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WORK PLAN

BLASLAND & BOUCK ENGINEERS, P.C.

Remedial Investigation / Feasibility Study

SHEBOYGAN RIVER AND HARBOR

Participating Potentially
Responsible Parties

November 1985

(revised January 1986
and March 1986)

APR 3 1986

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
(Revised January and March, 1986)

BLASLAND & BOUCK ENGINEERS, P.C.
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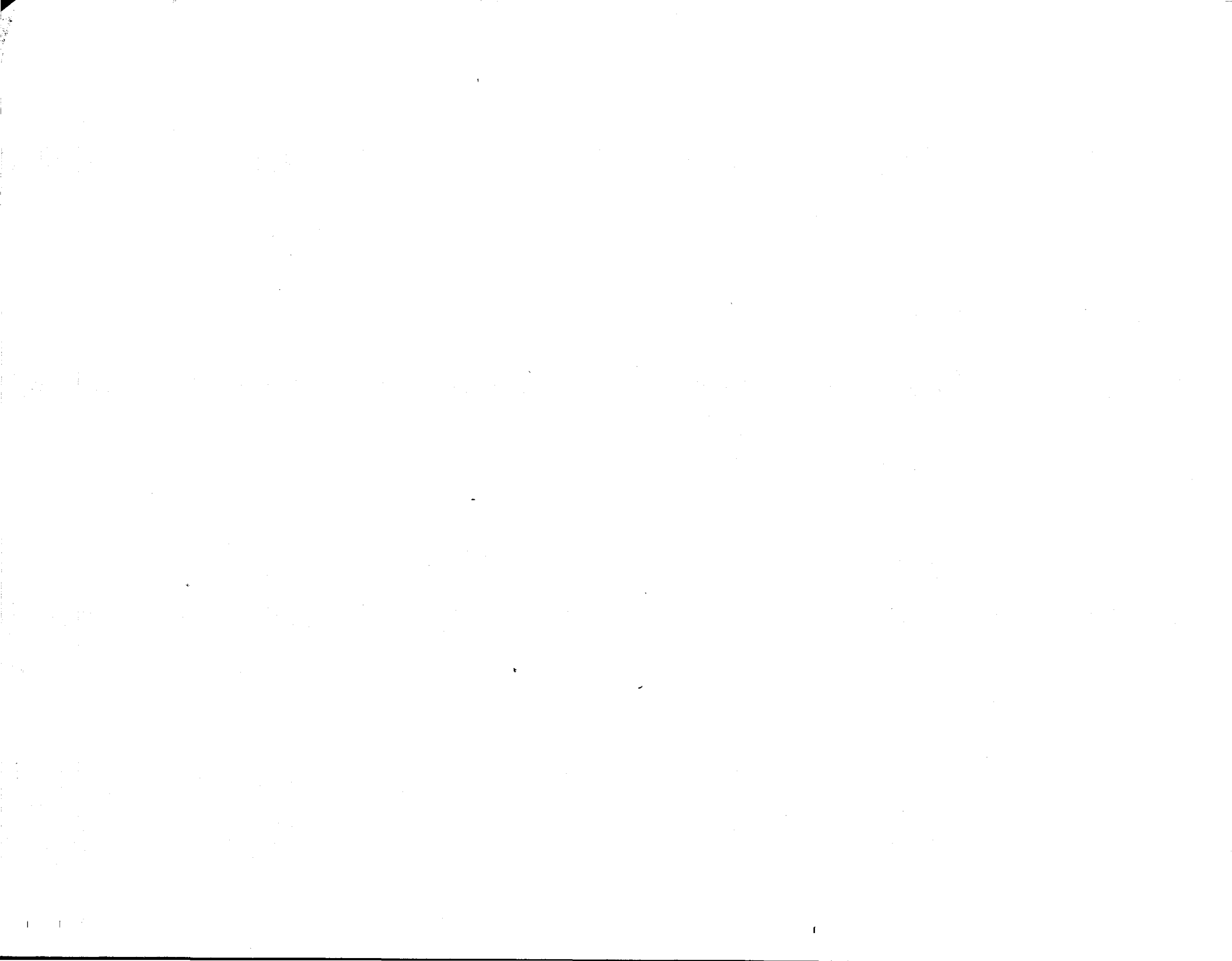
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LIST OF ACRONYMS

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.

Sheboygan River and Harbor - WKPLN
Section: Executive Summary
Revision No: 5
Date: 3/10/86

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) keep the local public informed of the project's status and take comments regarding the ultimate remedial actions (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 8.

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

SHEBOYGAN



Polynesian Productions
 Books 3.50/4.00
 North American 3.00/3.50

SOUNDINGS IN FEET

NOTES
PLANE OF REFERENCE OF THIS CHART (Low Water Datum) STLS R.
 Referenced to mean water level at Fairport (Pointe au Pelee), Quebec, International Great Lakes Datum (1985).
ADDS 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, Canadian Survey, and the U.S. Coast Guard.

CAUTION
 Temporary obstructions or details not shown on this chart should be reported to the U.S. Coast Guard Light List.

WARRANTY
 The prudent mariner will not rely solely on any single aid to navigation, particularly on bearing aids. See U.S. Coast Guard Light List and U.S. Coast Pilot 8 for details.

CAUTION
 Only marine submersibles have been tested for surface use. Limitations on the use of other submersibles are given in the U.S. Coast Pilot 8. For information on the use of submersibles, see U.S. Coast Pilot 8, Chapter 11, and the U.S. Coast Guard Light List and Sailing Directions.
 Hydrographic Survey, U.S. Coast Guard, Publication 117 (A) U.S.G.
 Hydrographic Survey, U.S. Coast Guard, Light List and Sailing Directions, U.S. Coast Pilot 8, and U.S. Coast Guard Light List and Sailing Directions, U.S. Coast Pilot 8.

POLLUTION REPORTS
 Report all spills of oil and hazardous substances to the National Pollution Discharge Elimination Act (NPDES) and to the nearest U.S. Coast Guard facility if telephone communication is impossible.
 24 HOURS: 1-800-424-2663

PUMP-OUT FACILITIES
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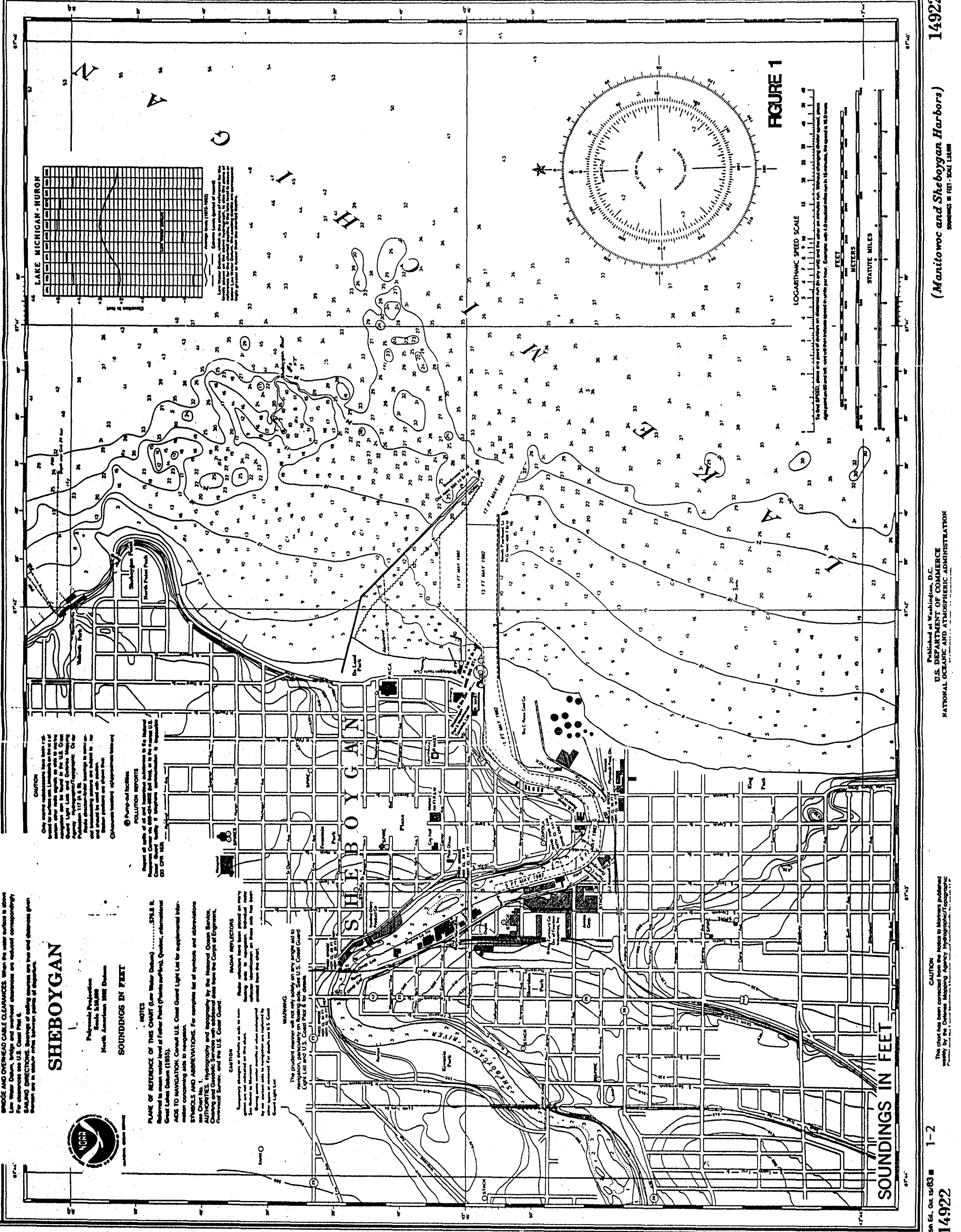
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are limited to the vicinity of the port. The Harbor is approximately 96 acres, and is formed by two breakwalls located immediately south of the River mouth and about 2000 feet north of the River mouth. The Army Corps had dredged the Sheboygan River 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 EPA's 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 cuestas 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

11

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.

Check for
this data.

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.

