WORK PLAN

BLASLAND & BOUCK ENGINEERS, P.C.

Remedial Investigation / Feasibility Study

SHEBOYGAN RIVER AND HARBOR

Participating Potentially Responsible Parties

November 1985

In the revised work plan, several tasks are listed as being contingent upon the results of the screening process. So that the Agency is aware of exactly what tasks will be undertaken, EPA involvement is specifically provided. In this way, the Agency may review the specific remedial investigations being proposed and assure itself that sufficient analyses will be conducted.

Due to the Agency's time schedule, and very limited time which the PPRPs have had to respond, we have undertaken a concentrated effort to provide you with this revised work plan. This alone demonstrates the seriousness with which we take these discussions. Moreover, we will commit to performing the tasks set forth in this revised plan by entering into an appropriate administrative order with the Agency before the end of 1985. This will permit the work to begin during 1986 and will expedite our discussions.

Very truly yours,

FOLEY & LARDNER

Mark A. Thimke

MAT/nlb
Attachments

cc: Kohler Co.: James Kieckhefer
Thomas Industries: Peter Ruud
Wisconsin Department of Natural Resources: Dennis Kugle
Wisconsin Department of Natural Resources: Frank Trcka

SHEBOYGAN RIVER AND HARBOR

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

WORK PLAN

(Revised EPA Work Plan: Contract No. 68-61-6939)

Participating Potentially Responsible Parties

November 18, 1985

BLASLAND & BOUCK ENGINEERS, P.C.
5793 Widewaters Parkway
Box 66
Syracuse, New York 13214

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LIST OF FIGURES

LIST OF ACRONYMS

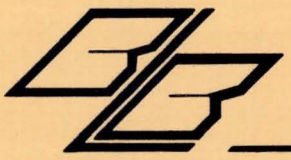
ASRI	Alternative-Specific Remedial Investigation
CDM	Camp Dresser & McKee
CLP	Contract Laboratories Program
CRL	U.S. EPA Central Regional Laboratory
EM	Electromagnetic
EPA	United States Environmental Protection Agency
ESP	Enhanced Screening Process
FS	Feasibility Study
H&SP	Health and Safety Plan
NCP	National Contingency Plan
NPMO	National Program Management Office
O&M	Operation and Maintenance
OF 60	Optional Form 60
PFS	Phased Feasibility Study
POTW	Publicly-Owned Treatment Works
PRP	Potential Responsible Party
QAM	Quality Assurance Manager (CDM)
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAMP	Remedial Action Master Plan
RI	Remedial Investigation
RI/ES	Remedial Investigation/Enhanced Screening
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager (EPA)
RQAM	Regional Quality Assurance Manager
RSPM	Remedial Site Project Manager (CDM)
SCHD	Sheboygan County Health Department
TM	Technical Memorandum
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WA	Work Assignment
WDNR	Wisconsin Department of Natural Resources
WDPH	Wisconsin Department of Public Health

Executive Summary

BLASLAND & BOUCK ENGINEERS, P.C.

EXECUTIVE SUMMARY

The primary objectives of the Remedial Investigation/Feasibility Study for the Sheboygan River and Harbor site are to 1) determine the extent and nature of the contamination in the Sheboygan River and Harbor, 2) determine the threat to public health and the environment from the identified contamination, 3) determine the necessity for and proposed extent of a cost-effective remedial action, 4) identify the potentially responsible parties (PRPs) associated with the contamination in the River and Harbor, and 5) include the local public in the decision-making process regarding the ultimate remedial requirements (if any) for the River and Harbor. If appropriate, a conceptual design of the selected cost-effective remedy will be prepared.



Introduction

BLASLAND & BOUCK ENGINEERS, P.C.

1.0 INTRODUCTION

This work plan represents revisions by Blasland & Bouck Engineers, P.C. to a work plan prepared by Camp, Dresser & McKee, Inc. (CDM) under contract to the USEPA. The revisions incorporate changes associated with implementation of the work plan by Potentially Responsible Parties (PRPs), rather than by the USEPA. The scope of the work plan is a Remedial Investigation and Feasibility Study (RI/FS) of the Sheboygan River and Harbor, located in Sheboygan County, Wisconsin.

This work plan allows for performance of the RI/FS by the participating PRPS. For purposes of this work plan, Tecumseh Products Company has been identified as the representative of the participating PRPS.

1.1 SITE LOCATION AND HISTORY

The Sheboygan Harbor site, located in Sheboygan, Wisconsin is presented in Figure 1. The City of Sheboygan is located on the western shore of Lake Michigan approximately 40 miles north of Milwaukee. Sheboygan is the county seat and an economic growth center with a population of about 48,085 people.

The Sheboygan River drains west to east into Lake Michigan and roughly bisects the city. It has a mean annual discharge of 247 cfs and had been classified as a high quality waterway for fishing throughout the Harbor area. The WDNR has named the lower Sheboygan River as an area of concern regarding human consumption of game fish.

Sheboygan Harbor has been categorized as a diversified cargo port by the Department of Transportation. This means that the port can handle more than one or two types of freight but the origins and destinations of the cargo

BRIDGE AND OVERHEAD CABLE CLEARANCES. When the water surface is above Low Water Datum, bridge and overhead clearances are reduced correspondingly. For clearances see U.S. Coast Pilot 6.

SAILING DIRECTIONS. Bearings of sailing courses are true and distances given thereon are in statute miles between points of departure.

SHEBOYGAN

Polyconic Projection
Scale 1:10,000
North American 1983 Datum

SOUNDINGS IN FEET

NOTES

PLANE OF REFERENCE OF THIS CHART (Low Water Datum) .....576.8 ft. Referred to mean water level at Father Point (Pointe au Père), Quebec, international Great Lakes Datum (1955).

AIDS TO NAVIGATION. Consult U.S. Coast Guard Light List for supplemental information concerning aids to navigation.

SYMBOLS AND ABBREVIATIONS. For complete list of symbols and abbreviations see Chart No. 1.

AUTHORITIES. Hydrography and topography by the National Ocean Service, Charting and Geodetic Services with additional data from the Corps of Engineers, Peninsular Survey, and the U.S. Coast Guard.

CAUTION

Temporary changes or defects in aids to navigation are not indicated on this chart. See Notice to Mariners.

During some winter months or when endangered by ice, certain aids to navigation are replaced by other types or removed. For details see U.S. Coast Guard Light List.

RADAR REFLECTORS

Radar reflectors have been placed on many floating aids to navigation. Individual radar reflector identification on these aids has been omitted from the chart.

WARNING

The prudent mariner will not rely solely on any single aid to navigation, particularly on floating aids. See U.S. Coast Guard Light List and U.S. Coast Pilot 6 for details.

CAUTION

Only marine radiobeacons have been calibrated for surface use. Limitations on the use of certain other radio signals as aids to marine navigation can be found in the U.S. Coast Guard Light Lists and Defense Mapping Agency Hydrographic/Topographic Center Publication 117 (A & B).

Radio direction-finder bearings to commercial broadcasting stations are subject to error and should be used with caution.

Station positions are shown thus:

⊙(Accurate location) ⊙(Approximate location)

Ⓟ Pump-out facilities

POLLUTION REPORTS

Report all spills of oil and hazardous substances to the National Response Center via 800-424-8802 (toll free), or to the nearest U.S. Coast Guard facility if telephone communication is impossible (33 CFR 153).

LAKE MICHIGAN - HURON

Elevation in Feet

Low Water Datum

Average levels (1973-1982)

Extreme Levels (period of record)

Low Water Datum, which is the plane of reference for the levels shown on the above hydrograph, is also the plane of reference for the charted depths. If the lake level is above or below Low Water Datum, the existing depths are correspondingly greater or lesser than the charted depths.

SHEBOYGAN

SOUNDINGS IN FEET

15 FT MAY 1982

13 FT MAY 1982

11 FT MAY 1982

17 FT MAY 1982

MAGNETIC

VAR 1°30'W (1982)

ANNUAL INCREASE 9'

LOGARITHMIC SPEED SCALE

To find SPEED, place one point of dividers on distance run (in any unit) and the other on minutes run. Without changing divider spread, place eight point on 60 and last point will then indicate speed in units per hour. Example: with 4.0 nautical miles run in 15 minutes, the speed is 16.0 knots

FEET

METERS

STATUTE MILES

FIGURE 1

DMA STOCK NO. 1KHA14922

15th Ed., Oct. 15/83 ■ 1-2

14922

CAUTION
This chart has been corrected from the Notice to Mariners published weekly by the Defense Mapping Agency Hydrographic/Topographic

Published at Washington, D.C.
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

(Manitowoc and Sheboygan Harbors)

14922

are limited to the vicinity of the port. The Harbor is approximately 96 acres, and is formed by two breakwalls located immediately south of the River mouth and about 2000 feet north of the River mouth. The Army Corps had dredged the Sheboygan River upstream for a distance of about one mile (including the inner Harbor area). Land uses adjacent to the Harbor consist mainly of small boat facilities, parks/recreation areas and industrial/transportation uses. The city's central business district and older industrial area are located in the vicinity of the Harbor.

Sheboygan Harbor was dredged to project navigation depths by the USACE in the mid 1950's. Harbor sediments were removed annually and disposed of in the offshore waters of Lake Michigan until 1969. The River and upper Harbor have not been dredged since 1969 since disposal of sediments became controversial due to the presence of heavy metals. Two different Confined Disposal Facilities STET had been proposed between 1974 and 1976; however, these have not been approved as acceptable means of disposing of the contaminated sediments. Sediments are estimated to be accumulating in the Harbor at an annual rate of 30,000 cubic yards. In 1981, approximately 28,556 cubic yards of uncontaminated sediments were removed by the USACE from a shoaling area at the mouth of the Harbor and placed on the C. Reiss Coal Company dock until trucked to the city's industrial park for use as fill. In 1984, an estimated 32,449 cubic yards of uncontaminated sediments were removed from the same area. Uncontaminated lake sand, which has formed a sand bar at the outer entrance, has been removed and disposed of on nearby shores several times.

