Natural
Resource
Technology, Inc.

N R T

REMEDIAL WORK PLAN
PHASE I, EXCAVATION AND GRADING
CAMPMARINA AND CENTER AVENUE RIGHT-OF-WAY

FORMER COAL GAS FACILITY
SHEBOYGAN, WISCONSIN

Project No: 1313

Prepared For:

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February 2, 2000

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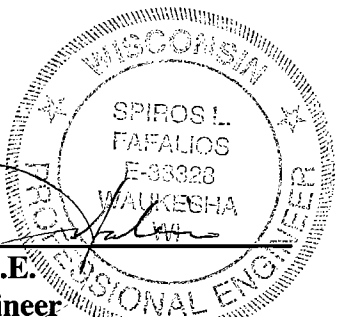

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"I, Spiros A. Fafalios, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the 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."

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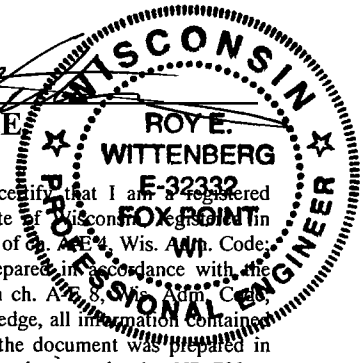

"I, Roy E. Wittenberg, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. 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."

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1 INTRODUCTION

1.1 Overview

Presented in this document is a Phase I Operable Unit (OU) Remedial Design/Remedial Action (RD/RA) Work Plan for Wisconsin Public Service Corporations (WPS's) former coal gas facility located at Campmarina in Sheboygan, Wisconsin (Figure 1). This Phase I Work Plan was prepared in substantive conformance with the May 7, 1999 Feasibility Study (FS) as approved by the Wisconsin Department of Natural Resources (WDNR) on October 27, 1999 and the March 5, 1991 Contract between WPS, the City of Sheboygan and the Wisconsin Department of Natural Resources (WDNR). General work plan requirements are outlined under task 13, RD/RA Project Plans, task 14, Remedial Design and task 15 Remedy Construction of the Contract. In accordance with the Contract task requirements, the Phase I Work Plan incorporates applicable and appropriate WDNR requirements under NR 718 and 724 as well as guidance provided by the United States Environmental Protection Agency's (U.S. EPA's) document "*Superfund Remedial Design and Remedial Action Guidance*", OSWER Directive 9355-0-4A, dated June 1986, as appropriate.

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. Proposed remedial activities in this work plan address both these locations as one comprehensive site ("site"). City of Sheboygan redevelopment plans for Campmarina and the Right-of-Way include a neighborhood park, river walk and condominiums.

Proposed redevelopment plans by the City of Sheboygan for Campmarina and the Center Avenue Right-of-Way that consist of a neighborhood park and river walk are components of a broader scope called the Water Street Neighborhood Redevelopment Plan. Other components of the

development plan include eliminating Water Street as part of the neighborhood park development and expansion of the condominium development from the Pennsylvania Bridge to the Center Avenue Right-of-Way. Construction of the park and the river walk is currently slated for mid to late 2000.

The conclusions of the FS recommended selection of one of the following two alternatives:

- Alternative 2A: Full source area encapsulation with a vertical cutoff wall completely around the MGP affected areas, an engineered cap and low flow biosparging; or,
- Alternative 2B: Partial source area encapsulation with an interceptor trench, vertical cutoff wall directly along the river, an engineered cap and low flow biosparging.

Based on economic concerns regarding long-term management of affected groundwater, and long-term and short-term effectiveness of the interceptor trench, Alternative 2A was selected as the preferred final remedy.

Remedial actions for Campmarina and the Center Avenue Right-of-Way will be implemented in two phases. Division into two phases reflects a restructuring of the submittals from what is requested in the March 5, 1991 Contract to better meet site specific conditions and current scheduling requests from the City. Two separate OU RD/RA work plans instead of one comprehensive document will be submitted to address each phase. Phase I site activities will consist of the excavation, site grading, material management and off-site thermal treatment or disposal of MGP affected soil and debris. Thermal treatment of MGP affected soil and debris will be accomplished using a mobile thermal treatment unit to be stationed at WPS's Wildwood Avenue facility in Sheboygan, Wisconsin (Figure 1). Phase II activities will consist of installing a vertical sheet pile wall around affected portions of Campmarina and the Right-of-Way, constructing a low permeability geosynthetic composite cap, backfilling the site to pre-existing grades and installing a flexible delivery and extraction system for low flow biosparging.

The primary objectives of the proposed Phase I activities will be to conduct removal of MGP affected materials from the unsaturated zone and prepare the site for the Phase II activities described above. In addition to a technical overview for implementing the Phase I activities, the Phase I Work Plan also addresses key Contract task elements including quality assurance/quality control (QA/QC) procedures, groundwater, soil and air monitoring requirements, permitting and scheduling for remedial implementation. Supplemental to the work plan, Phase I design plans and specifications are being prepared for bidding, and contract administration that will be forwarded to the WDNR under separate cover. A Phase II Work Plan is also under preparation that will be forwarded under separate cover.

1.2 General Site Information

Campmarina and the Center Avenue Right-of-Way encompass approximately 2.6 acres and are 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 currently vacant property.

Key project principals and personnel are listed below:

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. (NRT)
23713 West Paul Road
Pewaukee, WI 53072
Contact: Mr. Roy E. Wittenberg
(262) 523-9000

Key WPS personnel that will be involved in the implementation includes Ms. Connie Lawniczak and Mr. Dale Wiley. Ms. Lawniczak will serve as the Project Director and Mr. Wiley will serve as Construction Manager for WPS. Key NRT personnel involved in the implementation of remedial actions at the Campmarina site includes Mr. Roy Wittenberg P.E., Ms. Laurie Parsons P.E., Mr. Spiros Fafalios P.E., Mr. Chris Robb and Mr. Dan Plovnick. Mr. Wittenberg will serve as the Project Manager, Mr. Fafalios and Mr. Robb will serve as Project Engineers and Mr. Plovnik will serve as the field engineer. Ms. Parsons will provide support as Senior Review Engineer.

1.3 Summary of Soil and Groundwater Conditions

Summaries of soil quality data, and groundwater level monitoring and quality data from the FS are provided in Appendix A. Also provided in Appendix A are pertinent maps indicating former MGP structure and investigation sample locations, soil and groundwater MGP residual distributions, geologic cross sections and water table elevation contours. Additional information regarding the conditions at the site can also be found by referencing the previously prepared Phase I, II and FS investigation reports

1.3.1 Soil

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. Scattered oxide box wastes consisting primarily of Prussian blue (cyanide) stained wood chips and vegetation (tree roots) have been identified in the Center Avenue right-of way. 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 (Figure 2). Residual amounts of coal tar have also been identified in these localized areas.

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 residential and industrial guideline values. Similarly, weak acid dissociable cyanide concentrations are also below guideline values. Lighter MGP residual hydrocarbon fractions (coal tar oils) have been observed in sediments encountered beneath the riverbank near and at the shallow groundwater interface in the Right-of-Way.

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. Lenses of phase separated coal tar have been identified in saturated soils up to a depth of approximately 21 feet bgs.

1.3.2 Groundwater

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 groundwater in the upper alluvium unit consist of benzene, ethylbenzene, toluene, and xylene (BETX), polynuclear aromatic hydrocarbons (PAHs) and total and amenable cyanide.

1.4 Phase I Design Objectives and Approach

The Phase I design objectives for the remedial action are to:

- Excavate the most heavily MGP affected areas in Campmarina and the Center Avenue Right-of-Way;
- Grade the site to prepare for capping of the site as a developable property;
- Segregate and beneficially re-use non-MGP affected soil as backfill;

- Thermally treat soil containing MGP residuals and re-use as backfill;
- Conduct air sampling to monitor remedial activities for protection of on-site workers and public health;
- Sample treated material and soil left in-place to document the soil quality remaining on-site;
- Minimize potential human exposures to MGP residuals through institutional and engineering controls; and,
- Restore the site in preparation for the planned Phase II activities.

The approach to meet these objectives will include the following key elements:

- Decommissioning of Former MGP Structures: Former underground reinforced concrete tar wells will be accessed, inspected for the presence of phase separated coal tar and demolished for disposal, decontamination or off-site thermal treatment, as appropriate. Other former MGP structures (e.g., foundations, former retaining walls) will be demolished and removed as required to complete planned excavation and grading activities.

- Elimination of Potential Migration Pathways: Both Campmarina and the Center Avenue Right-of-Way are traversed by several storm sewer lines that lead to the river. Storm sewer lines at the site may have acted as contaminant migration pathways. These will be alternately removed to the limits of the proposed vertical cutoff wall and/or capped.

- Excavation of MGP residuals: Areas where MGP residuals were previously identified in the unsaturated zone in Campmarina and the right-of way and will be removed for off-site thermal desorption. This will include excavation along the entire river bank between Campmarina and the Right-of-Way particularly in the vicinity of the former coal tar wells in the central portion of Campmarina. No excavation will be conducted in the saturated zone.

- Engineered Backfilling and Reconstruction in the Right-of-Way and Along the River Bank: Following excavation of MGP affected soil and debris in the Right-of-Way, the area will be backfilled using a combination of low permeability flowable fill, geosynthetic materials and thermally treated soil to provide an initial vapor barrier over phase separated MGP residuals that will remain in the saturated zone. The river bank will be reconstructed using a combination of geosynthetic materials, low permeability engineered fill and rip rap to restore and stabilize the river bank on an interim basis pending completion of the Phase II activities.

- Phase I Grading: Following completion of the initial excavation and backfilling, the site will be graded to the subgrade elevations for the engineered cap. Soil and debris removed during the grading operations will be transported to the Wildwood facility for segregation or processing for thermal treatment. A substantial percentage of the material to be removed from Campmarina may not require thermal treatment and may be suitable for beneficial reuse as backfill over the engineered cap. Thermally treated and non-MGP affected soil will be stockpiled on an interim basis for later reuse as backfill over the engineered cap.

- Site Restoration and Interim Engineering Controls: Following completion of the site grading both Campmarina and the right-of way will be backfilled with approximately six inches of compacted engineered fill (e.g., crushed stone) to establish a hard durable interim protective/working surface suitable for construction traffic that will not readily erode pending startup of the Phase II activities and to minimize the potential for direct contact exposure. Additional interim erosion control measures will be implemented to include silt fencing along the river, use of erosion control netting and reseeding of the slopes along Water Street, the Right-of-Way and along the river bank.

2 EXCAVATION PLAN

An estimated project schedule is included as Figure 4 and is discussed in Section 7. The activities described in sections 2.1 and 2.2 will take place prior to conducting excavation activities. Sections 2.3 through 2.6 describe the proposed remedial excavation activities.

2.1 Preliminary Activities

2.1.1 Site Security

Controlled access to the site will be maintained during excavating and grading, as shown in Plate 2. A perimeter chain link fence will be installed to secure the site and equipped with warning signs to restrict unauthorized access. The fence will remain in-place through the duration of the Phase I and II operations. Routine inspections will be conducted and the fence will be repaired as necessary to maintain integrity. Double swing-gates will be placed at the north and south ends of the site entrance for site ingress and egress. Gates will be closed and locked during non-working hours.

2.1.2 Surveying and Construction Controls

A construction grid will be surveyed and tied into local benchmarks for the purpose of documenting excavation and backfill areas that include MGP affected or treated soil. Survey elevation control points will be used to establish grading elevations. The construction grid will also be used as a basis for surveying construction controls for placing the future vertical cut-off wall and engineered cap.

2.1.3 Community Relations and Public Involvement

Consistent with the intent of NR 714, public involvement in the remediation project includes the following activities that have been conducted or are ongoing:

- General public informational flyers will be mailed to nearby businesses and residents;
- Ongoing meetings and telephone conversations with City of Sheboygan representatives;
- Public meetings to answer questions regarding impact of the remediation to the vicinity of the site will be scheduled and advertised;
- Personal visits by WPS personnel or representatives to nearby residents, as needed; and,
- Continuous on-site presence by WPS personnel and its representatives during soil remedial actions to address problems and questions.

With regard to public notice activities governed by the Contract (Section XVII), WPS will prepare appropriate information to be disseminated to the public, as requested by the WDNR.

2.2 Permitting and Notifications

In accordance with NR 724.09, this work plan includes a listing of approvals anticipated to be required to conduct the remedial action described herein.

2.2.1 Grading Permit

A permit application package for "Grading in Excess of 10,000 Square Feet" was submitted on January 13, 2000 to Ms. Susan Schumacher of the WDNR Plymouth Service Center. NRT requested the grading permit on behalf of WPS for proposed work at Campmarina and the Center Avenue Right-of-Way along the Sheboygan River. Site work involves disturbing an area of approximately 2.6 acres. The permit application package includes a construction schedule, plans and profiles of existing and proposed grades, WDNR Form 3500-53 and the site erosion control plan. Issuance of the grading permit will follow a 30-day public notice period and a site inspection by the WDNR. Approval is expected by mid-March,2000.

2.2.2 Local Access Permits

The appropriate municipal permits including approval to access the Center Avenue Right-of-Way adjacent to the site will be requested from the City of Sheboygan. The City has officially closed Campmarina and will transfer control of the site to WPS.

2.2.3 Digger's Hotline Clearance

Prior to any subsurface activities, public and private utilities will be located. Diggers Hotline, WPS, and the City of Sheboygan will be notified to locate underground utilities in and near the proposed excavation areas.

2.2.4 Notification of Transportation to another Property

The WDNR will be notified in writing within 3 days of transporting soil to the WPS property located at 933 S. Wildwood Avenue (Wildwood site) for temporary storage pending processing and/or treatment, in accordance with NR 718.05 (2). Figure 1 shows the location of the Wildwood site in relation to the Campmarina site. Storage of excavated MGP affected soil at the Wildwood facility will be in compliance with the management requirements of NR 718. Transportation of materials for the purposes of treatment by thermal desorption will be by dump trucks. The transportation route for trucks from Campmarina to the Wildwood facility will be reviewed and approved by the City of Sheboygan prior to transporting contaminated soil.

2.2.5 Groundwater Discharge Permit

An application will be prepared for a temporary wastewater disposal permit from the City of Sheboygan for discharge of pre-treated groundwater. Depending upon extracted groundwater quality, pre-treatment prior to discharge will include sedimentation and may include filtration and/or carbon adsorption.

2.3 Decommissioning

2.3.1 Above-grade Structures

Prior to initiating the excavation and grading, several above-grade structures will be decommissioned and disposed or recycled in a manner consistent with current state and local regulations. These structures are indicated in Plate 2 and include the following:

- Boat house (shed)
- Electrical hook-ups for campers
- Concrete walk
- Piers
- Light poles

Existing overhead utility poles will be evaluated for additional supports or relocation, depending upon location relative to excavation and/or grading areas. As also indicated in Plate 2, there is a free standing one-foot wide reinforced concrete wall located in the central portion of Campmarina. This wall will be protected during the Phase I and II activities and will eventually be integrated as part of the planned neighborhood park by the City of Sheboygan.

2.3.2 Subsurface Structures and Utilities

Both Campmarina and the Center Avenue Right-of-Way contain a number of underground utilities and former MGP subsurface structures or foundations that will require decommissioning as the excavation and grading operations proceed. No former aboveground MGP structures remain at the site. Underground utility and former MGP structure locations are indicated in the decommissioning plan provided in Plate 3. Primary utilities and former structures of concern include the following:

- Former storm sewer lines that lead to the river that could potentially serve as MGP residual migration pathways;

- Former retaining walls along the river that contain numerous tie backs extending beneath the river bank that will require removal prior to installing the planed vertical sheet pile wall;
- Former reinforced concrete subgrade tar wells, located near the river that may contain residual amounts of coal tar within the unsaturated zone; and,
- Concrete or brick foundations for former aboveground MGP structures that will require removal to meet required cap subgrade elevations and prior to installing the vertical cut off wall.

Other miscellaneous underground utilities at the site include underground electrical and water lines that were formerly used by recreational vehicles that will be removed as part of the excavation and grading and segregated for off-site disposal. Subsurface structures encountered will be either demolished and aggregated for processing with excavated soil or segregated for decontamination or off-site disposal depending on the size and condition. Subsurface structures will be visually inspected by the on-site engineer for the presence of MGP residuals for appropriate management of structure debris. Structure debris targeted for off-site disposal that is affected with MGP residuals will be managed as non-hazardous special waste.

2.4 Site Preparation

2.4.1 Erosion Control

Proposed erosion control measures for excavation and grading and temporary material management areas are indicated in Plate 2. One silt fence will be placed on the down slope side of the graded areas for erosion control purposes as shown on Plate 2. A second silt fence will placed along the entire length of the site directly near the rivers edge. Silt fencing will also be installed where the drainage area slope exceeds 100 feet in length and directly downgradient of cleared and grubbed areas. Finally, silt fencing will be placed on the down slope sides of temporary material management areas as discussed below.

Surface run-on water is primarily controlled by the storm sewer system within Water Street. If necessary, additional measures will be taken to prevent run-on of surface water, particularly to

prevent surface water contact with the soil excavation areas and stockpile areas. Silt fencing and ditching will be used as needed for this purpose on the up-slope sides of the working areas.

During all phases of the proposed work, installation methods and maintenance procedures for erosion control silt fences and straw bale fences will follow best management practices. Activities described herein will be performed in accordance with *Wisconsin Best Management Practices for Construction Site Erosion Control.* Trucks, grading equipment, and other construction vehicles will use the gravel access roads to minimize off-site tracking of MGP affected soil and debris. Staging areas and access/haul roads will be maintained with gravel or crushed stone to minimize rutting or off-site tracking of soil or debris. Temporary mulching may be used to reduce erosion and promote establishment of vegetative cover as necessary. Suitable mulching material includes straw, wood chips, or wood fiber. Erosion control nets and mats may also be used.

2.4.2 Temporary Material Management Areas

Due to the limited space available for processing and temporary stockpiling at Campmarina, the majority of the excavated material will be direct loaded for transportation to the Wildwood facility for segregation, thermal treatment, off-site disposal or decontamination. However, temporary material management areas may be required at Campmarina for staging excavated soil and debris for loading and transportation. Contaminated media that are anticipated to be encountered and managed include:

- Contaminated soil;
- Clean overbrden;
- Contaminated MGP debris; and,
- Non-contaminated demolition debris.

Temporary material management areas will be lined and bermed in accordance with NR 718.05 (3). MGP affected soil and debris will be covered, anchored and inspected, as required.

2.4.3 Transportation Routes

Throughout the project, construction equipment such as cranes; hydraulic excavators; skid-loaders; end-loaders; bulldozers; compactors and dump trucks will be used to manage excavated material and backfill. Estimated site routing for transport vehicles and equipment is indicated in Plate 2. The excavation contractor, as necessary, may adjust routes to minimize interference with site work. Temporary staging of trucks waiting for loading may be required along Water Street. Proposed truck routing onto and off the site and to WPS's Wildwood facility will be clearly delineated and submitted to the City of Sheboygan for approval prior to proceeding. If required, truck tires will be decontaminated prior to leaving the site. Water Street will be swept on a daily basis for dust control and appearance, as required.

2.4.4 Clearing and Grubbing

Clearing and grubbing shall be conducted after temporary erosion control measures have been implemented. Clearing and grubbing will include removing from within the limits of excavation, capping and temporary access/haul roads; any trees, stumps, roots, brush, structures, trash, debris and all other materials found on or near the surface of the ground. Areas to be cleared and/or grubbed are shown on Plate 2. Residuals will be managed in accordance with City of Sheboygan requirements unless otherwise directed by the engineer. Cleared and grubbed materials may be mulched for reuse as erosion control material.

