



**REMEDIAL INVESTIGATION REPORT  
REVISION 1  
RIVER OPERABLE UNIT**

**WISCONSIN PUBLIC SERVICE CORPORATION'S SHEBOYGAN-CAMPMARINA  
FORMER MANUFACTURED GAS PLANT  
SHEBOYGAN, WISCONSIN**

**USEPA SITE ID: B5DA**

**Project No: 1665/7.2**


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**July 21, 2009**




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## ACROYNMS

$\mu\text{g}/\text{kg}$	Micrograms per kilogram
$\mu\text{g}/\text{L}$	Micrograms per liter
BBL	Blasland, Bouck & Lee, Inc.
bgs	Below ground surface
BLRA	Baseline risk assessment
BTEX	Benzene, toluene, ethylbenzene, xylene
CERCLA ("Superfund")	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	Cubic feet per second
COPCs	Contaminants of potential concern
CSM	Conceptual site model
DGPS	Differential Global Position System
DQOs	Data quality objectives
ECCS	Environmental Chemistry Consulting Services
Enviroscan	Enviroscan, Inc.
ESB	Equilibrium partitioning sediment benchmark
fps	Feet per second
FS	Feasibility study
FSP	Field Sampling Plan
Garton	Garton Toy Company
HASP	Health and safety plan
IBS	Integrays Business Support, LLC
in	inch
$\text{mg}/\text{kg}$	Milligrams per kilogram
MGP	Manufactured gas plant
$\text{mi}^2$	Miles squared
MS/MSD	Matrix spike/matrix spike duplicate
MSL	Mean sea level
MDL	Method detection level
NAD	North American Datum
NAPL	Non-aqueous phase liquid
NAVD	North American Vertical Datum
NCP	National contingency plan
NHI	Natural Heritage Inventory
NRT	Natural Resource Technology, Inc
OU	River operable unit
Pace	Pace Analytical Services, Inc.
PAHs	Polynuclear aromatic hydrocarbons

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## ACROYNMS CONTINUED

PCBs	Polychlorinated biphenyls
PID	Photoionization detector
PVOCs	Petroleum volatile organic compounds
QA/QC	Quality assurance/Quality control
QAPP	Quality assurance project plan
RAF	Risk assessment framework
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
RI/FS	Remedial investigation and Feasibility study
ROD	Record of decision
RV	Recreational vehicle
SARA	Superfund Amendments and Reauthorization Act
Settlement Agreement	Settlement Agreement and Administrative Order on Consent
SOW	Statement of work
SSB	Soil and/or sediment screening benchmarks
STS	STS Consultants-AECOM
Test America	Test America, Inc.
TOC	Total organic carbon
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VOCs	Volatile Organic Compounds
WDNR	Wisconsin Department of Natural Resources
WDOT	Wisconsin Department of Transportation
WHPD	Wisconsin Historic Preservation Database
WPSC	Wisconsin Public Service Corporation
WWSF	Warm water sport fish

# 1 INTRODUCTION

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## 1.1 Background

On behalf of Integrys Business Support, LLC (IBS), managing the site for Wisconsin Public Service Corporation (WPSC), Natural Resource Technology, Inc. (NRT) has prepared this Remedial Investigation (RI) Report. This report presents the Remedial Investigation and Feasibility Study (RI/FS) site investigation work completed at the River Operable Unit (OU) of the former Sheboygan-Campmarina Manufactured Gas Plant (MGP) Site (Figure 1). Activities described herein were performed in accordance with the RI/FS Work Plan – Revision 0 (NRT, March 2008) which the U.S. Environmental Protection Agency (USEPA) conditionally approved on May 7, 2008 following review of responses to USEPA comments dated April 9, 2008. The final RI/FS Work Plan – Revision 1 was submitted December 11, 2008.

The RI/FS work was performed in accordance with the Statement of Work (SOW) attached to the Settlement Agreement and Administrative Order (Settlement Agreement) between the USEPA and WPSC, CERCLA Docket No. V-W-07-C-862, effective January 26, 2007. The Settlement Agreement and SOW address the Upland and River OUs at the former MGP. However, this RI Report focuses on the River OU only. Under the Settlement Agreement/SOW, a generic approach to addressing six other WPSC sites (Multi-Site Approach) within the Superfund Alternatives Site Program (under CERCLA Docket No: V-W-06-C-847, dated May 5, 2006) will be used, which may be modified to account for site specific differences that may exist at a particular MGP site.