A recent investigation of 98 sediment profile samples collected from Sheboygan Harbor during December 2-6, 1982 show inner Harbor surficial sediments to be contaminated with Polychlorinated Biphenyls (PCBs). The possibility that the contaminated sediments may be classified as toxic has contributed to the impasse on acceptable dredging and disposal methods. The projected annual increase in commercial shipping from 15 to 90 ships (1983 vs 1984) due to a five-year coal transshipment agreement between Wisconsin Electric Power Company and C. Reiss Coal Company, will probably intensify pressure to

reach a resolution to the dredging impasse. Sheboygan Harbor and navigation channels are presently two to three feet below the project navigation depth limit. The project depth limit varies from 15-25 feet below low water datum, depending upon the location. Project depth is a limit which was authorized by Congress for Corp dredging projects.

1.2 SITE STATUS

In early 1985, using funds obtained from the Great Lakes National Program Office (GLNPO), USEPA retained Camp, Dresser, & McKee, Inc to develop a remedial investigation/feasibility study work plan. This work plan was submitted to USEPA/WDNR for review in July, 1985.

Sheboygan Harbor and River was nominated for the Superfund National Priorities List on September 5, 1985. Upon completion of USEPA/WDNR review, the work plan prepared by CDM was revised and filed with the USEPA/WDNR on October 1, 1985. The CDM work plan was revised once again on October 21, 1985. On October 30, 1985 the EPA hosted a meeting with potentially responsible parties (PRPS). In attendance were representatives of EPA, WDNR, Tecumseh Products Co., Kohler Co., and Thomas Industries. During this meeting, copies of the CDM Work Plan were provided to the PRPs. This was the first opportunity that the PRPs had to become involved in the work plan process. At the meeting, Tecumseh provided all parties with a scope of work which Tecumseh proposed that participating PRPs would perform in lieu of EPAs work plan. The EPA has subsequently requested that the participating PRPs revise the CDM work plan rather than independently developing a separate work plan. This document, therefore, fulfills this request by EPA.

Initial Site Evaluation

BLASLAND & BOUCK ENGINEERS, P.C.

2.0 INITIAL SITE EVALUATION

During the planning phase of the RI/FS, a substantial amount of available site information was evaluated. This information was gathered from EPA files and through discussions with the USACE and Wisconsin DNR personnel.

2.1 SITE DESCRIPTION

2.1.1 Environmental Setting

The Sheboygan Harbor is located on the west shore of Lake Michigan approximately 55 miles north of Milwaukee at the mouth of the Sheboygan River. The Sheboygan River watershed drains 432 square miles of eastern Wisconsin. The Harbor, shown in Figure 1, is 96 acres and is formed by two breakwalls immediately south of the River mouth, and about 2000 feet north of the River mouth. The Harbor consists of: (1) a breakwall and pier forming an outer basin; (2) an entrance channel through the outer basin 450 feet wide and 25 feet deep at the entrance-decreasing to 21 feet deep in the outer Harbor; (3) a channel in the Sheboygan River 21 feet deep to Maryland Avenue and then 15 feet deep to Jefferson Avenue; and (4) a turning basin in the outer basin 20 feet deep. These depths are authorized Project Depths for the Federal Navigation Channel.

The City of Sheboygan geologically lies on the Niagaran cuestra of the Lake Michigan basin and is generally underlain by 24-1000 feet of glacial drift. This drift is in turn underlain by approximately 700 feet of Niagaran limestone and/or dolomite. The deeper formations are the Maquoketa Shale, the Sinnipee Group and St. Peter Sandstone.

Sediment found in the Harbor consists of clay, silt, sand, and organic material underlain by dense glacial till of Wisconsin Age. The Sheboygan River has incised itself into the underlying Niagaran limestone to a

considerable depth; present day sediments have leveled the stream valley expression by strata of clay, sand, and organic material. Glacial erratics of considerable sizes are found within the Harbor limit.

Water quality in the Harbor represents the mixing of nearshore lake water with the Sheboygan River. A dilution effect is created for many pollutant parameters with concentrations decreasing from the River through the Harbor and into the open lake. There is probably an influx of sand from the lake proper into the outer Harbor caused by near shore currents and wind drawn wave action. The extent to which this sand has migrated into the inner Harbor has not been ascertained. The depth of light penetration, as indicated by a secchi disk, is lowest in River stations increasing to a maximum outside the Harbor. Water temperature decreases markedly from the River to the lake. Sulfate and chloride concentrations decrease from the River to the lake stations, although sulfate is especially high near Eighth Street. Moderate levels of major nutrients, e.g., nitrate, soluble reactive phosphate, and total phosphorus, are found in the River which are diluted by nutrient poor lake water in the Harbor.

Sediment sampling and testing has been conducted by various government agencies in the Sheboygan River and Harbor area in recent years. Test data indicates that both PCBs (greater than 50 ppm) and heavy metals are present in the sediments in sufficient concentration to classify the material within the River as being contaminated. In addition, pockets of contaminated sediments are randomly distributed throughout the Harbor area. This observation may be due to the spreading of sediments due to the propeller wash and hull displacement by large cargo transport vessels. Based upon test data, it has been determined that the sediments in the vicinity of the Harbor entrance are not highly contaminated. Concentrations of lead, zinc, copper, chromium, and PCBs are all low in this area of the Harbor with concentrations of contaminants generally decreasing from the inner Harbor, through middle and outer Harbor.

Land uses adjacent to the Harbor consist mainly of small boat facilities, parks/recreation areas and industrial/transportation uses. The city's central business district and older industrial area are located in the vicinity of the Harbor.

2.1.2 SITE HISTORY

The Sheboygan River was first authorized as a portion of the Sheboygan Harbor Project in 1954 and was first dredged in 1956. Between 1956 and 1969, approximately 30,000 cubic yards per year were dredged from the reach below Eighth Street on an approximate bi-annual basis. The channel above Eighth Street has not been dredged since 1956.

Prior to 1969, dredgings were disposed of in an authorized deep water disposal area in Lake Michigan. No dredging of contaminated sediments has been performed at Sheboygan Harbor since passage of PL 91-611 (River and Harbor Act of 1970) and a determination by the EPA that sediments were unsuitable for open water disposal.

A 1974 study performed by the U.S. EPA indicated moderate to high levels of lead, zinc, and chromium pollution, and moderate levels arsenic pollution present in sediment at all of nine (9) stations sampled. Moderate to high "organic pollution" was also found at all stations sampled.

Sheboygan Harbor sediments were initially tested for PCB concentrations in 1977 by the EPA. This study was in response to findings of high PCB levels during a routine fish sampling by the Wisconsin Department of Natural Resources. Results of these analyses showed that sediments in Sheboygan Harbor were contaminated with PCBs.

In June 1979, the U.S. Army Corps of Engineers collected 11 sediment cores from the Harbor area ranging in depth from 1.5 to 9 feet. These samples were analyzed for lead, zinc, copper, chromium, and PCB content. The study revealed greater PCB and metal contamination in the inner reaches of the Harbor, but the vertical extent of contamination was not clearly determined.

In October of 1979 the Army Corps of Engineers collected an additional 21 sediment cores. Analysis of these cores indicate an increase in PCB concentration with distance upstream from the Harbor and with depth of sediment.

Investigation of 98 sediment profile samples collected from Sheboygan Harbor during December 2nd through 6th, 1982, show Harbor surficial sediments to be contaminated with PCBs. The possibility that these contaminated sediments may be classified as regulated materials has contributed to the impasse on implementing an acceptable dredging and disposal method. The projected annual increase in commercial shipping from 15 to 90 ships (1983 vs 1984) due to a five year coal transshipment agreement between Wisconsin Electric Power Company and C. Reiss Coal Company is expected to add pressure for a resolution to the dredging impasse.

Figures 2, 3, and 4 show locations of cores collected from the 1979 and 1982 USACE studies and PCB concentration profiles in these cores.

2.2 CONTAMINATION PROBLEM DEFINITION

2.2.1 Site Contaminants

Historical analytical data has shown that the Sheboygan River from Sheboygan Falls and the inner Sheboygan Harbor to its confluence with the outer Harbor

