033	12/11/1998	DJN
SW-846-8021B	Volatile Organic Analysis	See Attached					12/16/1998	TO
98REL023762	**12/09/1998**	**SB-733 (11)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/14/1998	GLB
SW-846-9012A	Cyanide-Total	0.12	mg/Kg		0.024	0.080	12/18/1998	CLW
	Metal Preparation	Complete					12/14/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/23/1998	TMS
SW-846-6010B	Total Lead ICP	5.0	mg/Kg	13	1.7	5.7	12/15/1998	DLB
SM-2540G	Total Solids	83	%		0.010	0.033	12/11/1998	DJN
SW-846-8021B	Volatile Organic Analysis	See Attached					12/16/1998	TO
98REL023763	**12/09/1998**	**SB-734 (13)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/14/1998	GLB
SW-846-9012A	Cyanide-Total	2.5	mg/Kg		0.025	0.083	12/18/1998	CLW
	Metal Preparation	Complete					12/14/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/23/1998	TMS

Natural Resource Technology
23713 W Paul Rd

ewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59417
Report Date: 1/07/1999

Method	Parameter Name	Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
Lab No.	Collect Date	Sample ID						
SW-846-6010B	Total Lead ICP	20	mg/Kg		1.8	6.0	12/15/1998	DLB
SM-2540G	Total Solids	82	%		0.010	0.033	12/11/1998	DJN
SW-846-8021B	Volatile Organic Analysis	See Attached					12/16/1998	TO
98REL023764	**12/10/1998**	**SB-735 (11)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/14/1998	GLB
SW-846-9012A	Cyanide-Total	164	mg/Kg		1.2	4.0	12/18/1998	CLW
	Metal Preparation	Complete					12/14/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/23/1998	TMS
ASTM D129-64	Sulfur	0.15	%		0.014	0.047	12/14/1998	DEY
SW-846-6010B	Total Lead ICP	10	mg/Kg		1.7	5.7	12/15/1998	DLB
SM-2540G	Total Solids	85	%		0.010	0.033	12/11/1998	DJN
W-846-8021B	Volatile Organic Analysis	See Attached					12/18/1998	TO
98REL023765	**12/10/1998**	**COMPOSITE 1**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/14/1998	GLB
SW-846-9012A	Cyanide-Total	7.1	mg/Kg		0.024	0.080	12/18/1998	CLW
	Metal Preparation	Complete					12/14/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/23/1998	TMS
ASTM D129-64	Sulfur	0.12	%		0.014	0.047	12/14/1998	DEY
SW-846-6010B	Total Lead ICP	38	mg/Kg		1.7	5.7	12/15/1998	DLB
SM-2540G	Total Solids	85	%		0.010	0.033	12/11/1998	DJN
SW-846-8021B	Volatile Organic Analysis	See Attached					12/21/1998	TO
98REL023766	**12/10/1998**	**COMPOSITE 1**						
SW-846-8260B	TCLP Volatile Organic Analysis by GC/MS	See Attached					12/14/1998	JF
	TCLP Volatile Zero Head Space Extraction	Complete	Date				12/11/1998	GLB

Robert E. Lee & Associates. Inc.

Quality Control Report - Description of Flags

Flag	Section	Description
13	**L**	The reported result is less than the practical quantitation limit (PQL).

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59417

NARRATIVE

This narrative is relevant to samples PZ-702(15), SB-726(11.5), SB-733(11), SB-734(13), SB-735(11) and COMPOSITE 1.

The samples were analyzed for polynuclear aromatic hydrocarbons following SW-846 Method 8310.

The sample used for the matrix spikes is not listed above. The following is a summary of the quality control results:

1. The reported compounds were not detected in the method blank.

2. The precision between the matrix spike recovery and the method spike recovery was within laboratory limits for each of the reported compounds.

3. The matrix spike recovery was within laboratory limits for each of the reported compounds.

4. The matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.

5. The surrogate recovery for all samples was within laboratory limits except for samples PZ-702(15), SB-733(11), SB-734(13) and SB-735(11) which were above laboratory limits due to co-eluting interference peaks from the samples. The data was accepted because the surrogate recoveries in the method blank and method spike was within laboratory limits.

6. The initial and final check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /GJS

Steve Heraly
Laboratory Coordinator
tms

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/09/98
DATE EXTRACTED: 12/21/98
DATE ANALYZED: 12/23/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023760
SAMPLE NAME: PZ–702(15)

ANALYTE	MDL * ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	59300	198000	503000 **
ACENAPHTHYLENE	27700	92300	479000 ***
ANTHRACENE	2170	7250	159000 ***
BENZO(A)ANTHRACENE	2170	7250	133000 ***
BENZO(A)PYRENE	348	1160	47800 ****
BENZO(B)FLUORANTHENE	206	685	44500 ****
BENZO(G,H,I)PERYLENE	95	316	15800
BENZO(K)FLUORANTHENE	95	316	12400
CHRYSENE	153	511	60200 ****
DIBENZO(AH)ANTHRACENE	427	1420	39900 ****
FLUORANTHENE	4740	15800	243000 ***
FLUORENE	23	78	ND
INDENO(1,2,3–CD)PYRENE	190	633	24000 ****
1–METHYLNAPHTHALENE	19800	65900	264000 ***
2–METHYLNAPHTHALENE	19200	63900	226000 ***
NAPHTHALENE	30400	101000	1400000 **
PHENANTHRENE	2370	7910	543000 ***
PYRENE	8110	27000	729000 ***

MDL and results based on amount of sample used and percent solids.
* = THE MDL'S WERE ADJUSTED FOR A 10ML FINAL VOLUME
** = THIS SAMPLE WAS DILUTED 1:1000 FOR THESE COMPOUNDS AND ANALYZED ON 12/29/98
*** = THIS SAMPLE WAS DILUTED 1:500 FOR THESE COMPOUNDS AND ANALYZED ON 12/29/98
**** = THIS SAMPLE WAS DILUTED 1:40 FOR THESE COMPOUNDS AND ANALYZED ON 12/29/98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Heraly /GAL

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/09/98
DATE EXTRACTED: 12/21/98
DATE ANALYZED: 12/23/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023761
SAMPLE NAME: SB–726(11.5)

ANALYTE	MDL * ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	577	1920	ND
ACENAPHTHYLENE	539	1800	ND
ANTHRACENE	42	141	289
BENZO(A)ANTHRACENE	42	141	3460
BENZO(A)PYRENE	85	282	622
BENZO(B)FLUORANTHENE	50	167	2650
BENZO(G,H,I)PERYLENE	92	308	1180
BENZO(K)FLUORANTHENE	92	308	1350
CHRYSENE	37	124	4860
DIBENZO(AH)ANTHRACENE	104	346	ND
FLUORANTHENE	92	308	9990
FLUORENE	23	76	ND
INDENO(1,2,3–CD)PYRENE	46	154	1860
1–METHYLNAPHTHALENE	385	1280	ND
2–METHYLNAPHTHALENE	373	1240	ND
NAPHTHALENE	296	987	ND
PHENANTHRENE	46	154	5650
PYRENE	158	526	15000

MDL and results based on amount of sample used and percent solids.
* = THE MDL'S WERE ADJUSTED FOR A 10ML FINAL VOLUME

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve [illegible]

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/09/98
DATE EXTRACTED: 12/21/98
DATE ANALYZED: 12/23/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023762
SAMPLE NAME: SB–733(11)

ANALYTE	MDL * ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	567	1890	ND
ACENAPHTHYLENE	13200	44100	65700 **
ANTHRACENE	249	831	42400 ***
BENZO(A)ANTHRACENE	249	831	34600 ***
BENZO(A)PYRENE	83	277	14800
BENZO(B)FLUORANTHENE	49	164	9030
BENZO(G,H,I)PERYLENE	91	302	4990
BENZO(K)FLUORANTHENE	91	302	3710
CHRYSENE	37	122	15100
DIBENZO(AH)ANTHRACENE	102	340	10000
FLUORANTHENE	544	1810	66200 ***
FLUORENE	22	74	ND
INDENO(1,2,3–CD)PYRENE	45	151	6910
1–METHYLNAPHTHALENE	2270	7550	70400 ***
2–METHYLNAPHTHALENE	2200	7330	48700 ***
NAPHTHALENE	7270	24200	309000 **
PHENANTHRENE	1130	3780	130000 **
PYRENE	3870	12900	179000 **

MDL and results based on amount of sample used and percent solids.
* = THE MDL'S WERE ADJUSTED FOR A 10ML FINAL VOLUME
** = THIS SAMPLE WAS DILUTED 1:250 FOR THESE COMPOUNDS AND ANALYZED ON 12/29/98
*** = THIS SAMPLE WAS DILUTED 1:60 FOR THESE COMPOUNDS AND ANALYZED ON 12/29/98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve [illegible] /a7L

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/09/98
DATE EXTRACTED: 12/21/98
DATE ANALYZED: 12/23/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023763
SAMPLE NAME: SB–734(13)

ANALYTE	MDL * ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	1660	5530	11800 **
ACENAPHTHYLENE	516	1720	ND
ANTHRACENE	122	405	16200 **
BENZO(A)ANTHRACENE	122	405	32500 **
BENZO(A)PYRENE	243	811	14300 **
BENZO(B)FLUORANTHENE	48	160	10700
BENZO(G,H,I)PERYLENE	88	295	6320
BENZO(K)FLUORANTHENE	88	295	3650
CHRYSENE	36	119	13900
DIBENZO(AH)ANTHRACENE	100	332	9470
FLUORANTHENE	265	885	41100 **
FLUORENE	65	217	20100 **
INDENO(1,2,3–CD)PYRENE	44	147	8490
1–METHYLNAPHTHALENE	369	1230	7240
2–METHYLNAPHTHALENE	357	1190	ND
NAPHTHALENE	284	946	5850
PHENANTHRENE	133	442	44900 **
PYRENE	1360	4530	66400 ***

MDL and results based on amount of sample used and percent solids.
* = THE MDL'S WERE ADJUSTED FOR A 10ML FINAL VOLUME
** = THIS SAMPLE WAS DILUTED 1:30 FOR THESE COMPOUNDS AND ANALYZED ON 12/29/98
*** = THIS SAMPLE WAS DILUTED 1:90 FOR THIS COMPOUND AND ANALYZED ON 01/05/99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/10/98
DATE EXTRACTED: 12/21/98
DATE ANALYZED: 12/23/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023764
SAMPLE NAME: SB–735(11)

ANALYTE	MDL * ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	586	1950	ND
ACENAPHTHYLENE	5470	18200	87000 **
ANTHRACENE	430	1430	36300 **
BENZO(A)ANTHRACENE	430	1430	39700 **
BENZO(A)PYRENE	860	2870	16200 **
BENZO(B)FLUORANTHENE	51	169	9400
BENZO(G,H,I)PERYLENE	94	313	6240
BENZO(K)FLUORANTHENE	94	313	3760
CHRYSENE	38	126	14300
DIBENZO(AH)ANTHRACENE	106	352	10900
FLUORANTHENE	938	3130	54800 **
FLUORENE	231	769	54500 **
INDENO(1,2,3–CD)PYRENE	47	156	8110
1–METHYLNAPHTHALENE	3910	13000	68500 **
2–METHYLNAPHTHALENE	3790	12600	50100 **
NAPHTHALENE	7520	25100	268000 ***
PHENANTHRENE	469	1560	101000 **
PYRENE	1600	5340	123000 **

MDL and results based on amount of sample used and percent solids.
* = THE MDL'S WERE ADJUSTED FOR A 10ML FINAL VOLUME
** = THIS SAMPLE WAS DILUTED 1:100 FOR THESE COMPOUNDS AND ANALYZED ON 12/29/98
*** = THIS SAMPLE WAS DILUTED 1:250 FOR THIS COMPOUND AND ANALYZED ON 12/29/98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy /

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/10/98
DATE EXTRACTED: 12/21/98
DATE ANALYZED: 12/23/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023765
SAMPLE NAME: COMPOSITE 1

ANALYTE	MDL * ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	581	1940	ND
ACENAPHTHYLENE	542	1810	ND
ANTHRACENE	43	142	9680
BENZO(A)ANTHRACENE	128	426	45500 **
BENZO(A)PYRENE	256	852	17200 **
BENZO(B)FLUORANTHENE	151	504	16200 **
BENZO(G,H,I)PERYLENE	93	310	6820
BENZO(K)FLUORANTHENE	93	310	5700
CHRYSENE	113	376	18100 **
DIBENZO(AH)ANTHRACENE	105	349	ND
FLUORANTHENE	279	930	38300 **
FLUORENE	23	76	ND
INDENO(1,2,3–CD)PYRENE	46	155	11600
1–METHYLNAPHTHALENE	387	1290	1780
2–METHYLNAPHTHALENE	376	1250	ND
NAPHTHALENE	298	994	3150
PHENANTHRENE	139	465	26100 **
PYRENE	794	2650	50500 ***

MDL and results based on amount of sample used and percent solids.
* = THE MDL'S WERE ADJUSTED FOR A 10ML FINAL VOLUME
** = THIS SAMPLE WAS DILUTED 1:30 FOR THESE COMPOUNDS AND ANALYZED ON 12/30/98
*** = THIS SAMPLE WAS DILUTED 1:50 FOR THIS COMPOUND AND ANALYZED ON 12/29/98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59417

NARRATIVE

This narrative is relevant to samples PZ-702(15), SB-726(11.5), SB-733(11), and SB-734(13).

The samples were analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery for all samples was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly / GJL

Steve Heraly
Laboratory Coordinator
to

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LABORATORY SERVICES
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METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: PZ–702(15)
REL SAMPLE NUMBER: 98REL023760

DATE SAMPLED: 12/09/98
DATE ANALYZED: 12/16/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: 1 TO 1000

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	259000	9000	30000
ETHYLBENZENE	168000	4500	15000
TOLUENE	572000	4200	14000
m,p–XYLENE	405000	19000	63000
o–XYLENE	194000	9000	30000

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%)........... 100

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–726(11.5)
REL SAMPLE NUMBER: 98REL023761

DATE SAMPLED: 12/09/98
DATE ANALYZED: 12/16/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	27 (p)	9.0	30
ETHYLBENZENE	ND	4.5	15
TOLUENE	ND	4.2	14
m.p–XYLENE	ND	19	63
o–XYLENE	ND	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 100

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / G7L

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

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METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–733(11)
REL SAMPLE NUMBER: 98REL023762

DATE SAMPLED: 12/09/98
DATE ANALYZED: 12/16/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: 1 TO 10

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	25700	90	300
ETHYLBENZENE	5490	45	150
TOLUENE	55400	42	140
m,p–XYLENE	34100	190	630
o–XYLENE	15800	90	300

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 103

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Heraly | QAC

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–734(13)
REL SAMPLE NUMBER: 98REL023763

DATE SAMPLED: 12/09/98
DATE ANALYZED: 12/16/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	309	9.0	30
ETHYLBENZENE	370	4.5	15
TOLUENE	177	4.2	14
m.p–XYLENE	275	19	63
o–XYLENE	112	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 100

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / a7L

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59417

NARRATIVE

This narrative is relevant to sample SB-735(11).

The sample was analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /a7s

Steve Heraly
Laboratory Coordinator
to

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–735(11)
REL SAMPLE NUMBER: 98REL023764

DATE SAMPLED: 12/10/98
DATE ANALYZED: 12/18/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	172	9.0	30
ETHYLBENZENE	7070	4.5	15
TOLUENE	1150	4.2	14
m.p–XYLENE	9210	19	63
o–XYLENE	4250	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 93

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
ND = COMPOUND NOT DETECTED
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59417

NARRATIVE

This narrative is relevant to sample COMPOSITE 1.

The sample was analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.
6. The sample was reanalyzed to verify results.

Steve Heraly /GJL

Steve Heraly
Laboratory Coordinator
to

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC-CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: COMPOSITE 1
REL SAMPLE NUMBER: 98REL023765

DATE SAMPLED: 12/10/98
DATE ANALYZED: 12/21/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	183	9.0	30
ETHYLBENZENE	116	4.5	15
TOLUENE	247	4.2	14
m.p-XYLENE	258	19	63
o-XYLENE	154	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 101

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
ND = COMPOUND NOT DETECTED
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy /

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313 / WPSC-CAMP MARINA
CHAIN NUMBER: 59417

NARRATIVE

This narrative is relevant to sample COMPOSITE 1.

The sample was analyzed for benzene following SW-846 Method 8260.

The following is a summary of the quality control results:

1. Benzene was not detected in the method blank.
2. The precision between the matrix spike recovery and the matrix spike duplicate recovery was within laboratory limits for benzene.
3. The matrix spike and matrix spike duplicate recoveries were within laboratory limits for benzene.
4. The surrogate recovery was within laboratory limits for each of the three surrogates spiked.
5. The initial and final calibration check standards verified the calibration curve for benzene.

Ste Heraly

Steve Heraly
Laboratory Coordinator
JF

ROBERT E. LEE & ASSOCIATES, INC

LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 - 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8260. VOLATILE ORGANIC COMPOUNDS IN A TCLP BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH MASS SELECTIVE DETECTION.

CLIENT: Natural Resource Technology
DATE SAMPLED: December 10, 1998
DATE ANALYZED: December 14, 1998
ANALYZED BY: JF

PROJECT: 1313/WPSC-Camp Marina
CHAIN NUMBER: 59417
REL NUMBER: 98REL023766
SAMPLE: Composite 1
DILUTION: 1 to 25

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
Benzene	4.70	15.7	5.41 (p)

*Dibromofluoromethane surrogate recovery.................................. 98 %
*Toluene-d8 surrogate recovery.. 102 %
*Bromofluorobenzene surrogate recovery....................................... 102 %

ND= COMPOUND NOT DETECTED AT OR ABOVE MDL
MDL= METHOD DETECTION LIMIT
(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)

ATTEST

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE.

Robert E. Lee & Associates, Inc.
Engineering, Surveying, Laboratory Services
2825 S. Webster Ave. • Box 2100 • Green Bay, WI 54306-2100
Green Bay Office 920.336.6338 FAX 920.336.9141
Milwaukee Office 414.569.8893 FAX 414.569.7995

To ensure the proper handling of samples, please see the back for instructions.

CHAIN OF CUSTODY RECORD

COC # 59417M

Client: NATURAL RESOURCE TECHNOLOGY, INC.
Project Name: WPSC - CAMPMARINA
Project Number: 1313
Project Address: 723 N WATER STREET, SHEBOYGAN, WI
PO #: 1313
BID #:

Environmental Program:
☐ LUST ☐ SDWA ☐ WPDES ☐ RCRA ☒ OTHER

Requested Turnaround Time
☒ Normal (10-15 DAYS) ☐ Rush
Date Needed:
Rushes accepted only w/prior notification

Check Delivery Method
☐ In Person ☐ Mail
☐ Common Courier ☐ Courier Service
☐ Other

Sampler: REBECCA J. KOEPKE / Rebecca J Koepke
CHRIS A. ROBB / Chris Robb

Report To: MR. ROY WITTENBERG
Company: NATURAL RESOURCE TECH
Address: 23713 W. PAUL ROAD
PEWAUKEE WI 53072
Telephone: 414-523-9000
Fax: 414-523-9001

Invoice To: MS. JANET SCARLATA
Company: SAME
Address:
Telephone:
Fax:

Analyses Required: (Note special detection limits or methods)

Sample ID	Date	Time	Comp	Grab	Filtered Y/N	Sample Description	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Air, Other	No. of Containers	Preservation Type (see key below)	BETX	PAHs	TOTAL LEAD	TOTAL CYANIDE	TOTAL SULFUR	TCLP BENZENE				REL Sample No.	Remarks:
PZ-702(15)	12/09/98			X		PZ-702(14-16)	SOIL	5	M/U	X	X	X	X	X					23760	TAR, PID 914 St. Odor
~~COMPOSITE 1~~	~~12/10/98~~		~~X~~			~~SB-734 / SB-735 / PZ-702(15) / [illegible]~~	~~SOIL~~	~~5~~	~~M/U~~	~~X~~	~~X~~	~~X~~	~~X~~		~~X~~					
~~COMPOSITE 2~~	~~12/10/98~~		~~X~~			~~"~~	~~SOIL~~	~~7~~	~~M/U~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~					~~TAR, STRONG ODOR~~
SB-726(11.5)	12/9/98			X		SB-726(11-12)	SOIL	4	M/U	X	X	X	X						23761	NO ODOR, PID 0.7
SB-733(11)	12/9/98			X		SB-733(10-12)	SOIL	4	M/U	X	X	X	X						23762	TAR; STRONG ODOR
SB-734(13)	12/9/98			X		SB-734(12-14)	SOIL	4	M/U	X	X	X	X						23763	LITTLE TAR; ODOR
SB-735(11)	12/10/98			X		SB-735(10-12)	SOIL	4	M/U	X	X	X	X	X					23764	TAR; STRONG ODOR
COMPOSITE 1	12/10/98		X			"	SOIL	7	M/U	X	X	X	X	X	X				23765	St. ODOR
↓																			23766	(TCLP)

Relinquished By	Date	Time	Received By	Date	Time
1)	12/10/98	1132 [✓ A]/P	Marynell DeBoer	12/10/98	11:32 [✓ A]/P
2) Marynell DeBoer	12/10/98	1:50 A/[✓ P]			A/P
3)		A/P			A/P

Received by Lab 12-10-98 1350 P

A = AM P = PM

Laboratory Receiving Notes
Temperature of Contents: on ice °C
Custody Seal Intact
Sample Condition
Sample pH

WISCONSIN DNR CERTIFICATION NUMBER 405043870

Preservation Key

N = Nitric Acid	O = Sodium Hydroxide
H = Hydrochloric Acid	U = Unpreserved
M = Methanol	S = Sulfuric Acid

MASTER FILE COPY

PROJECT # 1313

CO: Pete

Robert E. Lee & Associates, Inc.

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830 Armour Rd.
Oconomowoc, WI 53066
Phone: (414)569-8893 1-800-775-8893
Fax: (414)569-7995
Wisconsin Certification Number: 405043870

ROY WITTENBURG
NATURAL RESOURCE TECHNOLOGY
23713 W PAUL RD
PEWAUKEE WI 53702

Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Contact ID: 3489

Sample Information

Report Date: 1/07/1999
Chain Number: 59412
Project No: 1313
Project Name: WPSC-CAMP MARINA
Receive Date: 12/12/1998
Sample Date: 12/10/1998

Attest:

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59412
Report Date: 1/07/1999

Method	Parameter Name	Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
Lab No.	Collect Date	Sample ID						
98REL023931	**12/10/1998**	**SB-732 (13)**						
SW-846-9013	Cyanide Solid/Oil Extraction	Complete					12/14/1998	GLB
SW-846-9012A	Cyanide-Total	0.049	mg/Kg	13	0.025	0.083	12/18/1998	CLW
	Metal Preparation	Complete					12/14/1998	DLB
SW-846-8310	PAH Analysis	See Attached					12/23/1998	TMS
SW-846-6010B	Total Lead ICP	5.2	mg/Kg	13	1.8	6.0	12/15/1998	DLB
SM-2540G	Total Solids	82	%		0.010	0.033	12/15/1998	DJN
SW-846-8021B	Volatile Organic Analysis	See Attached					12/18/1998	TO

Robert E. Lee & Associates. Inc.

Quality Control Report - Description of Flags

Flag	Section	Description
13	**L**	The reported result is less than the practical quantitation limit (PQL).

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59412

NARRATIVE

This narrative is relevant to sample SB-732(13).

The sample was analyzed for polynuclear aromatic hydrocarbons following SW-846 Method 8310.

The sample used for the matrix spikes is not listed above. The following is a summary of the quality control results:

1. The reported compounds were not detected in the method blank.
2. The precision between the matrix spike recovery and the method spike recovery was within laboratory limits for each of the reported compounds.
3. The matrix spike recovery was within laboratory limits for each of the reported compounds.
4. The matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
5. The surrogate recovery was below laboratory limits but re-extracted on 01/04/99 past hold time. Both results from the initial and re-extracted samples will be reported.
6. The initial and final check standards verified the calibration curve for each of the reported compounds.

Steve Heraly

Steve Heraly
Laboratory Coordinator
tms

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/10/98
DATE EXTRACTED: 12/21/98
DATE ANALYZED: 12/23/98
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023931
SAMPLE NAME: SB–732(13)

ANALYTE	MDL ug/kg	PQL ug/kg	RESULT ug/kg	
ACENAPHTHENE	55	182	222	
ACENAPHTHYLENE	51	170	122	(p)
ANTHRACENE	4.0	13	146	
BENZO(A)ANTHRACENE	4.0	13	76	
BENZO(A)PYRENE	8.0	27	46	
BENZO(B)FLUORANTHENE	4.7	16	31	
BENZO(G,H,I)PERYLENE	8.8	29	ND	
BENZO(K)FLUORANTHENE	8.8	29	17	(p)
CHRYSENE	3.5	12	51	
DIBENZO(AH)ANTHRACENE	9.9	33	16	(p)
FLUORANTHENE	8.8	29	163	
FLUORENE	2.2	7.2	231	
INDENO(1,2,3–CD)PYRENE	4.4	15	6.6	(p)
1–METHYLNAPHTHALENE	36	122	201	
2–METHYLNAPHTHALENE	35	118	51	(p)
NAPHTHALENE	28	94	699	
PHENANTHRENE	4.4	15	549	
PYRENE	15	50	583	

MDL and results based on amount of sample used and percent solids.

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Heraly

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/10/98
DATE EXTRACTED: 01/04/99 PAST HOLD TIME
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL023931
SAMPLE NAME: SB–732(13)

ANALYTE	MDL ug/kg	PQL ug/kg	RESULT ug/kg
ACENAPHTHENE	65	215	68 (p)
ACENAPHTHYLENE	60	201	300
ANTHRACENE	4.7	16	48
BENZO(A)ANTHRACENE	4.7	16	ND
BENZO(A)PYRENE	9.5	32	ND
BENZO(B)FLUORANTHENE	5.6	19	6.4 (p)
BENZO(G,H,I)PERYLENE	10	34	ND
BENZO(K)FLUORANTHENE	10	34	ND
CHRYSENE	4.2	14	6.8 (p)
DIBENZO(AH)ANTHRACENE	12	39	ND
FLUORANTHENE	10	34	106
FLUORENE	2.5	8.5	152
INDENO(1,2,3–CD)PYRENE	5.2	17	ND
1–METHYLNAPHTHALENE	43	143	245
2–METHYLNAPHTHALENE	42	139	61 (p)
NAPHTHALENE	33	110	1300
PHENANTHRENE	5.2	17	256
PYRENE	18	59	219

MDL and results based on amount of sample used and percent solids.

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59412

NARRATIVE

This narrative is relevant to sample SB-732 (13).

The sample was analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /

Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8021. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: SB–732(13)
REL SAMPLE NUMBER: 98REL023931

DATE SAMPLED: 12/10/98
DATE ANALYZED: 12/18/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: NONE

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	300	9.0	30
ETHYLBENZENE	2521	4.5	15
TOLUENE	43	4.2	14
m,p–XYLENE	1067	19	63
o–XYLENE	614	9.0	30

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%)........... 101

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / GTL

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

O

Robert E. Lee & Associates, Inc.
Eng ing, Surveying, Laboratory Services
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Green Bay Office 920.336.6338 FAX 920.336.9141
Milwaukee Office 414.569.8893 FAX 414.569.7995

To ensure the pr handling of samples, please see the ba for instructions.