The RI/FS Work Plan included an approach to assessing media and/or areas of the River OU that may pose a potential risk to human health and/or the environment, based on the conclusions of the River OU Technical Letter Report (NRT, March 2007). The RI work built upon previous data and information and was completed in accordance applicable federal regulations, including Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or "Superfund") as amended by SARA and the National Contingency Plan (NCP).

This report presents Sheboygan River sediment, surface water, and Boat Island (Figure 2) soil data collected as part of the RI/FS investigation activities between June and August 2008.

## 1.2 Work Objective

The overall objective of the RI/FS activities was to evaluate the nature and extent of MGP residuals in sediment, surface water, and Boat Island soil for use in human health and ecological risk assessments and feasibility studies. The risk assessments will evaluate if the River OU presents a risk to human health and/or the environment. The results of the RI will also be used to develop and evaluate remedial alternatives for the FS.

Previous investigation has been performed as discussed in the Technical Letter and summarized in Section 1.3.4 of this Report. As described in the RI/FS Work Plan (NRT, December 2008) the media that required further assessment and/or were not fully addressed by previous work with respect to public health, welfare or the environment included the following:

- Surface soil sampling on Boat Island to assess the soil quality and the potential risk to human health and the aquatic environment;
- Surface water sampling to assess: (1) the characteristics of the Sheboygan River (i.e., bathymetry and water clarity) and (2) the distribution of contaminants of potential concern (COPCs) and the potential risk to human health and the aquatic environment; and
- Sediment sampling to assess the distribution of COPCs and the potential risk to human health and the aquatic environment. In addition, geotechnical parameters were collected to support the FS.

Data quality objectives (DQOs) were elaborated in Section 5.4 of the RI/FS Work Plan.

## 1.3 Site Background

This section summarizes background information presented in the RI/FS Work Plan. Refer to the RI/FS Work Plan for additional detail.



Property Owner: City of Sheboygan  
Contact: Mr. Tom Holtan (920-459-3366)  
807 Center Avenue  
Sheboygan, WI 53081

Former MGP Operator: Wisconsin Public Service Corporation  
Contact: Mr. Brian Bartoszek (920.433.2643)  
700 North Adams Street, P.O. Box 19002  
Green Bay, WI 54307-9002

Property Location: NW1/4 of the SW 1/4 T15N, R23E, Section 23  
732 North Water Street  
Sheboygan, Wisconsin  
Sheboygan County

USEPA ID: WIN000510058

WDNR BRRTS #: 02060000095

As presented in the RI/FS Work Plan, the following definitions are used herein:

- Property – Refers to the former WPSC property which the former MGP facility occupied. The former property boundaries are shown on Figure 2;
- Facility – Refers to the former WPSC MGP structures and related areas (Figure 3);
- River OU – As defined in the Settlement Agreement (January 26, 2007), refers to the portion of the Site not addressed in the Site State Issued Upland Record of Decision (ROD), which includes the Sheboygan River and related sediments and flood plain areas of the Site not addressed in the State Issued Upland ROD (Figure 4);
- Upland OU – As defined in the Settlement Agreement (January 6, 2007), refers to the portion of the Site addressed in the State Issued Upland ROD (Figure 4); and
- Site – Refers to areas where contamination related to the former MGP have been discovered through site investigation activities completed to-date and near-by areas necessary for implementation of the response action. The extent of the Site within the River OU was determined through the RI/FS investigation activities.

### 1.3.1 Site Location and Description

The Upland OU encompasses an area of approximately 2.3 acres adjacent to the Sheboygan River, approximately 1 mile west of Lake Michigan. The River OU is located immediately adjacent to the Upland OU and based on the RI work, is approximately 4.5 acres. This area extends 80 feet upstream of

the former northern property boundary, as much as 200-feet outward from the shoreline, and about 1,000 feet downstream of the former southern property line. The River OU is within the limits of the Sheboygan River and Harbor Superfund Site as discussed in Section 1.3.6 of this Report.