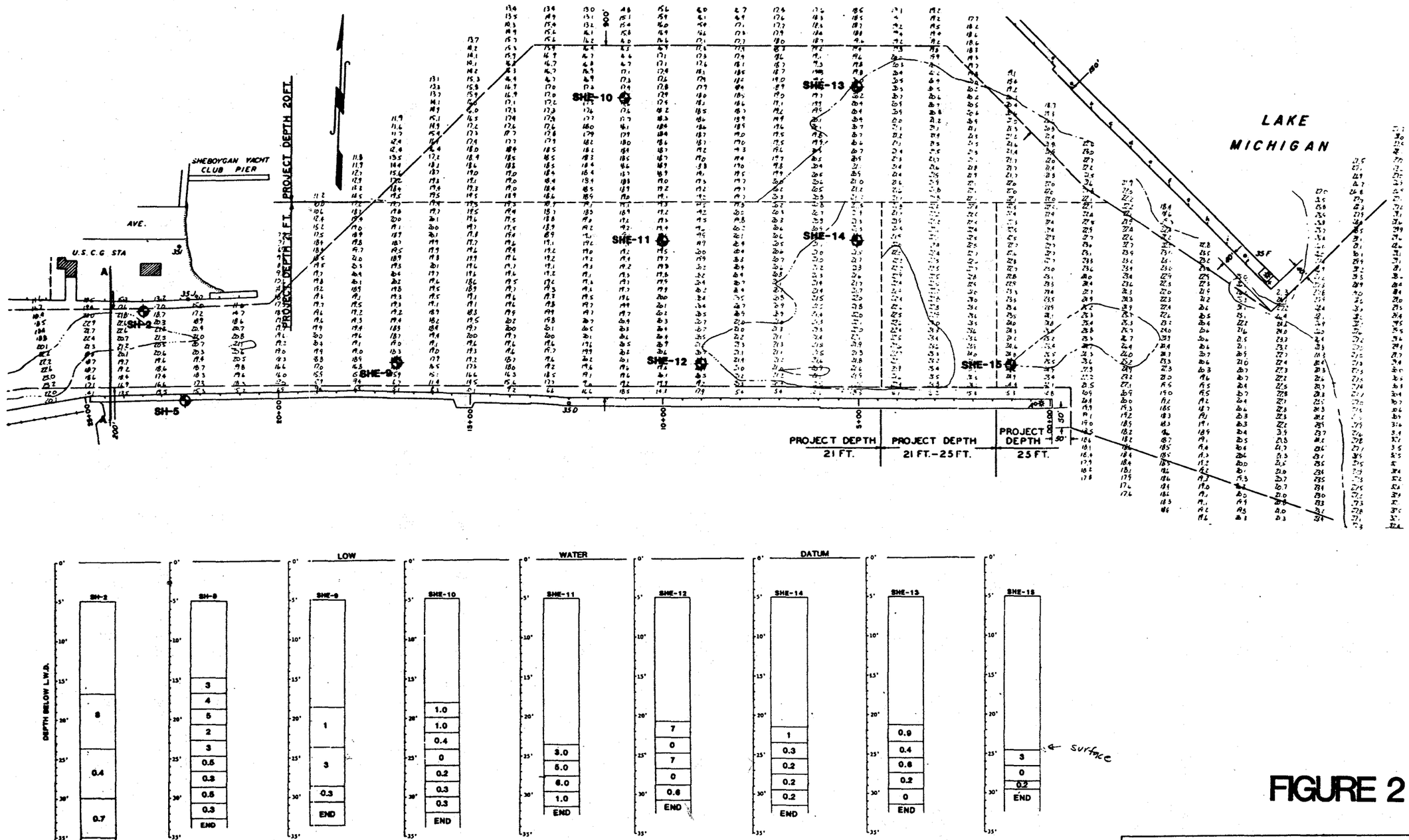


FIGURE 2

OUTER HARBOR STATIONS

NOTE:

1. BORING INFORMATION DATES:
   SHE - BORINGS 1982
   SH - BORINGS 1982
   OTHER BORINGS 1979
2. BORING LOG UNITS ARE, PARTS PER MILLION.

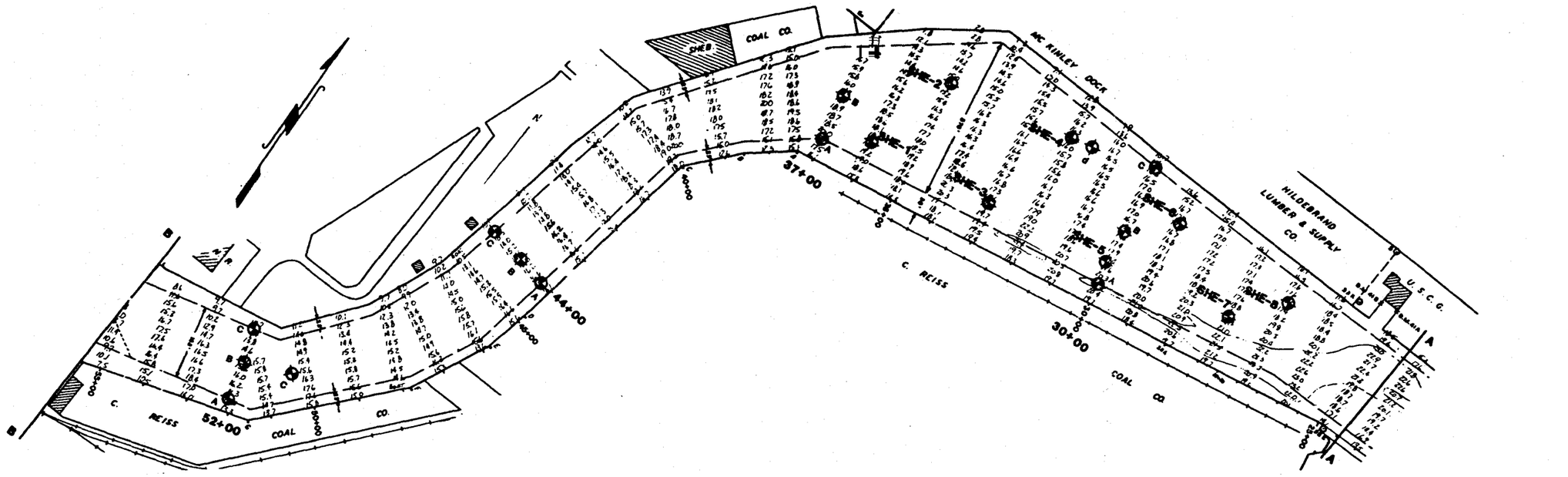
U. S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

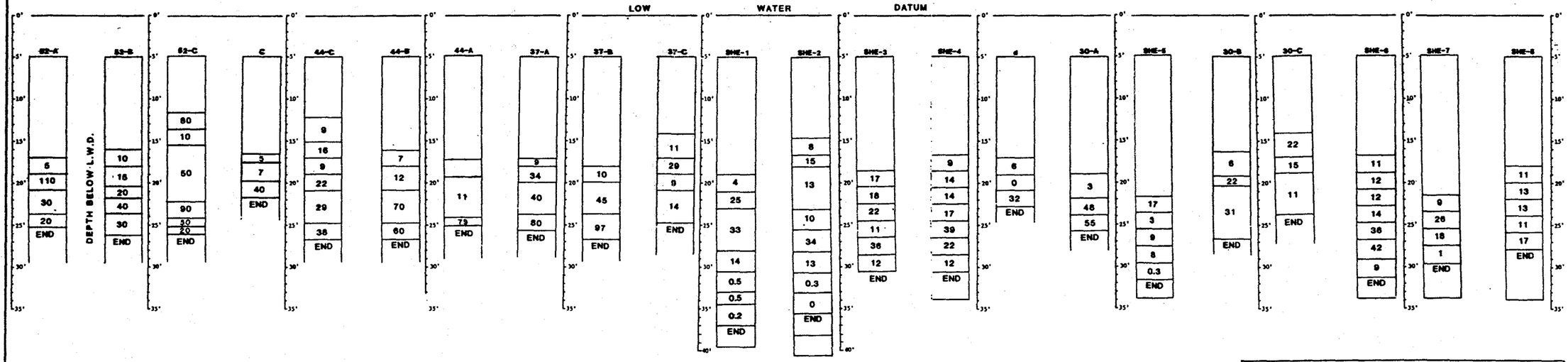
SHEBOYGAN HARBOR,
WISCONSIN

PCB PROFILE

20 MARCH 1984

SCALE OF FEET





MIDDLE HARBOR STATIONS

FIGURE 3

NOTE:

1. BORING INFORMATION DATES:
   SHE - BORINGS 1982
   SH - BORINGS 1982
   OTHER BORINGS 1979
2. BORING LOG UNITS ARE, PARTS PER MILLION.

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SHEBOYGAN HARBOR,
WISCONSIN

PCB PROFILE

20 MARCH 1984

SCALE OF FEET

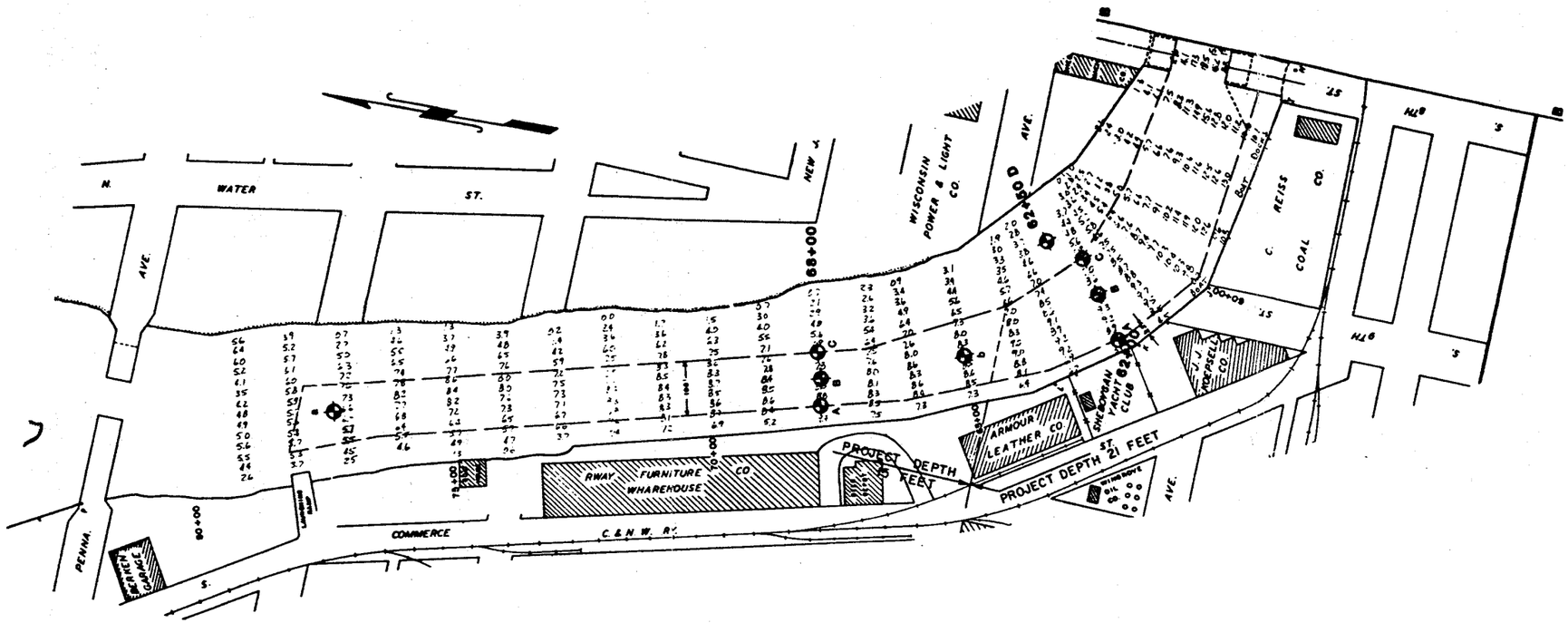

FIGURE 4

UPPER HARBOR STATIONS

NOTE:
1. BORING INFORMATION DATES:
SHE - BORINGS 1982
SH - BORINGS 1982
OTHER BORINGS 1979
2. BORING LOG UNITS ARE, PARTS PER MILLION.