CHAIN OF CUSTODY R ORD

COC # 59412MR

Client: Natural Resource Technology, Inc.
Project Name: WPSC - Campmarina
Project Number: 1313
Project Address: 723 North Water Street, Sheboygan, W
PO #: 1313
BID #:

Environmental Program:
☐ LUST ☐ SDWA ☐ WPDES ☐ RCRA ☒ OTHER

Requested Turnaround Time
☐ Normal (10-15 DAYS) ☐ Rush
Date Needed:
Rushes accepted only w/prior notification

Check Delivery Method
☐ In Person ☐ Mail
☐ Common Courier ☐ Courier Service
☐ Other

Sampler: Rebecca J. Koepke /
Christopher A. Robb /

Report To: Mr. Roy Wittenburg
Company: Natural Resource Tech
Address: 23713 W. Paul Road
Pewaukee, WI 53072
Telephone: 414-523-9000
Fax: 414-523-9001

Invoice To: Ms. Janet Scarlata
Company: Same
Address:
Telephone:
Fax:

Sample ID	Date	Time	Comp	Grab	Filtered Y/N	Sample Description	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Air, Other	No. of Containers	Preservation Type (see key below)	BETX	PAH	Total Lead	Total Cyanide	TCLP Benzene	Total Sulfur				REL Sample No.	Remarks:
Composite 2	12/10/98	A/P	X		N	Composite	Soil	7	M/U	X	X	X	X	X	X					→ All analyses for
SB-732 (13)	12/10/98	A/P		X	N	SB-732 12'-14' bgs	Soil	4	M/U	X	X	X	X						23931	No Odor
		A/P																		✓
		A/P																		Composite #2 to be
		A/P																		put "on hold"
		A/P																		per Chris Kobb 4:40pm
		A/P																		12-11-98
		A/P																		
		A/P																		
		A/P																		
		A/P																		
		A/P																		

	Relinquished By	Date	Time	Received By	Date	Time
1)		12/11/98	3:55 A/[✓ P]		12-11-98	3:55 A/[✓ P]
2)		12-11-98	4:15 A/[✓ P]			A/P
3)			A/P			A/P

Received by Lab Angela Jaugers 10:30 12-12-98 [✓ A] = AM P = PM

Laboratory Receiving Notes
Temperature of Contents: on ice °C
Custody Seal Intact
Sample Condition
Sample pH

WISCONSIN DNR CERTIFICATION NUMBER 405043870

Preservation Key
N = Nitric Acid
H = Hydrochloric Acid
M = Methanol
O = Sodium Hydroxide
U = Unpreserved
S = Sulfuric Acid

APPENDIX D

GROUNDWATER LABORATORY ANALYTICAL REPORTS

Robert E. Lee & Associates, Inc.

Engineering, Surveying, Laboratory Services

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Fax: (414)569-7995
Wisconsin Certification Number: 405043870

ROY WITTENBURG
NATURAL RESOURCE TECHNOLOGY
23713 W PAUL RD
PEWAUKEE WI 53702

Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Contact ID: 3489

Sample Information

Report Date: 1/12/1999
Chain Number: 59414
Project No: 1313
Project Name: WPSC-CAMP MARINA
Receive Date: 12/24/1998
Sample Date: 12/21/1998

Attest:

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59414
Report Date: 1/12/1999

Method	Parameter Name	Result	Units	Flag	MDL	PQL	Anls Date	Analyst
Lab No.	Collect Date	Sample ID						
98REL024734	**12/21/1998**	**MW-701**						
SW-846-9012A	Cyanide-Amenable-Dissolved	0.05	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved	0.17	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved	0.11	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis	See Attached					1/04/1999	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					12/31/1998	TO
98REL024735	**12/21/1998**	**MW-703**						
SW-846-9012A	Cyanide-Amenable-Dissolved	0.05	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved	0.20	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved	0.074	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis	See Attached					1/04/1999	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					12/30/1998	TO
98REL024736	**12/21/1998**	**MW-704**						
SW-846-9012A	Cyanide-Amenable-Dissolved	0.22	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved	0.31	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved	0.017	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis	See Attached					1/04/1999	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					12/30/1998	TO
98REL024737	**12/21/1998**	**MW-705**						
SW-846-9012A	Cyanide-Amenable-Dissolved	<0.001	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved	<0.001	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved	<0.001	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis	See Attached					1/04/1999	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					12/30/1998	TO
98REL024738	**12/21/1998**	**MW-707**						
SW-846-9012A	Cyanide-Amenable-Dissolved	0.13	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved	0.64	mg/L		0.0050	0.017	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved	0.033	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-6010B	Dissolved Iron ICP	0.69	mg/L		0.0089	0.030	12/29/1998	DAW
SW-846-7421	Dissolved Lead GFAA	<0.73	ug/L		0.73	2.4	12/30/1998	DLB

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59414
Report Date: 1/12/1999

Method Lab No.	Parameter Name Collect Date	Sample ID	Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
	Metal Preparation		Complete					12/29/1998	DLB
SW-846-8310	PAH Analysis		See Attached					1/04/1999	TMS
SW-846-6010B	Total Hardness		774	mg/L		0.24	0.8	1/04/1999	DAW
SW-846-6010B	Total Iron ICP		13	mg/L		0.0089	0.030	1/04/1999	DAW
SW-846-8021B	Volatile Organic Analysis		See Attached					12/31/1998	TO
98REL024739	**12/21/1998**	**MW-708**							
SW-846-9012A	Cyanide-Amenable-Dissolved		<0.001	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved		<0.001	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved		<0.001	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis		See Attached					1/04/1999	TMS
SW-846-8021B	Volatile Organic Analysis		See Attached					12/30/1998	TO
98REL024740	**12/21/1998**	**MW-709**							
SW-846-9012A	Cyanide-Amenable-Dissolved		0.03	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved		0.03	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved		0.014	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis		See Attached					1/05/1999	TMS
SW-846-8021B	Volatile Organic Analysis		See Attached					12/30/1998	TO
98REL024741	**12/21/1998**	**MW-A**							
SW-846-9012A	Cyanide-Amenable-Dissolved		<0.001	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved		<0.001	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved		0.004	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis		See Attached					1/05/1999	TMS
SW-846-8021B	Volatile Organic Analysis		See Attached					12/31/1998	TO
98REL024742	**12/21/1998**	**MW-B**							
SW-846-9012A	Cyanide-Amenable-Dissolved		0.29	mg/L		0.0010	0.0033	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved		0.29	mg/L		0.0010	0.0033	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved		0.023	mg/L		0.0010	0.0033	12/30/1998	CLW
SW-846-8310	PAH Analysis		See Attached					1/05/1999	TMS
SW-846-8021B	Volatile Organic Analysis		See Attached					12/31/1998	TO
98REL024743	**12/22/1998**	**PZ-701**							

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59414
Report Date: 1/12/1999

Method	Parameter Name	Result	Units	Flag	MDL	PQL	Anls. Date	Analyst
Lab No.	**Collect Date**	**Sample ID**						
SW-846-8310	PAH Analysis	See Attached					1/05/1999	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					1/04/1999	TO
98REL024744	**12/21/1998**	**PZ-702**						
SW-846-9012A	Cyanide-Amenable-Dissolved	<0.002	mg/L		0.0020	0.0067	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved	<0.002	mg/L		0.0020	0.0067	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved	<0.002	mg/L		0.0020	0.0067	12/30/1998	CLW
SW-846-6010B	Dissolved Iron ICP	0.063	mg/L		0.0099	0.033	12/29/1998	DAW
SW-846-7421	Dissolved Lead GFAA	<0.73	ug/L		0.73	2.4	12/30/1998	DLB
	Metal Preparation	Complete					12/29/1998	DLB
SW-846-8310	PAH Analysis	See Attached					1/05/1999	TMS
SW-846-6010B	Total Hardness	317	mg/L		0.24	0.8	1/04/1999	DAW
SW-846-6010B	Total Iron ICP	35	mg/L		0.22	0.73	1/04/1999	DAW
SW-846-8021B	Volatile Organic Analysis	See Attached					12/31/1998	TO
98REL024745	**12/21/1998**	**PZ-703**						
SW-846-9012A	Cyanide-Amenable-Dissolved	0.002	mg/L	13	0.0020	0.0067	12/31/1998	CLW
SW-846-9012A	Cyanide-Dissolved	0.002	mg/L	13	0.0020	0.0067	12/30/1998	CLW
SM-4500-CN-	Cyanide-Weak Acid Dissociable-Dissolved	0.002	mg/L	13	0.0020	0.0067	12/31/1998	CLW
SW-846-8310	PAH Analysis	See Attached					1/05/1999	TMS
SW-846-8021B	Volatile Organic Analysis	See Attached					1/05/1999	TO

Robert E. Lee & Associates, Inc.

Quality Control Report - Description of Flags

Flag	Section	Description
13	**L**	The reported result is less than the practical quantitation limit (PQL).

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59414

NARRATIVE

This narrative is relevant to samples MW-701, MW-703, MW-704, MW-705, MW-707, MW-708, MW-709, MW-A, MW-B, PZ-701, PZ-702 and PZ-703.

The samples were analyzed for polynuclear aromatic hydrocarbons following SW-846 Method 8310.

The sample used for the matrix spikes is not listed above. The following is a summary of the quality control results:

1. The reported compounds were not detected in the method blank.

2. The precision between the matrix spike recovery and the matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.

3. The matrix spike and matrix spike duplicate recoveries were within laboratory limits for each of the reported compounds except for acenaphthene which was above laboratory limits. The data was accepted because there was insufficient sample left to re-extract.

4. The surrogate recovery for all samples was within laboratory limits except for MW-701, MW-703 and MW-707 which were above laboratory limits due to co-eluting interference peaks from the sample. The data was accepted because the surrogate recovery in the method blank was within laboratory limits.

5. The initial and final check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /

Steve Heraly
Laboratory Coordinator
tms

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 - 6338
SCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/04/99
ANALYZED BY: TMS

PROJECT: WPSC-CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024734
SAMPLE NAME: MW-701

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
ACENAPHTHENE	24	80	420 *
ACENAPHTHYLENE	1.3	4.4	ND
ANTHRACENE	0.10	0.35	32
BENZO(A)ANTHRACENE	0.10	0.35	15
BENZO(A)PYRENE	0.21	0.69	7.7
BENZO(B)FLUORANTHENE	0.12	0.41	5.4
BENZO(G,H,I)PERYLENE	0.23	0.75	4.5
BENZO(K)FLUORANTHENE	0.23	0.75	2.5
CHRYSENE	0.092	0.31	7.6
DIBENZO(AH)ANTHRACENE	0.25	0.85	6.7
FLUORANTHENE	0.91	3.0	56 **
FLUORENE	0.22	0.74	92 **
INDENO(1,2,3-CD)PYRENE	0.11	0.38	4.3
1-METHYLNAPHTHALENE	16	53	367 *
2-METHYLNAPHTHALENE	16	52	188 *
NAPHTHALENE	145	484	3740 ***
PHENANTHRENE	0.45	1.5	129 **
PYRENE	1.5	5.2	98 **

MDL and results based on amount of sample used
* = THIS SAMPLE WAS DILUTED 1:17 FOR THESE COMPOUNDS AND ANALYZED ON 01/08/99
** = THIS SAMPLE WAS DILUTED 1:4 FOR THESE COMPOUNDS AND ANALYZED ON 01/08/99
*** = THIS SAMPLE WAS DILUTED 1:200 FOR THIS COMPOUND AND ANALYZED ON 01/08/99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Hendy

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ROBERT E LEE & ASSOCIATES, INC.
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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/04/99
ANALYZED BY: TMS

PROJECT: WPSC-CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024735
SAMPLE NAME: MW-703

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
ACENAPHTHENE	24	80	262 *
ACENAPHTHYLENE	1.3	4.4	ND
ANTHRACENE	0.10	0.35	5.9
BENZO(A)ANTHRACENE	0.10	0.35	8.7
BENZO(A)PYRENE	0.21	0.69	2.4
BENZO(B)FLUORANTHENE	0.12	0.41	1.7
BENZO(G,H,I)PERYLENE	0.23	0.75	1.6
BENZO(K)FLUORANTHENE	0.23	0.75	0.91
CHRYSENE	0.092	0.31	ND
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND
FLUORANTHENE	0.23	0.75	10
FLUORENE	0.17	0.56	45 **
INDENO(1,2,3-CD)PYRENE	0.11	0.38	1.4
1-METHYLNAPHTHALENE	16	53	408 *
2-METHYLNAPHTHALENE	0.92	3.1	ND
NAPHTHALENE	73	242	3080 ***
PHENANTHRENE	0.11	0.38	24
PYRENE	0.39	1.3	16

MDL and results based on amount of sample used
* = THIS SAMPLE WAS DILUTED 1:17 FOR THESE COMPOUNDS AND ANALYZED ON 01/08/99
** = THIS SAMPLE WAS DILUTED 1:3 FOR THIS COMPOUND AND ANALYZED ON 01/08/99
*** = THIS SAMPLE WAS DILUTED 1:100 FOR THIS COMPOUND AND ANALYZED ON 01/08/99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy

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METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/04/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024736
SAMPLE NAME: MW–704

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
ACENAPHTHENE	1.4	4.7	1.6	(p)
ACENAPHTHYLENE	1.3	4.4	5.9	
ANTHRACENE	0.10	0.35	6.0	
BENZO(A)ANTHRACENE	0.10	0.35	8.9	
BENZO(A)PYRENE	0.21	0.69	9.5	
BENZO(B)FLUORANTHENE	0.12	0.41	8.1	
BENZO(G,H,I)PERYLENE	0.23	0.75	7.0	
BENZO(K)FLUORANTHENE	0.23	0.75	3.5	
CHRYSENE	0.092	0.31	4.4	
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND	
FLUORANTHENE	0.23	0.75	21	
FLUORENE	0.056	0.19	10	
INDENO(1,2,3–CD)PYRENE	0.11	0.38	7.7	
1–METHYLNAPHTHALENE	0.94	3.1	14	
2–METHYLNAPHTHALENE	0.92	3.1	3.6	
NAPHTHALENE	0.73	2.4	22	
PHENANTHRENE	0.11	0.38	19	
PYRENE	0.39	1.3	26	

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Heath / QAL

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/04/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024737
SAMPLE NAME: MW–705

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
ACENAPHTHENE	1.4	4.7	ND
ACENAPHTHYLENE	1.3	4.4	ND
ANTHRACENE	0.10	0.35	ND
BENZO(A)ANTHRACENE	0.10	0.35	ND
BENZO(A)PYRENE	0.21	0.69	ND
BENZO(B)FLUORANTHENE	0.12	0.41	ND
BENZO(G,H,I)PERYLENE	0.23	0.75	ND
BENZO(K)FLUORANTHENE	0.23	0.75	ND
CHRYSENE	0.092	0.31	ND
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND
FLUORANTHENE	0.23	0.75	ND
FLUORENE	0.056	0.19	ND
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND
1–METHYLNAPHTHALENE	0.94	3.1	ND
2–METHYLNAPHTHALENE	0.92	3.1	ND
NAPHTHALENE	0.73	2.4	ND
PHENANTHRENE	0.11	0.38	ND
PYRENE	0.39	1.3	ND

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve [illegible] / QAL

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LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/04/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024738
SAMPLE NAME: MW–707

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
ACENAPHTHENE	17	57	221 *
ACENAPHTHYLENE	1.3	4.4	ND
ANTHRACENE	0.10	0.35	15
BENZO(A)ANTHRACENE	0.10	0.35	ND
BENZO(A)PYRENE	0.21	0.69	2.1
BENZO(B)FLUORANTHENE	0.12	0.41	ND
BENZO(G,H,I)PERYLENE	0.23	0.75	1.7
BENZO(K)FLUORANTHENE	0.23	0.75	0.76
CHRYSENE	0.092	0.31	2.2
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND
FLUORANTHENE	0.23	0.75	28
FLUORENE	0.17	0.56	64 **
INDENO(1,2,3–CD)PYRENE	0.11	0.38	1.3
1–METHYLNAPHTHALENE	11	38	454 *
2–METHYLNAPHTHALENE	0.92	3.1	ND
NAPHTHALENE	73	242	3470 ***
PHENANTHRENE	0.34	1.1	69 **
PYRENE	1.2	3.9	58 **

MDL and results based on amount of sample used
* = THIS SAMPLE WAS DILUTED 1:12 FOR THESE COMPOUNDS AND ANALYZED ON 01/08/99
** = THIS SAMPLE WAS DILUTED 1:3 FOR THESE COMPOUNDS AND ANALYZED ON 01/08/99
*** = THIS SAMPLE WAS DILUTED 1:100 FOR THIS COMPOUND AND ANALYZED ON 01/08/99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/04/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024739
SAMPLE NAME: MW–708

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
ACENAPHTHENE	1.4	4.7	ND
ACENAPHTHYLENE	1.3	4.4	ND
ANTHRACENE	0.10	0.35	ND
BENZO(A)ANTHRACENE	0.10	0.35	ND
BENZO(A)PYRENE	0.21	0.69	ND
BENZO(B)FLUORANTHENE	0.12	0.41	ND
BENZO(G,H,I)PERYLENE	0.23	0.75	ND
BENZO(K)FLUORANTHENE	0.23	0.75	ND
CHRYSENE	0.092	0.31	ND
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND
FLUORANTHENE	0.23	0.75	ND
FLUORENE	0.056	0.19	ND
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND
1–METHYLNAPHTHALENE	0.94	3.1	ND
2–METHYLNAPHTHALENE	0.92	3.1	ND
NAPHTHALENE	0.73	2.4	ND
PHENANTHRENE	0.11	0.38	ND
PYRENE	0.39	1.3	ND

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve [illegible]

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ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043670

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024740
SAMPLE NAME: MW–709

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
ACENAPHTHENE	1.4	4.7	3.4	(p)
ACENAPHTHYLENE	1.3	4.4	ND	
ANTHRACENE	0.10	0.35	2.9	
BENZO(A)ANTHRACENE	0.10	0.35	1.3	
BENZO(A)PYRENE	0.21	0.69	0.30	(p)
BENZO(B)FLUORANTHENE	0.12	0.41	0.51	
BENZO(G,H,I)PERYLENE	0.23	0.75	ND	
BENZO(K)FLUORANTHENE	0.23	0.75	ND	
CHRYSENE	0.092	0.31	0.66	
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND	
FLUORANTHENE	0.23	0.75	6.6	
FLUORENE	0.056	0.19	3.3	
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND	
1–METHYLNAPHTHALENE	0.94	3.1	ND	
2–METHYLNAPHTHALENE	0.92	3.1	ND	
NAPHTHALENE	0.73	2.4	4.6	
PHENANTHRENE	0.11	0.38	8.4	
PYRENE	0.39	1.3	10	

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024741
SAMPLE NAME: MW–A

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
ACENAPHTHENE	1.4	4.7	ND
ACENAPHTHYLENE	1.3	4.4	ND
ANTHRACENE	0.10	0.35	ND
BENZO(A)ANTHRACENE	0.10	0.35	ND
BENZO(A)PYRENE	0.21	0.69	ND
BENZO(B)FLUORANTHENE	0.12	0.41	ND
BENZO(G,H,I)PERYLENE	0.23	0.75	ND
BENZO(K)FLUORANTHENE	0.23	0.75	ND
CHRYSENE	0.092	0.31	ND
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND
FLUORANTHENE	0.23	0.75	ND
FLUORENE	0.056	0.19	ND
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND
1–METHYLNAPHTHALENE	0.94	3.1	ND
2–METHYLNAPHTHALENE	0.92	3.1	ND
NAPHTHALENE	0.73	2.4	ND
PHENANTHRENE	0.11	0.38	ND
PYRENE	0.39	1.3	ND

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve [illegible] / QAL

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GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024742
SAMPLE NAME: MW–B

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
ACENAPHTHENE	1.4	4.7	1.6 (p)
ACENAPHTHYLENE	1.3	4.4	ND
ANTHRACENE	0.10	0.35	4.9
BENZO(A)ANTHRACENE	0.10	0.35	6.6
BENZO(A)PYRENE	0.21	0.69	7.6
BENZO(B)FLUORANTHENE	0.12	0.41	6.0
BENZO(G,H,I)PERYLENE	0.23	0.75	5.3
BENZO(K)FLUORANTHENE	0.23	0.75	2.4
CHRYSENE	0.092	0.31	3.0
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND
FLUORANTHENE	0.23	0.75	16
FLUORENE	0.056	0.19	6.8
INDENO(1,2,3–CD)PYRENE	0.11	0.38	5.8
1–METHYLNAPHTHALENE	0.94	3.1	9.5
2–METHYLNAPHTHALENE	0.92	3.1	ND
NAPHTHALENE	0.73	2.4	17
PHENANTHRENE	0.11	0.38	16
PYRENE	0.39	1.3	20

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Heraly / QAL

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024743
SAMPLE NAME: PZ–701

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
ACENAPHTHENE	1.4	4.7	ND	
ACENAPHTHYLENE	1.3	4.4	ND	
ANTHRACENE	0.10	0.35	0.23	(p)
BENZO(A)ANTHRACENE	0.10	0.35	0.25	(p)
BENZO(A)PYRENE	0.21	0.69	ND	
BENZO(B)FLUORANTHENE	0.12	0.41	ND	
BENZO(G,H,I)PERYLENE	0.23	0.75	ND	
BENZO(K)FLUORANTHENE	0.23	0.75	ND	
CHRYSENE	0.092	0.31	ND	
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND	
FLUORANTHENE	0.23	0.75	0.60	(p)
FLUORENE	0.056	0.19	0.42	
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND	
1–METHYLNAPHTHALENE	0.94	3.1	ND	
2–METHYLNAPHTHALENE	0.92	3.1	ND	
NAPHTHALENE	0.73	2.4	7.3	
PHENANTHRENE	0.11	0.38	0.80	
PYRENE	0.39	1.3	1.1	(p)

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve [illegible] / QAC

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024744
SAMPLE NAME: PZ–702

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
ACENAPHTHENE	1.4	4.7	ND	
ACENAPHTHYLENE	1.3	4.4	ND	
ANTHRACENE	0.10	0.35	0.44	
BENZO(A)ANTHRACENE	0.10	0.35	0.90	
BENZO(A)PYRENE	0.21	0.69	ND	
BENZO(B)FLUORANTHENE	0.12	0.41	0.20	(p)
BENZO(G,H,I)PERYLENE	0.23	0.75	ND	
BENZO(K)FLUORANTHENE	0.23	0.75	ND	
CHRYSENE	0.092	0.31	0.27	(p)
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND	
FLUORANTHENE	0.23	0.75	1.5	
FLUORENE	0.056	0.19	0.50	
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND	
1–METHYLNAPHTHALENE	0.94	3.1	ND	
2–METHYLNAPHTHALENE	0.92	3.1	ND	
NAPHTHALENE	0.73	2.4	1.2	(p)
PHENANTHRENE	0.11	0.38	1.5	
PYRENE	0.39	1.3	2.3	

MDL and results based on amount of sample used

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve [illegible]

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024745
SAMPLE NAME: MW–703

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
ACENAPHTHENE	1.4	4.7	ND	
ACENAPHTHYLENE	1.3	4.4	ND	
ANTHRACENE	0.10	0.35	0.20	(p)
BENZO(A)ANTHRACENE	0.10	0.35	0.22	(p)
BENZO(A)PYRENE	0.21	0.69	ND	
BENZO(B)FLUORANTHENE	0.12	0.41	ND	
BENZO(G,H,I)PERYLENE	0.23	0.75	ND	
BENZO(K)FLUORANTHENE	0.23	0.75	ND	
CHRYSENE	0.092	0.31	ND	
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND	
FLUORANTHENE	0.23	0.75	0.25	(p)
FLUORENE	0.056	0.19	0.44	
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND	
1–METHYLNAPHTHALENE	0.94	3.1	2.8	(p)
2–METHYLNAPHTHALENE	0.92	3.1	ND	
NAPHTHALENE	2.2	7.3	86 *	
PHENANTHRENE	0.11	0.38	0.53	
PYRENE	0.39	1.3	0.64	(p)

MDL and results based on amount of sample used
* = THIS SAMPLE WAS DILUTED 1:3 FOR THIS COMPOUND AND ANALYZED ON 01/08/99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST Steve Healy / QAC

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59414

NARRATIVE

This narrative is relevant to samples MW-701, MW-703, MW-704, MW-705, MW-707, MW-708, and MW-709.

The samples were analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the water method blank.

2. The precision between the matrix spike recovery and matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.

3. The precision between the recoveries of the water duplicate control spikes was within method limits for each of the reported compounds.

4. The matrix spike and matrix spike duplicate recoveries were within laboratory limits for each of the reported compounds.

5. The recovery for each water laboratory control spike was within method limits for each of the reported compounds.

6. The surrogate recovery for all samples was within laboratory limits.

7. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly / GJL

Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.
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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/31/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024734
SAMPLE: MW–701
DILUTION: 1 TO 50

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	250	830	10200*
TOLUENE	30	100	77 (p)
ETHYLBENZENE	30	100	818
m,p–XYLENE	85	283	456
o–XYLENE	25	83	261

• FLUOROBENZENE SURROGATE RECOVERY (%).. 99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT

• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED
* = ANALYZED 01/04/99
DILUTION FACTOR FOR 01/04/99: 1 TO 500

ATTEST Steve Heraly / G7L

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT:	NATURAL RESOURCE TECHNOLOGY	PROJECT:	WPSC–CAMP MARINA
DATE SAMPLED:	12/21/98	PROJECT NUMBER:	1313
DATE ANALYZED:	12/30/98	REL JOB NUMBER:	98REL024735
ANALYZED BY & GC NO.:	TO /GC#3	SAMPLE:	MW–703
		DILUTION:	1 TO 10

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
BENZENE	50	167	1190*	
TOLUENE	6.0	20	9.2	(p)
ETHYLBENZENE	6.0	20	973	
m,p–XYLENE	17	57	138	
o–XYLENE	5.0	17	270	

• FLUOROBENZENE SURROGATE RECOVERY (%).. 99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT

• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED
* = ANALYZED 12/31/98
DILUTION FACTOR FOR 12/31/98: 1 TO 100

ATTEST Steve Healy | GAC

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WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS
BY PURGE AND TRAP CAPILLARY COLUMN
GAS CHROMATOGRAPHY WITH PHOTOIONIZATION
DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/30/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024736
SAMPLE: MW–704
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
BENZENE	0.50	1.7	29	
TOLUENE	0.60	2.0	1.6	(p)
ETHYLBENZENE	0.60	2.0	13	
m,p–XYLENE	1.7	5.7	6.0	
o–XYLENE	0.50	1.7	5.3	

• FLUOROBENZENE SURROGATE RECOVERY (%).. 99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy

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METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/30/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024737
SAMPLE: MW–705
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	ND
TOLUENE	0.60	2.0	ND
ETHYLBENZENE	0.60	2.0	ND
m.p–XYLENE	1.7	5.7	ND
o–XYLENE	0.50	1.7	ND

• FLUOROBENZENE SURROGATE RECOVERY (%).. 96

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Heraly / GJL

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

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LABORATORY SERVICES
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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/31/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024738
SAMPLE: MW–707
DILUTION: 1 TO 50

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
BENZENE	25	83	830	
TOLUENE	30	100	82	(p)
ETHYLBENZENE	30	100	3110	
m.p–XYLENE	85	283	193	(p)
o–XYLENE	25	83	797	

• FLUOROBENZENE SURROGATE RECOVERY (%).. 97

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/30/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024739
SAMPLE: MW–708
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	ND
TOLUENE	0.60	2.0	ND
ETHYLBENZENE	0.60	2.0	ND
m.p–XYLENE	1.7	5.7	ND
o–XYLENE	0.50	1.7	ND

• FLUOROBENZENE SURROGATE RECOVERY (%).. 96

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
MDL = METHOD DETECTION LIMIT
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Heraly / a7L

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/30/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024740
SAMPLE: MW–709
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	ND
TOLUENE	0.60	2.0	ND
ETHYLBENZENE	0.60	2.0	ND
m,p–XYLENE	1.7	5.7	ND
o–XYLENE	0.50	1.7	ND

• FLUOROBENZENE SURROGATE RECOVERY (%).. 96

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / ATL

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ROBERT E. LEE & ASSOCIATES, INC.

CLIENT:	NATURAL RESOURCE TECHNOLOGY
PROJECT:	1313/WPSC-CAMP MARINA
CHAIN NUMBER:	59414

NARRATIVE

This narrative is relevant to samples MW-A, MW-B, and PZ-702.

The samples were analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the water method blank.
2. The precision between the matrix spike recovery and matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
3. The precision between the recoveries of the water duplicate control spikes was within method limits for each of the reported compounds.
4. The matrix spike and matrix spike duplicate recoveries were within laboratory limits for each of the reported compounds.
5. The recovery for each water laboratory control spike was within method limits for each of the reported compounds.
6. The surrogate recovery for all samples was within laboratory limits.
7. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /ajc

Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
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GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS
BY PURGE AND TRAP CAPILLARY COLUMN
GAS CHROMATOGRAPHY WITH PHOTOIONIZATION
DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/31/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024741
SAMPLE: MW–A
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	ND
TOLUENE	0.60	2.0	ND
ETHYLBENZENE	0.60	2.0	ND
m,p–XYLENE	1.7	5.7	ND
o–XYLENE	0.50	1.7	ND

• FLUOROBENZENE SURROGATE RECOVERY (%).. 98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy | QAC

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GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/31/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024742
SAMPLE: MW–B
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
BENZENE	0.50	1.7	22	
TOLUENE	0.60	2.0	1.2	(p)
ETHYLBENZENE	0.60	2.0	9.5	
m.p–XYLENE	1.7	5.7	4.6	(p)
o–XYLENE	0.50	1.7	4.1	

• FLUOROBENZENE SURROGATE RECOVERY (%)...................................... 100

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy

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TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS
BY PURGE AND TRAP CAPILLARY COLUMN
GAS CHROMATOGRAPHY WITH PHOTOIONIZATION
DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/31/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024744
SAMPLE: PZ–702
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	ND
TOLUENE	0.60	2.0	1.5 (p)
ETHYLBENZENE	0.60	2.0	ND
m.p–XYLENE	1.7	5.7	ND
o–XYLENE	0.50	1.7	ND

• FLUOROBENZENE SURROGATE RECOVERY (%)....................................... 98

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / a7L

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59414

NARRATIVE

This narrative is relevant to samples PZ-701 and PZ-703.