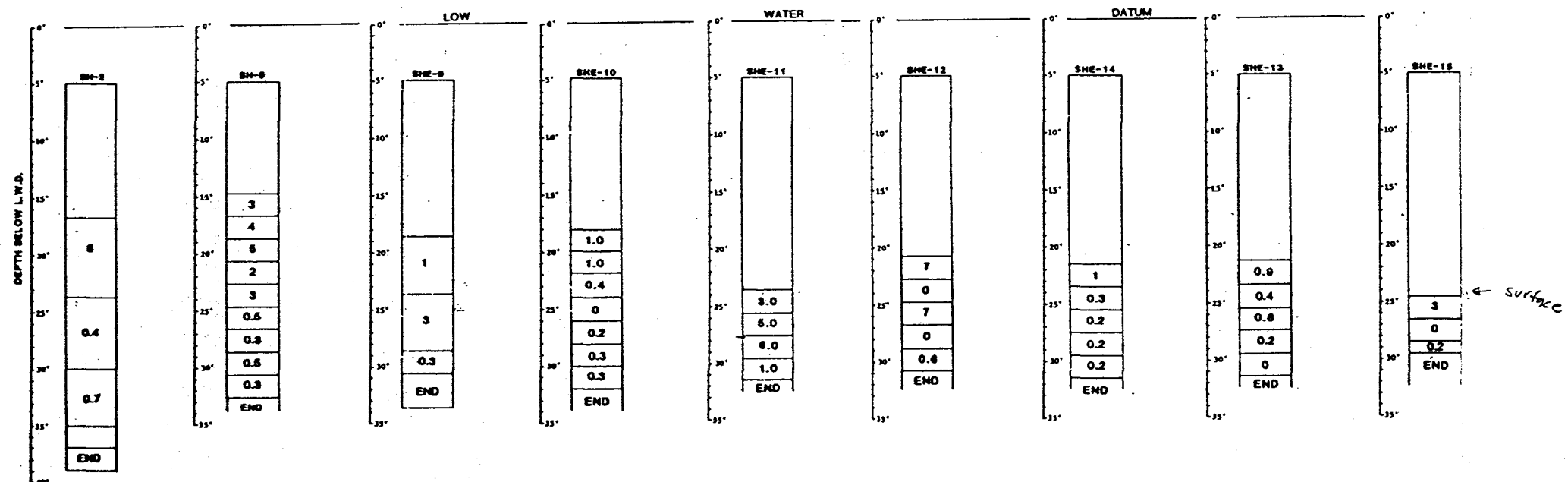
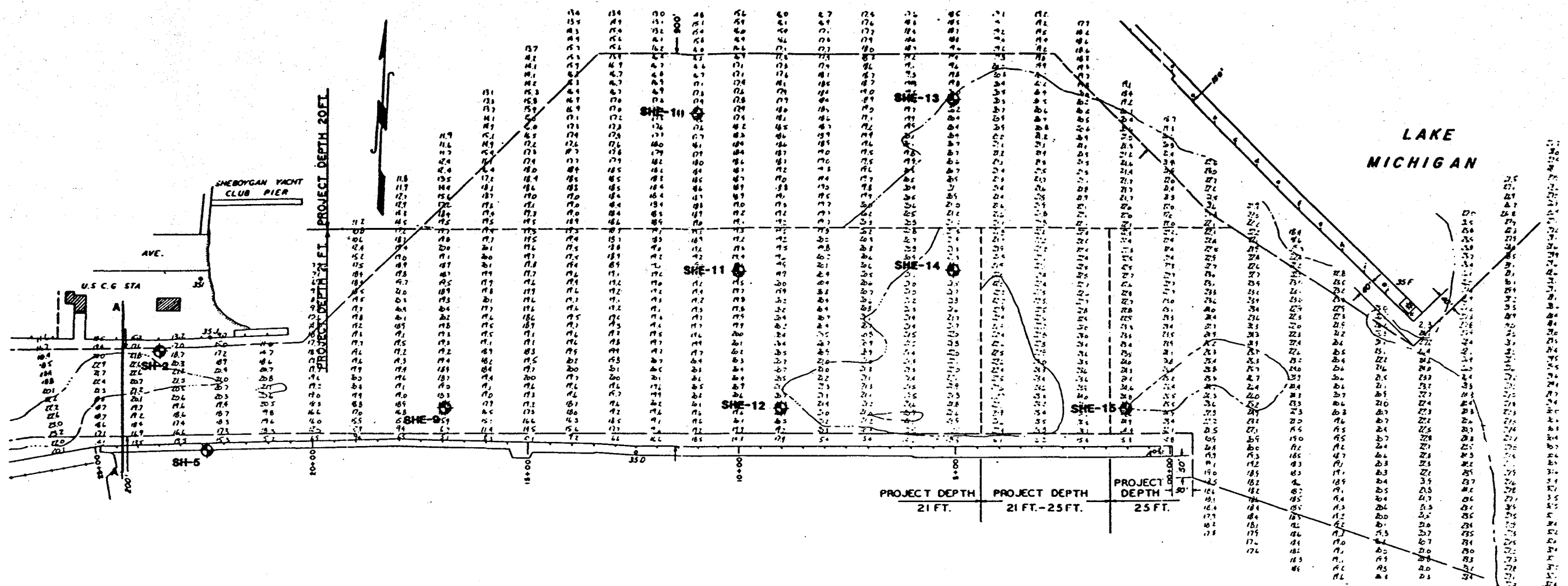
Investigation of 98 sediment profile samples collected from Sheboygan Harbor during December 2nd through 6th, 1982, show Harbor surficial sediments to be contaminated with PCBs. The possibility that these contaminated sediments may be classified as regulated materials has contributed to the impasse on 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



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

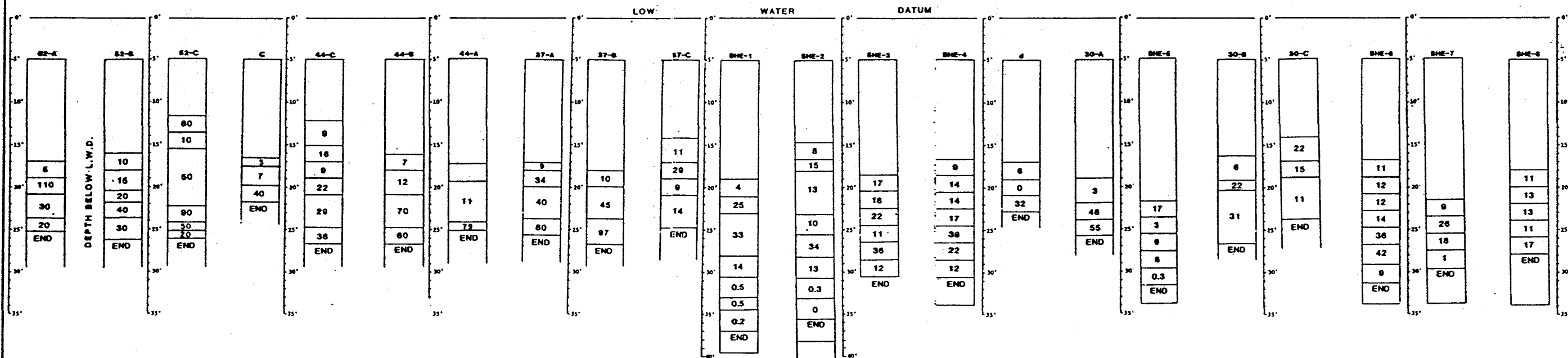
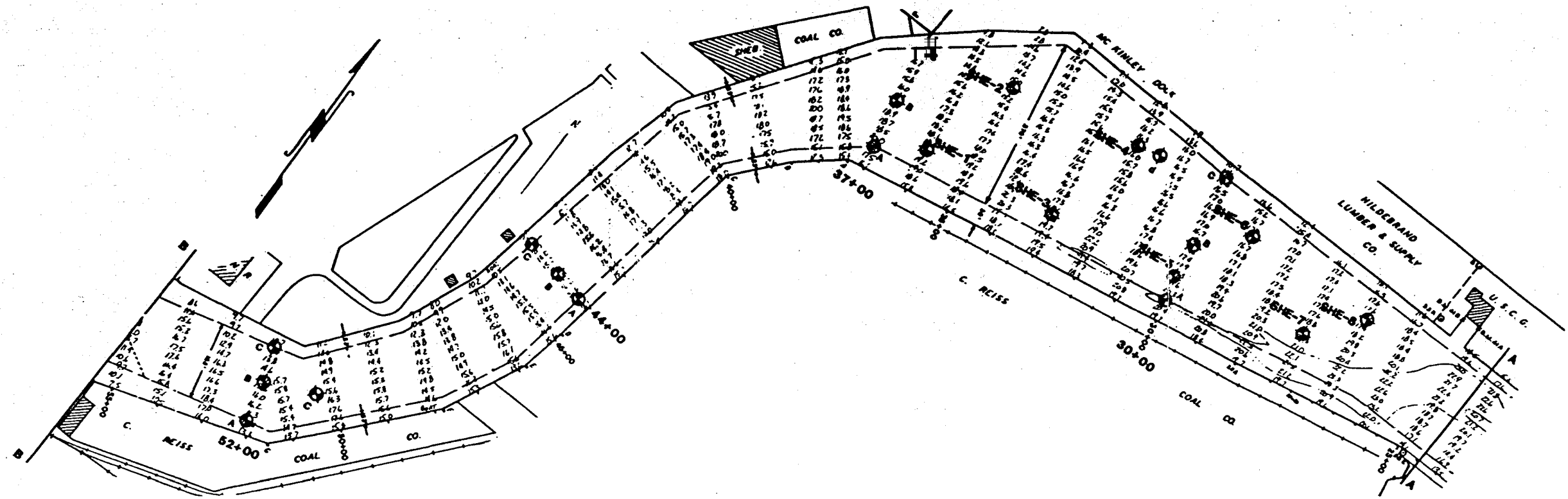
**SHEBOYGAN HARBOR,
 WISCONSIN**

PCB PROFILE

20 MARCH 1984

SCALE OF FEET

FIGURE 2



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.