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CORPS OF ENGINEERS
DETROIT, MICHIGAN

SHEBOYGAN HARBOR,
WISCONSIN

PCB PROFILE

20 MARCH 1984

SCALE OF FEET

and Lake Michigan are contaminated with PCBs. The other primary contaminants are heavy metals. The presence and concentration of other priority pollutants is yet to be determined and will be a goal of this study.

2.2.2 DEGREE OF SITE CONTAMINATION

The earliest studies on the Sheboygan River and Harbor sediments indicated moderate to high concentrations of lead, zinc, arsenic, and chromium. High levels of copper were detected during a 1979 study. In 1978, due to routine fish sampling, PCB levels in fish from the River and Harbor areas were discovered to be higher than the FDA Limits. Studies since then, especially USACE investigations, have outlined the extent of PCB contamination in the sediments. PCB concentrations are generally less than 5 mg/kg in the turning basin to the Harbor basin across the Sheboygan Yacht Club (Station 0.25+00). From the Yacht Club (Station 0.25+00) to the Pennsylvania Avenue Bridge (Station 0.800+00), PCB concentrations increase to a maximum concentration of 170 mg/kg 15 feet below low water depth at Station 78+00. Most concentrations were below 50 mg/kg from Station 25+00 to Station 78+00. See Figures 2,3, and 4.

2.3 CONTAMINATION MIGRATION AND ENVIRONMENTAL HEALTH EFFECTS

2.3.1 Migration Pathways

There are various avenues of contaminant migration throughout the terrestrial and aquatic ecosystem associated with the Sheboygan River and Harbor. Such pathways are ingestion of contaminated water, soils and sediment by animals, fowl and fish occupying the River and Harbor system. Surface runoff was a significant pathway for contaminant mobilization to the Sheboygan River in the past. This pathway will be investigated for its applicability to the present situation for the River system. All of these pathways will be evaluated for migration of contaminants.

2.3.2 POTENTIAL RECEPTORS

Potential receptors include sectors of the public and surrounding environment subject to dispersal of contaminants as described in Section 2.3.1. Potential receptors include those receptors in the food chain exposed to the River and Harbor. These receptors are benthos, fish, domestic and wild animals, and humans. Exposure could be through consumption of aquatic biota, direct assimilation of water, or dermal contact. Wildlife and domestic animals will be exposed when watering and foraging in the River. Birds are exposed in the same manner as are the domestic animals. Humans may be receptors of contaminants through consumption of fish, direct assimilation of water, and direct dermal contact.

2.4 INITIAL REMEDIAL MEASURES

Since there is no known imminent danger to human health and welfare associated with contaminants in the Sheboygan River and Harbor, no initial remedial measures have been performed to date.

Remedial Investigation/ Enhanced Screening

BLASLAND & BOUCK ENGINEERS, P.C.

3.0 REMEDIAL INVESTIGATION/ENHANCED SCREENING

The purpose of the remedial investigation/enhanced screening is to collect a sufficient amount of information with which to make decisions concerning the development and screening of potential remedial alternatives. Additional investigative efforts, if necessary, will be performed during the Alternative-Specific Remedial Investigation (ASRI) Feasibility Study phase of this work plan. In this manner, only those investigations which provide relevant data will be performed and the program will be cost effective. The large volume of existing data regarding similar projects will be utilized rather than extensive research being repeated on the Sheboygan River and Harbor. During performance of the remedial investigation, the findings and conclusions of similar recent projects will be reviewed including:

1. Waukegan Harbor, IL
2. Hudson River NY
3. Acushnet River Estuary, New Bedford, MA
4. Housatonic River, MA
5. James River, VA.
6. 10 Mile River, MA
7. Bear Creek, TN
8. And Others

The Remedial Investigation/Enhanced Screening program activities outlined in this section of the work plan represent the activities necessary to define the extent and type of contamination in the Sheboygan River and Harbor. This program will be implemented so that the locations and concentrations of contaminants can be quantified, thereby establishing the data base necessary to properly evaluate the potential remedial measures that may be required. In addition, separate programs will be established for the Sheboygan River and Sheboygan Harbor since differing water environments and respective uses will most likely result in different potential remedial measures. Therefore, where necessary, the distinction between the Sheboygan River and Sheboygan Harbor programs will be noted.

TASK 1.0 PROJECT OPERATIONS PLANS

During the course of work certain task elements may require changes and modifications to better attain the goals of the RI/FS. Ancillary plans, i.e., Quality Assurance Project Plan, Sampling Plan and the Site Health and Safety Plan will be modified to incorporate changes in scope of work. These plans are currently under development. Also similar plans are currently being developed by USEPA and these documents will be reviewed upon their completion.

The project operations plans are the instruments of control for all office and field activities associated with this project and present field sampling and analytical protocol, quality assurance/quality control procedures, health and safety protocol to be followed on site, data management, and site management functions. The Quality Assurance Projects Plan with the Sampling Plan appended (QAPP), the Health and Safety Plan and Site Management Plan will be prepared as separate documents. Data management protocol will be specified under designated sections of the QAPP and thus will not be a stand-alone document.

1.1 SITE HEALTH AND SAFETY ASSESSMENT

The objective of the site health and safety assessment is to determine if there are areas within the study area that present either potentially hazardous levels of pollutant contamination in the water, air, and soil or dangerous physical features and layouts. The assessment is being conducted using available information collected previously during site visits and project meetings.

Levels of personal protection and decontamination procedures will be specified and emergency information, including telephone numbers for police, fire department, and ambulance, along with mapped routes to local health care facilities will be included in the Site Health and Safety Plan.

The health and safety program of all subcontractors will be reviewed to ensure compliance with overall health and safety policies and procedures before they commence work on the site.

The plan will be updated as needed to reflect unanticipated changes in the hazardous or operating conditions encountered during the site investigation. The Site Health and Safety Plan specifies field monitoring to be performed and protective gear to be worn by site workers. Site waste characteristics have been identified and an evaluation performed on potential site hazards. A similar plan is being developed by the EPA, and will be reviewed upon completion.

The Site Health and Safety Plan also addresses site management. The areas addressed are:

- Site access for initial phase of investigative work.
- Site access for subsequent investigative work, e.g., drilling equipment, backhoe.
- Contingency measures.

1.2 QUALITY ASSURANCE PROJECT PLAN

A Quality Assurance Project Plan (QAPP) is being developed for the sampling, analysis, and data handling aspects of the remedial investigation. The QAPP will be submitted to EPA Region V for comment. All analytical work will be performed in a USEPA-certified laboratory.

1.3 QA/QC PLAN

The study will be performed under strict quality assurance/quality control procedures. These procedures will be documented in a site specific QA/QC Manual. The sampling locations, matrices, parameters, and frequency will be specifically outlined in the QA/QC Manual.

TASK 2.0 STUDY AREA SURVEY

The purpose of the study area survey is to gather available data and information to identify data gaps and provide guidance during the field sampling events. Data collected in this task will be utilized in other tasks of this project to the maximum extent possible.

The following sections describe the purpose and methods for each of these tasks and their associated subtasks.

2.1 SITE MAPPING

Site mapping will be performed by initially reviewing existing site maps, USGS maps, plat maps of property adjacent to the River and Harbor, City records, Department of Public Works plans, plans maintained by local planning agencies, and USACE dredge plans. In general, the site includes the Sheboygan River and Harbor downstream of Sheboygan Falls.

2.2 TOPOGRAPHICAL MAPPING

Readily available past investigations conducted on the area of investigation will be reviewed and summarized. This information is available from U.S. EPA (Waste Management Division, Planning and Management Division, Great Lakes National Program Office), WDNR, U.S. Fish and Wildlife, and U.S. Army Corps of Engineers.

A site map will be prepared in sufficient detail showing all historical sampling locations and sampling dates. The site map and all topographic surveys shall be of sufficient detail and accuracy to locate all current and proposed work performed at the site. Where possible, the site map will be tied into a more area-wide reference coordinate system such as the USCGS.

2.3 SENSITIVE RECEPTOR IDENTIFICATION

Potential receptors of the surface water and sediment contamination will be identified. Potable water suppliers, within or near the site, businesses and residents adjacent to the site, lakes and streams, land, including agricultural and animal grazing land within the site floodplain, aviaries, and wild animal habitats are among the sensitive receptors which may be affected by migration of site contaminants. These receptors will be identified and impacts associated with these receptors will be evaluated during subsequent tasks.

The current land use patterns for residential, industrial, and public uses will be determined in the vicinity of the River and Harbor. This will aid in identification of potential receptors.

The following information resources and others, as appropriate, will be utilized:

- U.S. State Public Health Agencies
- Local planning agencies
- U.S./State Fish and Wildlife Departments
- Local universities and colleges
- Local naturalists
- Aerial imagery

2.4 TRANSPORT PATHWAY IDENTIFICATION

A description of the extent and level of contamination in the River and Harbor will be provided. Geological, hydrogeological, physiographical, and climatological features which affect pollutant dispersal will be considered.

The following resources will be used:

- U.S. and State Geological Survey publications and maps
- USGS and State (e.g., DNR) water resources information, U.S. Department of Housing and Urban Development Flood Insurance Rate Maps and Corps of Engineers Reports

- o Aerial imagery for both geologic, ecologic and hydrologic information
- o Soil Conservation Service soil maps and descriptions
- o National Weather Service Data
- o Hydrogeologic reports

2.5 OTHER IDENTIFYING PROPERTIES OF THE SURVEY AREA

Any additional properties of the area contributing contamination to the River and Harbor will be identified during the remedial investigation. These properties will be considered in the site evaluation phase.

2.6 DELIVERABLES

Each subtask will constitute a subsection of the Remedial Investigation/ Enhanced Screening Report.

TASK 3.0 SOURCE CHARACTERIZATION

3.1 PHASE I SUPPORT TO REMEDIAL ALTERNATIVE SCREENING

3.1.1 SURFACE IMPOUNDMENTS, TANKS AND DRUMS

Aerial photographs, planning agency reports and other relevant literature will be used to confirm suspected sources and determine if other sources are contributing contaminants of concern to the River and Harbor system. Aerial photos will be received from U.S. EPA EMSEL in Las Vegas, Nevada and utilized in this effort.