The samples were analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the water method blank.
2. The precision between the matrix spike recovery and matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
3. The precision between the recoveries of the water duplicate control spikes was within method limits for each of the reported compounds.
4. The matrix spike and matrix spike duplicate recoveries were within laboratory limits for each of the reported compounds.
5. The recovery for each water laboratory control spike was within method limits for each of the reported compounds.
6. The surrogate recovery for all samples was within laboratory limits.
7. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly | G7L

Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT:	NATURAL RESOURCE TECHNOLOGY	PROJECT:	WPSC–CAMP MARINA
DATE SAMPLED:	12/22/98	PROJECT NUMBER:	1313
DATE ANALYZED:	01/04/99	REL JOB NUMBER:	98REL024743
ANALYZED BY & GC NO.:	TO /GC#3	SAMPLE:	PZ–701
		DILUTION:	NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
BENZENE	0.50	1.7	0.96	(p)
TOLUENE	0.60	2.0	1.8	(p)
ETHYLBENZENE	0.60	2.0	1.1	(p)
m.p–XYLENE	1.7	5.7	2.3	(p)
o–XYLENE	0.50	1.7	1.9	

• FLUOROBENZENE SURROGATE RECOVERY (%).. 97

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / GTL

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8310. POLYNUCLEAR AROMATIC HYDROCARBONS.

CLIENT NAME: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE EXTRACTED: 12/28/98
DATE ANALYZED: 01/05/99
ANALYZED BY: TMS

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL SAMPLE NUMBER: 98REL024745
SAMPLE NAME: PZ–703

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L	
ACENAPHTHENE	1.4	4.7	ND	
ACENAPHTHYLENE	1.3	4.4	ND	
ANTHRACENE	0.10	0.35	0.20	(p)
BENZO(A)ANTHRACENE	0.10	0.35	0.22	(p)
BENZO(A)PYRENE	0.21	0.69	ND	
BENZO(B)FLUORANTHENE	0.12	0.41	ND	
BENZO(G,H,I)PERYLENE	0.23	0.75	ND	
BENZO(K)FLUORANTHENE	0.23	0.75	ND	
CHRYSENE	0.092	0.31	ND	
DIBENZO(AH)ANTHRACENE	0.25	0.85	ND	
FLUORANTHENE	0.23	0.75	0.25	(p)
FLUORENE	0.056	0.19	0.44	
INDENO(1,2,3–CD)PYRENE	0.11	0.38	ND	
1–METHYLNAPHTHALENE	0.94	3.1	2.8	(p)
2–METHYLNAPHTHALENE	0.92	3.1	ND	
NAPHTHALENE	2.2	7.3	86 *	
PHENANTHRENE	0.11	0.38	0.53	
PYRENE	0.39	1.3	0.64	(p)

MDL and results based on amount of sample used
* = THIS SAMPLE WAS DILUTED 1:3 FOR THIS COMPOUND AND ANALYZED ON 01/08/99

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED AT OR ABOVE THE MDL

ATTEST

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59414

NARRATIVE

This narrative is relevant to sample PZ-703.

The sample was analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the water method blank.

2. The precision between the matrix spike recovery and matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.

3. The precision between the recoveries of the water duplicate control spikes was within method limits for each of the reported compounds.

4. The matrix spike and matrix spike duplicate recoveries were within laboratory limits for each of the reported compounds.

5. The recovery for each water laboratory control spike was within method limits for each of the reported compounds.

6. The surrogate recovery was within laboratory limits.

7. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

8. The sample was analyzed twice. The first analysis was on 12-31-98 but the benzene, ethylbenzene, and o-xylene results were above the highest standard in the calibration curve. The sample was reanalyzed on 1-5-99, theses compounds were within the calibration curve but the analysis was past hold time, Both analysis dates are reported.

Ste Heraly

Steve Heraly
Laboratory Coordinator

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 12/31/98
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024745
SAMPLE: PZ–703
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	960
TOLUENE	0.60	2.0	26
ETHYLBENZENE	0.60	2.0	429
m,p–XYLENE	1.7	5.7	180
o–XYLENE	0.50	1.7	121

• FLUOROBENZENE SURROGATE RECOVERY (%).. 102

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS
BY PURGE AND TRAP CAPILLARY COLUMN
GAS CHROMATOGRAPHY WITH PHOTOIONIZATION
DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 12/21/98
DATE ANALYZED: 01/05/99
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL024745
SAMPLE: PZ–703
DILUTION: 1 TO 25

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	13	42	1170
TOLUENE	0.60	2.0	26*
ETHYLBENZENE	15	50	527
m,p–XYLENE	1.7	5.7	180*
o–XYLENE	13	42	119

• FLUOROBENZENE SURROGATE RECOVERY (%).. 100

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED
* = ANALYZED 12/31/98
DILUTION FACTOR FOR 12/31/98: NONE

ATTEST

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

Robert E. Lee & Associates, Inc.
Engineering, Surveying, Laboratory Services
2825 S. Webster Ave. • Box 2100 • Green Bay, WI 54306-2100
Green Bay Office 920.336.6338 FAX 920.336.9141
Milwaukee Office 414.569.8893 FAX 414.569.7995

To ensure the proper handling of samples, please see the back for Instructions.

CHAIN OF CUSTODY RECORD

COC # 59414 MR

Client: Natural Resource Technology, Inc.
Project Name: WPSC - Campmarina
Project Number: 1313
Project Address: 723 North Water Street, Sheboygan, WI
PO #: 1313
BID #:

Environmental Program:
☐ LUST ☐ SDWA ☐ WPDES ☐ RCRA ☑ OTHER

Requested Turnaround Time
☒ Normal (10-15 DAYS) ☐ Rush
Date Needed:
Rushes accepted only w/prior notification

Check Delivery Method
☐ In Person ☐ Mail
☐ Common Courier ☐ Courier Service
☐ Other

Sampler:
Christopher A. Ross /

Report To: Mr. Ron Wittenberg
Company: Natural Resource Tech
Address: 23713 W. Paul Road
Pewaukee, WI 53072
Telephone: (414) 523-9000
Fax: (414) 523-9001

Invoice To: Ms. Janet Scarlata
Company: Same
Address:
Telephone:
Fax:

Analyses Required:
(Note special detection limits or methods)

Sample ID	Date	Time	Comp	Grab	Filtered Y/N	Sample Description	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Air, Other	No. of Containers	Preservation Type (see key below)	BETX	PAH	Total Cyanide	Amenable Cyanide	Dissolved Cyanide	Hardness	Total and Dissolved Iron	Dissolved Lead		REL Sample No.	Remarks:
MW-701	12/21/98	14:00		X	N/Y		GW	4	H U/C	X	X	X	X	X					24734	Slight Tar Odor
MW-703	↓	16:30		X	N/Y		↓	4	H U/C	X	X	X	X	X					24735	Tar Odor
MW-704		13:50		X	N/Y			4	H U/C	X	X	X	X	X					24736	Slight Tar Odor
MW-705		13:20		X	N/Y			4	H U/C	X	X	X	X	X					24737	None
MW-707		11:35		X	N/Y			7	H N U/C	X	X	X	X	X	X	X	X		24738	Hardness, Dissolved Lead + Dissolved Iron Filtered
MW-708		12:55		X	N/Y			4	H U/C	X	X	X	X	X					24739	None
MW-709		12:37		X	N/Y			4	H U/C	X	X	X	X	X					24740	None
MW-A		13:20		X	N/Y	Duplicate of MW-705		4	H U/C	X	X	X	X	X					24741	None
MW-B	↓	13:50		X	N/Y	Duplicate of MW-704		4	H U/C	X	X	X	X	X					24742	Slight Tar Odor
PZ-701	12/21/98 12/22/98	15:30 8:30		X	N			3	H U	X	X								24743	None
PZ-702	12/21/98	15:50		X	N/Y			7	H U/C	X	X	X	X	X	X	X	X		24744	Hardness, Dissolved Lead + Dissolved Iron Filtered
PZ-703	↓	11:20		X	N/Y		↓	4	H U/C	X	X	X	X	X					24745	None

	Relinquished By	Date	Time	Received By	Date	Time
1)	Ron Wittenberg	12/23/98	1:30 A/Ⓟ		12-23-98	1:30 A/Ⓟ
2)		12-23-98	2:00 A/Ⓟ			A/P
3)			A/P			A/P
Received by Lab		12-24-98	0815A			

A = AM P = PM

⑩

Laboratory Receiving Notes
Temperature of Contents: on ice °C
Custody Seal Intact
Sample Condition
Sample pH

WISCONSIN DNR CERTIFICATION NUMBER 405043870

Preserv Key
N = Nitric Acid
= Sodium Hydroxide
H = Hydrochloric Acid
U = Unpreserved
M = Methanol
S = Sulfuric Acid

Robert E. Lee & Associates, Inc.

Engineering, Surveying, Laboratory Services

2825 S. Webster Ave.
P.O. Box 2100
Green Bay, WI 54306-2100
Phone: (920) 336-6338
Fax: (920) 336-9141
E-Mail: rel@netnet.net

Milwaukee Area
830 Armour Rd.
Oconomowoc, WI 53066
Phone: (414)569-8893 1-800-775-8893
Fax: (414)569-7995
Wisconsin Certification Number: 405043870

ROY WITTENBURG
NATURAL RESOURCE TECHNOLOGY
23713 W PAUL RD
PEWAUKEE WI 53702

Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Contact ID: 3489

Sample Information

Report Date: 1/27/1999
Chain Number: 65495
Project No: 1313
Project Name: WPSC-CAMP MARINA
Receive Date: 1/20/1999
Sample Date: 1/19/1999

Attest:

MASTER FILE COPY
PROJECT # 1313
CO: DATA

Robert E. Lee & Associates, Inc.

Wisconsin Certification Number: 405043870

Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702

Project Number: 1313

Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 65495
Report Date: 1/27/1999

Method	Parameter Name		Result	Units	Flag	MDL	PQL	Anls Date	Analyst
Lab No.	Collect Date	Sample ID							
99REL000749	**1/19/1999**	**PZ-703**							
SW-846-8021B	Volatile Organic Analysis		See Attached					1/21/1999	TO
99REL000750	**1/19/1999**	**TRIP**							
SW-846-8021B	Volatile Organic Analysis		See Attached					1/21/1999	TO

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPS-CAMP MARINA
CHAIN NUMBER: 65495

NARRATIVE

This narrative is relevant to samples PZ-703 and TRIP.

The samples were analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the water method blank.
2. The precision between the matrix spike recovery and matrix spike duplicate recovery was within laboratory limits for each of the reported compounds.
3. The precision between the recoveries of the water duplicate control spikes was within method limits for each of the reported compounds.
4. The matrix spike and matrix spike duplicate recoveries were within laboratory limits for each of the reported compounds.
5. The recovery for each water laboratory control spike was within method limits for each of the reported compounds.
6. The surrogate recovery for all samples was within laboratory limits.
7. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly / ATL

Steve Heraly
Laboratory Coordinator
to

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS BY PURGE AND TRAP CAPILLARY COLUMN GAS CHROMATOGRAPHY WITH PHOTOIONIZATION DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 01/19/99
DATE ANALYZED: 01/21/99
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL000749
SAMPLE: PZ–703
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	71
TOLUENE	0.60	2.0	9.6
ETHYLBENZENE	0.60	2.0	12
m.p–XYLENE	1.7	5.7	4.2 (p)
o–XYLENE	0.50	1.7	11

• FLUOROBENZENE SURROGATE RECOVERY (%).. 95

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / GTL

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

ROBERT E. LEE & ASSOCIATES, INC.
LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY, WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043870

METHOD 8020. VOLATILE ORGANIC COMPOUNDS
BY PURGE AND TRAP CAPILLARY COLUMN
GAS CHROMATOGRAPHY WITH PHOTOIONIZATION
DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
DATE SAMPLED: 01/19/99
DATE ANALYZED: 01/21/99
ANALYZED BY & GC NO.: TO /GC#3

PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
REL JOB NUMBER: 98REL000750
SAMPLE: TRIP
DILUTION: NONE

ANALYTE	MDL ug/L	PQL ug/L	RESULT ug/L
BENZENE	0.50	1.7	ND
TOLUENE	0.60	2.0	ND
ETHYLBENZENE	0.60	2.0	ND
m.p–XYLENE	1.7	5.7	ND
o–XYLENE	0.50	1.7	ND

• FLUOROBENZENE SURROGATE RECOVERY (%).. 92

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
ND = COMPOUND NOT DETECTED
MDL = METHOD DETECTION LIMIT
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy /QAC

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

CHAIN OF CUSTODY RECORD

Natural
Resource
Technology

COC# 65495a

Sample Collectors(s)/Signature(s): CHRISTOPHER A. ROBB / C A Robb

NATURAL RESOURCE TECHNOLOGY, INC.
PEWAUKEE, WISCONSIN

Laboratory Samples are Being Submitted To: ROBERT E. LEE & ASSOC., INC.

Quote Number/Addendum Number ———

Attached: YES __ NO X

Site Name: WPSC-CAMPMARINA

Site Address: 723 NORTH WATER STREET
SHEBOYGAN, WI

Send Report To:
Project Manager: MR. ROY WITTENBURG
Natural Resource Technology, Inc.
23713 W. Paul Road
Pewaukee, WI 53072
Telephone (414) 523-9000 Fax (414) 523-9001

Project Number: 1313

Task Number: 2.5

Temperature of temperature blank __________

If sample(s) were received on ice and there was ice remaining, you may report the temperature as "received on ice". If all of the ice was melted, the temperature of the melt may be substituted for a temperature blank.

I hereby certify that I received, properly handled, and maintained custody of these samples as noted below:

Relinquished By (Signature)	Date/Time	Received By (Signature)	Date/Time
Sarah Ganswindt	1/20/99 9:45 a.m.	Marynell DeBoer	1/20/99 9:45 A.m.
Marynell DeBoer	1/20/99 1:30 pm		

Analytical Method / Numbers

Lab Use Only

Field ID Number	Date Collected	Time Collected	Sample Media	Sample Device	Location / Description	PID Reading	Field Comments	Preserv. Type	# of Cont.	BTEX						Lab ID Number	Sample Conditions @ Laboratory
PZ-703	1/19/99	11:02	GW		GROUNDWATER SAMPLE	—	No Odor	HCl	3	X						749	
Trip									1	X						750	

MD - 1/20/99
Not on COC

SPECIAL INSTRUCTIONS

Laboratory shall retain samples for 30 days after issuing analytical report unless indicated otherwise below:
__ Return __ Other ______________

APPENDIX E

HAZARDOUS AND NON-HAZARDOUS WASTE PROFILE DATA SHEETS AND MANIFESTS

MASTER FILE COPY
PROJECT # 1213
CO: Waste Management

WASTE MANAGEMENT

Special Waste Service Center
W124 N9355 Boundary Road
Menomonee Falls, WI 53051
(414) 253-8620
1-888-964-4700 Toll Free
(414) 253-1322 Fax

JAN 14 1999

January 12, 1999

Ms Julie Zimdars
Natural Resource Technology, Inc.
23713 West Paul Road
Pewaukee, WI 53072

Dear Ms Zimdars:

Thank you for choosing Waste Management for your disposal needs.

This letter serves to confirm the approval of your waste under profile number SOL59804. Attached is a copy of the special waste management decision for your records.

If you have any questions please do not hesitate to call me at 414/253-8620.

Sincerely,

Waste Management of Wisconsin, Inc.
Special Waste Service Center

Therese Buechel

Therese Buechel
Customer Service Representative

Enclosures

SPECIAL WASTE MANAGEMENT DECISION

DTP- SOL 59804
Waste Profile Sheet Code

I. Request For Decision: X Initial ___ Renewal

GENERATOR NAME: Wisconsin Public Serv Corp
ADDRESS: 732 North Water Street
CITY, STATE/PROVINCE: Sheboygan, WI 54307
WASTE NAME(S): Drilling Mud and Purge Water
PROPOSED MANAGEMENT FACILITY: Deer Track Park
PROPOSED INTERMEDIATE TRANSFER FACILITY: N/A
TRANSPORTER: Environmental Support Services
WMNA REQUESTOR: S Choren/tb
SIGNATURE: ___

II. TECHNICAL MANAGER DECISION: (circle one) [✓ APPROVED] DISAPPROVED ___ Check if additional information is attached.

If Disapproved, Explain: ___

If Approved, Complete A, B, C and D Below:

A Management Method(s). Solidification and Landfill

B Precautions, Conditions, or Limitations on Approval: Per the Site's Special Waste Plan and Solidification Approvals. Free liquids test to be performed on solidified waste. Waste must not contain free liquids at time of landfilling.

C Decision Expiration Date: 1/11/00

D For Type A Wastes. Laboratory Analysis of a Representative Sample Was: (Check only one)

___ Waived ✓ Supplied By Generator ___ From a WMI-Approved Lab ___ From Both Generator and WMI-Approved Lab

TECH. MGR. SIGNATURE: Richard Yager NAME: (Print) Richard Yager DATE: 1/11/99

III. WMI MANAGEMENT FACILITY GENERAL MANAGER DECISION: (circle one) [✓ APPROVED] DISAPPROVED
If Approved, State any Additional Precautions, Conditions or Limitations. ___

GENERAL MGR SIGNATURE: NAME: (Print) Jay Schwoch DATE 1-12-99

IV. WMI INTERMEDIATE TRANSFER FACILITY GENERAL MANAGER DECISION: (circle one) APPROVED DISAPPROVED
If Approved, State any Additional Precautions, Conditions or Limitations. ___

GENERAL MGR SIGNATURE ___ NAME: (Print) ___ DATE ___

MIDWEST REGION
GENERATOR'S WASTE PROFILE SHEET

PLEASE PRINT IN INK OR TYPE

Waste Profile Sheet C

☐ MW 59804

Proposed Management Facility Soil - Orchard Ri Lan
Drill Mud - Ridgeview S

This form is to be used to comply with the requirements of a waste agreement.

INSTRUCTIONS FOR COMPLETING THIS FORM ARE ATTACHED

Decision Expiration Date: / /

A. WASTE GENERATOR INFORMATION

1. Generator Name: Wisconsin Public Service Corporation 2. SIC Code: -4925 1-5-99 tb

[illegible] 3. Facility Address (site of waste generation): 732 N. Water Street, Sheboygan, WI

[illegible] → 4. Generator City, State: 700 N. Adams Street Green Bay, WI 54307-9002 5. Zip/Postal Code: 54307-9002

6. State ID #:

7. Technical Contact: Ms. Connie Lawniczak 8. Phone: (920) 433 - 1140

B. WASTE STREAM INFORMATION (See Instructions)

1. Name of Waste: Soil Cuttings from Former Manufactured Gas Plant Site, and Drilling Mud * Purge water

2. Process Generating Waste: Coal gasification operations Installation of monitoring wells per

3. Amount/Units: 20 yards soil, 9 drums - drill mud. * 8 drums water 4. Type A ☒ Type B ☐ Julie Zinckus

5. Special Handling Instructions/Supplemental Information: Currently, soil is contained in a W.M. Roll-off Box on-site. Drilling mud is contained in 9 drums at an alternate WPS facility in Sheboygan 1-6-99 tb

6. Incidental Waste Types and Amounts:

C. TRANSPORTATION INFORMATION

1. Method of Shipment: ☐ Bulk Liquid ☐ Bulk Sludge ☐ Bulk Solid ☒ Drum/Box ☐ Other

2. Supplemental Shipping Information:

Below is soil description. Drill Mud not sampled.

PHYSICAL CHARACTERISTICS OF WASTE (See Instructions) (Omit for Type B)

1. Color brown/black	2. Does the waste have a strong incidental odor? ☐ No ☒ Yes; if so, describe: coal tar	3. Physical State @ 70°F/21°C: ☒ Solid ☐ Semi-Solid ☐ Liquid ☐ Powder ☐ Other:	4. Layers ☐ Multi-layered ☐ Bi-layered ☒ Single Phased	5. Specific Gravity Range 1.8	6. Free Liquids: ☐ Yes ☒ No Volume:

7. pH: ☐ ≤2 ☐ > 2-4 ☐ 4-7 ☒ 7 ☐ 7-10 ☐ 10- <12.5 ☐ ≥12.5 ☐ Range ☐ NA

8. Flash Point: ☐ None ☐ <140°F/60°C ☐ 140 - 199°F/60 - 93°C ☒ ≥200°F/93°C ☐ Closed Cup ☐ Open Cup

E. CHEMICAL COMPOSITION (Omit for Type B)

	RANGE (MIN-MAX)
1. Soil	99.94 - 100 %
BETX	0 - 0.0015 %
Metals (see analytical)	0 - 0.05 %
	. %
	. %
	. %
	. %
	. %
	. %
Total:	100 %

The total composition must be greater than or equal to 100%. (.0001% = 1 ppm or 1 mg/l)

2. Does the waste contain any of the following? (provide concentration if known):

	NO	or	LESS THAN	or	ACTUAL
PCBs	☒		☐ < 50 ppm		< 0.15 ppm
Cyanides	☒		☐ < 50 ppm		< 0.93 ppm
Sulfides	☒		☐ < 50 ppm		< 10 ppm
Phenols	☐		☐ < 50 ppm		0.9 ppm

* Per Julie Zinckus 1-11-99 tb

F. SAMPLING SOURCE (Omit for Type B) (e.g., Drum, Lagoon, Pit, Pond, Tank, Vat) Roll-off Box Composite + Test

G. REPRESENTATIVE SAMPLE CERTIFICATION (Omit for Type B)

1. Print Sampler's Name: Chris Robb 2. Sample Date: 12/18/98, 8/24/98

3. Sampler's Title: Environmental Engineer

4. Sampler's Employer (if other than Generator): Natural Resource Technology, Inc.

The sampler's signature certifies that any sample submitted is representative of the waste described above pursuant to 40 CFR 2 equivalent rules.

5. Sampler's Signature Chris Robb

H. GENERATOR CERTIFICATION

By signing this profile sheet, the Generator certifies:

1. This waste is not "Hazardous Waste" as defined by USEPA and/or state regulation.
2. This waste does not contain regulated radioactive materials or regulated concentrations of PCB's (Polychlorinated Biphenyl
3. The waste does not contain regulated concentrations of the following pesticides and herbicides: Chlordane, Endrin, Heptachlor (an epoxide), Lindane, Methoxychlor, Toxaphene, 2, 4-D, or 2, 4, 5-TP (Silvex).
4. The waste does not contain halogenated compounds such as: tetrachloroethylene, trichloroethylene, methylene chloride, 1, 1, 1-trichloroethane, carbon tetrachloride, chloroform, ortho-dichlorobenzene, dichlorodifluoromethane, 1, 1, 2-trichloro-1, 2, 2-trifluoroethane, trichlorofluoromethane 1, 1-dichloroethylene, and 1, 2-dichloroethylene at greater than 1% (10,000ppm) total solvent concentration. This listing includes any combination of the above named halogenated compounds where the total concentration or the sum of the concentrations of the individual compounds exceed 1% or 10,000 ppm on a weight to weight basis.
5. This sheet and the attachments contain true and accurate descriptions of the waste material. All relevant information regarding known or suspected hazards in the possession of the Generator has been disclosed.
6. The Generator has read and understands the Contractor's Definition of Special Waste included in Part B.5. of the attached instruc All types and amounts of special wastes provided in incidental amounts have been identified in section B.6. of this form.
7. The analytical data presented herein or attached hereto were derived from testing a representative sample taken in accordan 40 CFR 261.20(c) or equivalent rules.
8. If any changes occur in the character of the waste, the Generator shall notify the Contractor prior to providing the waste to the t

9. Signature Connie Lawniczak 10. Title Sr. Environmental Analys

11. Name (Type or Print) Connie Lawniczak 12. Date 12/30/98

NOTE: Omit sections D., E., F., and G., for Type B waste.

Comments:

Side 2 of 2
[illegible]

Robert E. Lee & Associates, Inc.

Engineering, Surveying, Laboratory Services
2825 S. Webster Ave.
P.O. Box 2100
Green Bay, WI 54306-2100
Phone: (920) 336-6338
Fax: (920) 336-9141
E-Mail: rel@netnet.net

Milwaukee Area
830 Armour Rd.
Oconomowoc, WI 53066
Phone: (414)569-8893 1-800-775-8893
Fax: (414)569-7995
Wisconsin Certification Number: 405043870

JAN 04 1999

ROY WITTENBURG
NATURAL RESOURCE TECHNOLOGY
23713 W PAUL RD
PEWAUKEE WI 53702

Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Contact ID: 3489

Sample Information

Report Date: 12/31/1998
Chain Number: 59416
Project No: 1313
Project Name: WPSC-CAMP MARINA
Receive Date: 12/19/1998
Sample Date: 12/18/1998

Attest: ____________________

Robert E. Lee & Associates, Inc.
Wisconsin Certification Number: 405043870
Certificate of Analysis Report

Natural Resource Technology
23713 W Paul Rd

Pewaukee WI 53702
Project Number: 1313
Project Name: WPSC-CAMP MARINA

Attn.: Roy Wittenburg
Phone: (414)523-9000
Fax: (414)523-9001
Client ID: 003604
Chain: 59416
Report Date: 12/31/1998

Method Lab No	Parameter Name Collect Date	Sample ID	Result	Units	Flag	MDL	PQL	Anls Date	Analyst
98REL024399	**12/18/1998**	**ROLL-OFF BOX**							
SM-2540G	Total Solids		85	%		0.010	0.033	12/21/1998	DJN
SW-846-8021B	Volatile Organic Analysis		See Attached					12/23/1998	GLB
98REL024400	**12/18/1998**	**ROLL-OFF BOX**							
	Metal Preparation		Complete					12/22/1998	DLB
	TCLP Extraction-Metals		Complete	Date				12/21/1998	GLB
SW-846-6010B	TCLP Lead ICP		278	ug/L		29	97	12/22/1998	DAW

ROBERT E. LEE & ASSOCIATES, INC.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: 1313/WPSC-CAMP MARINA
CHAIN NUMBER: 59416

NARRATIVE

This narrative is relevant to sample ROLL-OFF BOX.

The sample was analyzed for petroleum volatile organic compounds following SW-846 Method 8021 and the Wisconsin Modified GRO Method.

The following is a summary of the quality control results:

1. The reported compounds were not detected in the soil method blank.
2. The precision between the recoveries of the soil duplicate laboratory control spikes was within method limits for each of the reported compounds.
3. The recovery for each soil laboratory control spike was within method limits for each of the reported compounds.
4. The surrogate recovery was within laboratory limits.
5. The initial and final calibration check standards verified the calibration curve for each of the reported compounds.

Steve Heraly /GTC
Steve Heraly
Laboratory Coordinator
to

LABORATORY SERVICES
2825 S. WEBSTER AVE. P.O. BOX 2100
GREEN BAY. WIS 54306
TELEPHONE NUMBER: (920) 336 – 6338
WISCONSIN CERTIFICATION NUMBER: 405043670

METHOD 8021: VOLATILE ORGANIC COMPOUNDS
BY PURGE AND TRAP CAPILLARY COLUMN GAS
CHROMATOGRAPHY WITH PHOTOIONIZATION
DETECTOR.