2.5 Excavation and Grading

An excavation and material plan indicating designated excavation zones, pertinent cross sections and estimated zones for material handling is provided in Plate 4. Each of the identified zones reflects estimated material management requirements based on the results of previous investigations that will be confirmed during the course of the excavation and grading. Soil in several areas of Campmarina may not be affected by MGP residuals that may be segregated and beneficially reused as backfill without pre-treatment. Estimated material volumes and quantities for each of the zones are summarized in Table 1.

A Phase I grading plan indicating required subgrade elevations for the Phase II vertical cutoff wall and engineered cap is provided in Plate 5. This plan also indicates the proposed limits for a working platform needed to complete the Phase II activities. In general, excavating and grading activities will proceed from the Center Avenue Right-of-Way to Campmarina. Excavation zones with specific restoration requirements include the Right-of-Way and the river bank along Campmarina. These areas will likely be completed before general site grading is initiated due to special restoration and reconstruction requirements as discussed in the following sections.

2.5.1 Shoring and Slope Stabilization

Shoring and/or sloping of banks along Water Street and the Center Avenue Right-of-Way will be required to stabilize excavation side walls as necessary to complete the excavation and grading. Sloping will be used primarily, unless not practicable due to site constraints. Slope cutbacks and stabilization (temporary shoring areas) will be in accordance with applicable industry standards and OSHA requirements. Estimated locations where shoring may be required are indicated on Plate 4.

2.5.2 Center Avenue Right-of-Way

Prior to excavating, the existing slope will be shored and/or cut back to meet OSHA excavation safety requirements. Existing rip rap will be removed and segregated for reuse. Targeted zones for excavation are shown on Plate 4 and include the following:

- *Excavation Zone 1:* Excavation in this zone will be completed to the approximate elevation of the river (-1, City of Sheboygan datum) to remove MGP affected soil and debris consisting of brick, concrete rubble, ash and bits of wood. Approximate excavation depths range from approximately five feet nearest the river to 20 feet bgs upgradient. Phase separated lighter fraction MGP oils were previously identified near and at the groundwater interface. No excavation will be conducted below the groundwater interface.

- *Excavation Zone 2.* Excavation in this zone will consist primarily of surficial removal of cyanide (blue stained) affected soil and wood chips. This activity will consist of removing the upper one to two feet of soil.

- *Excavation Zone 3.* As with Zone 2, excavation in this zone will consist primarily of surficial removal of cyanide (blue stained) affected soil and wood chips and trace amounts of coal tar. This activity will consist of removing the upper one to two feet of soil.

If former coal tar or cyanide contaminated structures and residuals are encountered, or soil impacts extend from planned excavation zones additional excavation may be conducted. As indicated in cross-section A-A' provided on Plate 4, the excavation will be extended towards Water Street and to the south to provide sufficient working area for the planned engineered barrier. The material from each zone will be processed for thermal treatment.

2.5.3 Campmarina

The work will consist of excavating along the river bank to the approximate river level and site grading of Campmarina. The plan and cross section for excavating along the river bank (Excavation Zone 4) is provided in Plate 4. Plate 5 presents the grading plan for the Campmarina site.

Precautions will be taken during excavation along the river bank to minimize disturbing affected river sediments. These precautions will include maintaining filter fabric fencing along the length of the river bank and not excavating directly within the river. Key excavation requirements for the river bank consist of the following:

- Rip rap will be removed and segregated for reuse. During removal, the rip rap will be inspected for any indications of MGP residuals. If required, rip rap will be decontaminated to a visually clean surface in accordance with the debris treatment standards stipulated under 40 CFR 268.45;
- The existing wooden retaining structures along the bank (Plate 3) will be cut to the approximate river level and the existing tie backs removed from beneath the river bank; and,
- Fill material along the bank will be excavated and removed to a distance of approximately 10 feet from the rivers edge. It is anticipated that most of the material will be thermally treated.

Phase I grading areas for Campmarina are divided into three main material management zones (Zones 5, 6 and 7). Estimated volumes and quantities are summarized in Table 1. Based on the previous investigation data, unsaturated fill material in Zones 5 and 7 should be relatively unaffected by MGP residuals and will be segregated and stockpiled for confirmation sampling during the grading activities. Unaffected clean graded material may be stockpiled at Campmarina pending completion of the Phase II activities for reuse as cover material. Zone 6 includes localized areas where MGP residuals were previously identified. It is also the zone where the former coal tar wells were located. As such, it is estimated that most of the material removed during grading from this zone will be processed for off-site thermal treatment.

2.6 Excavated Material Management

2.6.1 Fugitive Emission Controls

Fugitive emission control measures may include the use of sheet plastic, a wetting solution, an aqueous vapor suppression solution and/or a foam-based vapor suppression agents. Sheet plastic may be used to provide a physical barrier to fugitive vapor and dust emissions. Soil wetting using City of Sheboygan potable water with or without additives may be sufficient to control fugitive dust emissions. A vapor suppression solution or agent may be applied to excavations and stockpiles of contaminated soil when VOC ambient air action levels are met, or when nuisance odors warrant application based on field observations. Proprietary vapor suppression solutions are described below.

One aqueous based soil vapor suppression solution is a proprietary solution called Biosolv™. Biosolv™ has been used at MGP sites in the past to reduce VOC emissions. Biosolv™ is typically applied to temporary stockpiles and freshly exposed contaminated soil and acts as an emulsifier to prevent volatilization of contaminants. It may also reduce fugitive dust emissions as long as the soil remains moist. Information relating to Biosolv™ is presented in Appendix B. Foam-based soil vapor suppression agents from Rusmar® Foam Technology have also been used at MGP sites. In addition to vapor suppression, Rusmar® foams are reported to act as a physical barrier to reduce dust emissions. Depending upon the type of foam applied, short term or long

term control may be achieved. Information regarding Rusmar® Inc. foams is presented in Appendix B.

2.6.2 Aggregation/Segregation

During the excavation process, contaminated media will generally be aggregated as part of the normal mixing and demolition process. Aggregation defined herein includes blending and homogenizing contaminant concentrations throughout the excavated soil matrix as a precursor to off-site treatment.

Excavated material that visually appears to be unimpacted will be segregated from impacted material and stockpiled at the Campmarina or Wildwood facility pending characterization and reuse or further management. Debris that appears to be unimpacted will be stockpiled separately from the fill at the site pending characterization and disposal at an appropriate landfill (construction landfill or solid waste landfill). Characterization is discussed below.

2.6.3 Decontamination

Contaminated and uncontaminated debris removed from the excavation will be managed separately. Underground structures that will remain in place will be accessed for decontamination. High pressure washing equipment or scraping may be used for decontamination of surficially contaminated debris removed from the excavation or left in-place.

Debris that is coated or impregnated with contaminants that is not amenable for decontamination or thermal treatment, based on field conditions, will be profiled for disposal at a solid waste landfill. This material may include debris screened from soil to be thermally treated, that is larger than 2-inches in diameter. Examples of this material includes bricks, broken concrete, and wood.

2.6.4 Characterization

Characterization of excavated material will occur for three specific purposes. First, excavated contaminated debris that will be landfilled will require characterization prior to disposal. Two composite samples were collected for this purpose previously, to characterize in-place material at the Campmarina and the Center Avenue right-of-way. Composite soil samples Comp-1 and Comp-3 (results summarized on Tables 7 and 8, Appendix A) are representative of unsaturated and saturated soil, respectively. Neither composite soil sample, taken from representative areas of the site, exhibited hazardous characteristics. Additional waste characterization samples may be collected if material significantly different than that previously characterized is encountered.

Second, characterization of visually-segregated unimpacted soil will include composite sampling for laboratory parameters and field protocol in a manner consistent with the Sampling Plan at a frequency of every 300 cubic yards. Finally, characterization of visually-segregated unimpacted debris will include visual inspection consistent with the debris treatment standards set forth under 40 CFR 268.45 prior to off-site disposal.

2.7 Interim Site Restoration Plan

Backfilling and reconstruction requirements for the Right-of-Way and Campmarina are provided in Plate 4. The interim site restoration plan is presented in Plate 6.

2.7.1 Backfill Materials

Excavated soil will be re-used to the greatest extent possible for backfilling. Excavated soil to be backfilled will include thermally treated soil and non-MGP affected "fill" removed during the Phase I grading activities. Reuse of excavated soil will occur in Phase I and Phase II. As part of Phase I, thermally treated material and "fill" will be used to backfill the Center Avenue right-of-way and other areas up to the planned grade of the engineered cap to the extent possible. For Phase II, thermally treated material and "fill" will be backfilled above the engineered cap up to 6 inches below final surface grade. Imported soil including topsoil will be placed above the thermally

treated material and fill to the final restoration surface grade, with a minimum thickness of 6 inches. Imported soil and vegetative cover will act as a cap to limit direct contact for final site use.

Residual contaminant levels (RCLs) for backfill material above the engineered cap will be based on criteria in NR720. Backfill material will be tested for BETX, PAHs, total cyanide and lead at a frequency of 300-500 cubic yards, as presented in Section 4. Backfill material with concentrations above RCLs will not be placed above the geomembrane at the Campmarina site. Options for final disposal of backfill with concentrations above RCLs will be evaluated by WPS and/or the City of Sheboygan and may include placement below the engineered cap or an alternate beneficial reuse. Other alternatives for beneficial reuse include placement at WPS's Wildwood facility.

In areas where trees or shrubs are planned, amendments will be added to the soil, as prescribed by the landscape contractor to maintain the vegetative growth. Details regarding backfilling proposed areas for beneficial reuse and compaction of grading material will be further described in the Phase II OU RD/RA Work Plan. In general, fill including engineered fill will be placed and compacted to specifications agreed upon with the City of Sheboygan.

2.7.2 Center Avenue Right-of-Way

Restoration of the Right-of-Way will include reconstructing the river bank as discussed in the following section and backfilling the excavation zones to meet Phase I subgrade elevations. Shoring and slope stabilization measures will be left in-place pending completion of the Phase II activities. Backfilling at Excavation Zone 1 will also be conducted to construct an engineered vapor barrier over phase separated MGP residuals that will remain in affected sediment previously identified beneath the fill material in the Right-of-Way. Details for construction of the engineered barrier are provided in Plate 4 and include the following requirements:

- A engineered geofabric will be placed over the bottom of the excavation to serve as a marker layer and to provide subgrade structural support for the overlying backfill materials. Geosynthetic materials will be selected that have a long term chemical compatibility with the MGP residual components such as BETX and naphthalene;

- Directly over the geofabric, approximately one foot of fill (cement slurry) will be placed to provide a structurally sound subgrade for placement and compaction of upper layers of material; and,
- Over the flowable fill, a protective geofabric will be placed followed by a low permeability flexible membrane liner. Over this membrane liner a second protective layer of geofabric will be placed.

The excavation will be backfilled to approximately six inches beneath the proposed cap subgrade with compacted thermally treated material. A final layer of geosynthetic filter fabric will be placed over the compacted thermally treated material and the excavation will then be brought to the subgrade elevation with a compacted engineered fill such as crushed limestone to provide a hard durable working surface. Zones 2 and 3 will be backfilled to subgrade with compacted engineered fill.

2.7.3 Campmarina

Interim restoration for Campmarina will consist of reconstructing the river bank, placement of material in areas where fill will be required to bring the existing grade up to the necessary subgrade for the engineered cap and placement of engineered fill over the designated work platform to create a hard durable surface for the Phase II activities. Reconstruction of the river bank will consist of the following:

- The bottom of the excavation will be lined with a geofabric to stabilize to the subgrade in preparation for placement of engineered fill and rip rap;
- Over the geofabric, approximately six inches of washed stone will be placed followed by a second layer of geosynthetic filter fabric;
- Clean compacted engineered fill will be placed over the filter fabric to rebuild the bank to a slope of approximately one and one half feet horizontal to one foot vertical (11/2:1) and provide support for placement river rock along the rivers edge;
- Rip rap will be placed in accordance with WDNR requirements up the slope to a vertical elevation slightly above the ordinary high water mark; and,

- The remainder of the slope will be protected with pre-seeded erosion control matting or approved equivalent pending startup of the Phase II activities.

Following completion of the interim bank restoration, thermally treated fill material will be used in areas were the existing grades require raising to meet the subgrade for the cap. Thermally treated fill material will be used to within six inches of the final subgrade for the cap. The remaining six inches across the site will be completed with clean engineered fill (e.g., crushed limestone) to complete bringing the site to the cap subgrade and create a suitable work platform for the Phase II activities.

2.7.4 Interim Engineering Controls

Upon completion of Phase I, the site will be secured with temporary mulching, or erosion control nets and mats until startup of the Phase II activities. An interim site restoration plan and erosion control details are provided in Plate 6. Cleared and grubbed slopes along Water Street and within the Center Avenue Right-of-Way will be re-seeded using pre-seeded erosion control netting or hydroseeding. The restored river bank will also be reseeded. Throughout the project duration, silt fences placed on the down slope side of graded areas for erosion control purposes will be maintained until permanent erosion control measures are in place.

2.8 Excavation Dewatering

2.8.1 Groundwater Extraction

Surface water accumulation within excavation zones will be extracted and accumulated on-site in a temporary holding tank. Temporary dewatering during excavation will be conducted as necessary to prevent migration of potentially MGP affected water to the river. No excavation dewatering will be performed in the saturated zone.

2.8.2 Treatment and Discharge

If groundwater quality does not warrant treatment, relative to the City treatment guidelines, (Table 2 and Appendix C), extracted water will be transported directly to the City's waste water treatment facility for disposal. If the quality of extracted water warrants treatment, a groundwater treatment plant that includes free-product removal, filtration and/or carbon adsorption will be setup and used for treatment of groundwater at the Wildwood facility, prior to disposal at the wastewater treatment plant. Other means of discharge may be obtained, if necessary, based on treatment cost relative to other options, such as hauling to an alternate wastewater treatment plant. A schematic of groundwater treatment components that may be used is provided in Appendix D.

2.8.3 Treatment Residuals Management

Residuals resulting from the groundwater pretreatment system may include:

- Granular Activated Carbon;
- Bag or cartridge filters from the groundwater; and,
- Sediment from the sediment settling tank.

Residuals, such as GAC and sediment, may be either thermally treated or profiled for solid waste landfill disposal. Bag or cartridge filters may either be washed and reused or disposed at a solid waste landfill after profiling.

3 OFF-SITE TREATMENT PLAN

Contaminated soil that is excavated from the Campmarina site will be transported to WPS's Wildwood facility for thermal treatment. Prior to treatment, the soil will be screened and processed to remove debris and prepare the soil for treatment. Details of the thermal treatment unit are provided in this section, including the treatment operation, plant location, treatment performance criteria and other pertinent design parameters.

3.1 Permitting and Notification

3.1.1 Air Pollution Control Construction Permit

The thermal treatment contractor will obtain WDNR approval of an Air Pollution Control Construction Permit. If the contractor has obtained a permit for treatment of MGP waste in Wisconsin, the permit must not expire for the period of time inclusive of treatment.

3.1.2 Notifications

A Notification to Thermally Treat Petroleum Contaminated Soil (Form 4400-126) will be provided to the WDNR at least 10 business days prior to commencement of remedial excavation activities. The WDNR will also be notified within 30 days after startup and shutdown of the thermal treatment system, in accordance with NR 718.09.

3.1.3 Solid Waste Processing Permit

The thermal treatment contractor will obtain WDNR approval of a Solid Waste Processing Permit. The WDNR approval may require specific approval or plan modification to include storage, pre-treatment processing and thermal treatment of soil from the Campmarina site at the Wildwood site.

3.1.4 Conditional Use Permit

A City of Sheboygan zoning conditional use permit may be required for thermal treatment operations at the Wildwood site. If required, the permit will be secured for the duration of thermal treatment.

3.1.5 Off-site Disposal

Screened, contaminated debris will be profiled and disposed at Superior Services' Hickory Meadows Solid Waste Landfill. Composite soil samples Comp-1 and Comp-3 (results summarized on Tables 7 and 8, Appendix A) are representative of unsaturated and saturated soil quality, respectively. The composite soil samples, taken from representative areas of the site, did not exhibit hazardous characteristics. Additional waste characterization samples may be collected if material is significantly different than that previously characterized.

3.2 Site Preparation

The Wildwood site will be prepared for thermal treatment operations and excavated material management, in a manner similar to the Campmarina site. The proposed siting plan is shown on Figure 3. An existing site perimeter fence will be modified to separate the thermal treatment operations material and management areas from other areas of the site. Where necessary, the perimeter fence may be extended to accommodate additional material. Areas shown on Figure 3 for storage of contaminated soil and debris will be on existing pavement or lined and bermed areas in accordance with NR 718. The thermal treatment plant will be placed on existing pavement or an engineered work surface. The site work area will have a perimeter silt fence in non traffic areas, and gravel in transportation areas for erosion control. Utilities for thermal treatment and an engineered work surface for prepared prior to setup of the thermal treatment plant.

3.3 Soil Processing

Excavated soil transported to the treatment site will be screened to remove materials of 2-inch diameter or greater prior to thermal treatment. Contaminated debris encountered will be addressed by crushing and thermally treating crushed debris; or by disposal at a solid waste landfill at the discretion of WPS. Contaminated debris will be profiled for off-site disposal at a solid waste landfill, as described in Section 3.5.4.

Following excavation and screening, contaminated soils will be stockpiled on-site, to be treated by thermal desorption as discussed in the following section. Soil will be blended by the thermal treatment contractor as necessary to homogenize moisture and organic content for optimum treatment efficiency. Stockpiled soil will be managed in accordance with NR 718.09. Areas where contaminated soil is handled or stored will be protected from surface water run-on. Runoff control measures will also be implemented. Inactive portions of the stockpile will be covered to prevent erosion of materials off-site. Stockpile area shall be sized to contain 5,000 cubic yards of soil. Fugitive emission control options for the Wildwood site will be the same as options described in section 2.6.1.

3.4 Thermal Treatment Performance Criteria

The thermal treatment contractor will be responsible for meeting required air emission levels including, but not limited to, emission rates for particulates, organic compounds, and visible emissions. Air stack testing will be conducted as required by NR 400 in compliance with the facility operating permit. The thermal treatment contractor will provide treatment of the particulates (i.e. fines, dust) from the baghouse and primary knockout collector.

The thermal treatment contractor will treat the soils to the criteria listed in Table 3 and summarized below:

- 50 mg/kg for total non-carcinogenic PAHs
- 10 mg/kg for carcinogenic PAHs

- NR 720.09 Table 1 RCLs for BETX.
- 50 mg/kg for Total Cyanide in soil (ref. GRI Vol. III)

Consistent with the remedial objectives for the site, post treatment performance criteria for BETX and PAHs were established based on residual concentration values which are protective of the groundwater pathway. BETX RCLs listed in NR 720.09 were used as thermal treatment standards for protection of groundwater because of the higher mobility of volatile compounds. Values for protection of groundwater listed in Table 1 of *Interim Guidance on Soil Cleanup Levels for PAHs* were used as a guide to determine the minimum thermal treatment standard for those compounds. Treatment performance criteria for PAHs were further reduced to values which should be technically achievable based on the documented performance of medium temperature desorption technology at other similar sites. A technology derived criteria of 10 mg/kg total carcinogenic and 50 mg/kg total PAHs was established for PAH compounds with groundwater protection RCLs above 10 mg/kg.