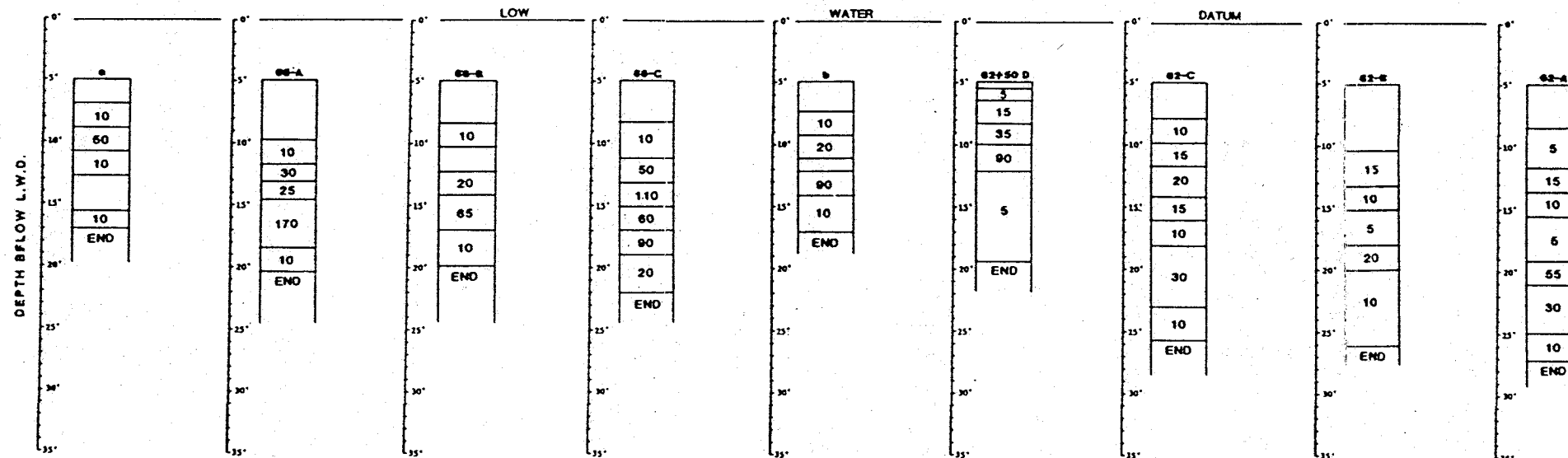
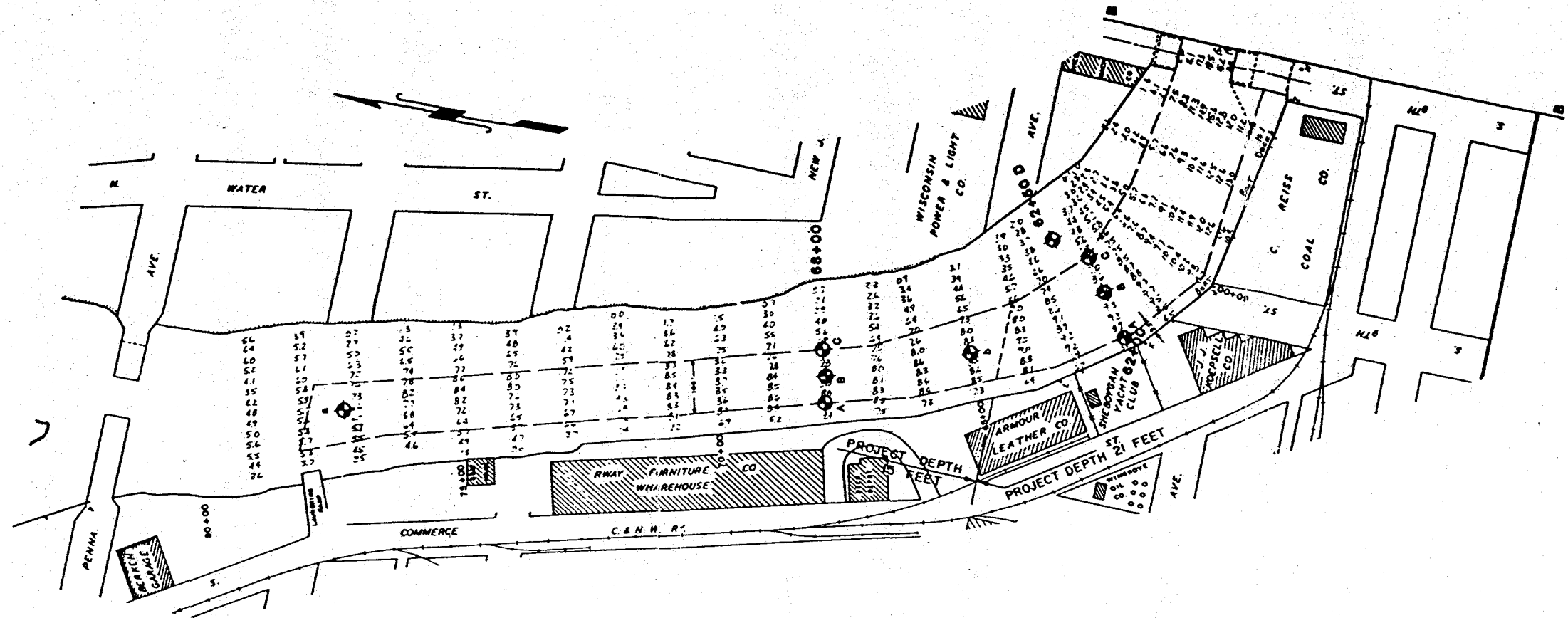
U.S. ARMY ENGINEER DISTRICT, DETROIT
 CORPS OF ENGINEERS
 DETROIT, MICHIGAN

SHEBOYGAN HARBOR,
 WISCONSIN

PCB PROFILE

20 MARCH 1984

SCALE OF FEET



UPPER HARBOR STATIONS

NOTE:
 1. BORING INFORMATION DATES:
 SHE - BORINGS 1962
 SH - BORINGS 1962
 OTHER BORINGS 1978
 2. BORING LOG UNITS ARE, PARTS PER MILLION.

FIGURE 4

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

SHEBOYGAN HARBOR,
 WISCONSIN

PCB PROFILE
 20 MARCH 1984

SCALE OF FEET
 0 100 200 300 400 500

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 significantly higher than the FDA Limits (2 ppm). 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

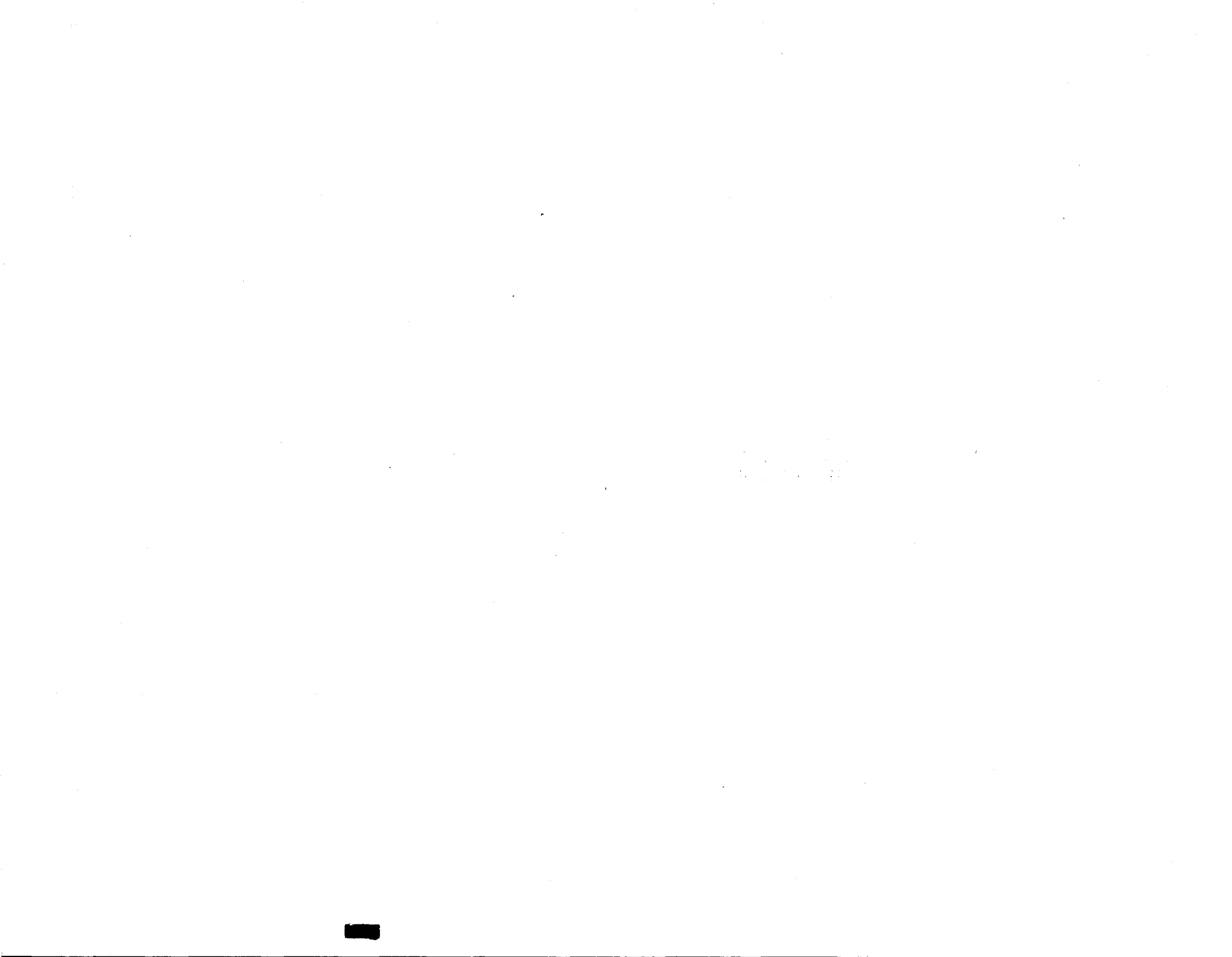
There are various avenues of contaminant migration throughout the terrestrial and aquatic ecosystem associated with the Sheboygan River and Harbor. Such pathways are ingestion of contaminated water, soils and sediment by animals, fowl and fish occupying the River and Harbor system. Surface runoff was 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 OPERABLE UNIT

No operable units have been performed regarding the contaminated region of the Sheboygan River and Harbor.





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.

The Sampling Plan described above will include a description of sampling locations (including depth of sample and parameters to be analyzed), sample collection protocols, and sample handling protocols. This Plan as well as all other Project Operations Plans will be submitted to the USEPA and WDNR in accordance with the Schedule presented in Section 5 for review and approval.

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:

- o Site access for initial phase of investigative work.
- o Site access for subsequent investigative work, e.g., drilling equipment, backhoe.
- o Contingency measures.
- o Location of on-site office/trailer.
- o Office/trailer security to prevent vandalism and trespassing for public protection.
- o Categorization of work areas.
- o Investigations and reporting of violations of health and safety rules.