The former MGP is located on property owned by the City of Sheboygan, known as Campmarina. In the past, Campmarina was equipped with parking areas, electrical power and potable water for recreational vehicle (RV) use. A docking area was also provided for recreational boat use on the Sheboygan River. After WPSC completed remediation work in the Upland OU (see Upland Technical Letter Report, NRT, April 2007), the City of Sheboygan redeveloped both Campmarina and the adjoining property to the south into a park, a condominium complex, and a river walk.

Boat Island is a man made land mass located approximately 180 feet from the eastern shoreline of the River OU. The island is approximately 375 feet long by 105 feet wide (at its widest point) and has several buildings used to store materials and supplies for the Sheboygan Outboard Club, located to the north. The City of Sheboygan owns Boat Island. The island has seasonal docking for boats. There is a polyethylene conduit that was horizontally bored approximately 15 feet below the river bed, between the Sheboygan Outboard Club and Boat Island (Figure 2), containing one or more electrical power lines and a sanitary sewer line to service the island.

The Sheboygan River is a gaining stream that receives groundwater and surface water from the Sheboygan area and discharges into Lake Michigan (Skinner and Borman, 1973). Near the Upland OU, within the River OU, the river varies from approximately 180 feet (on either the east or west side of Boat Island) to 300 feet wide (just upstream of Boat Island). Boat Island is in the approximate center of the river resulting in an east and a west channel. As described in Section 2.4 of this Report, water depths at normal river levels range from 2 feet at the eastern shoreline of the Upland OU to approximately 10 feet near the eastern shoreline of Boat Island.

### **1.3.2 Site History**

The following section summarizes historical data presented in the RI/FS Work Plan (NRT, December 2008) and the Upland OU Technical Letter Report (NRT, April 2007).

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

The carbureted water gas process, used from 1886 to 1929, involved passing air and steam over the incandescent coal in a brick-filled vessel to form a combustible gas which was then enriched by injecting a fine mist of oil over the bricks. The gas was then purified and stored in holders prior to distribution. The Campmarina MGP ceased operations in 1929. Former aboveground MGP related structures are shown on Figure 3. Structures were removed between 1950 and 1966.

Historical development activities adjacent to (north of) the Upland OU include a property formerly used as a tannery, then a toy factory. Tannery operations terminated sometime between 1903 and 1940 and the property was sold to Garton Toy Company (Garton). Garton used a portion of the property adjacent to the river, directly north of the former New York Avenue (Figure 3), for paint and lacquer spraying. This building was subsequently demolished. Garton also occupied a building north of Wisconsin Avenue that is now a multi-tenant complex. Additional current land use information is provided in Section 2.5.

Historic Sanborn Fire Insurance maps for the subject property depict the shorelines of the Sheboygan River over time at the MGP site. Between 1891 and 1903, the channel appears to have been straightened by fill that extended approximately 60 feet into the river. Later maps show that the shoreline has not changed substantially since 1903. Historical shorelines are presented on Figure 3.

Remedial actions were performed in the Upland OU beginning in 2000 through 2001 under a State issued ROD. The remedial action consisted of soil treatment or disposal, a vertical sheet pile wall, low permeability geosynthetic cover, and a low flow biosparge groundwater system. The remedial actions, components, and on-going groundwater operations, maintenance and monitoring are summarized in the Upland OU Technical Letter Report (NRT, April 2007).

### **1.3.3 Dredging History**

The following section summarizes known dredging activities performed near the River OU as provided in the River OU Technical Letter Report (NRT, March 2007).

The U. S. Army Corps of Engineers (USACE) Detroit District is responsible for maintaining a navigation channel and turning basin within the river downstream of the MGP Site. The upstream limit of the USACE navigation channel is located approximately 500 feet downstream of the former MGP facility, just below the Pennsylvania Avenue Bridge. From the Pennsylvania Avenue Bridge and extending approximately 2,300 feet downstream to near the Eighth Street Bridge, the channel has a project depth of 15 feet. The remainder of the navigation channel (4,200 feet) downstream to the harbor has a project channel depth of 21 feet.

Maintenance dredging of the Sheboygan harbor last occurred in 1991 (WDNR, October 1995). Dredged materials were disposed of south of the harbor as part of a beach nourishment project. The channel above the Eighth Street Bridge has not been dredged since 1956 (USEPA, May 2000).

