PRS Pollution Risk Services

Foth & Van Dyke

Sheboygan River and Harbor Superfund Site
Upper River – Phase II
Sediment Removal Design

Narrative

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Upper River – Phase II
Sediment Removal Design

Narrative

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services
Foth & Van Dyke

March, 2006

Sediment Removal Design
Executive Summary

Tecumseh Products Company (TPC) and its predecessors manufactured aluminum castings for engines, compressors and pumps at their facility adjacent to the Sheboygan River, in Sheboygan Falls, Wisconsin. TPC is considered a Responsible Party (RP) because polychlorinated biphenyls (PCBs) were found in sewer lines that led to the river from TPC and in hydraulic oils used by TPC in the manufacturing process. This Sediment Removal Design of the Upper Sheboygan River is developed by Foth & Van Dyke (FVD) and Pollution Risk Services (PRS), with input from Wisconsin Department of Natural Resources (WDNR), and the United States Environmental Protection Agency (USEPA) to detail the PCB impacted sediment removal locations, general approach, and performance.

The objectives of the Sediment Removal Design are to remove PCBs from the Upper Sheboygan River to protect human health and minimize environmental impacts. Three PCB impacted sediment areas are identified in the various controlling documents and orders from regulatory agencies. The sediment locations are the Near-Shore Sediment, Armored Areas, and Soft Sediment Deposits.

Sediment will be removed during the construction season of 2006 in two manners. Sediment areas that are proximate to the former TPC property, Near-Shore and Armored Areas, will be removed with excavation equipment, after the areas are de-watered. The Soft Sediment Deposits will be removed with a floating hydraulic dredge with the sediment and water pumped and separated at the former TPC site (Site). Activities associated with the equipment sizing and operations will be found in a subsequent document called, the Remedial Action Work Plan (RAWP). The RAWP will be developed in conjunction with the selected contractor(s) for the 2006 work and will include additional construction plans and detail.

Contents

Tables

Calculations

Drawings

Appendices

1 Introduction

This document is the culmination of the *95% Basis of Design* (Nov. 2005) and comments from the United States Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), and CH2MHill regarding the 95% Basis of Design. This Sediment Removal Design is intended to satisfy the Remedial Action Objectives listed in the *Record of Decision* (ROD), (May 2000). The three primary remediation objectives are identified in Section 3.

The Sediment Removal Design is consistent with the decisions and agreements presented in the *ROD, Consent Decree* (CD), (May 2003) and the *Upper River Statement of Work* (URSOW), (Jan 2003 rev). The remedial investigation summaries, design plans, calculations, and drawings represented in this document shall demonstrate that the selected remedy for sediment removal will meet the objectives of the *ROD*, *CD* and the *URSOW*.

Near-Shore Sediment removal was identified in the above mentioned documents as an "*URSOW Phase I*" activity; whereas, Armored Areas' Sediment and Soft Sediment Deposits were identified as "*URSOW Phase II*" activities. This design addresses Phase II activities, which will include the Near-Shore Sediments. After the PCB impacted sediment is removed, Floodplain soil, as identified in the prior consent order, will be addressed with a separate design and remediation plan. The design basis and remedial construction methods for the floodplains are deferred pending the outcome of additional discussions between USEPA, WDNR, PRS and the property owners (Kohler Company) of the potentially impacted Floodplains.

1.1 Previous Documents and Submittals

This document has been developed from data and information contained in previously submitted documents. These documents are as follows:

Blasland, Bouck & Lee, Inc. *Remedial Investigation/Enhanced Screening Report, Sheboygan River and Harbor*. May 1990.

Blasland, Bouck & Lee, Inc. *Construction Documentation Report, Sheboygan River and Harbor*. January 1991.

Blasland, Bouck, Lee, Inc. *Alternative Specific Remedial Investigation Report, Sheboygan River and Harbor (ASRI)*. October 1995.

Blasland, Bouck, Lee, Inc. *Feasibility Study (FS) Report, Sheboygan River and Harbor Superfund Site*. April 1998.

Blasland, Bouck, Lee, Inc. *External Source Assessment (ESA)*. November 1999.

Pollution Risk Services, LLC. *Pre-Design Investigation Results*. April 2005

Pollution Risk Services, LLC and Foth & Van Dyke. 95% *Basis of Design (Volume I and II)*. November 2005.

Pollution Risk Services, LLC, and Foth & Van Dyke. *Phase I Completion Report.* September 2005

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River.* May 2004.

United States Environmental Protection Agency. *EPA Superfund Record of Decision.* May 2000.

United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site.* January 2003 (revised).

2 Site Background and History

After PCBs were identified in the Sheboygan River, the USEPA determined that the uppermost river source was the Tecumseh Products Company (TPC) facility (Site). Pursuant to "Section 105" of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), the USEPA placed the Site on the National Priorities List (NPL) by publication in the Federal Register on May 21, 1986. In response to a release or a substantial threat of a release of one or more hazardous substances from the Site, Tecumseh Products Company commenced in May 1987, a Remedial Investigation and Feasibility Study (RI/FS).

In 1989 and 1990, USEPA requested Tecumseh to remove about 5,000 cubic yards of contaminated sediment. This sediment was stored in two containment facilities at Tecumseh's plant. In addition, approximately 1,200 square yards of contaminated sediment were capped or "armored" in place to prevent contaminants in the sediment from entering the river. These remediation locations thereafter became known as the Armored Areas.

Follow up investigation was performed from 1997-1999 to the initial work performed in 1989 and 1990. The documentation of the 97-99 work was published and is known as the *External Source Assessment* (Nov. 1999). In July 1999, USEPA published the proposed plan for remedial action and provided an opportunity for written and oral comments from the public. The decision by the USEPA on the remedial action to be implemented at the Site was embodied in a final *Record of Decision* (ROD) that was executed on May 12, 2000.

On March 25, 2003, Tecumseh and Pollution Risk Services, LLC (PRS) entered into a "Liability Transfer and Assumption Agreement" under which PRS assumed obligations to perform any and all activities associated with the environmental conditions of the Site, including additional investigations and remediation for the Upper River under the original *Consent Decree* lodged May 7, 2003.

In 2004, PRS performed Phase I source removal remedial activities at the Site and re-characterized the Upper River to determine the pre-removal conditions for this Sediment Removal Design. This Upper River Sediment Removal Design is the foundation of the sediment removal activities to be completed, upon document approval by the agencies, in 2006.

3 Remedial Objectives and Selected Remedy

The ROD, Consent Decree, and Upper River Statement of Work present the remedial objectives for the Upper River. In effect, these documents require the Near-Shore Sediment be removed when found and that the other sediments (Armored Areas and Soft Sediment Deposits) be removed such that the performance criteria are met, as discussed below. Although there was a *phasing* expectation in the *URSOW* with regard to the timing of Near-Shore Sediment removal relative to the other removals, all Upper Sheboygan River sediment is addressed in this document and will be removed during activities of 2006.

3.1 Upper River Sediment Remediation Objectives

3.1.1 Near-Shore Sediment

The Near-Shore Sediment remedial objective is as follows:

Identify and remove sediment from all Near-Shore Sediment ”Segments”. The performance of this remediation will be consistent with the performance of other sediment (Armored Areas and Soft Sediment Deposits) removal activities.

3.1.2 Armored Areas’ and Soft Sediment Deposits

The Armored Areas and Soft Sediment remedial objectives are to remove no less than 88% of the PCB mass and to achieve a surface weighted average concentration of 0.5 ppm PCBs or less over time. The specific terms quoted from the *ROD*, are as follow:

“Protect human health and the environment from imminent and substantial endangerment due to PCBs attributed to the Site.

To achieve this remediation objective, PCB-contaminated soft sediment will be removed so that the entire river will reach an average PCB sediment concentration of 0.5 ppm or less over time. An average PCB sediment concentration of 0.5 ppm results in an excess human health carcinogenic risk of 1.0 x 10^{-4}*, or less over time, through the consumption of PCB-contaminated fish.*

Based on site specific biota to sediment accumulation factors, the corresponding PCB tissue levels for resident fish are:

Sport Fish				
Small Mouth Bass:	*0.31 ppm,*	*Walleye:*	*0.63 ppm,*	*Trout: 0.09 ppm*
Bottom Feeders				
Carp:	*2.58 ppm*	*Catfish:*	*2.53 ppm*	

Achievement of the soft sediment concentration and fish tissue concentrations, over time, will be reevaluated every five years after completion of the remedy.

Reaching the river sediment objective of a 0.5 ppm average PCB concentration requires different approaches for the Upper, Middle, and Lower River, and the Inner Harbor because of the way *sediment is distributed and whether the contaminated sediment is considered mobile given the dynamics of that specific river component.*

Mitigate potential PCB sources to the Sheboygan River/Harbor system and reduce PCB transport within the river system.

As mentioned previously, additional investigations will occur to determine the effects of PCB-contaminated groundwater or possible additional PCB sources from Tecumseh's Sheboygan Falls plant. In addition, because of the dynamic nature of the Upper River and Middle River segments of the Sheboygan River, PCB-contaminated soft sediment deposits will be removed to achieve an average soft sediment deposit SWAC of 0.5 ppm. This includes PCB mass removal of 88% in the Upper River.

Remove and dispose of Confined Treatment Facility (CTF)/Sediment Management Facility (SMF) sediments and previously armored/capped PCB-contaminated soft sediment deposits.

The CTF and SMF were not designed to be permanent structures. As part of the remediation of the site, sediments in the CTF and SMF will be disposed of in a WDNR approved off-site landfill. In doing so, this action will reduce the long-term management and maintenance requirements for the site. In addition, because recent information collected by Tecumseh indicates that there may be continuing discharges of PCBs from Area 1 and because of concerns about the effectiveness of all of the previously armored/capped soft sediment deposits, the armored/capped sediment deposits, including Area 1, will be removed." (Note: Sediments in the CTF and SMF were removed and transported to an approved landfill in 2001).

3.1.3 Technical Impracticability Modification of Performance Standards

This Sediment Removal Design presents a remedial action plan which intends to remove Soft Sediments to the extent practicable given characteristics of the Upper River and dredging removal technologies. Given the PCB mass and SWAC discussion presented in subsequent sections, it is possible that post-dredge conditions may require a technical impractability modification. The *CD* addressed this situation through the following manner:

For purposed of this Consent Decree and the Upper River Work, the Settling Defendant may petition EPA to modify the 88% PCB mass removal or 0.5 ppm surface weighted average PCB concentrations (SWAC) Performance Standards contained in the Upper River sections of the ROD and URSOW. Settling Defendant's petition shall include: (a) identification of the Performance Standard for which a modification is sought; (b) a detailed justification setting forth the technical basis for the claim that is technically impracticable to achieve the Performance Standard through soft sediment dredging, based on data from the Upper River Work and any other relevant information; (c) a proposed alternative Performance Standard; and (d) a demonstration that the Upper River Work and/or any alternative cleanup standards at the Site, together with any additional response actions taken or proposed to be taken by Settling Defendant in the petition, will attain overall protection of human health and the environment and the other Performance Standards in the Upper River sections of the ROD and URSOW.

Pursuant to the URSOW, dredging of each deposit will proceed until any of the following goals are met:

Removal of a Soft Sediment deposit will be deemed complete when 3 to 4 inches (or less), on average, of residual sediment remains in the deposit as determined by sediment probing after dredging, or after three passes with conventional dredging equipment (or an equivalent level of effort with alternative dredging equipment), whichever goal is achieved first.

If USEPA determines that achieving these goals in a particular Soft Sediment deposit or set of deposits is impracticable or undesirable, USEPA may deem sediment removal complete when more than 3-4 inches of residual material or more remains in the deposit or fewer than three dredge passes have occurred. After consultation with USEPA, PRS may elect to conduct more than three dredging passes in an attempt to achieve a residual sediment level of less than 3-4 inches.

4 Design Basis

The design basis is the foundation of the sediment removal activities. The design basis is the measurements and calculation of the PCB mass in the Upper River sediments; a consideration of the river's flow as well as legal access issues to the sediment locations; a conclusion by sediment location as to wet or dry removal technique; and a discussion to complete more sediment /PCB mass removal, above the minimum standards, and the positive repercussions for doing so.

4.1 Measurements and Calculation of the Volume and PCB Mass in the Upper River Sediments

PCB Mass is calculated by considering the volume, PCB concentration and dry weight of any sediment location. Calculations which support the volume and PCB mass estimates are provided in the Calculation section of this document.

4.1.1 Near-Shore Sediment

The Near-Shore Sediment may be found in the bank or river bed adjacent to the shoreline of the former Tecumseh plant, along the north side of the Sheboygan River. Near-Shore Sediment was found during the sampling event described in the *External Source Assessment* (ESA). As a result of the above report, this Design assigns a "Segment" location corresponding to the found sediment of the ESA. "Segment" is defined as the area between two sampling locations. Re-characterization of the river bed in 2004 did not identify any sediment at any "Segment".

This Design considers a possibility that there is sediment along "Segments" based on the river water level. Any Near-Shore Sediment along any "Segment" whether "dry" on the river bank or "wet" in the river bed must be confirmed by poling and if present will be removed.

Drawing 3 shows the locations of the Near-Shore Sediment "Segments", as identified in 1999. The estimated volume of PCB impacted sediments from the Near-Shore was approximately 37 cy in 1999 along the four (4) Near-Shore Sediment "Segments" identified as ASD #6, 8, 9 and 10. The 2004 Pre-Design re-characterization poling work did not locate soft sediments ***in the river bed*** along the same Near-Shore Sediment "Segments". A summary of the possible Near-Shore Sediment volume, by "Segment" which historically had the highest PCB concentrations is presented on Table 1.

As requested by the Agencies, the PCB mass from the Near-Shore Sediments will not be included in the Upper River PCB mass calculations and 88% mass removal goal as this was originally a "Phase I" activity.

4.1.2 Armored Areas' Sediment

The Armored Areas are identified, named and numbered in prior documentations. The Armored Area locations consist of nine areas located along the river shoreline extending from river Stations 15+00 to 35+00; and are named Areas 1, 2, 3, 4, 5A, 7, 8, 10 and 11. These Armored Areas are the sediment locations that were incompletely dredged, capped and "Armored" in 1989 and 1990. The areas range in size from 360 square feet (sq ft) to 2,800 sq ft. This Design considers PCB Mass that has been measured or been assumed in the respective Armored Areas from prior documentation. The estimated total volume is approximately 2,149.4 cy. The estimated mass of

PCBs is approximately 164.2 lbs, with 96% of the PCB mass from the residual sediment (158.1 lbs).

The Armored Areas have two "layers" of sediment that have been identified as PCB impacted. These layers named "Overburden" and "Residual" Sediment. Overburden is re-deposited material in any Armored Area, since armoring. Residual Sediment is the soft sediment that was Armored during the activities of 1991. Mass is calculated by multiplying the respective sediment volume by the dry unit weight and the PCB concentration. Methods regarding the calculations of the above are shown in the Calculation Section.

Tables 2 show the volume and mass estimates for the "Overburden" and "Residual" Sediment, respectively, of the Armored Areas. The PCB concentration presented for the "Overburden" is the average PCB concentration in the Upper River Soft Sediments (Deposit 1 to Riverbend Dam) based on the 2004 characterization data. There is no consideration of PCB mass associated with the armoring material used in 1991. Drawing 4 shows the existing Armored Areas' sediment locations.

During sediment removal, armoring material will be removed and analyzed for PCBs. If the armoring is found to contain PCBs, it will be properly landfilled with a subsequent calculation to determine the removed PCB mass. In the event there are no PCBs in the armoring or other "Overburden", the un-impacted material may be used as clean fill.

4.1.3 Upper River Soft Sediment

"Soft Sediment" is the sediment found on the river bed as a result of the river deposited suspended material. The Design identifies the location of the deposits consistent with prior documentation. These Soft Sediment deposits are located in select depositional zones throughout the Upper River starting at the former plant site and extending to the Waelderhaus dam located approximately 3.4 miles downstream of the plant site.

Table 3 show the volume and mass estimates for the Soft Sediment by Deposit. Drawing 5 shows the location of Soft Sediment deposits within the Upper River portion of the Sheboygan River. Drawings 6 through 10 identify Upper River Soft Sediment locations by station. Based on the 2004 re-characterization work, the estimated total volume of Soft Sediment is approximately 33,335.6 cy. The estimated mass of PCBs is approximately 284.6 lbs.

Additionally in the drawings, the sediment deposits have been further divided into discrete locations of approximate 250 square meters (2,700 square feet) designated as Remediation Management Units (RMU). If a deposit is less than 250 square meters, the area of the deposit represents the RMU. Table 4 presents the PCB Mass estimation of Soft Sediment as identified by individual RMUs.

Identification of RMUs could lead to focused removal efforts at high PCB concentration areas and will contribute to efficient field documentation. In addition, RMUs assist quality assurance in the field during remedial construction activities with respect to locating, dredging and post-dredge verification of the sediment.

4.2 Access and Physical Conditions

4.2.1 River Hydrology

Hydrologic conditions were evaluated to understand the river conditions for floating a dredge to remove Soft Sediment Deposits and for the dry isolation of Near-Shore Sediment "Segments" and Armored Areas. In order to maintain adequate water depths for the dredge, temporary dams are considered in the design as a contingency measure. Two issues of primary importance are maintaining adequate low flow in the river and the 100-year flood condition.

The 7-day 10-year low flow (Q7, 10 flow) was selected as an adequate minimum river flow condition to maintain during placement of portable temporary dams. The Q7, 10 flow is a statistical estimate of the lowest average flow that would be experienced during a consecutive 7-day period with an average recurrence interval of ten years. Because it is estimated to recur, on average, only once in 10 years, this method is usually an indicator of low flow during drought conditions. The Q7, 10 flow for this reach of the Sheboygan River is estimated to be 15 cfs, based on stream gauging and statistical results of USGS studies.

Two other flow values were considered for design of the temporary dam flow-through structures; the low monthly mean flow and the average flow. The lowest monthly mean flow for the 20-year period from 1984 to 2003 was selected for the flow-through design during normal operations once the headwater is filled to design levels. These values were based on USGS flow gage data in the Sheboygan River for the months of April to September as these are the months that work will be performed on the river. The average of the lowest monthly flow is approximately 75 cfs. This compares to an average flow of approximately 230 cfs which was selected for design of the flow-through structures.

The FEMA HEC2 flood backwater model for the Sheboygan River downstream of the study reach was used to gain an understanding of the effects of temporary dams on the 100-year flood elevations. A cross-section, representative of the sections of potential damming, was modified to simulate a five-foot dam across the channel bottom. The 100-year flood flow of 14,000 cfs was modeled with this modified section in place. The results of the dam simulation showed backwater increases, above the existing condition flood elevations, ranging from 0.9 feet just upstream of the "dam" to 0.4 feet about 6,000 feet upstream and 0.1 feet about 14,000 feet upstream of the dam. Model simulation of the cofferdams showed flood elevation increases ranging from 0.3 feet near the dam, dissipating to no increase within 14,000 feet upstream. The proposed temporary ford crossings would cause something less than the cofferdam scenario.

Although the likelihood of the 100-year flood event occurring during the short timeframe that the dam structures will be in place is remote, the potential for property damage from the resulting 0.9 foot increase was evaluated. Based on the one-foot contour interval mapping, it appears that all residences along the study area are situated on land with elevations greater than 0.9 feet above the 100-year flood. As such, no significant impact should occur due to the 100-year flood occurring during the temporary dam deployment operations.

4.2.2 Physical and Legal Access to Locations

Removal of targeted sediment from the Upper River locations will require coordination with City of Sheboygan Falls, Kohler Company, and the Village of Kohler. Initial discussions with the property owners have occurred to date as part of the work associated with the Sediment Removal Design. Following USEPA's and WDNR's approval of this submittal, additional discussions will be necessary with the property owners prior to implementation of the remedial action work. Key issues for efficient implementation of the 2006 RA are construction access to the river and removal of debris (mostly tree limbs, trees, etc.) at the shoreline.

Access has been negotiated with the local municipalities pending approval of this design by the agencies. Subsequent approval by the Kohler Company is anticipated.

4.3 Sediment Removal Techniques

4.3.1 Near-Shore and Armored Areas

Small quantities of readily accessible material can be more adequately removed in dry conditions. A hydraulic dredge, although capable of large volumes and effective in submerged sediment conditions will not be able to remove the overlaying armoring nor will it be able to remove the sediment on the banks. As a result, the design shows that these areas will be removed with excavation equipment.

4.3.2 Soft Sediment Deposits

PCB impacted Soft sediment is found along 20,000 lineal feet of river centerline. The Sheboygan River's winding nature, lack of legal access, and the remediation distance preclude dry sediment removal of most of the soft sediment. River Hydrology, discussed above, indicate that river flow can be adjusted with temporary dams to allow operation of a floating dredge.

4.4 Sediment Removal Quantities

4.4.1 Near-Shore

All Near-Shore Sediment "Segments" will be removed to the extent these sediments are measurable in the field. PCB mass calculation is immaterial to the performance measurement of the Near-Shore remediation.

4.4.2 Soft Sediment Deposits and Armored Areas

The *ROD* remedial objectives are to remove 88% of the PCB mass in the Upper River to achieve an expected surface weighted area average concentration (SWAC) of 0.5 ppm PCBs or less over time. Table 5 presents a ranking from high PCB mass to low PCB mass of areas for removal to achieve 88% of the PCB mass removed in the river system. As indicated, 12,358.8 cubic yards of sediment need be removed to meet the mass removal objective. Recharacterization data (Table 6) indicate that the SWAC objective may not be met with these locations removed; as such Table 7 further identifies the point at which both the PCB mass removal objective and "expected" SWAC objective would be achieved. Data indicate that the SWAC objective is achieved with a total removal of 19,660.1 cubic yards of sediment *from selected areas.*

4.4.2.1 PCB Mass Estimate (Table 5)

Soft Sediment and Armored Areas are combined towards attaining the PCB mass removal objective. An estimated 448.8 lbs of PCBs are present in the Armored Areas and Upper River Soft Sediment deposits. To achieve 88% PCB mass removal approximately 395.7 lbs of PCBs will need to be removed from the Upper River RA work. The RMU approach merely segregates a deposit into smaller units which further helps to illustrate higher PCB mass locations.

Table 5 assumes and shows the results of a 100% volume removal efficiency from the nine Armored Areas and from the 46 RMUs with the greatest PCB mass. As shown, the PCB mass objective will be achieved by 100% removal of Armored Areas' Sediment, 2,149.4 cy, and 100% removal of selected RMUs, 10,209.4 cy for a total of 12,358.8 cy removed.

4.4.2.2 Assumed Pre-Dredge SWAC (Table 6)

Table 6 presents an assumed Pre-Dredge SWAC for the Upper River Soft Sediment RMUs. The concentration of any RMU is estimated from the core samples gathered in the 2004 study and are applied as a surface concentration estimate. The average concentration, SWAC, is presented through the use of a normalized contribution for each RMU or Armored Area to account for the specific area of a RMU in comparison to a normalized standard of 250 square meters (2,700 square feet). The overall Upper River SWAC for Soft Sediments based on the 2004 recharacterization data is 5.2 ppm PCBs.

4.4.2.3 Assumed Post-Dredge SWAC (Table 7)

Table 7 organizes the RMUs to show the descending order of an RMU remediation toward reaching the performance objectives of Upper River mass and Upper River SWAC. Table 7 assumes no post dredge residual thickness; i.e., dredging to bedrock or hardpan. Therefore, the assumed post dredge PCB concentration for each remediated RMU is the PCB detection limit (0.017 ppm).

This design indicates a minimum standard or maximum responsibility, to remove 19,660.1 cubic yards of sediment, if dredging reaches hard pan.

4.4.3 PCB Sediment Removal in Excess of *ROD* Objectives

Sediment identified in Table 7 may be selectively removed from the river system, subject to field performance, to meet the minimum standard for the remedial objectives. However, targeting *ALL SEDIMENT for removal* will help to attain the performance standards upon completion of the remedial activities, including SWAC. All sediment is targeted for removal in this design.

The Great Lakes Initiative (GLI) is one program that could be used to provide funding to remove sediment in excess of the *ROD* objectives. Similarly, a reduction in the Natural Resource Damage Assessment (NRDA) for the Upper River would be an incentive for additional work activity. Simply put, if dredging of the entire river can proceed to no measurable soft sediment (hardpan), approximately forty-five percent (45%) of the costs (e.g., 35,485.0 - 19,660.1 cy/35,485.0 cy) for soft sediment removal could be subject to one or both incentives. A back calculation of removal efficiency will be provided in the Post Dredging Documentation report for agency review.

5 Upper River Design Components

The Design Components are an assessment of the physical constraints, capabilities, flows etc. of the equipment and supplies used to remove the sediment quantities to meet the Remedial Objectives.

5.1 General Approach

Sediment removal will be completed with an expectation of reaching hardpan. Sediment will not be selectively passed over for a consideration of meeting the minimum standard. Sediment removed in excess of the *ROD* standards will be subject to incentives of GLI funding or NRDA reduction.

With the Design Components, the Remedial Action Work Plan (RAWP) will include the additional planning and construction detail regarding implementation of the design.

5.2 Upper River Remedial Action Key Components

Key components of the remedial design determine the scope of the remedial action construction. These key components are:

- Land area under control
- Access Roads, River Crossing and Dredge Pipeline Corridor
- River Depth (control)
- Dry Excavation
- Hydraulic Dredging
- Dewatering
- Carriage Water and Surface Water Treatment
- Transportation and Disposal of Sediment

5.2.1 Land Area Under Control

5.2.1.1 Mobilization and Site Preparation

Remedial activities begin with furnishing all necessary labor, equipment and supervision to perform and complete the 2006 removal action work. Mobilization will include:

- Delivery and installation of temporary trailers for office, product, and laboratory purposes.

- Delivery of necessary heavy equipment including backhoe(s), front-end loader(s), dozer(s), dredge(s), light plants and other miscellaneous equipment.

- Delivery and installation of water treatment plant equipment.

- Delivery of all materials used for staging and dewatering pad construction, including the sump and pump system, geotextile tubes, fencing, erosion control and necessary piping required for the dewatering process.

General site preparation will include construction of access roads, perimeter fencing, decontamination pad, and electrical service. Erosion control features such a berms, silt fences, hay bails and riprap will be either inspected and upgraded (if necessary) or constructed. The decontamination pad will be constructed on existing asphalt and/or concrete pavement. The decontamination pad will placed to deliver water to the water treatment system. The general facilities layout is shown in Drawing 2 and summarized below.

Component	Quantity	Comment
Temporary Facilities	2 Temporary Trailers	Owner/representative and contractor on-site offices.
Equipment Delivery	Required Large equipment	Backhoes, front-end loader, light plants, dredge and other miscellaneous equipment.
Water Treatment Plant	Sand Filter and Activated Carbon Filters	Piping and treatment equipment.
Construction Materials	Various	Staging area construction material.
Land Clearing	0.5 acres	Brush and trees will be removed from access roads to river.
Mechanical	Contractor Dependent	Temporary header plumbing for dewatering and water treatment systems.
Electrical	Contractor Dependent	Temporary power for offices and water treatment system.
Decontamination pad	0.05 acre	Approximate size: 100’ x 20’.
Pressure washer	1	Each contaminated truck/equipment washed with pressure prior to leaving site (if necessary).

5.2.1.2 Staging Area for Sediment Volume and Dewatering

The former plant site property is owned by an affiliate of Pollution Risk Services, LLC. The site is large enough to stage dewatering operations for all of the Upper River sediment removal, dewatering and load-out work. The former plant site, located on the west end of the Upper River stretch of the Sheboygan River currently exists as either concrete slab (building was removed) or asphalt pavement (former parking lot). The concrete slab and pavements are at or near surrounding grade levels, and cover an area of approximately 4 acres.

A 2.5 acre dewatering pad will be constructed over existing asphalt and concrete pavement for purposes of providing a secure area to dewater and stage the removed materials from the site. This acreage allows for dewatering of approximately 35,484.4 cubic yards (in situ) of material (Soft Sediment, "Overburden") assuming two stacked layers of geotextile tubes.

The dewatering pad area will be prepared by sealing cracks, holes and disturbed areas within the dewatering pad footprint. Asphalt pavement will be constructed over a portion of the prepared dewatering footprint area. The pavement will have an average thickness of approximately two inches. An eighteen inch asphalt curb or higher will be constructed around the perimeter of the dewatering pad. The perimeter curb will allow complete storage of a 50-year storm event within the dewatering pad area during the active project phase. Withstanding a cease in dredging, no water will be allowed to be released from the dewatering pad without water treatment. The surface of the dewatering pad will generally slope downward towards a sump. The sump will deliver water to an on-site water treatment facility where it will be treated and discharged to the Sheboygan River. A cross section of the pad is shown on Drawing 2.

A detail of the existing sump/pump system is shown on Drawing 12. A pump sized to convey expected runoff from precipitation within the dewatering pad and the carriage water from dewatered sediment to the water treatment plant will be placed in the sumps. The total expected maximum flow rate is approximately 2,100 gpm with an average flow rate of approximately 610 gpm during Soft Sediment removal. Near-Shore and Armored material run-off and dewatering anticipated flow rate is much less. The maximum flow rate, due to a 50 year storm event (282 gpm) and excavation (10 gpm) is approximately 300 gpm. The average flow rate is expected to be approximately 20 gpm.

A summary is listed below.

Component	Quantity	Comment
Dewatering Pad	2.5 acres	Seal (water tight) existing pavement, construct asphalt layer to slope surface water to sump and pump system. Construct berms.
Sump Manhole	1 unit	Install to direct surface flow from the dewatering pad to the water treatment system. Construct wier.
Pumps	2 unit	Each pump to deliver up to 1050 gallons per minute to the water treatment system.
Sump Piping	1 unit	Conveys sump water to treatment unit.

5.2.2 Access Road, River Crossings, and Dredge Pipeline Corridor

5.2.2.1 Temporary Roads

Temporary roads from existing public right-of-ways to the site staging area will be delineated on existing asphalt and concrete pavements. Temporary roads from the staging area to the removal locations (Armored Areas) will be constructed of well graded gravel/stone. The access road locations are shown on Drawing 4. Disturbed areas will be adequately restored with in-kind vegetation and/or material type.

5.2.2.2 River Crossing

One submerged temporary road for Armored Area removal will cross the Sheboygan River perpendicular to river flow as shown in Drawing 4. The submerged temporary road will consist of larger diameter stone. Typical details or a submerged temporary road are shown on Drawing 4. The submerged temporary road near Armored Area 1 will support haul truck traffic conveying excavated Armored Area material from Armored Areas 2, 3, 4, and 5A to the dewatering pad. The total estimated volume of material from these four Armored Areas (including armor material) targeted for removal is approximately 782 cubic yards. A total of approximately 52 truck loads of material will be hauled on this temporary road (assuming an individual truck load of approximately 15 cy).

Upon completion of hauling and restoration activities in the area of Armored Areas 2, 3, 4, and 5A the submerged temporary road will be removed as necessary.

5.2.2.3 Dredge Pipeline Corridor

A temporary pipeline corridor will be established for removal of the Soft Sediments. The corridor will provide access for the 8-inch inside diameter dredge pipeline. Ideally, the pipeline would be located to provide the shortest route between the river and the dewatering pad. Given potential access limitations the pipeline may need to be placed entirely in the river. If so, sufficient booster pump capacity will be established to allow transport of the sediment slurry. The pipeline will be properly marked with navigational buoys.

5.2.3 River Depth

For Soft Sediments, the river stage may need to be increased by placing Portadams across the river to form a temporary dam, as shown in on Drawing 11. Portadam is a temporary, portable cofferdam, water diversion or fluid retention system for use in open water up to 12 ft. Portadam is often used for construction, rehabilitation, remediation, flood protection, and inspection projects in rivers, lakes or reservoirs. By utilizing a free standing steel support system and impervious geomembrane, the Portadam allows many types of in-water construction to be accomplished in a "dry condition". The Portadam system consists of two main components; a welded tubular steel framework support and a flexible waterproof membrane permitting easy installation in numerous configurations and river bed conditions. The system support members are designed to transfer fluid loading to a near vertical downward load that eliminates the need for internal bracing which would otherwise obstruct the work area. Hydraulic loading on the membrane assists in sealing and stability of the structure. The Portadam design allows for water to overtop the structure if needed. Drawing 13 show the Portadam in a dam (with flow through structure), similar to what is proposed for the Sheboygan River project.

The tubular steel and geomembrane Portadam can be constructed without the use of heavy equipment. Once the materials are delivered to the work site, installation is done by small equipment and hand labor.

The proposed locations of the temporary dam are approximately:

- Station: 49 + 50
- Station: 69 + 50
- Station: 162 + 25

Since the equipment selected for dredging requires a minimum draft of 3 ft, the Portadam will create a minimum backwater elevation of 3 ft. Once this water depth is not achievable upstream of the Portadam location, it will be moved or additional installed at a suitable upstream location. Key design considerations for the dam configuration include the following, as discussed below:

- Maintain downstream flows for aquatic species
- Prevent 100 year flood elevation increases

The optimum size to handle a range of flow up to approximately 230 cfs is a combination of four 36-inch diameter pipes. These pipes will be fabricated out of HDPE. Knife valves will be attached to the flanged end of the pipe on the downstream side to control the flow during and after filling the reservoir. One pipe will always remain partly open to maintain a minimum flow of 15 cfs, the estimated $Q_{7,\ 10}$ flow.

The time required to change the river stage from ambient levels to the design stage (+ 4 ft) was estimated. The volume of the headwater behind the temporary dam was estimated assuming a flat water surface extending upstream from the design elevation. Given this volume and using the average flow condition of the river (230 cfs minus the $Q_{7,\ 10}$ flow release), provides an estimate of the time required to pond water behind the dam. Depending on the location, the time between ambient elevation and achieving a headwater of 4 feet at the temporary dam location ranges between approximately 2 to 4 hours. It should be recognized that average flow conditions at the time of operation will vary from the 230 cfs used in this calculation. Using 50 cfs as an average flow for instance, would increase the time to fill the “reservoir” to 12-15 hours. In any event, the $Q_{7,10}$ flow will only be in effect for a short period of time before the normal flow that existed before installation of the dam is attained. For the cofferdam configuration, the minimum flow will always be maintained as only a portion of the river will be modified.

As a further contingency, operation of the temporary dam structures during flood conditions was also evaluated. The dam will have to be removed when flood flows occur to assure that no backwater increases occur during the 100-year flood. One operational option would be to remove the Portadam when river stages at the Portadam exceed six (6) feet. As the dam height will be five (5) feet, (the dam is designed to be overtopped while still maintaining stability), the total river flow before removing the dam will be the 230 cfs through the 36-inch flow-through pipes plus about1,700 cfs of dam overtop flow, totaling about 1,930 cfs. This relates to between a 1-year and

2-year flood event. Weather forecasts will be monitored to alert workers of potential flooding and Portadam removal possibilities.

In order to remove the dam safely, without undo velocity, turbulence, or force downstream, the dam will be removed by sections. Removal of the first section will allow the backwater to lower upstream of the dam while minimizing the flow release downstream. Additional sections can be removed as necessary to control the flow, removing all the structures if the flooding doesn't subside. In this way, a maximum flood depth caused by the dam will be maintained at six (6) feet while providing controlled flow release during dam removal. The final operational details concerning Portadam removal will be discussed in the RAWP.

A summary is listed below.

Component	Quantity	Comment
Armored Sediments		
Port-A-Dam (cofferdam)	600 lineal ft, 5 ft high	Used between excavation and river to allow dry excavation.
Sump pump	1	Sump pump in excavation along river.
Piping	1,000 lin ft	3 inch diameter piping from river sump pump to water treatment system when conditions show murky water.
Soft Sediments		
Portadam	450 lineal ft (used several times) with flow-through structure, 5 ft high	Strategically placed to dam river flow and allow draft for dredging to occur in shallow river locations.

5.2.4 Dry Excavation

5.2.4.1 Near-Shore Sediment

The Near-Shore Sediment "Segments" are situated such that a portion of each are located in the river flow boundaries under high water conditions and located out of the water during low-flow periods as shown in Drawing 3. If impacted sediment is identified with poling, then the sediment will be removed using a dry method of excavation.

Process calculations for the Near-Shore Sediment are based on a potential removal volume of 37 cy, 1999 ESA, at 62.7% solids *in situ* and a specific gravity of 2.6. This volume if still present at this location in the river represents 100% of the total volume. The percent solids are derived from an assumed specific gravity of 2.60 and the numerical average of dry density (63.7 pcf) obtained from fourteen (14) geotechnical samples from the Upper River re-characterization. A summary of process calculations are shown in Table 8.

Removal by excavation at a rate of 15 cy/d is expected at 45% solids, producing a volume increase of roughly 50% as additional water is brought in with the sediment. Removal will take approximately 2 days. Additional set up time prior to removal would be required at the Near-Shore Sediment area. No coarse stream separation is planned. Given the high initial percent solids, dewatering to 60% solids is expected. The load-out at a rate of 300 wet tons per day will require less than a few hours to remove these materials from the staging area.

The relatively small volume and high density achieved during removal is expected to yield less than 4,000 gallons of water to be treated. The water would be produced at the pad during the period of removal and stockpiling. The water will be collected on the dewatering pad and treated by the on-site water treatment system and ultimately discharged back to the river.

5.2.4.2 Armored Areas

Armored Area material will be removed using standard excavation equipment (excavators and front-end loaders). Armored Area sediment areas will be isolated from the river by using a temporary containment barrier, as shown in detail on Drawing 3 and 4.

The portable hydraulic structures for the cofferdams will be approximately 5 feet high to provide ample freeboard above the river stage. Once installed, non-turbid (visual) water on the contained side of the barrier will be pumped out and discharged to the river. A sump/pump system will be installed within the enclosed area to provide ongoing dewatering as needed. Turbid water will be pumped to the on-site water treatment system. Once excavation of an Armored Area begins, all pumped water will be conveyed to the water treatment plant. Excavation will be performed with standard backhoes operating from the shore. The excavated material will be hauled to the dewatering pad by standard construction hauling equipment. Drawing 4 shows a typical configuration for this application, similar to what is expected on the Sheboygan River.

Process calculations for the Armored Area sediment are based on a removal volume of 2,149.4 cy at 62.7% solids *in situ*. The volume represents 100% of the total volume. The projected wet weight of sediment disposed will be 3,080 tons. The percent solids is derived from an assumed specific gravity of 2.60 and the numerical average of dry density (63.7 pcf) obtained from fourteen (14) geotechnical samples from the Upper River re-characterization. A summary of process calculations are shown in Table 8.

Removal by excavation at a rate of 100 cy/d is expected at 45% solids, producing a volume increase of roughly 80% as additional water is brought in with the sediment. Removal will take approximately 21 days. No coarse stream separation is planned. Given the high initial percent solids, dewatering to 60% solids is expected. Once dewatered, the load-out rate of 1000 wet tons per day will require approximately 3 days to remove these materials.

The processing of this material is expected to yield approximately 240,000 gallons of water to be treated

5.2.5 Hydraulic Dredging

Soft Sediment removal using a Swinging Ladder, Cutterhead (hydraulic) Dredge (with spuds) and a Horizontal Auger Dredge are both planned for the Upper River Soft Sediments. The dredge will allow free movement of the dredge using spuds that hold the dredge in place as the cutterhead swings an arc. This type of dredge is well suited for removal of the Soft Sediment deposits in the Upper River. Once the sediments within the arc have been dredged, the dredge will lift two of the three spuds while the third spud pushes or drives the dredge forward. The Horizontal Auger Dredge will be used for final clean-up passes. Dredging will start upstream at Deposit No. 1 and work downstream, as necessary. An 8-inch diameter dredge slurry pipe with booster pump(s) will convey the dredged sediment (slurry) to the dewatering pad. The slurry pipeline will be located to minimize the distance to the dewatering pad area. Sections of the pipeline will be added downstream of booster pumps area as the dredge advances down the river.

The best management practices that will be used during dredging to reduce soft sediment re-suspension will include:

- Reducing cutterhead rotation speed.
- Reducing swing speed of cutterhead
- Reducing or eliminating cut face undercutting by using a maximum lift thickness of 80% of the cutterhead diameter.

Prior to dredging, debris removal will be performed in the areas to be dredged. Final decisions on debris removal will be presented in the Remedial Action Work Plan (RAWP). Dam crossings will occur by removing and then launching the dredge below the dam. Access to the river will be key for both debris removal and dam crossing activities. Debris in contact with contaminated sediment will be placed into an appropriate landfill.

Controls and monitoring of sediment resuspension during dredging will occur during the Soft Sediment removal effort. Monitoring of river water turbidity will be performed upstream and downstream of RA activities, including during construction of the portable dams.

Process calculations for the Soft Sediment Deposits are based on a removal volume of 33,335.6 cy at 59.7% solids *in situ* and a specific gravity of 2.5. The volume represents 100% of the total volume. The projected wet weight of sediment disposed will be 47,496 tons. The percent solids are based on the weighted average for all deposits in the Soft Sediment area. A summary of process calculations are shown in Table 8.

Removal by hydraulic dredging at a rate of approximately 344 cy/d is expected at a slurry of 6.3% solids. Removal will take approximately 97 days, with a load-out rate of 1000 wet tons per day.

The processing of this material is expected to yield approximately 88 million gallons of water.

5.2.6 Dewatering

5.2.6.1 Dry Excavation

It is anticipated that once excavated and stockpiled on the dewatering pad, free drainage (passive drainage from stockpiled material) will occur from the material removed from the Near-Shore and Armored Areas. Dry excavations are planned for each of these two areas. As such, the material will be removed at its in situ percent solids condition.

5.2.6.2 Hydraulic Dredging

Several methods of dewatering were considered for the Soft Sediments. The Soft Sediment consists generally of silt and fine sand with some gravel and some fine grain material (clay). Appendix C of Volume II contains site geotechnical data from Upper River sediments. This material is conducive to being dewatered by geotextile tubes, belt presses and plate and frame presses. Both belt presses and/or plate & frame presses have relatively significant costs related to equipment and labor as compared to geotextile tube dewatering. Since an affiliate of PRS is the property owner of the staging area, dewatering by geotextile tubes was selected for the Upper River Soft Sediments.

5.2.6.3 Treatability Results

Initial treatability tests of Upper River Soft Sediment (Deposit 5) were performed to evaluate the sediment characteristics and chemistry associated with geotextile tube dewatering. A second round of treatability tests were performed on sediment samples obtained from Deposit 6 and Deposit 33A. The treatability reports are contained in Appendix B.

The results indicate that the Upper River sediment was readily dewatered using conventional geotextile tube fabric (hanging bag tests) such that the sediment would pass a paint filter test and have a percent solids greater than 50%. Also, in the event of polymer usage to assist dewatering an initial polymer addition rate was estimated as 0.75 to 1.0 pounds per dry ton of sediment.

5.2.6.4 Non-TSCA Sediment

For material excavated in the dry, dump trucks will place the material in windrows on the dewatering pad. The windrows will be oriented to allow free drainage of carriage water towards the sump. Carriage water will be conveyed through the sump to the on-site water treatment plant. The carriage water flow rate should average approximately 10 gpm.

For material dredged, dewatering will be accomplished for the Soft Sediments using geotextile tubes. The proposed geotextile tubes will have 60-foot circumference, and will be approximately 200 feet long. The tubes will be filled on the dewatering pad such that stacking of the tubes, if necessary; (up to 2 tubes) can be performed.

5.2.6.5 TSCA Sediment

Sediments have been identified in situ which contain PCB concentrations of 50 ppm (mg/kg) or greater. These sediments will initially be considered TSCA material. A mathematical averaging procedure will be used to estimate the in situ TSCA volumes similar to those procedures employed and accepted at other Region V sites.

Soft sediment in localized areas of Deposits 13, 14 and 26B are viewed as TSCA sediments. Similarly, sediments from Armored Areas 1, 2, 3, 4, 5A, 10 and 11 will be viewed as TSCA sediments.

Geotextile tubes and stockpiles will be segregated and identified as TSCA material and disposed of in a landfill approved to accept TSCA material. The carriage water from these sediments and materials will not be segregated from non-TSCA materials and will be treated and discharged to the river as part of normal operations.

5.2.7 Carriage Water and Surface Water Treatment

The sources of water requiring treatment are the carriage water which drains from the geotubes and the precipitation which comes in contact with contaminated sediment on the Geotube drainage pad. These waters will be treated for total suspended solids (TSS), PCBs, and additional requirements of the WPDES permit with a sand filtration and a granular activated carbon (GAC) system. Provisions will be made for chemical addition should this be necessary for TSS removal. A new temporary outfall will be constructed at the dewatering facility as shown on Drawing 2. The process flow diagram for the water treatment system is shown on Drawing 14. Monitoring of water within the process will occur at the influent, before and after the sand filters, after the GAC, and at the effluent (outfall).

Carriage and site contact water will be pumped from the dewatering pad sump to a 31,500 to 63,000 gallon influent wastewater storage using two 1,050 gpm submersible pumps. The influent storage will provide drainage water equalization and will also provide some sedimentation of solid materials. Any settled solids in the equalization tank will be pumped to a Geotube at the dewatering pad.

Two 1,050 gpm filter pumps will pump the wastewater from the equalization tank to three parallel sand filters. In-line with the discharge piping will be a sample port that will allow sampling of the incoming influent stream. The sand filters shall be pressure vessels equipped with suitable distribution and collection piping to allow for even distribution of flow through the filter media. The vessels shall be designed for working pressures up to 125 psi and equipped with a rupture disk to prevent over pressurization. The vessels shall have piping to allow for media backwashing, piping to allow for pneumatic conveyance of filter media, differential pressure filter gauges and an upper and lower man-way to allow for personnel access for inspection of media.

The loading rate for the sand filters shall not exceed 9 gpm/ft^2 at a 2,100 gpm maximum design flow (700 gpm each). The filters will be backwashed from a 35,000 gallon wastewater effluent storage tank and the backwash will flow to a Geotube. The wastewater will flow from the sand filters to the activated carbon filters for removal of organic contamination. In-line with the discharge piping will be a sample port that will allow sampling of the effluent stream for filter efficiency determination and the need for backwashing or media replacement.

The carbon filters will be pressure vessels equipped with suitable distribution and collection piping to allow for even distribution of flow through the filter media. The vessels will be designed for working pressures up to 125 psi and equipped with a rupture disk to prevent over pressurization. The vessels will have piping to allow for pneumatic conveyance of filter media, differential pressure filter gauges and an upper and lower man-way to allow for personnel access for inspection of media. In-line with the discharge piping will be a sample port that will allow sampling to determine if breakthrough has occurred and the need for media replacement. The loading rate for the carbon filters will not exceed 9 gpm/ft^2 at a 2,100 gpm maximum design flow (700 gpm each). The wastewater will flow from the carbon filters to the effluent storage tank.

The effluent will flow from the effluent storage tank to the project outfall. Effluent flow will be metered and totalized with sampling in accordance with the discharge requirements. The effluent will flow by gravity in an aboveground pipe to the outfall. The effluent pipe will be terminated 10 feet before the river bank. The outfall discharge point will be lined with rip-rap.

Polymer(s) may be added to the dredged sediment prior to placement in the geotubes. Additional chemical addition may be necessary to improve the water treatment performance. The need for chemical addition will be determined during start-up and operation of the water treatment plant. The types of chemicals, such as alum or polymers, and dosages of chemicals will be determined by field testing.

A summary is listed below.

Component	Quantity	Comment
Precipitation flow	270 gpm	Based on 25 year storm, 2.5 acres of pad.
Armored Area sump flow	10 gpm	Based on flow required to keep excavation dry.
Hydraulic dredge flow	610 gpm average 2100 gpm max	Based on 15 ft./sec velocity in an 8” PE SDR 15.5 pipe.
Dewatering pad sump pumps	2,100 gpm max. 610 gpm avg.	Two pumps, each 1,050 gpm.
Equalization tank	31,500-63,000 gal	Provides 15-30 minutes of equalization at the maximum treatment flow rate of 2,100 gpm.
Filter pumps	2,100 gpm	Two pumps, each 1,050 gpm.
Sand filters	2,100 gpm	Three, 10 ft diameter sand filters. Based on a maximum flow of 700 gpm for each filter. (<9 gpm/ft^2).
GAC filters	2,100 gpm	Three, 10 ft diameter GAC filters with 20,000 lbs GAC per filter. Sizing criteria based on a maximum flow of 700 gpm for each filter. Also sized for 4 months of operation without PCB breakthrough for a 50 ug/l PCB influent concentration and a 0.5 ug/l effluent concentration.
Effluent Tank	35,000 gal	Provides minimum 10 minutes of backwash water storage for the sand filter backwash rate of 15 gpm/ft^2.
Backwash Pump	1200 gpm	One pump, 1,200 gpm. Based on maximum backwash requirement of 15 gpm/ft^2 backwash for the 10 ft diameter. sand filter.