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.

The QAPP will be consistent with the requirements of EPA's Contract Laboratory Program. The plan will include the scope of work, a schedule of tasks, and the intended data usage. The QAPP will identify sample types, sampling locations, sampling procedures, sample labeling, documentation, and sample custody procedures. Routine procedures for determining data accuracy, completeness, representativeness, and comparability will be discussed. The QAPP will recommend QA performance and system audits including the audit frequency. The QAPP will identify sampling packaging and shipping procedures, preventive maintenance and schedules for equipment, and the methodologies for conducting field analysis of samples. The QAPP will be revised as necessary to incorporate changes in procedures and scope of work.

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. This mechanism of QA/QC will ensure that all segments of the study are performed according to procedures specified in the Work Plan and supporting QAPP. 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 the Tecumseh Plant in 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:

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

- o U.S. and State Geological Survey publications and maps
- o 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:

- o Hydraulic characteristics of the River
- o Sediment characteristics, horizontal and vertical distribution of contaminants.
- o Sediment mobilization, diffusion and transport phenomena
- o Affinity of PCBs and other contaminants for a particular particle size of sediment
- o Contamination in the water mass
- o 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/CONTAMINANT TRANSPORT ASSESSMENT

The goals of the water column/contaminant transport assessment are as follows:

1. To identify contaminants in the water column which have solubilized, or suspended into the water column as a result of contact with contaminated sediments;
2. To identify the transport mechanism for contaminants in the water column, and the resultant areas of contaminant transport and deposition; and
3. To identify background water column contaminants which may be from sources other than the contaminated sediments.

A. WATER COLUMN SAMPLING AND ANALYSIS

1.0 General

Upon completion of the Sediment Sampling and Analysis Program, theoretical relationships will be prepared to estimate the soluble water column concentration of contaminants detected in the sediments. Data from similar projects will also be utilized, as appropriate, for comparison purposes. As confirmation of these estimates, samples of the water column will be obtained and analyzed as described below.

2.0 Selection of Sampling Locations and Sampling Frequency

Water column samples will be obtained under varying flow conditions to simulate low flow, average flow and high flow. This information will allow for recognition of a range of contaminant concentrations with respect to flow. Five sampling locations have been preliminarily identified. The sampling locations described herein may be subject to change pending the results of the Sediment Sampling Program. The locations presented below are the PRP's best estimate of the most appropriate locations to sample the water column at this time. The locations ultimately selected for sampling will be reviewed and approved by the EPA/WDNR prior to sampling.

The first four sampling locations will be selected to represent the "worst case" of water column contamination. It is expected that these locations will be upstream and downstream of each of the two dams on the River between Sheboygan Falls and Sheboygan. These locations should represent the

worst-case water column concentrations. It should be noted that the most upstream sampling point will be utilized to confirm the presence or absence of contaminants in the water column prior to contact with significant deposits of contaminated sediments.

The fifth sampling location will be at the outlet of the Sheboygan Harbor into Lake Michigan. The exact location of sampling will be within the main channel just inside the constraint of the two Harbor breakwalls.

To summarize, five sampling locations will each be sampled at three different flow events. A total of 15 water column samples will, therefore, be obtained for analysis as described below.

3.0 Analytical Efforts

Laboratory analysis will be performed as stated below:

- o Aroclor-specific PCBs and metals (all samples);
- o Other contaminants detected in the River Sediment Sampling Program (all samples)
- o TSS (all samples)
- o Soluble/Sediment Phase PCB and metals analysis (3 samples)
- o pH (three samples)
- o Temperature (three samples)
- o Hardness and total alkalinity (three samples)
- o Total dissolved oxygen (three samples)
- o Total ammonia (three samples)
- o Specific conductivity (three samples)
- o Secchi disk depth (three samples)
- o Total TKN (three samples)

In addition, flow and velocity measurements will be obtained at the time of each sampling event. Therefore, a total of fifteen flow/velocity profiles will be obtained.

B. ASSESSMENT OF TRANSPORT PHENOMENON

1.0 General

The three key hydraulic restrictions in the River system between Sheboygan Falls and Lake Michigan are believed to be the two dams described above, as well as the Harbor breakwalls. It is likely that behind these two dams and in the Harbor itself, the quiescent water flow will result in the settling of sediments. Resuspension of these sediments is likely to result in contaminant transport. This resuspension will be dependent upon River flow including both intensity and duration. To understand this phenomenon, the water column sampling and analysis presented above will be assessed with relationship to River flow and intensity. In this manner flow/contaminant transport will be assessed for each of the key restrictions within the River and Harbor system. This assessment will include definition of contaminant transport in the River system, as well as contaminant delivery rates to the Sheboygan Harbor. Using this information, a contaminant isopleth assessment will be performed to indicate any possible connection between the Sheboygan River/Harbor and the City of Sheboygan public water supply intake. ✓

If it is determined during the Sediment Sampling and Analysis Program that the hydraulics of the River and Harbor system are such that alternate locations are warranted for assessment, the five water column sampling locations identified above will be modified with the concurrence of the EPA/WDNR.

Upon completion of the Sediment Sampling Program, a simple mass balance calculation will also be performed for the air, water and sediment fractions to assess the validity of the assumption that the River sediments are the primary source of contaminants.

The information derived from the analysis of the key locations described above will be utilized in conjunction with the Sediment Sampling and Analysis Program and the mass balance calculations to assess overall conclusions regarding sediment deposition between Sheboygan Falls and Lake Michigan. It should be noted that the sediment depth information derived from the sampling program will be a "true" model of the River and Harbor system.

Specifically, this information represents the sediment transport history of the Sheboygan River during all historic flooding events and is therefore an accurate assessment of sediment transport.

4.1.2 FLOW MEASUREMENTS

The flow and velocity characteristics of the Sheboygan River will be obtained from existing sources including the USGS gaging station located on the River as well as the actual flow and velocity data collection activities described under Task 4.1.1.

4.1.3 BOTTOM SEDIMENTS

Extensive sediment sampling will be implemented in the Sheboygan River from the Sheboygan Falls Dam to the upper Harbor (North of Pennsylvania Avenue). Aerial photographs, topographic maps and field reconnaissance will be used in determining sampling locations. The exact number of sampling locations depends basically on the River configuration and identification of areas of sediment deposition. Specifically, these sampling locations will be identified by field personnel performing a probing program to identify areas of sediment deposition. In addition, a field survey will be conducted to determine those areas likely to promote sedimentation, such as oxbows, point bars, quiescent areas, and areas downstream of islands. The nine transects selected as sampling locations by CDM will be included if sediment deposition is confirmed at these locations.

Three types of areas have been identified as characteristic of the River bottom including:

1. "Shelves" of limestone;
2. Native glacial deposits; and
3. Quiescent areas of sediment deposition.

The Sediment Sampling Program will include sampling of between 100 and 200 sampling locations to identify the extent of sediment contamination within the



River. If unusual conditions exist (i.e., no sediments exist in the River), then the sediment sampling plan will be modified and reviewed with the EPA/WDNR prior to implementation.

To define the analytical requirements associated with the River sediment sampling program, several sediment samples (a total of 10) from "key" locations will be subject to standard priority pollutant analysis and total organic carbon (TOC) 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.

In addition to the laboratory analysis presented above, two samples of sediment will be split prior to analysis. The first half of each sample will be analyzed as described above, while the second half of each sample will be analyzed for chlorinated dibenzofurans. The detection limit to be utilized in the furan analysis will be designated as one (1) percent of the level of PCBs detected in the split of the samples. The sampling location for these samples will be proposed in the Sampling Plan, and will be subject to USEPA, and WDNR review and approval.

In addition to the above analyses, two sediment samples will be analyzed for dioxin as requested by the WDNR/EPA. The current concern level established by the Center of Disease Control (CDC) of 1.0 ppb will be utilized as the detection limit. Should this level be changed by the CDC during the Remedial Investigation work phase the revised level will be utilized. The sampling location for these samples will be proposed in the Sampling Plan, and will be subject to USEPA and WDNR review and approval.

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 twenty (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. Twenty (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.

It is proposed to utilize the WDNR data to perform an assessment of biological contamination, subject to approval by EPA Region 5 of the WDNR Laboratory Quality Control/Quality Assurance procedures.

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 AND TECHNICAL REPORTS

Each subtask will constitute a subsection of the Remedial Investigation/Enhanced Screening Report. Following performance of these activities and QC review, the findings will be submitted to the EPA and WDNR in a technical report for review and comment.

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.

20 ft from sediment
surface

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 undisturbed 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. To define the analytical requirements associated with the Harbor sediment sampling program, several sediment samples (a total of 5) from "key" locations will be subject to standard priority pollutant analysis and total organic carbon (TOC) analysis. Depending on the results of this analysis, the "contaminants of concern" will be identified and thereafter analyzed for in all sediment samples. At a minimum, sediment samples will be analyzed for aroclor-specific PCBs and heavy metals.