According to a June 2005 USACE bathymetric survey of the Sheboygan River, water depths are much shallower than the USACE project depths. In this June 2005 survey, observed water depths within the 21 foot project depth portion of the channel were between 5 and 15 feet, while observed water depths within the 15 foot project depth portion of the channel were between 4 and 7 feet.

NRT is unaware of any historic public or private dredging activities or bathymetric surveys upstream of the Pennsylvania Avenue Bridge in the area of the River OU.

### **1.3.4 Previous Investigations**

The River OU Technical Letter Report (NRT, March 2007) contains a full bibliography of the reports and summaries of previously performed investigations related to the River OU.

#### **1.3.4.1 Sediment Investigations**

##### Blasland, Bouck & Lee, Inc. (BBL) 1987

Beginning in 1987, BBL conducted sediment sampling for PCBs, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and metals as part of the Sheboygan River and Harbor Remedial Investigation. Sampling methodologies and results are detailed in the Remedial Investigation/Enhanced Screening Report – Sheboygan River and Harbor (BBL, May 1990). Fifteen (15) sediment samples were collected along the length of the river, with 10 samples being collected above the Pennsylvania Avenue Bridge and 5 samples downstream of the bridge (sample locations and PCB analytical results are provided in Appendix A-1).

A number of sediment samples were collected near or just downstream of the MGP Site. Three samples, R-98, R-100, and H-20, had oil or concentrations of PAHs. Sample R-98 was collected near the downstream end of Boat Island and the sediment was described as “oil saturated” from 2 to 6 feet below the sediment surface. Sediment samples R-100 and H-20 were collected immediately downstream of the Pennsylvania Avenue bridge. Sample R-100 was described as “oil saturated” from 4 to 6 feet below the sediment surface; however, neither sample R-98 nor R-100 were analyzed for PAHs. Sample H-20 was described as “oil saturated” from 4 to 16 feet below the sediment surface and had a total PAHs concentration of 70,000  $\mu\text{g}/\text{kg}$  (or 70  $\text{mg}/\text{kg}$ ) in the 2 to 4 foot sediment sample. There was no mention of elevated PAHs downstream of sample location H-20 and no mention of oil saturated sediments was noted for samples R-99 and R-101, collected on the west side of Boat Island, opposite the former MGP (BBL, May 1990).

##### Wisconsin Department of Transportation, 1993

In 1993, river sediment sampling was performed for the Wisconsin Department of Transportation (WDOT) construction project on the Eighth Street Bridge. The bridge is located approximately 3,000 feet downstream of the MGP Site (RMT, May 1993). PAHs were found in the sediments around the Eighth Street Bridge in concentrations ranging from 5,000 to 97,000  $\mu\text{g}/\text{kg}$  (or 5 to 90  $\text{mg}/\text{kg}$ ) in the top 0 to 2 feet of sediment.

Wisconsin Department of Natural Resources (WDNR), 1998

In February 1995, WDNR collected one sediment sample within the River OU, approximately 20 to 30 feet from the shoreline, close to the downstream end of Boat Island (WDNR, October 1995). This sample contained apparent coal tar and had reported PAH concentrations greater than 3,000,000 µg/kg (or 3,000 mg/kg).

Natural Resource Technology, 1995/1996

NRT performed preliminary sediment investigations for WPSC in 1995 and 1996. Results are detailed in the Sediment Investigation Report (NRT, November 1998). Sediment sampling focused on identifying the preliminary nature and extent of MGP residuals in river sediments or natural soil (parent material) underlying the Sheboygan River. Sediment/soil samples were collected from as deep as 10.5 feet below the bottom of the river, although in some locations parent materials were encountered beneath the soft sediments, and this material was also sampled.

Further details regarding the methods for locating, poling, and sediment sampling are included in the Sediment Investigation Report (NRT, November 1998). The analytical results from NRT sampling efforts are tabulated in Appendix A-2, Table 2 (Sediment Analytical Results – PAHs), Table 3 (Sediment Analytical Results – BTEX), and Table 4 (Sediment Analytical Results – Cyanide, Phenol, Oil & Grease, RCRA Metals & PCBs). Appendix A-2, Sheet 3 provides a summary of the distribution of these constituents and the visual observations made during preliminary investigation activities. Appendix A-2, Plate 2 provides cross sectional details of river sediment investigations.