5.2.8 Transportation and Disposal of Sediment

5.2.8.1 Loading

Prior to hauling to a landfill, dewatered sediment will be sampled and analyzed for moisture content and PCB concentration. Landfill specific requirements will be discussed in the RAWP. General sampling and testing methods are described in the *Field Sampling Plan*, Appendix H. Load out of dewatered sediment, including sediment with geotextile tubes, will use a backhoe, front-end loader or dozer, and place the dewatered sediment into haul trucks. If necessary, truck wheels can be decontaminated after material has been loaded, prior to exiting the site. As required, a tarp may be rolled over the load. Further descriptions of sediment load-out will be described in a dewatered sediment removal plan in the RAWP.

5.2.8.2 Transportation

The dewatered non-TSCA sediment will be placed into trucks using backhoes and front-end loaders and transported to the Onyx (Chilton, Wisconsin) landfill for final disposal. The haul trucks will be equipped to contain the sediment with bed liners (if necessary) and appropriate covers. After loading and prior to leaving the site, truck wheels will be decontaminated (if necessary) at a prepared decontamination pad. All haul trucks will be properly placarded and manifested and be equipped with a leak-proof gate.

The dewatered TSCA sediment will be placed into haul trucks using backhoes and front-end loaders and transported to Environmental Quality (EQ), Wayne Disposal Facility for final disposal. The haul trucks will be equipped to contain the sediment with bed liners and appropriate covers. After loading and prior to leaving the site, haul trucks will be decontaminated (if necessary) at a prepared decontamination pad. All haul trucks will be properly placarded and manifested and be equipped with a leak-proof gate.

5.2.8.3 Disposal

All non-TSCA sediment will be placed into appropriate haul trucks and delivered to the Onyx, Chilton, Wisconsin landfill for disposal.

All TSCA dewatered material will be placed into haul trucks and delivered to a landfill approved for accepting TSCA material (e.g., Environmental Quality (EQ), Wayne Disposal, Michigan). A summary is listed below.

Component	Quantity	Comment
Landfill material	50,576 tons	Armored Areas and Soft Sediment requiring disposal.
Trucking schedule	2 months of trucking	Haul trucking up to 1000 tons/day.
Haul truck	10-20/Day	Haul truck to deliver dewatered sediment to landfill.
Onyx Landfill	1	Contracted landfill (Chilton, WI) to receive dewatered sediment.
Wayne Disposal	1	Approved TSCA Landfill.

6 Environmental Monitoring During Upper River Remedial Action

Methodologies and procedures necessary to implement an environmental monitoring plan for the Upper River remedial action are provided in the *Field Sampling Plan,* Appendix H. If additional monitoring procedures are required beyond these currently provided in the *Field Sampling Plan* an addendum to this plan will be developed as part of the RAWP.

6.1 Sampling Media

Monitoring during Upper River remedial action activities are likely to include:

- Surface water
- Effluent
- Dewatered sediment
- Post-dredge sediment
- Air (as needed)

A complete monitoring plan is provided in the FSP and a summary is listed below.

Media	General Location	Sampling Activity	Frequency
Surface Water	Upstream and downstream of dredge	River turbidity measurements	Per Field Sampling Plan
Effluent	Prior to discharge	Per requirements of WPDES	Per requirements of WPDES
Dewatered Sediments	Dewatering pad	Composite sediment sample for PCBs, moisture content and requirements of landfill	Per Field Sampling Plan
Post-dredge Sediment	Completed dredged areas	Sediment samples for PCBs analysis	Per Verification Sample Plan
Air	Staging area	Ambient air sampling	Per Field Sampling Plan

7 Post Removal Verification

The *Verification Sampling Plan,* Appendix E provides the complete detail, rationale and methodologies to sample sediment and soil at the site. A summary of the plan is provided in this section.

7.1 Near-Shore Sediments, Armored Areas and Soft Sediment Deposits

Confirmatory sampling will occur to document attainment of the PCB mass removal objective and to determine the post removal PCB SWAC. Confirmation sampling of Near-Shore Sediment will occur to document appropriate removal but will not be used in the PCB mass removal and PCB SWAC objectives.

Pursuant to the URSOW, PCB mass removal will be verified by dredging of each targeted deposit area until any of the following objectives are met:

- Removal of a Soft Sediment deposit will be deemed complete when 3 to 4 inches (or less), on average, of residual sediment remains in the deposit as determined by sediment probing after dredging, or after three passes with conventional dredging equipment (or an equivalent level of effort with alternative dredging equipment), whichever goal is achieved first.

- If USEPA determines that achieving these goals in a particular Soft Sediment deposit or set of deposits is impracticable or undesirable, USEPA may deem sediment removal complete when more than 3-4 inches of residual material or more remains in the deposit or fewer than three dredge passes have occurred.

- In consultation with USEPA, PRS may elect to conduct more than three dredging passes in an attempt to achieve a residual sediment level of less than 3-4 inches.

- Prior to any sediment removal, PRS will define a relationship between PCB mass and sediment volume for each RMU selected for removal. Based on the 2004 re-characterization data, PRS will develop and use this relationship along with post-dredge sediment probing data (i.e., residual sediment depth) to monitor and document cumulative PCB mass removed from the Site.

Specific to the expected SWAC outcome objective**:**

- If sediment thickness is measurable (unconsolidated material) and a sample can be collected, that PCB concentration is used to represent all residual sediment in that RMU.

- If sediment thickness is measurable (unconsolidated material) but a sample can not be recovered from any sample location within a RMU after 2 unsuccessful attempts with a Petite Ponar dredge, a determined value of 0.5 ppm will be used for this location to determine post-removal SWAC.

- If no measurable sediment exist in the RMU that has been dredged, a value of 0.017 ppm (detection limit) PCB will be used.

8 Mitigation Plan to Restore Habitats

The *Mitigation Plan*, (Vol. II, Appendix I) addresses the Upper River portion of the Sheboygan River. The goals of the mitigation efforts are to protect the existing natural resources and to restore the resources, if applicable, affected by the remedial action, to the extent practicable.

The areas that require remedial action that are considered for possible mitigation include the following:

- Near-Shore Sediments,
- Armored Areas, and
- Soft Sediment Deposits

The *Mitigation Plan* proposes methods to restore the aquatic and terrestrial resources and environments that might be disturbed by the remedial action activities. Pursuant to the *URSOW*, Soft Sediment removal from the river will not require replacement. The *Mitigation Plan* focuses on upland areas of the site such as the Armored Areas.

The Remediation Contractor will mark the boundaries of proposed areas with stakes that will be disturbed during 2006 RA activities in the Armored Areas. The WDNR will delineate those locations within the marked areas that are wetlands. Those areas will be restored as wetlands during the reclamation phase of the project.

9 Construction Schedule

The *Project Schedule*, (Vol. II, Appendix M) is aggressive to allow effective removal of impacted sediment, shorter the length of time required to facilitate the remedial action and to quicken the recovery of the affected improvements. The need to effectively and quickly initiate and complete remedial activities is underscored by local access agreements required to complete the activities.

9.1 Remedial Action Activities Schedule

The schedule of anticipated remedial action activities, including pre-construction activities and regulatory review activities is presented below:

Activity	Responsible Party	Dates
Pre-Construction Activities		
95% Basis of Design Submittals	PRS/Foth & Van Dyke	11/9/05
Agency Review of 95% Submittals	WDNR/EPA	11/9/05 – 12/13/06
Sediment Removal Design	PRS/Foth & Van Dyke	3/15/06
Agency Review of Sediment Removal Design	WDNR/EPA	3/15/06 – 3/31/06
RA Work Plan Submittal	PRS	4/3/06
Regulatory Review and Approval of RA Work Plan	WDNR/EPA	4/3/06 – 5/15/06
Construction Activities Milestones		
Preparation Work at Staging Area	PRS/Foth & Van Dyke/ Contractor(s)	5/15/06 – 5/26/06
Dredging/Excavation of Sediments	PRS/Foth & Van Dyke/ Contractor(s)	6/12/06[1] – 11/1/06

[1] Starting date dependent upon restrictions posed by spawning habits specific to the Sheboygan Upper River

10 Supporting Sediment Removal Design Submittals

Enclosed with this Sediment Removal Design are the following submittals which support the design.

The Design Support Submittals include:

Appendix D	QAPP Addendum
Appendix E	Verification Sampling Plan
Appendix F	Specifications
Appendix G	Mitigation Plan
Appendix H	Field Sampling Plan
Appendix I	Construction Quality Assurance Plan (CQAP)
Appendix J	Health and Safety Plan
Appendix K	Operation and Maintenance Plan
Appendix L	Contingency Plan
Appendix M	Project Schedule
Appendix N	Capital O&M Cost Estimate

11 Permit Equivalency

The Remedial Action on the Upper River is subject to federal, state and local permit requirements and regulations. Since the remedial action work on the Upper River is being performed under the *Comprehensive Environmental Response, Compensation and Liability Act*, (CERCLA), federal, state or local permits are not required for any on-site activities. However, the work proposed must comply with the substantive requirements of the federal, state and local permit requirements and regulations. This section identifies the federal, state and local permit requirements and regulations and describes how the proposed remedial design and remedial action will satisfy the applicable substantive requirements. Many of the regulatory substantive permit requirements, including further treatability studies, will be discussed in the Remedial Action Work Plan (RAWP).

For the purpose of this section, on-site is defined as the Upper Sheboygan River and all areas in near-proximity to the river that are necessary to implement the proposed remedial action. This will, in general, include the following:

- All in-river activities including dredging, excavation, monitoring and any construction required to facilitate the remedial activities;

- All near river activities including streambank remediation, restoration and the operation of land based facilities for barge unloading, sediment dewatering, water treatment and sediment loading for trucking to an off-site disposal area.

The following summarizes the remedial action activities planned for the Upper River,

Location	Approximate Area of Targeted Material	River Frontage	Material Volume	Expected Days of Removal
Armored Areas	12,900 sq ft	~940 ft	2,149 cy	21 days
Soft Sediment	10.7 Acres	~ 3 miles	33,335 cy	97 days

The following sections described the various construction activities that are part of the remedial action for the Upper River and the relevant federal, state and local environmental substantive requirements that typically apply to these activities.

11.1 Compliance with Section 106 of the National Historical Preservation Act

“Section 106” of the *National Historic Preservation Act,* as amended requires that Federal agencies take into account the effects of their undertakings on historic properties listed in, or eligible for listing in, the NRHP and to provide the ACHP opportunity to comment on the undertaking. Historic properties consist of prehistoric or historic sites, structures, buildings, objects, or features that are made or modified in the course of human activities.

PRS, a non-federal party, proposes to assist the lead agency (USEPA) in meeting their obligations under “Section 106” and implementing the regulations of *Title 36 Part CFR 800* for the Upper Sheboygan River remediation project. The WDNR completed a cursory review of its historical/archaeological resources screening map and determined that historic or cultural resources may be present in a portion of the Upper Sheboygan River remediation area. To comply with "Section 106" we propose to complete the following:

- As part of the RAWP efforts, consult with the Wisconsin State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officers (THPO) who can provide the Federal agency with a recommendation regarding the need to conduct further cultural resource studies to identify their concerns about historic properties with traditional religious or cultural significance that may be affected by the Upper Sheboygan River remediation project. Issues raised by SHPO will be addressed in the appropriate manner.

- If it is determined through consultation with the SHPO and Indian tribes that historic or cultural resources have the potential to be affected by the undertaking, a Phase I survey for archaeological and architectural/history resources will be completed in the Area of Potential Effect (APE). The APE is defined as the geographic area(s) in which an undertaking may directly or indirectly cause alteration in the character or use of historic properties. The Phase I investigation will be conducted by individuals who meet the Secretary of Interior's Standards and Guidelines for professional standards.

- If the Phase I survey identifies cultural resources within the APE that are potentially eligible for listing in the NRHP, the undertaking shall attempt to minimize impacts to the resources through avoidance. If avoidance is not possible, further investigation of the cultural resources will be conducted in accordance with Federal and State historic preservation regulations.

11.2 Section 404, 10 and 401 Dredge and Fill Permit

11.2.1 Applicability

Several federal and state programs including *Section 404 Dredge and Fill Permit of the Clean Water Act -33 U.C.S. 1344* (Section 404) is administered by the United States Army Corp of Engineers (USACE) and regulates the following:

- Discharge of dredged or fill material;
- Disturbance of streambeds; and
- Activities that impact wetlands

The following specific Upper River activities would likely require a need to meet substantive requirements of "Section 404":

- Constructing the sediment processing facilities and water treatment plant on the banks of the Upper River;

- Constructing any docking facilities that might be used for mobilizing and demobilizing of construction equipment and unloading excavated soils;

- Placement of temporary access road fords. Materials needed for road fords (riprap) will be used and described in the RAWP;

- Placement of containment barriers (e.g. cofferdam) around Armored removal areas. Materials needed for containment barriers (removable Port-A-Dam systems) will be used and described in the RAWP;

- Dredging and excavating the Soft Sediments, Near-Shore Sediments and Armored Area sediments;

- Replacing the soils and vegetation in the Armored sediment areas.

The requirements for these activities would likely require that adverse impact to aquatic ecosystems and to human health and the environment to evaluated and minimized.

11.2.2 Compliance

The remedial action work proposed includes construction practices to minimize the impacts of the dredging to the environment and monitoring the dredging process to assure compliance with the substantive requirements. The practice methods and monitoring that are proposed include the following:

- Hydraulic dredging, a technology that minimizes the suspension of sediment, is proposed for the Upper River. The specific process and type of equipment used will depend on the contractor selected, but minimization of sediment suspension will be a specified requirement. Performance requirements (e.g., best management practices) for minimizing downstream sediment resuspension will be used;

- Potential resuspension of sediment will be monitored for Total Suspended Solids (TSS) both up and downstream of the dredging operation and at the placement of any fords or coffer dams. The specific plans for these monitoring activities and the action levels for TSS are established the Field Sampling Plan. Currently, a 35 mg/l TSS trigger level requires notification to the contractor and a 70 mg/l TSS action level signifies a work shut down. More detail is provided in the Field Sampling Plan.

- Turbidity will be monitored both up and downstream from the dredging activity. Specific turbidity action levels will be determined based on the correlation between turbidity and TSS. If monitoring shows that the trigger level is exceeded, the dredge operator will be notified and instructed to use BMPs.

- Construction of near streambank and streambank structures needed to support the remedial action (docking facilities, temporary road fords, etc.) will be deployed. These facilities may require the placement of riprap, the use of other streambank stabilization practices to protect disturbed streambank areas, and appropriate soil erosion control devices to protect the river from disturbed area erosion. Bio-engineered stabilization alternatives have been considered and will be used where feasible. Such structures may be left in place, temporary or permanently, for streambank protection. The intent is to remove the artificial structures and the bank restored to natural conditions upon completion of the dredging operation. However, if long-term stabilization is an issue that is more appropriately addressed with a permanent structure, such as riprap, these methods will be deployed upon concurrence with WDNR.

- Restoration will be completed upon completion of dredging and excavation activities in specific areas. Where erosion potential is high (steep slopes or areas of potentially high stream velocities), an erosion mat will be placed to maintain soil stability. Native vegetation will be planted appropriate for the specific area, including shade tolerant species for woodland areas, wetland species within existing wetland areas, or wet-mesic prairie and emergent wetland species for Armored Areas. However, when wetlands are delineated by the WDNR, site specific decisions may be made regarding the appropriate vegetation.

11.3 Rivers and Harbors Act of 1899 (Potentially authorized under General Permit 1)

11.3.1 Applicability

S*ection 10 of the Rivers and Harbor Act of 1899*, implemented by the USACE, regulates excavation or filling of the channel of any navigable water similar to the “Section 404” dredging and filling permit. The Rivers and Harbor Act typically applies to activities such as dredging, filling in navigable waterways, structures in navigable waterways and access through navigable waterways. It overlaps the “Section 404” permit and typically the two permits can be authorized together under a USACE General Permit 1.

The specific remedial activities proposed in the Upper River that would typically require regulation under the River and Harbor Act includes:

- Placement of temporary access road fords and river containment barriers (cofferdams) across the Upper River channel;

- Placement of containment barriers around Armored removal areas;

- Temporary placement of riprap and/or other shoreline protection devices in construction staging areas and sediment unloading areas;

- Placement of riprap and/or other erosions control devices in streambank areas that are excavated to remove sediment. Bio-engineered streambank stabilization techniques will be used where feasible; and

- Construction of the outfall of the on-site carriage water treatment plant (shown on Drawing No. 2).

11.3.2 Compliance

As a contingency measure, temporary containment barriers could be constructed across reaches of the Upper River to enable sufficient water depth for the dredging equipment and/or barges to operate. The design proposes to use temporary dams that would span the river. This system would include small bypass piping to maintain some flow downstream. The dams would remain at a location in the river for only a time period long enough to allow the dredging in the backwater reach to be completed. Containment barriers may also be used to segregate portions of the river for excavation of armored and Near-Shore Sediments. Details concerning these containment barriers are included in Section 5 of this report. Proposed locations are shown on Drawings No. 3, 4 & 10. The locations may be adjusted in the field.

Similarly, temporary access road fords will be required to gain access to the stream for servicing the Armored Areas. This access road is shown on Drawing 4. Upon completion of the excavation effort in areas served by these fords, they will be substantially removed and the stream bottom restored to pre-construction conditions.

Erosion control features proposed for near bank and streambank areas where sediment is excavated will include erosion control during the removal process, and restoration and revegetation upon completion. The plan will be to put erosion control devices in-place that prevent scouring and erosion prior to the start of construction, maintain these devices during the remediation processes, and restore the area to pre-construction conditions after removal is complete. Where appropriate, such as around the water treatment discharge piping, riprap will be placed to stabilize areas with high erosion potential during operation, after which the erosion control facilities will be removed, if appropriate.

11.4 WPDES WWTP Discharge Permit

11.4.1 Applicability

A WPDES General Permit is typically required for the discharge of carriage water from the sediment dewatering process. Discharges of treated water to the Upper Sheboygan River are regulated under *Wis. Admin. Code Chapters NR 200 to 220 and 299 and Wis. Statues s. 281.41*. The substantive requirements for all covered facilities are as follows:

- Design berms and other containment facilities to provide containment (as detailed in Section 5.3.2.5),
- Design the containments facilities and the water treatment system using flow from the dredge and the intensity of the 10-year and 50 year, 24 hour rainfall events,
- Submit the required information regarding water treatment additives (polymers) to the WDNR for approval, and
- Submit process flow rates to the WDNR for the dredging removal work.

11.4.2 Compliance

The following is a general description of the water treatment processes for the Upper River. Details regarding the water treatment design are provided in Section 5 of this report.

Sediments will be removed from the river bottom using hydraulic dredging methods. The dredge slurry will be pumped through pipeline into geotextile tubes located in the Staging Area. Design details for the Staging Area and the geotextile tubes are provided in Section 5 of this report. The geotextile tubes will be used to dewater the sediment to a moisture content that will allow the sediments to be landfilled at a licensed municipal solid waste landfill.

The geotextile tubes, water treatment plant and the other facilities in the Staging Area will be surrounded by an asphalt berm to contain carriage water and stormwater contacting the sediment. Equipment used in the Staging Area will either be dedicated for use in the Staging Area or be decontaminated prior to leaving the Staging Area. A Decontamination Pad will be prepared to wash any potentially contaminated equipment and/or trucks.

The water streams that require treatment include the following:

- carriage water generated during the hydraulic dredging of the sediments.
- pore water generated during the dewatering of the sediment in the geotextile tubes,
- wash water from the Decontamination Pad, and
- contact water from precipitation that falls on the staging area.

These water streams will be treated at the on-site water treatment plant.

The water streams will drain to a sump and then be pumped to the water treatment plant located near the Staging Area. The water treatment plant will include the following treatment processes:

- Sand filter(s) to remove suspended solids, and

- Activated carbon filters for removal of PCBs and other organic compounds;

As required by *NR 205 Wis. Admin. Code* the water treatment plant will be designed to handle the expected water stream plus the probable intensity of a 10-year and 50 year, 24-hour rainfall event. The design calculations and details concerning the design of the water treatment plant and provided in Section 5 of this report.

The effluent from the plant will be monitored daily for the following parameters:

- Total Suspended Solids;
- PCBs;
- Discharge volume; And
- Other requirements of the WPDES permit

Characterization of the carriage water will be completed prior to finalization of the RAWP. The need to pilot test the water treatment system has been evaluated. Based on previous experience it is unlikely that a pilot study of the water treatment process will be needed. If proposed treatment methods have difficulty meeting the appropriate water quality standards during the dredging operation, the option to shut down the process until a resolution is reached is a viable alternative. The RAWP will provide water discharge requirements from the WDNR.

Details for the effluent monitoring are located in the *Field Sampling Plan* (Vol. II, Appendix H).

11.4.3 Wisconsin Statues Chapter 283- WPDES Permit

As part of the WPDES substantive permit requirements, the WDNR will define specific water quality standards and propose effluent limits for the Upper River project

11.5 Storm Water Discharge Permit (WAC NR 151 and 216)

11.5.1 Applicability

The stormwater discharge addresses the substantive requirements of *Wis. Admin. Codes NR 151 and NR 216* which apply to erosion control on projects that result in land disturbance of greater than one acre, including best management practices for erosion control and stormwater management. The process includes filing a Notice of Intent (NOI) for stormwater management discharges associated with land disturbance along with an erosion control and post-construction stormwater management plan.

The stormwater discharge substantive permit requirements cover activities that will occur on the land adjacent to the Upper River that are regulated under *NR 151 and 216*. These land based activities and approximate areas that will be disturbed are as follows:

- Construction of the three to four acre sediment Staging Area that includes the decontamination pad, layout pad for the geotextile tubes, haul road, sump, water treatment plant, water discharge piping, and loading area. As this area currently includes a paved impervious surface, the need to “disturb” this land is limited and may not strictly apply to *NR 151 and 216* requirements,

- Temporary access road construction, and

- Armored sediment areas located at the Upper River streambanks. The Armored Areas have a total area of approximately 12,900 sf (~0.30 acres). Depending on the water level in the Upper River some of these areas may be above the water level while others below the water.

11.5.2 Compliance

Because no increase of impervious areas will occur with this design, post-construction stormwater runoff calculations will not be needed to comply with the substantive requirements for construction and operation of the Staging Area. The existing conditions and post construction conditions will be the same from a hydrologic standpoint. Control of stormwater discharge from the Staging Area will be occurring because of the contact water designation for all precipitation falling on this area. Perimeter berms will maintain segregation of this area from off-site runoff.

Substantive compliance with stormwater standards also includes a water quality component. To meet NR 151, the following performance will be attained for the project:

- Design using Best Management Practices (BMP) and erosion control system that meets the standards of NR 151. Revegetation, buffer strips, and other BMPs will minimize runoff from the temporary facilities associated with the project. Upon completion of the project, the landscape will revert to natural conditions. The RAWP will discuss erosion and storm water management plans that implement BMPs for each area;

- Complete the required site inspection including post storm event inspections. These reports will be completed by field personnel throughout the life of the remediation project.

- Develop erosion control and stormwater management plans for the post-remediation period for each of the on-land remediation areas. As previously discussed, erosion control BMPs will be implemented during and after operations. The stormwater management plan will include land restoration, revegetation, and natural BMPs. These plans are provided below.

11.5.2.1 Erosion Control Plan

Erosion control measures have been incorporated into the design on the construction plans for each of the planned activities shown on Drawing 15. The erosion control measures were developed considering each of the different types of remedial activities as briefly described below. The erosion control measure proposed from the stormwater treatment BMPs includes the following:

- Preventative measures such as the berm around the Staging Area designed to contain contact water from non-contact water thus limiting the exposure of stormwater to contaminated areas;

- Containment measures such as providing asphalt or concrete below the areas where sediments are stored and contact water is handled to protect groundwater; and

- Containment measures such as the silt fencing proposed in the disturbed non-contact areas and the armored sediment areas described below.

The following describes the erosion control features that will be designed and installed at the various remediation areas on the Upper River. The RAWP will discuss the requirements of NR 216.46 and addresses soil material handling, appropriate BMPs, and other details.

11.5.2.1.1 Staging Area - Contact Area

The three to four acres Staging Area is considered a Contact Area as the typical activities that occur involve handling and treating of contaminated sediments, carriage water, pore water and precipitation that has come in contact with the sediments. The contact runoff from the Staging Area will be collected and treated. Source control measures include maintaining the access road into the site by keeping the road free of any tire track soils and routine cleaning of ditches, culverts and silt fencing and other erosion control structures so that they remain functional. The operations will be inspected weekly to comply with the substantive requirements of the permit.

- The entire Staging Area will be surrounded by a berm design to contain and prevent run-off during the probable intensity of a 10-year, 24-hour rainfall event. The internal contact water from the Staging Area is directed to a sump(s) that pumps the contact water to the water treatment plant.

- Run-on is prevented by the same berm and in addition, a ditch around the Staging Area channels runoff from the non-contact area to discharge to the Upper River.

11.5.2.1.2 Staging Area- Non-contact Area

The non-contact area is generally the grassed area surrounding the Staging Area which is separated from the contact area by a ditch and a berm. The non-contact area will not be disturbed and will drain as it presently does to the Upper River.

11.5.2.1.3 Armored Sediment Areas (Streambank Soils)

The total area of the Armored Sediment is approximately 12,900 sf (approximately 0.30 acres) At locations where the entire Armored Sediment Area is above the Upper River level at the time of excavation a silt fence will be placed below the area to be excavated prior to any disturbance. If the area to be excavated is completely or partially below the Upper River level a containment barrier (cofferdam) will be placed so that any silt laden water will be contained until excavation is completed.

After sediment excavation is completed, the disturbed area will be restored by replacing the material removed prior to excavation with a similar bank stabilization method.

The SWPPP will be included as an appendix to the RAWP. It will contain a typical inspection form that can be used during the weekly inspections and the inspection that must be conducted after any major storm event. A major storm event is considered a storm having a total precipitation of greater then on-half inch in less than a 24 hour period.

11.5.2.2 Mitigation Plan

The *Mitigation Plan* includes a plan for restoration of the areas that will be impacted during the support facilities construction, remediation and related activities. The *Mitigation Plan* is provided in Appendix G of Volume II.

11.5.2.2.1 Post-construction Storm water Management Plan

Because all facilities associated with the project will be removed and the disturbed areas restored and revegetated, there is no effective post-construction condition. As such, post-construction stormwater management will rely on the natural infiltration, water quality, and water quantity controls which will occur in the restored state.

11.6 Chapter 30 Stream Crossings Navigable Waters (Applications on County basis: WI NR 199, 102, 103, 155, 117)

11.6.1 Applicability

Typically any water or Near-Shore activity that requires a Wisconsin Stats. Chapter 30 permit in navigable waterways is applied for jointly with the federal requirements for the Section 404, 10 and Chapter 30 permit even though these regulatory standards are not identical. As such, please refer to Section 11.2.1 (Section 404, 10 and 401 Dredging and Filling Permit) for substantive requirements of this joint permit. Specific Chapter 30 requirements pertaining to navigation obstruction, public interest, flood flow capacity, riparian rights, and environmental pollution will be discussed in the RAWP.

11.6.2 Compliance

Refer to Section 11.2.2 for compliance discussion related to this regulation.

11.7 Section 401 Water Quality Certification – Joint Application with USACE Outside Navigable Waters

11.7.1 Applicability

Typically any water or Near-Shore activities that require a Section 401 Water Quality Certification with the USACE in navigable waterways is applied for jointly with the federal requirements for the Section 404, 10 and Chapter 30 permit. Please refer to Section 11.2.2 (Section 404, 10 and 401 Dredging and Filling Permit) for substantive requirements of this joint permit.

11.7.2 Compliance

Refer to Section 11.2.2 for compliance discussion for the associated Section 404 permitting.

11.8 NR 103 Water Quality Standards for Wetlands

11.8.1 Applicability

Wis. Admin. Code Chapter NR 103 (NR 103) applies to any proposed activity that may have an adverse cumulative or secondary impact on the value or function of a wetland that meets the definition of a wetland in Wis. Statues s. 23.32(1).

11.8.2 Compliance

A review of Wetland Inventory Maps shows no wetlands within the project limits. A site visit was performed on October 20, 2005 to observe the vegetation existing in the Armored Areas targeted for Upper River remediation. Due to the fact that the areas in question are contaminated, there were no samples taken. Upon investigation of Armored Areas there were no quality wetlands identified. The following discussion details the findings of the site visit.

In the low area of Armored Area #1 (drainage area), there is an abundance of reed canary grass (*Phalaris arundinacea*), smartweed (*Polygonum spp*.) & beggars ticks (*Bidens spp*.). On the armored slopes where there is a heavy silt blanket and rip rap, vegetation is sparse except for boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*) & unknown grass species.

Armored Area #2, 3 & 4 on the south side of the river contains box elder, silver maple, green ash, eastern cottonwood (*Populus deltoids*), reed canary grass, smartweed, curley dock (*Rumex crispus*), burdock (*Arctium minus*), false nettle (*Boehmeria cylandrica*), Clearweed (*Pilea pumila*), violets (*Viola spp*.), stinging nettle (*Urtica dioica*) & garlic mustard. The immediate river banks appear to be wetland, but above the banks it appears to be upland. At Armored Area # 5A, there was sand bar willow (*Salix exigua*) & reed canary grass.

On the north side of the river at Armored Areas #7, 8, 10 & 11, the river bank and the lower ledge is primarily degraded wetland with reed canary grass, sandbar willow, boxelder, cottonwood and silky dogwood (*Cornus amomum*). There is a large area in Armored Area # 8 that is a devoid of large trees and is exposed to full sun unlike the rest of the north side of the river. In this area there is blue vervain (*Vebena hastada*) & joe-pye-weed (*Eupatorium spp.*).

Although the Wetland Inventory Map or the site visit identifies no high quality wetland complex, the protection of any wetland must be secured. To that end, all areas of potential disturbance will be identified in the field and reviewed with WDNR. If wetland sites are identified, methods for avoidance and impact minimization will be reviewed. In all cases, the intent is to return all disturbed areas back to natural conditions. As such, no long-term impacts to wetlands should result from this project.

11.9 NR 406, NR 407 and NR 445 (WI Stats. s. 285-60; also Title V Permit, MACT)

11.9.1 Applicability

Handling the Upper River PCB contaminated sediments will not likely result in impacts to the air quality during the handling and processing of the sediments.

11.10 Shoreland-Floodplain Zoning Permit (NR 115 NR 116 and NR117)

11.10.1 Applicability

Floodplain regulations are no longer included in the state Chapter 30 permitting process. As such, the requirements for Floodplain zoning fall within local jurisdiction. To assure compliance in this area, the requirements within NR 115, NR 116 and NR 117 will be followed.

11.10.2 Compliance

The proposed features that may fall into the floodplain regulations are the temporary access road fords, the berms around the dewatered site, and the temporary containment barriers or coffer dams. The fords will be designed to minimize any backwater effects. Riprap set on the stream bottom could be feasible for this site and will be considered. This material will be removed as necessary.

The dewatering site containment berms will be located outside of the river floodway. As such, no flood backwater effect will be caused by the berm placement.

The temporary containment barriers will also be in place for only short periods of time (along with temporary signage to alert boaters of project activities). In addition, river stage monitoring will be in place to alert work crews of rising water levels. If water levels reach a set stage, the containment barriers will be removed so as to no longer cause obstruction to flow. As such, no affect on the 100-year flood backwater will take place due to the containment barriers. Discussion of the containment barrier removal and river stage monitoring are included in Section 5.3.3.2 and will also be discussed in the RAWP.

11.11 U.S. Fish and Wildlife Service Endangered Species Section 7 Consultation

11.11.1 Applicability

Part of the substantive requirements for the Upper River project will be to request a review by the United States Department of Interior Fish and Wildlife Service (Fish and Wildlife Service) of the project area. Based on our discussions with the regulatory community we understand that the Fish and Wildlife Service is the federal agency having jurisdiction with respect to the Sheboygan River project. This agency will be consulted regarding updating the endangered species list.

11.11.2 Compliance

Appendix A of Volume II includes the October 15, 2004 letter from Ms. Janet Smith, Field Supervisor for the Fish and Wildlife Service providing information on federally-listed threatened and endangered species, those proposed for listing, or designated critical habitat for the Sheboygan River PCB remediation area. Presences of the flora and fauna listed in the letter were investigated by URS Corporation (URS).

Appendix A of Volume II contains a copy of the September 30, 2004 memorandum titled *Field Report for the Critical Habitat Reconnaissance, Sheboygan River, Village of Kohler, Wisconsin,* URS Project No. 41683412.601, hereafter referred to as Habitat Report. The Habitat Report presents the findings of a critical habitat reconnaissance of six floodplain areas on the Sheboygan River.

The WDNR review of the 75% draft Design Report included a comment that …*suggested that some review be done to determine potential for impacting the Queen Snake (state endangered species) since it had been found in the past in the vicinity of a Kohler Dam.* The Habitat Report assessed the six floodplain areas for potential habitat for the Queen Snake. The preferred habitat for the Queen Snake was identified as; *Clear spring-fed streams with moderate to fast currents and rocky bottoms.* The Habitat report did not identify this type of habitat in any of the six floodplain areas examined. The USGS topographic maps for the Upper River area were reviewed. There are no streams flowing into the Sheboygan River in the Upper River area. The presence of Queen Snake habitat will be verified during upcoming field work.

The Habitat Report floral and fauna surveys indicated no threatened and endangered plant or bird species of forest communities, identified by the WDNR, were located in the six floodplain study areas.

11.12 National Marine Fisheries Service Endangered Species Section 7 Consultation

11.12.1 Applicability and Compliance

The National Marine Fisheries Service Endangered Species Section 7 consultation is not required for this project. The substantive requirements related to endangered species are addressed in Section 11.1 of this report.

11.13 Natural Heritage Inventory (Wisconsin Endangered Species Law – WI Stats. S. 29.415)

11.13.1 Applicability

Part of the substantive requirements for the Upper River project is to request a review by the WDNR, Bureau of Endangered Species (Bureau of Endangered Species) for an endangered habitat review of the project area. A 2004 review included information from the Natural Heritage Inventory data files that include historical records of rare terrestrial species known to have occurred at the site. An investigation of the aquatic species listed in the WDNR Bureau of Endangered Species will be undertaken and reported appropriately.

11.13.2 Compliance

Appendix A of Volume II of this report includes the July 14, 2004 letter from Ms. Candice Sovinski (Appendix A of the Habitat Report), Bureau of Endangered Species that provides information on state-listed endangered resources for the Sheboygan River PCB remediation area. Presences of the flora and fauna listed in the letter were investigated by URS.

12 Technical Plans and Specifications

The selected contractor will be required to conform to a set of Upper River Plans and Specifications. As of this Sediment Removal Design, the Specifications for the Upper River work include:

Technical Specification	Section
DIVISION 1 – GENERAL REQUIREMENTS	
Construction Staking	01050
Roles and Responsibilities During Construction	01055
Summary of Work	01100
Measurement and Payment	01285
Submittals	01330
Environmental Protection	01355
Stormwater Pollution Prevention Measures	01356
Testing and Inspection of Piping – Water Treatment System	01451
Temporary Construction Facilities and Utilities	01510
Owner Supplied Material and Equipment	01600
DIVISION 2 - SITE WORK	
Rip Rap	02050
Geotextile	02073
Dewatering (geotextile tubes)	02074
HDPE Pipe and Fittings	02090
General Earthwork	02301
Dredging	02325
Asphalt Pavement	02740
Landscaping, Turf, and Vegetative Cover Restoration	02931
DIVISION 11 – EQUIPMENT	
Water Treatment System	11355
DIVISION 13 – SPECIAL CONSTRUCTION (TSCA)	
Removal of PCB Contaminated Armored Area Sediments and Near-Shore Sediments and Disposal of Excavated and Dredged PCB Contaminated Sediments	13285

Substantive changes to these Specifications will be communicated to the agencies through the use of a RAWP addendum.

Calculations

Appendix A

ARARS

Appendix B

Treatability Study

Appendix C

Geotechnical Data

Appendix D

Quality Assurance Project Plan (QAPP) Addendum

Appendix E

Verification Sampling Plan

Appendix F

Specifications

Appendix G

Mitigation Plan to Restore Habitats

Appendix H

Field Sampling Plan

Appendix I

Construction Quality Assurance Plan (CQAP)

Appendix J

Site Specific Health & Safety Plan

Appendix K

Operations & Maintenance (O&M) Plan

Appendix L

Contingency Plan

Appendix M

Project Schedule

Appendix N

Capital O & M Cost Estimate

Tables

Table 1
Near-Shore Sediment

Segment	Surface Area(sq ft)	1999 Riverbed Sediment Depth (ft)	Volume (1999) (cy) [1]	2004 Riverbed Sediment Depth (ft)	Volume (2004) (cy) [2]
ASD #6	1500	0.2	11.0	0	0
ASD #8	1500	0.2	11.0	0	0
ASD #9	1000	0.2	7.5	0	0
ASD #10	1000	0.2	7.5	0	0
Total	**5,000**	**NA**	**37.0**	**NA**	**0**

1. Volume based on External Source Assessment, BBL, 1999, Table 12.
2. Volume based on poling performed during 2004 re-characterization.

Table 2
Armored Areas

Identifier	Volume (cu. yd.)	PCB Concentration (mg/kg)	Dry Unit Weight (lbs./cu. ft.)	PCB Mass (lbs.)
Armored Areas: Overburden Material				
Armored 1	103.7	7.4	63.7	1.3
Armored 2	55.6	7.4	63.7	0.7
Armored 3	13.3	7.4	63.7	0.2
Armored 4	44.4	7.4	63.7	0.6
Armored 5A	97.2	7.4	63.7	1.2
Armored 7	14.8	7.4	63.7	0.2
Armored 8	37.0	7.4	63.7	0.5
Armored 10	74.1	7.4	63.7	0.9
Armored 11	38.9	7.4	63.7	0.5
Re-Deposited Sediment Totals	**479.0**			**6.1**
Armored Areas: Residual Sediment				
Armored 1	25.9	295.0	63.7	13.1
Armored 2	13.9	51.0	63.7	1.2
Armored 3	3.3	148.0	63.7	0.8
Armored 4	11.1	63.0	63.7	1.2
Armored 5A	291.7	59.0	63.7	29.6
Armored 7	15.0	36.0	63.7	0.9
Armored 8	111.1	23.4	63.7	4.5
Armored 10	259.3	208.0	63.7	92.8
Armored 11	151.1	54.0	63.7	14.0
Residual Sediment Totals	**882.4**			**158.1**
Armored Material Totals	**788.0**			
Armored Area Totals	**2,149.4**			**164.2**

Table 3
Soft Sediment (By Deposit)

Identifier	Volume (cu. yd.)	PCB Concentration (mg/kg)	Dry Unit Weight (lbs./cu. ft.)	PCB Mass (lbs.)
Deposit 01	54.1	12.0	62.9	1.1
Deposit 02	108.3	2.8	63.5	0.5
Deposit 03	13.0	7.1	84.1	0.2
Deposit 04	8.7	1.7	93.0	0.0
Deposit 05	361.1	8.8	74.0	6.4
Deposit 06	424.3	4.2	64.6	3.2
Deposit 07	197.0	6.3	71.2	2.1
Deposit 08	7.2	1.0	64.6	0.0
Deposit 09	1,578.9	2.0	59.8	5.0
Deposit 10	12.2	1.2	47.8	0.0
Deposit 11	5.7	2.6	44.3	0.0
Deposit 12	1.1	1.2	84.5	0.0
Deposit 13	613.9	69.0	52.8	58.0
Deposit 14	1,523.0	26.6	57.3	49.0
Deposit 15	25.1	2.1	63.2	0.1
Deposit 16	890.4	1.7	48.3	2.0
Deposit 17	151.0	2.0	63.0	0.6
Deposit 18	2,532.4	11.4	61.8	49.7
Deposit 19	34.6	2.3	59.0	0.1
Deposit 20A	2,181.9	2.3	68.9	9.5
Deposit 20B	4,078.2	3.2	60.0	22.5
Deposit 20C	2,507.2	1.4	69.1	6.1
Deposit 21	202.3	1.6	46.8	0.4
Deposit 22	28.2	0.6	66.0	0.0
Deposit 23	678.2	1.4	73.9	2.0
Deposit 24	260.2	2.9	51.2	1.0
Deposit 25	3.1	2.7	46.5	0.0
Deposit 26A	3,329.5	3.4	57.3	24.0
Deposit 26B	428.4	16.0	54.9	16.5
Deposit 27	944.2	2.7	49.5	3.3
Deposit 28	5.2	0.3	67.4	0.0
Deposit 29	168.3	1.9	69.1	0.7
Deposit 30	98.6	0.4	64.8	0.1
Deposit 31	725.6	1.5	51.1	1.2
Deposit 32	3,145.5	0.7	53.8	3.3
Deposit 33A	2,982.5	0.8	64.8	4.0
Deposit 33B	1,611.7	1.1	44.1	2.2
Deposit 33C	1,414.3	5.6	47.5	9.8
Soft Sediment Totals	**33,335.6**			**284.6**

Table 4
Soft Sediment (By RMU)

Identifier	Volume (cu. yd.)	PCB Concentration (mg/kg)	Dry Unit Weight (lbs./cu. ft.)	PCB Mass (lbs.)
Dep01-1	54.1	12.0	62.9	1.1
Dep02-1	108.3	2.8	63.5	0.5
Dep03-1	13.0	7.1	84.1	0.2
Dep04-1	8.7	1.7	93.0	0.0
Dep05-1	152.2	12.1	67.8	3.4
Dep05-2	158.2	8.1	81.1	2.9
Dep05-3	50.8	1.5	71.2	0.2
Dep06-1	139.5	2.3	68.6	0.6
Dep06-2	153.2	4.4	65.1	1.3
Dep06-3	131.6	6.6	59.7	1.3
Dep07-1	157.0	7.9	66.0	2.0
Dep07-2	39.9	0.2	88.7	0.0
Dep08-1	7.2	1.0	64.6	0.0
Dep09-1	139.8	4.7	63.3	1.1
Dep09-2	227.9	2.6	56.3	0.9
Dep09-3	218.5	2.3	48.0	0.6
Dep09-4	249.7	1.5	60.7	0.5
Dep09-5	254.8	2.1	70.1	1.0
Dep09-6	239.2	1.3	61.3	0.5
Dep09-7	172.2	0.9	58.2	0.2
Dep09-8	76.8	1.3	60.9	0.1
Dep10-1	12.2	1.2	47.8	0.0
Dep11-1	5.7	2.6	44.3	0.0
Dep12-1	1.1	1.2	84.5	0.0
Dep13-1	170.8	5.3	55.0	1.4
Dep13-2	164.7	132.7	52.7	31.2
Dep13-3	140.2	56.3	51.0	10.8
Dep13-4	137	75.8	52.2	14.5
Dep13-5	1.2	74.0	60.8	0.2
Dep14-1	147.0	3.9	52.5	0.8
Dep14-2	139.7	190.6	63.1	41.2
Dep14-3	148.1	10.1	58.9	2.2
Dep14-4	143.3	1.5	43.4	0.2
Dep14-5	155.3	8.5	45.2	1.7
Dep14-6	201.3	2.8	53.4	0.7
Dep14-7	187.4	4.0	64.4	1.2
Dep14-8	167.1	1.5	63.6	0.4
Dep14-9	135.3	1.6	66.3	0.3
Dep14-10	98.5	2.3	64.5	0.3
Dep15-1	25.1	2.1	63.2	0.1
Dep16-1	156.0	1.2	50.3	0.2
Dep16-2	207.1	1.5	48.2	0.4
Dep16-3	198.4	2.1	51.1	0.6
Dep16-4	182.1	2.1	50.9	0.5
Dep16-5	140.5	1.6	41.4	0.3
Dep16-6	6.4	1.6	41.3	0.0
Dep17-1	124.9	2.2	62.5	0.5
Dep17-2	26.1	1.4	65.0	0.1
Dep18-1	236.1	25.0	62.8	10.2
Dep18-2	291.5	21.8	61.5	10.5
Dep18-3	215.8	7.2	63.6	2.6
Dep18-4	280.4	18.7	57.2	8.1
Dep18-5	252.1	9.3	61.9	4.5
Dep18-6	251.6	6.5	65.3	3.2
Dep18-7	312.9	3.8	66.6	2.2
Dep18-8	354.8	7.4	63.3	4.4
Dep18-9	245.1	8.8	54.0	3.1
Dep18-10	92.1	5.3	61.9	0.8
Dep19-1	34.6	2.3	59.0	0.1

Identifier	Volume (cu. yd.)	PCB Concentration (mg/kg)	Dry Unit Weight (lbs./cu. ft.)	PCB Mass (lbs.)
Dep20A-1	140.3	0.8	61.2	0.2
Dep20A-2	189.0	2.2	56.9	0.6
Dep20A-3	187.0	2.1	65.8	0.7
Dep20A-4	147.5	1.8	67.7	0.5
Dep20A-5	55.2	0.6	78.1	0.1
Dep20A-6	165.3	1.3	79.7	0.5
Dep20A-7	189.8	3.1	68.0	1.1
Dep20A-8	153.3	2.3	72.7	0.7
Dep20A-9	162.1	5.6	71.6	1.8
Dep20A-10	165.3	4.4	64.2	1.1
Dep20A-11	141.2	2.3	69.4	0.6
Dep20A-12	178.1	2.7	62.4	0.8
Dep20A-13	155.2	2.1	70.9	0.6
Dep20A-14	152.7	1.4	80.8	0.4
Dep20B-1	25.8	2.4	36.2	0.1
Dep20B-2	104.8	2.4	36.2	0.2
Dep20B-30	184.2	3.2	58.7	1.0
Dep20B-31	209.1	2.8	65.1	1.0
Dep20B-32	158.4	1.8	74.6	0.6
Dep20B-33	188.6	5.5	51.2	1.5
Dep20B-34	139.5	6.2	58.0	1.3
Dep20B-35	149.1	2.2	72.4	0.6
Dep20B-36	246.9	2.0	75.7	1.0
Dep20B-37	327.8	0.5	81.7	0.4
Dep20B-38	241.7	1.0	72.7	0.4
Dep20B-39	333.8	8.0	61.2	4.7
Dep20B-40	341.6	1.9	52.4	0.9
Dep20B-41	208.5	1.6	54.6	0.5
Dep20B-42	174.2	2.5	55.3	0.7
Dep20B-43	321.0	2.1	52.8	1.0
Dep20B-44	378.9	2.4	50.6	1.4
Dep20B-45	280.1	9.2	52.1	5.0
Dep20B-46	32.1	1.8	43.8	0.1
Dep20B-47	32.1	0.2	72.6	0.0
Dep20C-15	146.9	3.3	59.9	0.8
Dep20C-16	179.4	2.5	73.7	0.9
Dep20C-17	192.6	2.1	74.3	0.8
Dep20C-18	201.6	0.7	75.5	0.3
Dep20C-19	202.5	1.2	72.7	0.5
Dep20C-20	171.0	1.8	69.7	0.5
Dep20C-21	141.0	0.4	81.3	0.1
Dep20C-22	138.6	0.9	64.7	0.2
Dep20C-23	135.8	0.2	94.0	0.1
Dep20C-24	193.0	0.6	74.1	0.2
Dep20C-25	166.0	1.6	59.0	0.4
Dep20C-26	165.8	1.3	61.9	0.4
Dep20C-27	156.3	0.7	55.7	0.2
Dep20C-28	173.9	1.1	67.2	0.3
Dep20C-29	142.9	2.6	52.7	0.5
Dep21-1	140.5	1.3	49.5	0.3
Dep21-2	61.8	2.2	40.8	0.1
Dep22-1	28.2	0.6	66.0	0.0
Dep23-1	148.7	2.1	69.5	0.6
Dep23-2	161.1	1.2	92.3	0.5
Dep23-3	267.7	1.0	73.0	0.5
Dep23-4	100.8	3.2	47.2	0.4
Dep24-1	186.1	3.1	48.9	0.7
Dep24-2	74.2	2.1	55.6	0.2
Dep25-1	3.1	2.7	46.5	0.0
Dep26A-1	150.5	2.1	85.6	0.7
Dep26A-2	230.5	2.1	72.6	0.9
Dep26A-3	207.5	2.2	50.8	0.6
Dep26A-4	222.6	1.9	57.2	0.6