3.1.2 DISCHARGE RECORDS REVIEW

Plant source discharge records of known contributors to the River system will be reviewed to evaluate the addition of contaminants of concern. Attention will be focused on studies and records from known Potentially Responsible Parties (PRPs) to determine the extent to which contaminants were discharged to the River and Harbor.

The modes of possible discharge (e.g., pipe, spill, surface runoff) for each industrial process discharge, landfill, fill area, or other source will be identified.

3.1.3 NONPOINT SOURCE DISCHARGE

Nonpoint source discharge information will be reviewed and summarized evaluating the impact of this source on the site. The WDNR (Bureau of Water Resources Management) may provide valuable information on nonpoint source discharges. Nonpoint source discharge studies in neighboring regions have been conducted.

3.2 PHASE II SUPPORT TO REMEDIAL ALTERNATIVE ANALYSIS

3.2.1 VERIFICATION OF SURFACE IMPOUNDMENTS, TANKS AND DRUMS

Onsite verification of possible impoundments, tank and drum sites will be made, if necessary. EPA will obtain access to these locations.

3.2.2 ADDITIONAL STUDIES

Additional studies and analysis will be performed, if necessary, to verify contaminant addition from known PRPs or other sources to Sheboygan River and Harbor.

3.2.3 DELIVERABLES

Each subtask will constitute a subsection of the Remedial Investigation/ Enhanced Screening Report.

TASK 4.0 SITE CHARACTERIZATION

4.1 RIVER PROGRAM

The River study program has been designed to determine, and/or review:

- Hydraulic characteristics of the River
- Sediment characteristics, horizontal and vertical distribution of contaminants.
- Sediment mobilization, diffusion and transport phenomena
- Affinity of PCBs and other contaminants for a particular particle size of sediment
- Contamination in the water mass
- Bioaccumulation of contamination in indigenous fish species and macrobenthos.

To reiterate, the major goals of the Sheboygan River study are to determine differential concentrations of contaminants in the Sheboygan River; their extent and potential for mobilization and transport; and their implication to public health, aquatic biota and environment of the River and Harbor. The following subtasks address the parameters to be studied and their rationale.

4.1.1 WATER COLUMN ASSESSMENT

The extent of the contamination within the water column, and its effects (if any) on the public health and/or the environment will be determined using correlations developed in similar studies. For most common contaminants, relationships have been developed at similar sites between sediment contamination and water quality. Using these established relationships a water column profile of the Sheboygan River will be created based on the extensive sediment sampling in the Remedial Investigation and the existing water column data base. The data developed will be verified using partition coefficients for the various contaminants established by EPA-sponsored research.

The sediment sampling program will include a sufficient number of sampling locations (100-200) to identify the extent of sediment contamination within the River.

To define the analytical requirements associated with the River sediment sampling program, several sediment samples (estimated to be less than 10) from "key" locations will be subject to standard priority pollutant analysis. Key locations will be identified through field reconnaissance and the location of PRPs and likely PRPs. Depending upon the results of this analysis, the "contaminants of concern" will be identified and thereafter analyzed for in all the sediment samples. At a minimum, sediment samples will be analyzed for Aroclor-specific PCBs and heavy metals.

SAMPLE COLLECTION TECHNIQUES

Bottom sediment cores will be collected using a hand driven lexan core, split spoon sampler or Osterberg piston core for the loosely-bound silt material. A ballcheck corer, ponar dredge or hand-driven split spoon sampler will be used on the handpan clay substrate and compacted sand areas.

Samples will be collected at the sediment/water interface and at one foot intervals to an average depth of five feet or until the core sampler is unable to penetrate the bottom using reasonable human force. In areas of high deposition, eg., in back of dams, samples will be collected at greater depths due to a greater potential sedimentation. A log will be maintained for each boring in which the physical characteristics of the substrate will be recorded. If contamination is found in significant concentrations at the bottom of the deep cores, it may be necessary to do further sampling. Particle size analysis will be performed on approximately 20 samples to assist in characterization of sediment type.

4.1.4 HIGH WATER MARK STUDY

Samples of surface soils will be collected in deposition areas subjected to historic spring flooding. Approximately 20 samples will be collected. The goal is to determine if contaminants have migrated beyond the general channel bed during periods of high water.

4.1.5 BIOLOGICAL ASSESSMENT

Since 1978, the Wisconsin Department of Natural Resources (WDNR) has collected and analyzed approximately 500 fish and crayfish from the Sheboygan River and Harbor. This sampling program has been part of an overall state-wide assessment of impacts associated with point and non-point contaminant sources on aquatic biological species. As part of this program WDNR has documented a decreasing trend in PCB contamination of fish from the Sheboygan River/Harbor. These previous fish studies have focused primarily on PCB-contamination, however some data have been established for other contaminants such as heavy metals. Using this data together with information, previously developed for similar river/harbor situations, the relationship between contaminants in sediments and biological species can be defined.

If unusual or unexpected contaminants are identified in the sediment sampling program, additional sampling and analysis of biological species may be proposed.

The information obtained from the sediment sampling program will also provide the means with which to better define the direction and/or needs of future WDNR biological monitoring programs in the Sheboygan River.

4.1.6 DELIVERABLES

Each subtask will constitute a subsection of the Remedial Investigation/ Enhanced Screening Report.

4.2 HARBOR PROGRAM

This study will focus on site remedial investigations and recent U.S. Army Corps of Engineers data necessary to characterize the Harbor and its actual and potential hazard to public health and the impacts on wildlife and the

aquatic environment. The data will be sufficient to assess the preliminary remedial alternatives that have been developed during the Remedial Investigation and assess the detailed evaluation of alternatives in the Feasibility Study. These studies will adequately characterize the site under the no action alternative, potential dredging alternatives, and different intermediate remedial scenarios.

4.2.1 SEDIMENT SAMPLING

A total of 20 sediment cores will be collected in the Sheboygan Harbor. Stations will be chosen to augment data from existing locations taken in 1979 and 1982 by the USACE. The USACE station locations are shown in Figure 2, 3, and 4.

Sediment cores will extend to 20 feet, unless native material (bedrock or undesturbed glacial till) is encountered with eight samples per core of 20 feet submitted for analysis for a total of 160 samples. Samples will consist of 1) the top 6 inches, 2) 6 inches to 2 feet, 3) 2 to 4 feet, 4) 4 to 6 feet, 5) 6 to 8 feet, 6) 8 to 12 feet, 7) 12 to 16, and 8) 16 to 20 feet of sediment. Also, the core section not sent to the lab for analysis will be labeled and preserved for the duration of the study.

Core samples will be collected by a barge mounted drilling machine utilizing split spoon or an Osterberg piston corer to collect the samples. The sampling technique and equipment used will depend on the substrate. Soil logging will be performed on all sediment profile horizons. Particle size analysis will be

performed on approximately 10 samples to assist in characterization of sediment type. All samples will be retained should other tests be warranted on a particular profile.

4.2.2 WATER COLUMN ASSESSMENT

The extent of the contamination within the water column, and its effects (if any) on the public health and/or the environment will be determined using correlations developed in similar studies. For most common contaminants relationships have been developed at similar sites between sediment and water quality data. Using these established relationships a water column profile of the Sheboygan Harbor based on the extensive sediment sampling in the Remedial Investigation and the existing water column data base. The data developed will be verified using partition coefficients for the various contaminants established by EPA-sponsored research.

Should unusual or unexpected contaminants be identified in the sediment sampling program, additional sampling and analysis of water column samples will be proposed.

4.2.3 BIOLOGICAL ASSESSMENT

Since 1978, the Wisconsin Department of Natural Resources (WDNR) has collected and analyzed approximately 500 fish and crayfish from the Sheboygan River and Harbor. This sampling program has been part of an overall state-wide assessment of impacts associated with point and non-point contaminant sources on aquatic biological species. As part of this program, WDNR has documented a decreasing trend in PCB contamination of fish from the Shebogyan River/Harbor. These previous fish studies have focused primarily on PCB-contamination, however some data has been established for other contaminants such as heavy metals. Using this data together with information, previously developed for similar river/harbor situations, the relationship between contaminants in sediments and biological species can be defined.

If unusual or unexpected contaminants are identified in the sediment sampling program, additional sampling and analysis of biological species may be proposed.

The information obtained from the sediment sampling program will also provide the means with which to better define the direction and/or needs of future WDNR biological monitoring programs in the Sheboygan Harbor.

4.2.4 DELIVERABLES

Each subtask will constitute a subsection of the Remedial Investigation/ Enhanced Screening Report.

TASK 5.0 FEASIBILITY STUDY TESTING

All required feasibility study testing will be performed under the Alternative-Specific Remedial Investigation (ASRI) efforts. See Section 4, Task 1.

TASK 6.0 DATA VALIDATION

The objective of data validation is to review the data gathered in the Remedial Investigation study and determine its reliability. The types of quality control checks will be established in the project specific QAPP and QA/QC Plan.

TASK 7.0 CONTAMINANT PATHWAY AND TRANSPORT EVALUATION

All required pathway and transport evaluation will be performed under the Alternative-Specific Remedial Investigation (ASRI) efforts. See Section 4, Task 1.

TASK 8.0 PUBLIC HEALTH EVALUATION - ENDANGERMENT ASSESSMENT

A Public Health Evaluation (PHE) and Endangerment Assessment (EA) will be performed. See Section 3, Task 10, and Section 4, Task 2.

TASK 9.0 PRELIMINARY REMEDIAL ALTERNATIVE DEVELOPMENT

Upon completion of the remedial investigation activities, preliminary remedial alternatives applicable to the Sheboygan River and Harbor situations will be developed. These alternatives will be identified in preparation for the enhanced screening program. This task presents the development of preliminary remedial measures, and is followed in the subsequent task by the enhanced screening process.