CLIENT: NATURAL RESOURCE TECHNOLOGY
PROJECT: WPSC–CAMP MARINA
PROJECT NUMBER: 1313
SAMPLE: ROLL–OFF BOX
REL SAMPLE NUMBER: 98REL024399

DATE SAMPLED: 12/18/98
DATE ANALYZED: 12/23/98
ANALYZED BY & GC NO.: TO / GC#3
DILUTION: 1 TO 10

ANALYTE	RESULT ug/kg	MDL ug/kg	PQL ug/kg
BENZENE	3820	90	300
ETHYLBENZENE	11700	45	150
TOLUENE	22200	42	140
m,p–XYLENE	25500	190	630
o–XYLENE	12000	90	300

Results are based on dry weight

• FLUOROBENZENE SURROGATE RECOVERY (%).......... 100

(p) = REPORTED RESULT IS LESS THAN THE PRACTICAL QUANTITATION LIMIT (PQL)
MDL = METHOD DETECTION LIMIT
ND = COMPOUND NOT DETECTED
• SURROGATE STANDARD PERCENT RECOVERY
N/A = COMPOUND NOT ANALYZED

ATTEST Steve Healy / a7c

THIS REPORT IS VALID ONLY WHEN ACCOMPANIED WITH THE APPROPRIATE NARRATIVE

Robert E. Lee & Associates, Inc.
Engineering, Surveying, Laboratory Services
2825 S. Webster Ave. • Box 2100 • Green Bay, WI 54306-2100
Green Bay Office 920.336.6338 FAX 920.336.9141
Milwaukee Office 414.569.8893 FAX 414.569.7995

To ensure the proper handling of samples, please see the back for instructions.

CHAIN OF CUSTODY RECORD

COC # 59416MA

Client: NATURAL RESOURCE TECHNOLOGY, INC.
Project Name: WPSC-CAMPMARINA
Project Number: 1313
Project Address: 723 NORTH WATER STREET, SHEBOYGAN, WI
PO #: 1313
BID #:

Environmental Program:
☐ LUST ☐ SDWA ☐ WPDES ☐ RCRA ☒ OTHER

Requested Turnaround Time
☐ Normal (10-15 DAYS) ☒ Rush
Date Needed: 12/23/98
Rushes accepted only w/prior notification

Check Delivery Method
☐ In Person ☐ Mail
☐ Common Courier ☐ Courier Service
☐ Other

Sampler: CHRISTOPHER A. ROBB

Report To: MR. ROY WITTENBURG
Company: NATURAL RESOURCE TECH
Address: 23713 W. PAUL ROAD
PEWAUKEE, WI 53072
Telephone: 414-523-9000
Fax: 414-523-9001

Invoice To: MS. JANET SGARLATA
Company: SAME
Address:
Telephone:
Fax:

Analyses Required: (Note special detection limits or methods)

Sample ID	Date	Time	Comp	Grab	Field Filt	Sample Description	Sample Type (Matrix): DW, GW, WW, Soil, Oil, Sludge, Air, Other	No. of Containers	Preservation Type (see key below)	TOTAL BETX	TCLP LEAD							REL Sample No.	Remarks:
ROLL-OFF BOX	12/18/98	A P				GRAB FROM ROLL OFF BOX	SOIL	3	M/U	X	X							24399	STRONG ODOR
		A P																24400	(TCLP)
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	
		A P																	

	Relinquished By	Date	Time	Received By	Date	Time
1)		12/18/98	1:30 [✓ P]		12-18-98	1:30 [✓ P]
2)		12/18/98	2:00 [✓ P]	Paul D Knuth	12/19/98	0855 [✓ A]
3)			A/P			A/P

Received by Lab 12-19

A = AM P = PM

Laboratory Receiving Notes
Temperature of Contents: on ice °C
Custody Seal Intact
Sample Condition
Sample pH

WISCONSIN DNR CERTIFICATION NUMBER 405043870

Preservation Key
N = Nitric Acid
O = Sodium Hydroxide

EN CHEM INC.

1795 Industrial Driv
Green Bay, WI 5430
920-469-243
800-7-ENCHEI
FAX: 920-469-882

DEC 14 1998

- Analytical Report -

Project Name : WPC-SHEBOYGAN II

Project Number : 1313

WI DNR LAB ID : 405132750

Client: NATURAL RESOURCE TECHNOLOG

Report Date : 12/11/98

Sample No.	Field ID	Collection Date	Sample No.	Field ID	Collection Date
885057-001	TP-701-706-COMP	8/24/98			

The "Q" flag is present when a parameter has been detected below the LOQ. This indicates the results are qualified due to the uncertainty of the parameter concentration between the LOD and the LOQ.

Soil VOC detects are corrected for the total solids, unless otherwise noted.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample narrative. Release of this final report is authorized by Laboratory management, as is verified by the following signature.

Approval Signature

121198

Date

Lab#:	TestGroupID:	Comment:
885057-001 TP-701-706-COMP	PCB-S	The final PCB 1260 check standard was above method limits. The data was accepted because this compound was not detected in the sample even though the results may have been biased high.
	M-AS-S	The reported value for As was determined by the method of standard additions
	M-CD-S	The MS/MSD recoveries (84% / 84%) was below control limits (87.6%). The data was accepted because the post spike and LCS were in control.
	M-PB-S	The MS/MSD recoveries (81.8% / 87.1%) was below control limits (91.8%). The data was accepted because the post spike and LCS were in control.
	8240-S-ME	Soil to Methanol ratio not at a 1:1 ratio for analysis (10.0g/40.0 mLs).
	8240-S-ME	Surrogate failure low. This was confirmed by the initial analysis on 9/1/98.

EN CHEM INC.

1795 Industrial Dr
Green Bay, WI 543
920-469-24
800-7-ENCH
FAX: 920-469-88

- Analytical Report -

Project Name : WPC-SHEBOYGAN II
Project Number : 1313
Field ID : TP-701-706-COMP
Lab Sample Number : 885057-001
WI DNR LAB ID : 405132750

Client : NATURAL RESOURCE TECHNOLOGY, INC
Report Date : 12/11/98
Collection Date : 8/24/98
Matrix Type : SOIL

Inorganic Results

Test	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method	Analyst
Arsenic	13	1.9	6.1		mg/kg		10/8/98	SW846 3051	SW846 7060	MSB
Cadmium	0.46	0.30	0.96		mg/kg	Q	10/6/98	SW846 3051	SW846 7131	MSB
Chromium	15	1.7	5.4		mg/kg		10/7/98	SW846 3051	SW846 7191	MSB
Lead	150	8.7	28		mg/kg		9/30/98	SW846 3051	SW846 7421	MSB
Selenium	1.5	0.81	2.6		mg/kg	Q	10/8/98	SW846 3051	SW846 7740	MSB
Silver	< 0.18	0.18	0.57		mg/kg		10/7/98	SW846 3051	SW846 7761	MSB
Barium	100	0.079	0.25		mg/kg		9/3/98		SW846 6010A	*RL
Chlorine	0.045	.005	0.016		% wt.		8/27/98		D808	*SF
Copper	40	0.24	0.76		mg/kg		9/2/98		SW846 6010A	*RL
Cyanide, reactive	< 0.93			0.93	mg/kg		8/31/98		SW846 CH7.3	*RL
Mercury	0.22	0.012	0.038		mg/kg		9/2/98		SW846 7471A	*RL
Nickel	12	0.53	1.7		mg/kg		8/31/98		SW846 6010A	*RL
Phenolics, total recoverable	880	56	180		ug/kg		9/4/98		SW846 9065	*RL
Sulfide, reactive	< 10			10	mg/kg		8/28/98		SW846 CH7.7	*RL
Zinc	170	0.29	0.92		mg/kg		9/2/98		SW846 6010A	*RL
Flashpoint	>210.0				deg F		8/27/98	SW846 1010	SW846 1010	DKK
Free liquids (paint filter)	0.0				%		8/27/98	SW846 9095	SW846 9095	DKK
pH, Laboratory	7.0				su		8/26/98	SW846 9045A	SW846 9045A	DKK
Solids, percent	80.5				%		8/26/98	SM2540G	SM2540G	DJB
Specific gravity - Soil	1.8						8/27/98	SM 2710F	SM 2710F	DKK

Organic Results

PCB LIST - SOIL **Prep Method:** **Prep Date:** 8/27/98 **Analyst:** *RL

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Aroclor 1016	< 36	36	110		ug/kg		8/28/98	SW846 8080
Aroclor 1221	< 61	61	190		ug/kg		8/28/98	SW846 8080

EN CHEM INC.

1795 Industrial Dr
Green Bay, WI 543
920-469-24
800-7-ENCHE
Fax: 920-469-88

- Analytical Report -

Project Name : WPC-SHEBOYGAN II
Project Number : 1313
Field ID : TP-701-706-COMP
Lab Sample Number : 885057-001
WI DNR LAB ID : 405132750

Client : NATURAL RESOURCE TECHNOLOGY, INC
Report Date : 12/11/98
Collection Date : 8/24/98
Matrix Type : SOIL

Aroclor 1232	< 150	150	480		ug/kg		8/28/98	SW846 8080
Aroclor 1242	< 65	65	210		ug/kg		8/28/98	SW846 8080
Aroclor 1248	< 53	53	170		ug/kg		8/28/98	SW846 8080
Aroclor 1254	< 16	16	51		ug/kg		8/28/98	SW846 8080
Aroclor 1260	< 28	28	89		ug/kg		8/28/98	SW846 8080

Organic Results

SPECIAL SEMI-VOLATILE LIST   Prep Method: Prep Date: 9/1/98   Analyst: *RL

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
4-Methylphenol	< 220	220	700		ug/kg		9/2/98	SW846 8270
3-Methylphenol	< 280	280	890		ug/kg		9/2/98	SW846 8270
2-Methylphenol	< 220	220	700		ug/kg		9/2/98	SW846 8270
Cresol, total	< 280	280	890		ug/kg		9/2/98	SW846 8270
1,4-Dichlorobenzene	< 240	240	760		ug/kg		9/2/98	SW846 8270
2,4-Dinitrotoluene	< 400	400	1300		ug/kg		9/2/98	SW846 8270
Hexachlorobenzene	< 240	240	760		ug/kg		9/2/98	SW846 8270
Hexachlorobutadiene	< 280	280	890		ug/kg		9/2/98	SW846 8270
Hexachloroethane	< 320	320	1000		ug/kg		9/2/98	SW846 8270
Nitrobenzene	< 280	280	890		ug/kg		9/2/98	SW846 8270
Pentachlorophenol	< 440	440	1400		ug/kg		9/2/98	SW846 8270
Pyridine	< 240	240	760		ug/kg		9/2/98	SW846 8270
2,4,5-Trichlorophenol	< 270	270	860		ug/kg		9/2/98	SW846 8270
2,4,6-Trichlorophenol	< 240	240	760		ug/kg		9/2/98	SW846 8270

Organic Results

TARGET COMPOUND LIST - VOLATILES   Prep Method: SW846 5030   Prep Date: 8/28/98   Analyst: RJN

Analyte	Result	LOD	LOQ	EQL	Units	Code	Analysis Date	Analysis Method
Benzene	< 100	100	240		ug/kg		9/2/98	SW846 8260B
2-Butanone	< 260	260	620		ug/kg		9/2/98	SW846 8260B
Carbon tetrachloride	< 100	100	240		ug/kg		9/2/98	SW846 8260B

ENCHEM INC.

1795 Industrial Dri
Green Bay, WI 543C
920-469-243
800-7-ENCHE
FAX: 920-469-882

- Analytical Report -

Project Name : WPC-SHEBOYGAN II

Project Number : 1313

Client : NATURAL RESOURCE TECHNOLOGY, INC

Field ID : TP-701-706-COMP

Report Date : 12/11/98

Lab Sample Number : 886057-001

Collection Date : 8/24/98

WI DNR LAB ID : 405132750

Matrix Type : SOIL

Chloroform	<	100	100	240	ug/kg	9/2/98	SW846 8260B
Chlorobenzene	<	100	100	240	ug/kg	9/2/98	SW846 8260B
1,2-Dichloroethane	<	100	100	240	ug/kg	9/2/98	SW846 8260B
1,1-Dichloroethene	<	100	100	240	ug/kg	9/2/98	SW846 8260B
Tetrachloroethene	<	100	100	240	ug/kg	9/2/98	SW846 8260B
Trichloroethene	<	100	100	240	ug/kg	9/2/98	SW846 8260B
Vinyl chloride	<	100	100	240	ug/kg	9/2/98	SW846 8260B
4-Bromofluorobenzene		16			%Recov	9/2/98	SW846 8260B
Dibromofluoromethane		26			%Recov	9/2/98	SW846 8260B
Toluene-d8		11			%Recov	9/2/98	SW846 8260B

Page 1 of 2

CHAIN OF CUSTODY RECORD

Natural Resource Technology

Sample Collector(s)/Signature(s) Shawn L. McNamara / Shawn L. McN 732 N Water St 1-6-99	NATURAL RESOURCE TECHNOLOGY, INC. PEWAUKEE, WISCONSIN	Laboratory Samples are Being Submitted To: En Chem Quote Number/Addendum Number ____ Attached: YES __ NO __
Site Name: WPL Sheboygan II Site Address: Sheboygan, WI	Send Report To: Project Manager: Roy Wittenberg Project Number: 1313 Natural Resource Technology, Inc. Task Number: ____ 23713 W. Paul Road Pewaukee, WI 53072 Telephone (414) 523-9000 Fax (414) 523-9001	Temperature of temperature blank ROI If sample(s) were received on ice and there was ice remaining, you may report the temperature as "received on ice". If all of the ice was melted, the temperature of the melt may be substituted for a temperature blank.

I hereby certify that I received, properly handled, and maintained custody of these samples as noted below:

Relinquished By (Signature)	Date/Time	Received By (Signature)	Date/Time
	8/24 - 10:00		8/24/98 10:10
	8/25/98 12:30	D Jamsen 8/25/98 1230	
D Jamsen	8/25/98 1515		8/25/98 1515

Analytical Method / Numbers

Lab Use Only

885057

Field ID Number	Date Collected	Time Collected	Sample Media	Sample Device	Location / Description	PID Reading	Field Comments	Preserv. Type	# of Cont.	pH / Free Liquids	Flash Point / Spec. Gravity / Total Solids	Chlorine	Reactive Sulfide & Cyanide	T. Phenols	PCB	8240 Volatiles	Lab ID Number	Sample Conditions @ Laboratory
TP-101-106-Comp	8/24/98		Soil	[illegible]			5-4oz 1-4oz-w 1-8oz 2-8oz		9	X	X	X	X	X	X	X	001	Good

SPECIAL INSTRUCTIONS

Protocol B Parameters

Laboratory shall retain samples for 30 days after issuing analytical report unless indicated otherwise below.
___ Return ___ Other ____________

PT 1 - ORIGINAL-WHITE PT 2 - LABORATORY COPY-YELLOW PT 3 - NRT FIELD COPY-PINK

This form is based on the WDNR LUST Program Chain of Custody Record (Form 4400-151)

Page 2 of 2

Natural Resource Technology

CHAIN OF CUSTODY RECORD

Sample Collectors(s)/Signature(s) Shawn [illegible] Names / [illegible]
732 N. Water St 1-6 99 tb

NATURAL RESOURCE TECHNOLOGY, INC.
PEWAUKEE, WISCONSIN

Laboratory Samples are Being Submitted To: En Chem

Quote Number/Addendum Number ______ Attached: YES __ NO __

Site Name: WPL · Sheboygan II

Site Address: Sheboygan, WI

Send Report To:
Project Manager: Ron Wittenberg
Natural Resource Technology, Inc.
23713 W. Paul Road
Pewaukee, WI 53072
Telephone (414) 523-9000 Fax (414) 523-9001

Project Number: 1313

Task Number: ______

Temperature of temperature blank ROI

If sample(s) were received on ice and there was ice remaining, you may report the temperature as "received on ice". If all of the ice was melted, the temperature of the melt may be substituted for a temperature blank.

I hereby certify that I received, properly handled, and maintained custody of these samples as noted below:

Relinquished By (Signature)	Date/Time	Received By (Signature)	Date/Time
[illegible]	8/25 - 1000	[illegible]	8/25/98 10:00
[illegible]	8/25/98 [illegible]	B Koenigsen 8/25/98 1236	
B Koenigsen	8/25/98 1515	[illegible] 8/25/98 1515	

Analytical Method / Numbers

Lab Use Only

88505 7

Field ID Number	Date Collected	Time Collected	Sample Media	Sample Device	Location / Description	PID Reading	Field Comments	Preserv. Type	# of Cont.	8270 Semi-volatiles							Lab ID Number	Sample Conditions @ Laboratory
7P-701-706comp	8/24/98	-	Soil	[illegible]			[illegible]	None	9	X							001	Good

SPECIAL INSTRUCTIONS

Protocol B Parameters

Laboratory shall retain samples for 30 days after issuing analytical report unless indicated otherwise below:
__ Return __ Other ______

SPECIAL WASTE MANIFEST DISPOSAL TICKET

558506

WM A Waste Management Company

BILL TO: Environmental Support Services

TRANSPORTER: Environmental Support Services

GENERATOR: Wisconsin Public Service Corproation

GENERATORS SIGNATURE: for WPSC 1 / 14 / 99 Date

WASTE DESCRIPTION: Drilling Mud

PROFILE # SOL59804

ACCEPTED BY: ______ / ____ / ____ Date

DRIVERS SIGNATURE: ______ / ____ / ____ Date

TRUCK NO. ______ 9 Drums TONS/YARDS

MASTER FILE COPY
PROJECT # 1313
CO: Waste Mangmt

WHITE & YELLOW - GENERATOR COPY / PINK - DISPOSAL SITE COPY / GOLD - TRANSPORTER COPY

DCE-009-94

ASTER FILE CO

\# 1312

CONFIRMATION LETTER

JAN 11 1999

January 7, 1999 Waste Management

JULIE ZIMDARS
NATURAL RESOURCE TECH INC
23713 W PAUL RD
PEWAUKEE, WI 53072

JAN 11 1999

Re: Confirmation Number 4531325

Attention: JULIE ZIMDARS

We are pleased to confirm CWM's approval of your waste material as described below. The attached profile for the waste materials was prepared by CWM based upon information provided by you. It is important that no changes be made to the profile without CWM's consent. If the profile meets with your approval, please call 1-800-255-5092 to schedule shipment of your waste materials.

CWM Profile Number:	351672 CTW
Approved Mgmt. Facility:	CWM CONTROLLED WASTE DIVISION or another CWM or CWM approved facility
Waste Name:	CONTAMINATED SOIL
Disposal Method:	Store/Transship Soldification Repackage Secure Landfill
Disposal Price:	- $90.00 per 55 gallon drum - liquid/sludge - $32.00 per ton - bulk
Transportation Price:	- $15.00 per drum - $225.00 minimal transportation fee (LTL pickup) - $440.00 per initial drop fee (rolloff) - $490.00 per trip (rolloff) - $10.00 per day per rolloff (rental fee)
Demurrage:	- $85.00 per hour after the first free hour of loading time
Pricing Conditions:	- For all drummed waste, a surcharge of $50.00 will be added per overpack - The disposal price for drums less than or equal to 30 gallons will be invoiced at 75 % of the 55 gallon drum rate - Finance charges will be applied 30 days from the invoice date at a monthly rate of 1.5 %
Profile Expiration Date:	1/06/00

January 7, 1999

Re: Confirmation Number 4531325

Special Conditions:

- For non-hazardous material the following applies:
  Empty drums sent for crushing must be RCRA empty.
  All waste containers must have non-hazardous labels, and profile number on the top and sides of each drum.
- All shipments must be accompanied by a non-hazardous manifest, or special manifest disposal ticket.
- Containers (roll-offs, drums, lugger boxes, cubic yard boxes) must be properly labeled according to DOT regulations, and must be in good shape.
- Drummed wastes must be securely containerized.
- Wastes received in tankers must be pumpable upon delivery.
- All loads must be scheduled forty-eight (48) hours in advance.

Applicable state and local taxes are not included in these disposal prices. All wastes are priced as profiled, invoiced as actually received. Invoices shall be paid no later than thirty (30) days from the date of receipt. All terms are governed by the Agreement previously executed between our companies. The prices quoted above are subject to change by CWM upon thirty (30) days' prior written notice to you unless otherwise specifically provided or per the terms of our Agreement. If we have not previously concluded a Service Agreement with your company, one is enclosed for your convenience. Please sign and return it to us as soon as possible. Also, if 'Signature on File' does not appear on the signature line of the Waste Profile Sheet, please sign and return it before scheduling your material.

If you have any questions or would like to make changes to the profile, please contact your representative.
Thank you for this opportunity to be of service.

Allan H. Kountz

Allan Kountz - Waste Mgmt IS

Chemical Waste Management, Inc

Orchard Ridge RDF
N96 W13475 County Line Road
Menomonee Falls, WI 53051
414/253-8620 Fax: 414/253-1323

SERVICE AGREEN
NON-HAZARDOUS WASTE DISPC

The above-named disposal facility and corporation are referred to herein as "Facility" and "Contractor," respectively.

CUSTOMER'S BILLING NAME
Wisconsin Public Service Corporation

CUSTOMER'S BILLING ADDRESS
700 N. Adams Street, P.O. Box 19002

CITY, STATE/PROVINCE, ZIP/POSTAL CODE
Green Bay, WI 54307-9002

CUSTOMER CONTACT
Ms. Connie Lawniczak

PHONE NUMBER
920 433-1140

BANK REFERENCE
NA

BANK CONTACT

PHONE NUMBER
( )

Credit may be extended to Customer after appropriate credit information, in a form acceptable to Contractor, has been presented to and reviewed by Contr Contractor may, in its sole discretion, require a collateral deposit (in the form of cash, letter of credit or surety bond) acceptable to Contractor. It is the responsib of the Customer to keep said collateral deposit current. Collateral deposits, where utilized, may be adjusted when there is an increase in disposal tonnage and/or ra Collateral deficiencies must be corrected within 30 days of notice of required adjustment.

This is a legally binding contract, and Contractor agrees to provide and Customer agrees to accept the waste disposal services subject to the terms and conditions specified in this contract.

ESTIMATED MONTHLY AMOUNT OF WASTE FOR DISPOSAL:

One Time - 20 cubic yards soil, 9 drums drill mud, 8 drums purgewater
(Include units e.g. cubic yards, pounds, kilograms)

SPECIAL INSTRUCTIONS:

Follow all conditions for disposal stated on the attached Special Waste Management Decision (Profile No. 59804 30L) Section II B, also see section I for the approved facility. All loads must be manifested.

INCIDENTAL SPECIAL WASTE TYPES AND AMOUNTS:

THE TERMS AND CONDITIONS ON REVERSE SIDE AND THE ATTACHED CONTRACTOR'S DEFINITION OF SPECIAL WASTE ARE PART OF THIS AGREEME

CUSTOMER
Connie Lawniczak
Authorized Signature
Sr. Environmental Analyst
Title

CONTRACTOR
Waste Management of Wisconsin, Inc.
1-12-99
Authorized Signature
Site Manager
Title

WMNA 0002E (Rev 10/5/97)

TOTAL P.04

TERMS AND CONDITIONS OF DISPOSAL SERVICE AGREEMENT

<u>The Agreement</u>. The entire agreement of the parties for the disposal of waste (the "Agreement") shall consist of this Service Agreement and any applicable Generator's Waste Profile Sheet(s).

<u>Waste Accepted at Facility</u>. Customer warrants that the waste delivered to Contractor hereunder will not contain a regulated quantity of any hazardous, radioactive, or toxic waste or substance as defined by applicable Federal, state, local or provincial laws or regulations.

<u>Special Waste</u>. Customer acknowledges reading the attached Contractor's Definition of Special Waste (dated 02/92), and warrants that the waste delivered to Contractor hereunder will not contain any Special Waste unless and except: (1) as specifically described on Generator's Waste Profile Sheet(s) attached hereto or which Contractor later agrees to accept in writing; or (2) incidental amounts of Special Waste, as listed by Customer in the "Incidental Special Waste Types and Amounts" section of this form. The parties may incorporate additional Special Waste as part of this Agreement if prior to delivery of such waste to Contractor, Customer has provided a Generator's Waste Profile Sheet for such waste and Contractor has approved disposal of such waste in writing. Customer agrees to comply with precautions, limitations, and conditions contained in Contractor's written notice of approval of Special Waste.

<u>Rights of Refusal/Rejection</u>. Contractor has the right to refuse or reject after acceptance any load of wastes delivered to the Facility if the Contractor believes the Customer has breached (or is breaching) its warranties or agreements hereunder. If Customer delivers wastes in breach of any warranty or agreements herein, Contractor may <u>in its sole discretion</u> either remove and dispose of that waste and charge Customer for the costs or require Customer to promptly remove the waste.

<u>Limited License to Enter</u>. During the term of this Agreement, Customer shall have a license to enter the Facility for the limited purpose of, and only to the extent necessary for, off-loading waste at the location and in the manner directed by Contractor. Except in an emergency, or at the express direction of Contractor, Customer's personnel shall not leave the immediate vicinity of their vehicle. After off-loading the waste, Customer's personnel shall promptly leave the Facility. Under no circumstances shall Customer or its personnel engage in any scavenging of waste at the Facility. Contractor may refuse to accept waste from, and shall deny an entrance license to, any of Customer's personnel whom Contractor believes is under the influence of alcohol or other chemical substances.

<u>Charges and Payment</u>. Unless otherwise agreed in writing by the parties hereto, Customer agrees to pay Contractor's posted disposal rates which may change from time to time. Customer shall be liable for all taxes, fees, or other charges imposed upon the disposal of Customer's waste by Federal, state, local or provincial laws and regulations. Payment shall be made by Customer within ten (10) days after the date of the invoice from Contractor. In the event that any payment is not made when due, Contractor may terminate the Agreement. Customer agrees to pay a late fee for all past due payments not to exceed the maximum rate allowed by applicable law.

<u>Term</u>. This Agreement shall continue in effect until terminated by either party, with or without cause, upon forty-eight (48) hours notice. Customer's representations and warranties regarding the waste delivered and the mutual indemnities set forth herein shall survive termination of this Agreement.

<u>Driver's Knowledge and Authority</u>. Customer warrants that its drivers who deliver waste to the Facility have been advised by Customer of Contractor's prohibition of deliveries of hazardous, radioactive, or toxic waste to the Facility, of Contractor's restrictions on deliveries of Special Waste to the Facility, of the definitions of "hazardous waste" and "Special Waste" herein provided, and of the terms of this license to enter the Facility.

<u>Indemnification</u>. (A) Contractor agrees to indemnify, save harmless, and defend the Customer from and against any and all liabilities, claims, penalties, forfeitures, suites, and the costs and expenses incident thereto (including costs of defense, settlement, and reasonable attorneys' fees), which it may hereafter incur, become responsible for, or pay out as a result of death or bodily injuries to any person, destruction or damage to any property, contamination of or adverse effects on the environment, or any violation of governmental laws, regulation, or orders caused solely by the negligent act, negligent omission or willful misconduct of Contractor's employees, or its subcontractors in the performance of the Agreement.

(B) Customer agrees to indemnify, save harmless, and defend Contractor from and against any and all liabilities, claims, penalties, forfeitures, suits, and the costs and expenses incident thereto (including costs of defense, settlement, and reasonable attorneys' fees), which it may hereafter incur, become responsible for, or pay out as a result of death or bodily injuries to any person, destruction or damage to any property, contamination of or adverse effects on the environment, or any violation of governmental laws, regulations, or orders caused, in whole or in part by the Customer's breach of any warranty, term or provision of the Agreement, or any negligent act, negligent omission or willful misconduct of the Customer, its employees, or subcontractors in the performance of the Agreement.

<u>Attorney's Fees</u>. In the event of a breach of the Agreement, the breaching party shall pay all reasonable attorneys' fees, collection fees and costs of the other party incident to any action brought to enforce the Agreement.

<u>Assignment</u>. Neither party may assign, transfer to otherwise vest in any other company, entity or person, any of its rights or obligations under the Agreement without the prior written consent of the other party, which consents shall not be unreasonably withheld; provided, however, that Contractor may, without any such prior written consent, assign its rights and/or obligations under the Agreement to a subsidiary or affiliate corporation.

<u>Miscellaneous</u>. The Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their respective successors and permitted assigns. The Agreement shall be governed by and construed in accordance with the laws of the State in which the Facility is located.