Identifier	Volume (cu. yd.)	PCB Concentration (mg/kg)	Dry Unit Weight (lbs./cu. ft.)	PCB Mass (lbs.)
Dep26A-5	224.0	2.4	48.9	0.6
Dep26A-6	229.2	3.2	48.3	1.1
Dep26A-7	312.1	4.5	44.4	1.8
Dep26A-8	338.3	6.3	49.1	2.2
Dep26A-9	358.0	4.0	50.0	2.0
Dep26A-10	389.8	11.2	68.7	8.8
Dep26A-11	388.8	4.3	58.8	3.4
Dep26A-12	278.1	3.0	53.3	1.2
Dep26B-13	212.0	2.3	54.0	0.8
Dep26B-14	146.8	72.0	53.9	15.5
Dep26B-15	69.6	2.2	58.4	0.2
Dep27-1	101.6	2.0	47.0	0.3
Dep27-2	137.5	0.9	42.8	0.1
Dep27-3	172.7	0.9	44.6	0.2
Dep27-4	169.4	1.1	45.4	0.2
Dep27-5	139.5	0.9	48.2	0.2
Dep27-6	137.4	0.6	61.4	0.1
Dep27-7	86.0	17.1	61.5	2.2
Dep28-1	5.2	0.3	67.4	0.0
Dep29-1	135.4	2.1	74.0	0.6
Dep29-2	32.9	1.1	49.0	0.0
Dep30-1	98.6	0.4	64.8	0.1
Dep31-1	143.9	2.0	65.0	0.5
Dep31-2	199.1	1.1	45.4	0.3
Dep31-3	206.4	0.3	53.0	0.1
Dep31-4	171.4	1.5	40.7	0.3
Dep31-5	4.8	1.2	45.7	0.0
Dep32-1	142.2	0.7	50.1	0.1
Dep32-2	137.7	0.5	46.8	0.1
Dep32-3	170.2	0.8	45.3	0.2
Dep32-4	182.8	0.7	42.0	0.1
Dep32-5	204.1	0.8	42.1	0.2
Dep32-6	229.6	0.4	43.4	0.1
Dep32-7	234.1	0.8	50.4	0.2
Dep32-8	211.6	1.7	52.4	0.5
Dep32-9	210.9	0.9	59.0	0.3
Dep32-10	176.1	0.8	50.0	0.2
Dep32-11	141.0	0.6	48.9	0.1
Dep32-12	170.7	0.7	51.4	0.2
Dep32-13	155.8	0.8	52.9	0.2
Dep32-14	150.1	0.6	64.1	0.2
Dep32-15	159.0	0.6	65.1	0.2
Dep32-16	149.1	0.8	59.8	0.2
Dep32-17	138.6	0.5	62.1	0.1
Dep32-18	142.6	0.4	75.5	0.1
Dep32-19	39.3	0.2	80.8	0.0
Dep33A-1	137.9	0.1	86.1	0.0
Dep33A-2	144.5	1.2	79.6	0.3
Dep33A-3	140.0	0.4	75.2	0.1
Dep33A-4	137.2	0.2	59.9	0.1
Dep33A-5	163.9	0.5	64.3	0.2
Dep33A-6	189.6	0.5	62.3	0.2
Dep33A-7	213.3	0.6	81.2	0.3
Dep33A-8	207.9	0.3	90.4	0.1
Dep33A-9	173.4	1.4	71.4	0.4
Dep33A-10	260.4	1.5	55.0	0.6
Dep33A-11	306.6	0.7	46.9	0.3
Dep33A-12	317.0	1.0	46.3	0.4
Dep33A-13	313.3	1.6	37.6	0.5
Dep33A-14	277.5	1.4	52.2	0.5
Dep33B-21	227.3	1.8	42.0	0.5
Dep33B-22	262.3	1.6	48.2	0.5
Dep33B-23	254.0	1.3	48.4	0.4

Identifier	Volume (cu. yd.)	PCB Concentration (mg/kg)	Dry Unit Weight (lbs./cu. ft.)	PCB Mass (lbs.)
Dep33B-24	259.6	1.0	42.2	0.3
Dep33B-25	219.4	0.7	42.0	0.2
Dep33B-26	167.6	0.9	41.8	0.2
Dep33B-27	121.1	0.7	40.2	0.1
Dep33B-28	100.7	0.7	47.9	0.1
Dep33C-15	192.5	3.7	56.5	1.0
Dep33C-16	214.3	11.7	53.2	3.0
Dep33C-17	277.4	6.4	45.3	2.0
Dep33C-18	283.9	7.0	43.1	2.3
Dep33C-19	230.1	3.4	44.2	1.0
Dep33C-20	216.0	2.4	42.7	0.7
Soft Sediment Totals	**33,335.6**			**284.6**

Table 5
Sediment Volume to Achieve 88% PCB Mass Objective

Identifier	Volume (cu. yd.)	PCB Mass (lbs)	Cumulative Mass Removed (%)
AA1-1	336.7	14.4	3.2%
AA2-1	87.5	1.9	3.6%
AA3-1	43.4	1.0	3.9%
AA4-1	67.7	1.8	4.3%
AA5A-1	583.3	30.8	11.1%
AA7-1	59.3	1.1	11.4%
AA8-1	222.2	5.0	12.5%
AA10-1	481.5	93.7	33.4%
AA11-1	267.8	14.5	36.6%
Dep14-2	139.7	41.2	45.8%
Dep13-2	164.7	31.2	52.7%
Dep26B-14	146.8	15.5	56.2%
Dep13-4	137.0	14.5	59.4%
Dep13-3	140.2	10.8	61.8%
Dep18-2	291.5	10.5	64.2%
Dep18-1	236.1	10.2	66.4%
Dep26A-10	389.8	8.8	68.4%
Dep18-4	280.4	8.1	70.2%
Dep20B-45	280.1	5.0	71.3%
Dep20B-39	333.8	4.7	72.4%
Dep18-5	252.1	4.6	73.4%
Dep18-8	354.8	4.4	74.4%
Dep05-1	152.2	3.4	75.1%
Dep26A-11	388.8	3.4	75.9%
Dep18-6	251.6	3.2	76.6%
Dep18-9	245.1	3.1	77.3%
Dep33C-16	214.3	3.0	77.9%
Dep05-2	158.2	2.9	78.6%
Dep18-3	215.8	2.6	79.2%
Dep33C-18	283.9	2.3	79.7%
Dep18-7	312.9	2.2	80.2%
Dep26A-8	338.3	2.2	80.7%
Dep27-7	86.0	2.2	81.1%
Dep14-3	148.1	2.2	81.6%
Dep07-1	157.0	2.0	82.1%
Dep33C-17	277.4	2.0	82.5%
Dep26A-9	358.0	2.0	83.0%
Dep26A-7	312.1	1.8	83.4%
Dep20A-9	162.1	1.8	83.8%
Dep14-5	155.3	1.7	84.2%
Dep20B-33	188.6	1.5	84.5%
Dep13-1	170.8	1.4	84.8%
Dep20B-44	378.9	1.4	85.1%
Dep06-2	153.2	1.3	85.4%
Dep06-3	131.6	1.3	85.7%
Dep20B-34	139.5	1.3	86.0%
Dep26A-12	278.1	1.2	86.2%
Dep14-7	187.4	1.2	86.5%

Identifier	Volume (cu. yd.)	PCB Mass (lbs)	Cumulative Mass Removed (%)
Dep01-1	54.1	1.1	86.8%
Dep09-1	139.8	1.1	87.0%
Dep20A-10	165.3	1.1	87.2%
Dep26A-6	229.2	1.1	87.5%
Dep20A-7	189.8	1.1	87.7%
Dep09-5	254.8	1.0	87.9%
Dep20B-30	184.2	1.0	88.2%
88% Mass	**12,358.8**	**395.7**	
Dep20B-31	209.1	1.0	88.4%
Dep20B-36	246.9	1.0	88.6%
Dep20B-43	321.0	1.0	88.8%
Dep33C-15	192.5	1.0	89.1%
Dep33C-19	230.1	1.0	89.3%
Dep09-2	227.9	0.9	89.5%
Dep20B-40	341.6	0.9	89.7%
Dep20C-16	179.4	0.9	89.9%
Dep26A-2	230.5	0.9	90.1%
Dep18-10	92.1	0.8	90.3%
Dep14-1	147.0	0.8	90.4%
Dep20C-15	146.9	0.8	90.6%
Dep20C-17	192.6	0.8	90.8%
Dep20A-12	178.1	0.8	91.0%
Dep26B-13	212.0	0.8	91.2%
Dep20A-8	153.3	0.7	91.3%
Dep14-6	201.3	0.7	91.5%
Dep20A-3	187.0	0.7	91.6%
Dep20B-42	174.2	0.7	91.8%
Dep24-1	186.1	0.7	91.9%
Dep26A-1	150.5	0.7	92.1%
Dep33C-20	216.0	0.7	92.2%
Dep26A-3	207.5	0.6	92.4%
Dep26A-5	224.0	0.6	92.5%
Dep26A-4	222.6	0.6	92.7%
Dep20A-2	189.0	0.6	92.8%
Dep20A-11	141.2	0.6	92.9%
Dep06-1	139.5	0.6	93.1%
Dep09-3	218.5	0.6	93.2%
Dep16-3	198.4	0.6	93.3%
Dep20B-32	158.4	0.6	93.5%
Dep20B-35	149.1	0.6	93.6%
Dep23-1	148.7	0.6	93.7%
Dep29-1	135.4	0.6	93.9%
Dep33A-10	260.4	0.6	94.0%
Dep20A-13	155.2	0.6	94.1%
Dep20C-20	171.0	0.5	94.2%
Dep20A-4	147.5	0.5	94.4%
Dep02-1	108.3	0.5	94.5%
Dep09-4	249.7	0.5	94.6%
Dep09-6	239.2	0.5	94.7%
Dep16-4	182.1	0.5	94.8%
Dep17-1	124.9	0.5	94.9%
Dep20B-41	208.5	0.5	95.0%

Identifier	Volume (cu. yd.)	PCB Mass (lbs)	Cumulative Mass Removed (%)
Dep20C-19	202.5	0.5	95.1%
Dep20C-29	142.9	0.5	95.2%
Dep23-2	161.1	0.5	95.4%
Dep23-3	267.7	0.5	95.5%
Dep31-1	143.9	0.5	95.6%
Dep33B-21	227.3	0.5	95.7%
Dep33B-22	262.3	0.5	95.8%
Dep33A-14	277.5	0.5	95.9%
Dep33A-13	313.3	0.5	96.0%
Dep32-8	211.6	0.5	96.1%
Dep20A-6	165.3	0.5	96.2%
Dep33A-9	173.4	0.4	96.3%
Dep20A-14	152.7	0.4	96.4%
Dep16-2	207.1	0.4	96.5%
Dep20B-37	327.8	0.4	96.6%
Dep20B-38	241.7	0.4	96.7%
Dep20C-25	166.0	0.4	96.8%
Dep20C-26	165.8	0.4	96.9%
Dep23-4	100.8	0.4	97.0%
Dep33B-23	254.0	0.4	97.0%
Dep14-8	167.1	0.4	97.1%
Dep33A-12	317.0	0.4	97.2%
Dep14-10	98.5	0.3	97.3%
Dep33A-7	213.3	0.3	97.4%
Dep14-9	135.3	0.3	97.4%
Dep16-5	140.5	0.3	97.5%
Dep20C-18	201.6	0.3	97.6%
Dep20C-28	173.9	0.3	97.6%
Dep21-1	140.5	0.3	97.7%
Dep27-1	101.6	0.3	97.8%
Dep33A-2	144.5	0.3	97.8%
Dep33B-24	259.6	0.3	97.9%
Dep33A-11	306.6	0.3	98.0%
Dep32-9	210.9	0.3	98.0%
Dep31-2	199.1	0.3	98.1%
Dep31-4	171.4	0.3	98.1%
Dep14-4	143.3	0.2	98.2%
Dep32-16	149.1	0.2	98.2%
Dep03-1	13.0	0.2	98.3%
Dep05-3	50.8	0.2	98.3%
Dep09-7	172.2	0.2	98.4%
Dep13-5	1.2	0.2	98.4%
Dep16-1	156.0	0.2	98.5%
Dep20A-1	140.3	0.2	98.5%
Dep20B-2	104.8	0.2	98.5%
Dep20C-22	138.6	0.2	98.6%
Dep20C-24	193.0	0.2	98.6%
Dep20C-27	156.3	0.2	98.7%
Dep24-2	74.2	0.2	98.7%
Dep26B-15	69.6	0.2	98.8%
Dep27-3	172.7	0.2	98.8%
Dep27-4	169.4	0.2	98.9%

Identifier	Volume (cu. yd.)	PCB Mass (lbs)	Cumulative Mass Removed (%)
Dep27-5	139.5	0.2	98.9%
Dep32-15	159.0	0.2	99.0%
Dep32-3	170.2	0.2	99.0%
Dep33B-25	219.4	0.2	99.0%
Dep33B-26	167.6	0.2	99.1%
Dep32-13	155.8	0.2	99.1%
Dep32-10	176.1	0.2	99.2%
Dep32-12	170.7	0.2	99.2%
Dep32-14	150.1	0.2	99.3%
Dep32-7	234.1	0.2	99.3%
Dep32-5	204.1	0.2	99.3%
Dep33A-6	189.6	0.2	99.4%
Dep33A-5	163.9	0.2	99.4%
Dep20A-5	55.2	0.1	99.4%
Dep33A-8	207.9	0.1	99.5%
Dep33A-4	137.2	0.1	99.5%
Dep32-17	138.6	0.1	99.5%
Dep32-11	141.0	0.1	99.5%
Dep32-18	142.6	0.1	99.6%
Dep32-2	137.7	0.1	99.6%
Dep32-4	182.8	0.1	99.6%
Dep32-6	229.6	0.1	99.6%
Dep09-8	76.8	0.1	99.6%
Dep15-1	25.1	0.1	99.7%
Dep17-2	26.1	0.1	99.7%
Dep19-1	34.6	0.1	99.7%
Dep20B-1	25.8	0.1	99.7%
Dep20B-46	32.1	0.1	99.8%
Dep20C-21	141.0	0.1	99.8%
Dep20C-23	135.8	0.1	99.8%
Dep21-2	61.8	0.1	99.8%
Dep27-2	137.5	0.1	99.8%
Dep27-6	137.4	0.1	99.9%
Dep30-1	98.6	0.1	99.9%
Dep31-3	206.4	0.1	99.9%
Dep32-1	142.2	0.1	99.9%
Dep33A-3	140.0	0.1	100.0%
Dep33B-27	121.1	0.1	100.0%
Dep33B-28	100.7	0.1	100.0%
Dep32-19	39.3	0.0	100.0%
Dep04-1	8.7	0.0	100.0%
Dep07-2	39.9	0.0	100.0%
Dep08-1	7.2	0.0	100.0%
Dep10-1	12.2	0.0	100.0%
Dep11-1	5.7	0.0	100.0%
Dep12-1	1.1	0.0	100.0%
Dep16-6	6.4	0.0	100.0%
Dep20B-47	32.1	0.0	100.0%
Dep22-1	28.2	0.0	100.0%
Dep25-1	3.1	0.0	100.0%
Dep28-1	5.2	0.0	100.0%
Dep29-2	32.9	0.0	100.0%

Identifier	Volume (cu. yd.)	PCB Mass (lbs)	Cumulative Mass Removed (%)
Dep31-5	4.8	0.0	100.0%
Dep33A-1	137.9	0.0	100.0%
Remaining	**23,126.2**	**53.1**	
Total	**35,485.0**	**448.8**	

Table 6
Pre-Dredge Assumed SWAC by RMU

Identifier	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)
Dep01-1	909	12.0	0.337	4.0
Dep02-1	2,331	2.8	0.863	2.4
Dep03-1	337	7.1	0.125	0.9
Dep04-1	224	1.7	0.083	0.1
Dep05-1	2,694	12.1	0.998	12.1
Dep05-2	2,731	8.1	1.011	8.2
Dep05-3	1,001	1.5	0.371	0.6
Dep06-1	2,745	2.3	1.017	2.3
Dep06-2	2,679	4.4	0.992	4.4
Dep06-3	2,464	6.6	0.913	6.0
Dep07-1	2,715	7.9	1.006	7.9
Dep07-2	816	0.2	0.302	0.1
Dep08-1	185	1.0	0.069	0.1
Dep09-1	2,724	4.7	1.009	4.7
Dep09-2	2,704	2.6	1.001	2.6
Dep09-3	2,692	2.3	0.997	2.3
Dep09-4	2,667	1.5	0.988	1.5
Dep09-5	2,690	2.1	0.996	2.1
Dep09-6	2,695	1.3	0.998	1.3
Dep09-7	2,577	0.9	0.954	0.9
Dep09-8	1,455	1.3	0.539	0.7
Dep10-1	314	1.2	0.116	0.1
Dep11-1	147	2.6	0.054	0.1
Dep12-1	29	1.2	0.011	0.0
Dep13-1	2,738	5.3	1.014	5.4
Dep13-2	2,737	132.7	1.014	134.5
Dep13-3	2,660	56.3	0.985	55.5
Dep13-4	2,703	75.8	1.001	75.9
Dep13-5	25	74.0	0.009	0.7
Dep14-1	2,687	3.9	0.995	3.9
Dep14-2	2,680	190.6	0.993	189.2
Dep14-3	2,709	10.1	1.003	10.1
Dep14-4	2,716	1.5	1.006	1.5

Identifier	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)
Dep14-5	2,656	8.5	0.984	8.4
Dep14-6	2,673	2.8	0.990	2.8
Dep14-7	2,688	4.0	0.996	4.0
Dep14-8	2,678	1.5	0.992	1.5
Dep14-9	2,668	1.6	0.988	1.6
Dep14-10	1,804	2.3	0.668	1.5
Dep15-1	647	2.1	0.240	0.5
Dep16-1	2,738	1.2	1.014	1.2
Dep16-2	2,668	1.5	0.988	1.5
Dep16-3	2,700	2.1	1.000	2.1
Dep16-4	2,724	2.1	1.009	2.1
Dep16-5	2,683	1.6	0.994	1.6
Dep16-6	127	1.6	0.047	0.1
Dep17-1	2,725	2.2	1.009	2.2
Dep17-2	673	1.4	0.249	0.3
Dep18-1	2,669	25.0	0.989	24.7
Dep18-2	2,703	21.8	1.001	21.8
Dep18-3	2,744	7.2	1.016	7.3
Dep18-4	2,691	18.7	0.997	18.6
Dep18-5	2,678	9.3	0.992	9.2
Dep18-6	2,723	6.5	1.009	6.6
Dep18-7	2,692	3.8	0.997	3.8
Dep18-8	2,686	7.4	0.995	7.4
Dep18-9	2,722	8.8	1.008	8.9
Dep18-10	2,069	5.3	0.766	4.1
Dep19-1	892	2.3	0.330	0.8
Dep20A-1	2,639	0.8	0.977	0.8
Dep20A-2	2,712	2.2	1.004	2.2
Dep20A-3	2,711	2.1	1.004	2.1
Dep20A-4	2,728	1.8	1.010	1.8
Dep20A-5	1,090	0.6	0.404	0.2
Dep20A-6	2,660	1.3	0.985	1.3
Dep20A-7	2,748	3.1	1.018	3.2
Dep20A-8	2,736	2.3	1.013	2.3
Dep20A-9	2,684	5.6	0.994	5.6

Identifier	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)
Dep20A-10	2,641	4.4	0.978	4.3
Dep20A-11	2,680	2.3	0.993	2.3
Dep20A-12	2,704	2.7	1.001	2.7
Dep20A-13	2,703	2.1	1.001	2.1
Dep20A-14	2,708	1.4	1.003	1.4
Dep20B-1	664	2.4	0.246	0.6
Dep20B-2	2,697	2.4	0.999	2.4
Dep20B-30	2,656	3.2	0.984	3.1
Dep20B-31	2,743	2.8	1.016	2.8
Dep20B-32	2,682	1.8	0.993	1.8
Dep20B-33	2,640	5.5	0.978	5.4
Dep20B-34	2,635	6.2	0.976	6.1
Dep20B-35	2,821	2.2	1.045	2.3
Dep20B-36	2,681	2.0	0.993	2.0
Dep20B-37	2,738	0.5	1.014	0.5
Dep20B-38	2,628	1.0	0.973	1.0
Dep20B-39	2,682	8.0	0.993	7.9
Dep20B-40	2,708	1.9	1.003	1.9
Dep20B-41	2,644	1.6	0.979	1.6
Dep20B-42	2,764	2.5	1.024	2.6
Dep20B-43	2,726	2.1	1.010	2.1
Dep20B-44	2,726	2.4	1.010	2.4
Dep20B-45	2,638	9.2	0.977	9.0
Dep20B-46	534	1.8	0.198	0.4
Dep20B-47	827	0.2	0.306	0.1
Dep20C-15	2,684	3.3	0.994	3.3
Dep20C-16	2,695	2.5	0.998	2.5
Dep20C-17	2,731	2.1	1.011	2.1
Dep20C-18	2,681	0.7	0.993	0.7
Dep20C-19	2,692	1.2	0.997	1.2
Dep20C-20	2,720	1.8	1.007	1.8
Dep20C-21	2,720	0.4	1.007	0.4
Dep20C-22	2,604	0.9	0.964	0.9
Dep20C-23	2,677	0.2	0.991	0.2
Dep20C-24	2,693	0.6	0.997	0.6

Identifier	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)
Dep20C-25	2,636	1.6	0.976	1.6
Dep20C-26	2,695	1.3	0.998	1.3
Dep20C-27	2,702	0.7	1.001	0.7
Dep20C-28	2,708	1.1	1.003	1.1
Dep20C-29	2,692	2.6	0.997	2.6
Dep21-1	2,619	1.3	0.970	1.3
Dep21-2	1,130	2.2	0.419	0.9
Dep22-1	728	0.6	0.270	0.2
Dep23-1	2,636	2.1	0.976	2.1
Dep23-2	2,705	1.2	1.002	1.2
Dep23-3	2,735	1.0	1.013	1.0
Dep23-4	1,347	3.2	0.499	1.6
Dep24-1	2,680	3.1	0.993	3.1
Dep24-2	1,417	2.1	0.525	1.1
Dep25-1	80	2.7	0.030	0.1
Dep26A-1	2,687	2.1	0.995	2.1
Dep26A-2	2,720	2.1	1.007	2.1
Dep26A-3	2,706	2.2	1.002	2.2
Dep26A-4	2,714	1.9	1.005	1.9
Dep26A-5	2,708	2.4	1.003	2.4
Dep26A-6	2,673	3.2	0.990	3.2
Dep26A-7	2,786	4.5	1.032	4.6
Dep26A-8	2,691	6.3	0.997	6.3
Dep26A-9	2,670	4.0	0.989	4.0
Dep26A-10	2,729	11.2	1.011	11.3
Dep26A-11	2,740	4.3	1.015	4.4
Dep26A-12	2,609	3.0	0.966	2.9
Dep26B-13	2,693	2.3	0.997	2.3
Dep26B-14	2,746	72.0	1.017	73.2
Dep26B-15	1,373	2.2	0.509	1.1
Dep27-1	2,619	2.0	0.970	1.9
Dep27-2	2,685	0.9	0.994	0.9
Dep27-3	2,712	0.9	1.004	0.9
Dep27-4	2,657	1.1	0.984	1.1
Dep27-5	2,743	0.9	1.016	0.9

Identifier	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)
Dep27-6	2,709	0.6	1.003	0.6
Dep27-7	1,678	17.1	0.621	10.6
Dep28-1	135	0.3	0.050	0.0
Dep29-1	2,672	2.1	0.990	2.1
Dep29-2	652	1.1	0.241	0.3
Dep30-1	1,790	0.4	0.663	0.3
Dep31-1	2,747	2.0	1.017	2.0
Dep31-2	2,640	1.1	0.978	1.1
Dep31-3	2,722	0.3	1.008	0.3
Dep31-4	2,681	1.5	0.993	1.5
Dep31-5	95	1.2	0.035	0.0
Dep32-1	2,879	0.7	1.066	0.7
Dep32-2	2,701	0.5	1.000	0.5
Dep32-3	2,667	0.8	0.988	0.8
Dep32-4	2,659	0.7	0.985	0.7
Dep32-5	2,720	0.8	1.007	0.8
Dep32-6	2,773	0.4	1.027	0.4
Dep32-7	2,675	0.8	0.991	0.8
Dep32-8	2,702	1.7	1.001	1.7
Dep32-9	2,694	0.9	0.998	0.9
Dep32-10	2,731	0.8	1.011	0.8
Dep32-11	2,722	0.6	1.008	0.6
Dep32-12	2,717	0.7	1.006	0.7
Dep32-13	2,701	0.8	1.000	0.8
Dep32-14	2,658	0.6	0.984	0.6
Dep32-15	2,696	0.6	0.999	0.6
Dep32-16	2,693	0.8	0.997	0.8
Dep32-17	2,668	0.5	0.988	0.5
Dep32-18	2,699	0.4	1.000	0.4
Dep32-19	789	0.2	0.292	0.1
Dep33A-1	2,703	0.1	1.001	0.1
Dep33A-2	2,644	1.2	0.979	1.2
Dep33A-3	2,690	0.4	0.996	0.4
Dep33A-4	2,665	0.2	0.987	0.2
Dep33A-5	2,786	0.5	1.032	0.5

Identifier	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)
Dep33A-6	2,702	0.5	1.001	0.5
Dep33A-7	2,657	0.6	0.984	0.6
Dep33A-8	2,708	0.3	1.003	0.3
Dep33A-9	2,806	1.4	1.039	1.5
Dep33A-10	2,723	1.5	1.009	1.5
Dep33A-11	2,711	0.7	1.004	0.7
Dep33A-12	2,728	1.0	1.010	1.0
Dep33A-13	2,694	1.6	0.998	1.6
Dep33A-14	2,717	1.4	1.006	1.4
Dep33B-21	2,751	1.8	1.019	1.8
Dep33B-22	2,740	1.6	1.015	1.6
Dep33B-23	2,676	1.3	0.991	1.3
Dep33B-24	2,676	1.0	0.991	1.0
Dep33B-25	2,740	0.7	1.015	0.7
Dep33B-26	2,676	0.9	0.991	0.9
Dep33B-27	2,714	0.7	1.005	0.7
Dep33B-28	2,590	0.7	0.959	0.7
Dep33C-15	2,627	3.7	0.973	3.6
Dep33C-16	2,694	11.7	0.998	11.7
Dep33C-17	2,652	6.4	0.982	6.3
Dep33C-18	2,744	7.0	1.016	7.1
Dep33C-19	2,708	3.4	1.003	3.4
Dep33C-20	2,654	2.4	0.983	2.4
Average Above Dam				**7.4**
Average Below Dam				**2.6**
Overall Average				**5.2**

1. **Assumed 2004 re-characterization core sample data represent surficial PCB concentrations**.

Table 7
Post-Dredge Assumed SWAC by RMU

Identifier	Volume within RMU (cu. yd.)	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Post-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)	Cumulative SWAC Reduction (mg/Kg)
							5.990
AA1-1	336.7	2,800	7.400	0.017	1.037	0.018	5.950
AA2-1	87.5	1,500	7.400	0.017	0.556	0.009	5.920
AA3-1	43.4	360	7.400	0.017	0.133	0.002	5.920
AA4-1	67.7	1,200	7.400	0.017	0.444	0.008	5.900
AA5A-1	583.3	2,625	7.400	0.017	0.972	0.017	5.860
AA7-1	59.3	400	7.400	0.017	0.148	0.003	5.850
AA8-1	222.2	1,000	7.400	0.017	0.370	0.006	5.840
AA10-1	481.5	2,000	7.400	0.017	0.741	0.013	5.800
AA11-1	267.8	1,050	7.400	0.017	0.389	0.007	5.790
Dep14-2	139.7	2,680	190.600	0.017	0.993	0.017	4.720
Dep13-2	164.7	2,737	132.700	0.017	1.014	0.017	3.960
Dep26B-14	146.8	2,746	72.000	0.017	1.017	0.017	3.550
Dep13-4	137.0	2,703	75.800	0.017	1.001	0.017	3.120
Dep13-3	140.2	2,660	56.300	0.017	0.985	0.017	2.800
Dep18-2	291.5	2,703	21.800	0.017	1.001	0.017	2.680
Dep18-1	236.1	2,669	25.000	0.017	0.989	0.017	2.540
Dep26A-10	389.8	2,729	11.200	0.017	1.011	0.017	2.480
Dep18-4	280.4	2,691	18.700	0.017	0.997	0.017	2.370
Dep20B-45	280.1	2,638	9.200	0.017	0.977	0.017	2.320
Dep20B-39	333.8	2,682	8.000	0.017	0.993	0.017	2.280
Dep18-5	252.1	2,678	9.300	0.017	0.992	0.017	2.230
Dep18-8	354.8	2,686	7.400	0.017	0.995	0.017	2.180
Dep05-1	152.2	2,694	12.100	0.017	0.998	0.017	2.120
Dep26A-11	388.8	2,740	4.300	0.017	1.015	0.017	2.090
Dep18-6	251.6	2,723	6.500	0.017	1.009	0.017	2.050
Dep18-9	245.1	2,722	8.800	0.017	1.008	0.017	2.000
Dep33C-16	214.3	2,694	11.700	0.017	0.998	0.017	1.940
Dep05-2	158.2	2,731	8.100	0.017	1.011	0.017	1.890
Dep18-3	215.8	2,744	7.200	0.017	1.016	0.017	1.850
Dep33C-18	283.9	2,744	7.000	0.017	1.016	0.017	1.810
Dep18-7	312.9	2,692	3.800	0.017	0.997	0.017	1.790

Identifier	Volume within RMU (cu. yd.)	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Post-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)	Cumulative SWAC Reduction (mg/Kg)
Dep26A-8	338.3	2,691	6.300	0.017	0.997	0.017	1.750
Dep27-7	86.0	1,678	17.100	0.017	0.621	0.011	1.690
Dep14-3	148.1	2,709	10.100	0.017	1.003	0.017	1.640
Dep07-1	157.0	2,715	7.900	0.017	1.006	0.017	1.590
Dep33C-17	277.4	2,652	6.400	0.017	0.982	0.017	1.560
Dep26A-9	358.0	2,670	4.000	0.017	0.989	0.017	1.530
Dep26A-7	312.1	2,786	4.500	0.017	1.032	0.018	1.510
Dep20A-9	162.1	2,684	5.600	0.017	0.994	0.017	1.480
Dep14-5	155.3	2,656	8.500	0.017	0.984	0.017	1.430
Dep20B-33	188.6	2,640	5.500	0.017	0.978	0.017	1.400
Dep13-1	170.8	2,738	5.300	0.017	1.014	0.017	1.370
Dep20B-44	378.9	2,726	2.400	0.017	1.010	0.017	1.360
Dep06-2	153.2	2,679	4.400	0.017	0.992	0.017	1.330
Dep06-3	131.6	2,464	6.600	0.017	0.913	0.016	1.300
Dep20B-34	139.5	2,635	6.200	0.017	0.976	0.017	1.260
Dep26A-12	278.1	2,609	3.000	0.017	0.966	0.016	1.250
Dep14-7	187.4	2,688	4.000	0.017	0.996	0.017	1.220
Dep01-1	54.1	909	12.000	0.017	0.337	0.006	1.200
Dep09-1	139.8	2,724	4.700	0.017	1.009	0.017	1.170
Dep20A-10	165.3	2,641	4.400	0.017	0.978	0.017	1.150
Dep26A-6	229.2	2,673	3.200	0.017	0.990	0.017	1.130
Dep20A-7	189.8	2,748	3.100	0.017	1.018	0.017	1.120
Dep09-5	254.8	2,690	2.100	0.017	0.996	0.017	1.100
Dep20B-30	184.2	2,656	3.200	0.017	0.984	0.017	1.090
88% Mass	**12,358.8**						
Dep13-5	1.2	25	74.000	0.017	0.009	0.000	1.080
Dep03-1	13.0	337	7.100	0.017	0.125	0.002	1.080
Dep18-10	92.1	2,069	5.300	0.017	0.766	0.013	1.050
Dep14-1	147.0	2,687	3.900	0.017	0.995	0.017	1.030
Dep33C-15	192.5	2,627	3.700	0.017	0.973	0.017	1.010
Dep33C-19	230.1	2,708	3.400	0.017	1.003	0.017	0.990
Dep20C-15	146.9	2,684	3.300	0.017	0.994	0.017	0.970
Dep23-4	100.8	1,347	3.200	0.017	0.499	0.008	0.970
Dep24-1	186.1	2,680	3.100	0.017	0.993	0.017	0.950
Dep14-6	201.3	2,673	2.800	0.017	0.990	0.017	0.930

Identifier	Volume within RMU (cu. yd.)	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Post-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)	Cumulative SWAC Reduction (mg/Kg)
Dep20B-31	209.1	2,743	2.800	0.017	1.016	0.017	0.920
Dep02-1	108.3	2,331	2.800	0.017	0.863	0.015	0.900
Dep20A-12	178.1	2,704	2.700	0.017	1.001	0.017	0.890
Dep25-1	3.1	80	2.700	0.017	0.030	0.001	0.890
Dep09-2	227.9	2,704	2.600	0.017	1.001	0.017	0.870
Dep20C-29	142.9	2,692	2.600	0.017	0.997	0.017	0.860
Dep11-1	5.7	147	2.600	0.017	0.054	0.001	0.860
Dep20C-16	179.4	2,695	2.500	0.017	0.998	0.017	0.840
Dep20B-42	174.2	2,764	2.500	0.017	1.024	0.017	0.830
Dep26A-5	224.0	2,708	2.400	0.017	1.003	0.017	0.820
Dep33C-20	216.0	2,654	2.400	0.017	0.983	0.017	0.800
Dep20B-2	104.8	2,697	2.400	0.017	0.999	0.017	0.790
Dep20B-1	25.8	664	2.400	0.017	0.246	0.004	0.790
Dep14-10	98.5	1,804	2.300	0.017	0.668	0.011	0.780
Dep26B-13	212.0	2,693	2.300	0.017	0.997	0.017	0.760
Dep20A-11	141.2	2,680	2.300	0.017	0.993	0.017	0.750
Dep06-1	139.5	2,745	2.300	0.017	1.017	0.017	0.740
Dep09-3	218.5	2,692	2.300	0.017	0.997	0.017	0.730
Dep20A-8	153.3	2,736	2.300	0.017	1.013	0.017	0.710
Dep19-1	34.6	892	2.300	0.017	0.330	0.006	0.710
Dep26A-3	207.5	2,706	2.200	0.017	1.002	0.017	0.700
Dep20A-2	189.0	2,712	2.200	0.017	1.004	0.017	0.680
Dep20B-35	149.1	2,821	2.200	0.017	1.045	0.018	0.670
Dep17-1	124.9	2,725	2.200	0.017	1.009	0.017	0.660
Dep26B-15	69.6	1,373	2.200	0.017	0.509	0.009	0.650
Dep21-2	61.8	1,130	2.200	0.017	0.419	0.007	0.650
Dep20B-43	321.0	2,726	2.100	0.017	1.010	0.017	0.630
Dep20C-17	192.6	2,731	2.100	0.017	1.011	0.017	0.620
Dep20A-3	187.0	2,711	2.100	0.017	1.004	0.017	0.610
Dep26A-1	150.5	2,687	2.100	0.017	0.995	0.017	0.600
Dep16-3	198.4	2,700	2.100	0.017	1.000	0.017	0.590
Dep23-1	148.7	2,636	2.100	0.017	0.976	0.017	0.580
Dep26A-2	230.5	2,720	2.100	0.017	1.007	0.017	0.560
Dep29-1	135.4	2,672	2.100	0.017	0.990	0.017	0.550
Dep16-4	182.1	2,724	2.100	0.017	1.009	0.017	0.540

Identifier	Volume within RMU (cu. yd.)	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Post-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)	Cumulative SWAC Reduction (mg/Kg)
Dep24-2	74.2	1,417	2.100	0.017	0.525	0.009	0.530
Dep15-1	25.1	647	2.100	0.017	0.240	0.004	0.530
Dep20A-13	155.2	2,703	2.100	0.017	1.001	0.017	0.520
Dep20B-36	246.9	2,681	2.000	0.017	0.993	0.017	0.510
Dep31-1	143.9	2,747	2.000	0.017	1.017	0.017	0.500
SWAC Goal	**19,660.1**						
Dep27-1	101.6	2,619	2.000	2.000	0.970	1.940	0.500
Dep26A-4	222.6	2,714	1.900	1.900	1.005	1.910	0.500
Dep20B-40	341.6	2,708	1.900	1.900	1.003	1.906	0.500
Dep20A-4	147.5	2,728	1.800	1.800	1.010	1.819	0.500
Dep20B-32	158.4	2,682	1.800	1.800	0.993	1.788	0.500
Dep20C-20	171.0	2,720	1.800	1.800	1.007	1.813	0.500
Dep33B-21	227.3	2,751	1.800	1.800	1.019	1.834	0.500
Dep20B-46	32.1	534	1.800	1.800	0.198	0.356	0.500
Dep32-8	211.6	2,702	1.700	1.700	1.001	1.701	0.500
Dep04-1	8.7	224	1.700	1.700	0.083	0.141	0.500
Dep20B-41	208.5	2,644	1.600	1.600	0.979	1.567	0.500
Dep33B-22	262.3	2,740	1.600	1.600	1.015	1.624	0.500
Dep20C-25	166.0	2,636	1.600	1.600	0.976	1.562	0.500
Dep14-9	135.3	2,668	1.600	1.600	0.988	1.581	0.500
Dep16-5	140.5	2,683	1.600	1.600	0.994	1.590	0.500
Dep33A-13	313.3	2,694	1.600	1.600	0.998	1.596	0.500
Dep16-6	6.4	127	1.600	1.600	0.047	0.075	0.500
Dep14-4	143.3	2,716	1.500	1.500	1.006	1.509	0.500
Dep09-4	249.7	2,667	1.500	1.500	0.988	1.482	0.500
Dep16-2	207.1	2,668	1.500	1.500	0.988	1.482	0.500
Dep14-8	167.1	2,678	1.500	1.500	0.992	1.488	0.500
Dep33A-10	260.4	2,723	1.500	1.500	1.009	1.513	0.500
Dep31-4	171.4	2,681	1.500	1.500	0.993	1.489	0.500
Dep05-3	50.8	1,001	1.500	1.500	0.371	0.556	0.500
Dep33A-9	173.4	2,806	1.400	1.400	1.039	1.455	0.500
Dep20A-14	152.7	2,708	1.400	1.400	1.003	1.404	0.500
Dep33A-14	277.5	2,717	1.400	1.400	1.006	1.409	0.500
Dep17-2	26.1	673	1.400	1.400	0.249	0.349	0.500
Dep20A-6	165.3	2,660	1.300	1.300	0.985	1.281	0.500

Identifier	Volume within RMU (cu. yd.)	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Post-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)	Cumulative SWAC Reduction (mg/Kg)
Dep09-6	239.2	2,695	1.300	1.300	0.998	1.298	0.500
Dep20C-26	165.8	2,695	1.300	1.300	0.998	1.298	0.500
Dep33B-23	254.0	2,676	1.300	1.300	0.991	1.288	0.500
Dep21-1	140.5	2,619	1.300	1.300	0.970	1.261	0.500
Dep09-8	76.8	1,455	1.300	1.300	0.539	0.701	0.500
Dep20C-19	202.5	2,692	1.200	1.200	0.997	1.196	0.500
Dep23-2	161.1	2,705	1.200	1.200	1.002	1.202	0.500
Dep33A-2	144.5	2,644	1.200	1.200	0.979	1.175	0.500
Dep16-1	156.0	2,738	1.200	1.200	1.014	1.217	0.500
Dep10-1	12.2	314	1.200	1.200	0.116	0.140	0.500
Dep12-1	1.1	29	1.200	1.200	0.011	0.013	0.500
Dep31-5	4.8	95	1.200	1.200	0.035	0.042	0.500
Dep20C-28	173.9	2,708	1.100	1.100	1.003	1.103	0.500
Dep31-2	199.1	2,640	1.100	1.100	0.978	1.076	0.500
Dep27-4	169.4	2,657	1.100	1.100	0.984	1.082	0.500
Dep29-2	32.9	652	1.100	1.100	0.241	0.266	0.500
Dep23-3	267.7	2,735	1.000	1.000	1.013	1.013	0.500
Dep20B-38	241.7	2,628	1.000	1.000	0.973	0.973	0.500
Dep33B-24	259.6	2,676	1.000	1.000	0.991	0.991	0.500
Dep33A-12	317.0	2,728	1.000	1.000	1.010	1.010	0.500
Dep08-1	7.2	185	1.000	1.000	0.069	0.069	0.500
Dep09-7	172.2	2,577	0.900	0.900	0.954	0.859	0.500
Dep20C-22	138.6	2,604	0.900	0.900	0.964	0.868	0.500
Dep27-3	172.7	2,712	0.900	0.900	1.004	0.904	0.500
Dep27-5	139.5	2,743	0.900	0.900	1.016	0.914	0.500
Dep33B-26	167.6	2,676	0.900	0.900	0.991	0.892	0.500
Dep27-2	137.5	2,685	0.900	0.900	0.994	0.895	0.500
Dep32-9	210.9	2,694	0.900	0.900	0.998	0.898	0.500
Dep32-16	149.1	2,693	0.800	0.800	0.997	0.798	0.500
Dep20A-1	140.3	2,639	0.800	0.800	0.977	0.782	0.500
Dep32-3	170.2	2,667	0.800	0.800	0.988	0.790	0.500
Dep32-5	204.1	2,720	0.800	0.800	1.007	0.806	0.500
Dep32-13	155.8	2,701	0.800	0.800	1.000	0.800	0.500
Dep32-10	176.1	2,731	0.800	0.800	1.011	0.809	0.500
Dep32-7	234.1	2,675	0.800	0.800	0.991	0.793	0.500

Identifier	Volume within RMU (cu. yd.)	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Post-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)	Cumulative SWAC Reduction (mg/Kg)
Dep20C-18	201.6	2,681	0.700	0.700	0.993	0.695	0.500
Dep20C-27	156.3	2,702	0.700	0.700	1.001	0.701	0.500
Dep32-4	182.8	2,659	0.700	0.700	0.985	0.689	0.500
Dep33B-25	219.4	2,740	0.700	0.700	1.015	0.710	0.500
Dep32-1	142.2	2,879	0.700	0.700	1.066	0.746	0.500
Dep32-12	170.7	2,717	0.700	0.700	1.006	0.704	0.500
Dep33A-11	306.6	2,711	0.700	0.700	1.004	0.703	0.500
Dep33B-27	121.1	2,714	0.700	0.700	1.005	0.704	0.500
Dep33B-28	100.7	2,590	0.700	0.700	0.959	0.671	0.500
Dep20A-5	55.2	1,090	0.600	0.600	0.404	0.242	0.500
Dep33A-7	213.3	2,657	0.600	0.600	0.984	0.590	0.500
Dep20C-24	193.0	2,693	0.600	0.600	0.997	0.598	0.500
Dep32-11	141.0	2,722	0.600	0.600	1.008	0.605	0.500
Dep32-15	159.0	2,696	0.600	0.600	0.999	0.599	0.500
Dep27-6	137.4	2,709	0.600	0.600	1.003	0.602	0.500
Dep32-14	150.1	2,658	0.600	0.600	0.984	0.591	0.500
Dep22-1	28.2	728	0.600	0.600	0.270	0.162	0.500
Dep33A-5	163.9	2,786	0.500	0.500	1.032	0.516	0.500
Dep20B-37	327.8	2,738	0.500	0.500	1.014	0.507	0.500
Dep32-17	138.6	2,668	0.500	0.500	0.988	0.494	0.500
Dep33A-6	189.6	2,702	0.500	0.500	1.001	0.500	0.500
Dep32-2	137.7	2,701	0.500	0.500	1.000	0.500	0.500
Dep32-18	142.6	2,699	0.400	0.400	1.000	0.400	0.500
Dep32-6	229.6	2,773	0.400	0.400	1.027	0.411	0.500
Dep20C-21	141.0	2,720	0.400	0.400	1.007	0.403	0.500
Dep30-1	98.6	1,790	0.400	0.400	0.663	0.265	0.500
Dep33A-3	140.0	2,690	0.400	0.400	0.996	0.399	0.500
Dep33A-8	207.9	2,708	0.300	0.300	1.003	0.301	0.500
Dep31-3	206.4	2,722	0.300	0.300	1.008	0.302	0.500
Dep28-1	5.2	135	0.300	0.300	0.050	0.015	0.500
Dep33A-4	137.2	2,665	0.200	0.200	0.987	0.197	0.500
Dep20C-23	135.8	2,677	0.200	0.200	0.991	0.198	0.500
Dep32-19	39.3	789	0.200	0.200	0.292	0.058	0.500
Dep07-2	39.9	816	0.200	0.200	0.302	0.060	0.500
Dep20B-47	32.1	827	0.200	0.200	0.306	0.061	0.500

Identifier	Volume within RMU (cu. yd.)	Surface Area (sq. ft.)	Pre-Dredge RMU SWAC (mg/Kg)	Post-Dredge RMU SWAC (mg/Kg)	Surface Weighted Adjustment Factor	Normalized PCB Concentration (mg/Kg)	Cumulative SWAC Reduction (mg/Kg)
Dep33A-1	137.9	2,703	0.100	0.100	1.001	0.100	0.500
Remaining	**15,824.0**						
Total	**35,485.0**	**477,923**					

Table 8
Summary of Process Calculations

Area	Total *In Situ* Sediment Volume (cy)	*In Situ* Sediment Volume to be Removed (cy)	*In Situ* Percent Solids (%)[a]	Sediment Removal Rate (cy/day)	Time Required for Removal (day)	Assumed Percent Solids in Excavated Mat'l or Dredge Slurry (% by wt.)	Production Rate to Dewatering Pad (gpm)[b]	Assumed Percent Solids Dewatered (%)	Water Treatment Volume (million gallons)	Total Weight of Material (After Dewatering) (Tons)[c]	Time Required for Load-out (day)[d]
Near-Shore Sediments	37.0	37.0	62.7	15	2	45.0%	6	60%	.004	48	0
Armored Areas	2,149.4	2,149.4	62.7	100	21	45.0 %	80 (avg) 120 (max)	60%	0.246	3,080	3
Soft Sediment Deposits	33,335.6	33,335.6	59.7	344	97	6.3 %	610 (avg) 2,100 (max)	55%	87.700	47,496	47
Total Quantities (or average rate)	35,485.0	35,485.0			120				87.950	50,624	50

[a] In situ percent solids for Soft Sediment Deposits estimated from weighted average (compositing) of individual samples located within deposit. Estimate for Armored Sediments is derived from an assumed specific gravity of 2.60 and the numerical average of dry density (63.7 pcf), obtained from14 geotechnical samples from the Upper River re-characterization.

[b] Assumes excavator or mechanical dredge operation of 12 h per day for armored and hydraulic dredge operation of 6.5 h per day for soft sediment deposits. Production rate determined on basis of total dry tons of sediment, *in situ* removal rate, specific gravity, and percent solids expected as delivered to pad. Flow rate and water treatment volume for soft sediments increases by factor of 1.3 if dredge % solids decreases to 5.0%.

[c] Dewatered, wet tonnage of sediment expected to be delivered to landfill.

[d] Assumes load-out rate of dewatered sediment at 1000 wet tons per day.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Near Shore Sediment Volume (where identified with poling)

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the potential volume of the Near Shore Sediments to be removed during Phase II.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. <u>Design Restrictions</u>: There are no design restrictions for the effective removal of Near Shore Sediments.

4. <u>Process Performance Criteria</u>: There is no process performance criteria associated with this activity.

5. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with removal of Near Shore Sediments with the possible exception being access restrictions.

6. <u>Expected Removal or Treatment Efficiencies</u>: Poling during the 2004 recharacterization showed no sediment present at the Near Shore area. Prior to removal, confirmation poling will be performed, and if found, removal rate would be 15 cubic yards per day.

METHODOLOGY:

The volume of the near shore sediments is determined as follows:

Volume = A x t

Where:

A = area for Near Shore
t = 0.2 ft.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ____ DATE: ____	CB02-010

= average thickness of poling results

MATERIAL CHARACTERISTICS:

Near Shore Sediment materials characteristics are as follows:

Approximate distance between midpoints of samples ASD#9 and ASD#10 = 50 ft.
Assumed width of all near shore is 20 ft.

COMPUTATIONS:

The following is an example for ASD #9:

Surface area	= 1000 sq. ft.
Re-deposited sediment average thickness	= 0.2 ft.
V_1 = (1000 ft^2 x 0.2 ft) x 1/27 cy/ft^3	= 7.4 cy

CONCLUSIONS:

The results of the Near Shore Sediment volumes for 1999 (BBL) and 2004 (PRS) are shown in Sediment Removal Design, Table 1.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

SUBJECT:

Armored Areas – Re-deposited (Overburden) Material Volume

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the volume of the Armored Areas re-deposited (Overburden) material to be removed during Phase II.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. <u>Design Restrictions</u>: There are no design restrictions for the effective removal of the re-deposited (Overburden) material from the Armored Areas.