9.1 REMEDIAL ALTERNATIVES IDENTIFICATION

Potential remedial actions for this site are identified in this subtask. This list will be expanded and the conditions continuously evaluated during the RI/FS process as new information is gathered and evaluated. This evaluation will follow closely the procedures for attaining the goal established in section 300.68 of the National Contingency Plan. This goal is the selection of a cost-effective remedial alternative which effectively mitigates and minimizes threats to and provides adequate protection of public health, welfare and the environment.

9.1.1 HARBOR

The following is a discussion of candidate remedial action techniques for Sheboygan Harbor.

Remedial techniques for contaminated sediments may involve removal and subsequent disposal or treatment of the sediments. Sediment removal methods include well-established excavation and dredging techniques. Dredge

materials (spoils) management includes techniques for drying, physical processing, chemical treatment, and disposal. Remedial technologies for removal of contaminated sediments include the following:

1. Direct mechanical dredging using draglines, clamshells, or backhoes.
2. Direct mechanical dredging using draglines, clamshells, or backhoes following stream diversion and sediment dewatering.
3. Mechanical low-turbidity dredging.

Several options for degree of dredging are also possible at the Sheboygan Harbor site. These options include, but are not limited to, the following:

1. Dredging Harbor to authorized depths - 21 feet below low water datum.
2. Dredging Harbor to reduced depths - (above authorized depths) less than 20 feet below low-water datum.
3. Dredging of Harbor sediments to a set regulatory limit, i.e., 50 mg/kg, the TSCA limit or another regulatory limit.
4. Dredging of River and Harbor sediment to a level which does not meet regulatory limits.
5. No dredging of any sediments.

The dredging option may also include capping deeper sediment with clean material such as sand, rock, or solidified fly ash. This in-situ impoundment of deeper sediments may effectively isolate contaminated sediments from contact with the water column. A second option would include allowing for natural or enhanced biodegradation of the deeper sediments.

Techniques for drying of the dredge materials may or may not be a consideration, depending on the dredging technique used, the characteristics of the dredge spoils and the ultimate dispositon of the materials. If the sediments are excavated subsequent to water diversion and in-place sediment dewatering, further dewatering would not be necessary.

If clean sediments are separated from contaminated sediments, options for their management are available. These options include:

1) Return to the Harbor system
2) Use sediments for beach stabilization
3) Open lake disposal of the sediments
4) Upland disposal of sediments as fill material.

Disposal options for contaminated dredge spoils include the following:

1) Construction and utilization of a spoils containment basin or a confined disposal facility (CDF) formed by constructing perimeter berms or dikes around natural topographic depressions.

2) Disposal in a secured landfill. Depending on the degree of contamination of the sediments, the disposal facility may be a hazardous waste landfill or a conventional municipal solid waste landfill. An upland area in the Sheboygan region may be developed for landfilling of dredge spoils. It should be noted that current EPA policy favors local disposal of contaminants rather than transport and disposal at out-of-state landfills.

In addition to disposal, the treatment option exists for contaminated spoils. These spoils may be incinerated, chemically treated, or biodegraded.

9.1.2 RIVER

Remedial techniques for the Sheboygan River, if necessary, are more varied in nature than the Harbor since the River does not require dredging for navigational purposes. Remedial alternatives may include the following techniques:

1) Dredging, including the techniques described above for the Harbor. It should be noted, however, that the shallow depth of the River eliminates the use of several of the dredging apparatus since this equipment requires a deeper draft of available water on which to work. Alternately, water or stream diversion and dry excavation may be more appropriate for the River than the Harbor, since dry excavation of the Harbor is not practical.

2) In-situ impoundment-can reduce the potential for sediment transport and can be accomplished in several ways:

   A) Physical Isolation - provides in-place stabilization of contaminated sediments by layering granular materials such as sand and gravel to isolate the sediments from contact with the River water.

   B) Chemical Stabilization - consists of using binding materials such as cement to form a hardened soil mass which would not be subject to transport within the River system.

3) Rechannelization of River - the River rechannelization consists of re-routing portions of the Sheboygan River by means of a new channel, such that the flow bypasses contaminated sediments.

4) Hydraulic Modification of River - hydraulic modifications such as flow and velocity control may be accomplished to increase sedimentation and minimize sediment transport.

5) Biodegradation - natural biological degradation of persistent organic contaminants is seen as an increasingly viable and applicable means of dealing with these materials. In the case of PCB contamination, recent demonstrations within the scientific community have raised the viability of this alternative to a point where it should now be seriously considered for a number of sites. Methods to enhance the natural biodegradation process and therefore "speed-up" the process are currently being researched on a world-wide basis.

In conjunction with and/or in lieu of contaminated sediment removal and management for either the Harbor or River, management techniques may be implemented at the Sheboygan River and Harbor as remedial techniques. These management techniques may include but are not limited to:

1) Plan restrictions on River and Harbor for navigational purposes, i.e., speed zone markings on shore areas.

2) Place restrictions on eating fish.

3) Fence River to high water mark coupled with posting of warning signs.

4) Place fish barriers in River to prevent migration.

Finally, as in all superfund sites, in accordance with the National Contingency Plan, the no action alternative will be a potential remedial action option.

TASK 10.0 ENHANCED SCREENING OF REMEDIAL ALTERNATIVES

Upon satisfactorily completing the remedial investigation activities described above, the next proposed task comprising this work plan is the goal-oriented evaluation of potential remedial alternatives. The subjects of this evaluation include the range of conceivable, potential remedial alternatives available to both the Sheboygan River and Sheboygan Harbor. EPA Guidance documents regarding the performance of RI/FS will be utilized in the development and screening of remedial alternatives. It should be noted, however, that these guidance documents may not be appropriate for use in a river/harbor situation. Evaluation guidelines will be developed by which the potential remedial alternatives can be further studied to determine whether a detailed evaluation is warranted. Upon screening of all potential remedial alternatives as described above, the Enhanced Screening Process (ESP) will include the preliminary development of a number of alternatives which may be appropriate. Up to five alternatives will be subject to additional Alternative-Specific Remedial Investigations (ASRI) (if warranted), as discussed in Section 4, Task 1 and detailed analysis, as discussed in Section 4, Task 2.

10.1 FEASIBILITY SCREENING

The screening of the alternatives deemed applicable for the Sheboygan River or the Sheboygan Harbor situation is required to eliminate inappropriate technologies from further consideration. This screening process will remove from further consideration those potential remedial alternatives that far exceed (by an order of magnitude) the cost of other alternatives yet do not provide substantially greater public health or environmental benefit.

Screening criteria will include:

1. Effects of the alternative.

   A. Adverse environmental effects;

   B. Ability to achieve adequate control of materials;

   C. Ability to effectively mitigate and minimize the threat of harm to public health, welfare or the environment.

2. Acceptable engineering practices.

   A. Constructability;

   B. Difficulty of implementation;

   C. Design considerations.

10.1.1 RELIABILITY SCREENING

The technical issues relating to each of the alternatives will be evaluated. This will include the evaluation of the technical risks as well as the potential problems associated with each of the alternatives. The alternatives that have implementation problems or a high potential for failure will be eliminated.

10.1.2 INSTITUTIONAL SCREENING

The objective is to eliminate those alternatives that do not meet institutional requirements such as federal, state and local laws, regulations, etc. Institutional requirements will be identified which affect the implementation of the selected remedial alternative. This will be done by identifying permits and procedures which may restrict a planned remedial action.

10.2 ENVIRONMENTAL PUBLIC HEALTH SCREENING

10.2.1 ENVIRONMENTAL SCREENING FOR EACH ALTERNATIVE

Possible remedial alternatives that are being considered for the Sheboygan Harbor and River include:

1. No action alternative - for this alternative, the effects of contaminants that may be released if sediments are left intact will be determined.

2. Dredging - dredging presents various related options involving:

   A) Vertical and areal extent; the extent of dredging alternatives range from complete removal of all contaminated sediments to removal of only contaminated sediments (to less than 50 mg/kg) to dredging of materials above navigational limits. Consideration will be given to bioturbation and resuspension rates of contaminated sediments during and/or after dredging activities. Another consideration of public health would deal with the physical hazard limited dredging may impose on boating/shipping activities.

   B) Materials handling; the handling of contaminated and uncontaminated sediments including various techniques for materials removal, drying, and physical and chemical processing will consider the release of contamination, air borne and/or water borne, to the environment.

   C) Disposal; options for disposal of contaminated materials will consider possible environmental effects. Some of the effects upon the local environment may include wetland alteration or destruction, wildlife management area disruption and other detrimental impacts to the local public.

   D) Management during remedial action; management of the area will minimize the environmental effects due to dredging and related activities. Such options include navigational restrictions, utilizing fish barriers, fencing off highly contaminated zones, changing the course of the River, and applying restrictions on eating fish.

3) In-situ impoundment - can be accomplished by one of two methods, physical isolation or chemical stabilization. Screening for each however will be similar. Some of the environmental impacts to be assessed are as follows:
   A. Extent of alteration of benthic ecosystem in River/Harbor areas.
   B. Extent of destruction and/or alteration of wetland and backwater areas during installation.
   C. Dispersal of contaminants during installations, air borne and/or water borne depending upon construction methodology.

4) Rechannelization of River - rechannelization environmental impacts primarily include those associated with construction of "new" river bed. Specifically, destruction and/or alteration of wetlands, wildlife areas, the loss of recreational activities and general aesthetic nature of River.

5) Hydraulic Modification of River - hydraulic modification of the River may effect the rate of sedimentation in some portion of the River. This increased sedimentation may effect the benthic community in areas subject to significant deposition.

6) Biodegradation - the environmental screening of the biodegradation alternative will include an evaluation of impacts on the River and Harbor system during implementation of the alternative. As an example, if it is necessary to dewater segments of the River, or alternately to cover segments with sand (to enhance anaerobic degradation), then associated impacts will be assessed.

A comparative public health and environmental analysis will be performed for alternative remedial measures which remain following the feasibility and institutianal screening described above. Such evaluations will enable an

assessment of the extent to which remedial actions will affect the potential for exposures and thereby risk. The effect of these remedial actions will not necessarily be a reduction in risk; an important component of an assessment of remedial alternatives that involve removal and off-site disposal of hazardous materials is the consideration of exposures that may result during remediation.