Date Printed 01/07/99

Chemical Waste Management, Inc.
GENERATOR'S WASTE PROFILE SHEET

Profile #
CWM 351672

(_) Check here if this is a Recertification LOCATION OF ORIGINAL CWM CONTROLLED WASTE DIVISION

GENERAL INFORMATION

1. Generator Name: WISCONSIN PUBLIC SERVICE DPT
Generator USEPA ID: EXEMPT

2. Generator Address: 732 N WATER ST
SHEBOYGAN WI 53081-3935

Billing Address: (_) Same
NATURAL RESOURCE TECH INC
23713 W PAUL RD
PEWAUKEE WI 53072

3. Technical Contact/Phone: JULIE ZIMDARS 414/523-9000

4. Alternate Contact/Phone:

Billing Contact/Phone: JULIE ZIMDARS 414/523-9000

PROPERTIES AND COMPOSITION

5. Process Generating Waste: FACILITY CLEANUP

6. Waste Name: CONTAMINATED SOIL

7A. Is this a USEPA hazardous waste (40 CFR Part 261)? Yes (_) No (X)

B. Identify ALL USEPA listed and characteristic waste code numbers (D,F,K,P,U):

State Waste Codes:

8. Physical State @ 70F: A. Solid(X) Liquid(_) Both(_) Gas(_) B. Single Layer (X) Multilayer (_) C. Free liq. range 0 to 0%

9A. pH: Range ____ or Not applicable (X) B. Strong Odor (_);describe

10. Liquid Flash Point: < 73F (_) 73-99F (_) 100-139F (_) 140-199F (_) >= 200F (_) N.A. (X) Closed Cup (X) Open Cup (_)

11. CHEMICAL COMPOSITION: List ALL constituents (incl. halogenated organics) present in any concentration and forward analysis

Constituents	Range	Unit Description
SOIL	to 100	%
	to	
	to	
	to	
	to	
	to	
TOTAL COMPOSITION (MUST EQUAL OR EXCEED 100%):	100.000000	

12. OTHER: PCBs if yes, concentration _ ____ ppm, PCBs regulated by 40 CFR 761 (_). Pyrophoric (_) Explosive (_) Radioactive (_) Benzene if yes, concentration _ ____ ppm. NESHAP (_) Shock Sensitive (_) Oxidizer (_) Carcinogen (_) Infectious (_) Other

13. If waste subject to the land ban & meets treatment standards, check here: _ & supply analytical results where applicable.

SHIPPING INFORMATION

14. PACKAGING: Bulk Solid (X) Bulk Liquid (_) Drum (X) Type/Size: 55 GALLON DRUM Other

15. ANTICIPATED ANNUAL VOLUME: 20 Units: TONS Shipping Frequency: ONE TIME

SAMPLING INFORMATION

Sample Tracking Number: 4531325

16a. Sample source (drum, lagoon, pond, tank, vat, etc.):

Date Sampled: Sampler's Name/Company:

16b. Generator's Agent Supervising Sampling:

17. (_) No sample required (See instructions.)

GENERATOR'S CERTIFICATION

I hereby certify that all information submitted in this and all attached documents contains true and accurate descriptions of this waste. Any sample submitted is representative as defined in 40 CFR 261 - Appendix I or by using an equivalent method. All relevant information regarding known or suspected hazards in the possession of the generator has been disclosed. I authorize CWM to obtain a sample from any waste shipment for purposes of recertification.

Signature on original profile 351672

Signature Name and Title Date

18. This is a Nonwastewater.

19. If this waste is subject to any California list restrictions enter the letter from below (either A, B.1 or B.2) next to each restriction that is applicable:
___ HOCs, ___ PCBs, ___ Acid, ___ Metals, ___ Cyanides

Identify ALL Characteristic and Listed USEPA hazardous waste numbers that apply (as defined by 40 CFR 261). For each waste number, identify the subcategory (as applicable, check none, or write in the description from 40 CFR 268.41, 268.42, and 268.43).

REF #	A. US EPA HAZARDOUS WASTE CODE(S)	B. SUBCATEGORY Enter the subcategory description. If not applicable, simply check none		C. APPLICABLE TREATMENT STANDARDS			D. HOW MUST THE WASTE BE MANAGED? Enter letter from below
				PERFORMANCE-BASED: Check as applicable		SPECIFIED TECHNOLOGY: If applicable enter the 40 CFR 268.42 table 1 treatment code(s)	
		DESCRIPTION	NONE	268.41(a)	268.43(a)	268.42	
1							
2							
3							
4							
5							
6							
7							
8							
9							

Management under the land disposal restrictions:

A. RESTRICTED WASTE REQUIRES TREATMENT

B.1 RESTRICTED WASTE TREATED TO PERFORMANCE STANDARDS

B.2 RESTRICTED WASTES FOR WHICH THE TREATMENT STANDARD IS EXPRESSED AS A SPECIFIED TECHNOLOGY (AND THE WASTE HAS BEEN TREATED BY THAT TECHNOLOGY)

B.3 GOOD FAITH ANALYTICAL CERTIFICATION FOR INCINERATED ORGANICS

C. RESTRICTED WASTE SUBJECT TO A VARIANCE

D. RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT

E. NOT CURRENTLY SUBJECT TO LAND DISPOSAL RESTRICTIONS

21. Is this waste a soil or debris? No: X Yes, Soil: _ Yes, Debris: _

22. Specific Gravity Range: _____ to _____

23. Indicate the range of each: Units

Cyanides: ≤ 5 to ____________ PPM Type (free, total, amenable, etc.) TOTAL

Cyanides: _ Not Applicable to ____________ ______ Type (free, total, amenable, etc.) ____________

Sulfides: ≤ 3 to ____________ PPM Type TOTAL

Optional
Phenolics: ≤ 10 to ____________ PPM

24. Identify the waste color VARIES, DOT physical state Solid,

and physical appearance SOLID

25. COMPLETE ONLY FOR WASTES INTENDED FOR FUELS OR INCINERATION

TOTAL

Beryllium as Be ______ ppm
Potassium as K ______ ppm
Sodium as Na ______ ppm
Bromine as Br ______ %
Chlorine as Cl ______ %
Fluorine as F ______ %
Sulfur as S ______ %

26. RECLAMATION, FUELS or INCINERATION PARAMETERS
(Provide if information is available)

RANGE

A. Heat Value (Btu/lb): ____-____
B. Water: _____
C. Viscosity (cps): ____@____F _ 100 F _ 150 F
D. Ash: _____ %
E. Settleable solids: _____ %
F. Vapor Pressure @ STP (mm/Hg): ___
G. Is this waste a pumpable liquid? Yes _ No _
H. Can this waste be heated to improve flow? Yes _ No _
I. Is this waste soluble in water? Yes _ No _
J. Particle size: Will the solid portion of this waste pass through a 1/8 inch screen? Yes _ No _

27. TRANSPORTATION INFORMATION

A. Is this a DOT Hazardous Material? Yes _ No X

B. Proper Shipping Name. . . . .: NON-REGULATED MATERIAL

and Additional Description if required: (CONTAMINATED SOIL)

C. DOT Regulations: ______ Hazard Class: ___ ______ I.D. _____ Packing Group: ___

D. CERCLA Reportable Quantity (RQ) and units (Lb, Kg): ______

E. Non-Bulk code ___ Bulk code ___

F. Special Provisions ___ ___ ___ ___ ___ ___

G. Labels Required ______ ______ ______

28. SPECIAL HANDLING INFORMATION

_ Material Safety Data Sheets Attached

29. OTHER INFORMATION

30. CHEMICAL WASTE MANAGEMENT CERTIFICATION

Chemical Waste Management, Inc. has all the necessary permits and licenses for the waste that has been characterized and identified by this approved profile.

Date Printed 01/07/99

Profile #
CTW 351672

31. OTHER HAZARDOUS CONSTITUENTS Indicate if the waste contains any of the following.

METALS	TCLP Information: Check only ONE for each constituent Use units: ppm, mg/l				TCLP Data	TCA or TOTAL Use units: ppm, mg/l, mg/kg or percent			
						California List			
	Less Than	TC Regulated Level	Equal or More	Waste No.	TCLP Actual	Less Than	Regulated Level	Equal or More	Actual
Arsenic as As	X	5.0 mg/l		D004			500 mg/l		
Barium as Ba	X	100.0 mg/l		D005					
Cadmium as Cd	X	1.0 mg/l		D006			100 mg/l		
Chromium tot Cr	X	5.0 mg/l		D007					
Lead as Pb	X	5.0 mg/l		D008			500 mg/l		
Mercury as Hg	X	.2 mg/l		D009			20 mg/l		
Selenium as Se	X	1.0 mg/l		D010			100 mg/l		
Silver as Ag	X	5.0 mg/l		D011					
Nickel as Ni	X						134 mg/l		
Thallium as Tl							130 mg/l		
Chromium Hex							500 mg/l		
Antimony									
Beryllium									
Copper	X								
Vanadium									
	X								

32. OTHER HAZARDOUS CONSTITUENTS Indicate if the waste contains any of the following.

ORGANICS	TCLP Information: Check only ONE for each constituent				TCLP Data	TCA or TOTAL Use units: ppm, mg/l or %
	Less Than	Regulated Level	Equal or More	Waste No.	TCLP Analytical Test Results Use units: ppm or mg/l	
Benzene	X	0.5 mg/l		D018		
Carbon Tetrachloride	X	0.5 mg/l		D019		
Chlordane	X	0.03 mg/l		D020		
Chlorobenzene	X	100.0 mg/l		D021		
Chloroform	X	6.0 mg/l		D022		
m-Cresol	X	200 mg/l		D024		
o-Cresol	X	200.0 mg/l		D023		
p-Cresol	X	200.0 mg/l		D025		
Cresol	X	200.0 mg/l		D026		
2,4-D	X	10.0 mg/l		D016		
1,4 Dichlorobenzene	X	7.5 mg/l		D027		
1,2-Dichloroethane	X	0.5 mg/l		D028		
1,1-Dichloroethylene	X	0.7 mg/l		D029		
2,4-Dinitrotoluene	X	0.13 mg/l		D030		
Endrin	X	.02 mg/l		D012		
Heptachlor, & Hydroxide	X	0.008 mg/l		D031		
Hexachloro-1,3 Butadiene	X	0.5 mg/l		D033		
Hexachlorobenzene	X	0.13 mg/l		D032		
Hexachloroethane	X	3.0 mg/l		D034		
Lindane	X	0.4 mg/l		D013		
Methoxychlor	X	10.0 mg/l		D014		
Methyl Ethyl Ketone	X	200.0 mg/l		D035		
Nitrobenzene	X	2.0 mg/l		D036		
Pentachlorophenol	X	100.0 mg/l		D037		
Pyridine	X	5.0 mg/l		D038		
Tetrachloroethylene	X	0.7 mg/l		D039		
Toxaphene	X	0.5 mg/l		D015		
2,4,5-TP Silvex	X	1.0 mg/l		D017		
Trichloroethylene	X	0.5 mg/l		D040		
2,4,5-Trichlorophenol	X	400.0 mg/l		D041		
2,4,6-Trichlorophenol	X	2.0 mg/l		D042		
Vinyl Chloride	X	0.2 mg/l		D043		

SEE INSTRUCTIONS ON REVERSE SIDE OF COPY 6.

WISCONSIN DEPT OF NATURAL RESOURCES

STATE OF WISCONSIN

Chapter 291, Wis. Stats.
Form 4400-66P Rev. 1-98

ALL COPIES MUST BE LEGIBLE, PLEASE TYPE

State of Wisconsin
Department of Natural Resources
Bureau of Waste Management
Box 8094
Madison, WI 53708

FOR DNR USE ONLY

…m designed for use on elite (12-pitch) typewriter.

Form Approved. OMB No. 2050-0039. Expires 9-3

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. W I D 0 4 5 9 5 4 5 2 6

Manifest Document No. 39548

2. Page 1 of ,

Information in the shaded are is not required by Federal lav

A. State Manifest Document Number WI K39568

B. State Generator's ID

3. Generator's Name and Mailing Address
WISCONSIN PUBLIC SERVICE, CORPORATION
933 SOUTH WILDWOOD AVENUE
SHEBOYGAN WI 53081

Site Location If Different

4. Generator's Phone (920)892-8401

5. Transporter 1 Company Name ADV. ENVIR. TECH. SRVS. (AETS)

6. US EPA ID Number N J D 0 8 0 6 3 1 3 6 9

C. State Transporter's ID

D. Transporter's Phone (414)255-665

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
A.E.T.S.-CONTROLLED WASTE DIVISION
W124 N9451 BOUNDARY ROAD
MENOMONEE FALLS WI 53051

10. US EPA ID Number W I D 0 0 3 9 6 7 1 4 8

G. State Facility's ID 03135

H. Facility's Phone (414)255-665

11. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. HAZARDOUS WASTE, LIQUID, N.O.S., 9, NA3082, III, (GROUNDWATER), R.Q., (D018).	0 1 1	D M	0 0 6 0 5	G	D 0 1 1 A
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
A. WIP 415110, 10% FP, DW00131, ALL 55 DM
THIRD PARTY CUSTOMER TRANSPORTED BY TECH. SRVS.
SEND COPY 5 OF MANIFEST TO ABOVE ADDRESS, ATTN: MR. DICK JOHNSON

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY TELEPHONE NUMBER 1.888.353.2387

GENERATOR

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations and according to the requirements of the Wisconsin Department of Natural Resources. If I am a large quantity generator, I also certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment;

OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name & Position Title X MARY D. FLECK CUST. SERVICE MGR-GAS
Signature Mary D. Fleck
Date Month Day Year 02 01 99

TRANSPORTER

17. TRANSPORTER 1 Acknowledgement of Receipt of Materials
Printed/Typed Name & Position Title Joseph D. [illegible] ES III
Signature
Date Month Day Year 02 01 99

18. TRANSPORTER 2 Acknowledgement of Receipt of Materials
Printed/Typed Name & Position Title
Signature
Date Month Day Year

FACILITY

19. Discrepancy Indication Space

20. FACILITY OWNER OR OPERATOR: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name & Position Title William Banks / chemist
Signature William Banks
Date Month Day Year 02 03 99

EPA Form 8700-22 (Rev. 9-88) Previous editions are obsolete.

Copy Distribution:
1 — Generator send to Wis. DNR
2 — Generator retain
3 — Facility send to Wis. DNR
4 — Facility retain
5 — Facility send to Generator

Emergency 24 Hour Assistance Telephone Number

APPENDIX F

GEOTECHNICAL TESTING DATA

Summary of La ratory Test Results

Project: WPSC - Sheboygan
Location: Sheboygan, Wisconsin
Client: Natural Resource Technology, Inc.

Test Results

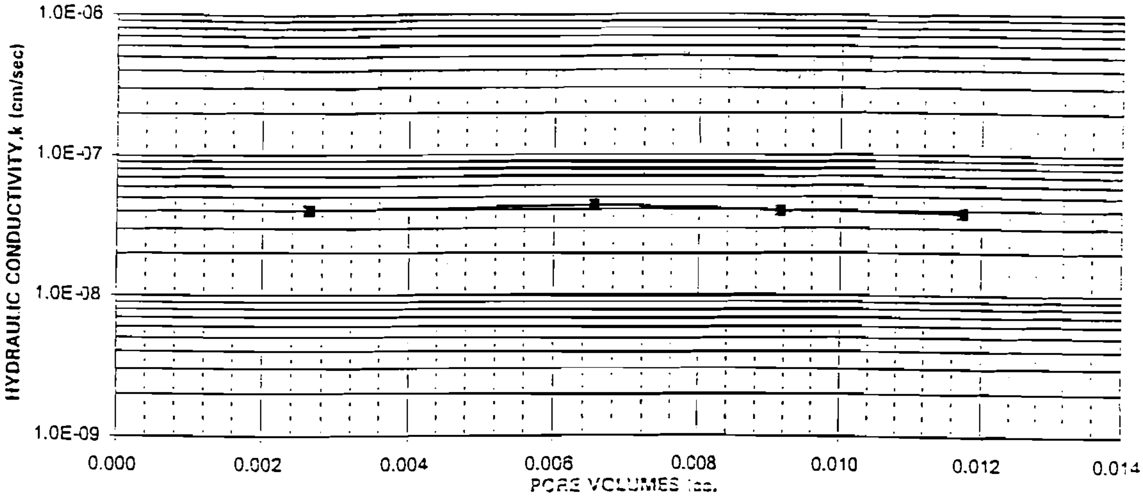
Boring	Depth (ft)		Triaxial Shear at Failure Dev. Stress (psf)	Strain (%)	Liquid Limit (%)	Plastic Limit (%)	Water Content (%)	Dry Unit Weight (pcf)	Specific Gravity	Gravel (%)	Sand (%)	P200 (%)	Hydraulic Conductivity (cm/sec)
GB-727	16' to 18'				NP	NP	18.3	108.6	2.640	14.6	76.2	9.2	
GB-727	26' to 28'				19	11	17.3	111.6		---	---	50.3	4.0E-08
GB-727	33.5' to 34		4622	9.9			31.9	87.7					
GB-728	2' to 4'				18	17	15.2	113.5	2.703	8.3	65.0	26.7	
GB-728	30' to 32'						25.4	100.7					
GB-729	12' to 14'				36	27	34.2	84.2		0.7	40.8	58.5	
GB-729	24' to 26'		2612	15.0	21	13	16.7	112.3		---	---	74.2	1.4E-08
GB-730	28' to 30'		2618	9.9	54	28	30.6	91.5	2.692	---	---	98.3	8.6E-09
PZ-703	24' to 26'		1170	15.0	22	12	19.9	107.5	2.684	---	---	73.7	1.1E-07

File: S nary of Laboratory Test Results
Date I ued: 2/1/99
Reviewed By:__

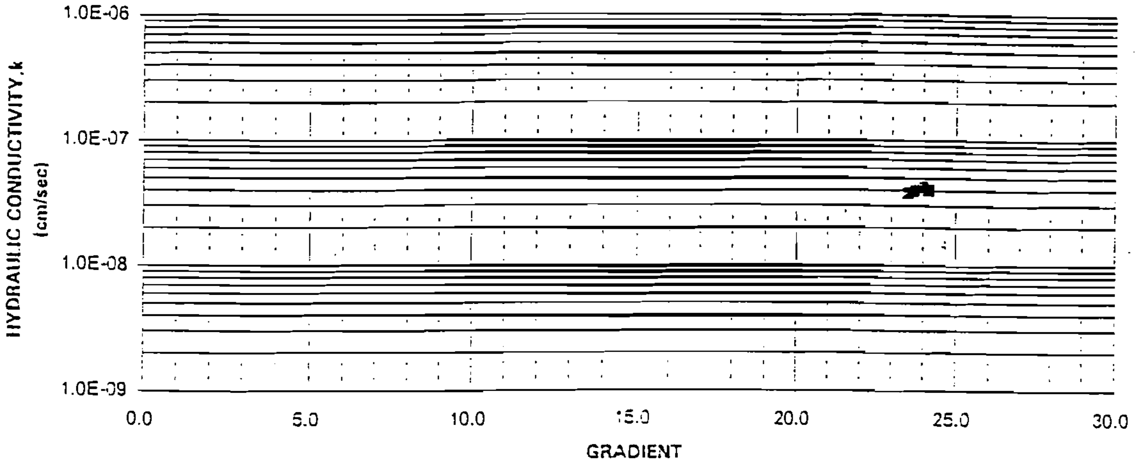
GeoTest
2135 S. 116th Street
West Al VI 53227
414-321-TEST

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: GB-727 (26' to 28')

SPECIMEN DESCRIPTION: Dark brown silty SAND, some clay

☐ REMOLDED

☑ UNDISTURBED

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.152	7.018	AVERAGE BACKPRESSURE (psi)	71.0
SPECIMEN AREA, A (cm)	40.17	38.68	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	20.7
SPECIMEN LENGTH, L (cm)	6.858	6.569	MINIMUM EFFECTIVE CONFINING STRESS (psi)	18.4
SPECIMEN VOLUME,V (cc)	275.5	254.1	CUMULATIVE PORE VOLUMES FLOW	0.012
WATER CONTENT (%)	17.3	15.4	PERMEANT	WATER
DRY DENSITY (pcf)	111.6	119.0		
SATURATION,n (%)	92	100	AVERAGE HYDRAULIC CONDUCTIVITY,k (cm/sec)	4.0E-08

PROJECT: WPSC - Sheboygan

PROJECT NUMBER: 01092-002

FLEXIBLE WALL
HYDRAULIC CONDUCTIVITY
ASTM D 5084-90

GeoTest

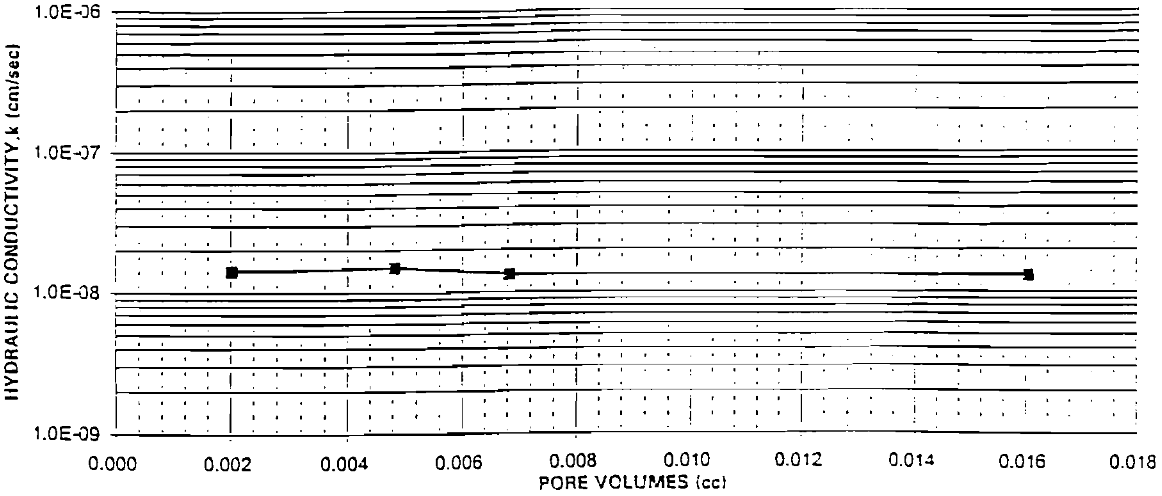
CHECKED BY:

REVIEWED BY:

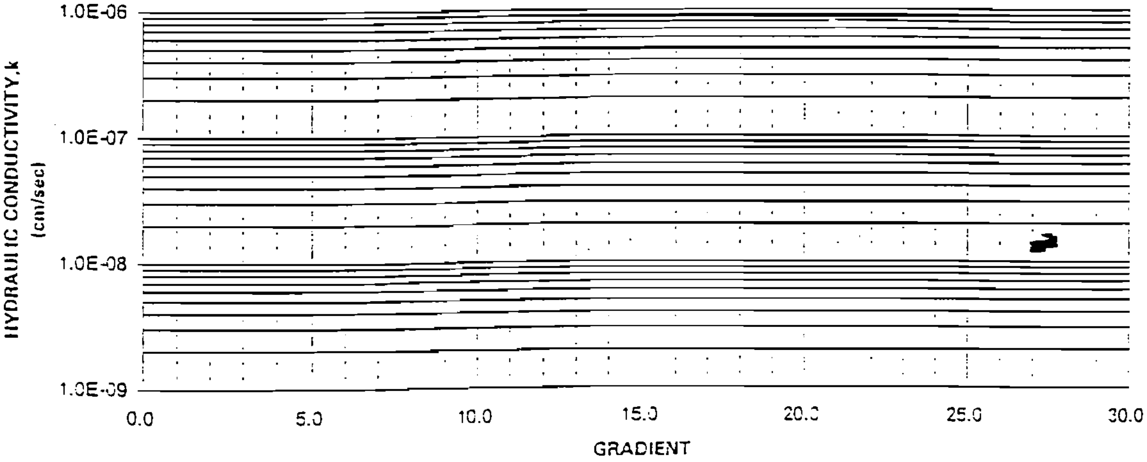
TEST DATE: 5-Jan-99

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: GB-729 (24' to 26') ☐ REMOLDED

SPECIMEN DESCRIPTION: Brown-gray mottled silty CLAY ☑ UNDISTURBED

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.371	7.302	AVERAGE BACKPRESSURE (psi)	81.0
SPECIMEN AREA, A (cm)	42.67	41.88	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	22.9
SPECIMEN LENGTH, L (cm)	6.614	6.565	MINIMUM EFFECTIVE CONFINING STRESS (psi)	20.2
SPECIMEN VOLUME,V (cc)	282.2	274.9	CUMULATIVE PORE VOLUMES FLOW	0.016
WATER CONTENT (%)	16.7	15.4	PERMEANT	WATER
DRY DENSITY (pcf)	116.4	117.9		
SATURATION,n (%)	101	97	AVERAGE HYDRAULIC CONDUCTIVITY k (cm/sec)	1.4E-08

PROJECT: WPSC - Sheboygan

PROJECT NUMBER: 01092-002

FLEXIBLE WALL
HYDRAULIC CONDUCTIVITY
ASTM D 5084-90

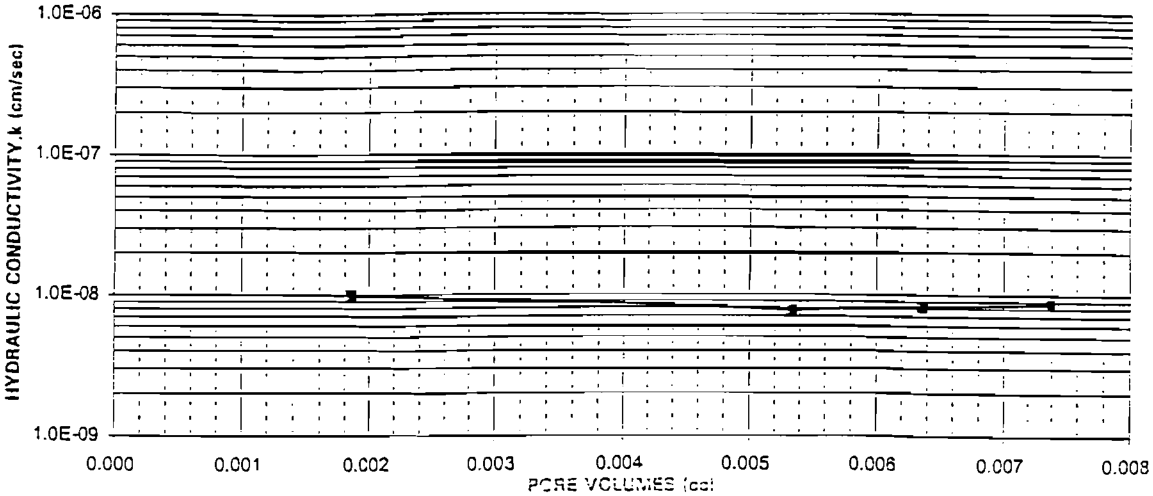
GeoTest

CHECKED BY: REVIEWED BY: TEST DATE:

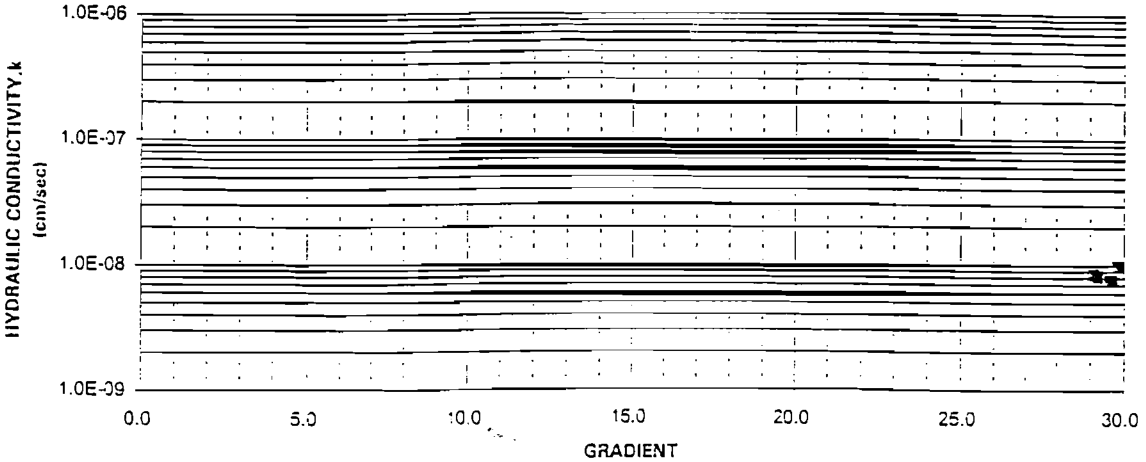
12-Jan-99

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: G8-730 (28' to 30') ☐ REMOLDED