4. <u>Process Performance Criteria</u>: There is no process performance criteria associated with this activity.

5. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with removal of the re-deposited (Overburden) material from the Armored Areas with the possible exception being access restrictions.

6. <u>Expected Removal or Treatment Efficiencies</u>: The expected removal rate with this activity will be 100 cubic yards per day.

METHODOLOGY:

The volume of the Armored Area re-deposited (Overburden) material is determined as follows:

$$V_1 = A \times t$$

Where:

V_1 = re-deposited (Overburden) material volume
A = surface area (ft^2)
t = assumed average thickness (1 ft)

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

MATERIAL CHARACTERISTICS:

Armored Area re-deposited (Overburden) materials characteristics are as follows:

Surface area is given in the Feasibility Study report (FSR), 1998. Actual volumes will be determined by weight in tons (load out tickets) delivered to the landfill.

COMPUTATIONS:

The following is an example for Armored Area 1:

Surface area = 2800 sq. ft.
Average re-deposited thickness = 1.00 ft.

$V_1 = (2800\ ft^2 \times 1.0\ ft) \times 1/27\ cy/ft^3$ = 103.7 cy

CONCLUSIONS:

The results of the Armored Areas re-deposited (Overburden) material volume are shown in the Sediment Removal Design, Table 2.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

SUBJECT:

Armored Areas - Residual Sediment Volume

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the volume of the Armored Areas residual sediment.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. <u>Design Restrictions</u>: There are no design restrictions for the effective removal of the residual sediments.

4. <u>Process Performance Criteria</u>: There is no process performance criteria associated with this activity.

5. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with removal of the residual sediments with the possible exception being access restrictions.

6. <u>Expected Removal or Treatment Efficiencies</u>: The expected removal rate with this activity will be 100 cubic yards per day.

METHODOLOGY:

The volume of the Armored Area residual sediment is determined as follows:

$V_3 = A \times t$

Where:

V_3 = residual sediment volume
A = surface area (1) (ft^2)
t = average thickness (1) (ft)
= 3 inches (or 0.25 feet)

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

MATERIAL CHARACTERISTICS:

Armored Area residual sediment characteristics are as follows:

(1) Surface area and thickness are given in the Feasibility Study report (FSR), 1998.

COMPUTATIONS:

The following is an example for Armored Area 1:

Surface area = 2800 sq. ft.
Average re-deposited thickness = 0.25 ft.

$V_3 = (2800\ ft^2 \times 0.25\ ft) \times 1/27\ cy/ft^3 = 25.9\ cy$

CONCLUSIONS:

The results of the Armored areas residual sediment volume calculations are shown in Sediment Removal Design, Table 2.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

RMU Soft Sediment Volumes

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the volume of the Soft Sediment to be removed during Phase II.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. <u>Design Restrictions</u>: There are no design restrictions for the effective removal of the Soft Sediments.

4. <u>Process Performance Criteria</u>: There is no process performance criteria associated with this activity.

5. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with removal of the Soft Sediments with the possible exception being access restrictions.

6. <u>Expected Removal or Treatment Efficiencies</u>: The expected removal rate with this activity will be 330 cubic yards per day.

METHODOLOGY:

The volume of the soft sediments is determined as follows:

$$\text{Volume (RMU)} = \sum_{i=1}^{n} A_i \times D_i$$

Where:

A_i = area of polygon i

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

D_i = assumed depth of polygon *i* based on sediment thickness [(1)]
n = number of polygons within an RMU [(2)]

MATERIAL CHARACTERISTICS:

Soft sediments characteristics are as follows:

[(1)]The assumed sediment depth of a polygon was solely based on its location within the sediment depth drawings provided in the Pre-Design. Contour sediment depths were normalized as illustrated below in Figure 1 so that the total Upper River sediment volume, when summed over all RMUs, are within 1% of the original Upper River estimates provided in the Pre-Design.

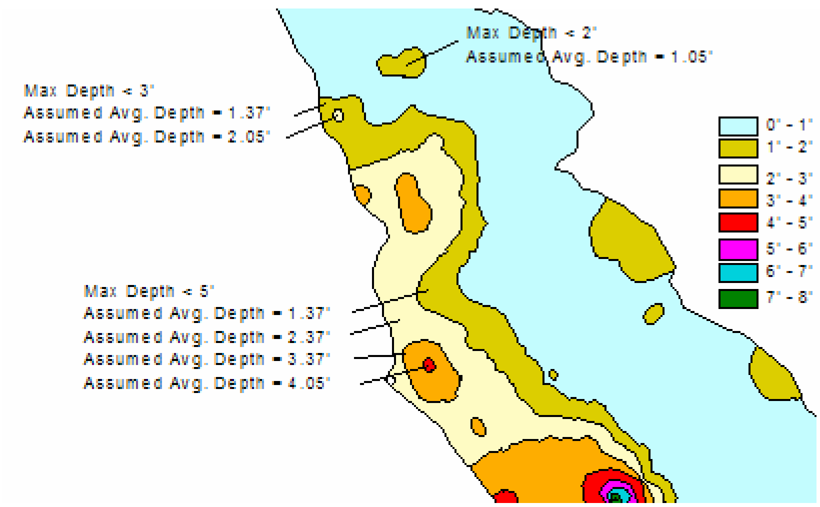


Figure 1. Depth contour polygons

[(2)]Individual polygons within a RMU are developed from sample core Thiessen polygons (generated from sample core PCB data) and intersected with sediment depth contour polygons as illustrated below. PCB Thiessen polygons were obtained from URS.

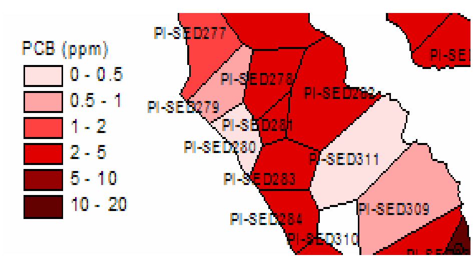


Figure 2. Sample core polygons

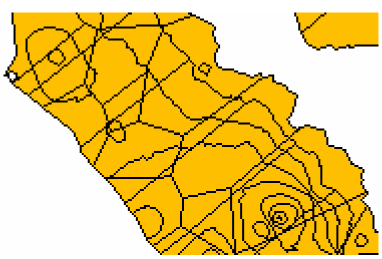


Figure 3. Sample core polygons intersected with depth contour polygons.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ____ DATE: ____	CB02-010

COMPUTATIONS:

The calculations of the Soft Sediment volumes were performed by CADD. Shape files defining RMU boundaries, Thiessen polygon areas and depth contours are maintained in a GIS project file. GIS functionality selects only those intersected polygons within an RMU to provide RMU specific estimates.

CONCLUSIONS:

The results of the Soft Sediment RMU volumes are shown in the Sediment Removal Design, Table 4.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
	BY: ___________	BY: ___________	
	DATE: ___________	DATE: ___________	

SUBJECT:

Backwater Curve Elevations and Distances Resulting from a Temporary Dam location.

PURPOSE AND OBJECTIVE:

The following computations were performed to determine the elevations and associated locations of points along a backwater curve extending from a Temporary Dam location back upstream until it effectively merges with the existing stream elevation.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The material properties and engineering parameters described below are based on available site data and various technical conferences and seminars. They represent the best available preliminary values for the proposed parameters. Actual values will depend upon local conditions, and may vary from the values assumed for these computations.

2. The flow rate (Q) is assumed to be constant and equal to the average of the lowest monthly mean value (in cubic feet per second) for the 20-year period from 1984 to 2003. These values are taken from the months of April to September as these are the months that work will be performed on the river. The values are based on USGS flow gage data in the Sheboygan River. The average of the lowest monthly values is **75 cubic feet / second**.

3. The length (L) of the Sheboygan River along the entire Phase II dredging area is **18,000 feet** (from the site of the existing dam at STA 180+00 to the Tecumseh facility at STA 0+00, see BODR, Drawing #11).

4. The elevation of the river bottom at the starting point of this river segment (the base of the existing dam) is **611.0 feet** (see BODR, Drawing #11).

5. The elevation of the river bottom at the furthest upstream area of excavation and dredging is **619.0 feet** (see BODR, Drawing #11).

6. The average flow gradient of the river along the length of the river segment (the potential location(s) of the backwater curve) is **0.00028 feet per feet**. It is assumed that the flow gradient is constant along the entire length of the river segment without significant local changes in slope.

7. The Manning's roughness coefficient for the riverbed is **0.040**. This is equivalent to an irregularly curving permanent alluvial stream with a smooth bed and/or well developed sediment deposits.

8. The river's average width (b) along the length of the river segment is **120.0 feet**.

9. The backwater curve is assumed to have merged with the river's normal flow depth (Y_n) when the flow depth is equal to $1.01*Y_n$.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED BY: ___________ DATE: ___________	CHECKED BY: ___________ DATE: ___________	PROJECT / PROPOSAL NUMBER

10. The overflow over the proposed dam structure is suppressed (not contracted) through a weir "opening" extending the full width of the channel. It is assumed that upstream velocity is uniform, flow is laminar over the dam crest, nape pressure is zero, the nape is fully ventilated, and the viscosity, turbulence and surface tension effects are negligible.

11. The height (Y_d) of the proposed portable dam structure above the river bottom will be **5.0 feet** (see BODR, Drawing #13). The dam will be placed as needed to ensure a minimum depth of 3.0 feet in the current dredging operations area.

12. The river's cross section is assumed to equivalent to a wide rectangle with the normal depth (depth at which flow neither accelerates nor decelerates) much smaller than the channel width ($Y_n << B$). Therefore the normal flow depth (Y_n) will be equal to the hydraulic radius in the Manning flow equation used to determine the normal depth.

METHODOLOGY:

A. Determining backwater curve starting height

The height of the flow above the dam crest is determined as follows:

$$H = ((3 * Q) / (2 * b * (2 * g)^{1/2}))^{2/3}$$

Where,

H = height of water above the dam crest (feet)
Q = river flow rate (75 cfs)
b = river flow width (120 feet)
g = acceleration due to gravity (32.2 feet / sec ^{2})

The total depth of water at the dam is determined as follows:

$$Y_0 = Y_d + H$$

Where,

Y_0 = total depth of the water at the dam (feet)
H = height of water above the dam crest (feet)
Y_d = height of the proposed dam structure above the river bottom (feet)

B. Determining backwater curve ending height

The normal flow depth is determined from Manning's equation for open channel flow. In a wide rectangular channel with the normal depth very small compared to the channel width, the normal depth can be considered equivalent to the hydraulic radius for simplicity of computation:

$$Q = (1.49 / n) * A * (Y_n^{2/3}) * (S^{1/2})$$

Or,

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
	BY: ___________	BY: ___________	
	DATE: ___________	DATE: ___________	

$Q = (1.49 / n) * b * (Y_n^{5/3}) * (S^{1/2})$

Or,

$Y_n =$ $((Q * n) / (1.49 * b * (S^{1/2})))^{3/5}$

Where,

$Y_n =$ the normal flow depth of the river (feet)
$Q =$ river flow rate (75 cfs)
$n =$ Manning's roughness coefficient (dimensionless)
$b =$ river flow width (120 feet)
$S =$ river flow gradient (0.00046 feet / feet)

The depth of the water at the end of the backwater curve is determined as follows:

$Y_4 =$ $1.01 * Y_n$

Where,

$Y_4 =$ the depth of water at the end of the backwater curve (feet)
$Y_n =$ the normal flow depth of the river (feet)

C. Determining critical (minimum energy) flow depth

The flow rate per unit width is determined as follows:

$q =$ Q / b

Where,

$q =$ flow rate per unit width (square feet per second)
$Q =$ river flow rate (75 cfs)
$b =$ river flow width (120 feet)

The river's critical flow depth is determined as follows:

$Y_c =$ $(q^2 / g)^{1/3}$

Where,

$Y_c =$ critical flow depth (feet)
$q =$ flow rate per unit width (square feet per second)
$g =$ acceleration due to gravity (32.2 feet / sec ^{2})

PROJECT / PROPOSAL NAME	PREPARED BY: ______ DATE: ______	CHECKED BY: ______ DATE: ______	PROJECT / PROPOSAL NUMBER

D. Determining hydraulic flow factors

The average depth of water along the backwater curve is determined as follows:

$$Y_{ave} = (Y_0 + Y_4) / 2$$

Where,

Y_{ave} = the average depth of water along the backwater curve (feet)
Y_0 = total depth of the water at the dam (feet)
Y_4 = the depth of water at the end of the backwater curve (feet)

The ratio of the average flow depth to the channel width is used to determine the hydraulic exponents:

$Y_{ave} / b =$ M and N (from nomographs)

Where,

Y_{ave} = the average depth of water along the backwater curve (feet)
b = river flow width (120 feet)
M = hydraulic exponent (dimensionless from nomograph)
N = hydraulic exponent (dimensionless from nomograph)

The hydraulic constant is determined as follows:

$$J = N / (N - M + 1)$$

Where,

J = hydraulic ratio (dimensionless)
M = hydraulic exponent (dimensionless from nomograph)
N = hydraulic exponent (dimensionless from nomograph)

E. Determining flow depths along the length of the backwater curve

The ratio of depths along the backwater curve to the average normal flow depth is determined as follows:

$$u = Y / Y_n$$

Where,

u = the ratio of flow depths along the backwater curve (dimensionless)
Y = the depth of flow at a point along the backwater curve (feet)
Y_n = the normal flow depth of the river (feet)

The depth ratio values at the same points along the backwater curve are determined as follows:

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED BY: ___________ DATE: ___________	CHECKED BY: ___________ DATE: ___________	PROJECT / PROPOSAL NUMBER

$$v = u^{N/J}$$

Where,

v = depth ratio value (dimensionless)
u = the ratio of flow depths along the backwater curve (dimensionless)
N = hydraulic exponent (dimensionless from nomograph)
J = hydraulic ratio (dimensionless)

The backwater constant is determined as follows:

$$B = (Y_c / Y_n)^M * (J / N)$$

Where,

B = the backwater constant (dimensionless)
Y_c = critical flow depth (feet)
Y_n = the normal flow depth of the river (feet)
J = hydraulic ratio (dimensionless)
M = hydraulic exponent (dimensionless from nomograph)
N = hydraulic exponent (dimensionless from nomograph)

The length of the backwater curve from its start to an elevation along its surface is determined as follows:

$$X = (Y_n / S) * (u - f(u, N) + (B * f(v, J)))$$

Where,

X = length of backwater curve form its start to a particular elevation (feet)
Y_n = the normal flow depth of the river (feet)
S = river flow gradient (0.00046 feet / feet)
u = the ratio of flow depths along the backwater curve (dimensionless)
B = the backwater constant (dimensionless)
f (u, N) = Bakhmeteff function
f (v, j) = Bakhmeteff function

The length equation for the start point, end point and three points along the backwater curve can be calculated in a tabular format.

MATERIAL CHARACTERISTICS:

The proposed dam structure will be a 5 feet tall Port-A-Dam that is placed across the width of the river.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
	BY: ___________	BY: ___________	
	DATE: ___________	DATE: ___________	

COMPUTATIONS:

Backwater curve computations are performed on the attached spreadsheet.

CONCLUSIONS:

By placing a dam with a height of 5.0 feet, the resultant backwater curve with a minimum height of 3.0 feet should extend a distance of approximately 3,700 feet upstream from the dam location. The proposed temporary dam can be located this distance down stream from the current dredging work area. Port-A-Dams were selected to provide flexibility in the field to accommodate an adequate range of water levels to provide 3 ft of draft, while still being well below the elevation of the 100 yr flood event. It is planned that the enhanced water elevations will remain within the river bank. Water depths will be controlled by the three (3) valved flow through structures.

The location of the each upstream Port-A-Dam was estimated by extending a flat line from the previous Port-A-Dam to a point upstream to where the increased water depth was at 3 ft. The extent of the backwater at each Port-A-Dam location was estimated by extending a flat line from the Port-A-Dam (5 ft above the river bottom) to a point upstream to where the increased water depth intersects the ambient water surface. The ambient water surface is variable at each location and is not provided on the FEMA maps. Therefore, ambient water depth was estimated based on informal poling along the river profile, in most cases estimated to be approximately 2 ft deep.

REFERENCES:

"Practical Hydraulics", Andrew L. Simon Ph.D. (1981)

US Geologic Survey, Water Resources Data (website)

A. Backwater Curve Starting Height

i.	River Flow Rate, Q =	75.00	cfs
ii.	River Flow Width, b =	120.00	feet
iii.	Acceleration due to gravity, g =	32.20	feet / sec^2
iv.	Height of flow above dam crest, H = ((3 * Q) / (2 * b * (2 * g) ^ (1/2))) ^ (2/3)	0.0037	feet
v.	Height of existing dam structure above the river bottom, Yde = (portable dams to be located where ther is no existing dam)	0.00	feet
vi.	Height of proposed dam structure above the river bottom, Yd =	5.00	feet
vii.	Height of water at the start of the backwater curve, Y0 = (H + Yd)	5.00	feet

B. Backwater Curve Ending Height

i.	River bottom elevation at start, E1 =	611.00	feet
ii.	River bottom elevation at end, E2 =	619.00	feet
iii.	Length of river, L =	18,000.00	feet
iv.	River flow gradient, S = (E2 - E1) / L	0.000444	feet / feet
v.	Manning'sroughness coefficient, n =	0.040	
vi.	Normal flow depth, Yn = ((Q * n) / (1.49 * b * (S ^ (1/2)))) ^ (3/5)	0.87	feet
vii.	Backwater curve ending height, Y4 = (1.01 * Yn)	0.88	feet

C. Critical Flow Depth

i.	Flow rate per unit width, q =	0.63	sf / sec

(Q / b)

ii. Critical flow depth, Yc = 0.23 feet

((q ^ 2) / g) ^ (1/3)

D. Hydraulic Flow Factors

i. Average depth of backwater curve, Yave = 2.94 feet

(Y0 + Y4) / 2

ii. Ratio of average depth to river width, Yave/b = 0.02

iii. Hydraulic exponent, M = *3.00*

(from nomograph)

iv. Hydraulic exponent, N = ***3.25***

(from nomograph)

v. Hydraulic constant, J = **2.60**

(N / (N - M + 1))

vi. Hydraulic ratio, N/J = 1.25

(N / J)

vii. Backwater constant, B = 0.01

((Yc / Yn) ^ M) * (J / N)

E. Flow Depths Along Backwater Curve

	Y (feet)	u	v	f(u,**N**) **3.250**	f(v,**J**) **2.600**	B * f(V,J)	X (feet)	L (feet)
Y0	5.00	5.74	8.88	*0.022*	*0.042*	0.0006	11,216	0
Y1	3.97	4.56	6.66	*0.035*	*0.063*	0.0009	8,872	2,344
Y2	2.94	3.37	4.57	*0.062*	*0.098*	0.0014	6,501	4,715
Y3	1.91	2.19	2.67	*0.143*	*0.221*	0.0032	4,027	7,190
Y4	0.88	1.01	1.01	*1.291*	*1.757*	0.0257	-501	11,717

Interpolation results

	Y (feet)	L (feet)
Y1	3.97	2,344
	3.00	**4,582**
Y2	2.94	4,715

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Dewatering

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the operating parameters (minimum required length and overall volume) of the Geotube system to be used for dewatering sediment dredged from the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The material properties and engineering parameters described below are based on published data from manufacturers, suppliers and various technical conferences and seminars. They represent the best available preliminary values for the proposed system components. Actual values will depend upon specific manufacturing processes, installation procedures, site characteristics and other local conditions, and may vary from the values assumed for these computations.

2. The material properties and engineering parameters described below are assumed to be consistent along the entire extent of the system being analyzed. Local variations are assumed to be minimal.

3. Approximately **35,484 bank cubic yards** of sediments are to be dredged.

4. The average specific gravity of the solids to be dredged is approximately **2.5**.

5. The dredging operation rate will be approximately **300,000 gallons per day**.

6. <u>Design Restrictions</u>: There are no design restrictions for the effective dewatering of the sediments.

7. <u>Process Performance Criteria</u>: The process performance criteria associated with this activity is based on dewatered solids content (see below).

8. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with dewatering.

9. <u>Expected Removal or Treatment Efficiencies</u>: The expected removal rate associated with this activity is approximately 610 gpm (average), 2100 gpm (maximum).

METHODOLOGY:

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: _____ DATE: _____	CB02-010

The amount (length and volume) of Geotube(s) needed to achieve the dewatering parameters described above is determined by a software program used by the Geotube supplier/manufacturer.

MATERIAL CHARACTERISTICS:

1. The percent solids of the sediments is approximately **60%**.
2. The percent solids of the dredged slurry to be dewatered is approximately **7%**.
3. The percent solids of the dewatered material is approximately **55%**.
4. The percent of coarse grained materials (sand and gravel) within the solids is approximately **30%**.

COMPUTATIONS:

Dewatering Pad Basis of Design and Calculations

AREA

1)	109,200	Sq Ft	Total Dewatering Pad Area	The dewatering pad will be approximately 455 feet wide by 240 feet. There will be a perimeter barrier along the outside edge of the pad. A 20 foot wide separation strip will be located around the entire area between the perimeter barrier and the geotextile tubes. The geotextile tubes will consist of 200 feet long by 60 foot circumference (approximately 25 wide by 6 ft high (when full) by 200 feet long) tubes. Each tube holds approximately 1,100 cubic feet of dewatered sediment. The first layer geotextile tubes will be placed in two rows, an east row and a west row, with eight geotextile tubes in each row. An access strip 15 feet wide will be located between the two rows.
2)	80,000	Sq Ft	Area of geotextile tubes	Area of first layer of geotextile tubes = 2 rows x 8 units/row x 25 ft wide x 200 ft long/unit = 80,000 sq ft.
3)	3,000	Sq Ft	Area of center access strip	The center access strip will be 15 feet wide by 200 feet long. Area = 200 ft x 15 ft = 3,000 sq ft.
4)	26,200	Sq Ft	Area of	The perimeter separation strip will be approximately

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

			perimeter separation strip	1310 feet long by 20 feet wide.

DEWATERING CAPACITY (assumes dewatered % solids = in situ % solids, conservative)

1)	1,100	CY	Dewatering capacity of each geotextile tube	Each geotextile tube (200ft by 60 ft circumference) can hold approximately 5.5 CY per lineal foot. Therefore, each 200 foot long tube can dewater approximately 200 ft x 5.5 CY/ft = 1,100 CY.
2)	17,600	CY	Dewatering capacity of first layer of geotextile tube	The first layer of geotextile tubes will consist of two rows of 8 tubes per row or 16 geotextile tubes. Each tube can dewater approximately 1,100 CY therefore the first layer of geotextile tubes will has a capacity of approximately = 16 tubes x 1,100 CY/tube = 17,600 CY.
3)	14,630	CY	Dewatering capacity of second layer of geotextile tube	The second layer of geotextile tubes will consist of two rows of 7 tubes per row or 14 geotextile tubes. Since each tube will be approximately 10 feet shorter than the first layer of tubes, the capacity each tube can dewater is approximately 190 ft x 5.5 CY/ft = 1045 CY. The dewatering capacity of the second layer then will be 14 tubes x 1,045 CY/tube = 14630 CY.
4)	32,230	CY	Total capacity of two layers of geotextile tubes	The total capacity of the two layers of tubes is the first layer plus the second layer capacity = 17,600CY = 14630 CY = 32,230 CY.

CONCLUSIONS:

The results of the geotube calculations are shown in the Sediment Removal Design, Table 8.

REFERENCES:

1. Geotube Manufacturer's data and specifications

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

SUBJECT:

Water Treatment System

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the waste water treatment system used to treat the dewatered sediment from the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. Design Restrictions: There are no design restrictions for the effective treatment of the carriage water.

4. Process Performance Criteria: There is no process performance criteria associated with this activity.

5. Appropriate Unit Process for Treatment Train: The limiting factor associated with the treatment stream is 2,100 gpm.

6. Expected Removal or Treatment Efficiencies: The expected treatment efficiencies are to meet the requirements of the WPDES permit.

METHODOLOGY:

Methodology for determining the water treatment facility system is given below.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

MATERIAL CHARACTERISTICS:

Water Treatment Plant Basis of Design and Calculations

1)	2,093	gpm	Maximum dredge flow rate	Based on a 15 ft/sec maximum velocity in an 8" PE SDR 17 pipe. The estimated dredge flow rates are based on sufficient velocity to entrain solids. The estimated velocities required to entrain solids range from 8 to 15 ft/sec. Formula: (Velocity)(Pi)(PipeDia^2/4), Calculation: (15 ft/sec) x (3.14/4) x (7.55^2 in^2) x (ft^2 / 144 in^2) x (7.48 gal/ft^3) x (60 sec/min) = 2093 gal/min
2)	567	gpm	Daily average dredge flow rate	Based on operating the dredge at the maximum estimated flow rate for 6.5 hours out of a 10 hour shift and one shift per day. Formula: (max flow) x (hrs operated / total hrs), Calculation: 2093 gpm x (6.5 hrs / 24 hrs) = 567 gpm
3)	265	gpm	Maximum precipitation flow rate	Based on 24 hr, 25 year storm even of 0.195 inches per hour or 4.68 inches over 24 hours on a 3 acre pad. (Source: Rainfall Frequency Atlas of the Midwest, Huff and Angel.) Formula: (max rainfall amount)(pad area) / (1440 minutes/day), Calculation: (0.195 in/hr) x (24 hr/day) x (ft / 12 in) x (3 acres) x (43560 ft^2 / acre) x (7.48 gal/ft^3) x (day / 1440 min.) = 265 gpm
4)	6	gpm	Average precipitation flow rate	Based on 40 inches/year average annual precipitation on a 3 acre pad. Formula: (Average rainfall per year)(Pad area) / (minutes/year), Calculation: (40 in / year) x (year / 365 days) x (ft / 12 in) x (3 acres) x (43560 ft^2 / acre) x (7.48 gal/ft^3) x (day / 1440 min.) = 6 gpm

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

5)	2,100	gpm	Treatment plant design flow rate	Based on maximum dredge flow rates. The maximum precipitation rain event is not added to the maximum design of the water treatment plant as a rain event which occurs during dredging operations may be temporarily stored on dewatering pad. The filter backwash water will be pumped to a geotube. This backwash water may also be temporarily stored on the dewatering pad. Calculation: 3 filters x 700 gpm/filter = 2,100 gpm
6)	700	gpm	Sand filter design flow rate	Based on Calgon Corporation's specifications for Calgon's 10 ft diameter sand filter.
7)	700	gpm	GAC filter design flow rate	Based on Calgon Corporation's specifications for Calgon's 10 ft diameter GAC filter.
8)	1,178	gpm	Backwash flow rate (maximum)	Based on 15 gpm/ft^2 for the 10 ft diameter sand filter. Formula: (backwash flux)(Pi)(Dia^2/4), Calculation: 15 gpm/ft^2 x (10 ft)^2 x 3.14/4 = 1178 gpm
9)	11,781	gal.	Backwash volume per filter	Based on 10 minute backwash at 15 gpm/ft^2. Formula: (backwash flow rate) x (backwash duration). Calculation: 1178 gpm x 10 minutes = 11,781 gallons
10)	25	gpm	Backwash flow rate (average)	Based on one backwash per day per filter. Formula: (backwash daily volume)/(1440 min/day), Calculation: (11781 gal/day) x 3 filters x (day/ 1440 min) = 25 gpm
11)	35,342	gal.	Effluent storage	Based on storage for backwashing 3 filters. Calculation: 11,781 gallons x 3 filters = 35,342 gallons
12)	31,500 to 63,000	gal.	Influent equalization	Based on 15 to 30 minutes of equalization at maximum design flows. Formula: (max design flow) x (equalization duration), Calculation: 2,100 gpm x 15 min = 31,500 gallons. 2,100 gpm x 30 min = 63,000 gallons.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

CONCLUSIONS:

The results of the water treatment system calculations are shown in the text of Sediment Removal Design.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Dry Unit Weight

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the in-situ dry unit weight of the Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

The specific gravity in the above calculation was determined utilizing the 14 sets of moisture content and dry weight results from the 2004 geotechnical data (Geotest Summary of Shelby Tube Laboratory Test Results, 1/2/2004). The average specific gravity was determined as follows:

$$G_s = \frac{1}{14}\sum_{1}^{14} \frac{\gamma_{dry}}{\gamma_{water} - \left(\omega / 100 \times \gamma_{dry} \right)} \cong 2.5$$

Where:

$$\gamma_{dry} = Dry\,Unit\ Weight$$
$$\omega = Percent\ \ Moisture\,Content$$

A dry unit weight associated with the Soft Sediment at each sample location was found as:

$$Dry\ \ Unit\ \ Weight\ \ (lbs\ /\ ft^3) = \frac{\gamma_{water}}{\left(1/G_s \right) + \left(100/PS \right) - 1}$$

Where:

ENGINEERING COMPUTATION SHEET

SHEET 2 OF 2

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

$$\gamma_{water} = unit\ weight\ of\ water = 62.4\ lbs/ft^3$$

$$G_s = Average\ Specific\ Gravity$$

$$PS = Percent\ Solids$$

MATERIAL CHARACTERISTICS:

Estimates of dry unit weight utilized percent solids measurements taken during the 2004 Upper River soft sediment re-characterization. Percent solids data was available from a total of 385 soft sediment re-characterization samples.

COMPUTATIONS:

Percent solids (PS) for Soft Sediment Deposit number 1 was 62.8 found from the 2004 Upper River soft sediment re-characterization samples.

Example (Dep-1):

$$Dry\ Unit\ Weight\ (lbs/ft^3) = \frac{62.4\ \text{lbs / ft}^3}{(1/2.5) + (100\% / 62.8\%) - 1} = 62.9\ \text{lbs / ft}^3$$

CONCLUSIONS:

The results for dry unit weight calculations for Soft Sediments by Deposit and RMU is shown in Sediment Removal Design, Table 3 and 4.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

SUBJECT:

Pre-Dredge PCB Mass Estimate

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the Pre-dredge PCB Mass of the Armored Areas and Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

PCB mass calculations for Armored Areas and Soft Sediment RMU areas utilized dry unit weight estimates.

Mass $= V \times C \times \gamma_{dry} \times (27 / 10^6)$

Where

V = volume in cubic yards
γ_{dry} = dry unit weight in lbs/ft^3
C = PCB concentration

COMPUTATIONS:

The following are examples:

Armored Area 1

Dry unit weight = average of dry unit weight from geotechnical data, PRS 2004
= 60.0+65.7+75.7+87.7+40.4+77.8+73.5+103.3+31.2+46.9+56.4+51.0 +35.6+106.2
= 63.7 lbs/ft^3

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

M (Total) $= M_1 + M_2 + M_3$

Where

M_1 = PCB mass in re-deposited (Overburden) material volume
M_2 = PCB mass of armoring material volume = 0
M_3 = PCB mass in residual sediment volume

$M_1 = V \times C \times \gamma_{dry} \times (27 / 10^6)$

Where

V = volume in cubic yards = 103.7
γ_{dry} = dry unit weight in lbs/ft^3 = 63.7
C = PCB concentration
= Average concentration from Soft Sediment Deposit 1 to Riverbend Dam
= 8.4 ppm

$M_1 = 103.7 \times 8.4 \times 63.7 \times (27 / 10^6) = 1.5$ lbs

$M_3 = V \times C \times \gamma_{dry} \times (27 / 10^6)$

Where

V = volume in cubic yards = 25.9
γ_{dry} = dry unit weight in lbs/ft^3 = 63.7
C = PCB concentration
= Concentration based on Feasibility Study Report, BBL, 1998

$M_3 = 25.9 \times 295 \times 63.7 \times (27 / 10^6) = 13.1$ lbs

M (Total) = 1.5 + 13.1 = 14.6 lbs

Sediment Deposit 1 RMU 1

Results of 2004 re-characterization sample core PI-Sed1:

$M = V \times C \times \gamma_{dry} \times (27 / 10^6)$

V = volume in cubic yards = 54.1
γ_{dry} = dry unit weight in lbs/ft^3 = 62.9
C = PCB concentration = 12

$M = 54.1 \times 12 \times 62.9 \times (27 / 10^6) = 1.1$ lbs.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

CONCLUSIONS:

Final results of the mass calculations are shown in the Sediment Removal Design, Tables 3 and 4.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Post-Dredge PCB Mass

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the post-dredge PCB mass of the Armored Area and Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

Post-dredge PCB mass will be calculated as a percentage of pre-dredge mass given the ratio of post-dredge sediment volume with pre-dredge sediment volume. The post-dredge sediment volume of an RMU is calculated as the average of the sediment thicknesses measured during post-dredge sampling, multiplied by the RMU area. Using this information, PCB mass removed in an RMU is estimated as:

Post-dredge volume = residual thickness sediment average x area [(1)]

Removal volume = pre-dredge volume – post-dredge volume

PCB mass removed = (pre-dredge PCB mass [(2)]) x (removal volume ÷ pre-dredge volume)

MATERIAL CHARACTERISTICS:

[(1)]The representative surface area for an Armored Area or sediment RMU is defined by the pre-dredge surface area.

[(2)]Pre-dredge PCB mass is taken from the calculations performed (pre-dredge mass section).

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ____ DATE: ____	CB02-010

COMPUTATIONS:

The following is an example:

Sediment Deposit DEP 1-1

Pre-dredge volume	= 54 cy
Pre-dredge PCB mass	= 1.1 lbs.
Assumed post-dredge volume	= 8.3 cy
Assumed PCB mass removed	= (1.1 lbs) * ((54-8.3)/54) = .93 lbs

CONCLUSIONS:

Final results of the post dredge mass calculations are pending removal activities and will be determined in real time to bench mark to the project objectives to meet 88% removal. An example is shown in the Sediment Removal Design, Table 5.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Assumed Pre-Dredge PCB Surface Weighted Average Concentration (SWAC) by RMU

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the pre-dredge PCB SWAC for the Armored Areas and Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

Upper River assumed pre-dredge SWAC by RMU is calculated as:

SWAC = SWAA x C

Where

SWAA = surface weighted adjusted area of an associated Armored Area or Soft Sediment RMU
= area of deposit or RMU / 2700 square feet
C = PCB concentration of associated Armored Area or Soft Sediment RMU

MATERIAL CHARACTERISTICS:

Assumed that core samples from the 2004 data represent the surface concentration.

COMPUTATIONS:

The calculations of the Armored Areas and Soft Sediment volumes are shown in previous calculations. The following is an example:

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

Sediment Deposit 1 RMU 1

Concentration = 12 ppm
Area = 909 ft^2

SWAA = 909 / 2700
= 0.337

SWAC = 12 x .337
= 4.0 ppm

CONCLUSIONS:

The results of the assumed pre-dredge SWAC are shown in the Sediment Removal Design, Table 6.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Near Shore Sediment Volume (where identified with poling)

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the potential volume of the Near Shore Sediments to be removed during Phase II.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. <u>Design Restrictions</u>: There are no design restrictions for the effective removal of Near Shore Sediments.

4. <u>Process Performance Criteria</u>: There is no process performance criteria associated with this activity.

5. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with removal of Near Shore Sediments with the possible exception being access restrictions.

6. <u>Expected Removal or Treatment Efficiencies</u>: Poling during the 2004 recharacterization showed no sediment present at the Near Shore area. Prior to removal, confirmation poling will be performed, and if found, removal rate would be 15 cubic yards per day.

METHODOLOGY:

The volume of the near shore sediments is determined as follows:

Volume = A x t

Where:

A = area for Near Shore
t = 0.2 ft.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: _____ DATE: _____	CB02-010

= average thickness of poling results

MATERIAL CHARACTERISTICS:

Near Shore Sediment materials characteristics are as follows:

Approximate distance between midpoints of samples ASD#9 and ASD#10 = 50 ft.
Assumed width of all near shore is 20 ft.

COMPUTATIONS:

The following is an example for ASD #9:

Surface area	= 1000 sq. ft.
Re-deposited sediment average thickness	= 0.2 ft.
V_1 = (1000 ft^2 x 0.2 ft) x 1/27 cy/ft^3	= 7.4 cy

CONCLUSIONS:

The results of the Near Shore Sediment volumes for 1999 (BBL) and 2004 (PRS) are shown in Sediment Removal Design, Table 1.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

SUBJECT:

Armored Areas – Re-deposited (Overburden) Material Volume

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the volume of the Armored Areas re-deposited (Overburden) material to be removed during Phase II.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. Design Restrictions: There are no design restrictions for the effective removal of the re-deposited (Overburden) material from the Armored Areas.

4. Process Performance Criteria: There is no process performance criteria associated with this activity.

5. Appropriate Unit Process for Treatment Train: There is no limiting factor associated with removal of the re-deposited (Overburden) material from the Armored Areas with the possible exception being access restrictions.

6. Expected Removal or Treatment Efficiencies: The expected removal rate with this activity will be 100 cubic yards per day.

METHODOLOGY:

The volume of the Armored Area re-deposited (Overburden) material is determined as follows:

$$V_1 = A \times t$$

Where:

V_1 = re-deposited (Overburden) material volume
A = surface area (ft^2)
t = assumed average thickness (1 ft)

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

MATERIAL CHARACTERISTICS:

Armored Area re-deposited (Overburden) materials characteristics are as follows:

Surface area is given in the Feasibility Study report (FSR), 1998. Actual volumes will be determined by weight in tons (load out tickets) delivered to the landfill.

COMPUTATIONS:

The following is an example for Armored Area 1:

Surface area	= 2800 sq. ft.
Average re-deposited thickness	= 1.00 ft.

$V_1 = (2800\ ft^2 \times 1.0\ ft) \times 1/27\ cy/ft^3 = 103.7\ cy$

CONCLUSIONS:

The results of the Armored Areas re-deposited (Overburden) material volume are shown in the Sediment Removal Design, Table 2.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Armored Areas - Residual Sediment Volume

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the volume of the Armored Areas residual sediment.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. <u>Design Restrictions</u>: There are no design restrictions for the effective removal of the residual sediments.

4. <u>Process Performance Criteria</u>: There is no process performance criteria associated with this activity.

5. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with removal of the residual sediments with the possible exception being access restrictions.

6. <u>Expected Removal or Treatment Efficiencies</u>: The expected removal rate with this activity will be 100 cubic yards per day.

METHODOLOGY:

The volume of the Armored Area residual sediment is determined as follows:

$V_3 = A \times t$

Where:

V_3 = residual sediment volume
A = surface area (1) (ft^2)
t = average thickness (1) (ft)
= 3 inches (or 0.25 feet)

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

MATERIAL CHARACTERISTICS:

Armored Area residual sediment characteristics are as follows:

(1) Surface area and thickness are given in the Feasibility Study report (FSR), 1998.

COMPUTATIONS:

The following is an example for Armored Area 1:

Surface area	= 2800 sq. ft.
Average re-deposited thickness	= 0.25 ft.
$V_3 = (2800\ ft^2 \times 0.25\ ft) \times 1/27\ cy/ft^3$	= 25.9 cy

CONCLUSIONS:

The results of the Armored areas residual sediment volume calculations are shown in Sediment Removal Design, Table 2.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

RMU Soft Sediment Volumes

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the volume of the Soft Sediment to be removed during Phase II.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. <u>Design Restrictions</u>: There are no design restrictions for the effective removal of the Soft Sediments.

4. <u>Process Performance Criteria</u>: There is no process performance criteria associated with this activity.

5. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with removal of the Soft Sediments with the possible exception being access restrictions.

6. <u>Expected Removal or Treatment Efficiencies</u>: The expected removal rate with this activity will be 330 cubic yards per day.

METHODOLOGY:

The volume of the soft sediments is determined as follows:

$$\text{Volume (RMU)} = \sum_{i=1}^{n} A_i \times D_i$$

Where:

A_i = area of polygon *i*

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

D_i = assumed depth of polygon i based on sediment thickness [1]
n = number of polygons within an RMU [2]

MATERIAL CHARACTERISTICS:

Soft sediments characteristics are as follows:

[1]The assumed sediment depth of a polygon was solely based on its location within the sediment depth drawings provided in the Pre-Design. Contour sediment depths were normalized as illustrated below in Figure 1 so that the total Upper River sediment volume, when summed over all RMUs, are within 1% of the original Upper River estimates provided in the Pre-Design.

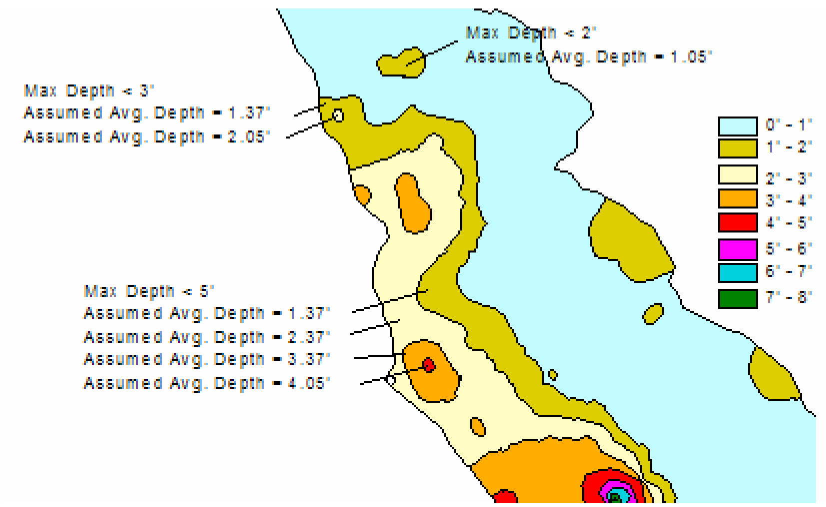


Figure 1. Depth contour polygons

[2]Individual polygons within a RMU are developed from sample core Thiessen polygons (generated from sample core PCB data) and intersected with sediment depth contour polygons as illustrated below. PCB Thiessen polygons were obtained from URS.

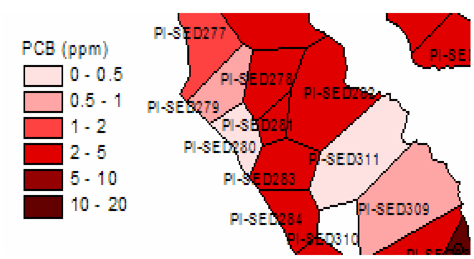


Figure 2. Sample core polygons

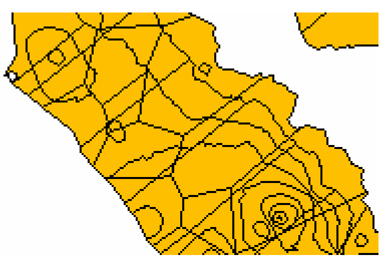


Figure 3. Sample core polygons intersected with depth contour polygons.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

COMPUTATIONS:

The calculations of the Soft Sediment volumes were performed by CADD. Shape files defining RMU boundaries, Thiessen polygon areas and depth contours are maintained in a GIS project file. GIS functionality selects only those intersected polygons within an RMU to provide RMU specific estimates.

CONCLUSIONS:

The results of the Soft Sediment RMU volumes are shown in the Sediment Removal Design, Table 4.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED BY: __________ DATE: __________	CHECKED BY: __________ DATE: __________	PROJECT / PROPOSAL NUMBER

SUBJECT:

Backwater Curve Elevations and Distances Resulting from a Temporary Dam location.

PURPOSE AND OBJECTIVE:

The following computations were performed to determine the elevations and associated locations of points along a backwater curve extending from a Temporary Dam location back upstream until it effectively merges with the existing stream elevation.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The material properties and engineering parameters described below are based on available site data and various technical conferences and seminars. They represent the best available preliminary values for the proposed parameters. Actual values will depend upon local conditions, and may vary from the values assumed for these computations.

2. The flow rate (Q) is assumed to be constant and equal to the average of the lowest monthly mean value (in cubic feet per second) for the 20-year period from 1984 to 2003. These values are taken from the months of April to September as these are the months that work will be performed on the river. The values are based on USGS flow gage data in the Sheboygan River. The average of the lowest monthly values is **75 cubic feet / second**.

3. The length (L) of the Sheboygan River along the entire Phase II dredging area is **18,000 feet** (from the site of the existing dam at STA 180+00 to the Tecumseh facility at STA 0+00, see BODR, Drawing #11).

4. The elevation of the river bottom at the starting point of this river segment (the base of the existing dam) is **611.0 feet** (see BODR, Drawing #11).

5. The elevation of the river bottom at the furthest upstream area of excavation and dredging is **619.0 feet** (see BODR, Drawing #11).

6. The average flow gradient of the river along the length of the river segment (the potential location(s) of the backwater curve) is **0.00028 feet per feet**. It is assumed that the flow gradient is constant along the entire length of the river segment without significant local changes in slope.

7. The Manning's roughness coefficient for the riverbed is **0.040**. This is equivalent to an irregularly curving permanent alluvial stream with a smooth bed and/or well developed sediment deposits.

8. The river's average width (b) along the length of the river segment is **120.0 feet**.

9. The backwater curve is assumed to have merged with the river's normal flow depth (Y_n) when the flow depth is equal to $1.01*Y_n$.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED BY: ___________ DATE: ___________	CHECKED BY: ___________ DATE: ___________	PROJECT / PROPOSAL NUMBER

10. The overflow over the proposed dam structure is suppressed (not contracted) through a weir "opening" extending the full width of the channel. It is assumed that upstream velocity is uniform, flow is laminar over the dam crest, nape pressure is zero, the nape is fully ventilated, and the viscosity, turbulence and surface tension effects are negligible.

11. The height (Y_d) of the proposed portable dam structure above the river bottom will be **5.0 feet** (see BODR, Drawing #13). The dam will be placed as needed to ensure a minimum depth of 3.0 feet in the current dredging operations area.

12. The river's cross section is assumed to equivalent to a wide rectangle with the normal depth (depth at which flow neither accelerates nor decelerates) much smaller than the channel width ($Y_n << B$). Therefore the normal flow depth (Y_n) will be equal to the hydraulic radius in the Manning flow equation used to determine the normal depth.

METHODOLOGY:

A. Determining backwater curve starting height

The height of the flow above the dam crest is determined as follows:

$$H = ((3 * Q) / (2 * b * (2 * g)^{1/2}))^{2/3}$$

Where,

$H =$ height of water above the dam crest (feet)
$Q =$ river flow rate (75 cfs)
$b =$ river flow width (120 feet)
$g =$ acceleration due to gravity (32.2 feet / sec ^{2})

The total depth of water at the dam is determined as follows:

$$Y_0 = Y_d + H$$

Where,

$Y_0 =$ total depth of the water at the dam (feet)
$H =$ height of water above the dam crest (feet)
$Y_d =$ height of the proposed dam structure above the river bottom (feet)

B. Determining backwater curve ending height

The normal flow depth is determined from Manning's equation for open channel flow. In a wide rectangular channel with the normal depth very small compared to the channel width, the normal depth can be considered equivalent to the hydraulic radius for simplicity of computation:

$$Q = (1.49 / n) * A * (Y_n^{2/3}) * (S^{1/2})$$

Or,

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
	BY: ___________	BY: ___________	
	DATE: ___________	DATE: ___________	

$$Q = (1.49 / n) * b * (Y_n^{5/3}) * (S^{1/2})$$

Or,

$$Y_n = ((Q * n) / (1.49 * b * (S^{1/2})))^{3/5}$$

Where,

Y_n = the normal flow depth of the river (feet)
Q = river flow rate (75 cfs)
n = Manning's roughness coefficient (dimensionless)
b = river flow width (120 feet)
S = river flow gradient (0.00046 feet / feet)

The depth of the water at the end of the backwater curve is determined as follows:

$$Y_4 = 1.01 * Y_n$$

Where,

Y_4 = the depth of water at the end of the backwater curve (feet)
Y_n = the normal flow depth of the river (feet)

C. Determining critical (minimum energy) flow depth

The flow rate per unit width is determined as follows:

$$q = Q / b$$

Where,

q = flow rate per unit width (square feet per second)
Q = river flow rate (75 cfs)
b = river flow width (120 feet)

The river's critical flow depth is determined as follows:

$$Y_c = (q^2 / g)^{1/3}$$

Where,

Y_c = critical flow depth (feet)
q = flow rate per unit width (square feet per second)
g = acceleration due to gravity (32.2 feet / sec ^{2})

PROJECT / PROPOSAL NAME	PREPARED BY: DATE:	CHECKED BY: DATE:	PROJECT / PROPOSAL NUMBER

D. Determining hydraulic flow factors

The average depth of water along the backwater curve is determined as follows:

$$Y_{ave} = (Y_0 + Y_4) / 2$$

Where,

Y_{ave} = the average depth of water along the backwater curve (feet)
Y_0 = total depth of the water at the dam (feet)
Y_4 = the depth of water at the end of the backwater curve (feet)

The ratio of the average flow depth to the channel width is used to determine the hydraulic exponents:

$Y_{ave} / b =$ M and N (from nomographs)

Where,

Y_{ave} = the average depth of water along the backwater curve (feet)
b = river flow width (120 feet)
M = hydraulic exponent (dimensionless from nomograph)
N = hydraulic exponent (dimensionless from nomograph)

The hydraulic constant is determined as follows:

$$J = N / (N - M + 1)$$

Where,

J = hydraulic ratio (dimensionless)
M = hydraulic exponent (dimensionless from nomograph)
N = hydraulic exponent (dimensionless from nomograph)

E. Determining flow depths along the length of the backwater curve

The ratio of depths along the backwater curve to the average normal flow depth is determined as follows:

$$u = Y / Y_n$$

Where,

u = the ratio of flow depths along the backwater curve (dimensionless)
Y = the depth of flow at a point along the backwater curve (feet)
Y_n = the normal flow depth of the river (feet)

The depth ratio values at the same points along the backwater curve are determined as follows:

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
	BY: ___________	BY: ___________	
	DATE: ___________	DATE: ___________	

$v = u^{N/J}$

Where,

v = depth ratio value (dimensionless)
u = the ratio of flow depths along the backwater curve (dimensionless)
N = hydraulic exponent (dimensionless from nomograph)
J = hydraulic ratio (dimensionless)

The backwater constant is determined as follows:

$B = (Y_c / Y_n)^M * (J / N)$

Where,

B = the backwater constant (dimensionless)
Y_c = critical flow depth (feet)
Y_n = the normal flow depth of the river (feet)
J = hydraulic ratio (dimensionless)
M = hydraulic exponent (dimensionless from nomograph)
N = hydraulic exponent (dimensionless from nomograph)

The length of the backwater curve from its start to an elevation along its surface is determined as follows:

$X = (Y_n / S) * (u - f(u, N) + (B * f(v, J)))$

Where,

X = length of backwater curve form its start to a particular elevation (feet)
Y_n = the normal flow depth of the river (feet)
S = river flow gradient (0.00046 feet / feet)
u = the ratio of flow depths along the backwater curve (dimensionless)
B = the backwater constant (dimensionless)
f (u, N) = Bakhmeteff function
f (v, j) = Bakhmeteff function

The length equation for the start point, end point and three points along the backwater curve can be calculated in a tabular format.