10.2.2 PUBLIC HEALTH AND ENDANGERMENT SCREENING

The objective is to eliminate those remaining alternatives that adversely impact public health. EPA's interim guidelines for the preparation of public health evaluations (PHEs) specify that endangerment assessment should be conducted by comparing exposure levels with applicable or relevant standards or criteria.

In addition, any potential impacts of the site on natural resources or public welfare will be identified. These impacts may include effects on ground-water resources, public water supply, property values, or the potential for future commercial or residential development.

10.2.3 DELIVERABLES

Each subtask will constitute a subsection of the Remedial Investigation/Enhanced Screening Report.

TASK 11.0 DRAFT REMEDIAL INVESTIGATION/ENHANCED SCREENING REPORT

The methods, results and conclusions of the remedial investigation and enhanced screening will be compiled and published in a draft report. Copies of this report will be submitted to EPA Superfund for further distribution to WDNR, USACOE, GLNPO, and U.S. Fish and Wildlife. The report will document the level and extent of contamination and perform screening of potential remedial alternatives.

11.1 TABLE OF CONTENTS

The following is a preliminary table of contents for the Remedial Investigation/Enhanced Screening Report. This table of contents has been prepared based upon EPA guidance documents related to the performance of remedial investigations and feasibility studies.

REMEDIAL INVESTIGATION/ENHANCED SCREENING REPORT

ANNOTATED TABLE OF CONTENTS

The RI/ES Report provides the site characterization, a summary of data collected and the conclusions of the site investigation/enhanced screening analysis. The draft report will be submitted for review and public comment. After the review and revision a final report will be submitted.

EXECUTIVE SUMMARY

1.0 OBJECTIVES

The objectives section will state the overall objective of the RI/ES and delineate the specific objectives of each of the sampling, investigations, and studies performed. The order of the specific objective will be set by the chronology of the RI/ES. Changes in the scope may affect the objectives and will be addressed.

2.0 BACKGROUND

The background section will provide the information obtained in the initial site characterization. This section will be an overview of the past and current activities at the site up to the RI/ES phase of the RI/FS.

3.0 INVESTIGATION METHODOLOGIES

The investigation methodologies section will provide the basic methods used to obtain the data and information that is used in the investigation analysis. The order of presentation of the methods will follow the order presented in the objectives section and will remain consistent throughout the report. Specific methodologies may be presented in the appendices. Separate subsections will be provided for each sampling, investigation or study performed.

REMEDIAL INVESTIGATION/ENHANCED SCREENING REPORT

ANNOTATED TABLE OF CONTENTS

(Continued)

4.0 INVESTIGATION PRESENTATION

The data will be described as raw data for this section. The findings of each sampling, study, or investigation will be presented. The basic data can be presented in appendices where appropriate.

5.0 INVESTIGATION SCREENING ANALYSIS

The investigation/screening analysis will provide the conclusion drawn from the data presented in the previous section. The first subsection will provide the overall conclusions drawn from all the sampling, studies and investigations. Specific analysis of the individual sets of data will follow the order previously set.

REFERENCES

APPENDICES

11.2 PUBLIC MEETINGS

For purposes of obtaining the necessary input of the local concerned public, public meetings will be held upon completion of the remedial investigation/enhanced screening of remedial alternatives. These public meetings will allow for acknowledgment of public concerns during the alternative screening process.

Public meetings will be "chaired" by the EPA and WDNR and each meeting will include a presentation by participating PRPs as to the status and findings of each phase of the work plan. The PRP committee will record minutes of these meetings, and receive written comments for use in screening of alternatives.

11.3 FINAL REPORT

Following the receipt of any comments received from the public, USEPA, WDNR and USACE a final report will be prepared. The final report will be submitted to the USEPA and the WDNR for approval.

TASK 12.0 COMMUNITY RELATIONS

A Community Relations Plan (CRP) will be prepared and will be based on a Community Relations Assessment and the findings of onsite discussions with local officials. Other documents including fact sheets, minutes of public meetings, responsiveness summary, etc. will be prepared as necessary.

TASK 13.0 QUALITY ASSURANCE

The project manager (PM) for the participating PRPs is responsible for achieving quality assurance of the overall RI/FS activities. The PM will spot review the work products of project team members from a quality assurance perspective. The PM is responsible for ensuring that the specific requirements of the QAPP and the QA/QC Manual are satisfied during RI/FS activities.

13.1 SYSTEM AUDITS

The activities proposed under this task will be included in both the Quality Assurance Project Plan and the QA/QC Manual.

13.2 PERFORMANCE AUDITS

The activities proposed under this task will be included in both the Quality Assurance Project Plan and the QA/QC manual.

Feasibility Study

BLASLAND & BOUCK ENGINEERS, P.C.

4.0 FEASIBILITY STUDY (FS)

The feasibility study will evaluate remedial alternatives on the basis of the remedial investigation/enhanced screening results and will identify the remedial action, to be taken at the Sheboygan River and Harbor site that provides the most favorable balance between protection of public health, welfare, the environment and cost. Therefore, the FS for the Sheboygan River and Harbor site will include:

- o Alternative-specific remedial investigation
- o Detailed analysis of alternatives
- o Selection of the most cost-effective remedial action for the site
- o Preparation of draft and final FS report
- o Preparation of Conceptual Design Report, if necessary.

TASK 1.0 ALTERNATIVE - SPECIFIC REMEDIAL INVESTIGATIONS (ASRI)

The intent of the work described in this section is to perform those tasks which are necessary for evaluation of the alternatives identified at the completion of the Enhanced Screening Process (ESP). These efforts are considered contingent items since it is not known which tasks will be necessary or to what extent they will be needed.

The contingent efforts may include any of the following:

1. Water column sampling and analysis; to RI
2. Biological species sampling and analysis;
3. Additional flow and velocity monitoring; to RI
4. Feasibility study testing;
   a. Treatability studies
   b. Pilot studies
   c. Compatability studies;

5. Contaminant pathway and transport evaluation;
   a. Air transport
   b. Ground water transport
   c. Surface water transport (including mobilization of contamination, contaminant delivery rates to harbor, contaminant mitigation, and biological pathways);
6. In-stream dredging study;
7. Biodegradation assessment; and
8. Enhanced sedimentation study.

Additional assessment of one or several of the above studies or tasks may be required to continue development of the selected alternatives.

TASK 2.0 DETAILED ANALYSIS OF ALTERNATIVES

Descriptions, engineering considerations, operation and maintenance requirements, disposal and transportation needs, safety requirements, and implementation options for each of the alternatives remaining after the enhanced screening will be developed and described in detail. Environmental effects, necessary mitigative measures, physical or legal constraints, and regulatory compliance will be assessed for each alternative. Capital and operational costs will be estimated using these detailed alternative descriptions.

Each of the alternatives then will be evaluated and compared on the basis of reliability, difficulty of implementation, operation and maintenance requirements, environmental effects, safety requirements, and costs. The lowest cost alternative that is technically feasible and reliable and that protects public health, welfare and the environment will be considered the cost-effective alternative. A preliminary report will be prepared describing the recommended remedial action and discussing the evaluation procedure.

2.1 FEASIBILITY ANALYSIS

The remedial alternatives will be evaluated with respect to the following factors.

- o Reliability
  - Effectiveness - includes an evaluation on the completeness of the alternative. Will it provide remediation of the problem continuously?
  - Durability - includes an evaluation of the longevity of the alternative, what the long term maintenance requirements are.
- o Implementability
  - Ease of Installation - how is the alternative affected by time of year, component availability, and the like.
  - Time to Implement - what are the alternative critical path requirements. Are there factors that may lengthen the time to final installation.
  - Monitoring Requirements - are there long term monitoring requirements that present a burden in terms of manpower and analysis costs.
- o Safety Considerations
  - Implementation - construction hazards or dangers to worker and public health.
  - Failure - dangers to the public health on failure of the remedial alternative.

2.1.2 PUBLIC HEALTH ANALYSIS - ENDANGERMENT ASSESSMENT

The public health analysis/endangerment assessment will constitute the public health and environmental analysis of the remedial alternatives. It will be conducted in a manner consistent with current (draft) EPA Guidance Documents. A comparative analysis will be performed for each remaining alternative remedial measure. Such evaluations will enable an assessment to

be made of the extent remedial actions will affect the potential for exposures and thereby risk. The effect of these remedial actions may not necessarily be a reduction in risk; an important component of an assessment of remedial alternatives that involve removal and disposal of hazardous materials is the consideration of exposures that may result during excavation and transportation.

2.1.3 ENVIRONMENTAL ANALYSIS

The purpose of this task is to perform a detailed environmental analysis to support the evaluation and selection of a remedial alternative. The objective of environmental assessment is to delineate the 'net' effects of the alternative responses so that consideration for environmental risk is explicitly incorporated into the selection of the response alternative.

The environmental analysis should evaluate the following for each of the alternatives:

1) Changes in release of contaminants and final environmental conditions,

2) Improvements in the biological environment,

3) Improvements in resources people use,

4) Adverse effects of the responses,

5) Wetland destruction, alteration and disturbance of wildlife,

6) Alteration of the availability of ground water or surface water,

7) Alteration of flood storage capabilities,

8) Traffic disturbance, congestion, increased accidents, etc.,

9) Nuisances due to noise and odors,

10) Impact on recreational uses and aesthetics of the River and Harbor, and

11) Impacts on living conditions and property values.

2.1.4 INSTITUTIONAL ANALYSIS

The institutional analysis will include a detailed evaluation of the remaining remedial alternatives with respect to local, state and federal requirements. In the process of this analysis, permitting requirements will be identified, and permitting schedules will be defined under which each alternative could be implemented.

2.1.5 COST ANALYSIS

A cost analysis will be performed such that present worth costs associated with an alternative are identified. The purpose of this subtask is to evaluate remedial alternatives in terms of aggregate costs. A listing of the items to be included in the analysis of each of the alternatives follows:

- Capital Costs
  - Construction costs
  - Equipment costs
  - Land and site-development costs
  - Buildings and service costs
  - Relocation expenses
  - Engineering expenses
  - Legal fees and license/permit costs
  - Start-up and shake-down costs
  - Contingency allowances
- O&M Costs
  - Operating labor costs
  - Maintenance material and labor costs
  - Auxiliary materials and energy
  - Purchased services
  - Disposal costs

- Administrative costs
- Insurance, taxes, and licensing costs
- Maintenance reserve and contingency funds
- Other costs.