The performance criterion of 50 mg/kg total cyanide is based upon GRI Vol. III Risk Assessment Guide (1987) and is also conservatively low based on direct contact risk values. Screening levels (US EPA PRGs) for total cyanide indicate a concentration of 1000 mg/kg would be protective of the direct contact pathway (Table 2, Appendix A). However, it is anticipated that the lower performance criterion is technically achievable at this site. Should a significant volume of cyanide bearing waste such as purifier box residuals be encountered, these wastes may be managed through other treatment and/or disposal options.

3.5 Thermal Treatment Operations

A process schematic of a thermal desorption treatment plant being considered for this project is included in Appendix D. This schematic is for a thermal processing unit owned by Dustcoating, Inc. and is typical of the type of unit anticipated for this project. The proposed location of the thermal treatment plant is presented on Figure 3. The primary kiln of the thermal treatment plant will be capable of soil temperatures high enough to exceed boiling points for volatilization

of target PAH compounds, or up to 1200 degrees F. Based on past experience, primary kiln temperatures of 900 degrees F are typically sufficient to remove target PAH compounds to the performance criteria levels. The design capacity is 25-45 tons of soil per hour, depending on moisture content, contaminant type and content. The plant includes a thermal oxidizer operating up to 1,600 degrees Fahrenheit or more with a residence time of at least 2 seconds to achieve a Destruction Removal Efficiency (DRE) of up to 99.99 % for target contaminants. Utility requirements include approximately 30 gpm water supply for quenching and re-moisturizing treated soil, and a source of natural gas and/or propane up to 25 million BTU per hour. Noise levels at the plant are below 85dBA.

3.6 Post-Treatment Soil Staging

Treated soil will be stockpiled pending laboratory analytical results in a separate stockpile area, as shown in Figure 3. The clean stockpiles will be kept segregated from contaminated media. The contractor will re-treat soils which do not substantially meet the soil treatment performance criteria summarized in Table 2.

Discretion will be used in evaluating compliance with treatment performance requirements depending on the plan for final disposition. For example, if the treated soil is to be used for general fill below the future cover on Campmarina, then reduction of contaminant levels to below leachable levels or allowable construction worker exposure levels will be the primary criterion.

Following laboratory confirmation of treatment to acceptable levels, treated soil will be re-located at the Wildwood site for long term storage pending completion of Phase II construction, or transported back to the Campmarina site for use as backfill material.

4 SAMPLING AND ANALYSIS PLAN

The sampling plan includes excavation limit samples, pre- and post-treatment samples, general fill samples (for potential re-use as future rooting zone material), and debris waste characterization samples. The locations, type, frequency and parameters to be sampled are summarized on Table 3 and discussed below.

4.1 Excavation Limit Sampling

Documentation of residual soil quality will be accomplished through soil sampling. The frequency of sampling along excavation limits will vary by zone as indicated on Table 3, depending on proximity to future off-site structures and the future engineered cover and vertical barrier. In general, the sampling will be focussed in areas where MGP-affected soils are being removed to reduce contaminant mass in the Center Avenue Right-of-Way (Zones #1 through #3) and will be conducted in general accordance with the WDNR guidance document PUBL-SW-127, *Soil Sampling Requirements for LUST Site Investigations and Excavations.* However, the frequency and number of samples will be less than a typical LUST site given the site conditions and remedial objectives described in this report. For example, base samples in saturated conditions would be collected less frequently, if at all, because an engineered barrier is being installed and base samples will not be used for closure documentation.

In addition to the parameters summarized on Table 3, select samples may also be analyzed for dissociable and amenable cyanide, and other physical parameters which may be relevant to interpreting the excavation limit sampling results.

4.2 Excavated Soil Sampling and Material Profiling

Excavated soils will be field screened with a 10.7 eV photoionization detector (PID), if visual indications of contamination are not evident. Historical soil data summarized in Appendix A were used as the main basis for pre-remedial soil conditions.

Significant volumes of clean overburden are expected during excavation of the Campmarina site. Apparently clean soil (based upon field screening, visual, and olfactory results), will be segregated and sampled to determine its potential re-use as general fill or rooting zone material for the future cover at Campmarina. Criteria for re-use is described in Section 2.7. Analytical parameters and frequency are shown on Table 3. Additional waste characterization will be conducted as needed on general debris, also indicated in Table 3.

4.3 Soil Treatment Sampling

Limited sampling of pre-treated excavated soils will be performed to confirm soil concentrations detected in the site investigations. Analytical parameters will be dependent upon the type of waste encountered, and would include the analytical methods listed in Table 2.

Verification of thermal treatment effectiveness will also be accomplished by random composite sampling at the frequencies listed in Table 3. In order to maintain sufficient area for post-treatment soil stockpiles, verification samples may be rush-analyzed for PAHs and BETX. Soil treatment verification sampling for BETX may be eliminated or reduced in frequency after correlation of post-treatment BETX concentrations relative to PAH levels is established. Sampling for lead and cyanide will also be performed on treated material, however, not on a rush-turnaround basis.

5 MONITORING PROGRAM PLAN

5.1 Ambient Air Monitoring

Ambient air monitoring will be performed to monitor levels of dust and organic MGP residuals generated from the movement and handling of soil at the perimeter of the site and in the work zone.

5.1.1 Perimeter

Monitoring stations will be established at the Campmarina and Wildwood sites to collect air monitoring samples prior to and during completion of the remedial activities. Prior to initiating remedial activities, two air samples will be collected from stations at the downwind perimeter of the sites to evaluate background ambient air quality. Downwind station locations will be based on prevailing winds in the site area, immediately prior to commencing sampling activities. During the remedial activities, two to three samples will be collected from stations at the downwind perimeter of each site on a weekly basis to evaluate ambient air quality. The frequency of perimeter monitoring at each site will be two per week but may be re-evaluated in the field based on odor levels, visual observations, and weather conditions.

The ambient air will be monitored for the following parameters:

- Total Volatile Screening (real time);
- BETX by a modified NIOSH 1501 method (laboratory analysis);
- PAHs by EPA Method TO-13 (laboratory analysis); and,
- Total Solid Particulates (TSP) by 40 CFR 60 Appendix B method (laboratory analysis).

A photoionization detector (PID) will be used to monitor volatile organic carbon compounds (VOCs) at the site perimeter at least twice daily. The compound-specific and TSP samples will be collected and analyzed at the laboratory according to each individual protocol at the frequency

discussed previously. The results will be compared to known OSHA exposure levels for health concern.

Any off-site exceedences of exposure levels will be reported to the WDNR as soon as possible after receiving laboratory results, and corrective action will be taken to mitigate the source of the problem. Appendix F includes summary Tables F-1, F-2 and F-3 that provide information pertaining to sampling methods and frequency, response action levels, detection limits, and QA/QC. Air monitoring sampling information is summarized on Table F-3.

If action levels are exceeded at the site perimeter, site excavation work will cease pending review of additional vapor control measures. Action levels will be adjusted for perimeter real-time monitoring, in accordance with NR 445.04(1) for hydrogen cyanide gas and naphthalene. The perimeter action levels for these compounds are as follows:

- Hydrogen cyanide gas - 1 ppm or 1,000 $\mu g/m^3$
- Naphthalene - 1.2 ppm or 1,200 $\mu g/m^3$

5.1.2 Work-zone

Work zone monitoring will consist of total volatiles screening (total volatiles screening refers to photoionization detector (PID) monitoring using a Photovac PID equipped with a 10.6 eV lamp or equivalent) and colorimetric tube readings for benzene, naphthalene and hydrogen cyanide gas. On-site contractors will also be responsible for air monitoring in working zones using real-time VOC monitoring equipment for any potential change in personal protective equipment (PPE). Compound-specific colorimetric tubes (Sensidyne tubes) will also be used as a backup to the VOC monitoring. If at any time, site workers become nauseous or dizzy, a change in PPE will be recommended. A health and safety plan for the project will be maintained at the job-site.

Although it is well documented that cyanides at MGP sites are generally not present in a gaseous form, we will conduct real-time monitoring of hydrogen cyanide. If hydrogen cyanide is not present in the work zone in areas that have high cyanide concentrations in soil, real-time monitoring of hydrogen cyanide will be reduced or eliminated.

Results of air monitoring will be compared to site action levels, summarized in on Table F-2. If any of the action levels, defined as exposure limits for benzene, naphthalene or hydrogen cyanide listed on Table F-2 or a PID reading of 50 instrument units is measured in the worker zone, the following chain of events will occur:

- Site workers will be informed of results of monitoring;
- The use of air-purifying respirators will be mandated;
- Colorimetric tubes will be used to evaluate compounds of interest at the perimeter;
- Site Health and Safety officer will be appraised to evaluate any modifications to work; and,
- Odor control measures will be taken, as described in Fugitive Emissions Controls, Section 2.6.1.

5.1.3 Weather

Local meteorological conditions will also be monitored while the ambient air monitoring samples are collected. This meteorological data will be obtained from the NOAA National Data Buoy Center Station located at the Sheboygan Breakwater for the duration of the project. The buoy is located approximately one mile east of the Campmarina site and approximately 2 miles east of the Wildwood site. To supplement this information, if necessary, weather information from the Sheboygan County Airport (located 6 miles west of the Wildwood site) or weather information from the WPS Valders weather station, located approximately 22 miles north of the site, may be used. At a minimum, weather information will be collected prior to, during, and immediately following air sampling includes:

- Wind Velocity;
- Temperature (°C); and,
- Altimeter (barometric pressure).

5.2 Surface Water Discharge Monitoring

Temporary dewatering during excavation will be conducted as necessary to remove surface water that accumulates in the excavation as described in Section 2.8. Extracted water will be temporarily stored in one or more tanks pending analysis for parameters required by the City of Sheboygan, including BETX, TSS, oil & grease, cyanide and lead. After analytical results are obtained, extracted water may be treated using sedimentation, filtration and possibly granular activated carbon filtration prior to discharge to meet municipal pretreatment standards (Table 2). Discharge to a Wastewater Treatment Plant will not commence prior to written approval to discharge from the municipality. Water samples will be collected as necessary to maintain the discharge approval conditions.

6 QUALITY ASSURANCE PROJECT PLAN

6.1 Standard Practices of Field Operations

Natural Resource Technology, Inc. (NRT) has developed numerous technical Standard Practices to provide documentation of the use of widely recognized protocols and standards in the performance of field operations. For this project, these protocols are particularly relevant to the field testing and confirmation sampling required for documenting remedial activities and the soil quality remaining in-place. The list of Standard Practices and source documents are provided in Appendix G. Copies of the relevant standard portions will be kept on-site throughout the duration of field activities. Copies of these standard technical practices for relevant aspects of the field work can be provided to the WDNR as necessary. Key practices are discussed below.

6.2 Equipment Decontamination

Equipment decontamination is addressed in NRT Standard Practice 07-04-05. The drilling subcontractor will provide a steam cleaner and a decontamination area will be established on the site for decontamination of construction equipment in contact with contaminated material. Sampling equipment (such as trowels and shovels) will be cleaned by washing in Alconox™ detergent followed by a distilled water rinse prior to the collection of each sample. If necessary, an isopropyl alcohol rinse will be performed to remove tar or PAH residues. Decontamination wash and alcohol rinsate will be containerized in drums for future treatment and/or disposal.

6.3 Cross-Contamination

Procedures for collecting soil and water samples which minimize the potential for cross-contamination are described in NRT Standard Practice Sections 07-07 and 07-08, respectively. Sampling personnel will wear new sampling gloves between collection of each sample.

6.4 Laboratory Quality Assurance

Analysis of environmental media samples will be performed by a laboratory certified by WDNR under NR 149. All samples for laboratory analysis will be collected in laboratory supplied containers. Analytical methods detection limits are provided in Table 2. These method detection limits are for standard dilution and assumptions of 100% solids content and no matrix interference. Each cooler of samples will contain a temperature blank and trip blank for BETX (as appropriate) analyzed to demonstrate proper sample preservation and handling, respectively. All QA/QC required by the analytical method shall be completed. Lab QA/QC summary and chain of custody documentation shall be submitted with analytical results.

6.5 Health and Safety Plan

WPS, its contractors and NRT personnel will be qualified and knowledgeable with respect to health and safety requirements relating to the remedial action. NRT will develop a Health and Safety Plan for NRT and WPS personnel working at the site during all field activities. This plan will be a separate document and will be available upon request if review of the document is required. NRT and WPS personnel will read and be familiar with the plan prior to the commencement of field work.

Contractors shall submit a written Health and Safety Plan to WPS prior to the start of field activities and shall maintain a copy of the Plan at the site at all times during work activities. The Contractor's Health and Safety Plan will comply with any and all applicable OSHA regulations including 29 CFR 1910: Occupational Safety and Health Standards and 29 CFR 1926: Health and Safety Regulations for Construction. The plan will, at a minimum, address the following elements:

- Key Personnel
- Air Monitoring
- Health and Safety Risks
- Site Control

- Training Documentation
- Decontamination
- Protective Equipment
- Emergency Response
- Medical Surveillance

Contractor's employees and subcontractors performing work on this project involving excavation, movement or treatment of solid waste or other contaminated media will be required to have appropriate training as specified in the OSHA Standards, including Hazwoper Standard 29 CFR 1910.120. All work is to be performed in Level D as defined by 29 CFR 1910.120, but the contractor will have capability to upgrade to Level C.

7 SCHEDULE

7.1 Construction Activities

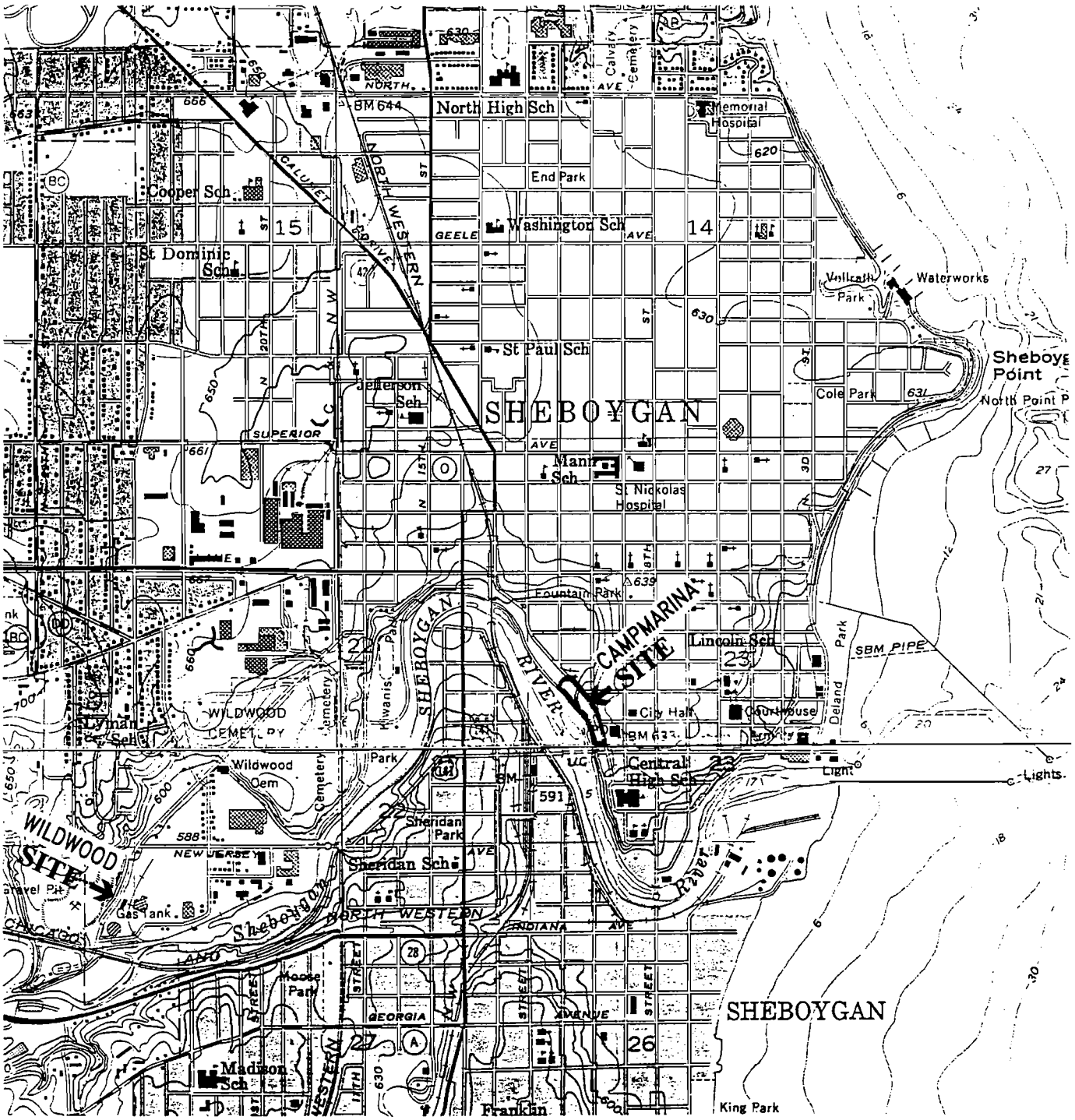
It is the intent of this work plan to proceed with the Phase I excavation and grading during March and April of 2000. It is anticipated that remedial construction activities will follow the general schedule outlined in Figure 4. This is an approximate schedule subject to field conditions, weather, contractor availability, etc. Excavation and grading during this time frame will take advantage of cool weather for excavating, transporting and processing MGP affected soil and debris. It will also support meeting City of Sheboygan requests for completing the remedy in 2000 such that construction of the neighborhood park and river walk can proceed. WDNR will be kept informed of the progress or deviations from this work plan as appropriate via verbal or written correspondence.

7.2 Future Submittals

A proposed schedule for the Phase I and II activities including key future submittals is provided in Figure 4. Future submittals will include the following:

- Phase I Plans and Specifications;
- Phase II OU RD/RA Work Plan;
- Phase II Plans and Specifications;
- Phase II Construction Quality Assurance (CQA) Plan;
- Operation and Maintenance (O&M) Plan; and,
- Remedial Construction Documentation Report.

The Phase II Work Plan will be prepared to substantively meet the requirements of tasks 13, RD/RA Project Plans, Task 14, Remedial Design and Task 15, Remedy Construction. Supplemental to the Phase II Work Plan are bid specifications for contractor selection that will be prepared and forwarded to the WDNR under separate cover.



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

QUADRANGLE LOCATION

N

0 2000 4000

SCALE IN FEET

CONTOUR INTERVAL 10 FEET

Natural Resource Technology

N R T

SITE LOCATION MAP

CAMPMARINA AND WILDWOOD, FORMER COAL GAS FACILITIES
WISCONSIN PUBLIC SERVICE CORPORATION
SHEBOYGAN, WISCONSIN

PROJECT NO. 1313

DRAWING NO. 1313-A03

FIGURE NO. 1

DRAWN BY: TAS APPROVED BY: REW DATE: 02/02/00

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
- APPROXIMATE LIMITS FOR UNSATURATED ZONE AFFECTED SOILS
- APPROXIMATE LIMIT OF ENGINEERED BARRIER

N

0 15 30 60

SCALE IN FEET

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 D3752BLDWG, RECEIVED BY NRT 8/1/98 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.