MATERIAL CHARACTERISTICS:

The proposed dam structure will be a 5 feet tall Port-A-Dam that is placed across the width of the river.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
	BY: ___________	BY: ___________	
	DATE: ___________	DATE: ___________	

COMPUTATIONS:

Backwater curve computations are performed on the attached spreadsheet.

CONCLUSIONS:

By placing a dam with a height of 5.0 feet, the resultant backwater curve with a minimum height of 3.0 feet should extend a distance of approximately 3,700 feet upstream from the dam location. The proposed temporary dam can be located this distance down stream from the current dredging work area. Port-A-Dams were selected to provide flexibility in the field to accommodate an adequate range of water levels to provide 3 ft of draft, while still being well below the elevation of the 100 yr flood event. It is planned that the enhanced water elevations will remain within the river bank. Water depths will be controlled by the three (3) valved flow through structures.

The location of the each upstream Port-A-Dam was estimated by extending a flat line from the previous Port-A-Dam to a point upstream to where the increased water depth was at 3 ft. The extent of the backwater at each Port-A-Dam location was estimated by extending a flat line from the Port-A-Dam (5 ft above the river bottom) to a point upstream to where the increased water depth intersects the ambient water surface. The ambient water surface is variable at each location and is not provided on the FEMA maps. Therefore, ambient water depth was estimated based on informal poling along the river profile, in most cases estimated to be approximately 2 ft deep.

REFERENCES:

"Practical Hydraulics", Andrew L. Simon Ph.D. (1981)

US Geologic Survey, Water Resources Data (website)

A. Backwater Curve Starting Height

i.	River Flow Rate, Q =	75.00	cfs
ii.	River Flow Width, b =	120.00	feet
iii.	Acceleration due to gravity, g =	32.20	feet / sec^2
iv.	Height of flow above dam crest, H = ((3 * Q) / (2 * b * (2 * g) ^ (1/2))) ^ (2/3)	0.0037	feet
v.	Height of existing dam structure above the river bottom, Yde = (portable dams to be located where ther is no existing dam)	0.00	feet
vi.	Height of proposed dam structure above the river bottom, Yd =	5.00	feet
vii.	Height of water at the start of the backwater curve, Y0 = (H + Yd)	5.00	feet

B. Backwater Curve Ending Height

i.	River bottom elevation at start, E1 =	611.00	feet
ii.	River bottom elevation at end, E2 =	619.00	feet
iii.	Length of river, L =	18,000.00	feet
iv.	River flow gradient, S = (E2 - E1) / L	0.000444	feet / feet
v.	Manning'sroughness coefficient, n =	0.040	
vi.	Normal flow depth, Yn = ((Q * n) / (1.49 * b * (S ^ (1/2)))) ^ (3/5)	0.87	feet
vii.	Backwater curve ending height, Y4 = (1.01 * Yn)	0.88	feet

C. Critical Flow Depth

i.	Flow rate per unit width, q =	0.63	sf / sec

	(Q / b)		
ii.	Critical flow depth, Yc =	0.23	feet
	((q ^ 2) / g) ^ (1/3)		

D. Hydraulic Flow Factors

i.	Average depth of backwater curve, Yave =	2.94	feet
	(Y0 + Y4) / 2		
ii.	Ratio of average depth to river width, Yave/b =	0.02	
iii.	Hydraulic exponent, M =	*3.00*	
	(from nomograph)		
iv.	Hydraulic exponent, N =	***3.25***	
	(from nomograph)		
v.	Hydraulic constant, J =	**2.60**	
	(N / (N - M + 1))		
vi.	Hydraulic ratio, N/J =	1.25	
	(N / J)		
vii.	Backwater constant, B =	0.01	
	((Yc / Yn) ^ M) * (J / N)		

E. Flow Depths Along Backwater Curve

	Y (feet)	u	v	f(u,**N**) **3.250**	f(v,**J**) **2.600**	B * f(V,J)	X (feet)	L (feet)
Y0	5.00	5.74	8.88	*0.022*	*0.042*	0.0006	11,216	0
Y1	3.97	4.56	6.66	*0.035*	*0.063*	0.0009	8,872	2,344
Y2	2.94	3.37	4.57	*0.062*	*0.098*	0.0014	6,501	4,715
Y3	1.91	2.19	2.67	*0.143*	*0.221*	0.0032	4,027	7,190
Y4	0.88	1.01	1.01	*1.291*	*1.757*	0.0257	-501	11,717

Interpolation results

Y1	3.97	2,344
	3.00	**4,582**
Y2	2.94	4,715

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Dewatering

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the operating parameters (minimum required length and overall volume) of the Geotube system to be used for dewatering sediment dredged from the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The material properties and engineering parameters described below are based on published data from manufacturers, suppliers and various technical conferences and seminars. They represent the best available preliminary values for the proposed system components. Actual values will depend upon specific manufacturing processes, installation procedures, site characteristics and other local conditions, and may vary from the values assumed for these computations.

2. The material properties and engineering parameters described below are assumed to be consistent along the entire extent of the system being analyzed. Local variations are assumed to be minimal.

3. Approximately **35,484 bank cubic yards** of sediments are to be dredged.

4. The average specific gravity of the solids to be dredged is approximately **2.5**.

5. The dredging operation rate will be approximately **300,000 gallons per day**.

6. <u>Design Restrictions</u>: There are no design restrictions for the effective dewatering of the sediments.

7. <u>Process Performance Criteria</u>: The process performance criteria associated with this activity is based on dewatered solids content (see below).

8. <u>Appropriate Unit Process for Treatment Train</u>: There is no limiting factor associated with dewatering.

9. <u>Expected Removal or Treatment Efficiencies</u>: The expected removal rate associated with this activity is approximately 610 gpm (average), 2100 gpm (maximum).

METHODOLOGY:

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

The amount (length and volume) of Geotube(s) needed to achieve the dewatering parameters described above is determined by a software program used by the Geotube supplier/manufacturer.

MATERIAL CHARACTERISTICS:

1. The percent solids of the sediments is approximately **60%**.
2. The percent solids of the dredged slurry to be dewatered is approximately **7%**.
3. The percent solids of the dewatered material is approximately **55%**.
4. The percent of coarse grained materials (sand and gravel) within the solids is approximately **30%**.

COMPUTATIONS:

Dewatering Pad Basis of Design and Calculations

AREA

1)	109,200	Sq Ft	Total Dewatering Pad Area	The dewatering pad will be approximately 455 feet wide by 240 feet. There will be a perimeter barrier along the outside edge of the pad. A 20 foot wide separation strip will be located around the entire area between the perimeter barrier and the geotextile tubes. The geotextile tubes will consist of 200 feet long by 60 foot circumference (approximately 25 wide by 6 ft high (when full) by 200 feet long) tubes. Each tube holds approximately 1,100 cubic feet of dewatered sediment. The first layer geotextile tubes will be placed in two rows, an east row and a west row, with eight geotextile tubes in each row. An access strip 15 feet wide will be located between the two rows.
2)	80,000	Sq Ft	Area of geotextile tubes	Area of first layer of geotextile tubes = 2 rows x 8 units/row x 25 ft wide x 200 ft long/unit = 80,000 sq ft.
3)	3,000	Sq Ft	Area of center access strip	The center access strip will be 15 feet wide by 200 feet long. Area = 200 ft x 15 ft = 3,000 sq ft.
4)	26,200	Sq Ft	Area of	The perimeter separation strip will be approximately

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ____ DATE: ____	CB02-010

			perimeter separation strip	1310 feet long by 20 feet wide.

DEWATERING CAPACITY (assumes dewatered % solids = in situ % solids, conservative)

1)	1,100	CY	Dewatering capacity of each geotextile tube	Each geotextile tube (200ft by 60 ft circumference) can hold approximately 5.5 CY per lineal foot. Therefore, each 200 foot long tube can dewater approximately 200 ft x 5.5 CY/ft = 1,100 CY.
2)	17,600	CY	Dewatering capacity of first layer of geotextile tube	The first layer of geotextile tubes will consist of two rows of 8 tubes per row or 16 geotextile tubes. Each tube can dewater approximately 1,100 CY therefore the first layer of geotextile tubes will has a capacity of approximately = 16 tubes x 1,100 CY/tube = 17,600 CY.
3)	14,630	CY	Dewatering capacity of second layer of geotextile tube	The second layer of geotextile tubes will consist of two rows of 7 tubes per row or 14 geotextile tubes. Since each tube will be approximately 10 feet shorter than the first layer of tubes, the capacity each tube can dewater is approximately 190 ft x 5.5 CY/ft = 1045 CY. The dewatering capacity of the second layer then will be 14 tubes x 1,045 CY/tube = 14630 CY.
4)	32,230	CY	Total capacity of two layers of geotextile tubes	The total capacity of the two layers of tubes is the first layer plus the second layer capacity = 17,600CY = 14630 CY = 32,230 CY.

CONCLUSIONS:

The results of the geotube calculations are shown in the Sediment Removal Design, Table 8.

REFERENCES:

1. Geotube Manufacturer's data and specifications

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

SUBJECT:

Water Treatment System

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the waste water treatment system used to treat the dewatered sediment from the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

3. Design Restrictions: There are no design restrictions for the effective treatment of the carriage water.

4. Process Performance Criteria: There is no process performance criteria associated with this activity.

5. Appropriate Unit Process for Treatment Train: The limiting factor associated with the treatment stream is 2,100 gpm.

6. Expected Removal or Treatment Efficiencies: The expected treatment efficiencies are to meet the requirements of the WPDES permit.

METHODOLOGY:

Methodology for determining the water treatment facility system is given below.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

MATERIAL CHARACTERISTICS:

Water Treatment Plant Basis of Design and Calculations

1)	2,093	gpm	Maximum dredge flow rate	Based on a 15 ft/sec maximum velocity in an 8" PE SDR 17 pipe. The estimated dredge flow rates are based on sufficient velocity to entrain solids. The estimated velocities required to entrain solids range from 8 to 15 ft/sec. Formula: (Velocity)(Pi)(PipeDia^2/4), Calculation: (15 ft/sec) x (3.14/4) x (7.55^2 in^2) x (ft^2 / 144 in^2) x (7.48 gal/ft^3) x (60 sec/min) = 2093 gal/min
2)	567	gpm	Daily average dredge flow rate	Based on operating the dredge at the maximum estimated flow rate for 6.5 hours out of a 10 hour shift and one shift per day. Formula: (max flow) x (hrs operated / total hrs), Calculation: 2093 gpm x (6.5 hrs / 24 hrs) = 567 gpm
3)	265	gpm	Maximum precipitation flow rate	Based on 24 hr, 25 year storm even of 0.195 inches per hour or 4.68 inches over 24 hours on a 3 acre pad. (Source: Rainfall Frequency Atlas of the Midwest, Huff and Angel.) Formula: (max rainfall amount)(pad area) / (1440 minutes/day), Calculation: (0.195 in/hr) x (24 hr/day) x (ft / 12 in) x (3 acres) x (43560 ft^2 / acre) x (7.48 gal/ft^3) x (day / 1440 min.) = 265 gpm
4)	6	gpm	Average precipitation flow rate	Based on 40 inches/year average annual precipitation on a 3 acre pad. Formula: (Average rainfall per year)(Pad area) / (minutes/year), Calculation: (40 in / year) x (year / 365 days) x (ft / 12 in) x (3 acres) x (43560 ft^2 / acre) x (7.48 gal/ft^3) x (day / 1440 min.) = 6 gpm

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

5)	2,100	gpm	Treatment plant design flow rate	Based on maximum dredge flow rates. The maximum precipitation rain event is not added to the maximum design of the water treatment plant as a rain event which occurs during dredging operations may be temporarily stored on dewatering pad. The filter backwash water will be pumped to a geotube. This backwash water may also be temporarily stored on the dewatering pad. Calculation: 3 filters x 700 gpm/filter = 2,100 gpm
6)	700	gpm	Sand filter design flow rate	Based on Calgon Corporation's specifications for Calgon's 10 ft diameter sand filter.
7)	700	gpm	GAC filter design flow rate	Based on Calgon Corporation's specifications for Calgon's 10 ft diameter GAC filter.
8)	1,178	gpm	Backwash flow rate (maximum)	Based on 15 gpm/ft^2 for the 10 ft diameter sand filter. Formula: (backwash flux)(Pi)(Dia^2/4), Calculation: 15 gpm/ft^2 x (10 ft)^2 x 3.14/4 = 1178 gpm
9)	11,781	gal.	Backwash volume per filter	Based on 10 minute backwash at 15 gpm/ft^2. Formula: (backwash flow rate) x (backwash duration). Calculation: 1178 gpm x 10 minutes = 11,781 gallons
10)	25	gpm	Backwash flow rate (average)	Based on one backwash per day per filter. Formula: (backwash daily volume)/(1440 min/day), Calculation: (11781 gal/day) x 3 filters x (day/ 1440 min) = 25 gpm
11)	35,342	gal.	Effluent storage	Based on storage for backwashing 3 filters. Calculation: 11,781 gallons x 3 filters = 35,342 gallons
12)	31,500 to 63,000	gal.	Influent equalization	Based on 15 to 30 minutes of equalization at maximum design flows. Formula: (max design flow) x (equalization duration), Calculation: 2,100 gpm x 15 min = 31,500 gallons. 2,100 gpm x 30 min = 63,000 gallons.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

CONCLUSIONS:

The results of the water treatment system calculations are shown in the text of Sediment Removal Design.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

SUBJECT:

Dry Unit Weight

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the in-situ dry unit weight of the Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

The specific gravity in the above calculation was determined utilizing the 14 sets of moisture content and dry weight results from the 2004 geotechnical data (Geotest Summary of Shelby Tube Laboratory Test Results, 1/2/2004). The average specific gravity was determined as follows:

$$G_s = \frac{1}{14}\sum_{1}^{14} \frac{\gamma_{dry}}{\gamma_{water} - \left(\omega/100 \times \gamma_{dry}\right)} \cong 2.5$$

Where:

$$\gamma_{dry} = Dry\,Unit\ Weight$$
$$\omega = Percent\ \ Moisture\,Content$$

A dry unit weight associated with the Soft Sediment at each sample location was found as:

$$Dry\ Unit\ Weight\ \ (lbs/\ ft^3) = \frac{\gamma_{water}}{\left(1/G_s\right) + \left(100/PS\right) - 1}$$

Where:

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

$$\gamma_{water} = unit\ weight\ of\ water = 62.4\ lbs/ft^3$$
$$G_s = Average\ Specific\ Gravity$$
$$PS = Percent\ Solids$$

MATERIAL CHARACTERISTICS:

Estimates of dry unit weight utilized percent solids measurements taken during the 2004 Upper River soft sediment re-characterization. Percent solids data was available from a total of 385 soft sediment re-characterization samples.

COMPUTATIONS:

Percent solids (PS) for Soft Sediment Deposit number 1 was 62.8 found from the 2004 Upper River soft sediment re-characterization samples.

Example (Dep-1):

$$\textit{Dry Unit Weight } (lbs/ft^3) = \frac{62.4\ \text{lbs / ft}^3}{(1/2.5) + (100\% / 62.8\%) - 1} = 62.9\ \text{lbs / ft}^3$$

CONCLUSIONS:

The results for dry unit weight calculations for Soft Sediments by Deposit and RMU is shown in Sediment Removal Design, Table 3 and 4.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

SUBJECT:

Pre-Dredge PCB Mass Estimate

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the Pre-dredge PCB Mass of the Armored Areas and Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

PCB mass calculations for Armored Areas and Soft Sediment RMU areas utilized dry unit weight estimates.

Mass $= V \times C \times \gamma_{dry} \times (27 / 10^6)$

Where

V = volume in cubic yards
γ_{dry} = dry unit weight in lbs/ft^3
C = PCB concentration

COMPUTATIONS:

The following are examples:

Armored Area 1

Dry unit weight = average of dry unit weight from geotechnical data, PRS 2004
= 60.0+65.7+75.7+87.7+40.4+77.8+73.5+103.3+31.2+46.9+56.4+51.0 +35.6+106.2
= 63.7 lbs/ft^3

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: __________ DATE: __________	CB02-010

M (Total) $= M_1 + M_2 + M_3$

Where

M_1 = PCB mass in re-deposited (Overburden) material volume
M_2 = PCB mass of armoring material volume = 0
M_3 = PCB mass in residual sediment volume

$M_1 = V \times C \times \gamma_{dry} \times (27 / 10^6)$

Where

V = volume in cubic yards = 103.7
γ_{dry} = dry unit weight in lbs/ft^3 = 63.7
C = PCB concentration
= Average concentration from Soft Sediment Deposit 1 to Riverbend Dam
= 8.4 ppm

$M_1 = 103.7 \times 8.4 \times 63.7 \times (27 / 10^6) = 1.5$ lbs

$M_3 = V \times C \times \gamma_{dry} \times (27 / 10^6)$

Where

V = volume in cubic yards = 25.9
γ_{dry} = dry unit weight in lbs/ft^3 = 63.7
C = PCB concentration
= Concentration based on Feasibility Study Report, BBL, 1998

$M_3 = 25.9 \times 295 \times 63.7 \times (27 / 10^6) = 13.1$ lbs

M (Total) = 1.5 + 13.1 = 14.6 lbs

Sediment Deposit 1 RMU 1

Results of 2004 re-characterization sample core PI-Sed1:

$M = V \times C \times \gamma_{dry} \times (27 / 10^6)$

V = volume in cubic yards = 54.1
γ_{dry} = dry unit weight in lbs/ft^3 = 62.9
C = PCB concentration = 12

$M = 54.1 \times 12 \times 62.9 \times (27 / 10^6) = 1.1$ lbs.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ________ DATE: ________	CB02-010

CONCLUSIONS:

Final results of the mass calculations are shown in the Sediment Removal Design, Tables 3 and 4.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ____ DATE: ____	CB02-010

SUBJECT:

Post-Dredge PCB Mass

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the post-dredge PCB mass of the Armored Area and Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

Post-dredge PCB mass will be calculated as a percentage of pre-dredge mass given the ratio of post-dredge sediment volume with pre-dredge sediment volume. The post-dredge sediment volume of an RMU is calculated as the average of the sediment thicknesses measured during post-dredge sampling, multiplied by the RMU area. Using this information, PCB mass removed in an RMU is estimated as:

Post-dredge volume = residual thickness sediment average x area [(1)]

Removal volume = pre-dredge volume – post-dredge volume

PCB mass removed = (pre-dredge PCB mass [(2)]) x (removal volume ÷ pre-dredge volume)

MATERIAL CHARACTERISTICS:

[(1)]The representative surface area for an Armored Area or sediment RMU is defined by the pre-dredge surface area.

[(2)]Pre-dredge PCB mass is taken from the calculations performed (pre-dredge mass section).

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

COMPUTATIONS:

The following is an example:

Sediment Deposit DEP 1-1

Pre-dredge volume	= 54 cy
Pre-dredge PCB mass	= 1.1 lbs.
Assumed post-dredge volume	= 8.3 cy
Assumed PCB mass removed	= (1.1 lbs) * ((54-8.3)/54) = .93 lbs

CONCLUSIONS:

Final results of the post dredge mass calculations are pending removal activities and will be determined in real time to bench mark to the project objectives to meet 88% removal. An example is shown in the Sediment Removal Design, Table 5.

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ____ DATE: ____	CB02-010

SUBJECT:

Assumed Pre-Dredge PCB Surface Weighted Average Concentration (SWAC) by RMU

PURPOSE AND OBJECTIVE:

The following computations are performed to determine the pre-dredge PCB SWAC for the Armored Areas and Soft Sediments in the Upper River section of the Sheboygan River.

DESIGN ASSUMPTIONS AND CONDITIONS:

1. The properties and engineering parameters described below are based on established standards provided by previous site investigation studies. They represent the best available preliminary values for the analysis. Actual values will depend upon site specific conditions, and may vary from the values assumed for these computations.

2. The properties and engineering parameters described below are assumed to be consistent along the entire extent of the area being analyzed. Local variations are assumed to be minimal.

METHODOLOGY:

Upper River assumed pre-dredge SWAC by RMU is calculated as:

SWAC = SWAA x C

Where

SWAA = surface weighted adjusted area of an associated Armored Area or Soft Sediment RMU
= area of deposit or RMU / 2700 square feet
C = PCB concentration of associated Armored Area or Soft Sediment RMU

MATERIAL CHARACTERISTICS:

Assumed that core samples from the 2004 data represent the surface concentration.

COMPUTATIONS:

The calculations of the Armored Areas and Soft Sediment volumes are shown in previous calculations. The following is an example:

ENGINEERING COMPUTATION SHEET

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River Upper River Phase II	BY: DPD DATE: 03/06	BY: ______ DATE: ______	CB02-010

Sediment Deposit 1 RMU 1

Concentration = 12 ppm
Area = 909 ft^2

SWAA = 909 / 2700
= 0.337

SWAC = 12 x .337
= 4.0 ppm

CONCLUSIONS:

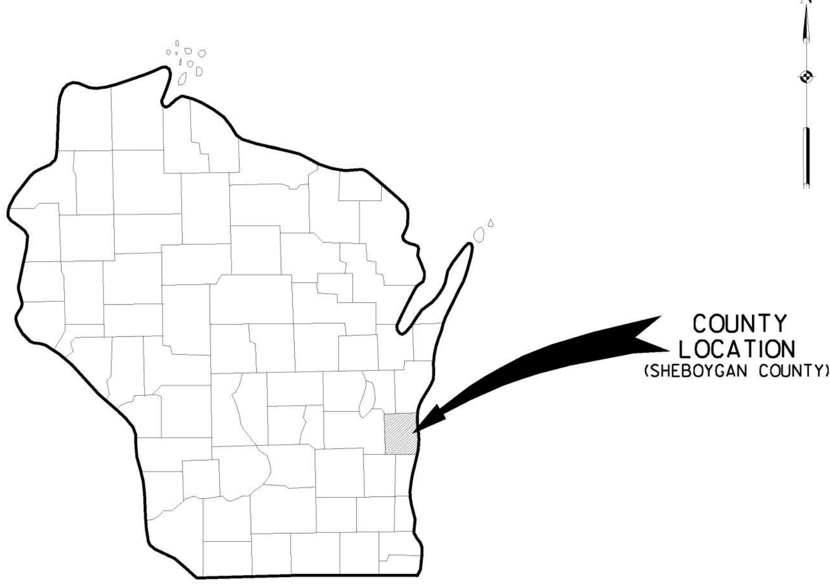
The results of the assumed pre-dredge SWAC are shown in the Sediment Removal Design, Table 6.

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II – UPPER RIVER

SHEBOYGAN FALLS, WISCONSIN

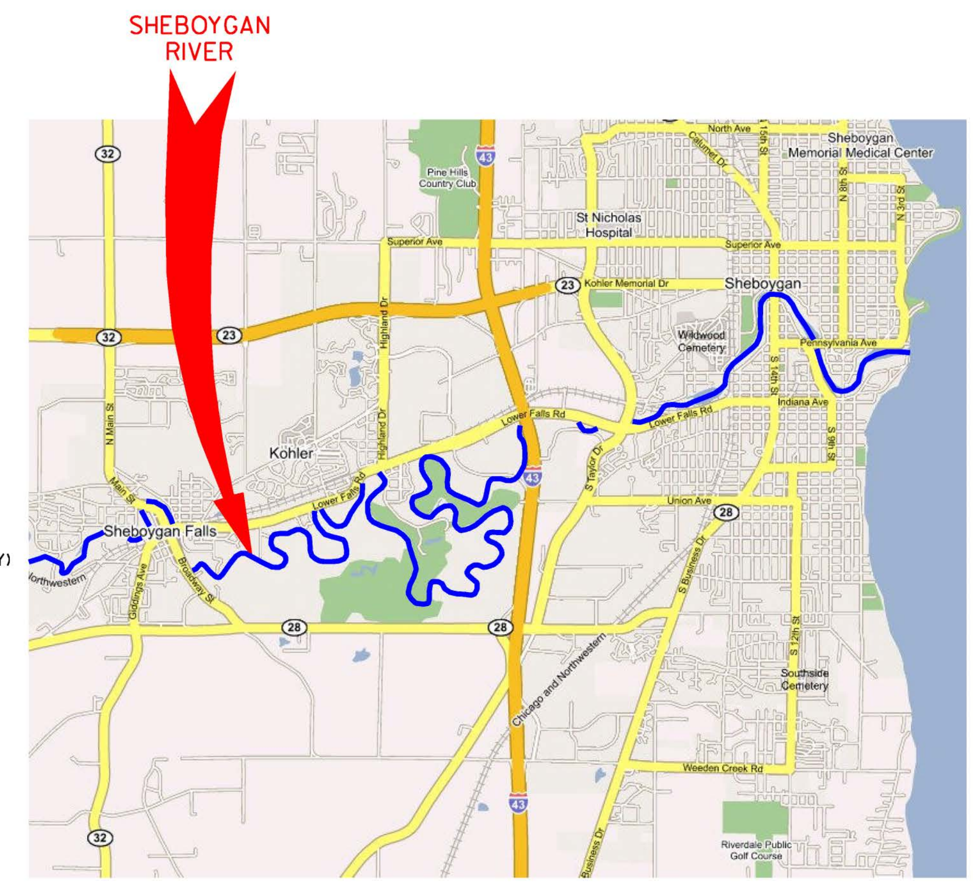
MARCH 2006

Foth & Van Dyke



COUNTY LOCATION MAP

NOT TO SCALE



SITE LOCATION MAP

NOT TO SCALE

INDEX	
DRAWING NO.	DESCRIPTION
1	TITLE SHEET
2	SEDIMENT DEWATERING, DECON AND STAGING LAYOUT AND DETAILS
3	UPPER RIVER NEAR-SHORE SEDIMENT AREAS, APPROXIMATE COFFERDAM LOCATION AND DETAIL
4	UPPER RIVER ARMORED AREAS, APPROXIMATE COFFERDAM LOCATION AND DETAILS
5	UPPER RIVER SOFT SEDIMENT RMU LOCATIONS
6	UPPER RIVER CHARACTERIZATION SOFT SEDIMENT DEPOSITS AND RMU LOCATIONS STA 0+00 TO STA 45+00
7	UPPER RIVER CHARACTERIZATION SOFT SEDIMENT DEPOSITS AND RMU LOCATIONS STA 45+00 TO STA 100+00
8	UPPER RIVER CHARACTERIZATION SOFT SEDIMENT DEPOSITS AND RMU LOCATIONS STA 100+00 TO STA 127+00
9	UPPER RIVER CHARACTERIZATION SOFT SEDIMENT DEPOSITS AND RMU LOCATIONS STA 127+00 TO STA 166+00
10	UPPER RIVER CHARACTERIZATION SOFT SEDIMENT DEPOSITS AND RMU LOCATIONS STA 166+00 TO WAELDERHAUS DAM
11	GENERAL TEMPORARY DAM LAYOUT AND ACCESS LOCATIONS
12	SUMP AND PUMP STATION DETAILS
13	TEMPORARY DAM DETAILS
14	WATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM
15	SEDIMENT AND EROSION CONTROL DETAILS

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z1.dgn
DRAWN BY: JRB2 DATE: MARCH 2005

Foth & Van Dyke

SIGNATURES	BY	DATE
APPROVED		
REVIEWED		
DESIGNED		

REVISIONS NO.	BY	DATE
△		
△		
△		

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY DATE

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

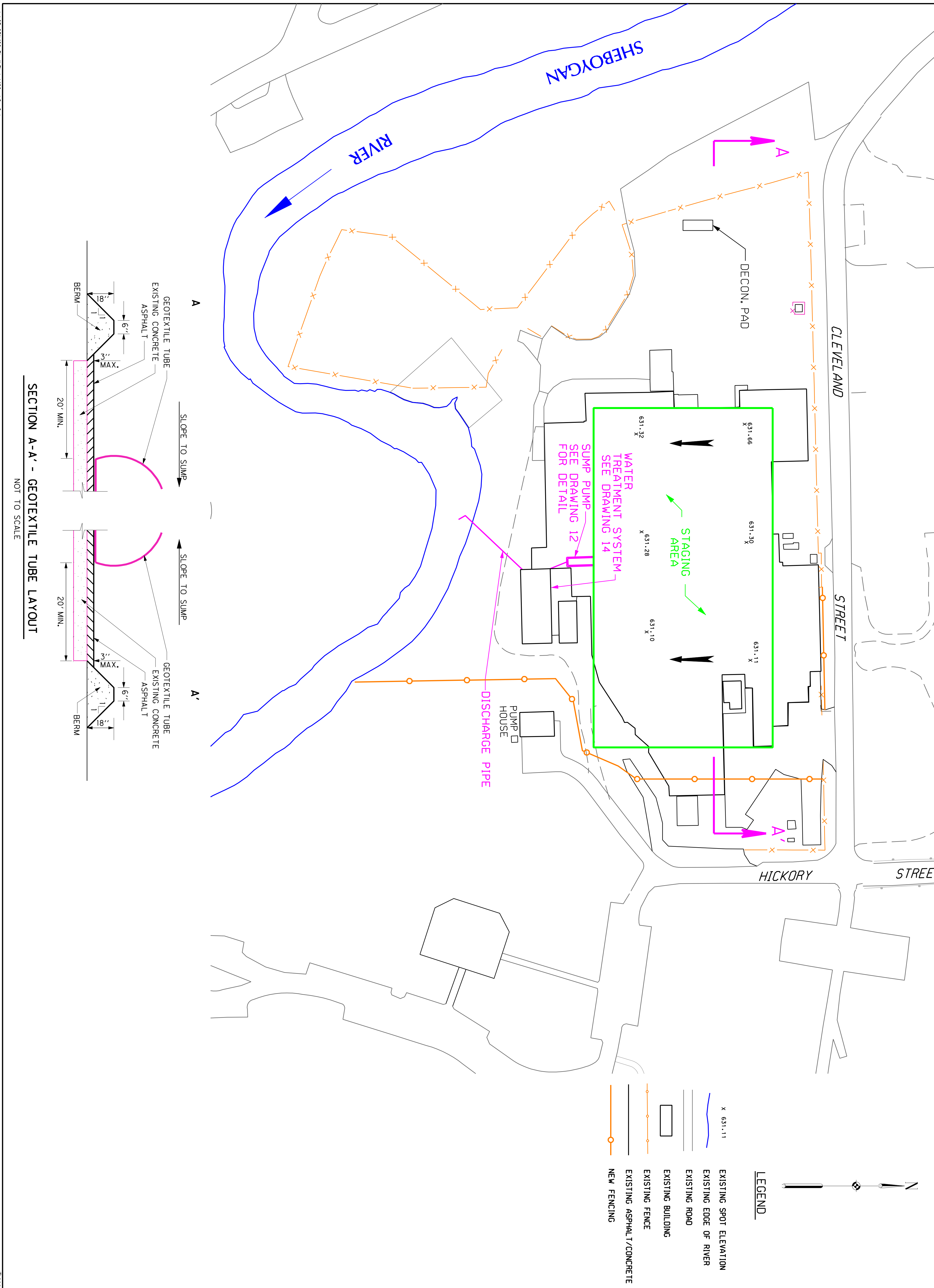
TITLE PAGE

SCALE: NOT TO SCALE

SCOPE ID: 05P031

DRAWING NO. 1

L:\05p031\100 Ph II\Plots\100-ph2 z1.dgn
3/14/2006 dat



SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

SEDIMENT DEWATERING, DECON AND STAGING LAYOUT AND DETAILS

SCALE 0' 60' 120'

SCOPE ID 05P031

DRAWING NO. 2

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△			APPROVED	
△			REVIEWED	
△			DESIGNED	

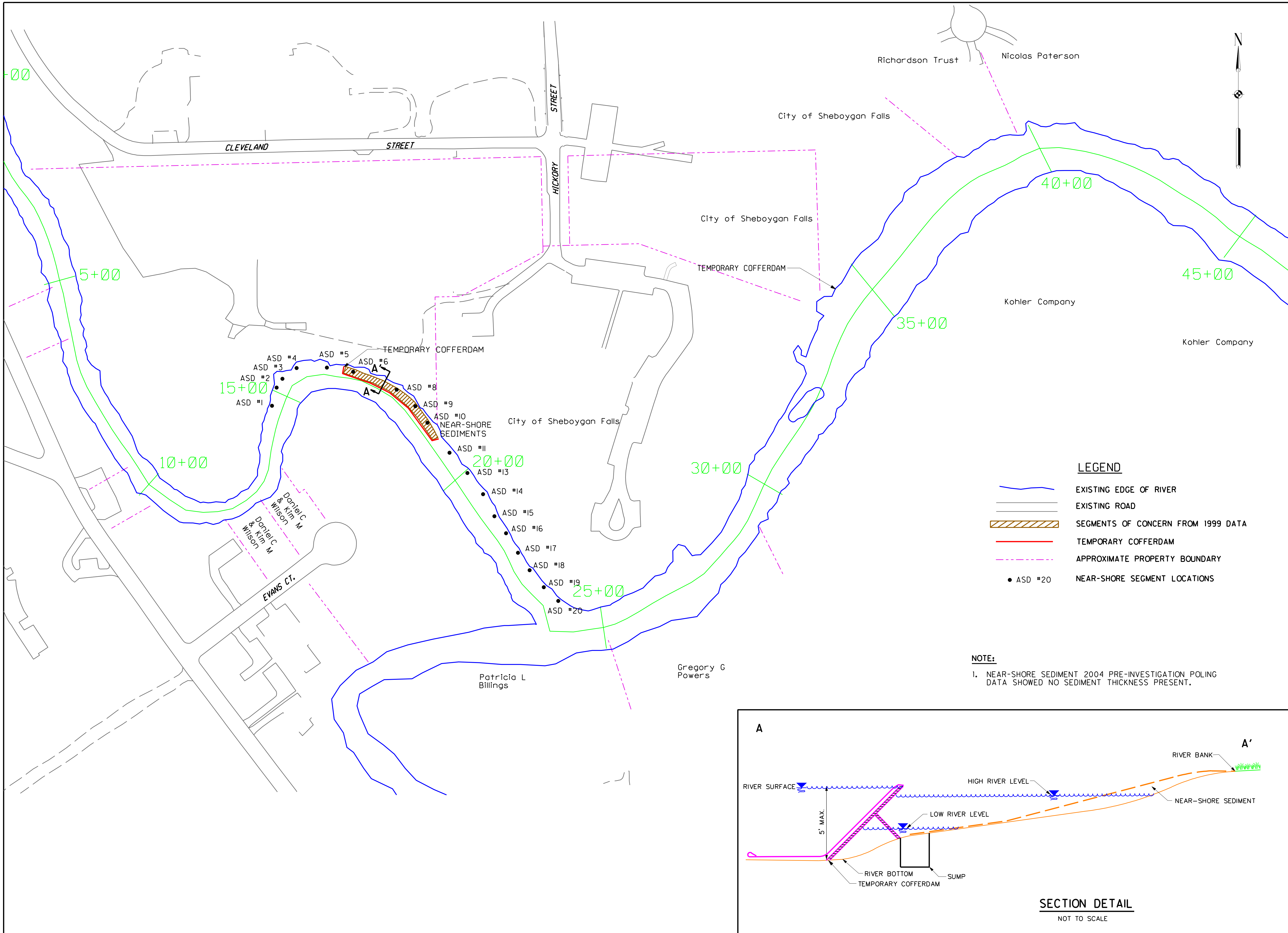
RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z2.dgn
DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE AND ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

L:\05p031\100 Ph II\Plots\100-ph2 z2.dgn
3/14/2006



FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z3.dgn

DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke

SIGNATURES	BY	DATE
APPROVED		
REVIEWED		
DESIGNED		

REVISIONS NO.	BY	DATE

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS, BY ________ DATE ________

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

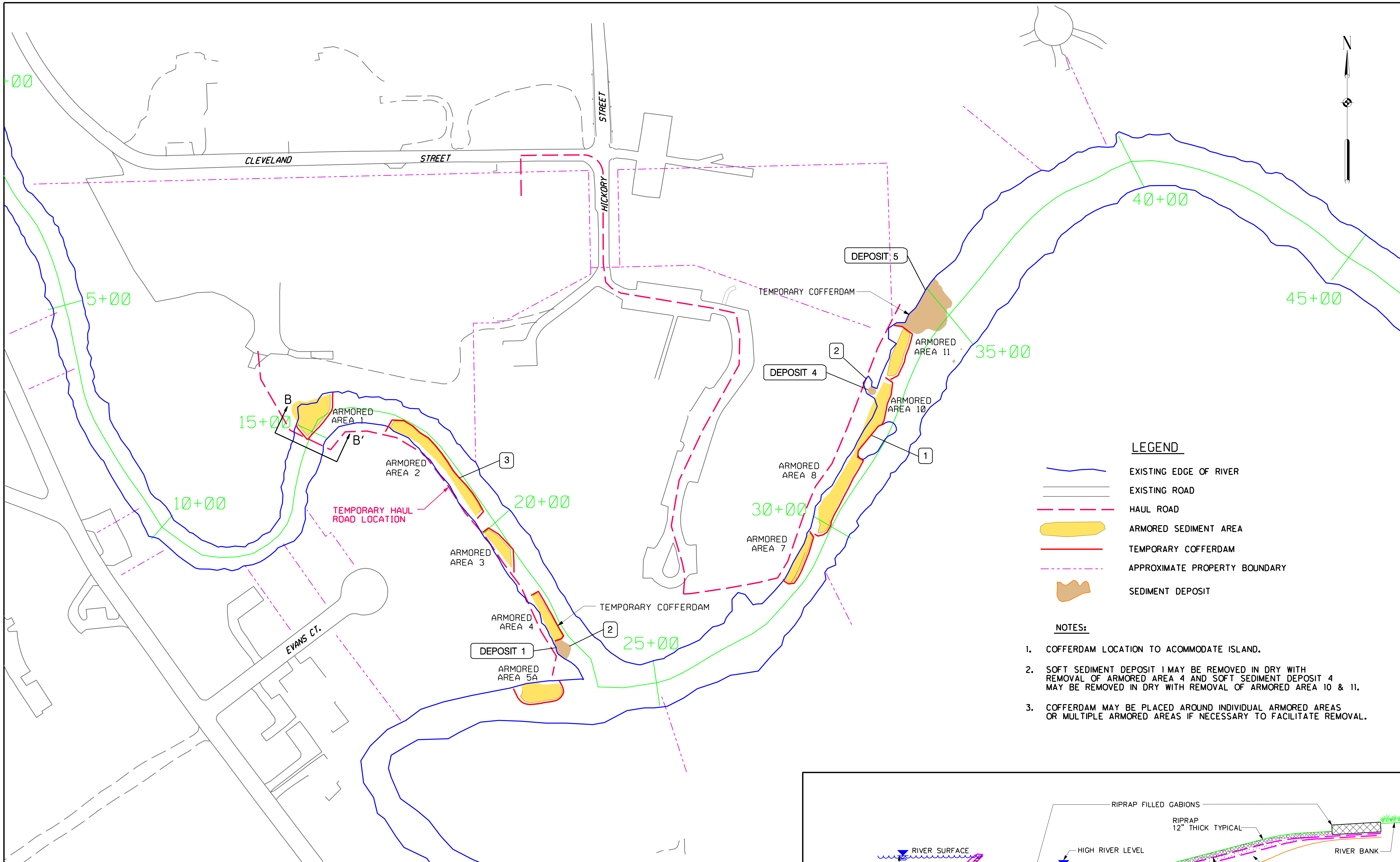
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

UPPER RIVER NEAR-SHORE SEDIMENT AREAS, APPROXIMATE COFFERDAM LOCATION AND DETAIL

SCALE 0 100' 200'

SCOPE ID 05P031

DRAWING NO. 3

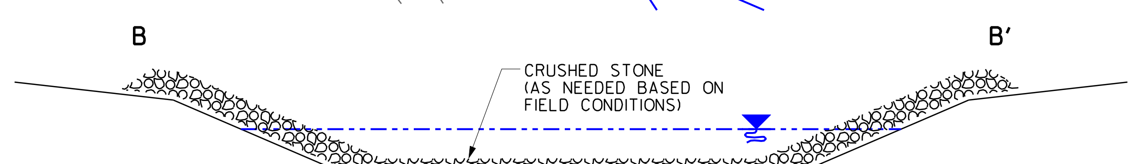


LEGEND

EXISTING EDGE OF RIVER
EXISTING ROAD
HAUL ROAD
ARMORED SEDIMENT AREA
TEMPORARY COFFERDAM
APPROXIMATE PROPERTY BOUNDARY
SEDIMENT DEPOSIT

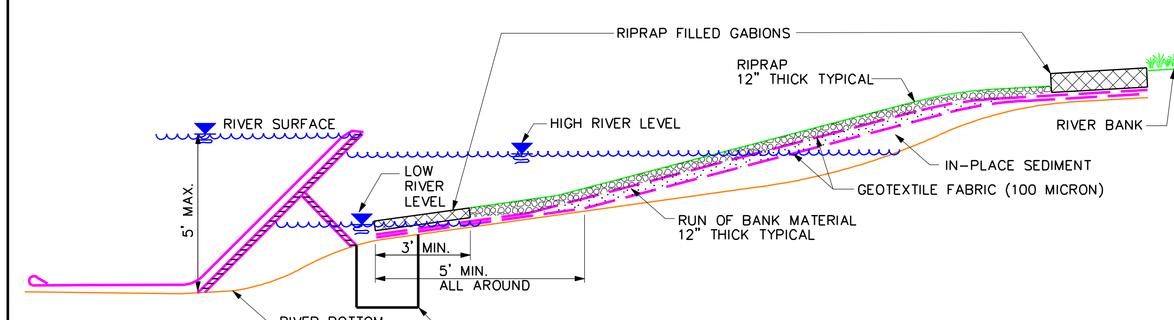
NOTES:

1. COFFERDAM LOCATION TO ACOMMODATE ISLAND.
2. SOFT SEDIMENT DEPOSIT 1 MAY BE REMOVED IN DRY WITH REMOVAL OF ARMORED AREA 4 AND SOFT SEDIMENT DEPOSIT 4 MAY BE REMOVED IN DRY WITH REMOVAL OF ARMORED AREA 10 & 11.
3. COFFERDAM MAY BE PLACED AROUND INDIVIDUAL ARMORED AREAS OR MULTIPLE ARMORED AREAS IF NECESSARY TO FACILITATE REMOVAL.



SECTION B-B' - RIVER CROSSING DETAIL

NOT TO SCALE



TEMPORARY COFFERDAM DETAIL

NOT TO SCALE

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z4.dgn
DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△				APPROVED
△				REVIEWED
△				DESIGNED

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

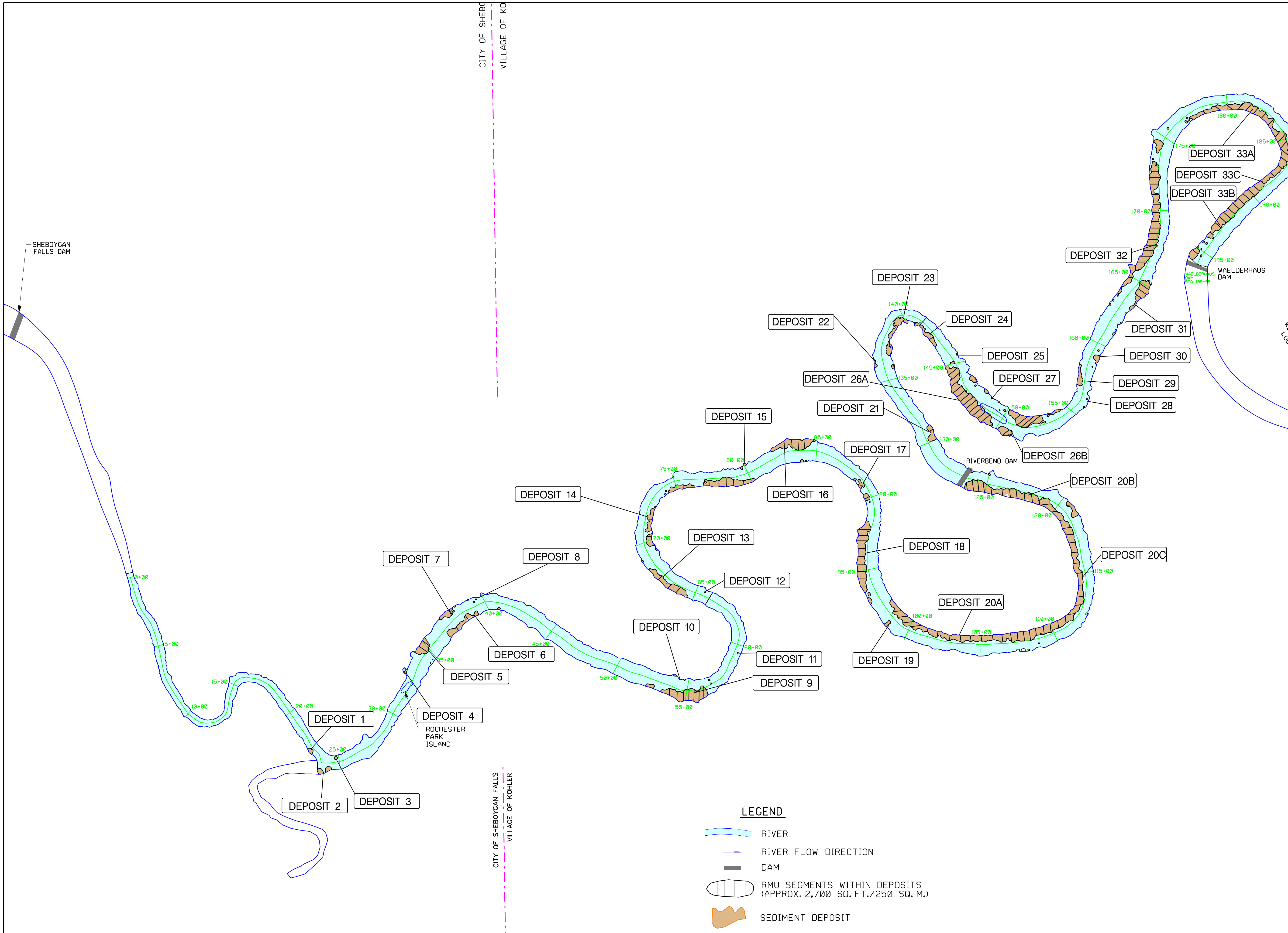
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

UPPER RIVER ARMORED AREAS, APPROXIMATE COFFERDAM LOCATION AND DETAILS

SCALE 0 100' 200'

SCOPE ID 05P031

DRAWING NO. 4



LEGEND

RIVER

RIVER FLOW DIRECTION

DAM

RMU SEGMENTS WITHIN DEPOSITS (APPROX. 2,700 SQ. FT./250 SQ. M.)