The cost analysis will use readily available cost information to estimate the costs of the items. The cost analysis shall be performed in the following manner:

- o Determine capital costs
- o Determine O&M annual costs
- o Determine stream of payments
- o Determine present worth
- o Identify key cost sensitivity analysis
- o Summarize input for cost-effectiveness analysis.

TASK 3.0 COMPARATIVE EVALUATION OF ACCEPTABLE ALTERNATIVES

In accordance with the National Contingency Plan (300.68i) a comparison of alternatives will be made using the detailed analysis of each of the remaining remedial alternatives. The remedial action selected will be the lowest cost alternative which meets all of the following criteria:

1. It is technologically feasible;

2. It effectively mitigates and minimizes damage to and provides adequate proteciton of public health, welfare, and the environment:

3. It complies with relavent Federal, State, and Local standards: and

4. It is acceptable to the local communities.

TASK 4.0 FEASIBILITY STUDY REPORT

4.1 DRAFT FEASIBILITY REPORT

The draft report will summarize data developed during the alternative remedial actions assessment process, and recommend an alternative, or combination of alternatives for implementation at the site.

A preliminary copy of the draft report will be submitted to EPA for comment and then the draft report will be issued to EPA and other appropriate agencies. The Table of Contents is presented in the following table.

FEASIBILITY STUDY REPORT

TABLE OF CONTENTS

4.2 PUBLIC HEARING

There will be a minimum 3-week comment period on the draft Feasibility Study report. The EPA Region V staff anticipates holding a public meeting during this comment period to receive comments and answer questions on the recommended remedial alternative. The participating PRPS will assist EPA in answering these questions received during the public hearing and review phase and consider them in the final report.

4.3 REVISED DRAFT FEASIBILITY STUDY REPORT

The draft FS will be revised to consider and incorporate review comments as warranted. This document will be submitted to EPA within 60 days following completion of the draft FS review and receipt of all substantive comments in the study.

4.4 FINAL FEASIBILITY STUDY REPORT

EPA has stated that a final FS report is not needed. The public comment draft and a responsiveness summary to public comment is all that is needed. Therefore, a final feasibility study report will not be prepared.

TASK 5.0 PRE-DESIGN REPORT [IF NECESSARY]

5.1 PROCESS DEVELOPMENT

The various steps in accomplishing the goals of the conceptual pre-design will be developed. The process or path to be followed will be developed using a critical path approach. Monitoring of QA/QC, goals, and schedule will be incorporated throughout this process.

5.2 CONCEPTUAL DESIGN

A conceptual design will be prepared of the remedial alternative for the site selected through the screening and evaluation of identified alternatives. This design will be based on good engineering judgment and practices. The design will be prepared so that it can be readily implemented in remediating the Sheboygan River and Harbor.

5.3 PRELIMINARY REMEDIATION SCHEDULE

A remediation schedule will be prepared as part of the Conceptual Design Report. This schedule will present milestones for completion of the various tasks for easy tracking of the progress mode in accomplishing site remediation.

5.4 PRELIMINARY SPECIFICATION OUTLINE

As part of the conceptual design phase, a preliminary specification outline will be prepared. This outline will list all equipment and work to be performed by the contractors involved in remediating the site.

5.5 CONCEPTUAL COST ESTIMATE

Estimated costs will be developed for items specified in Section 4, Task 5.4 for the selected alternative. These costs will be a refined estimate of those developed in the original cost screening phase of the various alternatives selected for evaluation in the RI/ES and FS phases.

5.6 DRAFT CONCEPTUAL DESIGN REPORT

The following conceptual design elements will be developed and addressed as required for the remedial actions selected and included in the Conceptual Design report.

- A conceptual plan view drawing of the overall site, showing general locations for project actions and facilities.
- Conceptual layouts (plan and cross-sectional views where required) for the individual facilities, other items to be installed, or actions to be implemented.
- Conceptual design criteria.
- A description of types of equipment required, including approximate capacity, size and materials of construction.
- Process flow sheets, including chemical consumption estimates and a description of the process.
- An operational description of process units or other facilities.
- A description of unique structural concepts for facilities.
- A description of operation and maintenance requirements.
- A discussion of potential construction problems.
- Right-of-way requirements.
- A description of technical requirements for environmental mitigation measures.
- Additional engineering data required to proceed with design.
- Construction permit requirements.
- Order-of Magnitude implementation cost estimate.
- Order-of-Magnitude annual O&M cost estimates.
- Preliminary project schedule.

PRELIMINARY OUTLINE FOR PREDESIGN REPORT

Section	Title	Topics
1	Site Description	Brief 2-3 page summary of site conditions
2	Available Information	Brief 5-10 page synopsis of material pertinent to the final design
3	Summary of Selected Remedy	Description of remedy and rationale for selection
		Conceptual plan view drawings of the overall site showing general locations for project actions and facilities
		Predesign criteria, performance expectations, and rationale
		Description of types of equipment required, including approximate capacity and size and material type
3	Summary of Selected Remedy	Process description and flow sheets
		Operational description of process units or other facilities
		Description of special construction techniques and operations and maintenance requirements
		Utility requirements
		Closure and long-term monitoring requirements
		Performance standards to define what levels of cleanup will be required to complete the remedial action (if appropriate)

PRELIMINARY OUTLINE FOR PREDESIGN REPORT
(Continued)

Section	Title	Topics
4	Design Implementation Precautions	Special technical problems
		Additional engineering data requirements
		Health and Safety Precautions
		Community Relations strategies
		Access, easement and right-of-way requirements
5	Cost Estimates and Schedules	Implementation cost estimate (Order-of-Magnitude +50 percent to -30 percent)
		Preliminary annual O&M cost estimate and design life of project
		Project Schedule (design, construction, permit and access)

5.7 AGENCY REVIEW

A one-day draft report review meeting will be scheduled within 10 days of the submittal of the draft report. EPA, U.S. Army Corps of Engineers and State review comments will be discussed at this meeting. In addition, the draft report will be available for public review and public comments will be considered in preparation of the final Conceptual Design Report.

5.8 PREPARATION OF FINAL CONCEPTUAL DESIGN REPORT

Within 20 days of the receipt of written EPA review comments, the draft report will be finalized. Ten copies of the final report will be provided to the EPA for distribution to appropriate project personnel.

In addition to the Conceptual Design Report, a package of backup documents will be assembled and copies provided to the EPA, the USACE, and the State.

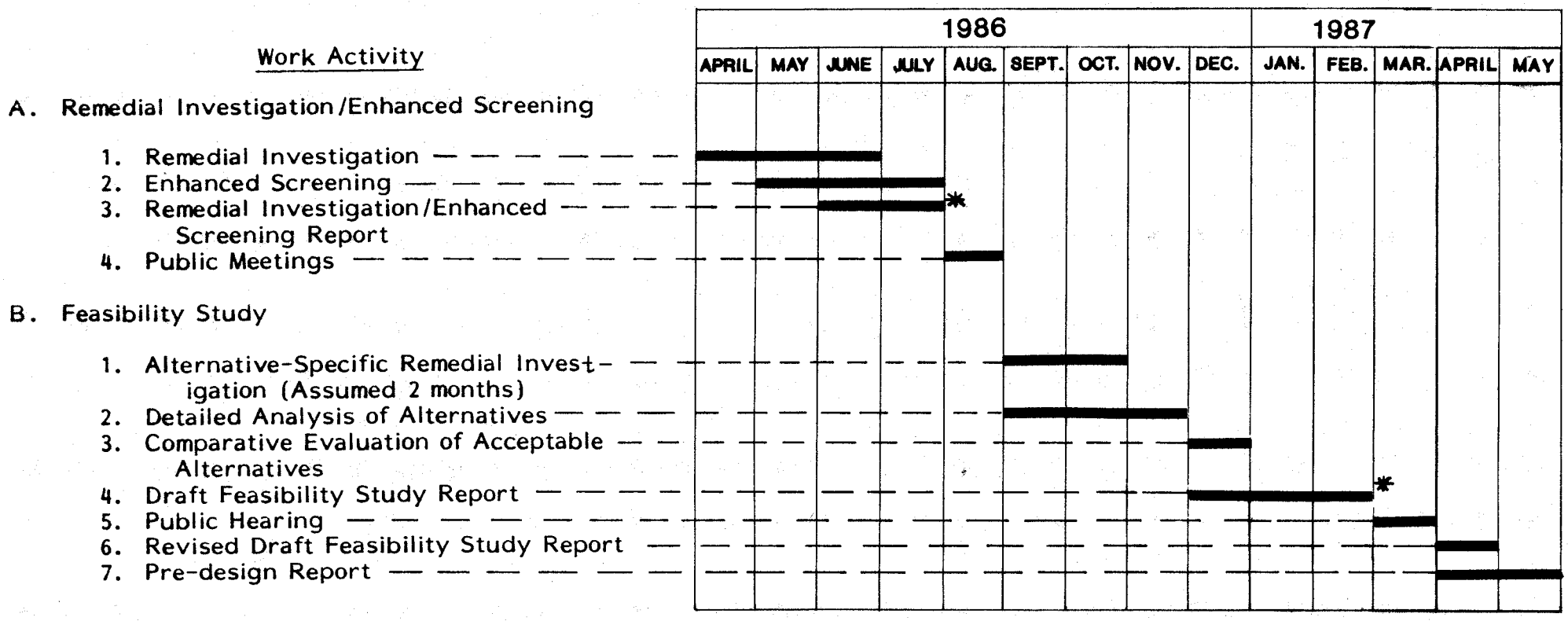
A final report presenting the conceptual design will be prepared and submitted to EPA for review and approval.

5.0 SCHEDULE

SHEBOYGAN RIVER AND HARBOR

REMEDIAL INVESTIGATION / FEASIBILITY STUDY

PROJECT SCHEDULE



* - SUBMITTAL TO EPA AND WDNR

NOVEMBER 18, 1985