NEW YORK AVENUE
NORTH WATER STREET
CENTER AVENUE
NORTH WATER STREET
PENNSYLVANIA AVENUE BRIDGE
GRAVEL DRIVE
GRAVEL PARKING AREA
GRAVEL RV PARKING AREA
APPROXIMATE TOP OF BANK
TOP OF SLOPE
PROPERTY BOUNDARY FOR FIRST PHASE OF FUTURE CONDOMINIUM DEVELOPMENT
SECOND PHASE CONDOMINIUM CONSTRUCTION
BUILDING NO. 1
BUILDING NO. 2
BUILDING NO. 3
CENTER AVENUE RIGHT-OF-WAY
STORM SEWER OUTFALL WITH CONCRETE PAD
PROPOSED RIGHT-OF-WAY FOR FUTURE RIVER WALK
STORM SEWER OUTFALL
GRANITE WALL
CAMPMARINA AND LOCATION OF FORMER COAL GAS FACILITY
APPROXIMATE SHORELINE
SHEBOYGAN RIVER FLOW
BOAT ISLAND
SHEBOYGAN RIVER FLOW
APPROXIMATE SHORELINE
595'
590'
585'
580'
605'
600'
595'
590'
595'
580'

Natural Resource Technology

N R T

DISTRIBUTION OF MGP RESIDUALS IN THE UNSATURATED ZONE

REMEDIAL WORK PLAN
PHASE I EXCAVATION AND GRADING
CAMPMARINA AND CENTER AVENUE RIGHT-OF-WAY
WISCONSIN PUBLIC SERVICE CORPORATION, SHEBOYGAN, WISCONSIN

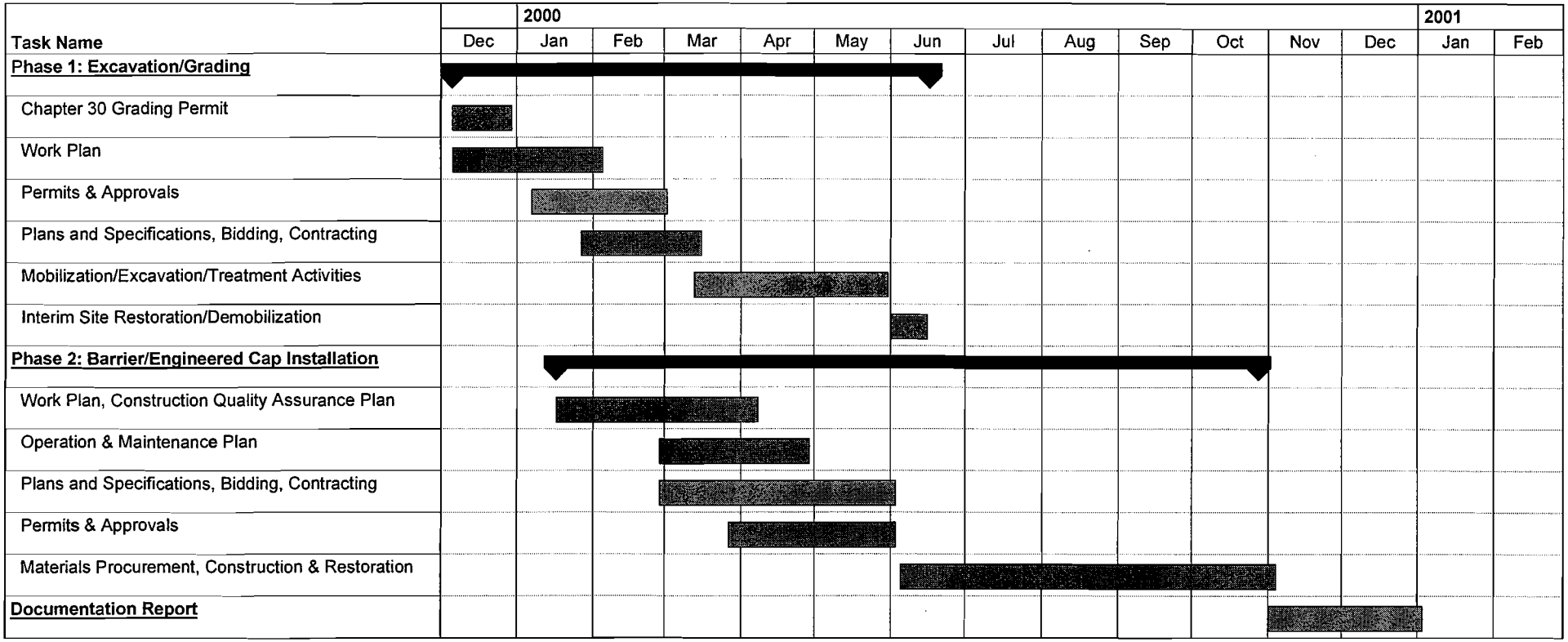
DRAWN BY: TAS	CHECKED BY: SLF	APPROVED BY: RSW
DATE: 01/31/00	DATE: 02/02/00	DATE: 02/03/00

PROJECT NO. 1313/3.5

DRAWING NO. 1313-811

FIGURE NO. 2

FIGURE 4--PROPOSED PROJECT SCHEDULE
Phase I and Phase II Remedial Action, Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation, Sheboygan, Wisconsin



Task

Note: Phase 2 schedule subject to such factors as final WDNR approval, material procurement and delivery lead times, and contractor availability.

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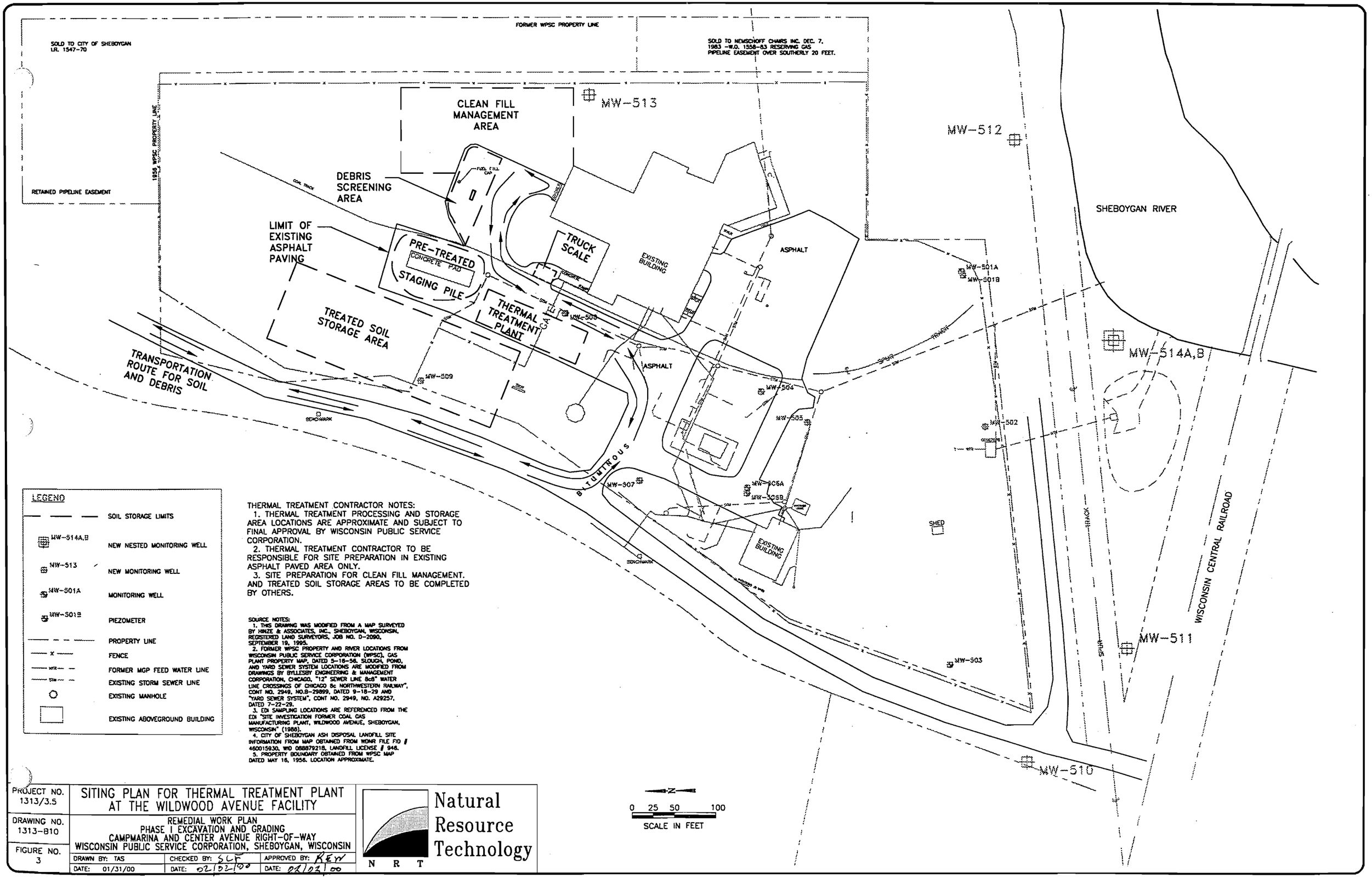

LEGEND

- SOIL STORAGE LIMITS
- MW-514A,B — NEW NESTED MONITORING WELL
- MW-513 — NEW MONITORING WELL
- MW-501A — MONITORING WELL
- MW-501B — PIEZOMETER
- PROPERTY LINE
- FENCE
- FORMER MGP FEED WATER LINE
- EXISTING STORM SEWER LINE
- EXISTING MANHOLE
- EXISTING ABOVEGROUND BUILDING

THERMAL TREATMENT CONTRACTOR NOTES:

1. THERMAL TREATMENT PROCESSING AND STORAGE AREA LOCATIONS ARE APPROXIMATE AND SUBJECT TO FINAL APPROVAL BY WISCONSIN PUBLIC SERVICE CORPORATION.
2. THERMAL TREATMENT CONTRACTOR TO BE RESPONSIBLE FOR SITE PREPARATION IN EXISTING ASPHALT PAVED AREA ONLY.
3. SITE PREPARATION FOR CLEAN FILL MANAGEMENT. AND TREATED SOIL STORAGE AREAS TO BE COMPLETED BY OTHERS.

SOURCE NOTES:

1. THIS DRAWING WAS MODIFIED FROM A MAP SURVEYED BY HINZE & ASSOCIATES, INC., SHEBOYGAN, WISCONSIN, REGISTERED LAND SURVEYORS, JOB NO. D-2090, SEPTEMBER 19, 1995.
2. FORMER WPSC PROPERTY AND RIVER LOCATIONS FROM WISCONSIN PUBLIC SERVICE CORPORATION (WPSC), GAS PLANT PROPERTY MAP, DATED 9-18-56. SLOUGH, POND, AND YARD SEWER SYSTEM LOCATIONS ARE MODIFIED FROM DRAWINGS BY BYLLESBY ENGINEERING & MANAGEMENT CORPORATION, CHICAGO, "12" SEWER LINE 8c8" WATER LINE CROSSINGS OF CHICAGO 8c NORTHWESTERN RAILWAY", CONT NO. 2949, NO.8-29899, DATED 9-18-29 AND "YARD SEWER SYSTEM", CONT NO. 2949, NO. A29257, DATED 7-22-29.
3. EDI SAMPLING LOCATIONS ARE REFERENCED FROM THE EDI "SITE INVESTIGATION FORMER COAL GAS MANUFACTURING PLANT, WILDWOOD AVENUE, SHEBOYGAN, WISCONSIN" (1986).
4. CITY OF SHEBOYGAN ASH DISPOSAL LANDFILL SITE INFORMATION FROM MAP OBTAINED FROM WDNR FILE FID # 460015930, WID 058879218, LANDFILL LICENSE # 946.
5. PROPERTY BOUNDARY OBTAINED FROM WPSC MAP DATED MAY 16, 1956. LOCATION APPROXIMATE.

0 25 50 100
SCALE IN FEET

PROJECT NO. 1313/3.5	SITING PLAN FOR THERMAL TREATMENT PLANT AT THE WILDWOOD AVENUE FACILITY		
DRAWING NO. 1313-B10	REMEDIAL WORK PLAN PHASE I EXCAVATION AND GRADING CAMPMARINA AND CENTER AVENUE RIGHT-OF-WAY WISCONSIN PUBLIC SERVICE CORPORATION, SHEBOYGAN, WISCONSIN		
FIGURE NO. 3	DRAWN BY: TAS	CHECKED BY: SLF	APPROVED BY: REW
	DATE: 01/31/00	DATE: 02/02/00	DATE: 02/02/00

Natural Resource Technology

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TABLES

Table 1 - Estimated Excavation Zone Volumes and Tonnages, Phase I Excavation and Grading
Phase I: Excavation and Grading
Campmarina and Center Avenue Right-of-Way
Wisconsin Public Service Corporation - Sheboygan, WI

Excavation Zone	Estimated Surface Area (sq.ft.)	Approximate Excavation Depth (feet bgs)	Total Estimated Volume (cu.yds.)	Estimated Quantity Requiring Thermal Treatment (tons)	Estimated Quantity Not Requiring Thermal Treatment (tons)	Total Tonnage	Comments
Center Avenue Right-of-Way							
Excavation Zone #1, Deep Excavation to Approximate Elevation of River	5,300	5 to 20	2,000	3,300	0	3,300	See Cross-Section A-A'. Excavation of this area will range from 5 to 20' BGS at approximately -1' (580' MSL). Excavation will be backfilled to the geomembrane subgrade surface.
Excavation Zones #2 and # 3, Shallow Excavation Areas	1,750	1 to 2	130	200	0	200	Excavation of these areas will not exceed 2' BGS. Excavation will be backfilled to the approximate pre-existing grade
Campmarina							
Excavation Zone # 4, Along River Bank	5,100	0 to 4	625	1,000	0	1,000	See Cross -Section B-B'. Excavation will extend to approximately 1' (580' MSL) just above the elevation of the Sheboygan river.
Grading Zone # 5, Southern Portion of Campmarina	17,900	3	1,430	1,140	1,140	2,280	Estimate approximately 50% of excavated material will have to be thermally treated.
Grading Zone # 6, Central Portion of Campmarina	22,600	2.5	1,810	2,460	430	2,890	Estimate approximately 85% of excavated material will have to be thermally treated.
Grading Zone #7, Northern Portion Of Campmarina	27,300	2.5	2,220	890	2,660	3,550	Estimate approximately 25% of excavated material will have to be thermally treated.
Total	____		**8,215**	**8,990**	**4,230**	**13,220**	

(O-CAR 1/14/2000, R-REW 1/24/2000)

Table 2 - Laboratory Analytical Methods, Method Detection Limits and Treatment Performance Criteria
Phase I: Excavation and Grading
Campmarina and Center Avenue Right-of-Way
Wisconsin Public Service Corporation - Sheboygan, WI

SOIL PARAMETERS

Chemical Parameter	Laboratory Analytical Method	Minimum Laboratory Method Detection Limit (mg/kg)	Treatment Performance Criteria (mg/kg)
PAHs			
Acenaphthene	EPA 8270C	0.033	< 50 Total PAHS
Acenaphthylene		0.034	0.7
Anthracene		0.035	< 50 Total PAHS
Benz(a)anthracene [C]		0.037	<10 Total cPAHs
Benzo(b)fluoranthene [C]		0.036	<10 Total cPAHs
Benzo(k)fluoranthene [C]		0.037	<10 Total cPAHs
Benzo(a)pyrene [C]		0.035	<10 Total cPAHs
Benzo(ghi)perylene		0.071	< 50 Total PAHS
Chrysene [C]		0.037	<10 Total cPAHs
Dibenz(a,h)anthracene [C]		0.04	<10 Total cPAHs
Fluoranthene		0.039	< 50 Total PAHS
Fluorene		0.034	< 50 Total PAHS
Indeno(1,2,3-cd)pyrene [C]		0.048	<10 Total cPAHs
1-methyl naphthalene		0.020	< 50 Total PAHS
2-methyl naphthalene		0.041	< 50 Total PAHS
Naphthalene		0.045	0.4
Phenanthrene		0.037	1.8
Pyrene		0.033	< 50 Total PAHS
BETX			
Benzene	EPA 8020	0.009	0.025
Ethylbenzene		0.0045	2.9
Toluene		0.0042	1.5
Xylenes (total)		0.019	4.1
Cyanide (Total)	EPA 9012	0.02	50
Lead	EPA 6010B	*	NS

WATER PARAMETERS

Chemical Parameter	Laboratory Analytical Method	Minimum Laboratory Method Detection Limit (mg/L)	Sheboygan WWTP Influent Criteria (mg/L)
Oil & Grease	EPA 9070/413.1	1.4	200
Total Suspended Solids	EPA 160.2	1.0	210
Total BETX	EPA 8260B	0.23	2.13
Lead, total	EPA 6010B	0.029	0.69
Cyanide, total	EPA 9012A	0.000001	5.0

Notes:

DVP/AAS-1/31/00

[C] = Carcinogenic PAH, classified as B2 probable human carcinogen.
cPAHs = carcinogenic PAHs
NS = no standard provided
All soil parameters to be sampled every 500 tons.
* = Actual MDLs may vary, based on matrix interference, dilution required, sample volume available, and other variables.
Total BETX MDL is sum of individual MDLs.

Table 3 - Soil Sampling Plan Summary
Phase I: Excavation and Grading
Campmarina and Center Avenue Right of Way
Wisconsin Public Service Corporation - Sheboygan, WI

Sampling Location	*Type*	*Frequency*	*Laboratory Parameters*
Excavation Limits Zones #1, #2, #3 Zones #4, #5, and #7 Zone #6 (around former tar wells)	Discrete	 50 lineal ft on sidewalls, 2500 sq ft on base As needed if site conditions differ from investigation Two to three samples	BETX, PAHs, Cyanide, Lead
General Fill	Composite (quartile)	every 300 cubic yards	BETX, PAHs, Cyanide, Lead
Debris Characterization	Composite	collected as necessary for disposal profile	BETX, PAHs, Cyanide, Lead, other parameters as necessary
Pre-treatment sampling	Composite (grab)	1 sample for every 500 cubic yards of material to be treated.	BETX, PAHs, Cyanide, Lead
Post-treatment sampling	Composite (quartile)	1 representative sample from each 300 cubic yards of excavated material.	BETX, PAHs, Cyanide, Lead

Notes:

by: SLF/LJP

Refer to Table 1 for definition of Zones
Refer to Table 2 for analytical methods and detection limits

APPENDIX A

SUBSURFACE INVESTIGATION SOIL AND GROUNDWATER DATA

PLATES

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

Sampling Location	Sampling Depth (feet below ground surface)	Sampling Date	mg/kg				µg/kg				
			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

Sampling Location	Sampling Depth (feet below ground surface)	Sampling Date	mg/kg				µg/kg				
			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) Bold numbers indicate detected concentrations.
3) < - Parameter was not detected above the indicated detection limit.
4) nd - not detected.
5) na - not analyzed.
6) TACO - Illinois Tiered Approach to Cleanup Objectives.
7) TACO total cyanide SRO shown is for amenable species.
8) SRO - Soil remediation objectives for inhalation (BTEX) and ingestion (lead, cyanide, phenolics).
9) PRG = US EPA Region 9 Preliminary Remediation Goals for direct contact.
10) PRGs assume all dissociable cyanide as free cyanide.
11) ne - not established.
12) Concentrations within unsaturated zone which attain or exceed an NR 720 Direct Contact Pathway-Non-industrial RCL are boxed.
13) Concentrations within unsaturated zone which attain or exceed NR 720 Groundwater Pathway RCLs and/or Direct Contact Pathway-Industrial RCLs have been boxed and shaded.
14) Concentrations within unsaturated zone 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

Sampling Location	Sampling Depth (feet)	Sampling Date	POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs) (mg/kg)																	
			Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) 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
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	80
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	63
	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
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
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	47
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
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	15

SAG/BJK/DVP-02/17/99

Notes:
1) * - Parameter detected above the limit of detection (LOD) but below the limit of quantitation (LOQ).
2) ** - RCLs for PAH compounds are guidance values proposed in the WDNR publication RR-519-97, dated April, 1997.
3) *** - The laboratory surrogate recovery was below laboratory limits. The sample was re-extracted past hold time and analyzed. Both results are reported.
4) TACO - Illinois Tiered Approach to Cleanup Objectives.
5) SRO - Soil remediation objectives for ingestion.
6) PRGs - US EPA Region 9 Preliminary Remediation Goals for direct contact.
7) Concentrations within unsaturated zone which attain or exceed residential PRGs are boxed.
8) Concentrations which attain or exceed PRGs and/or TACO SROs are underlined.
9) < - Parameter was not detected above the indicated detection limit.
10) ne - standard 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

Sampling Location	Sampling Date	Cyanide (mg/L)			BTEX (µg/L)				
		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^	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^	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^	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^	<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

Sampling Location	Sampling Date	POLYNUCLEAR AROMATIC HYDROCARBONS - PAHs (µg/L)																	
		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-8]	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 7 - Composite Soil Analytical Summary, BTEX, TCLP Benzene & Inorganics
Feasibility Study
Campmarina, Former Coal Gas Facility
Wisconsin Public Service Corporation - Sheboygan, WI

Sampling Location	Sampling Zone	Sampling Date	BETX (µg/kg)					TCLP (mg/L)	Inorganics (mg/kg)		
			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

Sampling Location	Sampling Zone	Sampling Date	POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs) (mg/kg)																	
			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.