SEDIMENT DEPOSIT

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z5.dgn
DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE, THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

REVISIONS			SIGNATURES		
NO.	BY	DATE		BY	DATE
△			APPROVED		
△			REVIEWED		
△			DESIGNED		

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

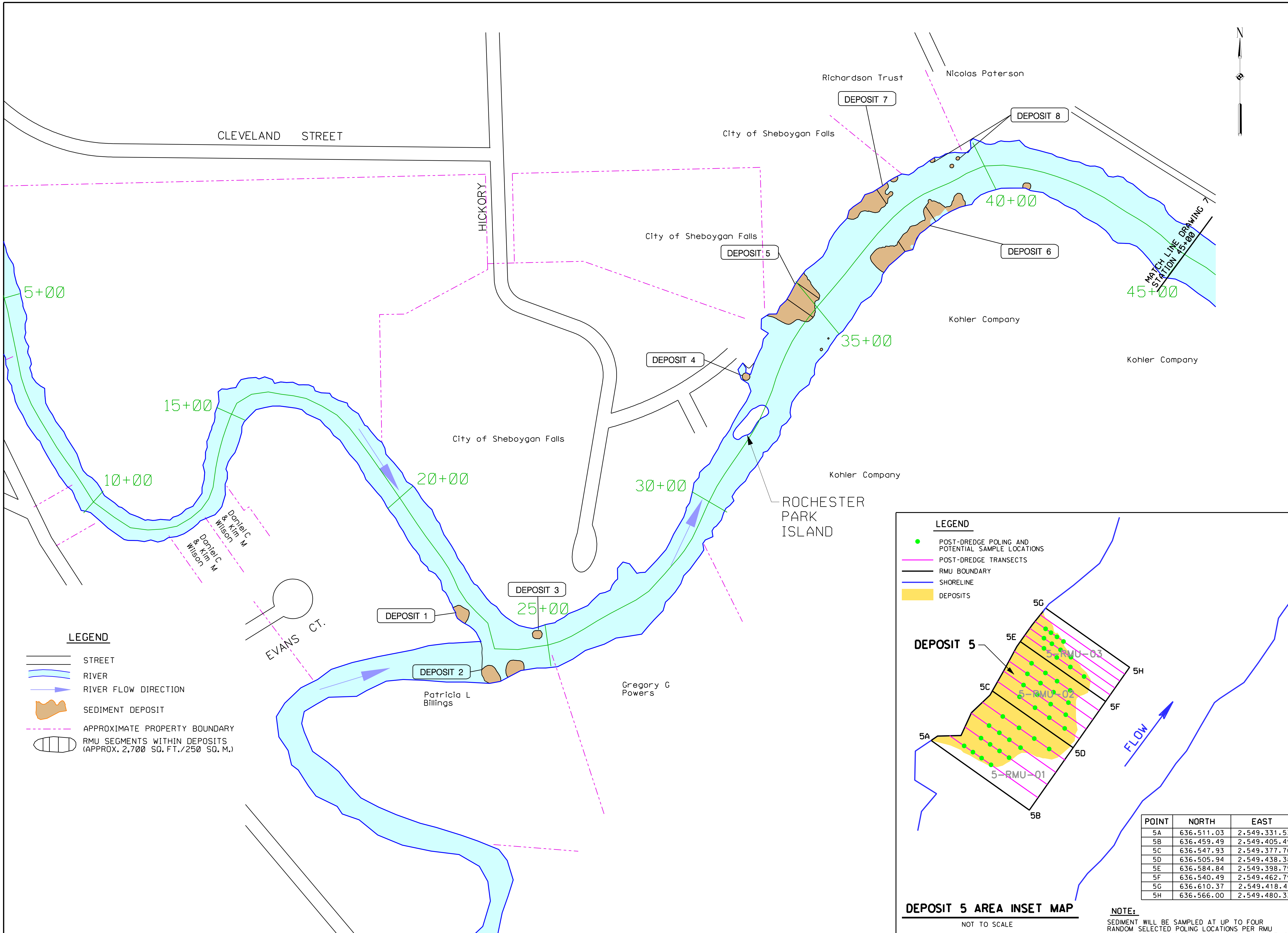
UPPER RIVER SOFT SEDIMENT RMU LOCATIONS

SCALE 0 300' 600'

SCOPE ID 05P031

DRAWING NO. 5

L:\05p031\100 Ph II\Plots\100-ph2 z5.dgn
3/14/2006 dat



POINT	NORTH	EAST
5A	636,511.03	2,549,331.53
5B	636,459.49	2,549,405.49
5C	636,547.93	2,549,377.76
5D	636,505.94	2,549,438.38
5E	636,584.84	2,549,398.75
5F	636,540.49	2,549,462.79
5G	636,610.37	2,549,418.41
5H	636,566.00	2,549,480.33

DEPOSIT 5 AREA INSET MAP

NOT TO SCALE

NOTE:
SEDIMENT WILL BE SAMPLED AT UP TO FOUR RANDOM SELECTED POLING LOCATIONS PER RMU WHERE POST-DREDGE SEDIMENT WAS FOUND TO EXIST.

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z6.dgn

DRAWN BY: JDW DATE: MARCH 2006

Foth & Van Dyke

SIGNATURES: BY / DATE — APPROVED — REVIEWED — DESIGNED

REVISIONS: NO. / BY / DATE

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY DATE

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

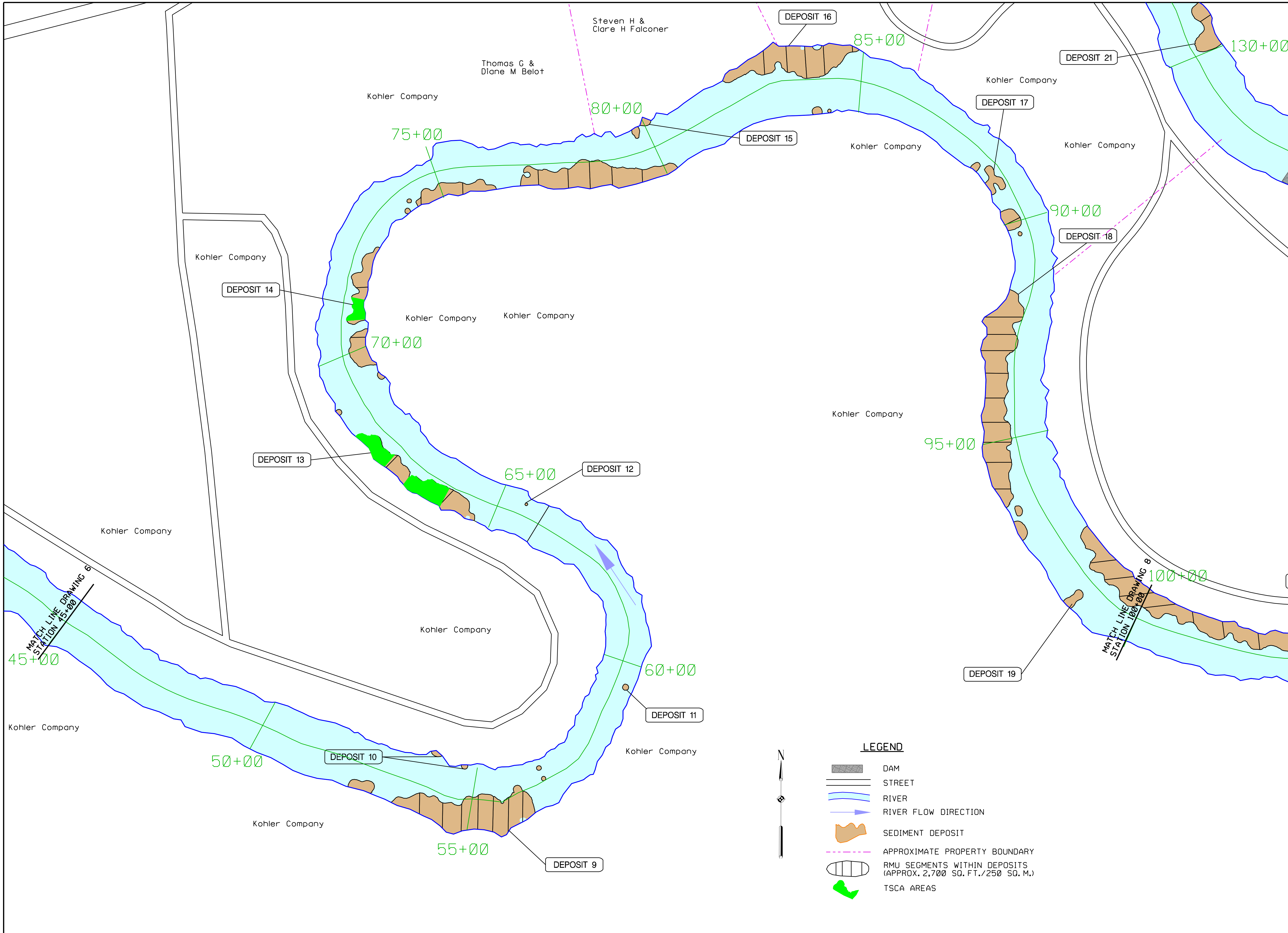
UPPER RIVER CHARACTERIZATION
SOFT SEDIMENT DEPOSITS AND RMU
LOCATIONS STA 0+00 TO STA 45+00

SCALE 0 100' 200'

SCOPE ID 05P031

DRAWING NO. 6

L:\05p031\100 Ph II\Plots\100-ph2 z6.dgn
3/14/2006 dot



FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z7.dgn

DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke

REUSE OF DOCUMENTS

THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE, THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△			APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY _______ DATE _______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

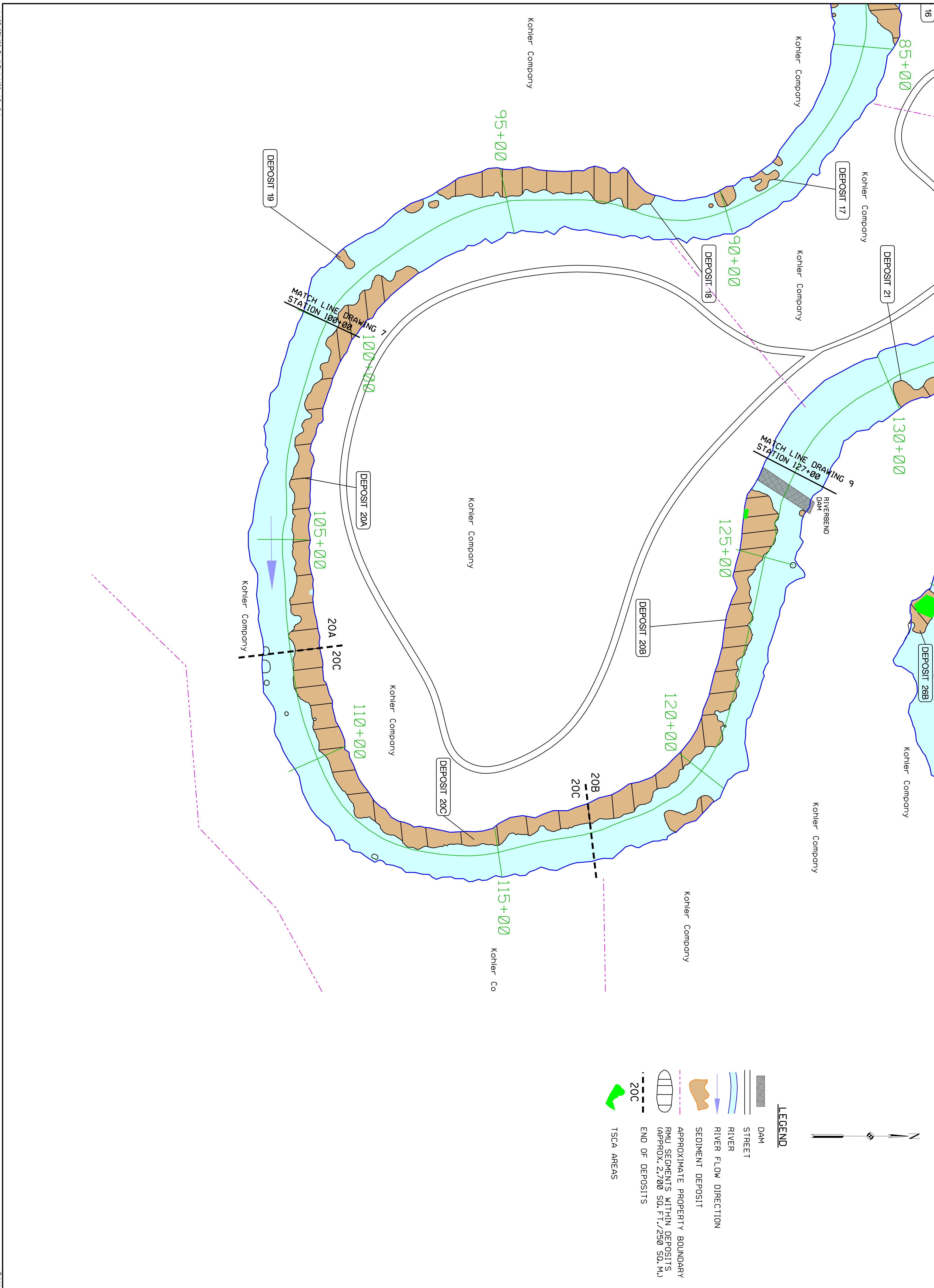
UPPER RIVER CHARACTERIZATION
SOFT SEDIMENT DEPOSITS AND RMU
LOCATIONS STA 45+00 TO STA 100+00

SCALE 0 100' 200'

SCOPE ID 05P031

DRAWING NO. 7

L:\05p031\100 Ph II\Plots\100-ph2 z7.dgn
3/14/2006 dat



L:\05p031\100 Ph II\Plots\100-ph2 z8.dgn
3/14/2006

DRAWING NO. 8

SCALE 0 100' 200'

SCOPE ID 05P031

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

UPPER RIVER CHARACTERIZATION
SOFT SEDIMENT DEPOSITS AND RMU
LOCATIONS STA 100+00 TO STA 127+00

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

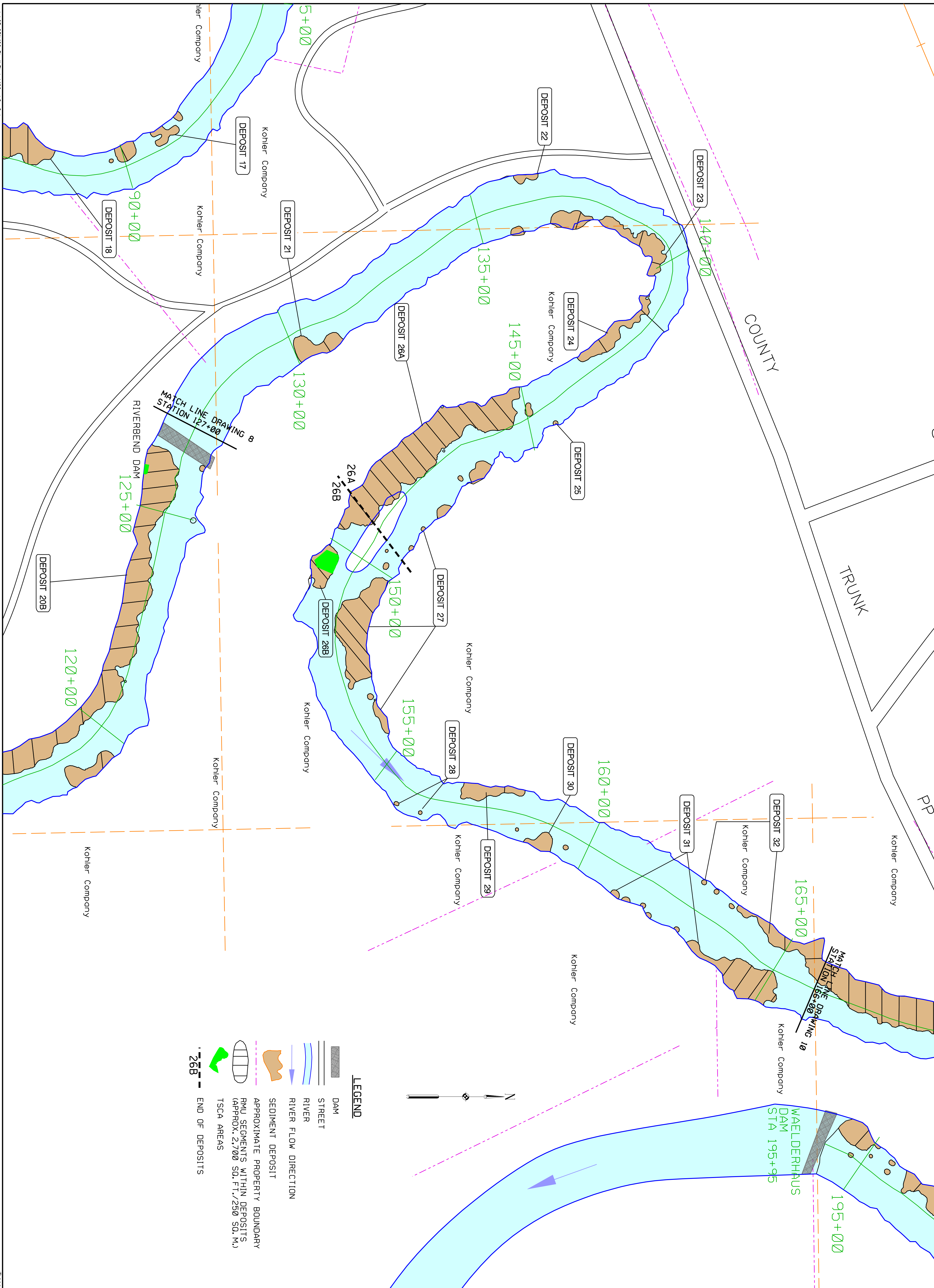
REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△			APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY _______ DATE _______

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z8.dgn
DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE AND ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.



L:\05p031\100 Ph II\Plots\100-ph2 z9.dgn
3/14/2006

SCALE 0 100' 200'

SCOPE ID 05P031

DRAWING NO. 9

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

UPPER RIVER CHARACTERIZATION
SOFT SEDIMENT DEPOSITS AND RMU
LOCATIONS STA 127+00 TO STA 166+00

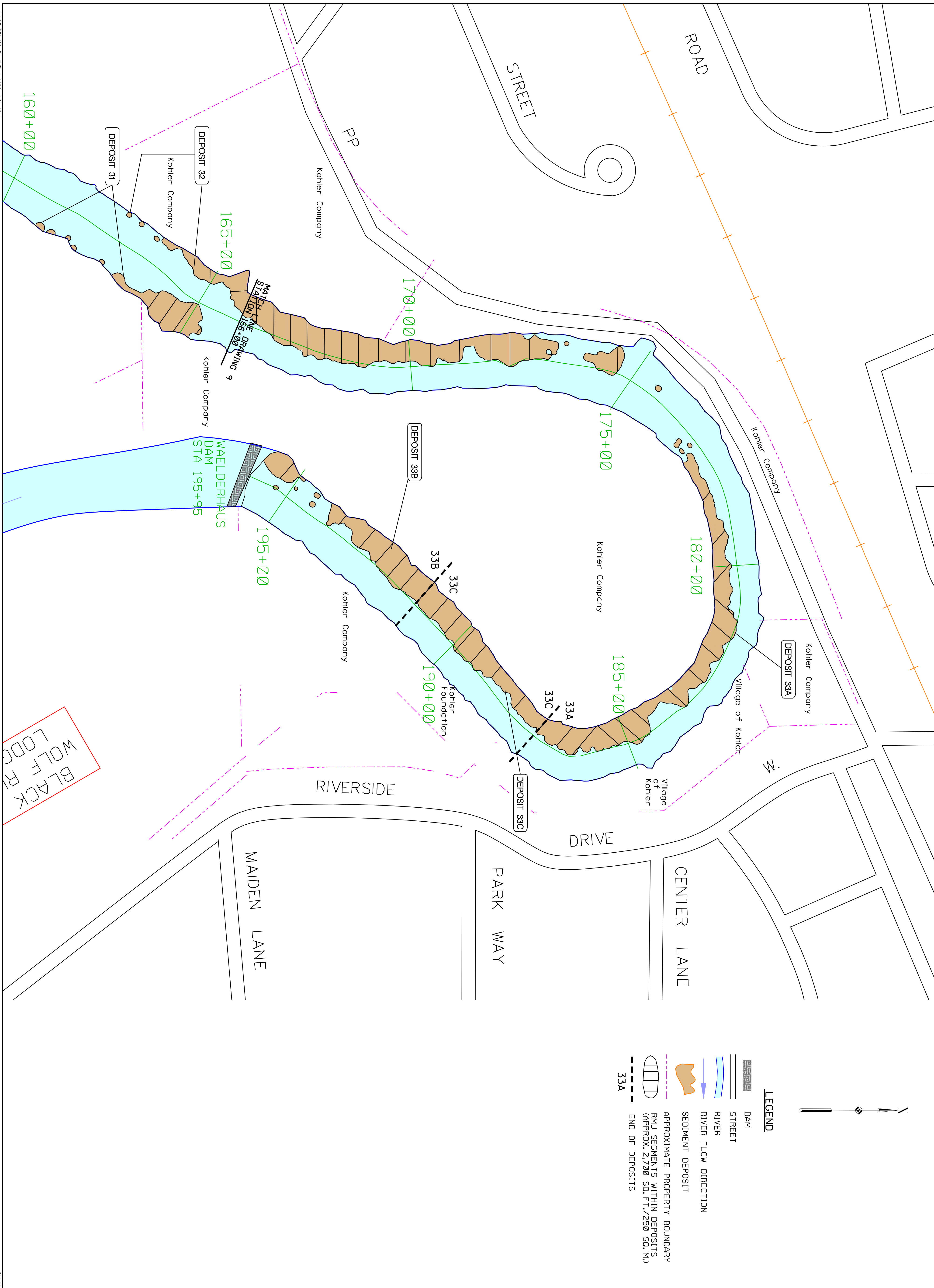
PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△			APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z9.dgn
DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke



L:\05p031\100 Ph II\Plots\100-ph2 z10.dgn
3/14/2006

SCALE 0 100' 200'

SCOPE ID 05P031

DRAWING NO. 10

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

UPPER RIVER CHARACTERIZATION SOFT SEDIMENT DEPOSITS AND RMU LOCATIONS STA 166+00 TO WAELDERHAUS DAM

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

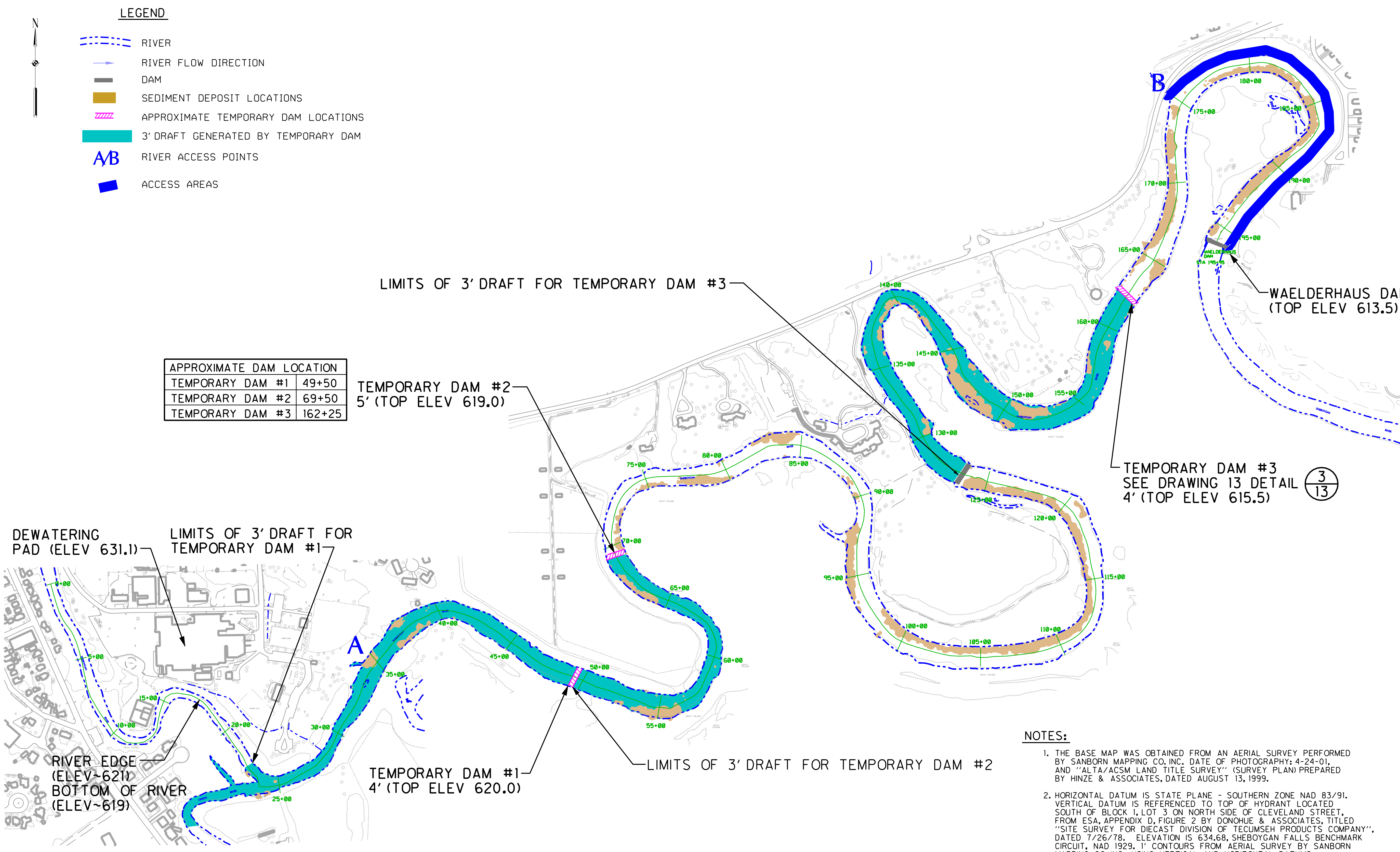
REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△			APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z10.dgn

DRAWN BY: JOW DATE: MARCH 2006

Foth & Van Dyke



APPROXIMATE DAM LOCATION	
TEMPORARY DAM #1	49+50
TEMPORARY DAM #2	69+50
TEMPORARY DAM #3	162+25

NOTES:

1. THE BASE MAP WAS OBTAINED FROM AN AERIAL SURVEY PERFORMED BY SANBORN MAPPING CO. INC. DATE OF PHOTOGRAPHY: 4-24-01, AND "ALTA/ACSM LAND TITLE SURVEY" (SURVEY PLAN) PREPARED BY HINZE & ASSOCIATES, DATED AUGUST 13, 1999.
2. HORIZONTAL DATUM IS STATE PLANE - SOUTHERN ZONE NAD 83/91. VERTICAL DATUM IS REFERENCED TO TOP OF HYDRANT LOCATED SOUTH OF BLOCK 1, LOT 3 ON NORTH SIDE OF CLEVELAND STREET, FROM ESA, APPENDIX D, FIGURE 2 BY DONOHUE & ASSOCIATES, TITLED "SITE SURVEY FOR DIECAST DIVISION OF TECUMSEH PRODUCTS COMPANY", DATED 7/26/78. ELEVATION IS 634.68, SHEBOYGAN FALLS BENCHMARK CIRCUIT, NAD 1929. 1' CONTOURS FROM AERIAL SURVEY BY SANBORN MAPPING CO. INC. USING VERTICAL AND HORIZONTAL DATUMS DESCRIBED ABOVE. DATE OF SURVEY APRIL 24, 2001
3. LOCATIONS OF TEMPORARY DAM STRUCTURES ARE APPROXIMATE. ACTUAL LOCATIONS TO BE DETERMINED BY THE CONTRACTOR.
4. 100 YEAR FLOOD ELEVATIONS PROVIDED BY FEMA HEC2 FLOOD STUDY RIVER PROFILES.

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z11.dgn
DRAWN BY: JOW DATE: FEBRUARY 2006

Foth & Van Dyke

SIGNATURES	BY	DATE
APPROVED		
REVIEWED		
DESIGNED		

REVISIONS NO.	BY	DATE
△		
△		
△		

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY DATE

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

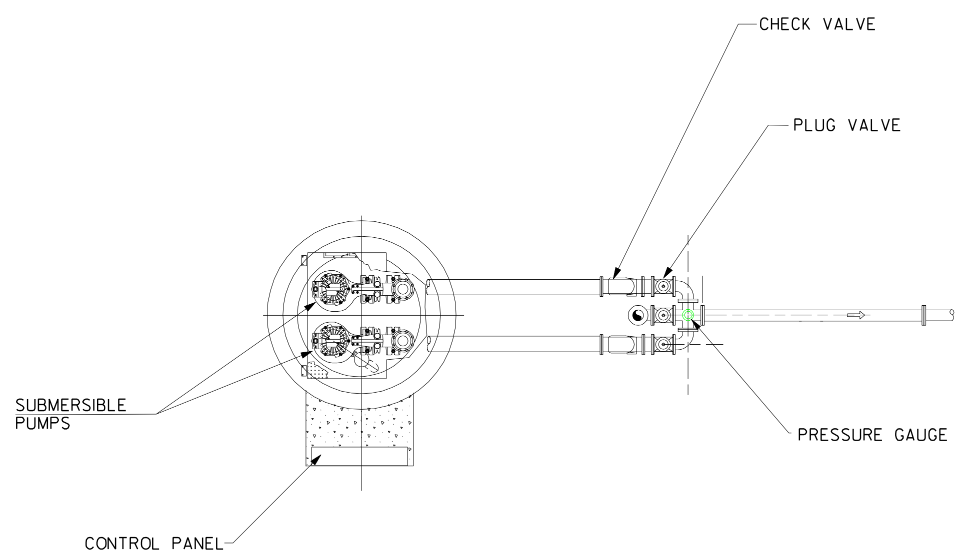
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

GENERAL TEMPORARY DAM LAYOUT AND ACCESS LOCATIONS

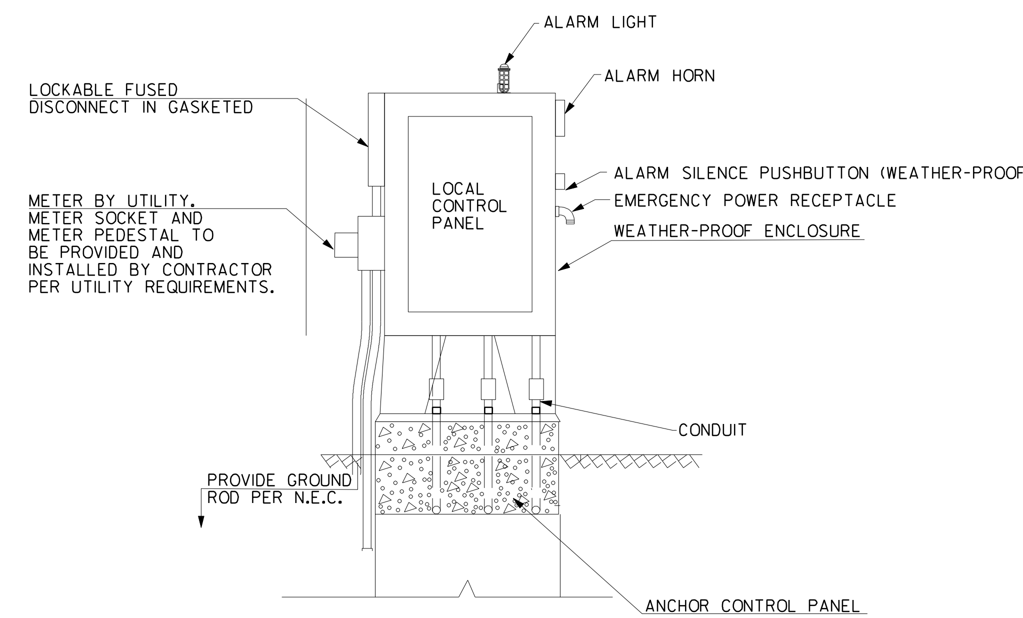
SCALE 0 300' 600'

SCOPE ID 05P031

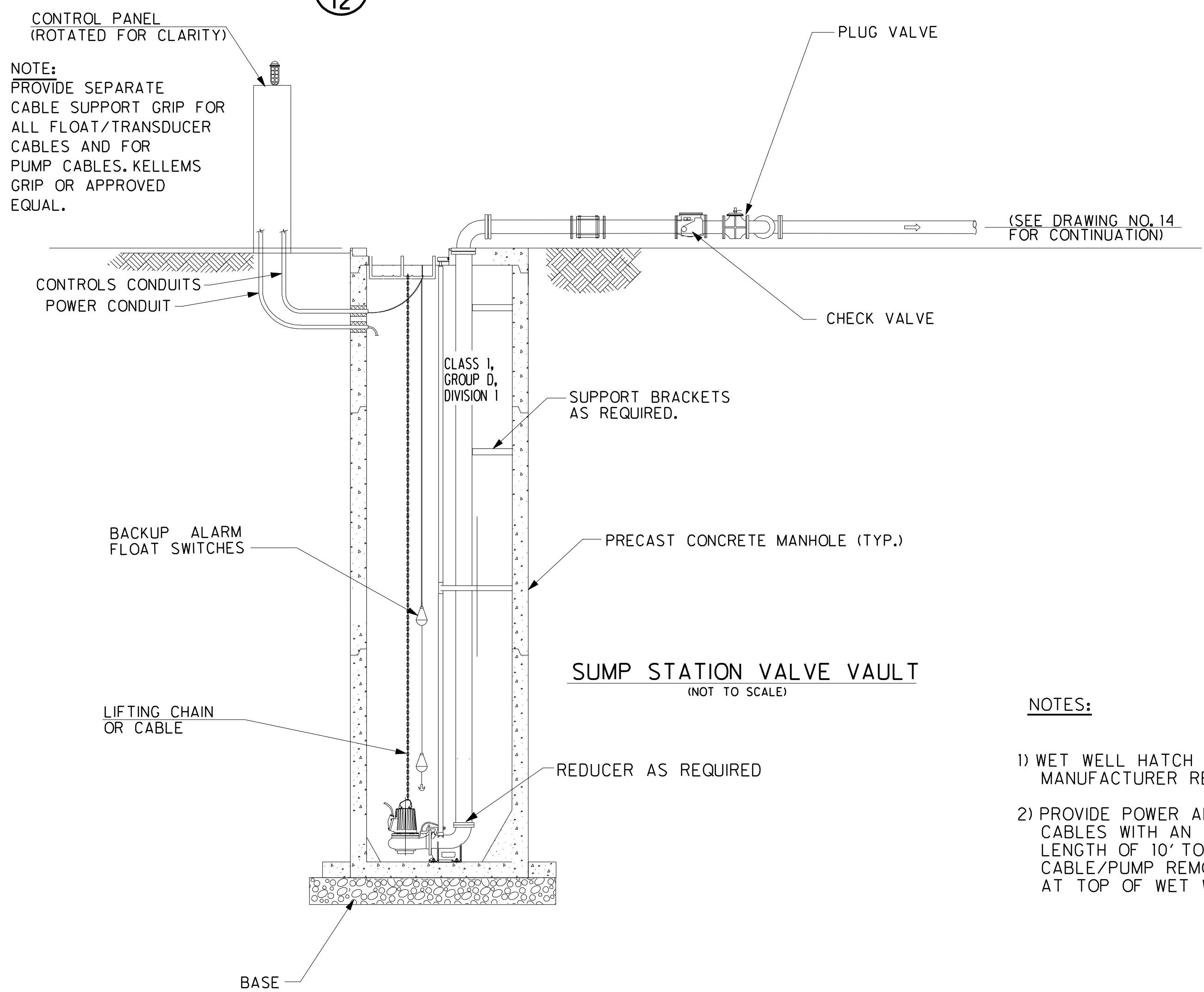
DRAWING NO. 11



1/12 PLAN VIEW



2/12 SUMP CONTROL PANEL
(NOT TO SCALE)



SECTION VIEW

3/12 SUMP
(NOT TO SCALE)

NOTES:

1) WET WELL HATCH SIZING PER PUMP MANUFACTURER RECOMENDATION.

2) PROVIDE POWER AND CONTROL CABLES WITH AN ADDITIONAL SLACK LENGTH OF 10' TO FACILITATE MULTIPLE CABLE/PUMP REMOVALS. COIL SLACK AT TOP OF WET WELL.

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z12.dgn
DRAWN BY: JOW DATE: FEBRUARY 2006

Foth & Van Dyke

REVISIONS			SIGNATURES		
NO.	BY	DATE		BY	DATE
△			APPROVED		
△			REVIEWED		
△			DESIGNED		

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ____ DATE ____

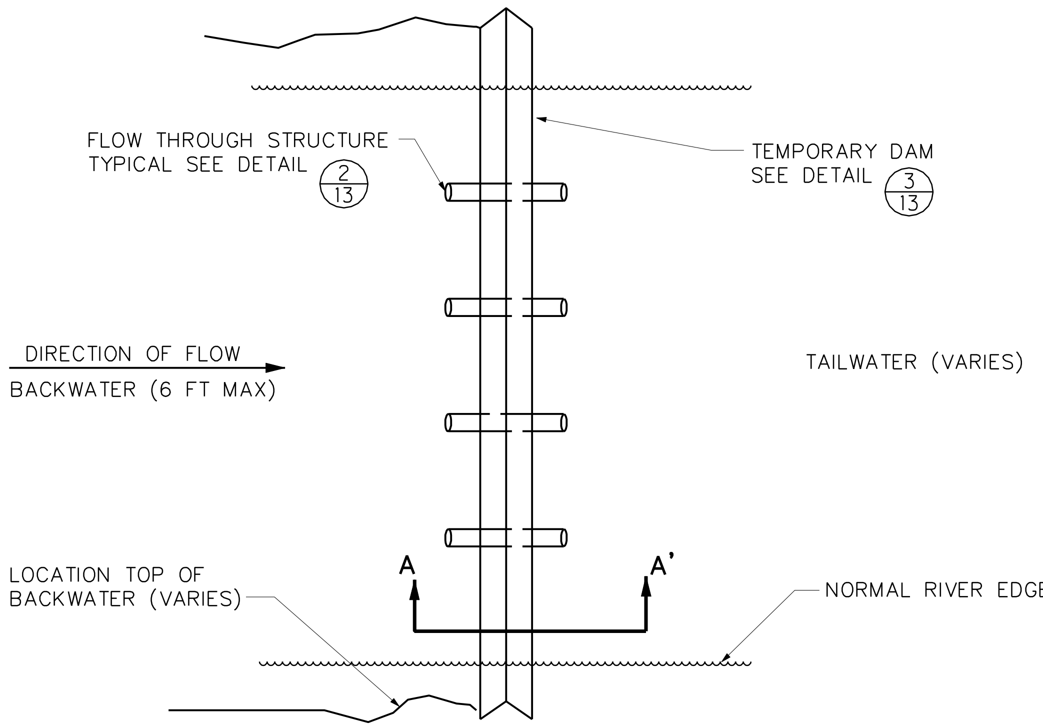
PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

SUMP AND PUMP STATION DETAILS

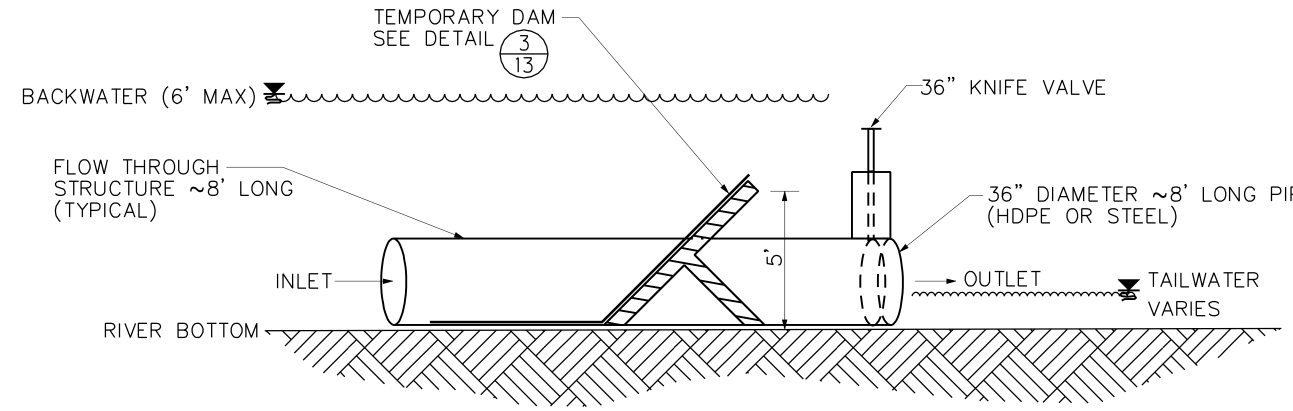
SCALE: NOT TO SCALE
SCOPE ID: 05P031
DRAWING NO. 12

L:\05p031\100 Ph II\Plots\100-ph2 z12.dgn
3/14/2006 dat



1/13 TEMPORARY DAM PLAN VIEW

NOT TO SCALE



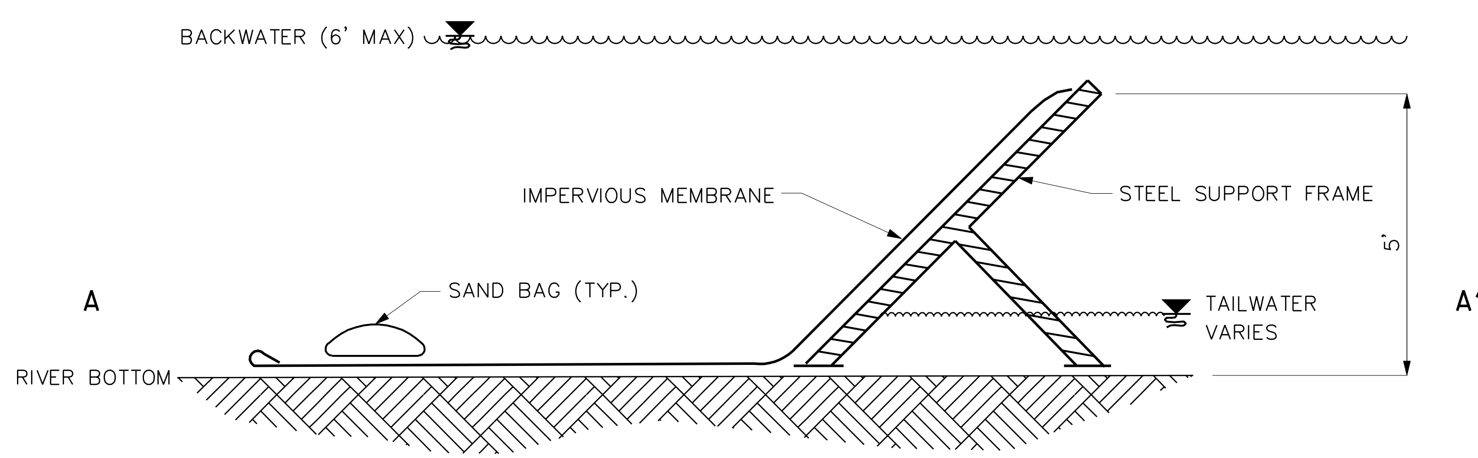
2/13 PORTADAM® - CROSS SECTION A - A'

NOT TO SCALE

NOTES:

1. TUBULAR STEEL WITH GEOMEMBRANE TEMPORARY DAM WILL BE USED.

2. SANDBAGS OR OTHER SUITABLE MEANS ARE USED TO PROVIDE A SEAL BETWEEN THE FLOW–THROUGH STUCTURE AND THE PORTABLE DAM.



3/13 PORTADAM®

NOT TO SCALE

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z13.dgn

DRAWN BY: JOW DATE: FEBRUARY 2006

Foth & Van Dyke

REVISIONS			SIGNATURES		
NO.	BY	DATE		BY	DATE
			APPROVED		
			REVIEWED		
			DESIGNED		

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY _______ DATE _______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

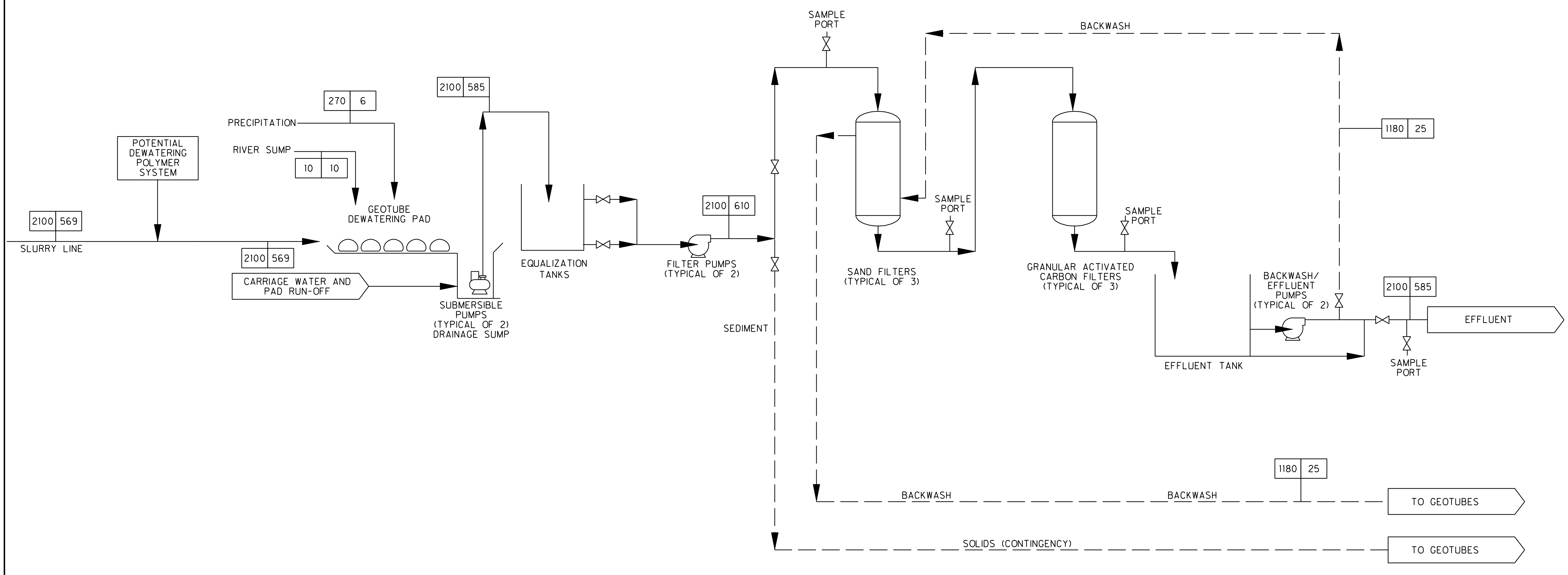
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

TEMPORARY DAM DETAILS

SCALE

SCOPE ID 05P031

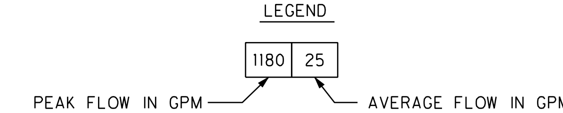
DRAWING NO. 13



NOTE:

REFER TO TECHNICAL SPECIFICATION 01600 FOR EQUIPMENT SIZES.