SPECIMEN DESCRIPTION: Brown-gray mottled lean CLAY ☑ UNDISTURBED

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.282	7.201	AVERAGE BACKPRESSURE (psi)	91.5
SPECIMEN AREA, A (cm)	41.65	40.73	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	29.4
SPECIMEN LENGTH, L (cm)	8.644	8.473	MINIMUM EFFECTIVE CONFINING STRESS (psi)	25.7
SPECIMEN VOLUME,V (cc)	360.0	345.1	CUMULATIVE PORE VOLUMES FLOW	0.007
WATER CONTENT (%)	30.6	31.7	PERMEANT	WATER
DRY DENSITY (pcf)	90.0	91.2		
SATURATION,n (%)	95	101	AVERAGE HYDRAULIC CONDUCTIVITY,k (cm/sec)	8.6E-09

PROJECT: WPSC - Sheboygan

PROJECT NUMBER: 01092-002

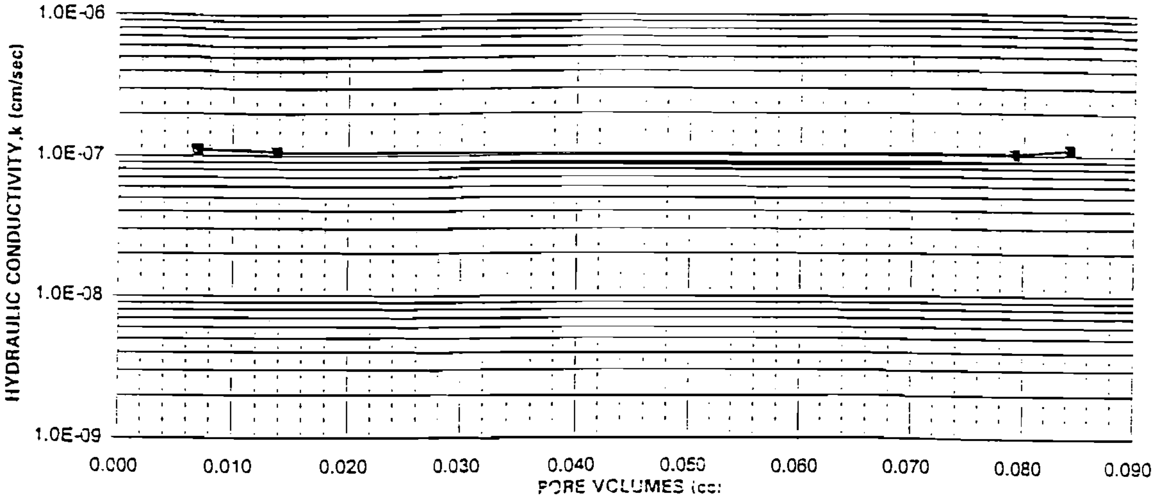
FLEXIBLE WALL
HYDRAULIC CONDUCTIVITY
ASTM D 5084-90

GeoTest

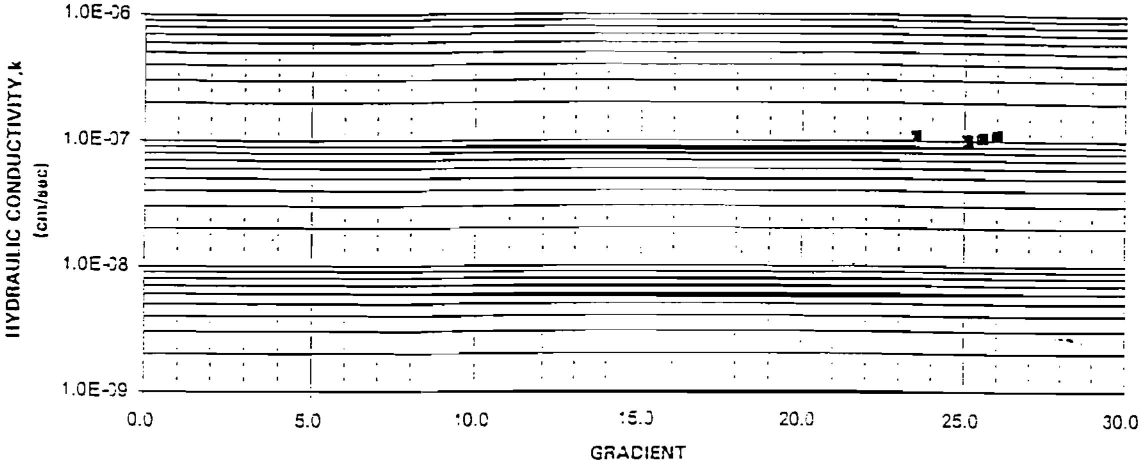
CHECKED BY:	REVIEWED BY:	TEST DATE:
		12-Jan-98

TEST REPORT

HYDRAULIC CONDUCTIVITY VS. PORE FLOW



HYDRAULIC CONDUCTIVITY VS. GRADIENT



SPECIMEN NO: PZ-703 (24' to 26') ☐ REMOLDED

SPECIMEN DESCRIPTION: Brown-gray mottled silty CLAY ☑ UNDISTURBED

	INITIAL	FINAL		
SPECIMEN DIAMETER (cm)	7.261	7.207	AVERAGE BACKPRESSURE (psi)	81.0
SPECIMEN AREA, A (cm)	41.41	40.79	MAXIMUM EFFECTIVE CONFINING STRESS (psi)	23.9
SPECIMEN LENGTH, L (cm)	6.879	7.021	MINIMUM EFFECTIVE CONFINING STRESS (psi)	21.2
SPECIMEN VOLUME,V (cc)	284.8	286.4	CUMULATIVE PORE VOLUMES FLOW	0.084
WATER CONTENT (%)	19.9	13.2	PERMEANT	WATER
DRY DENSITY (pcf)	122.1	123.9		
SATURATION,n (%)	141	99	AVERAGE HYDRAULIC CONDUCTIVITY,k (cm/sec)	1.1E-07

PROJECT: WPSC - Sheboygan

PROJECT NUMBER: 01092-002

FLEXIBLE WALL
HYDRAULIC CONDUCTIVITY
ASTM D 5084-90

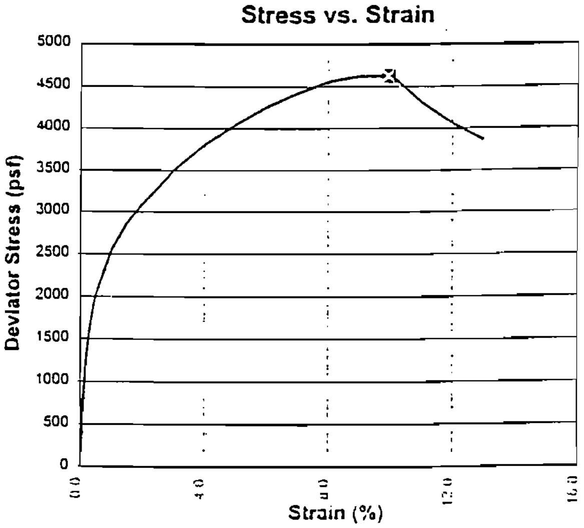
GeoTest

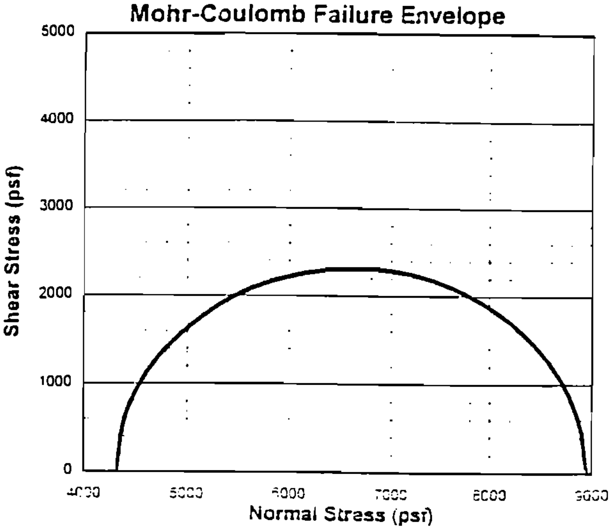
CHECKED BY:

REVIEWED BY:

TEST DATE: 11-Jan-99

Test Report





Boring Number: ______ Sample Number: GB-727 Depth: 33.5' to 34'

Soil Description: Brown lean CLAY ☐ Remolded ☑ Undisturbed

Test Specimen Data

Specimen Diameter, D (in)	1.429
Specimen Area, A (in^2)	1.604
Specimen Length, L (in)	3.056
Specimen Volume, V (in^3)	4.90
Height to Diameter Ratio	2.139
Dry Density (pcf)	87.8
Water Content (%)	31.9
● Trimmings ○ Whole Sample	
Specific Gravity (Estimated)	2.70
Volume of Solids (in^3)	41.9
Void Ratio, e	0.919
Porosity, n	0.479
Saturation (%)	93.6

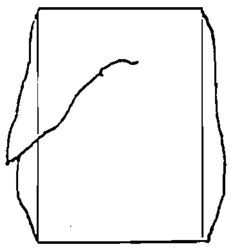
Test Results

Deviator Stress at Failure (psf)	4622
Strain at Failure (%)	9.9
Major Principle Stress at Failure (psf)	8942
Minor Principle Stress at Failure (psf)	4320
Rate of Axial Strain (%/min)	1.0

Test Specimen Data

Liquid Limit (%)	NA
Plastic Limit (%)	NA
Plasticity Index (%)	NA
Gravel (%)	NA
Sand (%)	NA
Silt (%)	NA
Clay (%)	NA
USCS	NA

Failure Sketch



Project: WPSC - Sheboygan

Project Number: 01092-002

Unconsolidated Undrained Compressive Strength Test Report

ASTM D2850-95

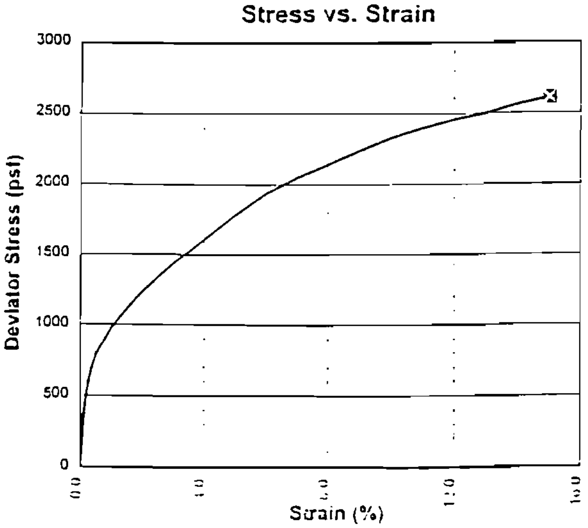
GeoTest

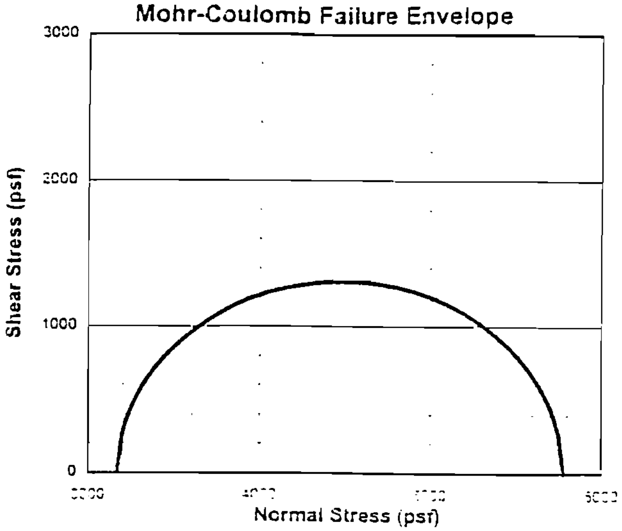
Checked By: Reviewed By: Test Date: 20-Jan-99

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Triax GB-727 (33.5 to 34)

Test Report


Stress vs. Strain


Mohr-Coulomb Failure Envelope

Boring Number: ______ Sample Number: GB-729 Depth: 24' to 26'

Soil Description: Brown-gray mottled silty CLAY ☐ Remolded ☑ Undisturbed

Test Specimen Data

Specimen Diameter, D (in)	2.919
Specimen Area, A (in^2)	6.692
Specimen Length, L (in)	5.586
Specimen Volume, V (in^3)	37.38
Height to Diameter Ratio	1.914
Dry Density (pcf)	112.3
Water Content (%)	16.7
● Trimmings ○ Whole Sample	
Specific Gravity (Estimated)	2.70
Volume of Solids (in^3)	408.5
Void Ratio, e	0.500
Porosity, n	0.333
Saturation (%)	90.5

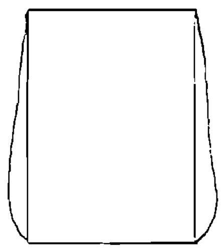
Test Results

Deviator Stress at Failure (psf)	2612
Strain at Failure (%)	15.0
Major Principle Stress at Failure (psf)	5780
Minor Principle Stress at Failure (psf)	3168
Rate of Axial Strain (%/min)	1.0

Test Specimen Data

Liquid Limit (%)	21
Plastic Limit (%)	13
Plasticity Index (%)	8
Gravel (%)	NA
Sand (%)	NA
Fines (%)	74.2
USCS	NA

Failure Sketch



Project: WPSC - Sheboygan

Project Number: 01092-002

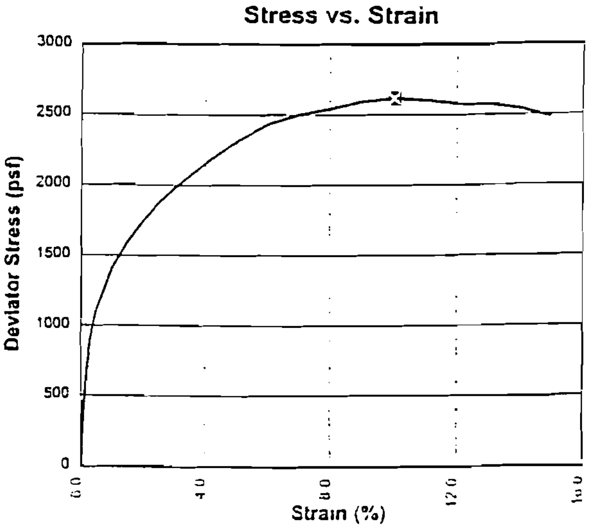
Unconsolidated Undrained Compressive Strength Test Report

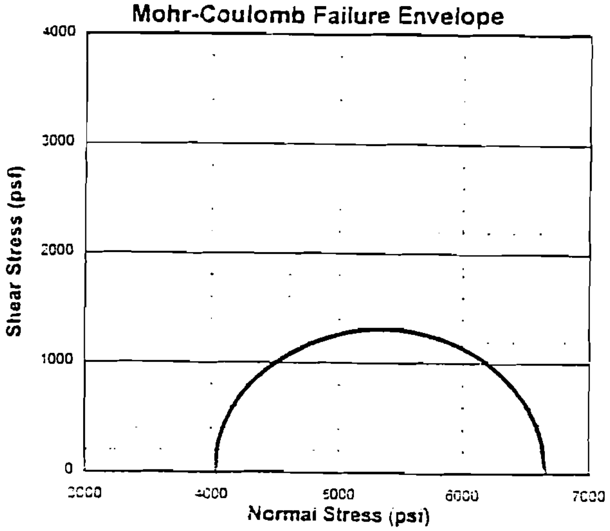
ASTM D2850-95

GeoTest Checked By: Reviewed By: Test Date: 20-Jan-99

File: Triax GB-729 (24 to 26)

Test Report





Boring Number: ______ Sample Number: GB-730 Depth: 28' to 30'

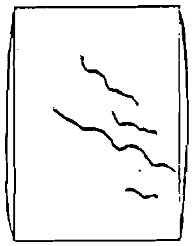
Soil Description: Brown-gray mottled lean CLAY ☐ Remolded ☑ Undisturbed

Test Specimen Data	
Specimen Diameter, D (in)	2.858
Specimen Area, A (in^2)	6.415
Specimen Length, L (in)	6.235
Specimen Volume, V (in^3)	40.00
Height to Diameter Ratio	2.182
Dry Density (pcf)	91.5
Water Content (%)	30.6
● Trimmings ○ Whole Sample	
Specific Gravity (Estimated)	2.69
Volume of Solids (in^3)	357.1
Void Ratio, e	0.836
Porosity, n	0.455
Saturation (%)	98.6

Test Results	
Deviator Stress at Failure (psf)	2618
Strain at Failure (%)	9.9
Major Principle Stress at Failure (psf)	6650
Minor Principle Stress at Failure (psf)	4032
Rate of Axial Strain (%/min)	1.0

Test Specimen Data	
Liquid Limit (%)	54
Plastic Limit (%)	28
Plasticity Index (%)	26
Gravel (%)	NA
Sand (%)	NA
Fines (%)	98.3
USCS	NA

Failure Sketch



Project: WPSC - Sheboygan

Project Number: 01092-002

Unconsolidated Undrained Compressive Strength Test Report

ASTM D2850-95

GeoTest

Checked By:

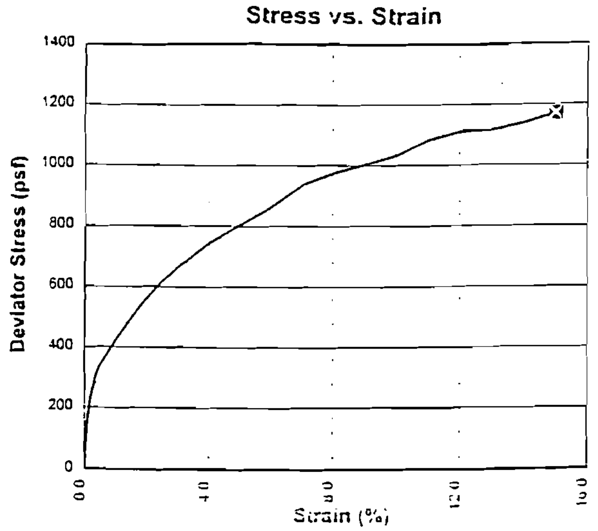
Reviewed By:

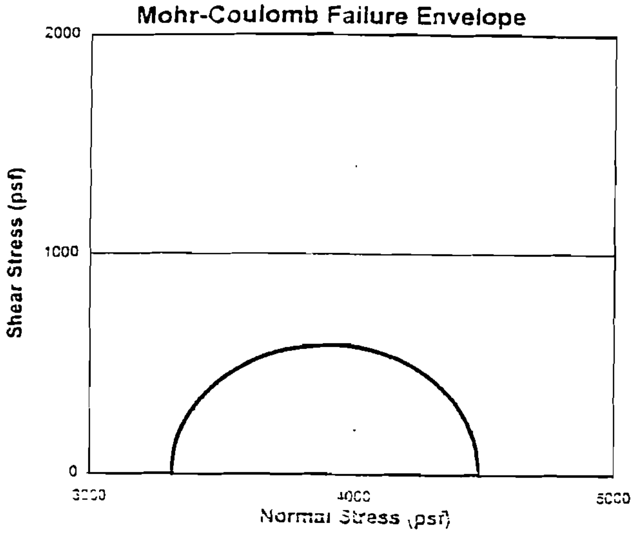
Test Date: 20-Jan-99

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-3359 Fax

File: Triax GB-730 (28 to 30)

Test Report





Boring Number: ______ Sample Number: PZ-703 Depth: 24' to 26'

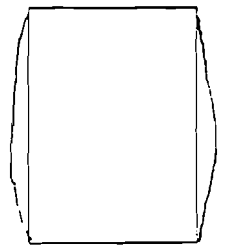
Soil Description: Brown-gray mottled silty CLAY ☐ Remolded ☑ Undisturbed

Test Specimen Data	
Specimen Diameter, D (in)	2.393
Specimen Area, A (in^2)	6.573
Specimen Length, L (in)	6.083
Specimen Volume, V (in^3)	39.99
Height to Diameter Ratio	2.103
Dry Density (pcf)	107.5
Water Content (%)	19.9
● Trimmings ○ Whole Sample	
Specific Gravity (Estimated)	2.68
Volume of Solids (in^3)	420.5
Void Ratio, e	0.558
Porosity, n	0.358
Saturation (%)	95.9

Test Results	
Deviator Stress at Failure (psf)	1170
Strain at Failure (%)	15.0
Major Principle Stress at Failure (psf)	4482
Minor Principle Stress at Failure (psf)	3312
Rate of Axial Strain (%/min)	1.0

Test Specimen Data	
Liquid Limit (%)	22
Plastic Limit (%)	12
Plasticity Index (%)	10
Gravel (%)	NA
Sand (%)	NA
Fines (%)	73.7
USCS	NA

Failure Sketch



Project: WPSC - Sheboygan

Project Number: 01092-002

Unconsolidated Undrained Compressive Strength Test Report

ASTM D2850-95

GeoTest

Checked By:

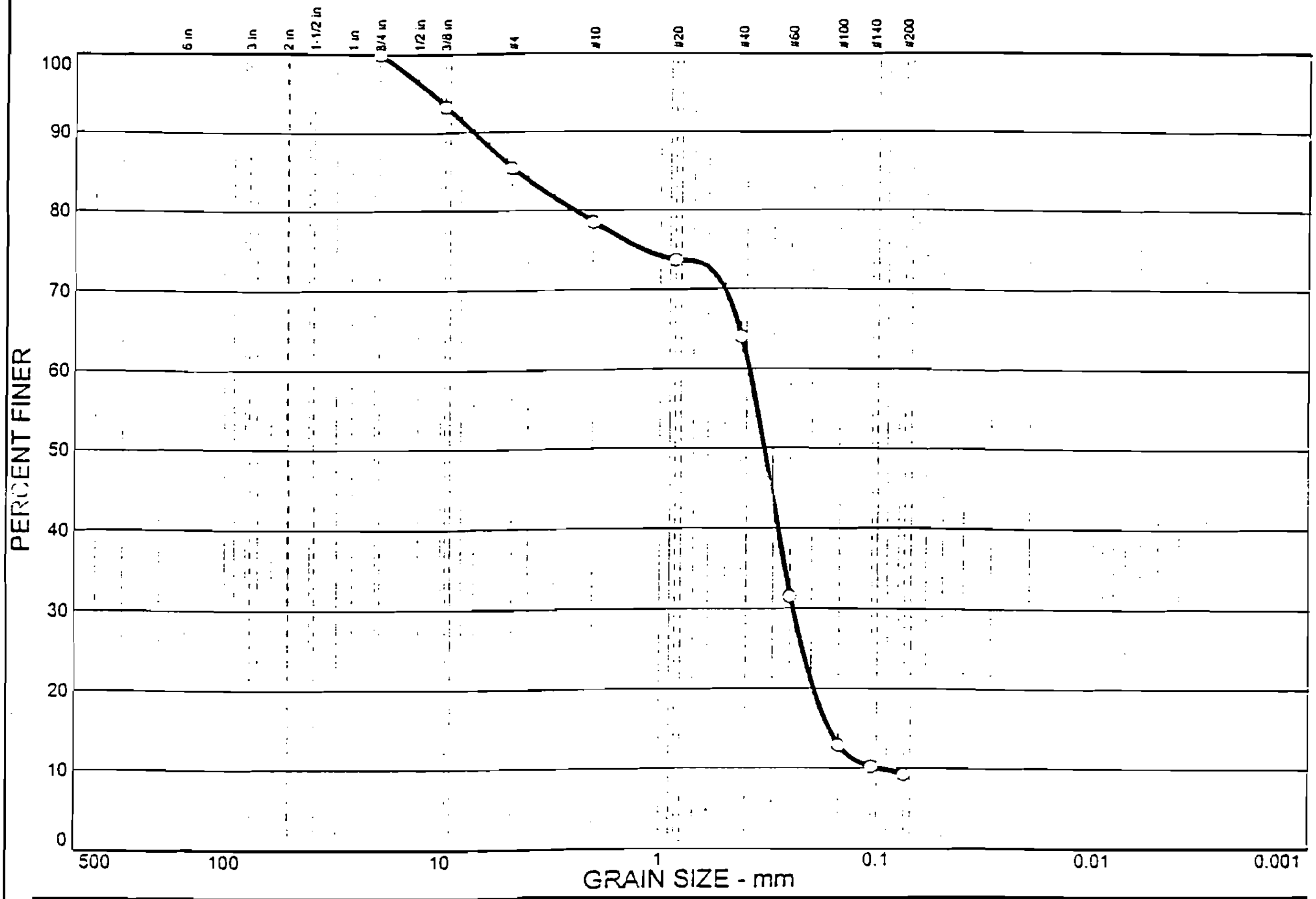
Reviewed By:

Test Date: 20-Jan-99

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Trax PZ-703 (24 to 26)

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	14.6	76.2	9.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	93.3		
#4	85.4		
#10	78.5		
#20	73.7		
#40	64.0		
#60	31.5		
#100	12.9		
#140	10.2		
#200	9.2		

* (no specification provided)

Soil Description

Brown f-c SAND, some gravel, trace silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 4.56 D_{60}= 0.392 D_{50}= 0.333

D_{30}= 0.243 D_{15}= 0.166 D_{10}= 0.0994

C_u= 3.94 C_c= 1.52

Classification

USCS= SP-SM AASHTO=

Remarks

Tested By: NL

Checked By:

Reviewed By:

Sample No.: GB-727 (16' to 18') **Source of Sample:** 7002 **Date:** 1/5/99

Location: **Elev./Depth:** 16' to 18'

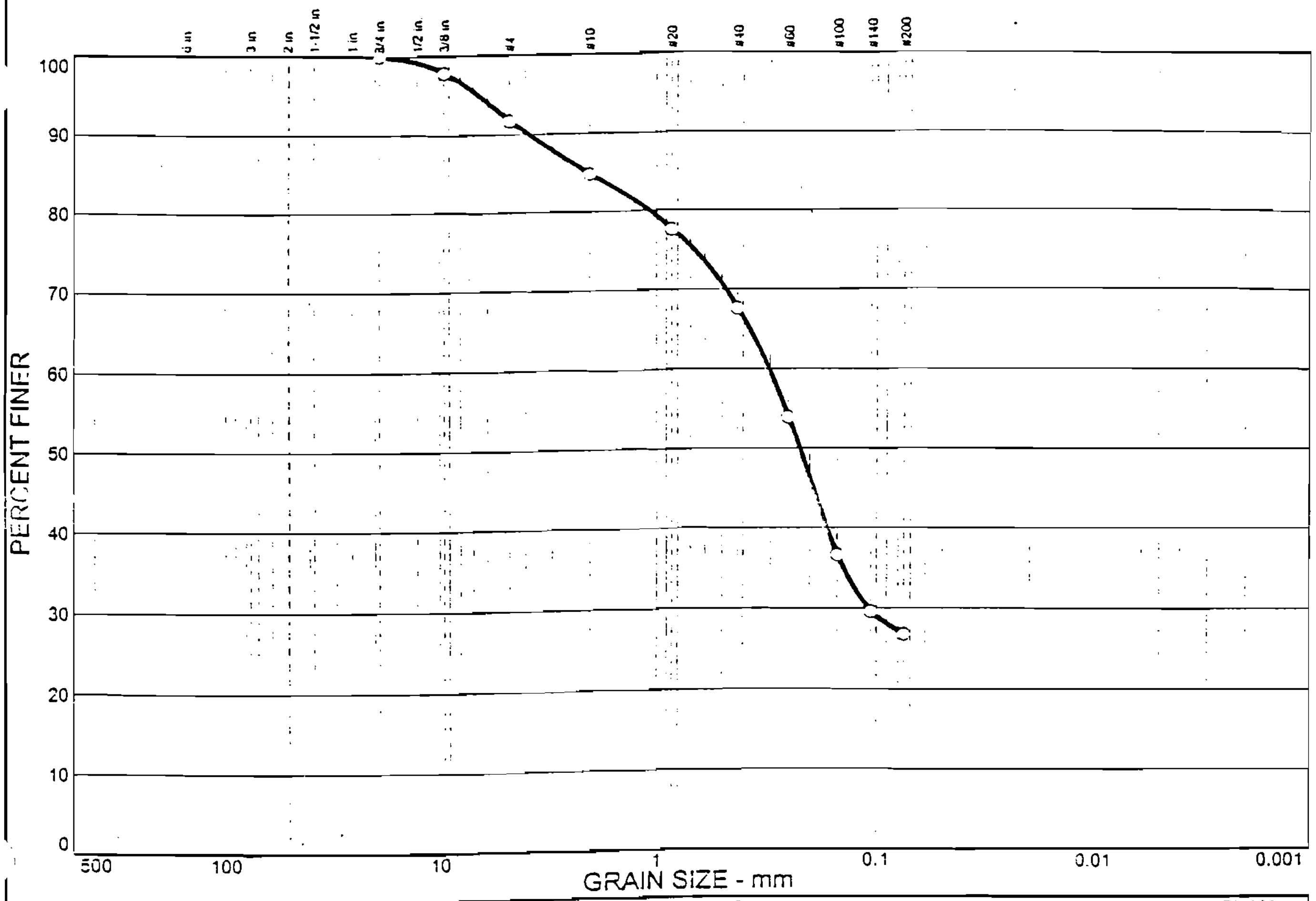
GeoTest

Client: Natural Resource Technology, Inc.