**1.3.4.2 Surface Water Investigations**

Surface water sampling has not been conducted as part of previous Site investigations. Surface water sampling was performed as part of the 2008 RI work as discussed in Section 3.6.

Surface water chemistry data for conventional pollutants (i.e., nutrients, solids, bacteria, etc.) are collected on a nearly monthly basis in the Sheboygan River at the Esslingen Park sampling location by the WDNR. Esslingen Park is located approximately 1.5 miles upstream of the Former MGP Site. PAHs, benzene, toluene, ethylbenzene, xylene (BTEX), Resource Conservation and Recovery Act (RCRA) metals,

polychlorinated biphenyls (PCBs), cyanide, and phenols are not routinely measured in the Sheboygan River water.

Table 3 of the USEPA ROD for the Sheboygan River and Harbor Superfund site (USEPA, May 2000) showed PCB concentrations in surface water ranged from non-detect (<0.05 parts per billion [ppb]) to 0.77 ppb during an interim PCB removal action conducted several miles upstream in 1989 and 1990.

### **1.3.5 Previous Response Action**

Excerpts from the Documentation Report for previous Upland OU response actions (NRT, February 2003) are discussed below and are also provided in Appendix B of this RI Report.

During the 2001 Upland OU soil remediation activities (NRT, February 2003), approximately 670 feet of river bank was excavated and reconstructed to provide structural support for the geosynthetic cover and future park structures. Excavation operations generally were limited to material above the groundwater table and/or shoreline. As described in the River OU Technical Letter Report (NRT, March 2007), MGP-related contamination and evidence of coal tar-like materials were observed in soils in the central portion of EZ-4 excavation.

Analytical samples were collected at the base of the excavation to assess remaining soil quality. The results are summarized in the RI/FS Work Plan (NRT, 2008) and indicate residual concentrations of benzene, naphthalene, total lead, and total cyanide.

The river bank was restored with filter gravel, structural fill and riprap. Approximately 2 feet of structural fill was placed in the over excavated area from 1 to 3 feet below ground surface (bgs). A non woven geofabric and 6 inches of filter gravel was placed along the base of the riverbank (1 feet bgs). A second layer of filter fabric was placed over the filter gravel followed by structural fill that was placed and compacted to restore the river bank at a slope of approximately 2 feet horizontal to 1 foot vertical (2H:1V). Riprap was then placed along the restored river bank.

### **1.3.6 Sheboygan River and Harbor Superfund Site**

The River OU is within the downstream end of the Lower River portion of the Sheboygan River and Harbor Superfund Site (EPA Identification number WID980996367). The Sheboygan River and Harbor

Site includes the lower 14 miles of the Sheboygan River from the Sheboygan Falls Dam, downstream to, and including the Inner Harbor. The Sheboygan River is divided into three sections based on physical characteristics (e.g., average depth, width), the Upper River, Middle River, and Lower River and Harbor.

The Sheboygan River and Harbor Superfund Site is subject to a separate Remedial Action, unrelated to the Campmarina MGP Site. A ROD was issued by USEPA in May 2000 to address PCB-contaminated sediment through sediment removal in the Upper River, additional characterization and monitoring in the Middle River, and additional characterization and potential sediment removal subject to natural and recreational disturbances in the Lower River and Inner Harbor.

The responsible party for the Sheboygan River and Harbor Superfund Site was notified in advance of RI activities in a good faith effort to coordinate data and information sharing. Excess sediment sample volume was provided to the responsible party to assist in characterizing sediment quality in the Lower River portion of the Sheboygan River. IBS will continue to support information sharing. It is anticipated USEPA will continue to assist in information sharing between the Sheboygan River and Harbor Superfund Site and the Campmarina MGP River OU.

A summary of the Sheboygan River and Harbor Superfund Site is provided in the River OU Technical Letter Report (NRT, March 2007). The Sheboygan River and Harbor ROD indicates a continuous layer of soft sediment in the Lower River (which includes the River OU) and soft sediments are deposited within the Lower River and the Inner Harbor.

## 1.4 Report Organization

The RI Report is organized as follows:

- Section 2: Site Characteristics
- Section 3: Site Characterization Activities
- Section 4: Investigation Observations and Results
- Section 5: Fate and Transport
- Section 6: Summary and Conclusions
- Section 7: References