LEGEND



FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z14.dgn

DRAWN BY: JOW DATE: FEBRUARY 2006

Foth & Van Dyke

REUSE OF DOCUMENTS

SIGNATURES			REVISIONS		
	BY	DATE	NO.	BY	DATE
APPROVED					
REVIEWED					
DESIGNED					

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

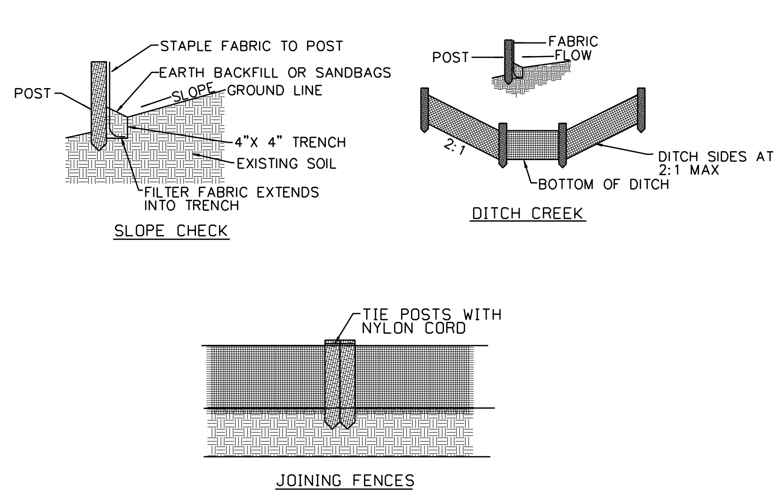
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

WATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM

SCALE NOT TO SCALE

SCOPE ID 05P031

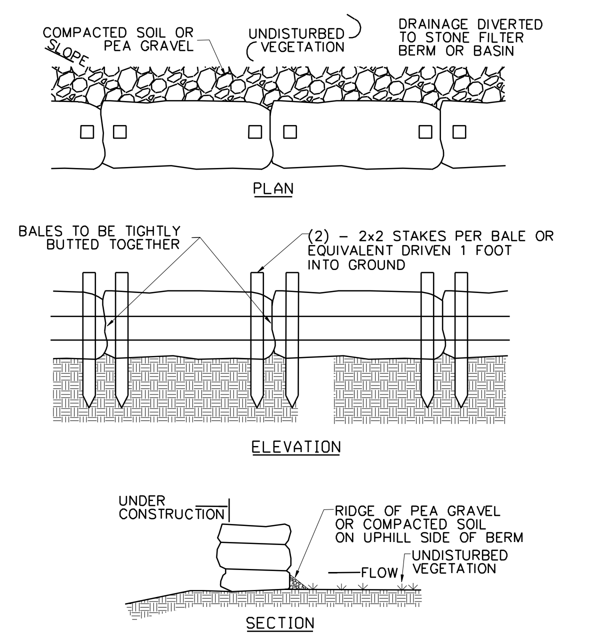
DRAWING NO. 14



NOTE: SILT FENCE TO BE INSTALLED PARALLEL TO SLOPE.

1/15 SILT FENCE DETAILS

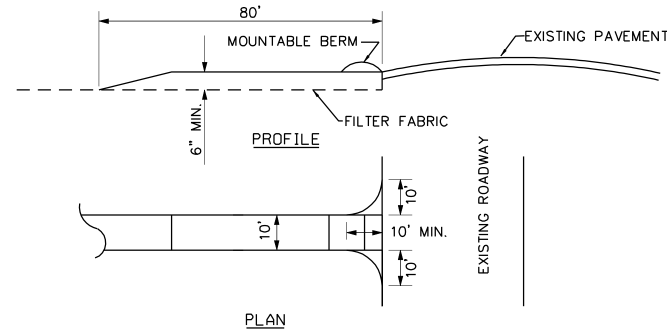
NOT TO SCALE



NOTE: PROVIDE SILT FENCE AT OUTLET OF DIVERSION

2/15 STRAW BALE DIVERSION BERM DETAIL

NOT TO SCALE



3/15 CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE

CONSTRUCTION ENTRANCE SPECIFICATIONS

1. STONE SIZE - 2" STONE SHALL BE USED, OR RECYCLED CONCRETE EQUIVALENT.

2. LENGTH - THE CONSTRUCTION ENTRANCE SHALL BE AS LONG AS REQUIRED TO STABILIZE HIGH TRAFFIC AREAS BUT NOT LESS THAN 50 FT.

3. THICKNESS - THE STONE LAYER SHALL BE AT LEAST 6" THICK.

4. WIDTH - THE ENTRANCE SHALL BE AT LEAST 10 FT WIDE, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.

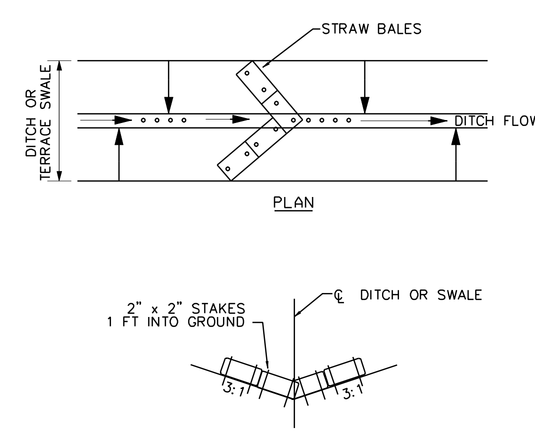
5. BEDDING - A GEOTEXTILE SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE. IT SHALL HAVE A GRAB TENSILE STRENGTH OF AT LEAST 200 LB. AND A MULLEN BURST STRENGTH OF AT LEAST 150 LB.

6. CULVERT - A PIPE OR CULVERT SHALL BE CONSTRUCTED UNDER THE ENTRANCE IF NEEDED TO PREVENT SURFACE WATER FLOWING ACROSS THE ENTRANCE FROM BEING DIRECTED OUT ONTO PAVED SURFACES.

7. WATER BAR - A WATER BAR SHALL BE CONSTRUCTED AS PART OF THE CONSTRUCTION ENTRANCE IF NEEDED TO PREVENT SURFACE RUNOFF FROM FLOWING THE LENGTH OF THE CONSTRUCTION ENTRANCE AND OUT ONTO PAVED SURFACES.

8. MAINTENANCE - TOP DRESSING OF ADDITIONAL STONE SHALL BE APPLIED AS CONDITIONS DEMAND. MUD SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC ROADS, OR ANY SURFACE WHERE RUNOFF IS NOT CHECKED BY SEDIMENT CONTROLS, SHALL BE REMOVED IMMEDIATELY. REMOVAL SHALL BE ACCOMPLISHED BY SCRAPING AND SWEEPING.

9. CONSTRUCTION ENTRANCES SHALL NOT BE RELIED UPON TO REMOVE MUD FROM VEHICLES AND PREVENT OFF-SITE TRACKING. VEHICLES THAT ENTER AND LEAVE THE CONSTRUCTION SITE SHALL BE RESTRICTED FROM MUDDY AREAS.



NOTE: INSTALL STRAW BALES EVERY 200 FT IN DITCHES AROUND BORROW AREAS, STOCKPILES, OR OTHER AREAS WHERE SEDIMENT TRAP IS NEEDED DURING CONSTRUCTION.

4/15 STRAW BALE SEDIMENT TRAP DETAIL

NOT TO SCALE

SEDIMENTATION AND EROSION CONTROL GENERAL NOTES

1. THE PUBLICATIONS LISTED BELOW FORM A PART OF THIS SPECIFICATION.

A. WISCONSIN CONSTRUCTION SITE BEST MANAGEMENT PRACTICE HANDBOOK - PREPARED BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES, PUBLICATION #1700

B. EROSION CONTROL PRODUCT ACCEPTABILITY LISTS (PAL) FEBRUARY 2004 EDITION - PREPARED BY THE WISCONSIN DEPARTMENT OF TRANSPORTATION

2. WORK SHALL INCLUDE ESTABLISHING VEGETATIVE COVER ON ALL AREAS DISTURBED BY CONSTRUCTION AND/OR AS SHOWN ON THE DRAWINGS. WORK SHALL ALSO INCLUDE PROVIDING, INSTALLING AND MAINTAINING EROSION AND SEDIMENT CONTROL MEASURES FOR USE DURING CONSTRUCTION AND DURING POST CONSTRUCTION WHILE VEGETATIVE COVER IS BEING ESTABLISHED.

3. DEFINITIONS
A. EROSION IS THE WASHING AWAY OF SOIL.

B. SEDIMENT IS SOIL THAT HAS ALREADY BEEN ERODED.

C. EROSION CONTROL IS THE PREVENTION OR MINIMIZATION OF EROSION.

D. SEDIMENT CONTROL IS THE TRAPPING OF SUSPENDED SOIL PARTICLES.

4. CONTRACTOR SHALL SUBMIT THE FOLLOWING:
A. DESCRIPTION OF EROSION AND SEDIMENT CONTROL METHODS THAT WILL BE USED DURING AND POST CONSTRUCTION AND REMEDIATION ACTIVITIES.

B. SILT FENCING SEDIMENT CONTROL PRODUCT LITERATURE DATA AND MANUFACTURER'S INSTALLATION DATA ON GEOTEXTILE FABRIC.

C. PRODUCT LITERATURE DATA ON OTHER CONTRACTOR REQUESTED MATERIAL(S) IDENTIFIED IN THEIR DESCRIPTION OF EROSION AND SEDIMENT CONTROL.

REFERENCE PAL FOR ACCEPTABLE ALTERNATES.

5. DURING SHIPMENT AND STORAGE, SILT FENCING FABRIC (GEOTEXTILE) SHALL BE WRAPPED IN RELATIVELY IMPERMEABLE AND OPAQUE PROTECTIVE COVERS. STORAGE AREA SHALL BE SUCH THAT GEOTEXTILE AND EROSION MAT ARE PROTECTED FROM MUD, DIRT, DUST, DEBRIS, MOISTURE, AND EXPOSURE TO THE SUNLIGHT AND HEAT. HANDLING, STORAGE, AND CARE OF GEOTEXTILE AND STRAW BALES ON SITE ARE THE RESPONSIBILITY OF THE CONTRACTOR PRIOR TO, DURING, AND AFTER THEIR INSTALLATION.

6. SILT FENCING AND STRAW BALES SHALL BE PROVIDED IN ACCORDANCE WITH REMEDIAL DESIGN SPECIFICATION #01356, STORM WATER POLLUTION PREVENTION MEASURES.

7. SILT FENCING SHALL BE INSTALLED PER SPECIFICATION #01356 STORM WATER POLLUTION PREVENTION MEASURES. INSTALL WITH THE POSTS TO THE DOWNSTREAM DIRECTION AND THE FABRIC TO THE UPSTREAM DIRECTION. THE FABRIC SHALL BE ANCHORED BELOW GRADE APPROXIMATELY 4 INCHES. REPLACE AND COMPACT SOIL IN ANCHOR TRENCH TO RESTORE TO ORIGINAL GRADE.

8. STRAW BALES SHALL BE INSTALLED PER SPECIFICATION #01356 STORM WATER POLLUTION PREVENTION MEASURES AND AS DETAILED ON THE PROJECT DRAWINGS. INSTALL WITH REBARS, STEEL PICKETS, OR 2-INCH X 2-INCH STAKES EMBEDDED ABOUT 6 INCHES BELOW GROUND.

9. THE CONTRACTOR SHALL INSPECT ALL DISTURBED AREAS AND EROSION AND SEDIMENT CONTROL DEVICES IN ACCORDANCE TO PROJECT SPECIFICATION SECTION 01356: STORM WATER POLLUTION PREVENTION MEASURES IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY DEFICIENCIES SHALL BE IMMEDIATELY CORRECTED BY THE CONTRACTOR. IN ADDITION, THE CONTRACTOR SHALL MAKE A DAILY REVIEW IN AREAS WHERE CONSTRUCTION ACTIVITY CHANGES THE EARTH CONTOUR AND DRAINAGE RUNOFF, TO ENSURE THAT EROSION CONTROL DEVICES ARE PROPERLY LOCATED FOR EFFECTIVENESS. REPLACE DAMAGED SILT FENCING AS LONG AS SEDIMENT CONTROL IS REQUIRED.

10. DURING CONSTRUCTION THE CONTRACTOR SHALL PROVIDE PROPER SOIL EROSION MEASURES FOR PROTECTION OF ALL ADJACENT ROADS, LANDS AND STREAMS AS DESCRIBED BY THE CURRENT APPLICABLE FEDERAL, STATE, OR LOCAL REQUIREMENTS.

11. THE CONTRACTOR SHALL PROVIDE SEDIMENT CONTROL AT:

1. ALL POINTS WHERE PROJECT WATERS LEAVE THE LIMITS OF THE PROJECT.

2. ALL POINTS WHERE PROJECT WATERS ENTER PORTIONS OF COMPLETED UNDERGROUND PIPING.

3. AROUND ANY AREA DESIGNATED FOR SOIL STOCKPILING OR MATERIAL STAGING.

ACCEPTED METHODS OF PROVIDING EROSION/SEDIMENT CONTROL INCLUDE BUT ARE NOT LIMITED TO: HAY/STRAW BALES, SEDIMENT BASINS, SILT FENCE, TEMPORARY GROUND COVER.

12. ANY DISTURBED AREA WITHIN 50 FEET OF A STREAM AND NOT AT FINAL GRADE SHALL HAVE TEMPORARY EROSION CONTROLS WITHIN 2 DAYS OF THE MOST RECENT DISTURBANCE IF THE AREA WILL REMAIN IDLE FOR MORE THAN 21 DAYS.

13. ANY DISTURBED AREAS NOT WITHIN 50 FEET OF A STREAM THAT WILL BE DORMANT FOR MORE THAN 21 DAYS, BUT LESS THAN ONE YEAR, SHALL HAVE TEMPORARY EROSION CONTROLS APPLIED WITHIN 7 DAYS OF THE MOST RECENT DISTURBANCE TO THE AREA.

14. IF AREAS WILL LIE DORMANT OVER THE WINTER, TEMPORARY EROSION CONTROLS SHALL BE APPLIED PRIOR TO THE ONSET OF WINTER.

15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL TEMPORARY SEDIMENT DEVICES AT THE CONCLUSION OF CONSTRUCTION BUT NOT BEFORE GROWTH OF PERMANENT GROUND COVER.

16. IF AREAS WILL LIE DORMANT FOR ONE YEAR OR MORE, PERMANENT EROSION CONTROLS SHALL BE APPLIED WITHIN 7 DAYS OF THE MOST RECENT DISTURBANCE.

17. FOR ANY AREA WITHIN 50 FEET OF A STREAM AND AT FINAL GRADE, PERMANENT EROSION CONTROLS SHALL BE APPLIED WITHIN 2 DAYS OF REACHING FINAL GRADE.

18. FOR ANY OTHER AREAS THAT ARE AT FINAL GRADE, PERMANENT EROSION CONTROLS SHALL BE APPLIED WITHIN 7 DAYS OF REACHING FINAL GRADE WITHIN THAT AREA.

15. THE CONTRACTOR SHALL PROVIDE ADEQUATE DRAINAGE (CONSISTENT WITH SEDIMENT/EROSION PRACTICES) OF THE WORK AREA AT ALL TIMES.

20. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH RAINFALL OR WHEN LEVEL OF DEPOSIT REACHES APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.

21. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE BARRIERS ARE NO LONGER REQUIRED SHALL BE REGRADED AS NECESSARY AND SEEDED.

22. EROSION CONTROL SILT FENCE SHALL BE INSTALLED DURING CONSTRUCTION ACTIVITIES AT A MINIMUM DISTANCE OF 5 FEET FROM THE TOE OF EACH EARTH MOUND OR ALONG PROPERTY LINE IF MOUND NOT PRESENT.

23. THE CONSTRUCTION ENTRANCE SHALL BE LOCATED AS SHOWN ON THE SITE MAP. SEE DETAIL 3 FOR CONSTRUCTION DETAILS.

FILE NAME: L:\05p031\100 Ph II\Plots\100-ph2 z15.dgn
DRAWN BY: JOW | DATE: MARCH 2006

Foth & Van Dyke

REVISIONS			SIGNATURES		
NO.	BY	DATE		BY	DATE
△			APPROVED		
△			REVIEWED		
△			DESIGNED		

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SEDIMENT REMOVAL DESIGN
PHASE II - UPPER RIVER
SHEBOYGAN FALLS, WISCONSIN

SEDIMENT AND EROSION CONTROL DETAILS

SCALE: NOT TO SCALE

SCOPE ID: 05P031

DRAWING NO. 15

CHEMICAL SPECIFIC ARARs & GUIDANCE FOR SHEBOYGAN RIVER PHASE II REMEDIATION

No.	Medium/Action	Type	Citation(s)	Project Document Reference
1	Concentrations of PCBs and other contaminants in sediments, surface water, ecological receptors, and wastewater from treatment systems.	Federal	Toxic Substances Control Act (TSCA) Cleanup Levels are found in 40 CFR 761.61(a)(4). USEPA disposal approval is also required per the Record of Decision (ROD). Clean Water Act (CWA) federal water quality standards are found in 40 CFR 131 and 33 CFR 323. The USEPA calculated surface weighted average concentration ranges for the Sheboygan River and Harbor. The Sheboygan River and Harbor target sediment and soil SWAC concentration ranges are 0.005 to 0.5 ppm for human health. For ecological health, the SWACs are 0.05 to 1.0 ppm for sediments and 0.05 to 10 ppm for floodplain soil. The primary remediation objectives are identified in the ROD, and include removing PCB-contaminated soft sediment so the entire river will reach an average PCB sediment concentration of 0.5 ppm or less over time. The remedies to achieve this concentration vary depending on location and are detailed in the ROD for the Upper River, Middle River, Lower River and Inner Harbor. The PCB trigger concentration is 26 ppm in sediment. The corresponding PCB tissue levels for resident fish are: Sport Fish: Small Mouth Bass--0.31 ppm, Walleye--0.63 p pm, Trout--0.09 ppm.	UR Design Basis; Quality Assurance Project Plan (QAPP)

No.	Medium/Action	Type	Citation(s)	Project Document Reference
			Bottom Feeders: Carp—2.58 ppm, Catfish—2.53 ppm. The ROD contains The clean-up level for floodplain soils is an average PCB soil concentration of 10 ppm or less; however, contaminated soil with more than 10 ppm may be left in place to prevent negative impacts to high-quality habitat.	
2	Concentrations of PCBs and other contaminants in sediments, surface water, and waters from treatment systems.	State	State water quality standards are based on the use designation for the water body and on water quality criteria, which are found in NR 102 to NR 105, Wis. Adm. Code. The site appears to be classified as a "Great Lakes System" waterway, per NR 102.12. Variances and additions applicable to the Lake Michigan district are found in NR 104.07. Rules for applying water quality standards to water-quality-based effluent limits are found in NR 106 and NR 207, Wis. Adm. Code. Surface water quality standards are applicable to point source discharges that are part of the remedial action. Environmental laws and standards for remedial actions for soil, surface water, wetlands, and groundwater are found in NR 722.09, Wis. Adm. Code. Groundwater quality standards are found in NR 140, Wis. Adm. Code. The enforcement standard (ES) for total PCBs in groundwater is 0.03 micrograms per liter (ug/l) and the	As Above in Item #1; Water Management Plan (WMP); PCB-Impacted Soils/Sediment Management Plan (SSMP)

No.	Medium/Action	Type	Citation(s)	Project Document Reference
			preventive action limit (PAL) is 0.003 ug/l. Impacted groundwater may not cause surface water to be impacted at levels above surface water quality standards in NR 102 to NR 105. Generic Soil Cleanup Standards are included in chapter NR 720 and NR 722. Site-specific soil clean-up standards are provided in the ROD, and include 10 ppm for floodplain soils and concentrations for sediments, based on location in the river. Solid Waste Rules are included in NR 500-520, Wis. Adm. Code. Hazardous Waste Rules are included in Chapter NR 600, Wis. Adm. Code.	

GENERAL LOCATIONS & ACTION-SPECIFIC ARARs & GUIDANCE FOR SHEBOYGAN RIVER PHASE II REMEDIATION

No.	Medium/Action	Type	Citation(s)	Project Document Reference
1	Dredging of impacted sediments/river restoration	Federal	Fish and Wildlife Coordination Act (FWA)--16 USC 661 *et seq.* River and Harbors Act—33 USC 403 *et seq.* 33 CFR 320-331— Department of the Army Section 404 Permit Requirements--Rivers and Harbors Act 320—General Regulatory Policies 322—Permits for structures or work in or affecting navigable waters of the United States 323—Permits for discharges of dredged or fill material into waters of the United States 325—Processing of Department of the Army permits 40 CFR 6.302 (Wetlands, floodplains, important farmlands, coastal zones, wild and scenic rivers, fish and wildlife, and endangered species.) 40 CFR 230—EPA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material Endangered Species Act 16 USC 1531 *et seq.* 50 CFR 402	Design Basis; Design Specification Section # 02325 (Dredging); Design Specification Section #13285 (Removal & Disposal of PCB-Impacted Soils/Sediment); WMP & SSMP; Remedial Action Work Plan (RAWP)

No.	Medium/Action	Type	Citation(s)	Project Document Reference
			National Historic Preservation Act 15 USC 470; *et seq.* 36 CFR 800 Floodplain and Wetlands Regs & Executive Orders 40 CFR 264.18(b) and Executive Order 11988 (location standards for hazardous waste TSD facilities in a floodplain) Memorandum of Agreement between the EPA and DOA concerning the determination of mitigation under the CWA Section 404(b)(1) guidelines (February 6, 1990) Great Lakes Water Quality Initiative, Part 132, Appendix E--Guidance to states bordering the Great Lakes regarding wastewater discharge programs (to be considered)	
2	Dredging of impacted sediments/river restoration	State	Great Lakes System classification for surface waters – NR 102.12 (all waters within the drainage basin of the Great Lakes) Management of PCBs and Products Containing PCBs—NR 157 s. 30.20, Wisconsin Statutes “Removal of Material from Beds of Navigable Waters” (Permits or contracts required) NR 346, Wis. Adm. Code “Dredging Fees” NR 347, Wis. Adm. Code “Sediment Sampling and Analysis, Monitoring Protocol and Disposal Criteria for Dredging	As Above in Item #1; QAPP; Field Sampling Plan (FSP); Verification Sampling Plan (VSP) Design Spec Section # 13285

No.	Medium/Action	Type	Citation(s)	Project Document Reference
			Projects" Solid Waste Management—NR 500-520 Navigable Waters, Harbors, and Navigation – Chapter 30, Wis. Stats. (includes permit requirements) Fish and Game – Chapter 29.415, Wis. Stats. WDNR Guidance Memo "Solid Waste issues related to disposal of PCB contaminated sediments in Wisconsin landfills" (dated March 20, 1995) WDNR RAP (1995) prepared under the Great Lakes Water Quality Agreement (to be considered) WDNR Sheboygan River Basin Water Quality Management Plan (to be considered) Soil Cleanup Standards (floodplain soils) – Wis. Admin. Code NR 720 NR 115, Wis. Adm. Code, "Wisconsin's Shoreland Management Program" requires counties to adopt zoning and subdivision regulations for the protection of shorelands. NR 117, Wis. Adm. Code, "Wisconsin's City and Village Shoreland-Wetland Protection Program" establishes standards for cities and villages to adopt shoreland-wetland zoning	

No.	Medium/Action	Type	Citation(s)	Project Document Reference
			ordinances.	
3	Dredging of impacted sediments/river restoration	Local	Section 134, Waterways, City of Sheboygan Municipal Code Section 3, Shoreland-Wetland Zoning District, City of Sheboygan Municipal Code—District boundaries, navigability and high water mark issues, zoning permits, permitted uses according to Chs. 30 and 31, Wis. Stats. Section 4, Design Criteria, Performance Standards and Specifications for Control Measures, City of Sheboygan Municipal Code—Erosion, Sediment and other pollutant control standards. Should other technical standards be used, must be approved by the Department of Public Works. Chapter 72, Shoreland-Floodplain Ordinance, Sheboygan County, Wisconsin. Includes permit requirements for dredging, filling, and other activities. Chapter 70, Sanitary Regulations, Sheboygan County, Wisconsin. Includes requirements for private sewage systems.	
4	Release of PCB impacted sediment into surface water. Must manage erosion, run off and turbidity to prevent release of PCB impacted particulates into surface waters of the State.	State	WDNR Guidance Memo "Solid Waste issues related to disposal of PCB contaminated sediments in Wisconsin landfills" (dated march 20, 1995) WDNR Chapter 720 "Soil Cleanup Standards" Clean Water Act Section 404 (Discharges of Dredged Materials)	As Above in Item #1; QAPP

No.	Medium/Action	Type	Citation(s)	Project Document Reference
			Toxic Substances control Act (TSCA) 40 CFR Ch 1 (7-1-01 Edition) Part 761 – "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and use Prohibitions" Subpart 761.61(a)(4) "Cleanup Levels"	
5	Meeting effluent discharge standards (Wisconsin Pollutant Discharge Elimination System)	State	WDNR NR 215 WDNR NR 217	WMP

LOCATION-SPECIFIC ARARs & GUIDANCE FOR SHEBOYGAN RIVER PHASE II REMEDIATION

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
1	Aquatic Resources - Wetlands	Wetland protection	NA	10 CFR 1022.3 Clean Water Act Sections 101, 507, and 404 NR 103, Wis. Adm. Code	Design Basis
2	Aquatic Resources – Waters of the State	Must comply with the substantive requirements of WDNR for erosion and sediment control to prevent pollution.	Actions potentially altering the properties of any waters of the state	WDNR Wisconsin Construction Site Best Management Practices Handbook NR 216.01-55, Wis. Adm. Code	Design Basis; Spec Section #01355 & 13285; Mitigation Plan; WMP; SSMP
3	Aquatic Resources – Waters of the State	Erosion and sediment requirements include but are not limited to: • Limit clearing, grubbing and other disturbances in areas in or immediately adjacent to waters of the State to the minimum necessary to accomplish the activity. • Unnecessary vegetative removal is prohibited and all disturbed area must be properly stabilized and revegetated as soon as practical.	Actions potentially altering the properties of any waters of the state Work performed in navigable waterways	WDNR Wisconsin Construction Site Best Management Practices Handbook NR 216.01-55, Wis. Adm. Code NR 30, Wis. Adm. Code	As Above in Item #2

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
		• Limit excavation, dredging, bank reshaping, or grading to the minimum necessary to install authorized structures, accommodate stabilization, perform soil and sediment excavation in accordance with site remediation goals, or prepare banks for revegetation. • Maintain the erosion and sedimentation control measures throughout the construction and remediation period.			
4	Aquatic Resources – with presence of Wildlife Resources	The effects of water related projects on fish and wildlife resources and their habitat should be considered with a view to the conservation of fish and wildlife resources by preventing the loss and damage to such resources.	Action that impounds, modifies, diverts or controls water, including navigation and drainage activities.	Fish and Wildlife Coordination Act (16 USC 661 et seq)	As Above in Item #2
5	Aquatic Resources – Discharge of Dredge or Fill Material	No discharge of dredge or fill material into an aquatic ecosystem is permitted if there is a practical alternative that would have less adverse impact.	Action that involves the discharge of dredged or fill material into waters of the state or US.	40 CFR 230.10	As Above in Item #2; Spec Section #02325; RAWP
6	Cultural Resources	Cultural resource assessment	NA	NA	Design Basis

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
7	Endangered, Threatened or Rare Species	Endangered, threatened or rare species identification.	Identification of endangered/rare resources	"Endangered Species Act" 16 USC 1531 *et seq.* 50 CFR 402 "Joint Counterpart Endangered Species Act Section 7 Consultation Regulations" 50 CFR 17.11 and 17.12—lists of endangered and threatened wildlife and plants 50 CFR 17.95, 50 CFR 17.96, and 50 CFR 226 identify designated critical habitats.	Design Basis
8	Site Work – Activities Causing Fugitive Dust Emissions	Shall take reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions shall include but are not limited to the following: • Use, where possible of water or chemicals for control of dust during construction operation, excavation performed as part of the remediation effort, grading of roads and access ramps, and clearing of land. • Application, when appropriate, of water or chemicals or tarps to temporary soil and sediment	Fugitive emissions from land disturbing activities (e.g. excavation, construction).	NR 415.04, Wis. Adm. Code	Design Basis; Health & Safety Plan (HASP); SSMP

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
		stockpiles and other surfaces that can create airborne dust.			
9	Site Work – Activities Causing Storm Water Runoff	Implement good construction management techniques, sediment and erosion, structural and vegetative controls to ensure that storm water discharge: • Does not include distinctly visible floating scum, oil or other matter • Does not cause an objectionable color contrast in receiving streams • Results in no materials in concentrations sufficient to be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life or fish and aquatic life in the receiving stream.	Storm water discharges associated with construction activities at remediation, construction and industrial sites – areas greater than 1 acre.	40 CFR 122 Department of the Army Permit, regional General Permit for Stream Restoration", subparagraphs 6. Turbidity and 7. Erosion Control. NR 102, Wis. Adm. Code "Water Quality Standards for Wisconsin Surface Waters" NR 105, Wis. Adm. Code "Surface Water Quality Criteria and Secondary Values for Toxic Substances" Clean Water Act Section 304 "Surface Water Quality Standards"	Spec Section #01355 & 01356 (Storm Water Pollution Prevention Measures); Storm Water {Pollution Prevention Plan (SWP3); WMP & SSMP
10	Site Work – Land Disturbance Activities	Clearing and grubbing must be held to the minimum necessary for grading and equipment operations	Stripping and removal of existing vegetation, cutting down of larger trees and grinding their stumps.	33 CFR 322 "Permits for Structures or Work in or Affecting Navigable Waters of the United States" (US Army Corps of Engineers Standards)	Spec Section #01355, 01356, & Design Basis; SSMP

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
				NR 30, Wis. Adm. Code (Work Performed in Navigable Waterways)	
11	Site Work – Phasing	Construction must be sequenced to minimize exposure time of cleared surface areas, and staged or phased for large projects with areas of one phase stabilized prior to another being initiated. Stabilization shall be accomplished by temporary or permanently protecting disturbed soil surface from rainfall impacts and runoffs.	Partial construction and remediation efforts scheduled for each project phase.	NA	As above in Item #10; RAWP
12	Site Work – Erosion and Sediment Controls	Erosion and sediment controls must be in place and functional before earth working operations begin and must be maintained during the operational period.	Installation and construction of temporary controls and permanent structures to manage erosion and minimize sediment run-off.	NR 152, Wis. Adm. Code NR 216, Wis. Adm. Code	As above in Item #10;
13	Site Work – Erosion and Sediment Controls	Surface water flows towards the current construction or remediation area shall be diverted using berms, channels or sedimentation traps as necessary	Installation and construction of temporary controls and permanent structures to manage erosion and minimize sediment run-off.	NR 152, Wis. Adm. Code NR 216, Wis. Adm. Code	As above in Item #10;

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
14	Site Work – Erosion and Sediment Controls	Dredged material pumped from remediation and excavation areas will be discharged at an appropriate staging area designed to contain and manage the slurry.	Installation and construction of temporary controls and permanent structures to manage erosion and minimize sediment run-off.	NR 152, Wis. Adm. Code NR 216, Wis. Adm. Code	Design Basis; Spec Section #02325; RAWP
15	Site Work – Erosion and Sediment Controls	Shall develop and maintain a storm water pollution and prevention control plan which includes a description of potential pollution sources and paths to outfalls.	Installation and construction of temporary controls and permanent structures to manage erosion and minimize sediment run-off.	NR 152, Wis. Adm. Code NR 216, Wis. Adm. Code	Spec Section #01355 & 01356; SWP3; WMP
16	Site Work – Erosion and Sediment Controls	Shall develop and maintain a run-off discharge monitoring plan, indicating sampling locations, parameters and monitoring procedures.	Installation and construction of temporary controls and permanent structures to manage erosion and minimize sediment run-off.	NR 152, Wis. Adm. Code NR 216, Wis. Adm. Code	As Above in Item#15
17	Waste Management – Soil/Sediment	Must determine if PCB-impacted soil is TSCA or Non-TSCA.	Sampling and analysis of soil and sediment during	40 CFR 262.11	QAPP; FSP; VSP

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
	Characterization	• PCB-impacted soil is hazardous if PCBs exceed 50 ppm. • PCB-impacted soil is non-hazardous if PCBs are less than 50 ppm.	remediation.		
18	Waste Management – Characterization Methods	Must characterize waste using prescribed testing methods. Obtain a detailed chemical and physical analysis of a representative sample(s) of PCB-impacted material. If waste is determined to be hazardous, it must be managed appropriately. There are four (4) general waste categories, which have different cleanup levels: bulk PCB remediation waste, non-porous surfaces, porous surfaces, and liquids. Cleanup levels and institutional or engineering controls are described in 40 CFR 761.61(a)(4)	Sampling and analysis of soils and sediments excavated during remediation to determine if the material is hazardous or non-hazardous.	40 CFR 761.61(a)(4) "Cleanup Levels" NR 605, Wis. Adm. Code "Identification and Listing of Hazardous Waste", subsection NR 605.13 "PCB Wastes Regulated Under the Toxic Substances Control Act" NR 157, Wis. Adm. Code "Management of PCBs and Products Containing PCBs"	QAPP; FSP; VSP; #013285 Spec Section
19	Wastewater discharge	The decontamination standard for water containing PCBs is <3 ug/l if discharged to a POTW or navigable waters, OR a PCB discharge limit included in a permit issued under section 307(b) or 402 of the CWA. The ambient water criterion for PCBs in navigable waters is 0.001 ug/l.	Storage and Disposal decontamination procedures, discharge requirements.	40 CFR 129.105 "Toxic Pollutant Effluent Standards" for PCBs 40 CFR 761.79(b)(1) "Decontamination Procedures" Clean Water Act Section 307(b) or 402 "Toxic and Pretreatment	QAPP; HASP; SWP3; Spec Section #01356

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
		Per the Great Lakes Water Quality Initiative, remedial action involving discharges should, in general, minimize lowering of water quality to the extent practicable.		Effluent Standards” Great Lakes Water Quality Initiative, Part 132, Appendix E (to be considered) NR 102 to NR 106, Wis. Adm. Code POTW-specific requirements for Sheboygan Falls, Sheboygan, Kohler, Port Washington.	
20	Waste Management – Temporary Storage	PCB-impacted soils and sediments excavated as part of the remediation effort will be temporarily stockpiled (if necessary) in a safe and appropriate manner.	Temporary accumulation of PCB-impacted RCRA hazardous waste on-site.	40 CFR 761.40(a) 40 CFR 761.61 “PCB Remediation Waste”	Design Basis; SSMP; Spec Section #13285
21	Waste Management – Permanent Disposal	PCB impacted soil that exceeds 50 ppm will be disposed of in a licensed and permitted hazardous waste landfill.	Final transport and disposal of PCB impacted RCRA hazardous waste at a licensed facility.	40 CFR 761 “PCBs Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions” applies to PCB-containing materials, which include dredge spoils, sediments, soil, material containing PCBs from spills. 40 CFR 761.61 “PCB	QAPP; Design Basis; Spec Section #13285; SSMP

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
				Remediation Waste” 40 CFR 761.62(a) “Disposal of PCB Bulk Product Waste” WDNR Chapter 722 “Standards for Selecting Remedial Actions”	
22	General – Site Security	Must prevent unknowing entry into the work area by persons or livestock, by use of natural barrier, fence and warning signs.	Installation of temporary fencing and warning sings during remediation and construction operations.	40 CFR 761.75(b)(9) Requirements for supporting facilities used to dispose PCBs (relevant and appropriate)	HASP; Contingency Plan
23	General – Road Maintenance	Road shall be maintained to and within the site which are adequate to support the operation and maintenance of the site without causing safety and nuisance problems or hazardous conditions	Maintenance of temporary access roads including minimization of fugitive dust.	40 CFR 761.75(b)(9) Requirements for supporting facilities used to dispose PCBs (relevant and appropriate)	As Above in Item #22
24	General – Safety	Site shall be operated and maintained in a manner to prevent safety problems or hazardous conditions resulting from spilled liquids and windblown materials.	Prevent safety problems and hazardous conditions	40 CFR 761.75(b)(9) Requirements for supporting facilities used to dispose PCBs (relevant and appropriate)	As Above in Item #22
25	General - Inspections	Must inspect facility for malfunctions and deterioration, operator errors, and discharges often enough to identify and correct problems. Once detected, the operator must remedy on a schedule that	Operations and maintenance of mechanical and electrical components of the	40 CFR 264.15	NA

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
		ensures that the problem does not lead to an environmental or human health hazard.	remediation system.		
26	General – Personnel Training	Must ensure personnel adequately trained in hazardous waste, emergency response, monitoring equipment maintenance, alarm system procedures, etc.	Training of construction workers in regards to health, safety, hazard response, etc.	40 CFR 264.16	As Above in Item #22
27	General – Construction QAP	Must develop and implement a CQAP to ensure that the work meets or exceeds the design criteria and specifications for all physical components and remediation efforts.	Utilization of third part CQA oversight.	40 CFR 264.19	QAPP; Spec Section #01055 (Project Roles); Construction Quality Assurance Plan (CQAP)
29	General - Contingency Plan	Must have a contingency plan designed to minimize hazards to human health and the environment that designates at least one emergency coordinator onsite responsible for coordinating emergency response activities.	Contingency planning document and procedures.	40 CFR 264.51	HASP; Contingency Plan
30	Monitoring - Surface Water Baseline	The surface water discharging from the remediation site must be sampled prior to commencing work for use as baseline data.	Sampling and analysis of surface water before remediation efforts to determine baseline levels of sedimentation and turbidity.	40 CFR 761.65(b) WDNR Chapter 140	NA

No.	Location Characteristic	Requirements	Prerequisite	Citation(s)	Project Document Reference
31	Transportation of PCB Impacted Soil/Sediment Waste	Transporter must comply with manifesting provisions	Proper record keeping and documentation of the transport of hazardous waste to a licensed disposal facility.	40 CFR 761.207(a) 40 CFR 262.10(h) WDNR Chapter 615.08 WDNR Chapter 620	Spec Section #13285; SSMP
32	Transportation of PCB Impacted Soil/Sediment Waste	Transporter must comply with local, county and state hauling permits and standards.	Proper cover and tarp to be used along with other safe hauling procedures.	Wisconsin Code Chapter 291.23 Wisconsin Code Chapter 348	As Above in Item #31

Ciba Specialty Chemicals Corp.
USA

Water & Paper Treatments

WASTE WATER SPECIALTIES TECHNICAL REPORT

Report Number: WWS/05/933/01 **Date:** October 19, 2005

AUTHOR: Will Morse
CUSTOMER: Foth and Van Dyke
PROJ / TSE #: 05/933
SUBJECT: Polymer Selection to Aid the Geotube Dewatering of River Sediment from the Sheboygan River, Sheboygan Falls, MI

SUMMARY

In support of this treatment opportunity, samples of in-place solids and top water were delivered to the laboratory in Suffolk to allow test work to be undertaken.

The test work indicated the following.

- The best technical performance was generated using **Ciba®KRYSALIS®FC2044**. Optimal performance was achieved, using 10% solids slurry, at an active dose of 1lb/dry ton. This generated cake solids of 69.0% with filtrate turbidity of 22NTU.

- The sample as received contained dry solids of 63.7% with a specific gravity (SG) of 1.690. The substrate also had ~61% of the particles greater than 106um in size.

1.0 INTRODUCTION

A request was received on behalf of Foth and Van Dyke for a product evaluation on a sample of dredge material from the Sheboygan River, Sheboygan Falls, MI, to be undertaken. The contact person for this project is Steve Laszewski. A sample of in-place solids was taken from a site ~250 feet east of Rochester Park Island using a Manual Core Sampler on 10/11/05. The in-place solids along with a sample of top water were delivered for evaluation. A dry polymer is desired for treatment and the material will be dewatered via Geotubes. This is a multi year project planned from 2006 to 2008.

This report details the results of this evaluation.

2.0 EXPERIMENTAL AND RESULTS

2.1 Characterization of Sample

The sample was characterized in the laboratory, and the obtained results are presented below in Tables 1, 2, & 3.

TABLE 1: Sample Characteristics (as received)

CHARACTERISTIC	RESULT
Sample Type	River Sediment
pH	7.5
Physical Characteristics	Brown Color, Earthy Odor
Dry Solids	63.7%
Specific Gravity (of slurry)	1.690
Particle Size	
- d_{10}	7 um
- d_{50}	118 um
- d_{90}	801 um
Mean	110 um

TABLE 2: Slurry Specific Gravity Range

Slurry Solids (%)	Specific gravity (SG)
2	1.022
4	1.043
6	1.065
8	1.086
10	1.108
12	1.130
14	1.151
16	1.173
18	1.194
20	1.216

This information is also included graphically – see Figure 1.

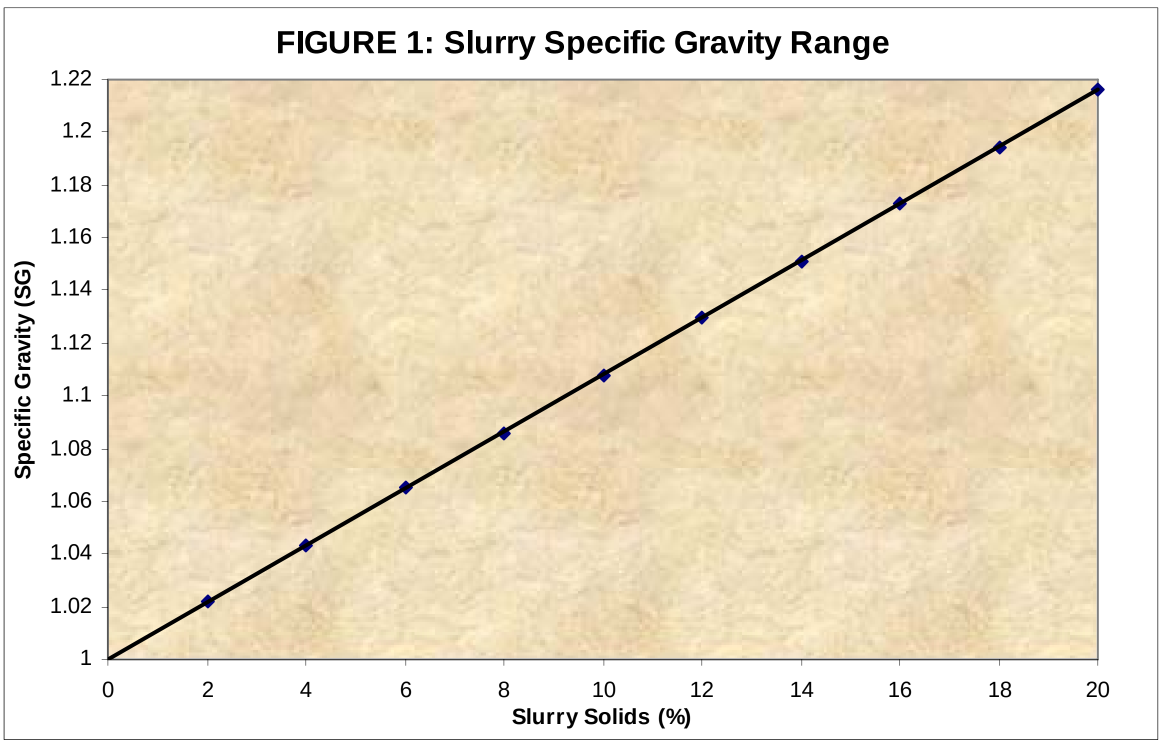


TABLE 3: Grain Size Analysis

Mesh Size	Aperture (um)	Solids (% by volume)
	1	6.41
	2	0.61
	3	0.24
	4	0.28
	5	0.57
	10	5.43
	15	6.97
	20	4.93
	30	5.99
325	45	3.80
250	60	1.56
200	75	1.22
150	106	0.95
100	150	46.24
45	355	3.58
35	500	0.88
20	850	1.64
12	1700	1.11
6	3350	1.71

This information is also included graphically – see Figures 2 & 3.

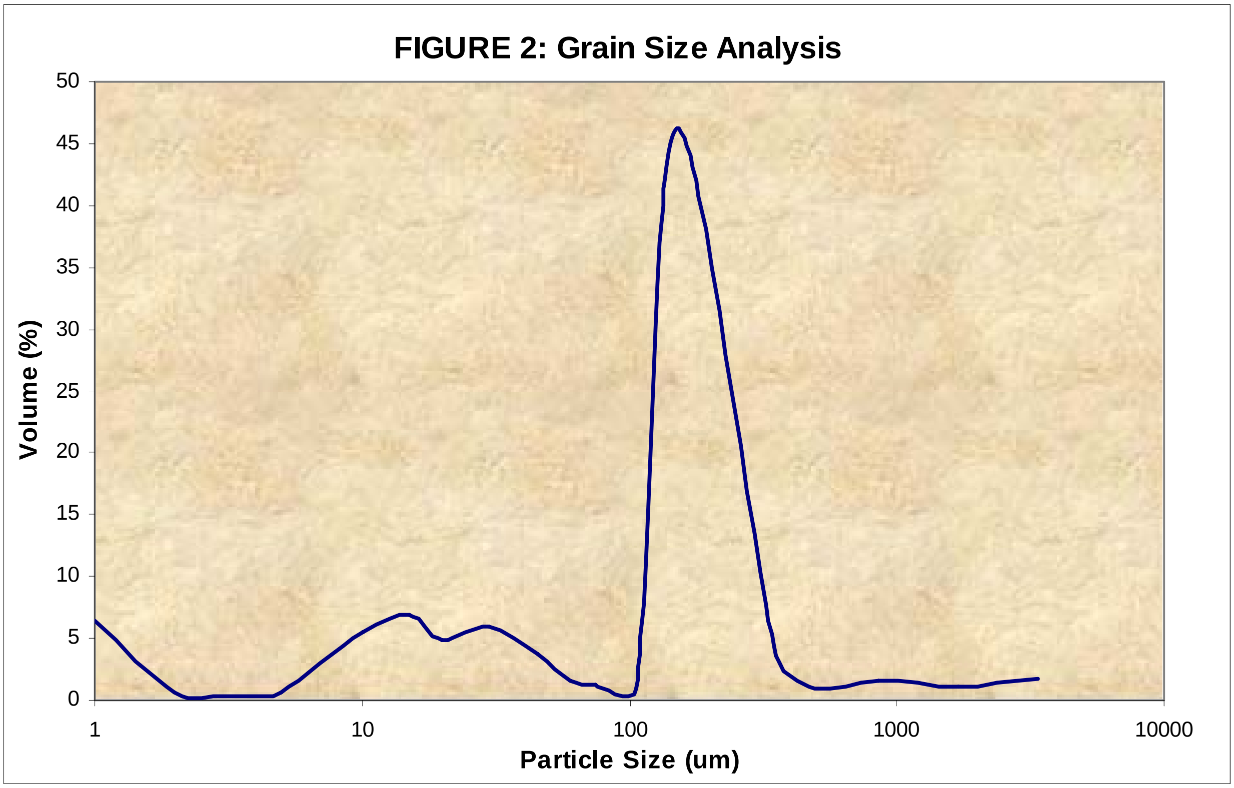


FIGURE 2: Grain Size Analysis
Volume (%)
Particle Size (um)
0
5
10
15
20
25
30
35
40
45
50
1
10
100
1000
10000

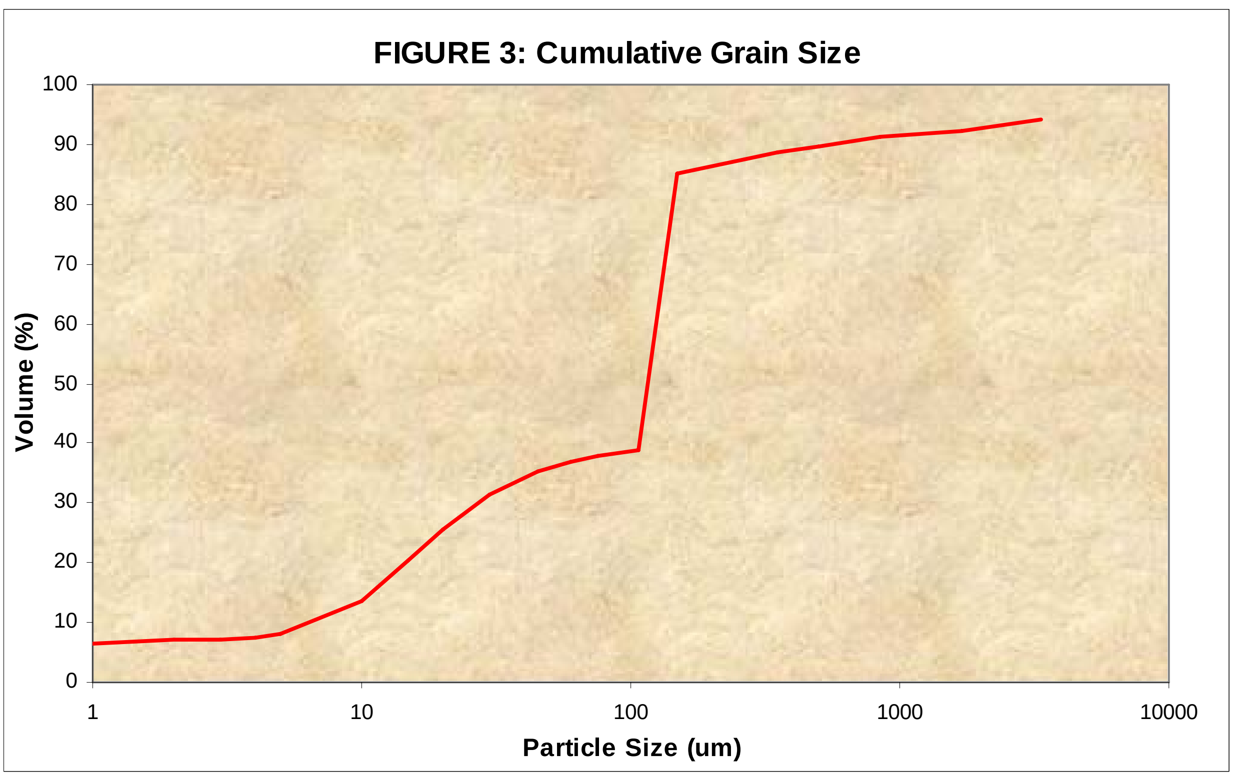


FIGURE 3: Cumulative Grain Size
Volume (%)
Particle Size (um)
0
10
20
30
40
50
60
70
80
90
100
1
10
100
1000
10000

2.2 Product Screening

The as supplied solids were diluted with the supplied top water down to a 10% solids slurry for this evaluation. In all cases sample aliquots of 200mL were taken. Polymer was diluted to 0.2% active solutions and added under moderate shear induced through the repeated transfer of the slurry/polymer mix from one beaker to another until a visually optimal floc had formed. This mixing method was thought to simulate most accurately the mixing conditions typical of geo-tube applications. A small sample of the flocculated material was then analyzed by Capillary Suction Time (CST). The remaining conditioned material was then allowed to drain through a section of Geotube material with the filtrate volumes collected after 20 seconds being recorded. In addition, the filtrate collected from each evaluation was also tested for turbidity. All filtrate volumes were corrected by subtracting the dosage volumes.