APPENDIX B

ENGINEERING CONTROLS FOR VAPOR AND DUST SUPPRESSION

SOIL VAPOR SUPPRESSION

The enclosed information offers independent lab results demonstrating BioSolve's effectiveness to suppress vapor, while not masking hydrocarbon contamination.

BioSolve offers a relatively simple and cost effective method of suppressing VOC vapor release from soils during excavation, loading, stockpiling, etc.. The following guidelines will apply to the most common situations encountered on site.

In most cases a 3% solution of BioSolve will be adequate to keep vapor emissions within acceptable limits. Dilute BioSolve concentrate with water at the ratio of 1 part BioSolve to 33 parts water to make a 3% solution.

The BioSolve solution should be applied evenly to the soil surface in sufficient quantity to dampen the surface well, (as a general rule, 1 gallon of BioSolve solution will cover approximately 4 sq. yd. of soil surface area). BioSolve is not a foam, it is a surfactant based product that will apply like water. Solution may be applied with a hand sprayer, high pressure power sprayer, water truck, etc., whichever method best suits the site and/or conditions.

NOTE: In the case of extremely high emission levels and/or very porous soil it may be necessary to increase the strength of the BioSolve solution (6%) or apply more per sq. yd. to reduce emissions adequately.

On stockpiled soil or other soil that will be undisturbed, a single application of BioSolve to the exposed surfaces may last 10-14 days or more. During excavation, loading, or other movement of soil it may be necessary or required to spray each freshly exposed surface to keep emissions below acceptable levels.

It is important that the site be monitored regularly and BioSolve solution be reapplied if/when necessary to insure that vapor emissions remain at or below acceptable levels.

For more information contact your local BioSolve distributor

BioSolve should only be used in accordance with all state and local rules and regulations

BIOSOLVE™ USED TO ENABLE THE DISPOSAL OF MERCAPTAN DRUMS

Situation:

A gas plant in Alberta had a large number of empty mercaptan drums stored on its property. The drums varied in age from less than a year old up to five years old. The top bungs had been left open on the empty drums to allow the residual mercaptan to escape.

Problem:

It is very difficult to dispose of the drums because:

- Drum recyclers find that washing out the drums causes too much odour even though the drums have been vented for 5 years. The workers and neighbors complain enough that the recyclers now refuse to handle these drums.
- Scrap metal dealers do not want to process them because the crushing operation creates odours that neither the workers or the neighbors will accept.
- The most popular solution is storing the drums on site or at remote sites. This leaves a continuous or secondary liability. The storage of drums can be unsitely. Because of the odour, it can be perceived by the public to be a hazardous material.

Solution:

A hot 6% solution of BIOSOLVE™ was high pressure sprayed into the drums to wash them out. BIOSOLVE'S capacity to encapsulate the mercaptans in water and contain the mercaptan vapours suppressed the odour.

The 6% solution was recirculated to conserve on water to be disposed of. After washing, the drums were crushed with no odour problems.

Because BIOSOLVE™ enhances the bioremediation of organic compounds such as mercaptans, it made it possible to dispose of wash water to the plants activated sludge pond.

Result Summary:

The following is a summary of this project:

- The drums were rendered odourless.
- The drum crusher operator had no problem with odour.
- The washing solution was nontoxic and biodegradable, greatly enhancing worker and environmental safety.
- The left over washing solution was easily disposed of by bioremediation.

VOC & ODOUR SUPPRESSION USING BIOSOLVE™

Situation:

A major oil company was decommissioning a facility in Southern California. The decommissioning included excavation. When the excavation had begun VOC's (Volatile Organic Compounds) which included some hydrogen sulfide and mercaptans were released from the face of the excavation.

Problem:

The project was shut down by the Environmental Authorities because the VOC emissions exceeded standards. Also the odours were a nuisances factor.

Remediation Procedure:

The contractor suggested spraying the excavation site with a solution of BIOSOLVE™. At the same time of the excavation the work area would be misted with a BIOSOLVE™ solution.

Results:

The BIOSOLVE™ applications suppressed the vaporization of the hydrocarbons eliminated the VOC's and odours. The project was allowed to proceed without amendment to the permit.

4a

333 Pfingsten Road
Northbrook, Illinois 60062-2096
(708) 272-8800
FAX No. (708) 272-8129
MCI Mail No. 254-3243
Telex No. 6502543243

Underwriters Laboratories Inc.®

100 a century of public safety est. 1894

January 27, 1995

The Westford Chemical Corporation
Mr. Ron LaRoche, President
14 Boutwell Hill Road
Westford, MA 01886

Our Reference: File Ex4707, Project 94NK17233

Subject: Bio-Solve Wetting Agent

Dear Mr. LaRoche:

This is to inform you that we have completed all required testing of your product and have found it to be in compliance with all applicable requirements of NFPA 18, UL 162, and UL 711 utilizing a premix solution of 6 percent concentrate when mixed with water.

A detailed Report of the test methods employed and the results obtained will be sent to your attention.

Very truly yours,

F. Nusak

F. HUSAK (Ext. 42447)
Engineering Associate
Engineering Services, Dept 411

FH:lem
S:\FPWP5\EX4707.JAN
L0535

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
AIR RESOURCES DIVISION
64 North Main St.
Caller Box 2033
Concord, N.H. 03302-2033
(603) 271-1370
Fax 271-1381
TTY/TDD 225-4032

ROBERT W. VARNEY
COMMISSIONER
DENNIS R. LUNDERVILLE
DIRECTOR
DONALD C. DAVIS
CHIEF ENGINEER

August 20, 1991

Mr. William E. Simendinger
Wesco, Inc.
P.O. Box 1485
Burlington, VT. 05402-1485

Re: Champlain Farms
Soil Remediation
Claremont, NH

Dear Mr. Simendinger:

This is to acknowledge receipt of your 7-17-91 proposal and your 8-2-91 supplement describing the referenced project. You are authorized to proceed with remediation in accordance with the Bio Solve protocol. An operating air permit will not be required.

I do request, however, that you keep me advised of project progress. Copies of your final laboratory analysis of the soils will also be required to confirm that you have reached your remediation goals.

Sincerely,

Richard D. Andrews
Administrator
Toxics Management Bureau

RDA:smh
0441R

MANUFACTURED GAS PLANT
COAL TAR CONTAMINATION
ODOR & VOC CONTROL

TYPICAL APPLICATION

PRODUCTS USED:

- AC-645 Long Duration Foam
- AC-904 Long Duration Foam
- Pneumatic Foam Unit 400/25

Rusmar Long Duration Foam products have been used at numerous manufactured gas plant facilities. Often, tanks containing coal tar were filled with soil and other debris from the site before being abandoned.

Old manufactured gas plants are usually located in the center of the town near residential and industrial facilities. Therefore, the control of odors and VOC's, particularly benzene, is very important. The excavation plans usually require that the soil be stabilized prior to being shipped off site for disposal or treatment. Rusmar Long Duration Foam is used to control both the odors and VOC's.

Periods of warm weather can cause emission problems during the stabilization process. AC-645 is applied over the top layer of contaminated soil during active excavation to control emissions. The worst emission problems occur when the contaminated soil is allowed to sit dormant for a period of time, particularly overnight. Rusmar AC-645 Long Duration Foam can be applied over the top layer of contaminated soil to control emissions when control requirements do not exceed eighteen (18) hours.

If the emission control requirements exceed eighteen (18) hours, such as on weekend or holiday shutdowns, AC-904 Long Duration Foam is applied over the contaminated soil. The AC-904 Long Duration Foam provides superior emission control for up to ten (10) days.

The Pneumatic Foam Unit 400/25 can be used to apply both foam products. The unit is self contained and simple to operate.

Please contact Rusmar Incorporated for more details and references.

RUSMAR INCORPORATED, 216 GARFIELD AVENUE WEST CHESTER, PA 19380
610-436-4314 phone • 610-436-8436 fax
rusmar@voicenet.com • www.rusmarinc.com

PRODUCT DATA SHEET

LONG DURATION FOAM

AC-645

GENERAL DESCRIPTION

AC-645 Long Duration Foam is a patented product which produces a thick, long-lasting, viscous foam barrier for immediate control of dust, odors and volatile organic compounds (VOC's). AC-645 is designed for use with Rusmar Pneumatic Foam Units.

AC-645 foam is recognized by the Environmental Protection Agency and the U.S. Army Corps of Engineers as providing superior emission control for a period up to 17 hours. AC-645 has been specified for use at Superfund and other hazardous waste sites across the United States and Canada.

FEATURES

- Biodegradable
- Will not add to treatment costs
- No ambient temperature limitations
- Easy to use
- More effective than tarps
- Non-hazardous
- Safe for workers and the environment
- Requires only water dilution
- No clean up necessary
- Non-combustible

APPLICATIONS

The primary application for AC-645 is control of odors, VOC's and dust during active excavation and for overnight coverage of contaminated soils at hazardous waste sites. AC-645 can also be applied on top of liquid surfaces.

SPECIAL ODOR CONTROL PROBLEMS

The remediation of hazardous waste sites often includes excavation of soil contaminated with odorous compounds. AC-645 has little or no odor itself, although a pleasant wintergreen or vanilla scent can be added. It performs as a barrier between contaminants and the atmosphere and can be applied during active excavation to provide a continuous and effective barrier to minimize odors. It is completely biodegradable and poses no threat to workers, neighboring residents or ground water. AC-645 will not add to soil treatment costs.

RUSMAR INCORPORATED, 216 Garfield Avenue, West Chester, PA 19380
610-436-4314 phone • 610-436-8436 fax
www.rusmarinc.com

AC-645 can also be applied on top of trucks for emission control during transport of materials such as contaminated soils or sewage sludge. Ammonia tests performed on trucks containing sewage sludge resulted in a drop of concentration levels from 170 ppm prior to foaming down to 6 ppm after coverage with AC-645.

Minimizes worker exposure.
Maintains fence-line odor and VOC emission limits.
Works on lagoon and pond closures.
Can be applied to liquid surfaces.

FUGITIVE DUST

At hazardous waste sites, fugitive dust can present a health hazard. AC-645 can be applied on top of the dusty material to prevent any wind-borne emissions.

No need to mobilize equipment to immediately cover with soil or tarps. The Pneumatic Foam Unit can be filled and placed at the site to be used at a moment's notice.

EMERGENCY SPILL CLEAN UP

In emergency spills, odor and VOC control is often difficult because of the terrain and accident conditions. AC-645 Long Duration Foam can be applied to any shaped object, as well as steep slopes, water, mud, snow and ice.

Non-flammable and non-reactive - difficult spill problems can be accommodated.

METHOD OF APPLICATION

AC-645 Long Duration Foam is supplied in either 450 pound drums or by bulk load (approximately 46,000 pounds). Bulk shipments can be stored outside in a Rusmar Bulk Storage-Dilution System. The Bulk Storage and Dilution system is comprised of a 7000 gallon heated and stirred chemical storage tank and a microprocessor to accurately dilute and transfer the chemical.

AC-645 is designed to be applied with a Rusmar Pneumatic Foam Unit. The Pneumatic Foam Units are available in a variety of sizes to accommodate a range of site conditions and application needs.

PRODUCT DATA SHEET

LONG DURATION FOAM

AC-900 SERIES

GENERAL DESCRIPTION

The AC-900 Series Long Duration Foam products produce an impermeable, flexible membrane that seals a surface to prevent emissions. AC-900 Series foam products utilize foam as a distribution method for latex. After the foam has been applied, the air bubbles begin to collapse and the latex coagulates to form a continuous flexible membrane that adheres to the substrate. AC-900 Series products are designed for use with Rusmar Pneumatic Foam Units.

AC-900 Series foams are recognized by the Environmental Protection Agency and the U.S. Army Corps of Engineers as providing superior emission control for periods from 2 weeks up to 6 months. AC-900 Series foams have been specified for use at Superfund and other hazardous waste sites across the United States and Canada.

FEATURES

- Adheres to vertical and irregular surfaces
- Completely controls odors & VOC's
- Prevents erosion
- Easy to use, no mixing necessary
- Available in black, red, green or brown
- Non-hazardous
- Controls dusting
- Repels water
- No temperature limitations
- More effective than tarps

APPLICATIONS

AC-900 Series Long Duration Foam products have numerous applications in landfills and remediation projects.

ODOR AND VOC CONTROL

As a medium for controlling odors and VOC's, AC-900 Series has proven to be very effective with diverse applications:

- Extended odor & VOC control of open excavations or exposed trash.
- Extended odor & VOC control of stockpiled soils or debris.
- Special odor control problems, such as sewage sludge.
- Baled trash cover – the membrane seals the surface completely.

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610-436-4314 phone • 610-436-8436 fax
www.rusmarinc.com

FUGITIVE DUST

Exposed soil can often become a dust problem in windy locations, presenting a potential health hazard. Hazardous waste sites, receiving periodic shipments of dusty materials, can prevent windorne dusting by immediately applying AC-900 Series foam.

- No need to mobilize equipment to immediately cover with soil or tarps.
- Extended dust control of stockpiled soils or debris.

EROSION CONTROL

Graded areas can be covered with AC-900 Series Membrane reducing erosion damage caused by rain, melting snow or ice and wind.

- On outside slopes of the landfill – prevents trash from being exposed
- On new liners – compacted clay can be protected from weather before a plastic liner or select trash is put down.

SEALING HIGH PERCOLATION SOILS

Sand and other high percolation soils do not effectively repel rain water or melting snow and ice. Covering areas with AC-900 Series foam dramatically reduces soil permeability.

- Improved run-off from inside surfaces of the landfill
- Reduced leachate generation

WASTE TRANSPORTATION

Trucks or railcars transporting trash, odorous or dusty materials can be quickly covered with AC-900 Series foam to form a complete barrier between emissions and the atmosphere.

- No wind blown losses
- Produces a better visual appearance

METHOD OF APPLICATION

AC-900 Series Long Duration Foam products are supplied in either 450 pound drums or by bulk load (approximately 46,000 pounds). Bulk shipments can be stored outside in a Rusmar Bulk Storage-Dilution System. The Bulk Storage and Dilution system is comprised of a 7000 gallon heated and stirred chemical storage tank and a microprocessor to accurately transfer the chemical.

AC-900 Series products are designed to be applied with a Rusmar Pneumatic Foam Unit. The Pneumatic Foam Units are available in a variety of sizes to accommodate a range of site conditions and application needs.

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APPENDIX C

CITY OF SHEBOYGAN SANITARY PRE-TREATMENT REQUIREMENTS

SHEBOYGAN WASTEWATER TREATMENT PLANT
HAULED WASTEWATER DISPOSAL GUIDELINES

Sheboygan Municipal Code, Article VI. Sewer, contains regulations for the disposal of hauled wastes. In addition to these regulations, the following guidelines have also been developed. In the event any parts of this document are in conflict with the municipal code, the latter shall control.

1. PERMIT AND FEES

No person shall dispose of any hauled wastes at the Sheboygan Wastewater Treatment Plant (WWTP) unless a hauled wastewater disposal permit has first been obtained and a permit fee of $100.00 per year has been paid. (Section 122-340)

2. INSURANCE

Any person disposing of hauled wastes shall carry public liability insurance in an amount not less than $100,000.00. A current insurance certificate must be furnished certifying such insurance is in effect. (Section 122-340)

3. RESTRICTIONS ON MATERIALS DISPOSED

All materials disposed at the WWTP shall be of domestic origin or compatible pollutants only. Disposal of grease trap wastes are prohibited. Permission shall be obtained prior to the disposal of any non-domestic type waste. No person shall dispose of any waters or wastes as specified in Section 122-469 or Section 122-470.

4. REGULATED WASTEWATER

Any wastewater subject to the nation categorical pretreatment standards is prohibited unless a wastewater discharge permit has been obtained in accordance with Section 122-511.

5. DISPOSAL OF NON-DOMESTIC WASTES

Prior to the disposal of any non-domestic waste, information shall be obtained as to the source of the waste, description, potential contaminants present, volume, site of origin, and any other pertinent information. When applicable, material safety data sheets and product literature will be reviewed. Such waste may be tested to establish strength, treatability, and when appropriate, concentration of any other pollutants of concern. All testing requirements shall be the responsibility of the hauler.

6. COMBINING OF WASTE TYPES

Different waste types shall not be combined in the same truckload. E.g. A holding tank waste shall not be mixed with a septic tank waste in the same load.

7. CONTAMINATED GROUNDWATER DISPOSAL

Prior to the disposal of any petroleum contaminated groundwater, a representative sample shall be evaluated as follows:

Source of Contamination	Analysis Required	Limits (mg/l)
Gasoline	BETX (1)	2.13 (2)
Diesel fuel and # 1, 2, and	BETX	2.13
4 fuel oil	O & G	200
Fuel oil #6	O & G	200

(1) BETX shall mean benzene, ethylbenzene, toluene, and xylene.

(2) The limit of 2.13 mg/l shall apply to the combined BETX concentration. If volatile organic carbon (VOC) analysis is requested or provided, the combined VOC concentration shall not exceed 2.13 mg/l.

If any groundwaters are likely to contain heavy suspended solids, such waters shall also be analyzed for total suspended solids. Concentrations of suspended solids above normal domestic strength shall be subject to the surcharge set forth in Section 122-403.

8. DISPOSAL SITE AND TIMES

All hauled wastes shall be disposed at a designated discharge point located at the Wastewater Treatment Plant. Hauled wastes shall not be discharged at any location outside the Treatment Plant. Disposal times shall be Monday thru Friday from 7:00 a.m. - 5:00 p.m. There shall be no waste disposal on municipal holidays.

9. DISPOSAL CHARGES

Charges for the disposal of holding tank wastes, septic tank wastes or other hauled wastewater shall be assessed in accordance with Section 122-405.