Project: WPSC - Sheboygan

Project No: 01092-002 **Plate**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	8.3	65.0	26.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	97.8		
#4	91.7		
#10	84.8		
#20	77.6		
#40	67.6		
#60	53.9		
#100	36.6		
#140	29.6		
#200	26.7		

* (no specification provided)

Soil Description

Brown-gray mottled SAND, some clay, trace gravel

Atterberg Limits

PL= 17 LL= 18 PI= 1

Coefficients

D_{85}= 2.06 D_{60}= 0.306 D_{50}= 0.223

D_{30}= 0.109 D_{15}= D_{10}=

C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Tested By: NL

Checked By:

Reviewed By:

Sample No.: GB-728 (2' to 4') Source of Sample: 7002 Date: 1/5/99

Location: Elev./Depth: 2' to 4'

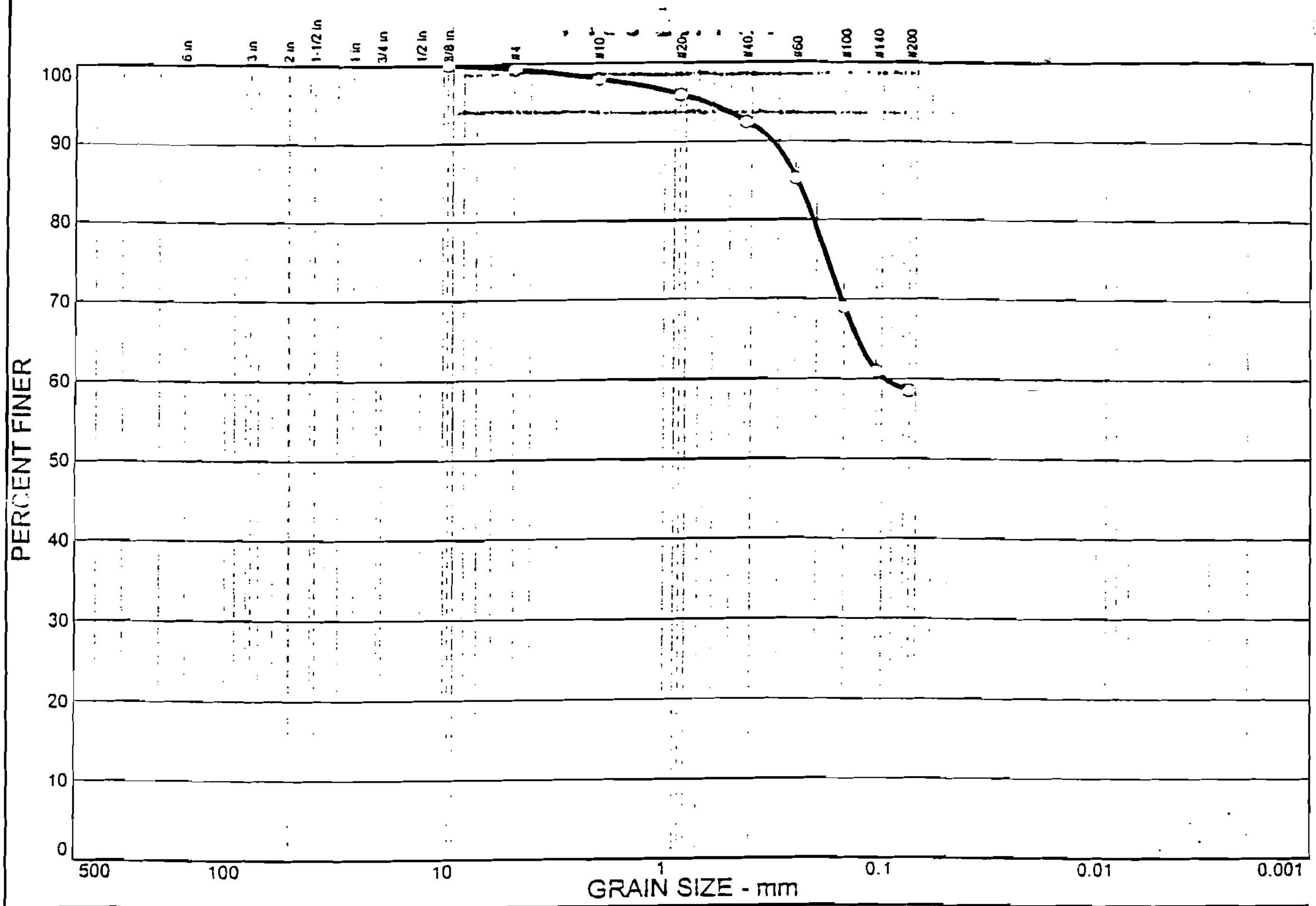
GeoTest

Client: Natural Resource Technology, Inc.

Project: WPSC - Sheboygan

Project No: 01092-002 Plate

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.7	40.8	58.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.3		
#10	98.0		
#20	95.9		
#40	92.4		
#60	85.3		
#100	69.0		
#140	60.9		
#200	58.5		

* (no specification provided)

Soil Description

Dark brown-gray mottled sandy CLAY, trace organics

Atterberg Limits

PL= 27 LL= 36 PI= 9

Coefficients

D_{85}= 0.247 D_{60}= 0.0983 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Tested By: NL
Checked By:
Reviewed By:

Sample No.: GB-729 (12' to 14') **Source of Sample:** 7002 **Date:** 1/5/99
Location: **Elev./Depth:** 12' to 14'

GeoTest

Client: Natural Resource Technology, Inc.
Project: WPSC - Sheboygan

Project No: 01092-002 **Plate**

APPENDIX G

GROUNDWATER GRADIENT CALCULATIONS

VERTICAL HYDRAULIC GRADIENT CALCULATIONS

Site: **Campmarina Sheboygan Former Manufactured Gas Plant Site**
Project: **Feasibility Study**
Project #: **1313**

Well	Ground Surface Elevation (MSL)	TOC Elevation (MSL)	Total Well Depth from TOC (feet)	Well Screen Length (feet)	Top of Well Screen Elevation (MSL)	Base of Well Elevation (MSL)	Middle of Screen Elevation (MSL)	Date	Depth to Water from TOC (feet)	Groundwater Elevation (MSL)	Change in Head (dh) feet	Change in distance (dl) feet	Vertical Hydraulic Gradient (dh/dl)
MW-701	588.97	588.51	13.40	10	585.11	575.11	na	08/14/95	5.51	583.00	7.38	25.41	2.9E-01 downward
								08/20/95	5.63	582.88	9.14	25.29	3.6E-01 downward
								09/25/95	5.58	582.93	10.30	25.34	4.1E-01 downward
								12/21/98	5.72	582.79	0.60	25.20	2.4E-02 downward
PZ-701	589.28	588.89	33.80	5	560.09	555.09	557.59	08/14/95	13.27	575.62			
								08/20/95	15.15	573.74			
								09/25/95	16.26	572.63			
								12/21/98	6.70	582.19			
MW-706	591.51	591.34	13.40	10	587.94	577.94	na	21-Dec-98	3.34	588.00	-0.55	29.34	-1.9E-02 upward
PZ-702	591.62	591.16	35 *	5	561.16	556.16	558.66	21-Dec-98	2.61	588.55			
MW-707	590.29	590.08	13.35	10	586.73	576.73	na	21-Dec-98	6.65	583.43	2.84	26.71	1.1E-01 downward
PZ-703	589.85	589.22	35 *	5	559.22	554.22	556.72	21-Dec-98	8.63	580.59			

Notes:
1. dh (change in head) is the difference in water level elevations in the well nest on the given date.
2. dl (change in distance) is the difference between the two middle screen elevation in a well nest on the given date.
3. The middle of screen elevations for the water table observation wells is the water table elevation on the given day.
4. Vertical hydraulic gradient is a unitless value.

prepared by: BJK 02/08/99
checked by: EPK 02/09/99

HORIZONTAL HYDRAULIC GRADIENT CALCULATIONS

Site: **Campmarina Sheboygan Former Manufactured Gas Plant Site**
Project: **Feasibility Study**
Project #: **1313**

Hydraulic Gradient = dh/dL
dh=change in elevation between two chosen water table or piezometric surface elevation contours on a given date.
dL=change in distance between two chosen water table or piezometric surface elevation contours on a given date.

Water Table Observation Wells

21-Dec-98

dh=	589 feet - 580 feet	dh/dL=	4.6E-02 northeast
dL=	195 feet		

21-Dec-98

dh=	589 feet - 580 feet	dh/dL=	6.2E-02 northeast
dL=	146 feet		

21-Dec-98

dh=	588 feet - 580 feet	dh/dL=	7.8E-02 northeast
dL=	102 feet		

Piezometers

21-Dec-98

dh=	588 feet - 581 feet	dh/dL=	7.4E-02 west/southwest
dL=	94.5 feet		

Notes:
1. Horizontal hydraulic gradient is a unitless value.
2. Maps are attached indicated the contour lines used to calculate dh and dL.

LEGEND

PZ-701 582.19	PIEZOMETER (NRT) WITH PIEZOMETRIC SURFACE ELEVATION, FT.
SG-702	STAFF GAUGE (NRT)
MW-707	MONITORING WELL (NRT)
SB-711	SOIL BORING (NRT)
GB-727	GEOTECHNICAL SOIL BORING (NRT)
B1	GEOTECHNICAL SOIL BORING (MES)
TP-705	TEST PIT (NRT)
TP-101	TEST PIT (SHS)
HA-701	HAND AUGER (NRT)
SS-701	SURFACE SOIL SAMPLE (NRT)
CS-1023	SURFACE SOIL SAMPLE (SHS)
SG-701	ABANDONED STAFF GAUGE (NRT)
— - — - —	CENTER AVENUE RIGHT-OF-WAY
	LIGHT POLE
	FIRE HYDRANT
	GAS SHUT-OFF VALVE
	STORM SEWER MANHOLE
	STORM CATCH BASIN-CURB TYPE
●	WATER SHUT-OFF VALVE
○	SANITARY SEWER MANHOLE
	GAS MANHOLE
	TELEPHONE MANHOLE
	TELEPHONE PEDESTAL
	DISTRIBUTION POLE
	WATER VALVE

APPROXIMATE LOCATION OF:

- - - - -	PRIOR MGP RELATED STRUCTURE
----UGS----	UNDERGROUND GAS
----SAN----	SANITARY SEWER
----STM----	STORM SEWER
----OEL----	OVERHEAD ELECTRIC
----UEL----	UNDERGROUND ELECTRIC
----WTR----	WATERMAIN
—— — — ——	PROPERTY BOUNDARY

GENERAL NOTES:

1. FIRST PHASE CONDOMINIUM CONSTRUCTION TO INCLUDE BUILDING NOS. 1 AND 2. CONSTRUCTION ACTIVITIES TARGETED FOR COMPLETION DURING THE FALL OF 1999.

2. SECOND PHASE TO INCLUDE CONSTRUCTION OF BUILDING NO. 3. CONSTRUCTION SCHEDULED FOR THE FALL OF 1999.

3. CITY TO RETAIN APPROXIMATE 26 FOOT WIDE RIGHT-OF-WAY ALONG RIVER FRONT FOR FUTURE RIVER WALK.

4. ON-SITE TEST PITS (TP-101 THROUGH TP-114) AND SURFACE SOIL SAMPLES (CS-101 THROUGH CS-103) COMPLETED BY SIMON HYDRO-SEARCH (SHS). REFERENCE "PHASE I ENVIRONMENTAL INVESTIGATION MANUFACTURED GAS PLANT SITE, SHEBOYGAN, WISCONSIN", REPORT DATED JUNE 30, 1992.

5. ON-SITE SOIL BORINGS (SB-701 THROUGH SB-710), MONITORING WELLS (MW-701 THROUGH MW-707 AND PZ-101), AND STAFF GAUGE (SG-701) COMPLETED BY NATURAL RESOURCE TECHNOLOGY, INC. (NRT). REFERENCE "PHASE II ENVIRONMENTAL INVESTIGATION REPORT" DATED JUNE 26, 1998.

6. GEOTECHNICAL SOIL BORINGS (B1 THROUGH B5) PERFORMED BY MILLER ENGINEERS, SCIENTISTS (MES). B1 THROUGH B3 WERE COMPLETED ON APRIL 4, 1998 AND B4 AND B5 WERE COMPLETED ON JULY 23, 1998.

7. ON-SITE SOIL BORINGS (SB-711 THROUGH SB-716) COMPLETED BY NRT ON APRIL 4, 1998. REFERENCE NRT LETTER REPORT "ADDITIONAL SOIL BORINGS AND SOIL LABORATORY ANALYSES, CITY OF SHEBOYGAN PROPERTY SOUTH OF CENTER AVENUE RIGHT-OF-WAY, SHEBOYGAN, WISCONSIN" DATED NOVEMBER 24, 1998.

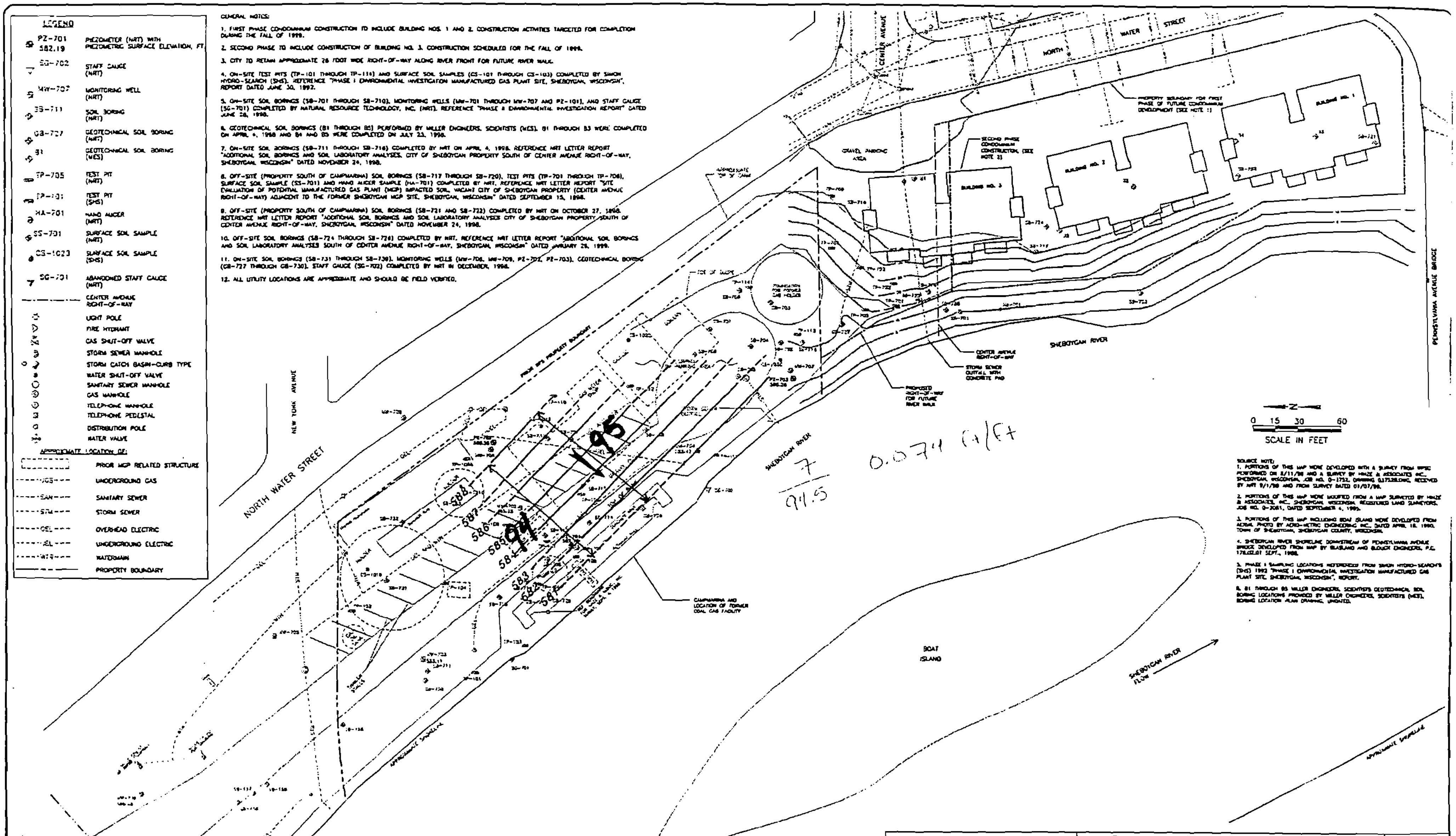
8. OFF-SITE (PROPERTY SOUTH OF CAMPMARINA) SOIL BORINGS (SB-717 THROUGH SB-720), TEST PITS (TP-701 THROUGH TP-708), SURFACE SOIL SAMPLE (SS-701) AND HAND AUGER SAMPLE (HA-701) COMPLETED BY NRT. REFERENCE NRT LETTER REPORT "SITE EVALUATION OF POTENTIAL MANUFACTURED GAS PLANT (MGP) IMPACTED SOIL, VACANT CITY OF SHEBOYGAN PROPERTY (CENTER AVENUE RIGHT-OF-WAY) ADJACENT TO THE FORMER SHEBOYGAN MGP SITE, SHEBOYGAN, WISCONSIN" DATED SEPTEMBER 15, 1998.

9. OFF-SITE (PROPERTY SOUTH OF CAMPMARINA) SOIL BORINGS (SB-721 AND SB-722) COMPLETED BY NRT ON OCTOBER 27, 1998. REFERENCE NRT LETTER REPORT "ADDITIONAL SOIL BORINGS AND SOIL LABORATORY ANALYSES CITY OF SHEBOYGAN PROPERTY SOUTH OF CENTER AVENUE RIGHT-OF-WAY, SHEBOYGAN, WISCONSIN" DATED NOVEMBER 24, 1998.

10. OFF-SITE SOIL BORINGS (SB-724 THROUGH SB-726) COMPLETED BY NRT. REFERENCE NRT LETTER REPORT "ADDITIONAL SOIL BORINGS AND SOIL LABORATORY ANALYSES SOUTH OF CENTER AVENUE RIGHT-OF-WAY, SHEBOYGAN, WISCONSIN" DATED JANUARY 26, 1999.

11. ON-SITE SOIL BORINGS (SB-731 THROUGH SB-736), MONITORING WELLS (MW-708, MW-709, PZ-702, PZ-703), GEOTECHNICAL BORING (GB-727 THROUGH GB-730), STAFF GAUGE (SG-702) COMPLETED BY NRT IN DECEMBER, 1998.

12. ALL UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED.



—Z—

0 15 30 60

SCALE IN FEET

SOURCE NOTE:

1. PORTIONS OF THIS MAP WERE DEVELOPED WITH A SURVEY FROM WPSC PERFORMED ON 8/11/98 AND A SURVEY BY HINZE & ASSOCIATES INC., SHEBOYGAN, WISCONSIN, JOB NO. 0-1732, DRAWING 01732BLDG, RECEIVED BY NRT 9/1/98 AND FROM SURVEY DATED 01/07/99.

2. PORTIONS OF THIS MAP WERE MODIFIED FROM A MAP SURVEYED BY HINZE & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN, REGISTERED LAND SURVEYORS, JOB NO. 0-2081, DATED SEPTEMBER 4, 1995.

3. PORTIONS OF THIS MAP INCLUDING BOAT ISLAND WERE DEVELOPED FROM AERIAL PHOTO BY AERO-METRIC ENGINEERING INC., DATED APRIL 18, 1990, TOWN OF SHEBOYGAN, SHEBOYGAN COUNTY, WISCONSIN.

4. SHEBOYGAN RIVER SHORELINE DOWNSTREAM OF PENNSYLVANIA AVENUE BRIDGE DEVELOPED FROM MAP BY BLASLAND AND BOUCK ENGINEERS, P.C. 178.02.01 SEPT., 1998.

5. PHASE I SAMPLING LOCATIONS REFERENCED FROM SIMON HYDRO-SEARCH'S (SHS) 1992 "PHASE I ENVIRONMENTAL INVESTIGATION MANUFACTURED GAS PLANT SITE, SHEBOYGAN, WISCONSIN", REPORT.

6. B1 THROUGH B5 MILLER ENGINEERS, SCIENTISTS GEOTECHNICAL SOIL BORING LOCATIONS PROVIDED BY MILLER ENGINEERS, SCIENTISTS (MES), BORING LOCATION PLAN DRAWING, UNDATED.

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PIEZOMETRIC SURFACE ELEVATION CONTOURS, DECEMBER 21, 1998

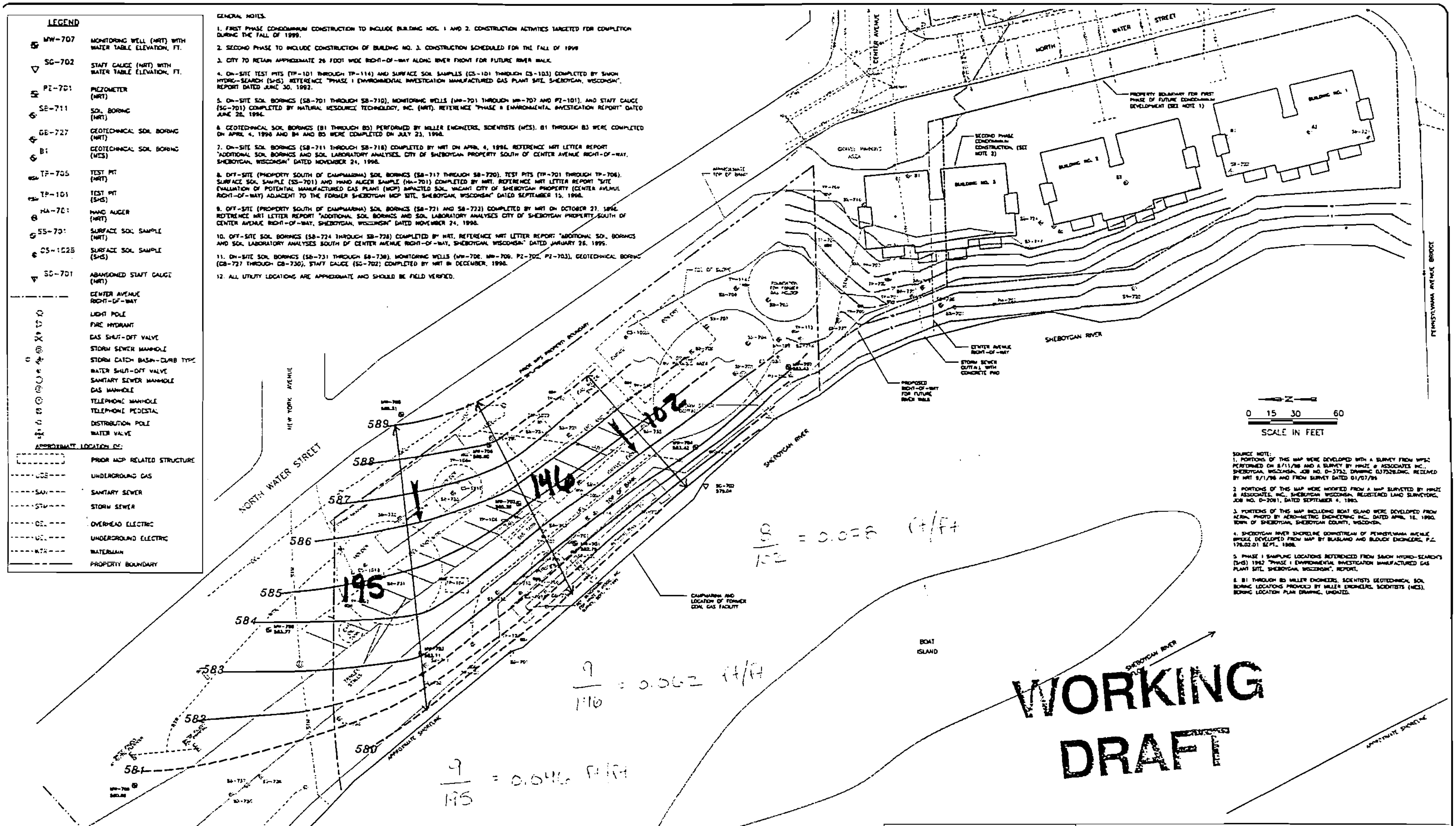
FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPS)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	CHECKED BY:	APPROVED BY:
DATE: 02/10/99	DATE:	DATE:

PROJECT NO. 1313/2.6

DRAWING NO. 1313-013

PLATE 4



$\frac{9}{152} = 0.058$ ft/ft

$\frac{9}{146} = 0.062$ ft/ft

$\frac{9}{195} = 0.046$ ft/ft

LEGEND

MW-707	MONITORING WELL (NRT) WITH WATER TABLE ELEVATION, FT.
SG-702	STAFF GAUGE (NRT) WITH WATER TABLE ELEVATION, FT.
PZ-701	PIEZOMETER (NRT)
SB-711	SOIL BORING (NRT)
GB-727	GEOTECHNICAL SOIL BORING (NRT)
B1	GEOTECHNICAL SOIL BORING (MES)
TP-705	TEST PIT (NRT)
TP-101	TEST PIT (SHS)
HA-701	HAND AUGER (NRT)
SS-701	SURFACE SOIL SAMPLE (NRT)
CS-1025	SURFACE SOIL SAMPLE (SHS)
SG-701	ABANDONED STAFF GAUGE (NRT)
— · — · —	CENTER AVENUE RIGHT-OF-WAY
	LIGHT POLE
	FIRE HYDRANT
	GAS SHUT-OFF VALVE
	STORM SEWER MANHOLE
	STORM CATCH BASIN-CURB TYPE
	WATER SHUT-OFF VALVE
	SANITARY SEWER MANHOLE
	GAS MANHOLE
	TELEPHONE MANHOLE
	TELEPHONE PEDESTAL
	DISTRIBUTION POLE
	WATER VALVE
APPROXIMATE LOCATION OF:	
	PRIOR MGP RELATED STRUCTURE
----- UGS -----	UNDERGROUND GAS
----- SAN -----	SANITARY SEWER
----- STM -----	STORM SEWER
----- OEL -----	OVERHEAD ELECTRIC
----- UEL -----	UNDERGROUND ELECTRIC
----- WTR -----	WATERMAIN
——— — — ———	PROPERTY BOUNDARY

GENERAL NOTES.