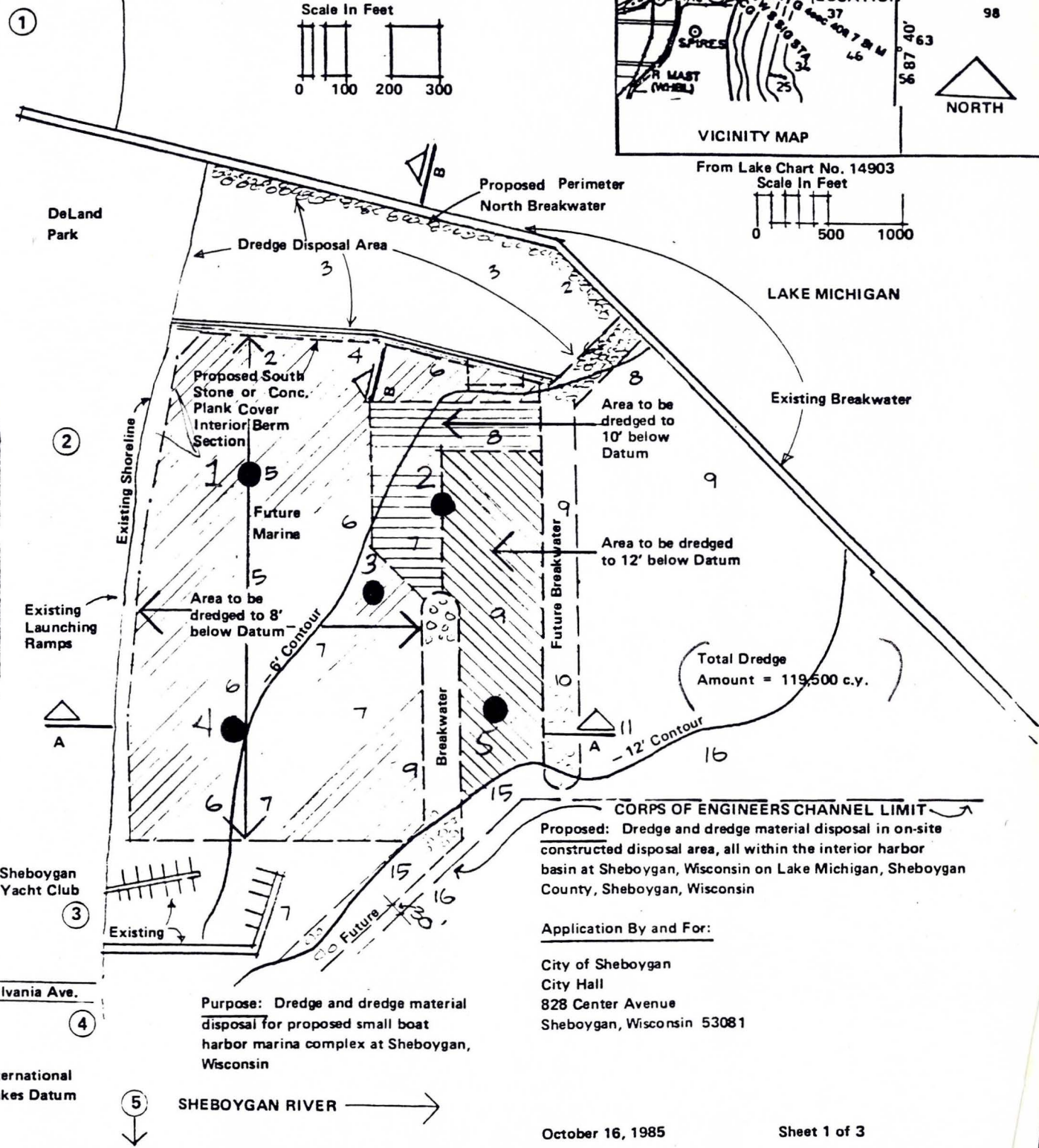
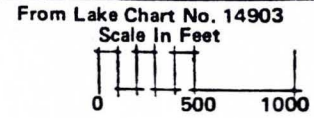
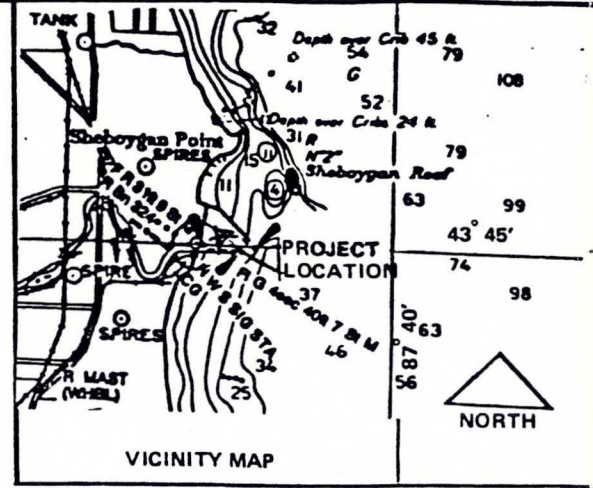
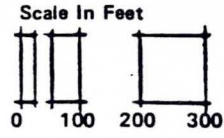
5+8
Core samples will be collected by a barge mounted drilling machine utilizing split spoon or an Osterberg piston corer to collect the samples. The sampling technique and equipment used will depend on the substrate. Soil logging will be performed on all sediment profile horizons. Particle size analysis will be performed on two samples from each boring (above and below designated navigational depth limits) to assist in characterization of sediment type. A total of forty samples will therefore be analyzed for particle size analysis. In addition, a total of twenty samples will be analyzed for Total Organic Carbon (TOC). All samples will be retained should other tests be warranted on a particular profile.

4.2.2 WATER COLUMN/CONTAMINANT TRANSPORT ASSESSMENT

Section 4.1.1 presents the Water Column/Contaminant Transport Assessment for both the River and Harbor. Refer to that section for appropriate task description.

Dots (•) indicate approximate locations of necessary sediment sample collection

All soundings are in feet and refer to
1955 International Great Lakes
Datum (IGLD) 576.8



Total Dredge Amount = 119,500 c.y.

CORPS OF ENGINEERS CHANNEL LIMIT
Proposed: Dredge and dredge material disposal in on-site constructed disposal area, all within the interior harbor basin at Sheboygan, Wisconsin on Lake Michigan, Sheboygan County, Sheboygan, Wisconsin

Application By and For:
City of Sheboygan
City Hall
828 Center Avenue
Sheboygan, Wisconsin 53081

Purpose: Dredge and dredge material disposal for proposed small boat harbor marina complex at Sheboygan, Wisconsin

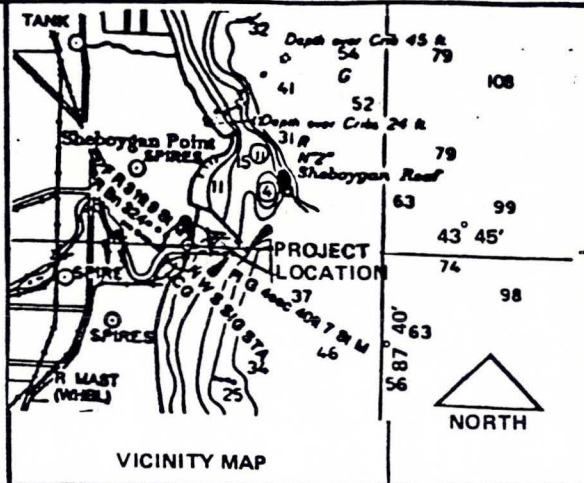
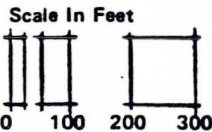
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1955 International Great Lakes Datum

October 16, 1985

Sheet 1 of 3

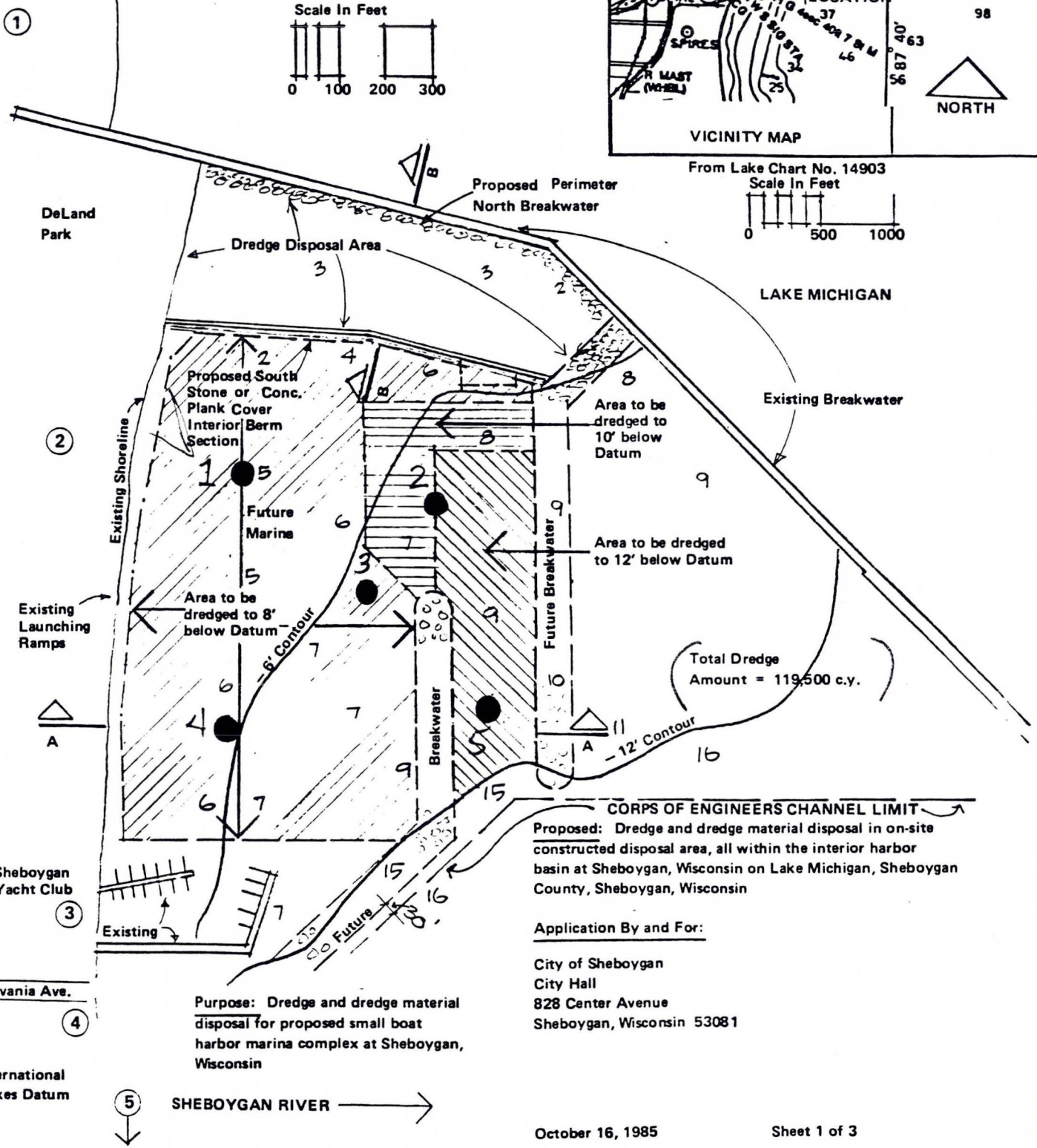
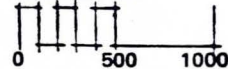
DOTS (•) indicate approximate locations of necessary sediment sample collection

All soundings are in feet and refer to 1955 International Great Lakes Datum (IGLD) 576.8



From Lake Chart No. 14903

Scale In Feet



Total Dredge Amount = 119,500 c.y.