10. SAMPLE COLLECTION AND RECORD KEEPING

All hauled wastes shall be sampled at the WWTP from the tanker truck. The date, time, location, load #, volume, driver's initials, and waste type shall be recorded on the hauler's log sheets at the time of disposal.

This document may be amended whenever it is deemed necessary. The WWTP may impose additional restrictions or requirements when deemed appropriate.

$4 / 1,000 gallons

PERMITTED HAULERS AT SHEBOYGAN WWTP

		920
	Affordable Septic Systems	~~(414)~~ 528-7171
	N4259 County Trunk Hwy. S	
	Plymouth, Wisconsin 53073	
		920
	Den-Bec, Inc.	~~(414)~~ 452-5628
	P.O. Box 342	
	Plymouth, wisconsin 53073	
		920
	Jossee's Trucking, Inc.	~~(414)~~ 564-3949
	215 North 11th Street	
	Oostburg, Wisconsin 53070	
*	Kenway Service, Inc.	(414) 384-7050
	4841 West Burnham Street	
	West Milwaukee, Wisconsin 53219	
		920
	Krier Foods, Inc.	~~(414)~~ 994-2469
	ATTN: Tom Bretza	
	4555 West Schroeder Dr., Ste 190	
	Brown Deer, Wisconsin 53223	
		920
	Maritime Liquid Waste Transport	~~(414)~~ 458-7700
	8923 South Union Road	
	Newton, Wisconsin 53063	
		920
	Pit-Stop Portable LTD	~~(414)~~ 683-3200
	512 South 32nd Street	
	Manitowoc, wisconsin 542220	
	~~Steven R. Schenian Trucking, Inc.~~	~~(414) 682-3166~~
	~~7681 Polifka Road~~	
	~~Whitelaw, wisconsin 54247~~	
		920
	Schwind Trucking	~~(414)~~ 526-3666
	W9160 County Trunk Hwy. T	
	Glenbeulah, Wisconsin 53023	
*	Superior Special Services, Inc.	1-800-932-6216
	P.O. Box 1323	
	Fond du Lac, Wisconsin 54936-1323	

The haulers marked with an asterisk have previously hauled in groundwater, although, Affordable Septic Systems and Schwind Trucking also have large tankers and may be able haul groundwater.

b. Cause the treatment plant to violate its WPDES discharge permits;

c. Contaminate the sludge;

d. Pass through the system, inadequately treated, into receiving waters or the atmosphere;

e. Pose a health threat to sewer workers; or

f. Be otherwise incompatible with the system.

(3) Improve the opportunity to recycle and reclaim wastewaters and sludges from the system; and

(4) Provide for equitable distribution of the cost of the municipal wastewater system.

(Code 1975, § 34.5-108)

Sec. 122-468. Applicability.

This article shall apply to all users of the city POTW, including all persons outside the city who are users of the city POTW.
(Code 1975, § 34.5-109)

Sec. 122-469. General discharge prohibitions.

(a) No person shall contribute or cause to be contributed directly or indirectly to the POTW any pollutant or wastewater which will pass through or interfere with the operation or performance of the POTW.

(b) No person shall contribute the following substances to the POTW:

(1) Any substances which may create a fire or explosion hazard to the POTW, including but not limited to wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Celsius using the test methods specified in 40 CFR 261.21.

(2) Any wastewater having a pH less than 5.0 or greater than 12.0 or having any other corrosive property capable of causing damage or hazard to structures, equipment or personnel of the POTW.

(3) Any solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater collection and treatment facilities.

(4) Any pollutant, including oxygen demanding pollutants released in a discharge at a flow rate or concentration which may cause interference to the POTW.

(5) Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 degrees Celsius (104 degrees Fahrenheit) unless the approval authority, upon request of the POTW, approves alternate temperature limits.

(6) Any wastewater containing more than 200 mg/l of total oil and grease, including but not limited to fats, waxes, petroleum oil, cutting oils or products of mineral oil origin.

(7) Pollutants which result in the presence of toxic gases, vapors or fumes within the POTW in a quantity that may cause acute worker health and safety problems.

(8) Any trucked or hauled pollutants, except at discharge points designated by the POTW.

(9) Any substance which may cause public nuisance, cause hazard to life or prevent entry into the sewers for maintenance and repair.

(10) Any wastewater containing substances which are not amenable to treatment or reduction by the POTW.

(11) Any pollutant in excess of the allowable limits as determined by city, state or federal rules and regulations.

(12) Any sludges, scums, skimmings, residuals, etc., generated by industrial and commercial facilities. Such substances shall be contained, transported and disposed of in accordance with all federal, state and local regulations.

(13) Any unpolluted waters such as stormwater, surface water, groundwater, roof runoff, subsurface drainage or noncontact cooling water. Stormwater runoff and groundwater from limited areas, which may be polluted at times, may be discharged to the sanitary sewers by permission of the POTW.

(14) Any wastewater containing antifreeze originating from automotive service or repair facilities. Such material shall be recycled or disposed of in accordance with all federal, state and local regulations.

(Code 1975, § 34.5-111)

Sec. 122-470. Specific pollutant limitations (local limits).

No person shall discharge wastewater to the POTW containing the following pollutants in excess of the following 24-hour flow proportional average concentrations:

Pollutant	*Limit, mg/l*
Cadmium, total	0.69
Chromium, total	10.0
Copper, total	4.3
Lead, total	0.69
Mercury, total	0.02
Nickel, total	4.1
Silver, total	5.0
Zinc, total	4.0
Cyanide, total	5.0[FN1]

[1]The limitation for total cyanide shall be based on a single grab sample.

(Code 1975, § 34.5-112; Ord. No. 21-96-97, 7-17-96; Ord. No. 104-97-98, § 9, 12-15-97)

Sec. 122-471. Pretreatment requirements.

(a) Industrial users shall provide necessary wastewater treatment as required to comply with the most stringent standards of this article, federal pretreatment standards, as established by 40 CFR chapter N, subpart I, state standards and permit conditions and shall achieve compliance with all national categorical pretreatment standards within the time limitations as specified by the federal pretreatment regulations and with any other pretreatment standards by applicable deadlines.

(b) Any facilities required to pretreat wastewater shall be provided, operated and maintained at the industrial user's expense. Detailed plans showing the pretreatment facilities and operating procedures shall be submitted to the POTW for review before construction of the facility. The review of plans and operating procedures does not relieve the industrial user from complying with this article and permit conditions. Any subsequent changes in the pretreatment facilities or method of operation shall be reported to the POTW prior to the industrial user's initiation of the changes.

(Code 1975, § 34.5-113)

Sec. 122-472. Dilution prohibition.

No industrial user shall increase the use of process water or in any way dilute a discharge as a substitute for adequate treatment to achieve compliance with any pretreatment standard or requirement. The control authority may impose mass limitations on industrial users which are using dilution to meet applicable pretreatment standards or requirements or in other cases where the imposition of mass limitations is appropriate.

(Code 1975, § 34.5-114)

Sec. 122-473. Spill prevention and slug control plans.

(a) Industrial users shall provide protection from accidental discharge of prohibited materials or other regulated substances by developing spill prevention plans. Facilities necessary to implement these plans shall be provided and maintained at the owner's or industrial user's expense.

(b) The POTW shall evaluate each significant industrial user at least once every two years and other industrial users as necessary to determine whether such user needs a plan to control slug discharges. If the POTW decides that a slug control plan is needed, the plan shall contain, at a minimum, the following elements:

(1) Description of discharge practices, including nonroutine batch discharges.

APPENDIX D

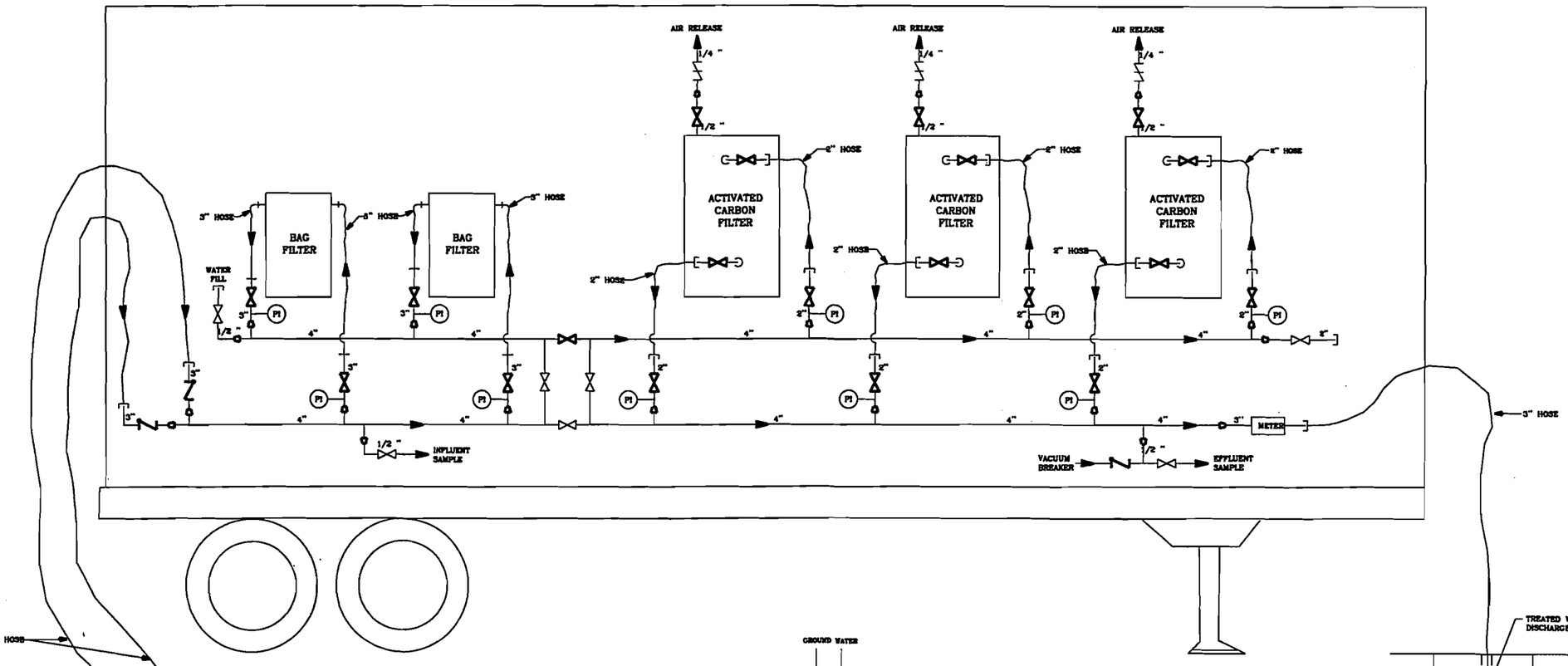
MOBILE GROUNDWATER TREATMENT SYSTEM

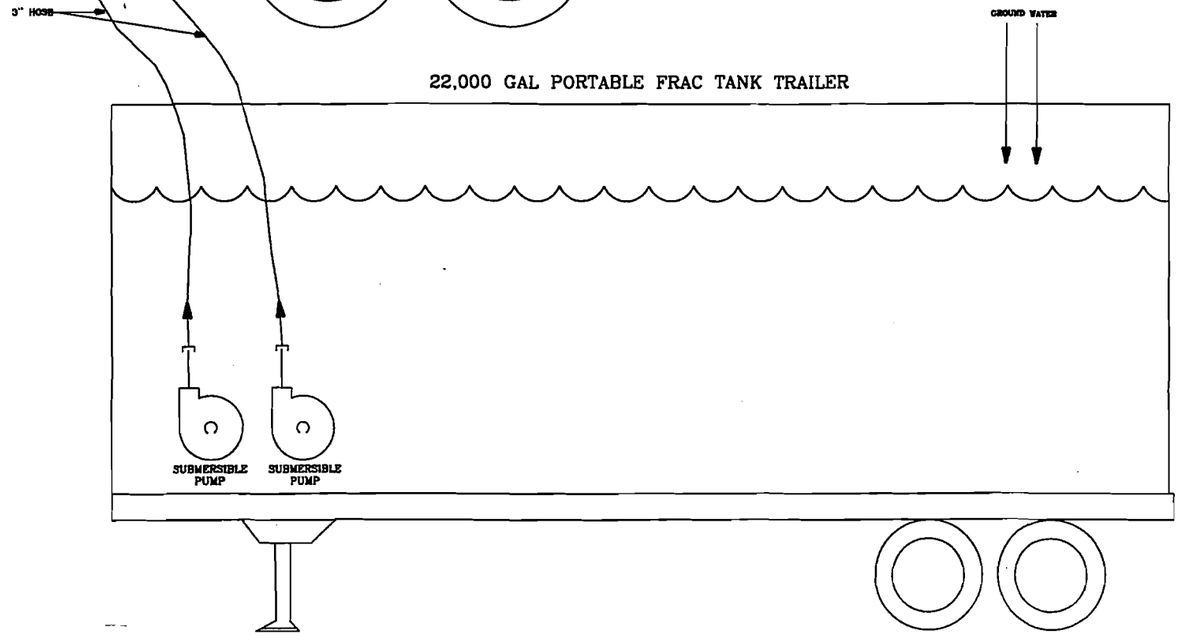
WSK531

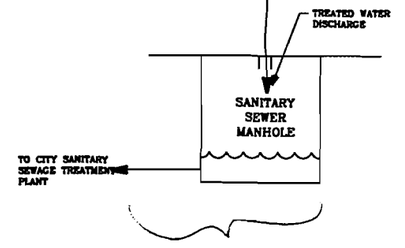
SHEET OF

REVISIONS

PORTABLE WATER TREATMENT TRAILER







OR DISCHARGE TO TEMPORARY HOLDING TANK.

WSK531

P

SCALE: NONE	MGP SITE REMEDIATION	DRAWN: R J SEROOGY	CHECKED: D.S. WILEY
PROJECT NUMBER:	WISCONSIN PUBLIC SERVICE CORPORATION GREEN BAY, WISCONSIN	APPROVED:	FILMED:
CADD:	WATER TREATMENT P&ID	DRAWING NO.: WSK531	REV.:
		SHEET: OF	

PLOT SIZE 36" X 24"

APPENDIX E

THERMAL TREATMENT PROCESS DESCRIPTION

DUSTCOATING, INC.

MEDIUM TEMPERATURE
TANDEM THERMAL DESORPTION - 1200°F

INTRODUCTION

The 90" tandem rotary desorber, is specifically designed for the remediation of soils containing heavier or long chain hydrocarbons such as polyaromatic hydrocarbons (PAHs) and bunker oils which require remediation temperatures to 1200°F. The rotary thermal desorption process is based upon the concept of transferring heat into contaminated soils. The contaminated soil temperature is raised to a predetermined temperature sufficient to cause the contaminants to reach their boiling points, resulting in a change from a solid or a liquid phase to a gaseous phase. Operating temperatures at this point in the process are below the auto ignition temperatures of the contaminants of concern.

The gas stream containing water vapor, particulate and vaporized hydrocarbons, is passed through a primary separation device and into the main baghouse where the particulates are separated from the gas stream. The gas stream is then forced into a thermal oxidizer where the temperature is increased to destroy the hydrocarbons. The hydrocarbons of concern are thermally broken down to carbon dioxide and water vapor.

TANDEM SOIL REMEDIATION UNIT
PROCESS DESCRIPTION

DCI, utilizing a 90"X38' rotary Medium Temperature Thermal Desorption (MTTD) plant can remediate polyaromatic hydrocarbon (PAH) contaminated soils and heavy petroleum related hydrocarbons while operating at a production rate of 25 to 45 tons per hour. The MTTD plant is comprised of a two stage (Tandem) counter flow direct fired rotary desorber with the capability to heat soils to 1200°F. The 38 foot long desorber has proven to provide the residence required to remove PAHs and heavy petroleum products. The MTTD plant has remediated PAH concentrations as great as 8000 ppm, to less than 1 ppm and weathered #6 oil concentrations of 30,000 ppm to less than 10 ppm.

The plant is equipped with a thermal oxidizer capable of operating at 2000°F and is of proven size to provide a residence time of at least 2 seconds, to achieve a DRE of 99.99 %.

The MTTD remediation process is depicted in Exhibit 4. Soil requiring treatment is loaded into a feed hopper (1). A variable speed belt from the feed hopper charges the soil at a rate of 20 to 50 tons per hour onto a weigh belt (2) and into the two stage rotary drum desorber (3) consisting of; the Low Temperature Stage (LTS), and the High Temperature Stage (HTS). This two stage process is referred to as "Tandem".

The soil in the LST is fed in a countercurrent direction to the combustion gases, and the temperature of the soil is raised as required to remove the light hydrocarbons to 300°F to 500°F. The low temperature gas stream (4), which also contains water vapor, is drawn through a baghouse (5) for particulate removal. This gas stream from the desorber is maintained at 200°F/300°F through variable drum speed control. Superheating this gas with recycled stack gas (16) to 300°F to 425°F inhibits hydrocarbon condensation.

The dried and heated soil from the LTS passes into the HTS. The temperature of soil in the Tandem stage HTS is then raised as necessary (maximum 1200°F), where mid to high boiling point hydrocarbons are volatilized.

The desorbed vapors from the HTS flow into the LTS and are routed through the LTS burner flame where they are oxidized or cracked to lower boiling point hydrocarbons. These hydrocarbons and combustion gases are then drawn off with the lower boiling hydrocarbons from the LTS at 200°F to 300°F for particulate removal in the baghouse (5) and thermal destruction in the thermal oxidizer (7). The exhaust gases from the desorber pass through a primary knockout collector where the larger particulate is collected. The collected particulate is returned to the HTS outer annular zone (10) where it undergoes further remediation prior to being recombined with the discharged remediated (11) soil at operating temperatures to 1200°F. The remediated recombined soil and collected particulate drop into the mixer cooler extending the residence time by four minutes, within a refractory lined mixing portion (12), and is then transferred into the cooling zone which includes the water spray portion (13) of the rotary mixer cooler. The soil is then discharged into a twin shafted pugmill type cooler (14) for final remoisturizing and onto a covered discharge conveyor (15). The fines or particulate matter which are carried (4) to the knockout and into the main baghouse (5) at 250°F to 425°F may have portions which have not have been remediated. This potentially unremediated dry fine material is pulsed from the bags in the baghouse, processed around the HTTS within the annular zone (10) and then transferred to the rotary mixer-cooler.

Particulate from the primary knockout collector (18) is also returned (21) to the HTS annular zone (10) for final remediation. This processing assures that the collected particulate from the baghouse and primary knockout collector is elevated to sufficient remediation temperatures.

Residual hydrocarbons, which may be present on the dust and particulate are volatilized in this step. The resulting vapors are drawn into the HTS and recycled to the main vapor stream.

COUNTERCURRENT DESORPTION

Both the low LTS and the high temperature HTS zones of the desorber operate with a countercurrent flow of soil to the combustion gases. This scheme, with lifting and combustion volume flight augers, provides highly efficient heat transfer with flue gas and soil temperature control. The desorber unit has been sized to minimize gas velocities at the outlets of both the low and high temperature stages. These lower velocities, <425 FPM in the LTS and <220 FPM in the HTS, minimize dust carryover in the gas stream. This, in turn, improves the level of remediation and minimizes maintenance and related effects on capacity.