1. FIRST PHASE CONDOMINIUM CONSTRUCTION TO INCLUDE BUILDING NOS. 1 AND 2. CONSTRUCTION ACTIVITIES TARGETED FOR COMPLETION DURING THE FALL OF 1999.
2. SECOND PHASE TO INCLUDE CONSTRUCTION OF BUILDING NO. 3. CONSTRUCTION SCHEDULED FOR THE FALL OF 1999
3. CITY TO RETAIN APPROXIMATE 26 FOOT WIDE RIGHT-OF-WAY ALONG RIVER FRONT FOR FUTURE RIVER WALK.
4. ON-SITE TEST PITS (TP-101 THROUGH TP-114) AND SURFACE SOIL SAMPLES (CS-101 THROUGH CS-103) COMPLETED BY SIMON HYDRO-SEARCH (SHS). REFERENCE "PHASE I ENVIRONMENTAL INVESTIGATION MANUFACTURED GAS PLANT SITE, SHEBOYGAN, WISCONSIN", REPORT DATED JUNE 30, 1992.
5. ON-SITE SOIL BORINGS (SB-701 THROUGH SB-710), MONITORING WELLS (MW-701 THROUGH MW-707 AND PZ-101), AND STAFF GAUGE (SG-701) COMPLETED BY NATURAL RESOURCE TECHNOLOGY, INC. (NRT). REFERENCE "PHASE II ENVIRONMENTAL INVESTIGATION REPORT" DATED JUNE 28, 1996.
6. GEOTECHNICAL SOIL BORINGS (B1 THROUGH B5) PERFORMED BY MILLER ENGINEERS, SCIENTISTS (MES). B1 THROUGH B3 WERE COMPLETED ON APRIL 4, 1998 AND B4 AND B5 WERE COMPLETED ON JULY 23, 1998.
7. ON-SITE SOIL BORINGS (SB-711 THROUGH SB-716) COMPLETED BY NRT ON APRIL 4, 1996. REFERENCE NRT LETTER REPORT "ADDITIONAL SOIL BORINGS AND SOIL LABORATORY ANALYSES, CITY OF SHEBOYGAN PROPERTY SOUTH OF CENTER AVENUE RIGHT-OF-WAY, SHEBOYGAN, WISCONSIN" DATED NOVEMBER 24, 1998.
8. OFF-SITE (PROPERTY SOUTH OF CAMPMARINA) SOIL BORINGS (SB-717 THROUGH SB-720), TEST PITS (TP-701 THROUGH TP-706), SURFACE SOIL SAMPLE (SS-701) AND HAND AUGER SAMPLE (HA-701) COMPLETED BY NRT. REFERENCE NRT LETTER REPORT "SITE EVALUATION OF POTENTIAL MANUFACTURED GAS PLANT (MGP) IMPACTED SOIL, VACANT CITY OF SHEBOYGAN PROPERTY (CENTER AVENUE RIGHT-OF-WAY) ADJACENT TO THE FORMER SHEBOYGAN MGP SITE, SHEBOYGAN, WISCONSIN" DATED SEPTEMBER 15, 1998.
9. OFF-SITE (PROPERTY SOUTH OF CAMPMARINA) SOIL BORINGS (SB-721 AND SB-722) COMPLETED BY NRT ON OCTOBER 27, 1998. REFERENCE NRT LETTER REPORT "ADDITIONAL SOIL BORINGS AND SOIL LABORATORY ANALYSES CITY OF SHEBOYGAN PROPERTY SOUTH OF CENTER AVENUE RIGHT-OF-WAY, SHEBOYGAN, WISCONSIN" DATED NOVEMBER 24, 1998.
10. OFF-SITE SOIL BORINGS (SB-724 THROUGH SB-726) COMPLETED BY NRT. REFERENCE NRT LETTER REPORT "ADDITIONAL SOIL BORINGS AND SOIL LABORATORY ANALYSES SOUTH OF CENTER AVENUE RIGHT-OF-WAY, SHEBOYGAN, WISCONSIN" DATED JANUARY 26, 1999.
11. ON-SITE SOIL BORINGS (SB-731 THROUGH SB-739), MONITORING WELLS (MW-708, MW-709, PZ-702, PZ-703), GEOTECHNICAL BORING (GB-727 THROUGH GB-730), STAFF GAUGE (SG-702) COMPLETED BY NRT IN DECEMBER, 1998.
12. ALL UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED.

SOURCE NOTE:

1. PORTIONS OF THIS MAP WERE DEVELOPED WITH A SURVEY FROM WPSC PERFORMED ON 8/11/98 AND A SURVEY BY HINTZ & ASSOCIATES INC., SHEBOYGAN, WISCONSIN, JOB NO. D-3732, DRAWING D3732B.DWG, RECEIVED BY NRT 9/1/98 AND FROM SURVEY DATED 01/07/99
2. PORTIONS OF THIS MAP WERE MODIFIED FROM A MAP SURVEYED BY HINTZ & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN, REGISTERED LAND SURVEYORS, JOB NO. D-2081, DATED SEPTEMBER 4, 1985.
3. PORTIONS OF THIS MAP INCLUDING BOAT ISLAND WERE DEVELOPED FROM AERIAL PHOTO BY AERO-METRIC ENGINEERING INC., DATED APRIL 16, 1990. TOWN OF SHEBOYGAN, SHEBOYGAN COUNTY, WISCONSIN.
4. SHEBOYGAN RIVER SHORELINE DOWNSTREAM OF PENNSYLVANIA AVENUE BRIDGE DEVELOPED FROM MAP BY BLASLAND AND BOUCK ENGINEERS, P.C. 176.02.01 SEPT., 1998.
5. PHASE I SAMPLING LOCATIONS REFERENCED FROM SIMON HYDRO-SEARCH'S (SHS) 1992 "PHASE I ENVIRONMENTAL INVESTIGATION MANUFACTURED GAS PLANT SITE, SHEBOYGAN, WISCONSIN", REPORT.
6. B1 THROUGH B5 MILLER ENGINEERS, SCIENTISTS GEOTECHNICAL SOIL BORING LOCATIONS PROVIDED BY MILLER ENGINEERS, SCIENTISTS (MES), BORING LOCATION PLAN DRAWING, UNDATED.

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WATER TABLE ELEVATION CONTOURS
DECEMBER 21, 1998

FEASIBILITY STUDY
CAMPMARINA, FORMER COAL GAS FACILITY
WISCONSIN PUBLIC SERVICE CORPORATION (WPS)
SHEBOYGAN, WISCONSIN

DRAWN BY: TAS	CHECKED BY:	APPROVED BY:	PROJECT NO. 1313/2.6
DATE: 02/09/99	DATE:	DATE:	DRAWING NO. 1313-D12
			PLATE 3

APPENDIX H

PRELIMINARY REMEDIATION COST ESTIMATES

PROJECT: WPSC - Campmarina Sheboygan	NRT PROJECT NO.: 1313	
Former Manufactured Gas Plant Site	BY: CAR	CHKD BY: REW
Preliminary Cost Estimate	DATE: 4/9/99	
Soil and Groundwater Remediation	corrected rem alts-Sheboygan	

REMEDIAL ALTERNATIVE 1
- Source Area Excavation and Off-Site Treatment

	ITEM COST	SUB-TOTAL
CAPITAL COSTS		
CONSULTING CAPITAL COSTS		
1.0 Project Management and Coordination		$25,750
Meetings		
Monthly Summary and Budgetary Reports		
Coordination and Scheduling		
2.0 Remedial Action Planning, Permitting and Agency Negotiation		$31,970
Health and Safety Plan		
Design Report		
Permitting and Agency Negotiation		
3.0 Design Plans and Specifications and Contractor Selection		$41,350
Plans, Specifications and Bid Documents		
Bidding and Contractor Selection		
4.0 Remedial Implementation		$192,500
Mobilization/Prep.		
Site Preparation		
Barrier Wall & Shoring Installation		
Excavation Oversight and Sampling		
Demobilization/Cleanup		
Replacement Well Installation		
5.0 Remedial Documentation Report		$21,970
SUBTOTAL, CONSULTING CAPITAL COSTS		$313,540
15% Estimating Contingency		$47,031
TOTAL, CONSULTING CAPITAL COSTS		$360,571
CONSTRUCTION CAPITAL COSTS		
1.0 Vertical Barrier Installation (Contractor)		$456,200
Mobilization/Demobilization	$20,000	
Vertical Barrier Wall	$421,200	
Barrier Engineering Design Support	$15,000	
2.0 Soil Excavation (Contractor)		$920,600
Site Preparation, Mobilization, Setup	$2,000	
Erosion/Pedestrian Control (Fencing)	$12,000	
Shoring	$156,000	
Overburden Excavation	$33,600	
Contam. Soil Excavation & Screening	$497,000	

REMEDIAL ALTERNATIVE 1

- Source Area Excavation and Off-Site Treatment

	ITEM COST	SUB-TOTAL
Temp. Underground Utility Relocation	$20,000	
Construction Debris (Transportation & Disposal)	$84,000	
Compaction Testing	$5,000	
Excavation Dewatering and Disposal	$100,000	
Site Restoration (grading)	$5,000	
Replacement Wells (5 water table, 2 piezometer)	$6,000	
3.0 Off-Site Thermal Treatment (Contractor)		$3,570,600
Mobilization/Demobilization	$60,000	
Soil Transportation (To & From Thermal Unit)	$556,800	
Medium Temperature Thermal Treatment	$2,644,800	
Granular Backfill Installation/Compaction	$25,200	
Backfill/Regrading/Compaction - Treated Soil	$208,800	
Confirmatory Soil Sample Analytical	$40,000	
Treatment Verification Sample Analytical	$20,000	
Air Monitoring	$15,000	
4.0 Off-Site Treatment @ LaFarge (Contractor)		$5,053,400
Mobilization/Demobilization	$2,000	
Contam. Soil Transportation	$1,705,200	
Off-Site Treatment & Disposal @ Lafarge	$2,436,000	
Confirmatory Soil Sample Analytical	$40,000	
Treatment Verification Sample Analytical	$20,000	
Granular Backfill Installation/Compaction	$835,200	
Air Monitoring	$15,000	
SUBTOTAL, CONSTRUCTION CAPITAL COSTS Off-Site Thermal Treatment		$4,947,400
15% Estimating Contingency		$742,110
TOTAL, CONSTRUCTION CAPITAL COSTS Off-Site Thermal Treatment		$5,689,510
SUBTOTAL, CONSTRUCTION CAPITAL COSTS Off-Site Disposal @ LaFarge		$6,430,200
15% Estimating Contingency		$964,530
TOTAL CONSTRUCTION CAPITAL COSTS Off-Site Treatment @ LaFarge		$7,394,730
TOTAL CAPITAL COSTS (Off-Site Thermal Treatment)		**$6,050,081**
TOTAL CAPITAL COSTS (Off-Site Treatment @ LaFarge)		**$7,755,301**

REMEDIAL ALTERNATIVE 1

- Source Area Excavation and Off-Site Treatment

	ITEM COST	SUB-TOTAL
ANNUAL COSTS		
1.0 Annual RNA Groundwater Monitoring (per sampling event)		$5,980
Sampling Labor, Travel, Prep.	$1,000	
Groundwater Analyses:		
Lab Analytical (BTEX, PAHs, Cyanides)	$2,160	
Lab Analytical (RNA Parameters)	$1,920	
Field Equipment:		
Vehicle and Field Equipment	$500	
Data Evaluation/Reports:		
1. Computer Charges	$100	
2. Printing/ Reproduction	$300	
ANNUAL SUBTOTAL - First Two Years of RNA Groundwater Monitoring (4 Sampling Events Per Year)		$23,920
15% Estimating Contingency		$3,588
TOTAL ANNUAL COST (First 2 Years)		**$27,508**
ANNUAL SUBTOTAL - Remaining 8 Years of RNA Groundwater Monitoring (Annually)		$5,980
15% Estimating Contingency		$897
TOTAL ANNUAL COSTS (Remaining 8 years)		**$6,877**
1.0 Project Closure Costs (After 10 years)		
Consultant Closure Costs	$12,000	
Construction Closure Costs	$11,000	
CLOSURE SUBTOTAL		$23,000
15% Estimating Contingency		$3,450
TOTAL CLOSURE COSTS		**$26,450**

TOTAL NET PRESENT WORTH (10 yrs., 9% cost of capital, 3% inflation) ***Off-site Thermal Treatment***	**$6,151,460**

TOTAL NET PRESENT WORTH (10 yrs., 9% cost of capital, 3% inflation) ***Off-site Disposal @ LaFarge***	**$7,856,680**

NOTES:

1. Conceptual system layout is presented on Figure 1.
2. Above is a preliminary estimate and may be revised during final design.

PROJECT: WPSC - Campmarina Sheboygan	NRT PROJECT NO.: 1313	
Former Manufactured Gas Plant Site	BY: CAR	CHKD BY: REW
Preliminary Cost Estimate	DATE: 4/9/99	
Soil and Groundwater Remediation	corrected rem alts-Sheboygan	

REMEDIAL ALTERNATIVE 2A
- Full Source Area Encapsulation With Low Flow Biosparging System

	ITEM COST	SUB-TOTAL
CAPITAL COSTS		
CONSULTING CAPITAL COSTS		
1.0 Project Management and Coordination		$25,750
Meetings		
Monthly Summary and Budgetary Reports		
Coordination and Scheduling		
2.0 Remedial Action Planning, Permitting and Agency Negotiation		$34,970
Health and Safety Plan		
Design Report		
Permitting and Agency Negotiation		
3.0 Design Plans and Specifications and Contractor Selection		$40,450
Plans, Specifications and Bid Documents		
Bidding and Contractor Selection		
4.0 Remedial Implementation		$104,270
Mobilization/Prep.		
Site Preparation		
Center Avenue ROW Excavation Oversight		
Barrier Wall Installation Oversight		
Engineered Cap Installation Oversight		
In-Situ Biosparging Installation Oversight		
Demobilization/Cleanup		
5.0 Remedial Documentation Report		$20,570
SUBTOTAL, CONSULTING CAPITAL COSTS		$226,010
15% Estimating Contingency		$33,902
TOTAL, CONSULTING CAPITAL COSTS		$259,912
CONSTRUCTION CAPITAL COSTS		
1.0 Vertical Barrier Installation (Contractor)		$927,125
Mobilization/Demobilization	$10,000	
Vertical Barrier (30 feet deep)	$892,125	
Perimeter Monitoring System	$10,000	
Barrier Engineering Design Support	$15,000	
2.0 Soil Excavation in Center Ave. ROW (Contractor)		$360,220
Site Preparation, Mobilization, Setup	$2,000	
Erosion/Pedestrian Control (Fencing)	$6,000	
Slope Stabilization (Grading & Cutbacks)	$2,000	

REMEDIAL ALTERNATIVE 2A
- Full Source Area Encapsulation With Low Flow Biosparging System

	ITEM COST	SUB-TOTAL
Soil Excavation & Screening	$30,100	
Soil Transportation for Off-site Treatment	$98,000	
Off-site Treatment & Disposal @ Lafarge	$140,000	
Temp. Underground Utility Relocation	$8,000	
Construction Debris-Transportation & Disposal	$18,000	
Geotextile Liner	$1,520	
Granular Backfill Installation/Compaction	$51,600	
Compaction Testing	$2,000	
Air Monitoring	$1,000	
3.0 Engineered Cap Installation (Contractor)		$157,000
Site Preperation, Mobilization and Setup	$5,000	
Grading	$9,000	
Install & Compact Subbase & Clean Cover	$60,000	
Engineered Cap - Geomembrane	$42,000	
Geotextile Fabric/Mat (For Drainage)	$39,000	
Well Extensions	$2,000	
4.0 In-Situ Biosparging (Contractor)		$89,670
Bioventing Wells (20)	$12,000	
Low Flow Air Sparge Blowers (2)	$6,000	
Trenching, Process Piping and Hookup	$17,670	
System Automation & Controls	$10,000	
Remediation Enclosure	$15,000	
Abandonment Activities	$2,000	
Trans./Disp. of Well/Trench Spoils	$27,000	
SUBTOTAL, CONSTRUCTION CAPITAL COSTS		$1,534,015
15% Estimating Contingency		$230,102
TOTAL, CONSTRUCTION CAPITAL COSTS		$1,764,117
TOTAL CAPITAL COSTS		**$2,024,029**

ANNUAL COSTS

1.0 Annual Groundwater Monitoring		$4,060
Sampling Labor, Travel, Prep.	$1,000	
Groundwater Analyses:		
Lab Analytical (BTEX, PAHs, Cyanides)	$2,160	
Field Equipment:		
Vehicle and Field Equipment	$500	
Data Evaluation/Reports:		
1. Computer Charges	$100	
2. Printing/ Reproduction	$300	
2.0 Vertical Barrier Wall & Engineered Cap Maintenance		$2,000
Trienniel Barrier Wall and Cap Maintenance (1/3 ann.	$2,000	

REMEDIAL ALTERNATIVE 2A

- Full Source Area Encapsulation With Low Flow Biosparging System

	ITEM COST	SUB-TOTAL
3.0 In-Situ Bioremediation O & M		$6,000
O & M Labor, Travel, Equipment	$1,000	
Utilities-Electric	$5,000	
ANNUAL SUBTOTAL		$12,060
15% Estimating Contingency		$1,809
TOTAL ANNUAL COSTS		**$13,869**
1.0 Project Closure Costs (After 30 years)		
Consultant Closure Costs	$12,000	
Construction Closure Costs	$11,000	
CLOSURE SUBTOTAL		$23,000
15% Estimating Contingency		$3,450
TOTAL CLOSURE COSTS		**$26,450**
TOTAL NET PRESENT WORTH (30 yrs., 9% cost of capital, 3% inflation)		**$2,217,730**

NOTES:

1. Conceptual system layout is presented on Figure 2.
2. Above is a preliminary estimate and may be revised during final design.

PROJECT: WPSC - Campmarina Sheboygan	NRT PROJECT NO.: 1313	
Former Manufactured Gas Plant Site	BY: CAR	CHKD BY: REW
Preliminary Cost Estimate	DATE: 4/9/99	
Soil and Groundwater Remediation	corrected rem alts-Sheboygan	

REMEDIAL ALTERNATIVE 2B
- Partial Source Area Encapsulation w/ Interceptor Trench & Low Flow Biosparging System

	ITEM COST	SUB-TOTAL
CAPITAL COSTS		
CONSULTING CAPITAL COSTS		
1.0 Project Management and Coordination		$25,750
Meetings		
Monthly Summary and Budgetary Reports		
Coordination and Scheduling		
2.0 Remedial Action Planning, Permitting and Agency Negotiation		$34,970
Health and Safety Plan		
Design Report		
Permitting and Agency Negotiation		
3.0 Design Plans and Specifications and Contractor Selection		$41,850
Plans, Specifications and Bid Documents		
Bidding and Contractor Selection		
4.0 Remedial Implementation		$102,920
Mobilization/Prep.		
Site Preparation		
Center Avenue ROW Excavation Oversight		
Barrier Wall/Interceptor Trench Installation Oversight		
Engineered Cap Installation Oversight		
In-Situ Biosparging/Dewatering System Installation Oversight		
Demobilization/Cleanup		
5.0 Remedial Documentation Report		$20,570
SUBTOTAL, CONSULTING CAPITAL COSTS		$226,060
15% Estimating Contingency		$33,909
TOTAL, CONSULTING CAPITAL COSTS		$259,969
CONSTRUCTION CAPITAL COSTS		
1.0 Vertical Barrier/Intercepotor Trench Installation (Contractor)		$681,960
Mobilization/Demobilization	$30,000	
Vertical Barrier w/ Interceptor Trench (24 feet deep)	$466,560	
Granular Backfill Installation/Compaction	$26,160	
Trench Spoil Transportation & Disposal	$130,800	
Flexible Feed Pipe	$1,440	
Perimeter Monitoring System	$10,000	
Air Monitoring	$2,000	
Barrier Engineering Design Support	$15,000	

REMEDIAL ALTERNATIVE 2B
- Partial Source Area Encapsulation w/ Interceptor Trench & Low Flow Biosparging System

	ITEM COST	SUB-TOTAL
2.0 Soil Excavation in Center Ave. ROW (Contractor)		$360,220
Site Preparation, Mobilization, Setup	$2,000	
Erosion/Pedestrian Control (Fencing)	$6,000	
Slope Stabilization (Grading & Cutbacks)	$2,000	
Soil Excavation & Screening	$30,100	
Soil Transportation for Off-site Treatment	$98,000	
Off-site Treatment & Disposal @ Lafarge	$140,000	
Temp. Underground Utility Relocation	$8,000	
Construction Debris-Transportation & Disposal	$18,000	
Geotextile Liner	$1,520	
Granular Backfill Installation/Compaction	$51,600	
Compaction Testing	$2,000	
Air Monitoring	$1,000	
3.0 Engineered Cap Installation (Contractor)		$157,000
Site Preperation, Mobilization and Setup	$5,000	
Grading	$9,000	
Install & Compact 1' Subbase & Clean Cover	$60,000	
Engineered Cap - Geomembrane	$42,000	
Geotextile Fabric/Mat (For Drainage)	$39,000	
Well Extensions	$2,000	
4.0 In-Situ Bioventing System (Contractor)		$89,670
Bioventing Wells (20)	$12,000	
Low Flow Air Sparge Blowers (2)	$6,000	
Trenching, Process Piping and Hookup	$17,670	
System Automation & Controls	$10,000	
Remediation Enclosure	$15,000	
Abandonment Activities	$2,000	
Trans./Disp. of Well/Trench Spoils	$27,000	
5.0 Interceptor Trench System (Contractor)		$50,100
Trench Sumps (4)	$2,000	
Submersible Pumps (4)	$4,000	
Trenching, Process Piping and Hookup	$17,100	
System Automation & Controls	$5,000	
Treatment Equipment (Air stripper, etc.)	$10,000	
Treatment Enclosure	$10,000	
Abandonment Activities	$2,000	
SUBTOTAL, CONSTRUCTION CAPITAL COSTS		$1,338,950
15% Estimating Contingency		$200,843
TOTAL, CONSTRUCTION CAPITAL COSTS		$1,539,793
TOTAL CAPITAL COSTS		**$1,799,762**

REMEDIAL ALTERNATIVE 2B

- Partial Source Area Encapsulation w/ Interceptor Trench & Low Flow Biosparging System

	ITEM COST	SUB-TOTAL
ANNUAL COSTS		
1.0 Annual Groundwater Monitoring		$4,060
Sampling Labor, Travel, Prep.	$1,000	
Groundwater Analyses:		
Lab Analytical (BTEX, PAHs, Cyanides)	$2,160	
Field Equipment:		
Vehicle and Field Equipment	$500	
Data Evaluation/Reports:		
1. Computer Charges	$100	
2. Printing/ Reproduction	$300	
2.0 Vertical Barrier Wall & Engineered Cap Maintenance		$2,000
Trienniel Barrier Wall and Cap Maintenance (1/3 ann)	$2,000	
3.0 In-Situ Bioremediation O & M		$6,000
O & M Labor, Travel, Equipment	$1,000	
Utilities-Electric	$5,000	
4.0 Interceptor Trench & Discharge O & M		$8,250
O & M Labor, Travel, Equipment	$1,000	
Capital Replacement	$1,000	
Discharge Sampling Analytical	$1,000	
Report Preperation / Project Management	$2,000	
Discharge Service Fee	$100	
Volmetric Service Fee	$3,150	
ANNUAL SUBTOTAL		$20,310
15% Estimating Contingency		$3.047
TOTAL ANNUAL COSTS		**$23,357**
1.0 Project Closure Costs (After 30 years)		
Consultant Closure Costs	$12,000	
Construction Closure Costs	$11.000	
CLOSURE SUBTOTAL		$23,000
15% Estimating Contingency		$3,450
TOTAL CLOSURE COSTS		**$26,450**

TOTAL NET PRESENT WORTH (30 yrs., 9% cost of capital, 3% inflation) **$2,122,659**

NOTES:
1. Conceptual system layout is presented on Figure 3.
2. Above is a preliminary estimate and may be revised during final design.

PROJECT: WPSC - Campmarina Sheboygan	NRT PROJECT NO.: 1313	
Former Manufactured Gas Plant Site	BY: CAR	CHKD BY: REW
Preliminary Cost Estimate	DATE: 4/9/99	
Soil and Groundwater Remediation	corrected rem alts-Sheboygan	

REMEDIAL ALTERNATIVE 3

- Steam Enhanced Vapor Extraction (SEVE)

	ITEM COST	SUB-TOTAL
CAPITAL COSTS		
CONSULTING CAPITAL COSTS		
1.0 Project Management and Coordination		$25,750
Meetings		
Monthly Summary and Budgetary Reports		
Coordination and Scheduling		
2.0 Remedial Action Planning, Permitting and Agency Negotiation		$30,720
Health and Safety Plan		
Design Report		
Permitting and Agency Negotiation		
3.0 SEVE Pilot Tests		$35,700
Plans		
Pilot Test and System Oversight		
4.0 Design Plans and Specifications and Contractor Selection		$23,250
Plans, Specifications and Bid Documents		
Bidding and Contractor Selection		
5.0 Remedial Implementation		$111,480
Mobilization/Prep.		
Site Preparation		
Center Avenue ROW Excavation Oversight		
SEVE System Installation Oversight		
Progress Monitoring (air/water sampling)		
Barrier Wall Installation Oversight		
Abandonment/Restoration Oversight		
Post Remedial Soil Borings		
6.0 Remedial Documentation Report		$21,570
SUBTOTAL, CONSULTING CAPITAL COSTS		$248,470
15% Estimating Contingency		$37,271
TOTAL, CONSULTING CAPITAL COSTS		$285,741
CONSTRUCTION CAPITAL COSTS		
1.0 SEVE Pilot Tests (Contractor)		$70,000
(2) 3 week pilot tests	$70,000	
2.0 Vertical Barrier Installation (Contractor)		$446,200
Mobilization/Demobilization	$10,000	

REMEDIAL ALTERNATIVE 3
- Steam Enhanced Vapor Extraction (SEVE)

	ITEM COST	SUB-TOTAL
Vertical Barrier	$421,200	
Barrier Engineering Design Support	$15,000	
3.0 Soil Excavation in Center Ave. ROW (Contractor)		$360,220
Site Preparation, Mobilization, Setup	$2,000	
Erosion/Pedestrian Control (Fencing)	$6,000	
Slope Stabilization (Grading & Cutbacks)	$2,000	
Soil Excavation & Screening	$30,100	
Soil Transportation for Off-site Disposal	$98,000	
Off-site Treatment & Disposal @ Lafarge	$140,000	
Temp. Underground Utility Relocation	$8,000	
Construction Debris-Transportation & Disposal	$18,000	
Geotextile Liner	$1,520	
Granular Backfill Installation/Compaction	$51,600	
Compaction Testing	$2,000	
Air Monitoring	$1,000	
4.0 Full Scale SEVE System Installation (Contractor)		$952,400
Engineering Design, Equip. Specs. Prep. & Procureme	$60,000	
Drilling, (40) 25 ft. deep, DPE Recovery Wells	$100,000	
Drilling, (18) 25 ft. deep, Steam Injection Wells	$60,000	
Process Trailer (DPE pumps, AS skids, Steam Gen. et	$300,000	
Installation of Surface Infiltration Trenches	$50,000	
Vertical Separators and Accessories (2)	$40,000	
Carbon Adsorption Systems (2)	$20,000	
Electrical, Gas, Water, Telephone Hook-up	$30,000	
Process Control Equipment & Telemetry Installation	$60,000	
Trenching, Process Piping and Hookup	$100,000	
Permitting Fees (Air, Water, Construction)	$10,000	
Trans./Disp. of Well/Trench Spoils	$102,000	
Imported Backfill for Trenches-Install & Compact	$20,400	
5.0 SEVE System O & M (Includes 2 years O & M)		$465,000
O & M Labor (Contracted)	$90,000	
Utilities (Gas, Water, Telephone & Electric)	$240,000	
GW/Vapor Sampling Analytical	$30,000	
Carbon Bed Replacement	$30,000	
Surfactant/Nutrient for Infiltration Galleries	$20,000	
System Abandonment & Carbon Disposal	$30,000	
Boarding, Lodging and Travel	$20,000	
Closure Report Preperation	$5,000	
SUBTOTAL, CONSTRUCTION CAPITAL COSTS		$2,223,820
15% Estimating Contingency		$333,573
TOTAL, CONSTRUCTION CAPITAL COSTS		$2,557,393
TOTAL CAPITAL COSTS		**$2,843,134**

REMEDIAL ALTERNATIVE 3
- Steam Enhanced Vapor Extraction (SEVE)

	ITEM COST	SUB-TOTAL
ANNUAL COSTS		
1.0 Annual Groundwater Monitoring		$5,980
Sampling Labor, Travel, Prep.	$1,000	
Groundwater Analyses:		
Lab Analytical (BTEX, PAHs, Cyanides)	$2,160	
Lab Analytical (RNA Parameters)	$1,920	
Field Equipment:		
Vehicle and Field Equipment	$500	
Data Evaluation/Reports:		
1. Computer Charges	$100	
2. Printing/ Reproduction	$300	
ANNUAL SUBTOTAL - First Two Years of RNA Groundwater Monitoring (4 Sampling Events Per Year)		$23,920
15% Estimating Contingency		$3,588
TOTAL ANNUAL COST (First 2 Years)		**$27,508**
ANNUAL SUBTOTAL - Remaining 8 Years of RNA Groundwater Monitoring (Annually)		$5,980
15% Estimating Contingency		$897
TOTAL ANNUAL COSTS (Remaining 8 years)		**$6,877**
1.0 Project Closure Costs (After **10** years)		
Consultant Closure Costs	$12,000	
Construction Closure Costs	$11,000	
CLOSURE SUBTOTAL		$23,000
15% Estimating Contingency		$3,450
TOTAL CLOSURE COSTS		**$26,450**
TOTAL NET PRESENT WORTH (10 yrs., 9% cost of capital, 3% inflation)		**$2,944,512**

NOTES:
1. Conceptual system layout is presented on Figure 4.
2. Above is a preliminary estimate & may be revised during final design.

PLATES