CORPS OF ENGINEERS CHANNEL LIMIT
 Proposed: Dredge and dredge material disposal in on-site constructed disposal area, all within the interior harbor basin at Sheboygan, Wisconsin on Lake Michigan, Sheboygan County, Sheboygan, Wisconsin

Application By and For:
 City of Sheboygan
 City Hall
 828 Center Avenue
 Sheboygan, Wisconsin 53081

Purpose: Dredge and dredge material disposal for proposed small boat harbor marina complex at Sheboygan, Wisconsin

Datum:
 1955 International Great Lakes Datum

October 16, 1985

Sheet 1 of 3

Approved Methods for Analysis of Dredged Material

- 1) Wastewater analysis shall be performed in accordance with Chapter NR 219, Wis. Adm. Code "Analytical Test Methods and Procedures," supplemented where appropriate by proposed regulations at 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants" Federal Register, December 3, 1979, Pgs. 69464-69575.
- 2) Dredged Material Settling Test shall be performed in accordance with U.S. Army Corps of Engineers Technical Report DS-78-10, "Guidelines for Designing, Operating, and Managing Dredged Material Containment Areas," pages 25-28 and A1-A4.
- 3) Elutriate Test shall be performed in accordance with U.S. Army Corps of Engineers Miscellaneous Paper D-76-17, "Ecological Evaluation of Proposed Discharge of Dredged or Fill Material Into Navigable Waters," pages A1-A6.
- 4) Sediment sample collection and preservation for samples collected by dredge type samplers shall be performed in accordance with the above referenced C.O.E. paper D-76-17, pages D1 and D2. Core samples should be handled as addressed in U.S. Army Corps of Engineers Dredged Material Research Program, Technical Report D-77-24, "Aquatic Disposal Field Investigation Duwamish Waterway Disposal Site Puget Sound, Washington," Appendix D, Vol. 1, appendix B, pages B1 and 2.
- 5) Bulk Sediment Analysis shall be performed in accordance with U.S.-EPA Region V - Central Laboratory publication "Chemistry Laboratory Manual for Bottom Sediments and Elutriate Testing," NTIS document PB 294596/AS.
- 6) Pesticides in sediment shall be determined in accordance with "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples" document number EPA 600/8-80-038, and "Manual for Analytical Quality Control for Pesticides and Related Compounds in Human and Environmental Samples" document number EPA 600/1-79-008, both available from: U.S. Environmental Protection Agency
Health Effects Research Laboratory
Research Triangle Park, NC 17711.

* Spike & recovery

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 Sheboygan 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 AND TECHNICAL PAPERS

Each subtask will constitute a subsection of the Remedial Investigation/Enhanced Screening Report. Following performance of these activities and QC review, the findings will be submitted to the EPA and WDNR in a technical report for review and comment.

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 what data should be accepted or rejected based upon its reliability and accuracy necessary to make a determination or conclusion for a particular circumstance. The types of quality control checks will be established in the project specific QAPP and QA/QC Plan. A technical report will be submitted to EPA and WDNR describing project QA/QC status.

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. Total dredging of all contaminated sediment to background.
4. Dredging of Harbor sediments to a set regulatory limit, i.e., 50 mg/kg, the TSCA limit or another regulatory limit.



5. Dredging of River and Harbor sediment to a level which does not meet regulatory limits.
6. 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.

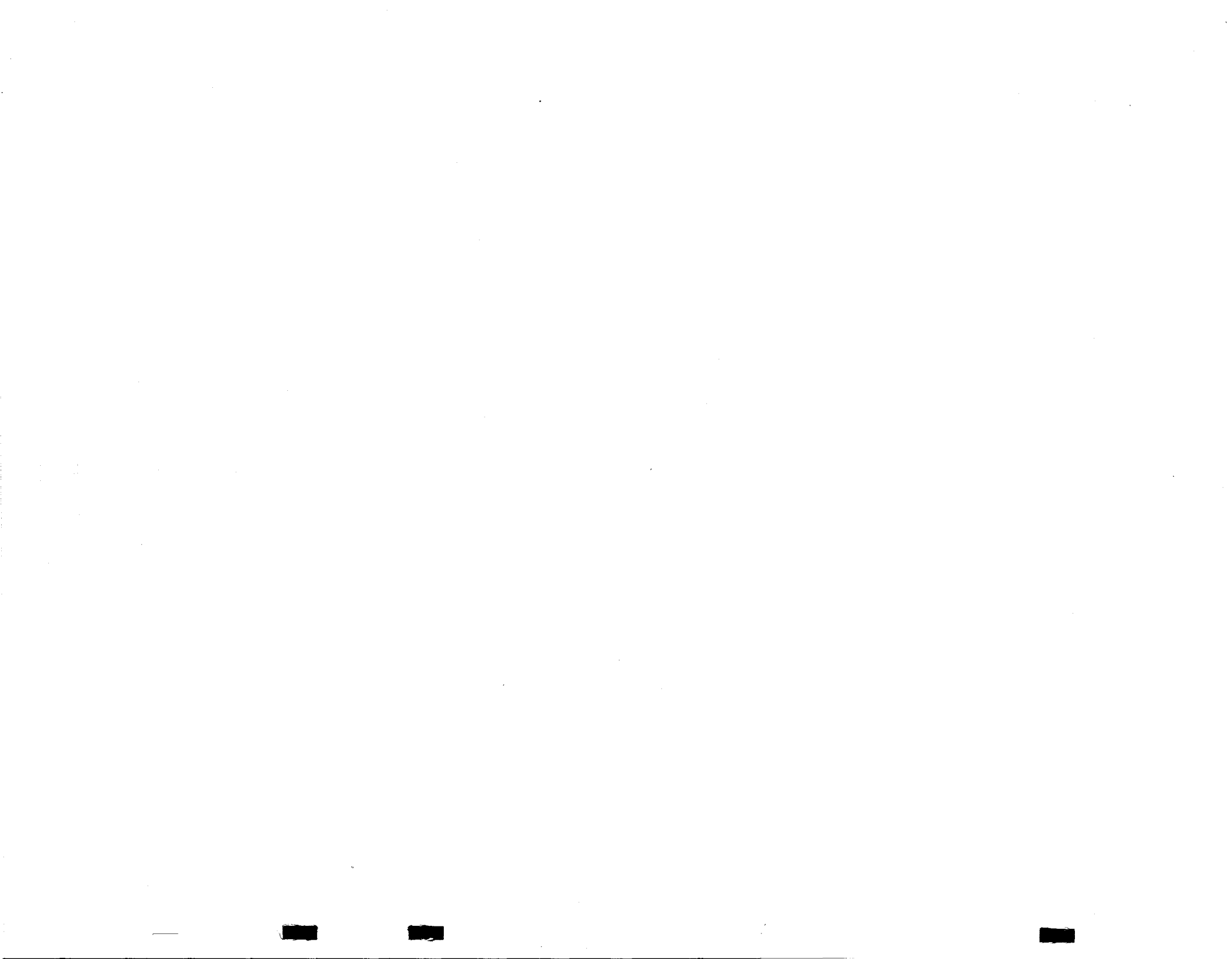
Techniques for drying of the dredge materials may or may not be a consideration, depending on the dredging technique used, the characteristics of the dredge spoils and the ultimate disposition of the materials. If the sediments are excavated subsequent to water diversion and in-place sediment dewatering,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

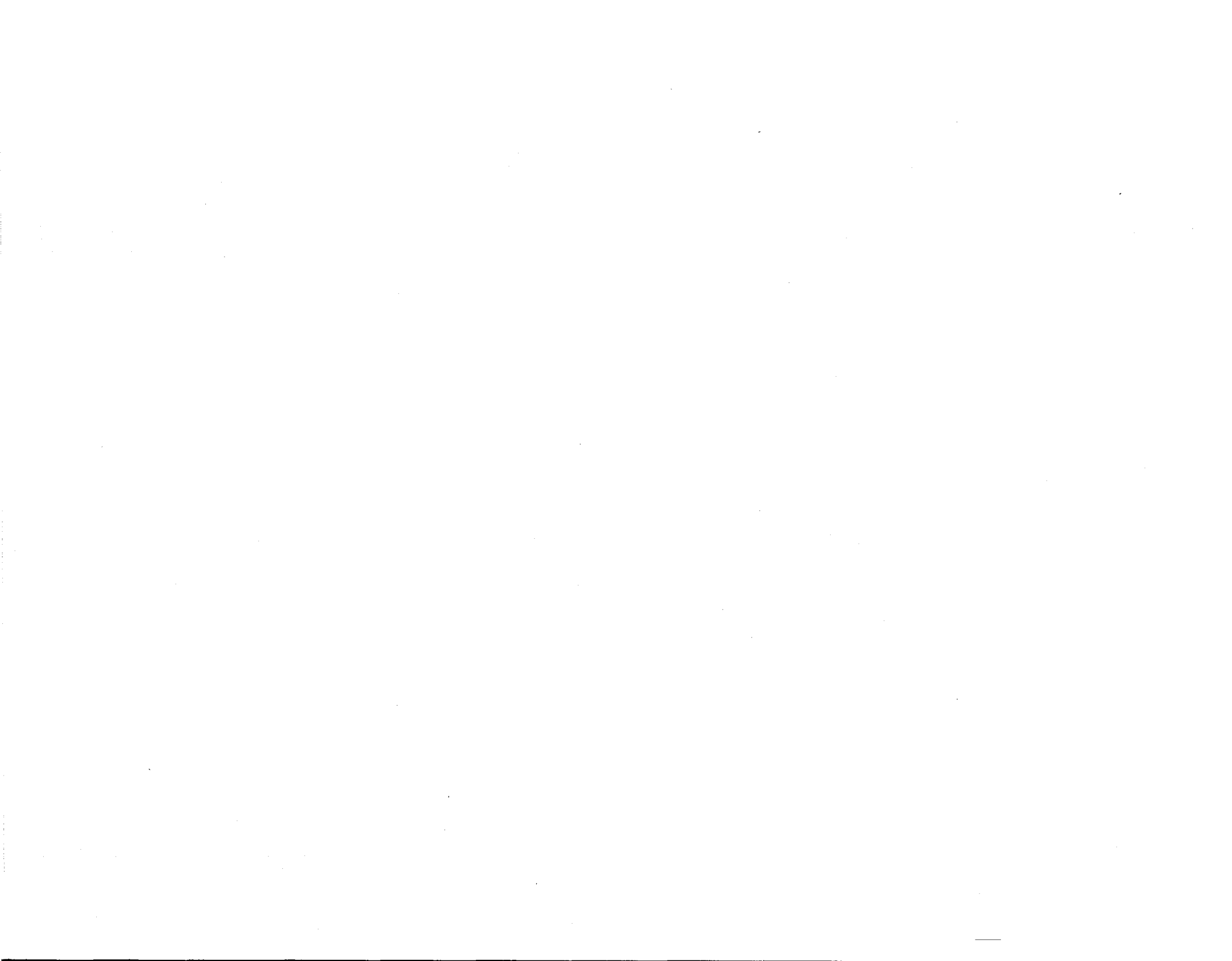
In conjunction with and/or in lieu of contaminated sediment removal and management for either the Harbor or River, management techniques may be implemented at the Sheboygan River and Harbor as remedial techniques. These management techniques may include but are not limited to:

- 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. 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 technologies as described above, the Enhanced Screening Process (ESP) will include the preliminary development of a number of alternatives which may be appropriate. It should be noted that impacts resulting from



various River remedial alternatives may affect the remediation efforts in the Harbor and vice versa. Although separate remedial alternatives will be defined for both the River and Harbor (including joint alternatives), the alternatives will be analyzed together. In this manner, the interrelationships of contaminant transport between the two will be recognized and will be included in the evaluation of all potential remedial actions.