EFFICIENT PROCESSING OF HEAVY HYDROCARBONS

Medium temperature desorption of heavy petroleum hydrocarbon and PAH contaminated soil is achieved through use of a second stage or zone within the desorber drum. Each stage has its own combustion system to allow for control and balance. With tandem two stage desorption, coupled with coutercurrent flow, the resulting heavier hydrocarbons in the low velocity gas stream from the HTS (second stage) will be destroyed or cracked in the flame of the LTS burner (first stage) reducing the chance of hydrocarbon condensation.

DUST REMEDIATION

The tandem system remediates dust (fines or collected particulates) that has been carried out of the counterflow desorber in three ways:

1) Dust particles are partially treated in the two stage rotary desorber;

2) Upon leaving the desorber at low temperature and low velocity the fines are treated in a superheated gas stream (16). The superheat volatilizes hydrocarbons on the dust particles and lowers the dew point effectively protecting vapors from condensing.

3) Heavier particulate collected within the primary knockout collector is conveyed with baghouse dust to the annular zone which surrounds the high temperature stage (see Exhibit 3), area shown in green) for final remediation. Radiant and conductive heat from the internal walls of the HTS remediate the dust at high temperatures. The dust, in turn, helps maintain a lower temperature on the outside surface of the internal chamber.

The dust is then mixed or recombined with the soil leaving the desorber. The thermal mass stored within the remediated soil is transferred into the collected particulate.

The recombined soil particulate and fines are transferred from the mixing zone of the mixer cooler (12) into the cooling zone (13) wherein, water (24) is sprayed onto the soil for cooling, and mixed into the soil for rehydration. The soil is then discharged from the rotary mixer cooler into the pugmill cooler (14) for final rehydration and ultimately discharged from the process at approximately 200°F containing 3 to 5% moisture for dust free handling

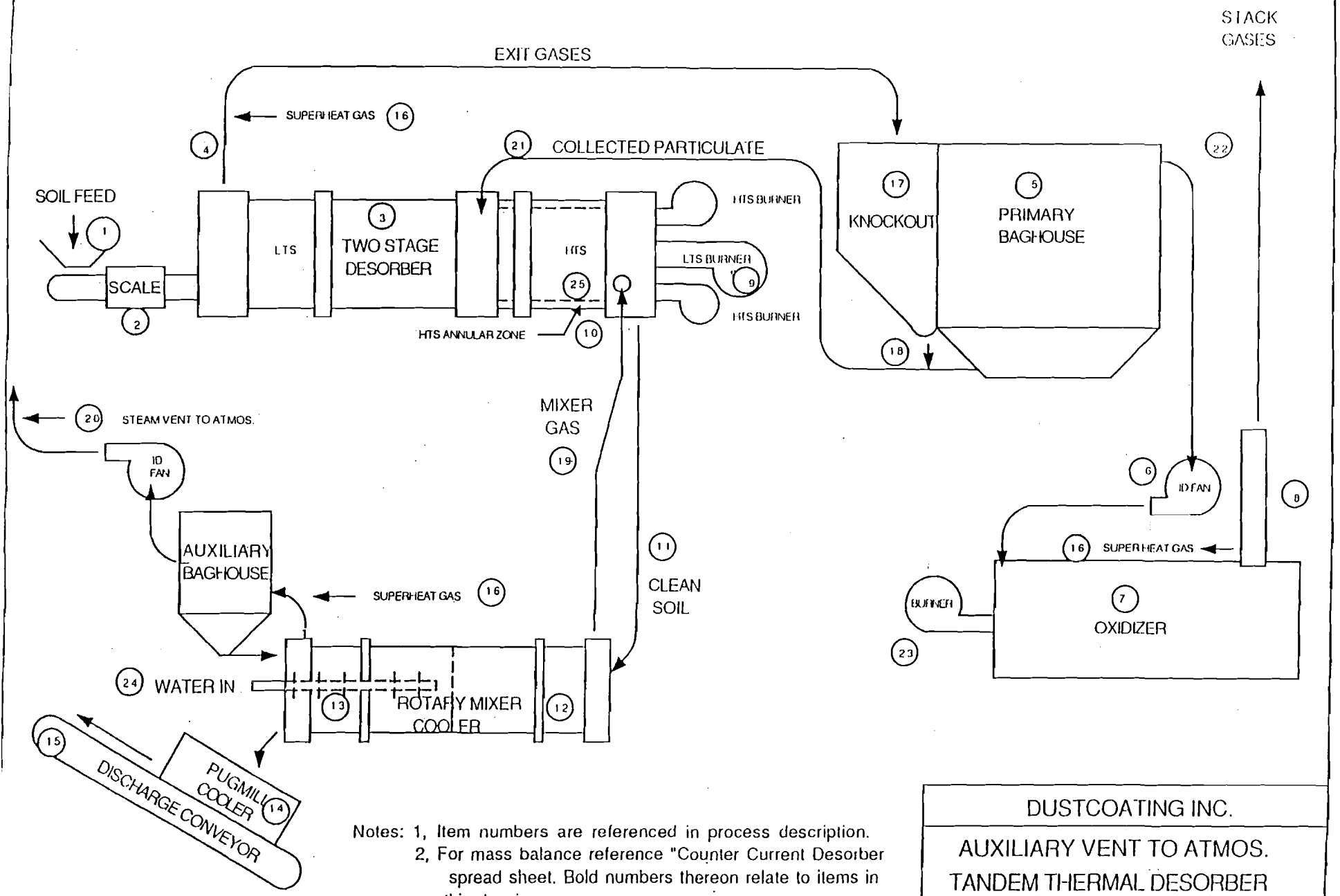
AUXILIARY COLLECTOR

During the cooling process, steam is released which may carry some fine clean particulate out of the cooler. The steam, also containing some entrained air, is superheated (16) to prevent condensation and drawn into the auxiliary baghouse (18). The vent from the auxiliary baghouse (20) can be released directly to atmosphere, forced into the primary baghouse for final release from the process through the oxidizer or ducted directly into the main stack. Permit requirements determine which method of venting the auxiliary baghouse will be acceptable.

DISTRIBUTED PLANT CONTROL GRAPHICS STATION (SEE PICTURE)

In addition to standard electro mechanical operating and safety controllers and instrumentation, the control station includes a graphical user interface for the burner control. It consists of an IBM PS/2 computer, VGA color monitor, and interconnection hardware, it allows the operator to have easy access to all of the temperature control parameters, showing major parameters in color bar-graphs or time-trended plots. Parameters can also be printed at specified intervals, can be stored on the computer's hard disk drive in a Lotus or DBase compatible format, or can be transferred across a local area network to other supervisory stations, distributed controls, or other computers as required.

The graphs station, when configured with the appropriate flow sensors and transmitters can be an automated data acquisition and reporting system providing plant personnel with detailed information on such items as instantaneous, hourly, daily, weekly, monthly or annual fuel usage, fuel usage per ton of material produced, combustion efficiency or plant emissions.



Notes: 1, Item numbers are referenced in process description.
2, For mass balance reference "Counter Current Desorber spread sheet. Bold numbers thereon relate to items in this drawing.

DUSTCOATING INC.

AUXILIARY VENT TO ATMOS.
TANDEM THERMAL DESORBER
PROCESS SCHEMATIC

DWN: EEH	SCALE: - - -	DATE 2-6-95

APPENDIX F

AIR MONITORING

TABLE F-1
AIR MONITORING RESPONSE PLAN

Note 1:	A PhotoVac MicroTip 3000 PID (or equivalent) will be calibrated and checked on a minimum basis at least three times per day: 1) before work activities begin; 2) during lunch break or approximately half way through the working day; and 3) following work activities at the end of the day. These calibration checks will be used to ensure accuracy of VOC readings. Calibration procedures will follow those outlined in the PID manual.
Note 2:	The PID will be used to monitor air quality in the breathing zone of the work area for VOC vapor levels. Prior to Contractor Personnel entering any excavations, the PID will be lowered into the excavation to determine air quality in the excavation as well. If an excavation is deeper than 4 feet deep, it is considered a confined space in accordance with OSHA definitions. Therefore, the walls of any excavation deeper than 4 feet which require entry by site personnel will be reinforced and shored. Additionally, any personnel entering confined space will wear a body harness attached to a safety line. Besides using the PID to monitor VOC vapors in the breathing zone and in confined spaces, an oxygen meter will also be used. The oxygen meter will be used to measure percent oxygen in any excavation considered to be a confined space. Calibration of the combustible gas meter is required based on use to insure accuracy.
Note 3:	The VOCs "action level" is considered when a reading of 50 ppm is sustained on the PID for two minutes when the PID is held at a constant height. Reaching the VOC action level will require use of either full-face or half-face air-purifying respirators utilizing organic vapor cartridge filters and the collection of colorimetric detector tubes to evaluate compound levels. Further air quality monitoring will be required to ensure that the PID readings do not exceed a sustained reading of 500 ppm. This will be done under the direction of the NRT PHSO who will determine specific modifications to work practices and personal protective equipment requirements. PID readings will be collected hourly during digging operations and when requested by workers involved in operations. If the 500 ppm action level is achieved all activities on the site will immediatelystop. The NRT PM will be contacted prior to taking any further action on the site, unless a situation exists which requires immediate action. Options such as dust and odor suppression will be available on-site for use if warranted by air monitoring action levels or nuisance-level odors.
Note 4:	In the presence of odorous compounds, the use of air-purifying respirators is encouraged. If dizziness, headaches, or other physical effects are apparent, use of the air-purifying respirators (with organic vapor cartridge filters) will be mandatory. Sensidyne compound specific colorimetric detector tubes will be used to evaluate real-time concentrations of specific compounds, including benzene, naphthalene, and hydrogen cyanide. One set of detector tubes will be collected during each 8 hours of digging operations and when requested by workers involved in operations.
Note 5:	The permissible exposure levels (established by both OSHA and NIOSH) listed on Table 2 for the compounds of concern for this site will apply. Use of air-purifying respirators with organic vapor cartridge filters will be required if the ambient air results exceed the concentrations on Table 2.

TABLE F-2
AIR MONITORING EXPOSURE LIMITS

Compounds	Exposure Limits (mg/m^3) PEL	Odor Threshold (ppm)
Volatile Organic Compounds		
Benzene	3.25 (2)	1.5-119 (1,3)
Ethylbenzene	441 (2,5)	399 $\mu g/m^3$ (6)
Toluene	383 (2,5)	0.16-72 (1,3)
Total Xylene	441 (5)	20 (3)
Semi-Volatile Organic Compounds [A]		
Acenaphthene	-	-
Acenaphthylene	-	-
Anthracene	0.2 (5)	-
Benzo(a)anthracene	-	-
Benzo(b)fluoranthene	-	-
Benzo(k)fluoranthene	-	-
Benzo(a)pyrene	0.2 (5)	-
Benzo(ghi)perylene	-	-
Chrysene	0.2 (5)	-
Dibenzo(a,h)anthracene	-	-
Fluoranthene	-	-
Fluorene	-	-
Indeno(1,2,3-cd)pyrene	-	-
Naphthalene	53.3 (2)	0.3-25 (1)
Phenanthrene	0.2 (5)	-
Pyrene	0.2 (5)	-
Particulates and Non-organic Compounds		
Particulates (as Coal Tar Pitch Volatiles) [B]	0.2 (2)	-
Hydrogen Cyanide	11.2 (2)	
Cyanides [C]	5 (2)	-

BJK/EPK-02/06/98 (modified 02/17/98-BJK)

A) **Semi-Volatile Organic Compounds**: Based on the absorption of these compounds to soil particles, volatilization of these compounds from site soils will likely be very limited.

B) **Coal Tar Pitch Volatiles**: Defined by OSHA as the fused polycyclic hydrocarbons that volatilize from the distillation residue of coal, petroleum, wood, and other organic matter such as anthracene, benzo(a)pyrene, phenanthrene, chrysene, etc.

C) **Cyanide**: Cyanide is not a volatile compound. The limit shown above represents cyanide in site soils in the form of complex cyanide compounds attached to particulate matter. Therefore, based on the lower Particulates exposure level, the Particulates exposure level will dictate possible response action.

Odor Threshold: Ranges are reported for human odor thresholds based on values from referenced publications.

OSHA	Occupational Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
TWA	Time Weighted Average concentrations for a normal eight hour workday and a forty hour work week
PEL	Permissible Exposure Limit; OSHA standard (29 CR 1910.1000) TWA concentrations that must not be exceeded during an 8-hour work shift of a 40-hour work-week.
TLV	Threshold Limit Values; ACGIH standards; 8 hour TWA concentrations
-	Concentration has not been established or tested.
ppm	parts per million
mg/m3	milligrams per cubic meter of air

References:

(1) Roberson, C.L., C. Menzie, et al., Odorous Compounds: Identification in Tar-Contaminated Soil Samples from Manufactured Gas Plants, Topical Report September 1987-March 1989, Gas Research Institute, GRI 89/0233

(2) NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health & Human Services, Centers for Disease Control, June 1990 and June 1997.

(3) 3M 1995 Respirator Selection Guide, 3M OH&ESD, St. Paul, Minnesota.

(4) Chemical Hazards Response Information System, Hazardous Chemical Data Manual, Commandant Instruction M16465.12B, U.S. Coast Guard, Volumes I, II, III, 1992

(5) Lewis, R.J. Sr., Sax's Dangerous Properties of Industrial Materials, Eighth Edition, 1992, Van Nostrand Reinhold, New York, New York, Volume I, II, and III.

(6) Yarmac, R.F., et al., Comparison of Ambient Air Quality Measurements at Five MGP Sites, Topical Report, September 1993, Gas Research Institute, GRI-93/0353.

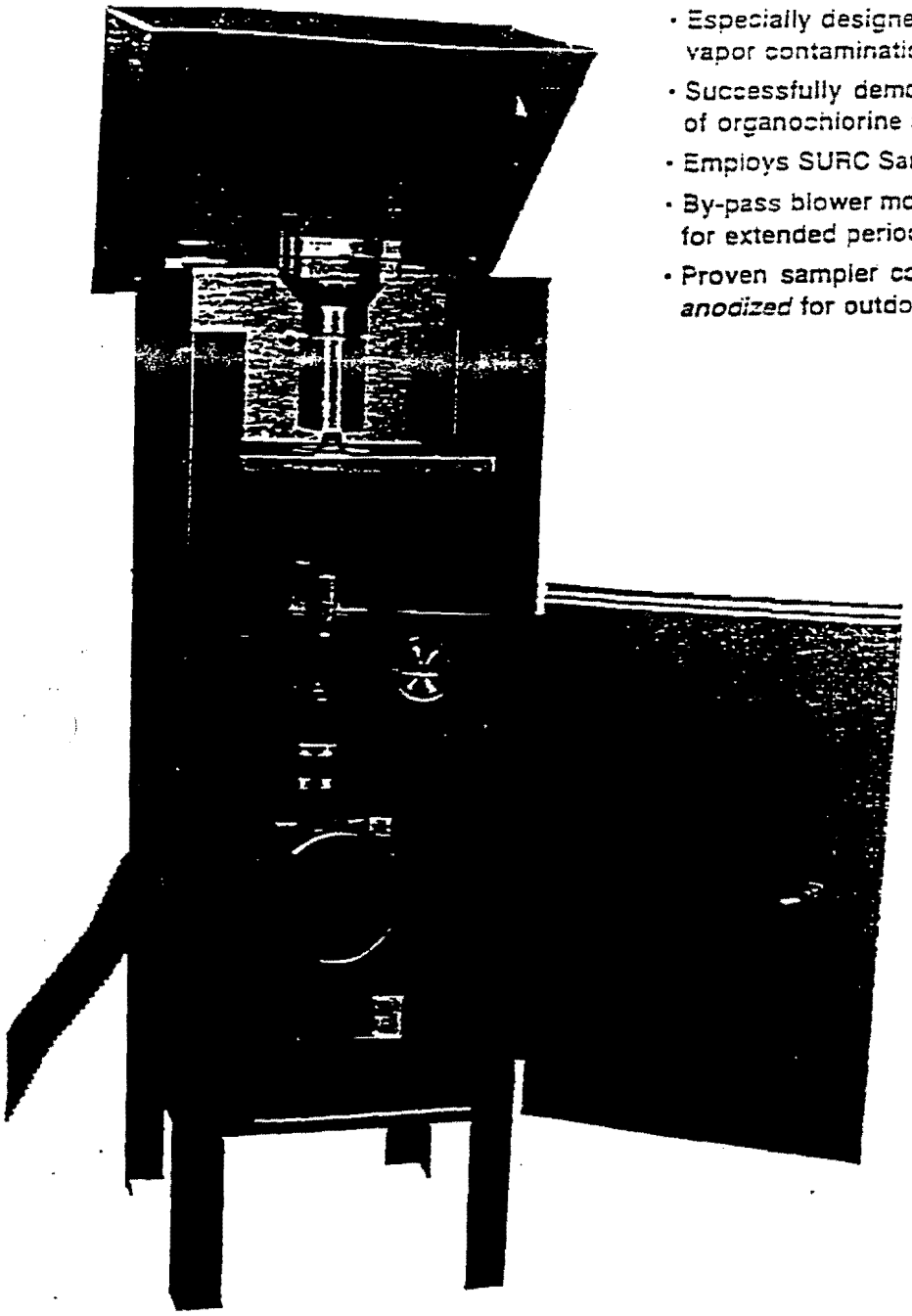
TABLE F-3
AIR MONITORING SAMPLING INFORMATION

Sampling Method & Parameters Detected	Sampling Frequency	Sampling Locations	Detection Limit	QA/QC
Real-Time Sample Collection Methods & Information				
MicroTip 3000 PID (or equivalent): VOCs	1 reading during every 2-4 hours of excavation	Breathing/work zone, Downwind Air Monitoring Station (see note #1) at Excavation Site	0.1 ppm	Calibration as listed in Table 1.
Sensidyne Colorimetric Tubes: Benzene (tube #121SL) Naphthalene (tube #60) Hydrogen cyanide (tube #12L)	1 set of tubes during every 8 hours of excavation at excavation site and once daily at treatment site	Breathing/work zone, Downwind Air Monitoring Station (see note #1) at Excavation and Treatment Sites	B: 1-100 ppm N: 0.4-187 ppm H: 0.36-120 ppm	Duplicates of each tube will be collected once during the course of remedial actions.
Laboratory Analytical Sample Collection Methods and Information				
NIOSH 1501 (see note #4) BTEX	2 samples per week at each site.	Downwind Air Monitoring Station (see note #1) at Excavation and Treatment Sites	0.013 mg/m^3	The lab calibrates the sampling pump before every rental
TO-13: PAHs	2 samples per week at each site.	Downwind Air Monitoring Station (see note #1) at Excavation and Treatment Sites	0.15 $\mu g/m^3$	NRT will calibrate the PS-1 Sampler once every 3 weeks
Total Suspended Particulates	2 samples per week at each site.	Downwind Air Monitoring Station (see note #1) at Excavation and Treatment Sites	1.5 $\mu g/m^3$	NRT will calibrate the PS-1 Sampler once every 3 weeks

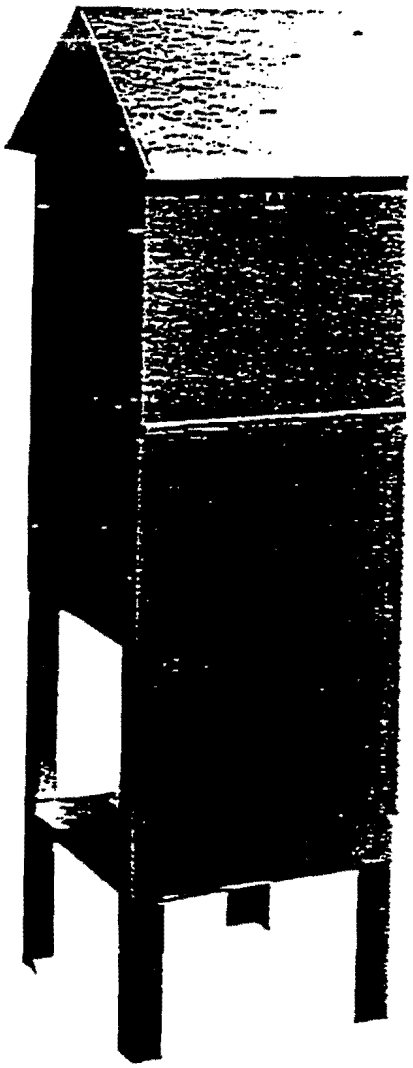
Notes:
1) Air monitoring station locations will be based on the prevailing winds and the desire to monitor air quality near residential and commercial homes and towards the downtown area. The exact locations will be selected and documented in the field.
2) The detection limits shown are based on information from DataChem Laboratory in Cincinnati, Ohio and are well below the limits listed on Table 2.
3) A schematic of the PS-1 Sampler, along with operating instructions, is included in Appendix F.
4) NIOSH 1501 may be modified using methylene chloride for extraction instead of carbon disulfide. Laboratory matrix spikes will be the primary means for laboratory QA/QC. One trip blank will be analyzed during the air monitoring period to evaluate sample handling methodologies. A personal sampling pump will be used for sample collection using Supelco ORBO 100 carbon sampling tubes at a calibrated flowrate of 100 ml/min for approximately 8 hours. Primary and backup carbon adsorbent sections will be analyzed separately to ensure breakthrough is not achieved.
5) TO-13 method for PAHs will be used with PUF/XAD2 sampling cartridge specified in the method and shown in Appendix F. The PS-1 sampler will be used for sample collection at a flowrate of 220-230 L/min for approximately 24 hours. All equipment and laboratory QA/QC procedures will be followed as specified in the method.
6) TSP is collected using a TO-13 pre-filter over approximately 24 hours at a flowrate of 220-230 L/min. The gravimetric laboratory method is very similar to 40 CFR Part 60, Appendix A, Method 5 (Appendix F). All airborne particulates are captured on the 4-inch diameter filer, with a gravimetric limit of detection of 500 µg/sample. For the approximate TO-13 sample volume of 335 cubic meters, the method limit of detection is therefore 1.5 $\mu g/m^3$.
7) Real-time sample collection frequencies are minimum requirements and will be increased as necessary to address site worker requests and to evaluate target concentrations at or near the exposure/action levels.

MODEL PS-1 PUF SAMPLER

Pesticide Particulate and Vapor Collection System

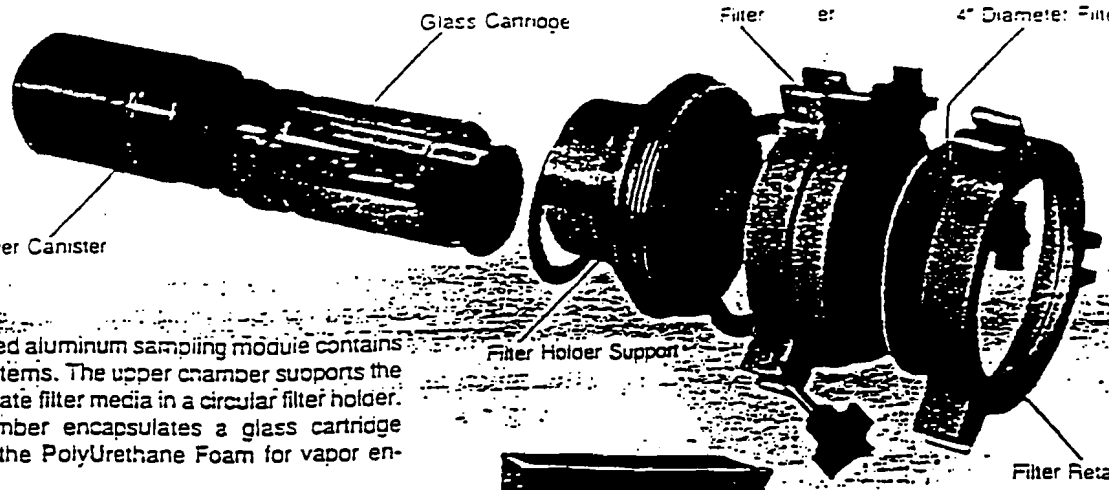


- Especially designed for sampling airborne particulates and vapor contamination from pesticide compounds.
- Successfully demonstrated to efficiently collect a number of organochlorine and organophosphate pesticides.
- Employs SURC Sampler concepts.
- By-pass blower motor design permits continuous sampling for extended periods at rates to 280 liters per minute.
- Proven sampler components housed in aluminum shelter *anodized* for outdoor service.



General Metal Works' PUF (PolyUrethane Foam) Sampler is a complete air sampling system designed to simultaneously collect suspended airborne particulates as well as trap airborne pesticide vapors at flow rates up to 280 liters per minute. Based on early SURC sampler collection concepts, the Model PS-1 features the latest in technological advances for accurately measuring airborne particulates and vapors.

The GMW PUF Sampler is equipped with a by-pass blower motor arranged with an independent cooling fan. This feature permits the motor to operate at low sampling flow rates for periods of long duration without motor failure from overheating.



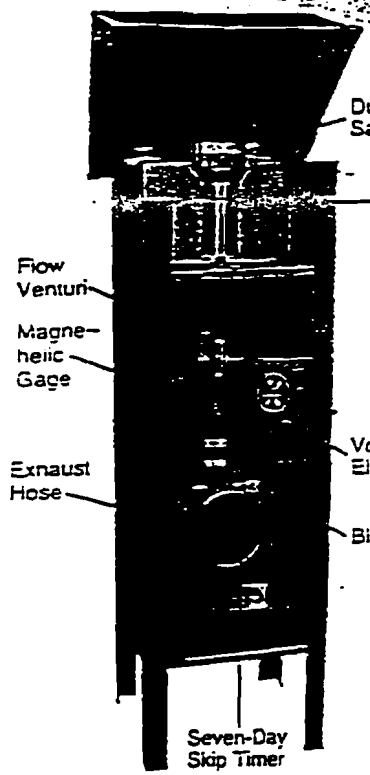
A dual chambered aluminum sampling module contains both filtering systems. The upper chamber supports the airborne particulate filter media in a circular filter holder. The lower chamber encapsulates a glass cartridge which contains the PolyUrethane Foam for vapor entrapment.

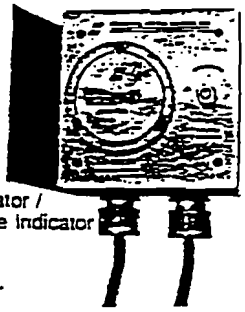
A wide variety of sorbents can be used in a manner that permits their continual use. Polyurethane foam or wet/dry granular solid media can be used individually or in combination.

The dual chambered sampling module is designed for easy access to both upper and lower media. Swing-away bolts simplify changing the 4" diameter particulate filter media. The threaded lower canister is removed with the cartridge intact for immediate exchange. Filter support screens and module components are equipped with gaskets providing a leak proof seal during the sampling process.

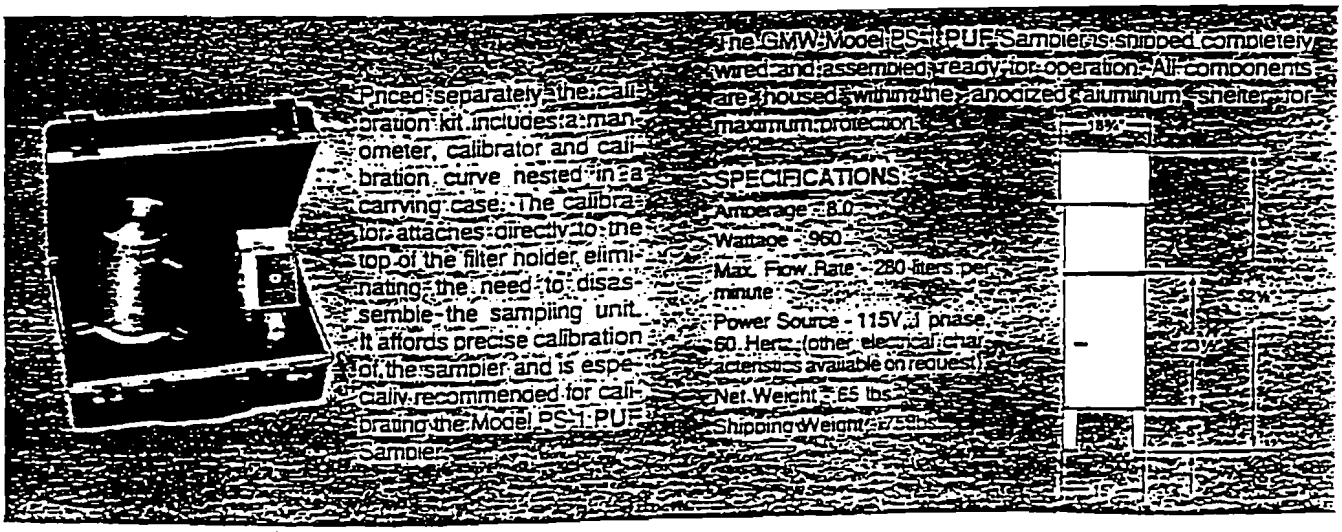
Air flow rates are infinitely variable up to 280 liters per minute. The voltage variator adjusting screw alters the blower motor speed to achieve the flow rate desired. The air flow rate is measured through the flow venturi utilizing a 0-100" Magnehelic Gage. Periodic calibration is necessary to maintain on-site sampling accuracy.

A 7-day skip timer is included as standard and permits weekly scheduling with individual settings for each day and 14 trippers to turn the sampler on and off as desired. Any day or days may be omitted. Day and night periods are distinctly marked. Other timers and timer/programmers are available optionally to suit any sampling requirement.





A nonresettable, elapsed time indicator verifies accumulative intermittent sampling time periods as well as total elapsed time of operation. Calibrated in tenths of a minute, the unit has a total register of 99,999.9 minutes.



Priced separately, the calibration kit includes a manometer, calibrator and calibration curve nested in a carrying case. The calibrator attaches directly to the top of the filter holder, eliminating the need to disassemble the sampling unit. It affords precise calibration of the sampler and is especially recommended for calibrating the Model PS-1 PUF Sampler.

The GMW Model PS-1 PUF Sampler is shipped completely wired and assembled, ready for operation. All components are housed within the anodized aluminum shelter for maximum protection.

SPECIFICATIONS

- Amperage - 8.0
- Wattage - 960
- Max. Flow Rate - 280 liters per minute
- Power Source - 115V, 1 phase, 60 Hertz (other electrical characteristics available on request)
- Net Weight - 65 lbs.
- Shipping Weight - 75 lbs.

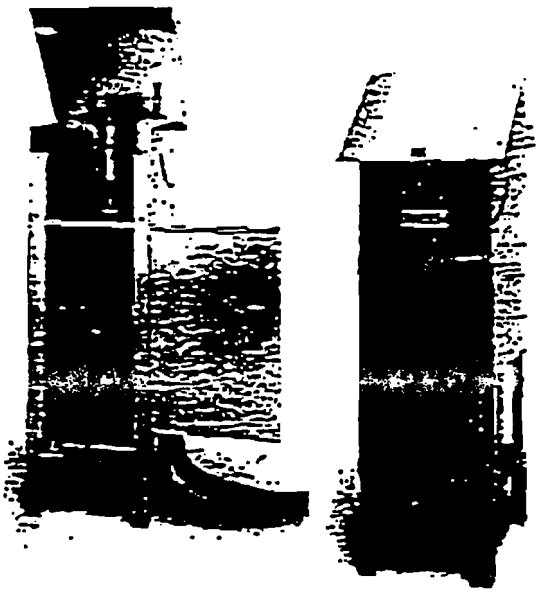
Outside Ohio call toll free 1-800-543-7412

GENERAL METAL WORKS INC.

A Subsidiary of Andersen Samplers, Inc.

145 South Miami Ave. / Village of Cleves, Ohio 45002 / Tel. 513-941-2229

MODEL GPS1 PUF SAMPLER PARTICULATE AND VAPOR COLLECTION SYSTEM



- Samples semivolatile organic compounds.
- Especially designed for sampling airbourne particulates and vapor contamination from pesticide compounds.
- Successfully demonstrated to efficiently collect a number of organochlorine and organophosphate pesticides.
- By-pass blower motor design permits continuous sampling for extended periods at rates to 280 liters per minute.
- Proven sampler components housed in an anodized aluminum shelter for outdoor service.
- Samples in accordance with U.S. EPA Method TO-4, "Method for the Determination of Organochlorine Pesticides and Polychlorinated Biphenyls in Ambient Air".

Graseby's PUF (PolyUrethane Foam) sampler is a complete air sampling system designed to simultaneously collect suspended airborne particulates as well as trap airborne pesticide vapors at flow rates up to 280 liters per minute. The Model GPS1 features the latest in technological advances for accurately measuring airborne particulates and vapors.

The Graseby PUF Sampler is equipped with a by-pass blower motor arranged with an independent cooling fan. This feature permits the motor to operate at low sampling flow rates for periods of long duration without motor failure from overheating.

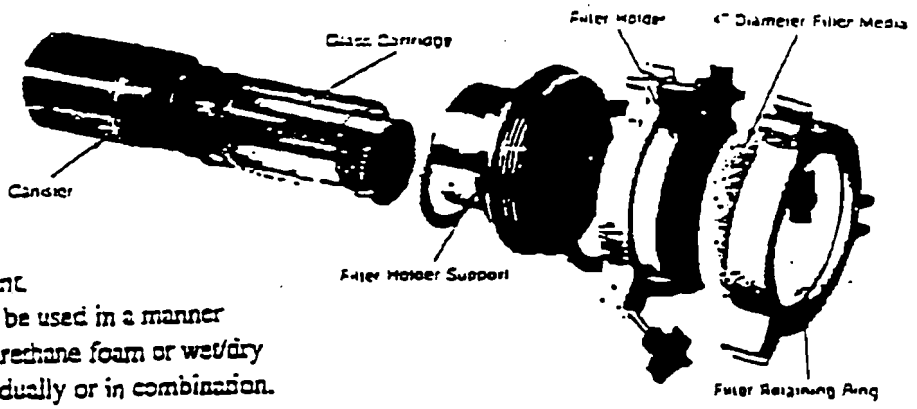
■ MODEL GPS1 PUF SAMPLER

GPS1-11 ..... Blower Motor Assembly
GPS1-1 ..... Dual Sampling Module
GPS1-9 ..... Flow Venturi
GPS1-6 ..... Voltage Variator / Elapsed Time Indicator
GPS1-8 ..... Magnehelic Gage
GPS1-7 ..... Seven Day Skip Timer
GPS1-19 ..... Anodized Aluminum Shelter

GRASEBY GMW
145 South Miami Ave. Village of Cleves, Ohio 45002-1218, USA

MODEL GPS1 PUF SAMPLER PARTICULATE AND VAPOR COLLECTION SYSTEM

A dual chambered aluminum sampling module (GPS1-1) contains both filtering systems. The upper chamber supports the airborne particulate filter media in a circular filter holder (GFH2104). The lower chamber encapsulates a glass cartridge (GPS1-4) which contains the PolyUrethane Foam for vapor entrapment.



A wide variety of sorbents can be used in a manner that permits their continual use. Poly-urethane foam or wet/dry granular solid media can be used individually or in combination. The dual chambered sampling module is designed for easy access to both upper and lower media. The threaded lower canister is removed with the cartridge intact for immediate exchange. Filter support screens and module components are equipped with gaskets providing a leak proof seal during the sampling process. Air flow rates are infinitely variable up to 280 liters per minute. The voltage variator adjusting screw alters the blower motor speed to achieve the flow rate desired. Air flow rate is measured through the flow venturi utilizing a 0-100" Magnehelic Gage. Periodic calibration is necessary to maintain on-site sampling accuracy.

A Seven Day Mechanical Timer (G70) is included as standard equipment and permits weekly scheduling with individual settings for each day and 14 trippers to turn the sampler On and Off as desired. Any day or days may be omitted. Day and night periods are distinctly marked. Other timers and programmers are available optionally to suit any sampling requirement.

SPECIFICATIONS

Amperage	*8.0*
Wattage	*960*
Max.Flow Rate	*280 lpm*
Power Source	*115v, 1 phase, 60 Hz (other electrical characteristics available on request)*
Net Weight	*65 lbs.*
Shipping Sizes and Weights	*46" x 20" x 23" 71 lbs. (Shelter)* *20" x 15" x 15" 8 lbs. (Lid)*

Tel: 513 941 2779
800 543 7412
Fax: 513 941 1977

Total Suspended Particulate (TSP) gravimetrically measures particulate loading on a filter. No attempt is made to segregate a certain particulate size as in the PM-10 method. All airborne particulate is captured on the filter. The TO-13 sampled does not segregate what is drawn through the filter. The air volume for the TO-13 is similar to the air volume for the TSP method. The necessary detection limit is easily obtained in a very dusty environment the smaller TO-13 pre-filter would load up faster than a TSP filter which is considerably larger. In that situation a smaller air volume would be recommended if you were using the TO-13 pre-filter.

2. Devorkin, Howard, et al. Air Pollution Source Testing Manual. Air Pollution Control District, Los Angeles, CA. November, 1963.

3. Methods for Determination of Velocity, Volume, Dust and Mist Content of Gases. Western Precipitation Division of Joy Manufacturing Co., Los Angeles, CA. Bulletin WP-50. 1968.

METHOD 5—DETERMINATION OF PARTICULATE EMISSIONS FROM STATIONARY SOURCES

1. *Principle and Applicability*

1.1 Principle. Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature in the range of 120±14° C (248±25° F) or such other temperature as specified by an applicable subpart of the standards or approved by Administrator, U.S. Environmental Protection Agency, for a particular application. The particulate mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after removal of uncombined water.

1.2 Applicability. This method is applicable for the determination of particulate emissions from stationary sources.

2. *Apparatus*

2.1 Sampling Train. A schematic of the sampling train used in this method is shown in Figure 5-1. Complete construction details are given in APTD-0581 (Citation 2 in Bibliography); commercial models of this train are also available. For changes from APTD-0581 and for allowable modifications of the train shown in Figure 5-1, see the following subsections.

The operating and maintenance procedures for the sampling train are described in APTD-0576 (Citation 3 in Bibliography). Since correct usage is important in obtaining valid results, all users should read APTD-0576 and adopt the operating and maintenance procedures outlined in it, unless otherwise specified herein. The sampling train consists of the following components:

Method 5
Gravimetric LOD = 500 µg/sample
if sample volume = 335 m^3 the
the LOD is $\frac{500\ \mu g/s}{335\ m^3/s} = 1.5\ \mu g/m^3$

Environ

IMPINGER TRAIN OPTIONAL, MAY BE REPLACED BY AN EQUIVALENT CONDENSER

TEMPERATURE SENSOR

APPENDIX G

QUALITY ASSURANCE STANDARD PRACTICE

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REFERENCE DOCUMENTS

1. Natural Resource Technology, Inc.. 1994.

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

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

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

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

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

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

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

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

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

11. Photovac Microtip IS-3000 User's Manual

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

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

14. AMS Vapor Probe Instruction Manual

15. Bouwer and Rice, 1976. "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially

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