10.1 FEASIBILITY SCREENING

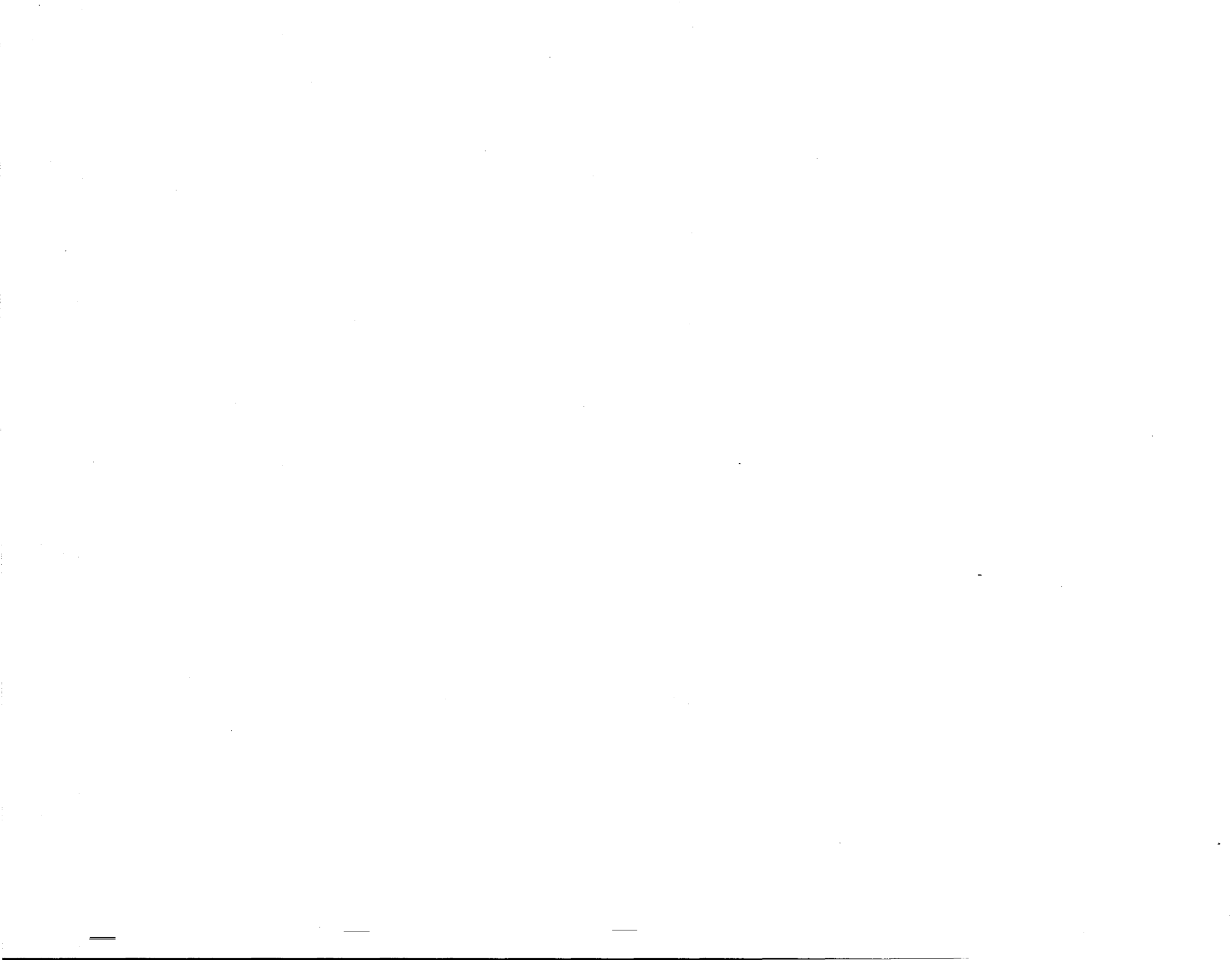
The screening of the alternatives deemed applicable for the Sheboygan River or the Sheboygan Harbor situation is required to eliminate inappropriate technologies from further consideration. This screening process will remove from further consideration those potential remedial alternatives that far exceed (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 institutional 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. The report shall be structured to enable the reader to cross reference with ease.

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 implemented by the USEPA. Documents including fact sheets, minutes of public meetings, responsiveness summary, etc. will be prepared by the PRPs 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.

Sheboygan River and Harbor - WKPLN
Section 3.0
Revision No: 4
Date: 11/18/85

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 Recommendation 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.

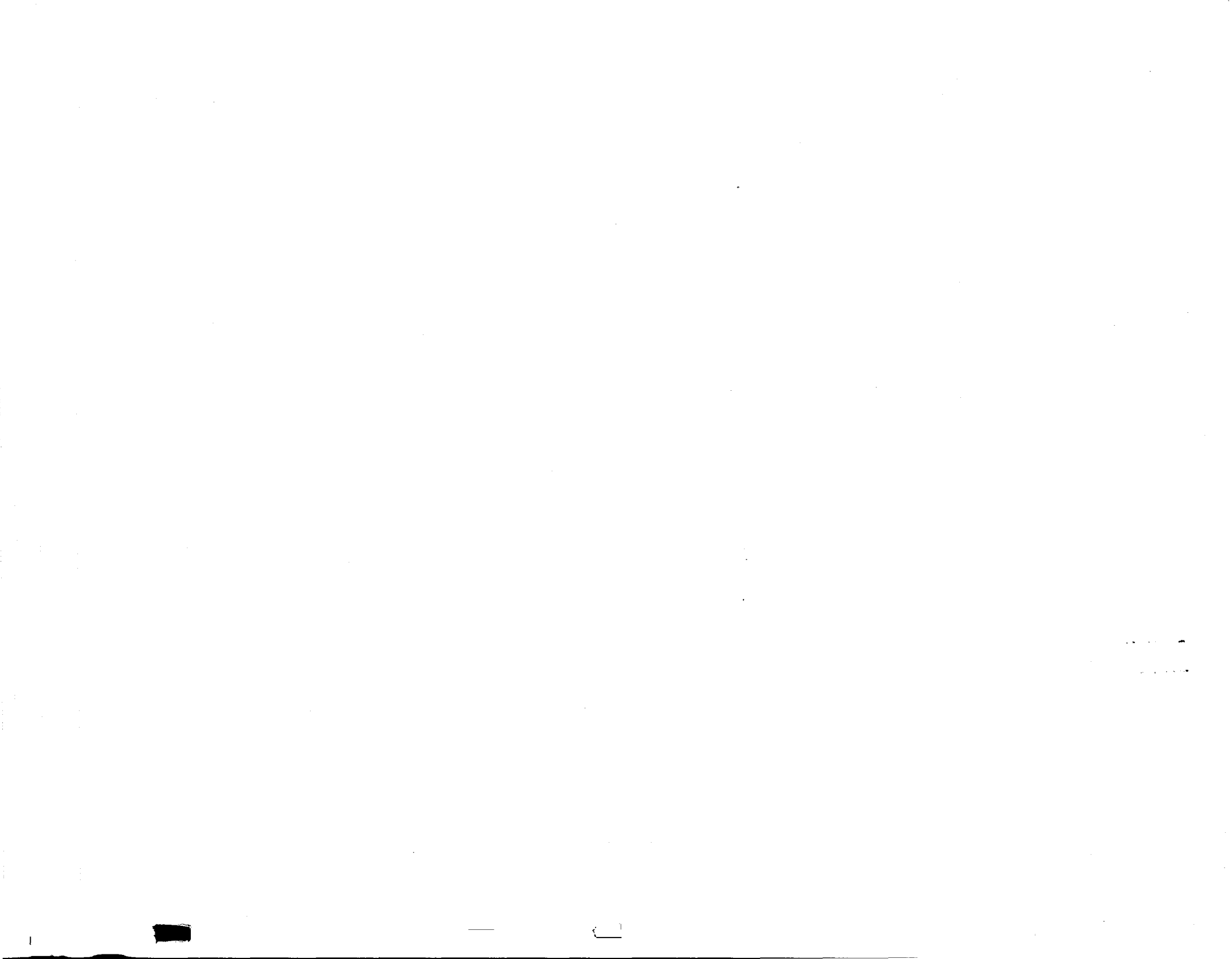
TASK 1.0 ALTERNATIVE - SPECIFIC REMEDIAL INVESTIGATIONS (ASRI)

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. Additional water column sampling and analysis;
2. Additional biological species sampling and analysis;
3. Additional flow and velocity monitoring;
4. Feasibility study testing;
 - a. Treatability studies
 - b. Pilot studies
 - c. Compatibility studies;

Ries



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;
8. Enhanced sedimentation study; and
9. Congener-specific PCB analysis. ✓

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

The appropriate Project Operations Plans will be modified as necessary to include the ASRI activities and will be resubmitted to the USEPA/WDNR for approvals.

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.



2.2 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.

2.3 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.

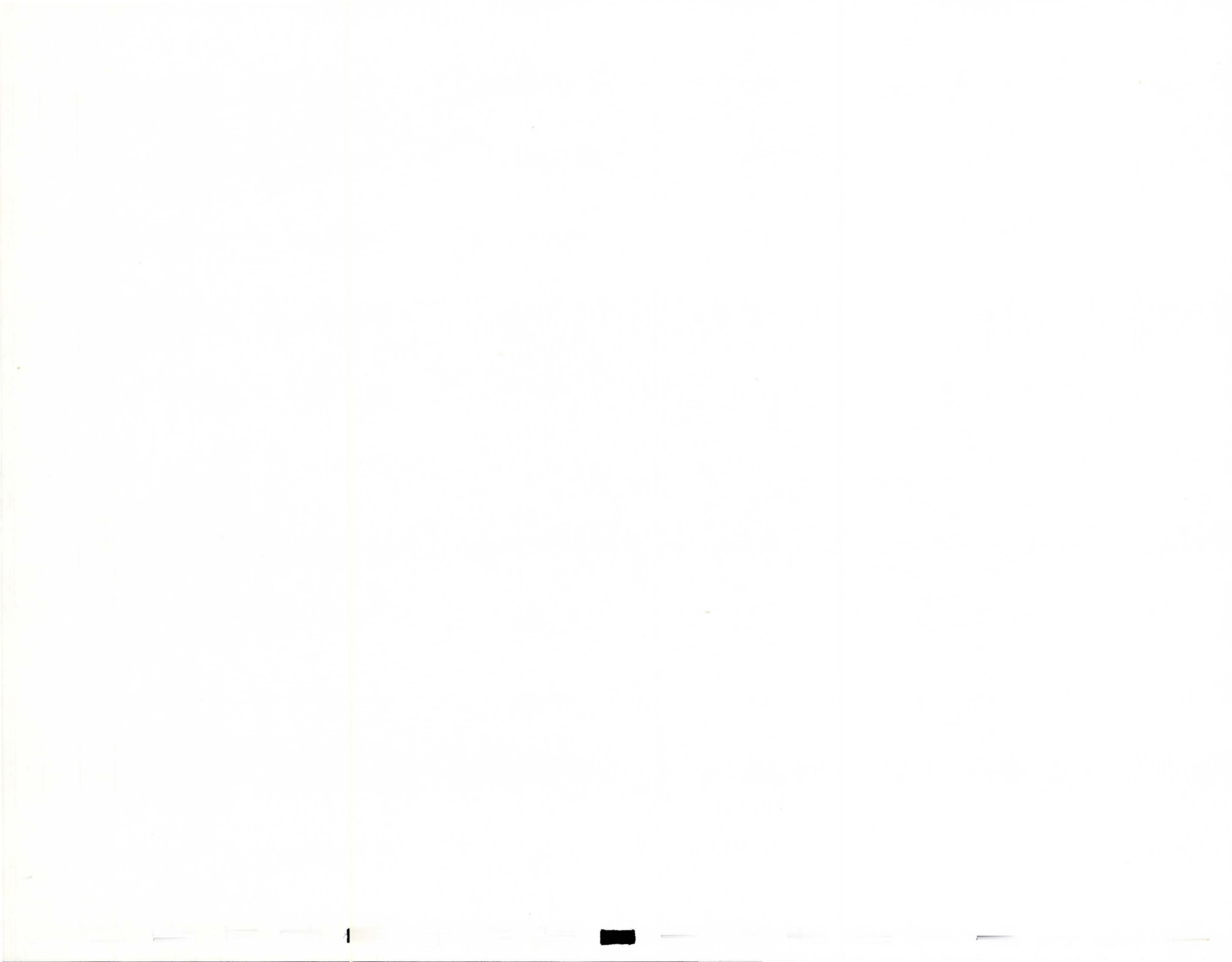
2.4 INSTITUTIONAL ANALYSIS

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.

2.5 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:

- o 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 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 protection of public health, welfare, and the environment:



3. It complies with relevant 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

EXECUTIVE SUMMARY

1.0 INTRODUCTION

- 1.1 Site Background Information
- 1.2 Nature and Extend of Problems
- 1.3 Objectives of Remedial Action

2.0 ALTERNATIVE - SPECIFIC REMEDIAL INVESTIGATIONS

- 2.1 Description of Work Efforts

3.0 REMEDIAL ACTION ALTERNATIVES

- 3.1 Alternative 1 (No Action)
- 3.2 Alternative 2
- 3.X Alternative X

4.0 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

- 4.1 Cost Analysis
- 4.2 Non-Cost Criteria Analysis
 - 4.2.1 Technical Feasibility
 - 4.2.2 Environmental Evaluation
 - 4.2.3 Institutional Requirements
- 4.3 Cost-Effectiveness Analysis
- 4.4 Public Health Analysis

5.0 RECOMMENDED REMEDIAL ACTION

REFERENCES

APPENDICES

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.

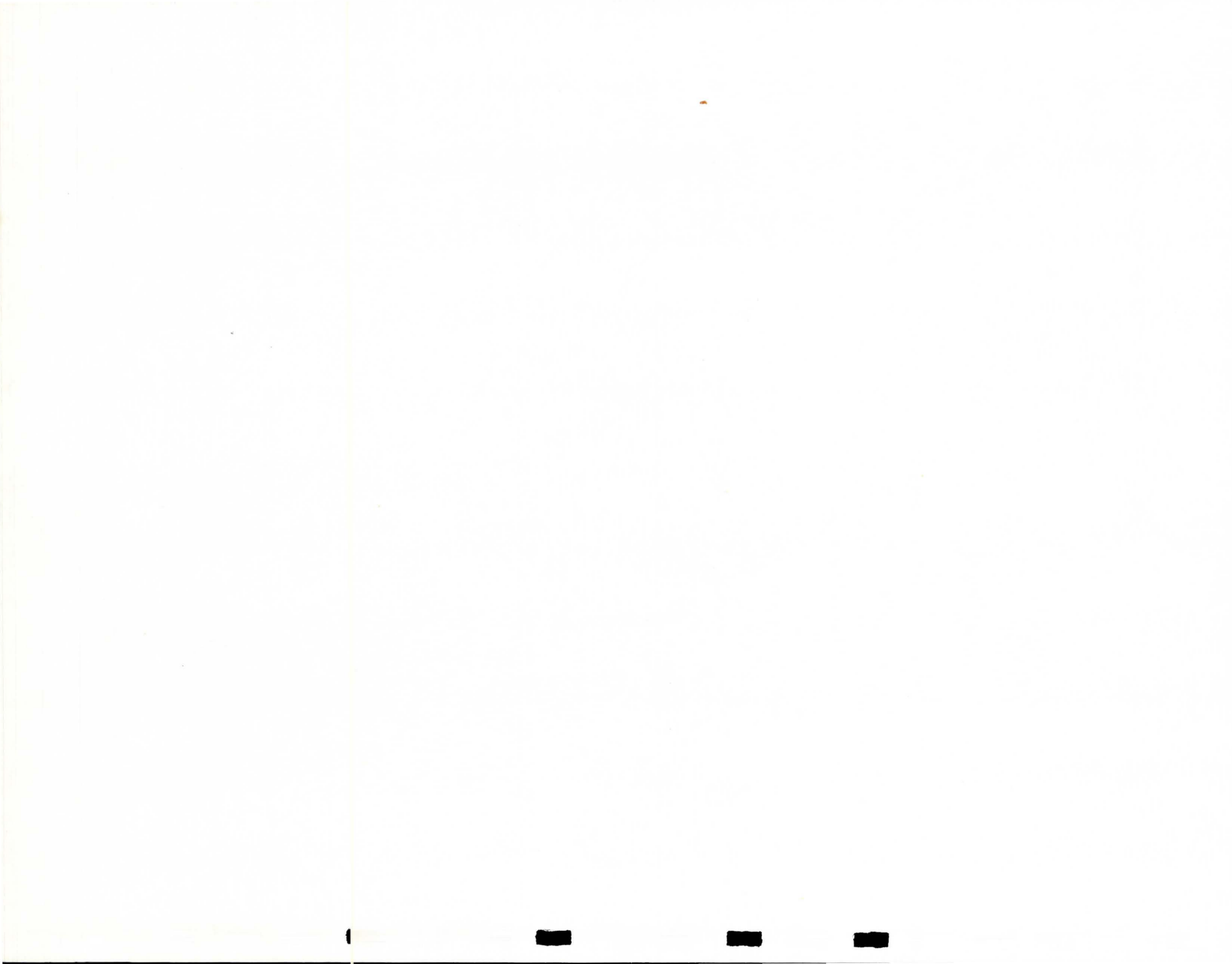
4.4 FINAL FEASIBILITY STUDY REPORT

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 made 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.

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

PRELIMINARY OUTLINE FOR PREDESIGN REPORT

<u>Section</u>	<u>Title</u>	<u>Topics</u>
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)

<u>Section</u>	<u>Title</u>	<u>Topics</u>
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.



Schedule

BLASLAND & BOUCK ENGINEERS, P.C.

Sheboygan River and Harobr - WKPLN

Section 5.0

Revision No: 5

Date: 3/10/86

5.0 SCHEDULE

SHEBOYGAN RIVER AND HARBOR
REMEDIAL INVESTIGATION / FEASIBILITY STUDY
PROJECT SCHEDULE

Set:
90

57

62

Work Activity	1986												1987				
	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APRIL	MAY
A. Remedial Investigation/Enhanced Screening																	
1. Project Operations Plans	—————			*													
2. Remedial Investigation				—————													
3. Enhanced Screening				—————													
4. Remedial Investigation/Enhanced Screening Report				—————				*									
5. Public Meetings				—————													
B. Feasibility Study																	
1. Project Operations Plans								*	—————								
2. Alternative-Specific Remedial Investigation (Assumed 2 months)									—————								
3. Detailed Analysis of Alternatives									—————								
4. Comparative Evaluation of Acceptable Alternatives									—————								
5. Draft Feasibility Study Report									—————							*	
6. Public Hearing									—————								
7. Revised Draft Feasibility Study Report									—————								
8. Pre-design Report									—————								

* - SUBMITTAL TO EPA AND WDNR

3/10/86

Additional Submittals

Approx. Schedule

- | | |
|--------------------------------------|------------------|
| 1. RI/ES Final Report (if necessary) | Sept., 1986 |
| 2. Pre-design Report (if necessary) | June, 1987 |
| 3. Site Map/Topographic Map | May, 1986 |
| 4. River Program Technical Report | June, 1986 |
| 5. Harbor Program Technical Report | June, 1986 |
| 6. Endangerment Assessment | Nov., 1986 |
| 7. QA/QC Status Report | June, 1986 |
| 8. ASRI Technical Reports | Sept.-Oct., 1986 |