The results of this work are presented in Table 4.

The products that obtained the highest filtrate volumes with correspondingly low CST and residual turbidity were selected for dewatering work simulating a Geotube application.

The dewatering results are displayed in Table 5.

Additional work was also performed by taking the 10% slurry and allowing it to settle for 30 seconds then decanting the unsettled portion into another container for further product analysis. The slurry solids decreased from 10% to ~5% in the decanted portion. The 5% slurry was then subjected to the same product screening method stated above. This work was done to show the effect of removing the larger/heavier particles from the slurry, via hydro-cyclones or screening, and then applying polymer treatment.

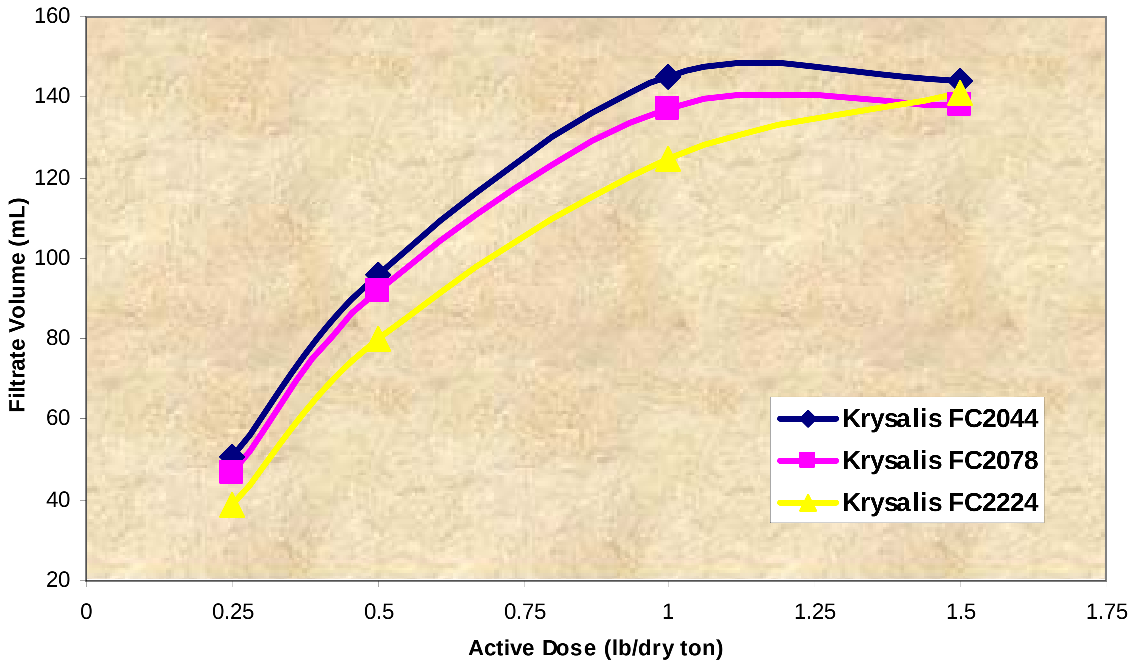
The results of this additional work are presented in Table 6.

TABLE 4: Product Screening (10% Slurry Solids)

Product	Active Dose (lb/dry ton)	Filtrate Turbidity (NTU)	CST (sec)	Net Filtrate Volume (mL) after 20 (sec)
Krysalis FC2044	0.25	256	9	51
	0.5	89	8	96
	1	22	6	145
	1.5	34	9	144
Krysalis FC2078	0.25	302	8	47
	0.5	125	7	92
	1	22	7	137
	1.5	22	9	138
Krysalis FC2224	0.25	365	9	39
	0.5	138	8	80
	1	31	7	125
	1.5	30	8	141

This information is also displayed graphically - see Figures 4, 5, & 6.

FIGURE 4: Filtrate Volume



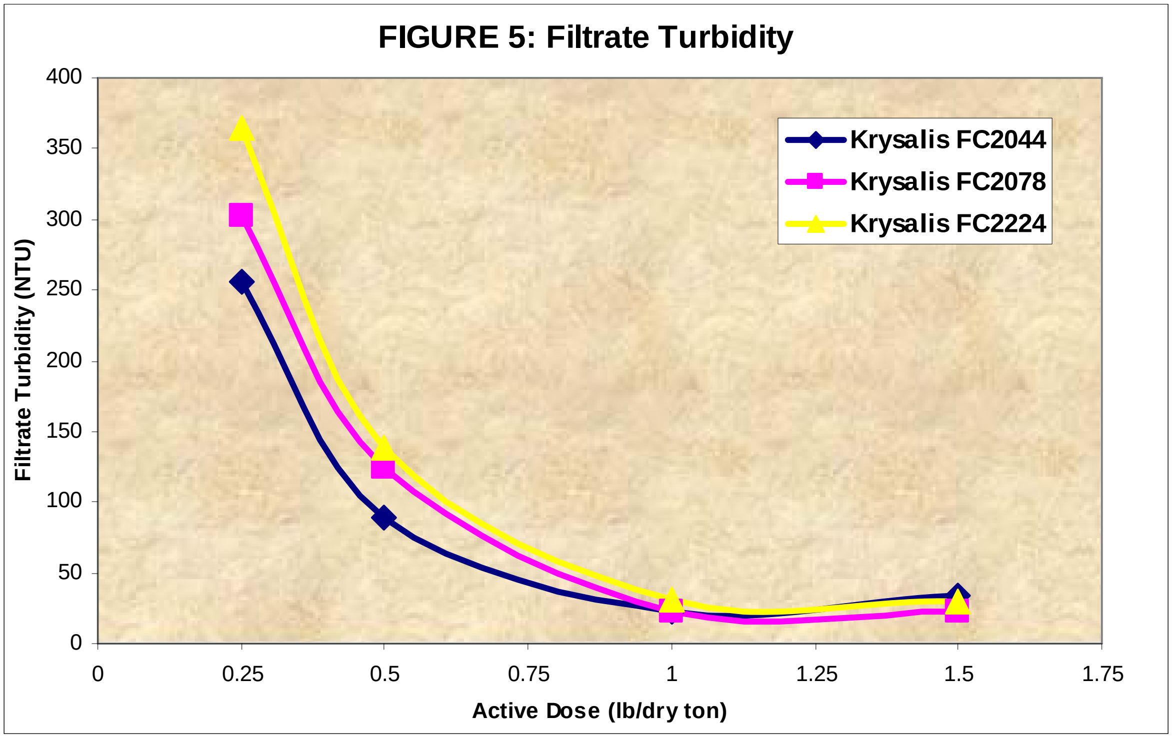


FIGURE 5: Filtrate Turbidity
Filtrate Turbidity (NTU)
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224
0
50
100
150
200
250
300
350
400
0
0.25
0.5
0.75
1
1.25
1.5
1.75

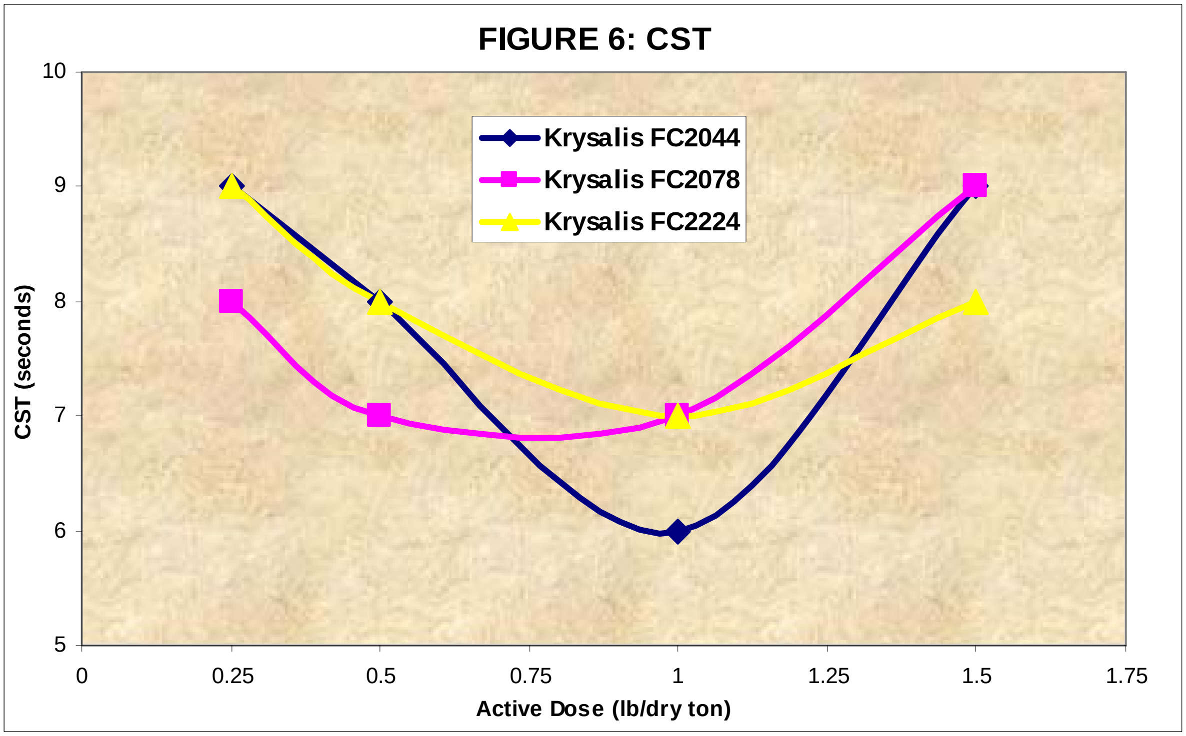


FIGURE 6: CST
CST (seconds)
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224
5
6
7
8
9
10
0
0.25
0.5
0.75
1
1.25
1.5
1.75

From this, dewatering work was preformed using **Krysalis FC2044** and **Krysalis FC2078** at an active dose of 1lb/dry ton. The treated material was pressed to 50psi over a 30-minute cycle to simulate a Geotube application.

TABLE 5: Dewatering Simulation

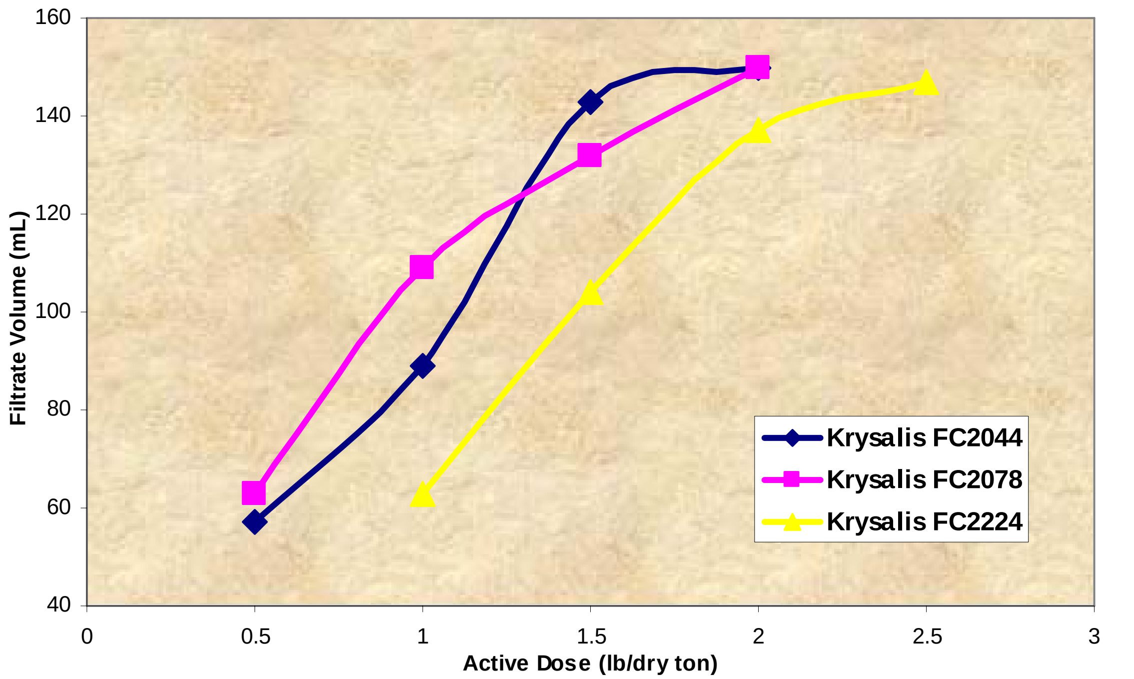
Product	Active Dose (lb/dry ton)	Filtrate Turbidity (NTU)	Cake Solids (%)
Krysalis FC2044	1	22	69.0
Krysalis FC2078	1	23	68.5

TABLE 6: Product Screening (Settled, 5% Slurry Solids)

Product	Active Dose (lb/dry ton)	Filtrate Turbidity (NTU)	CST (sec)	Net Filtrate Volume (mL) after 20 (sec)
Krysalis FC2044	0.5	212	9	57
	1	61	8	89
	1.5	36	7	143
	2	34	8	150
Krysalis FC2078	0.5	154	8	63
	1	89	7	109
	1.5	33	6	132
	2	29	7	150
Krysalis FC2224	1	204	8	63
	1.5	55	7	104
	2	28	7	137
	2.5	27	8	147

This information is also displayed graphically - see Figures 7, 8, & 9.

FIGURE 7: Filtrate Volume



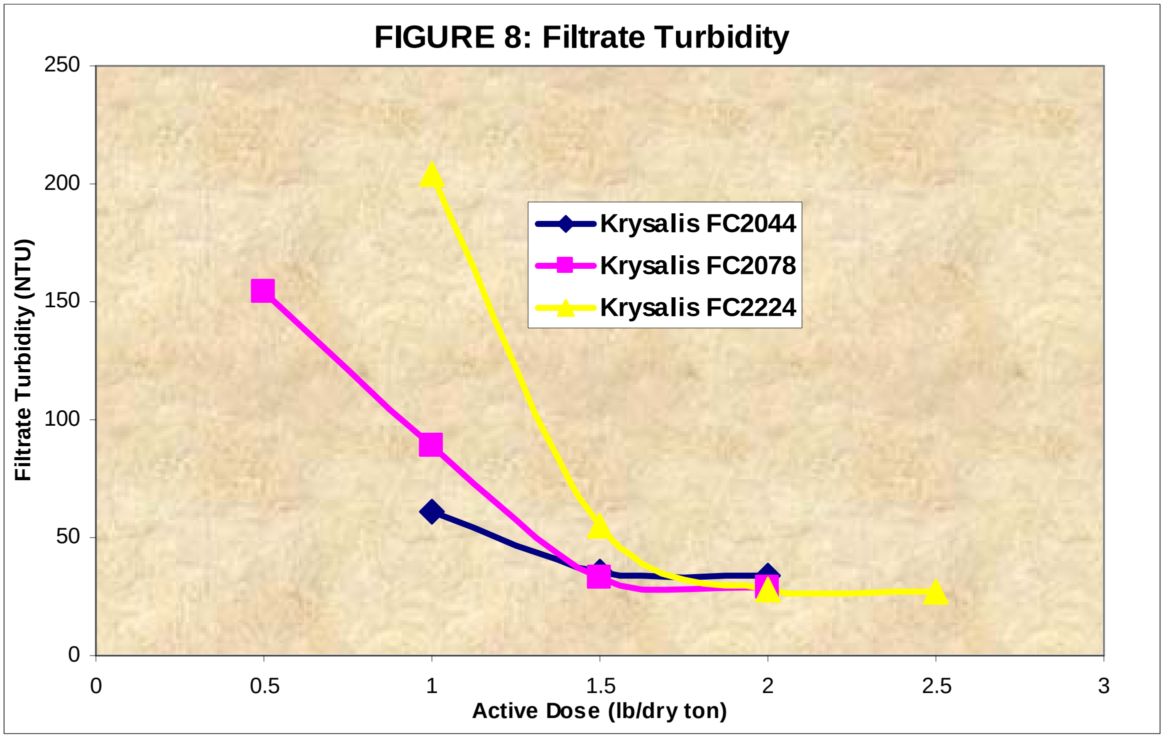


FIGURE 8: Filtrate Turbidity
Filtrate Turbidity (NTU)
250
200
150
100
50
0
0
0.5
1
1.5
2
2.5
3
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224

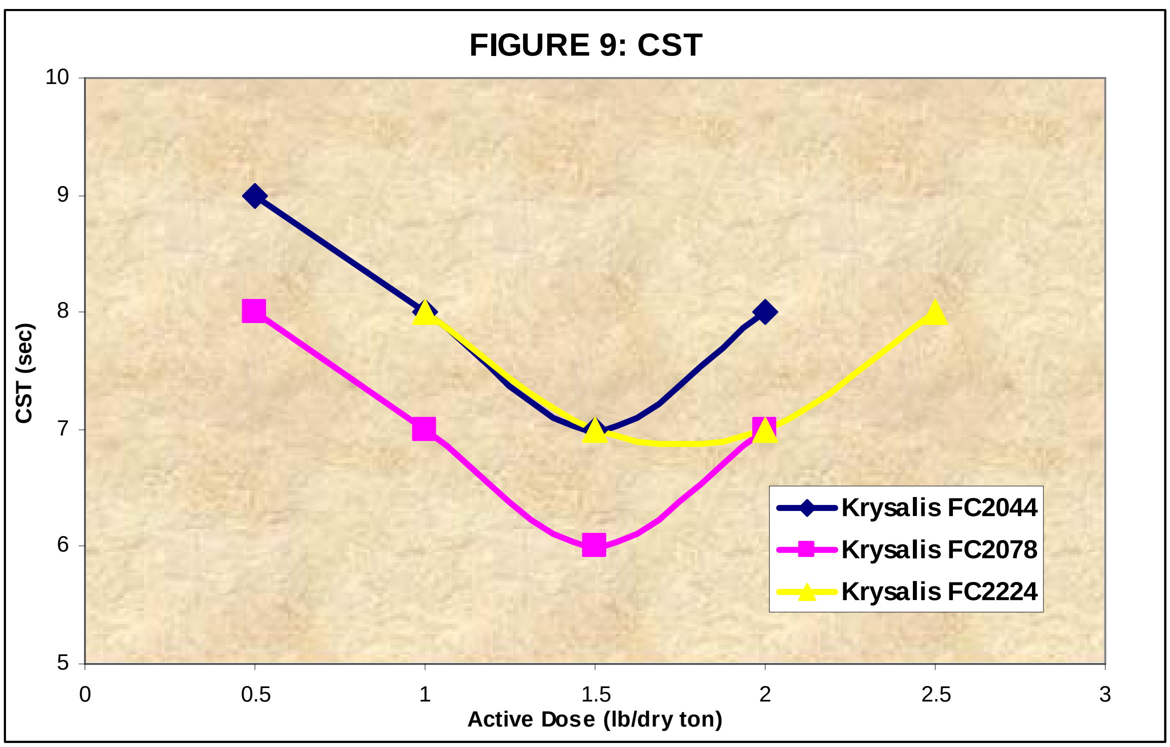


FIGURE 9: CST
CST (sec)
10
9
8
7
6
5
0
0.5
1
1.5
2
2.5
3
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224

3.0 DISCUSSION

Considering these results, **Krysalis FC2044** is the best product to aid in the Geotube dewatering of the dredge material. This product provides filtrate turbidity of 22 NTU at an optimum dosage of 1lb/dry ton. The dewatering simulation provides cake solids of 69.0%. This is the recommended treatment for the sample as received. This treatment may change due to characteristics of the sediment changing at different locations along the dredge site.

The sample itself contains a large portion of particles (~61%) above 106um in size. The slurry at 10% solids settles very rapidly due to the larger/heavier particles. This rapid settling led to additional testing on material with the larger/heavier particles removed representing the possible usage of hydro-cyclones or another screening process. This slurry with a much smaller average particle size, due to larger particles removal, shows a change in charge demand as well as dosage level. The best product for this additional testing is **Krysalis FC2078** at an optimum active dose of 1.5lb/dry ton. There is a marginal difference in performance between **Krysalis FC2044** and **Krysalis FC2078** and **Krysalis FC2044** would still achieve acceptable performance in this case.

This additional work shows that the material can be treated readily with the larger particles removed. This work also shows that if the characteristics of material change the treatment may also change.

4.0 CONCLUSIONS

- The best technical performance is generated using **Ciba®KRYSALIS®FC2044**. Optimal performance is achieved, using 10% solids slurry, at an active dose of 1lb/dry ton. This treatment generates cake solids of 69.0% with filtrate turbidity of 22NTU.

- The sample as received contained dry solids of 63.7% with a SG of 1.690. The substrate also had ~61% of the particles above 106um in size.

- This treatment is recommended based on the material received and may vary if the characteristics change.

Will Morse
Applications Specialist
Waste Water Specialties – NAFTA

Distribution: Dewey Hunter
Matthew Englis
Steve Laszewski

Ciba Specialty Chemicals Corp.
USA

Water & Paper Treatments

WASTE WATER SPECIALTIES TECHNICAL REPORT

Report Number: WWS/05/933/01 **Date:** October 19, 2005

AUTHOR: Will Morse
CUSTOMER: Foth and Van Dyke
PROJ / TSE #: 05/933
SUBJECT: Polymer Selection to Aid the Geotube Dewatering of River Sediment from the Sheboygan River, Sheboygan Falls, MI

SUMMARY

In support of this treatment opportunity, samples of in-place solids and top water were delivered to the laboratory in Suffolk to allow test work to be undertaken.

The test work indicated the following.

- The best technical performance was generated using **Ciba®KRYSALIS®FC2044**. Optimal performance was achieved, using 10% solids slurry, at an active dose of 1lb/dry ton. This generated cake solids of 69.0% with filtrate turbidity of 22NTU.

- The sample as received contained dry solids of 63.7% with a specific gravity (SG) of 1.690. The substrate also had ~61% of the particles greater than 106um in size.

1.0 INTRODUCTION

A request was received on behalf of Foth and Van Dyke for a product evaluation on a sample of dredge material from the Sheboygan River, Sheboygan Falls, MI, to be undertaken. The contact person for this project is Steve Laszewski. A sample of in-place solids was taken from a site ~250 feet east of Rochester Park Island using a Manual Core Sampler on 10/11/05. The in-place solids along with a sample of top water were delivered for evaluation. A dry polymer is desired for treatment and the material will be dewatered via Geotubes. This is a multi year project planned from 2006 to 2008.

This report details the results of this evaluation.

2.0 EXPERIMENTAL AND RESULTS

2.1 Characterization of Sample

The sample was characterized in the laboratory, and the obtained results are presented below in Tables 1, 2, & 3.

TABLE 1: Sample Characteristics (as received)

CHARACTERISTIC	RESULT
Sample Type	River Sediment
pH	7.5
Physical Characteristics	Brown Color, Earthy Odor
Dry Solids	63.7%
Specific Gravity (of slurry)	1.690
Particle Size	
- d_{10}	7 um
- d_{50}	118 um
- d_{90}	801 um
Mean	110 um

TABLE 2: Slurry Specific Gravity Range

Slurry Solids (%)	Specific gravity (SG)
2	1.022
4	1.043
6	1.065
8	1.086
10	1.108
12	1.130
14	1.151
16	1.173
18	1.194
20	1.216

This information is also included graphically – see Figure 1.

FIGURE 1: Slurry Specific Gravity Range

TABLE 3: Grain Size Analysis

Mesh Size	Aperture (um)	Solids (% by volume)
	1	6.41
	2	0.61
	3	0.24
	4	0.28
	5	0.57
	10	5.43
	15	6.97
	20	4.93
	30	5.99
325	45	3.80
250	60	1.56
200	75	1.22
150	106	0.95
100	150	46.24
45	355	3.58
35	500	0.88
20	850	1.64
12	1700	1.11
6	3350	1.71

This information is also included graphically – see Figures 2 & 3.

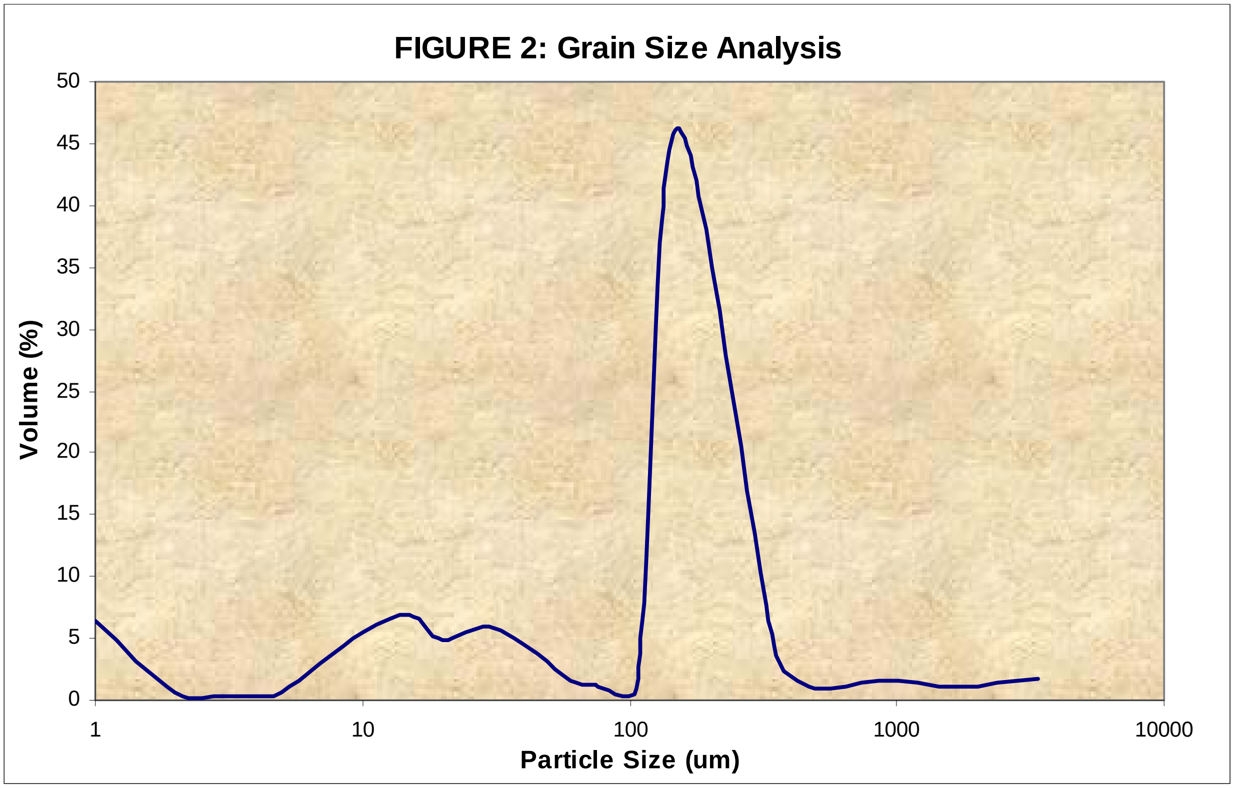


FIGURE 2: Grain Size Analysis
Volume (%)
0
5
10
15
20
25
30
35
40
45
50
1
10
100
1000
10000
Particle Size (um)

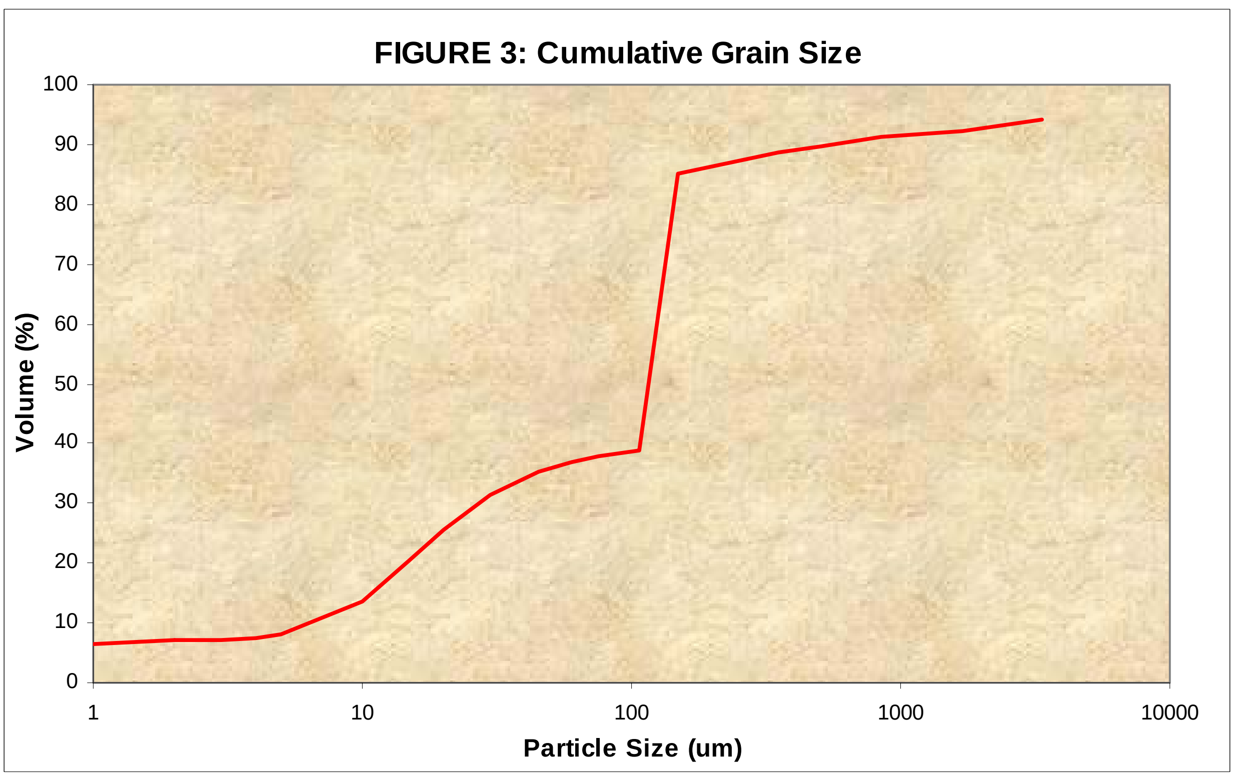


FIGURE 3: Cumulative Grain Size
Volume (%)
0
10
20
30
40
50
60
70
80
90
100
1
10
100
1000
10000
Particle Size (um)

2.2 Product Screening

The as supplied solids were diluted with the supplied top water down to a 10% solids slurry for this evaluation. In all cases sample aliquots of 200mL were taken. Polymer was diluted to 0.2% active solutions and added under moderate shear induced through the repeated transfer of the slurry/polymer mix from one beaker to another until a visually optimal floc had formed. This mixing method was thought to simulate most accurately the mixing conditions typical of geo-tube applications. A small sample of the flocculated material was then analyzed by Capillary Suction Time (CST). The remaining conditioned material was then allowed to drain through a section of Geotube material with the filtrate volumes collected after 20 seconds being recorded. In addition, the filtrate collected from each evaluation was also tested for turbidity. All filtrate volumes were corrected by subtracting the dosage volumes.

The results of this work are presented in Table 4.

The products that obtained the highest filtrate volumes with correspondingly low CST and residual turbidity were selected for dewatering work simulating a Geotube application.

The dewatering results are displayed in Table 5.

Additional work was also performed by taking the 10% slurry and allowing it to settle for 30 seconds then decanting the unsettled portion into another container for further product analysis. The slurry solids decreased from 10% to ~5% in the decanted portion. The 5% slurry was then subjected to the same product screening method stated above. This work was done to show the effect of removing the larger/heavier particles from the slurry, via hydro-cyclones or screening, and then applying polymer treatment.

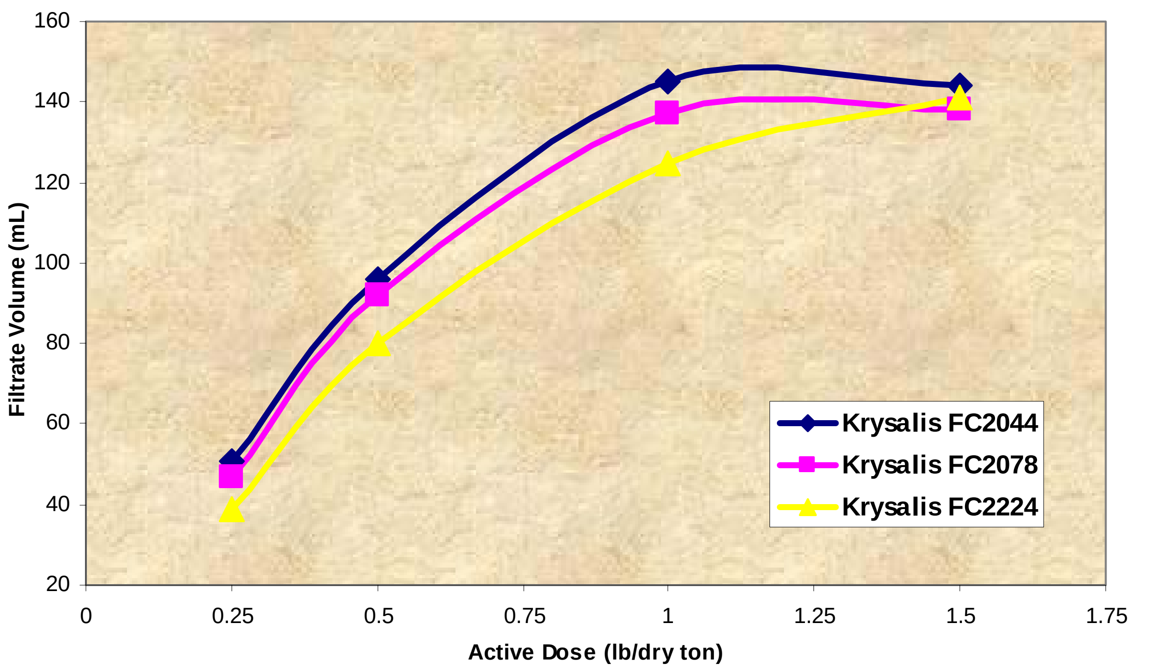
The results of this additional work are presented in Table 6.

TABLE 4: Product Screening (10% Slurry Solids)

Product	Active Dose (lb/dry ton)	Filtrate Turbidity (NTU)	CST (sec)	Net Filtrate Volume (mL) after 20 (sec)
Krysalis FC2044	0.25	256	9	51
	0.5	89	8	96
	1	22	6	145
	1.5	34	9	144
Krysalis FC2078	0.25	302	8	47
	0.5	125	7	92
	1	22	7	137
	1.5	22	9	138
Krysalis FC2224	0.25	365	9	39
	0.5	138	8	80
	1	31	7	125
	1.5	30	8	141

This information is also displayed graphically - see Figures 4, 5, & 6.

FIGURE 4: Filtrate Volume



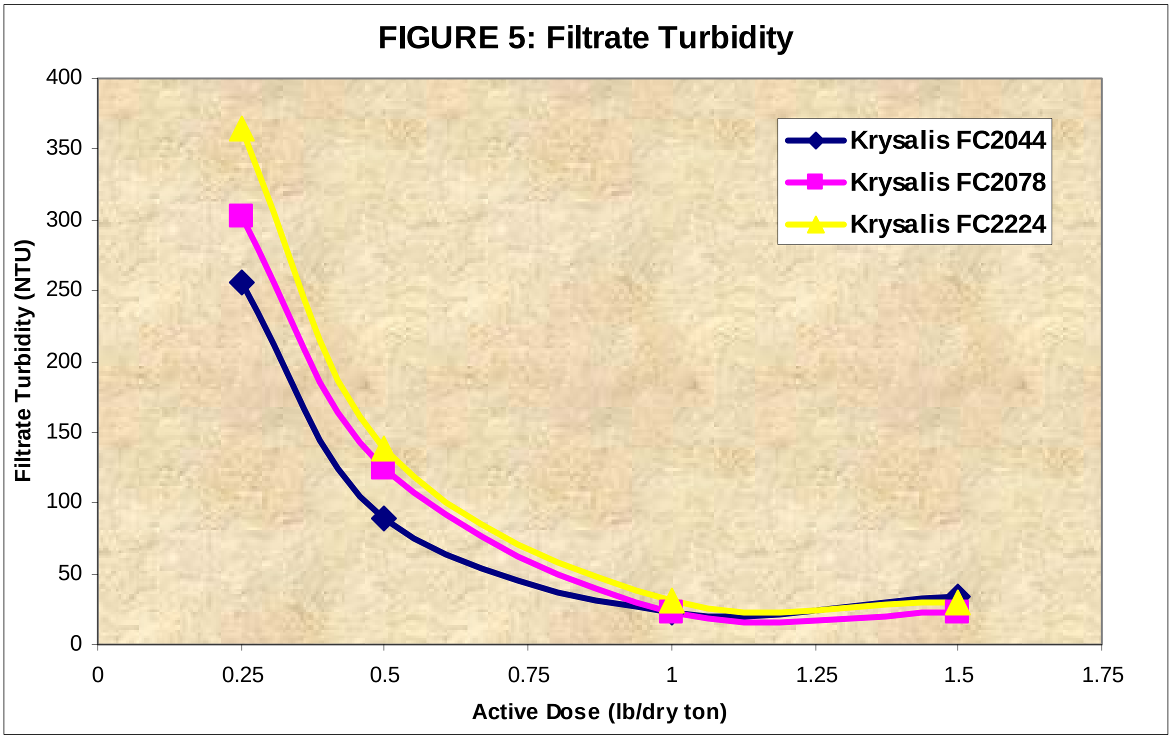


FIGURE 5: Filtrate Turbidity
Filtrate Turbidity (NTU)
0
50
100
150
200
250
300
350
400
Active Dose (lb/dry ton)
0
0.25
0.5
0.75
1
1.25
1.5
1.75
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224

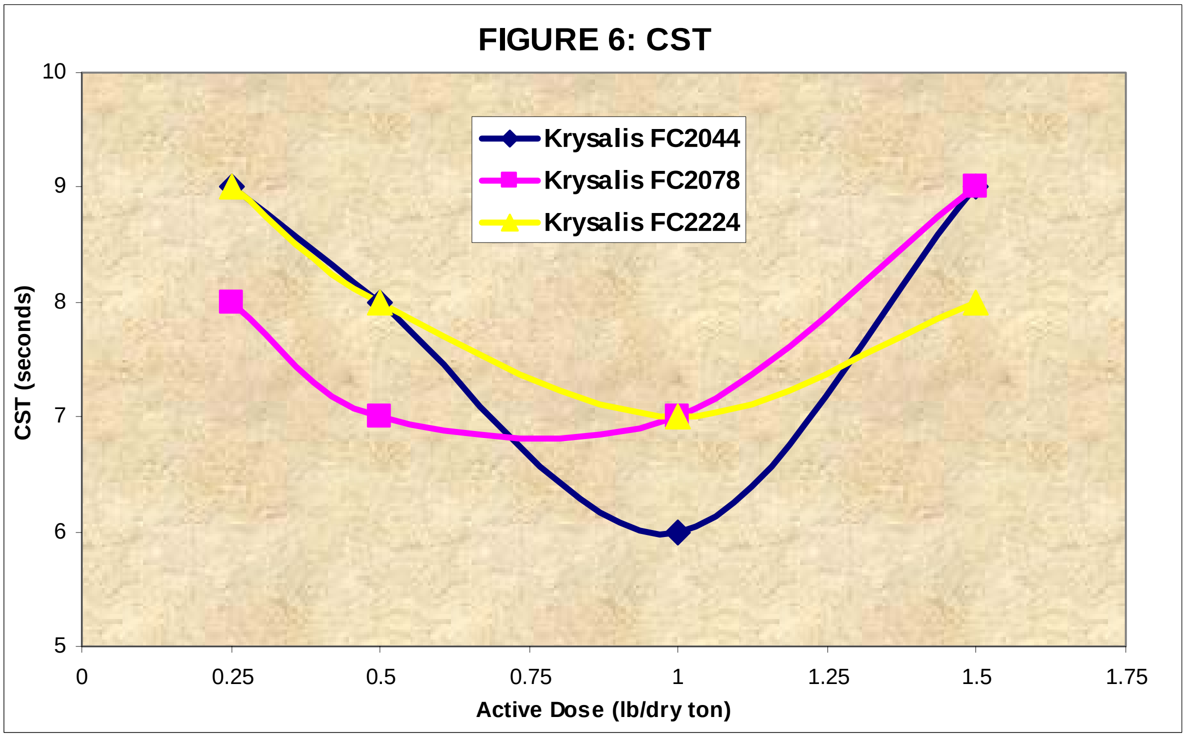


FIGURE 6: CST
CST (seconds)
5
6
7
8
9
10
Active Dose (lb/dry ton)
0
0.25
0.5
0.75
1
1.25
1.5
1.75
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224

From this, dewatering work was preformed using **Krysalis FC2044** and **Krysalis FC2078** at an active dose of 1lb/dry ton. The treated material was pressed to 50psi over a 30-minute cycle to simulate a Geotube application.

TABLE 5: Dewatering Simulation

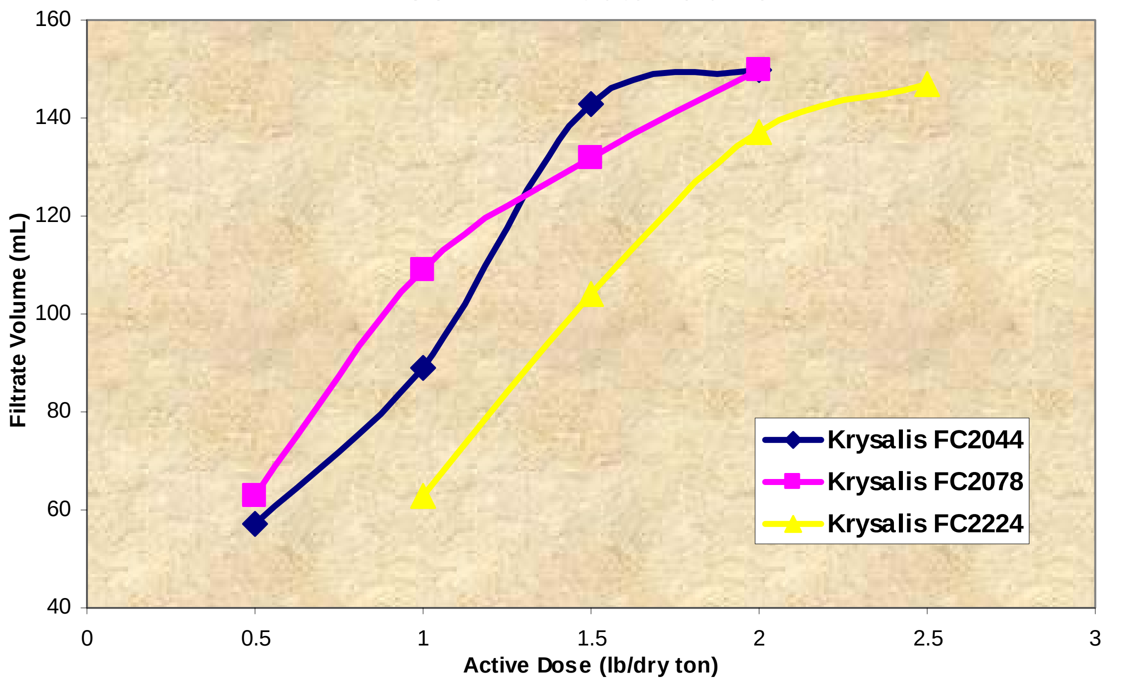
Product	Active Dose (lb/dry ton)	Filtrate Turbidity (NTU)	Cake Solids (%)
Krysalis FC2044	1	22	69.0
Krysalis FC2078	1	23	68.5

TABLE 6: Product Screening (Settled, 5% Slurry Solids)

Product	Active Dose (lb/dry ton)	Filtrate Turbidity (NTU)	CST (sec)	Net Filtrate Volume (mL) after 20 (sec)
Krysalis FC2044	0.5	212	9	57
	1	61	8	89
	1.5	36	7	143
	2	34	8	150
Krysalis FC2078	0.5	154	8	63
	1	89	7	109
	1.5	33	6	132
	2	29	7	150
Krysalis FC2224	1	204	8	63
	1.5	55	7	104
	2	28	7	137
	2.5	27	8	147

This information is also displayed graphically - see Figures 7, 8, & 9.

FIGURE 7: Filtrate Volume



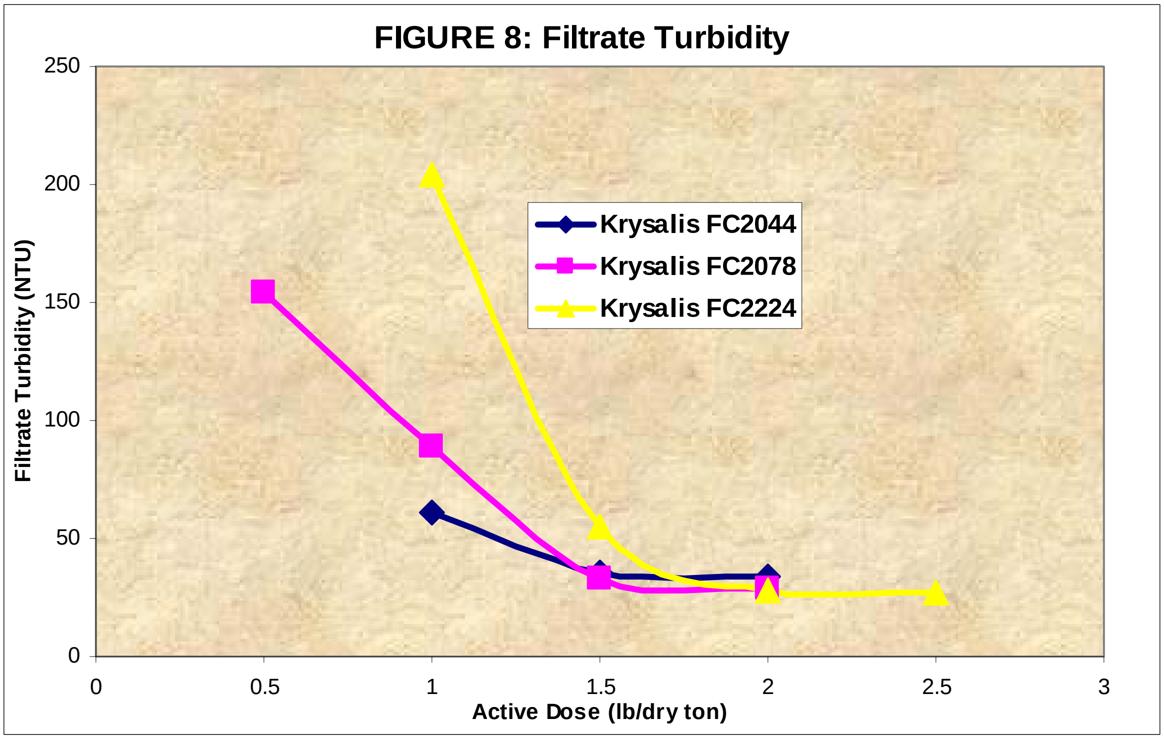


FIGURE 8: Filtrate Turbidity
Filtrate Turbidity (NTU)
250
200
150
100
50
0
0
0.5
1
1.5
2
2.5
3
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224

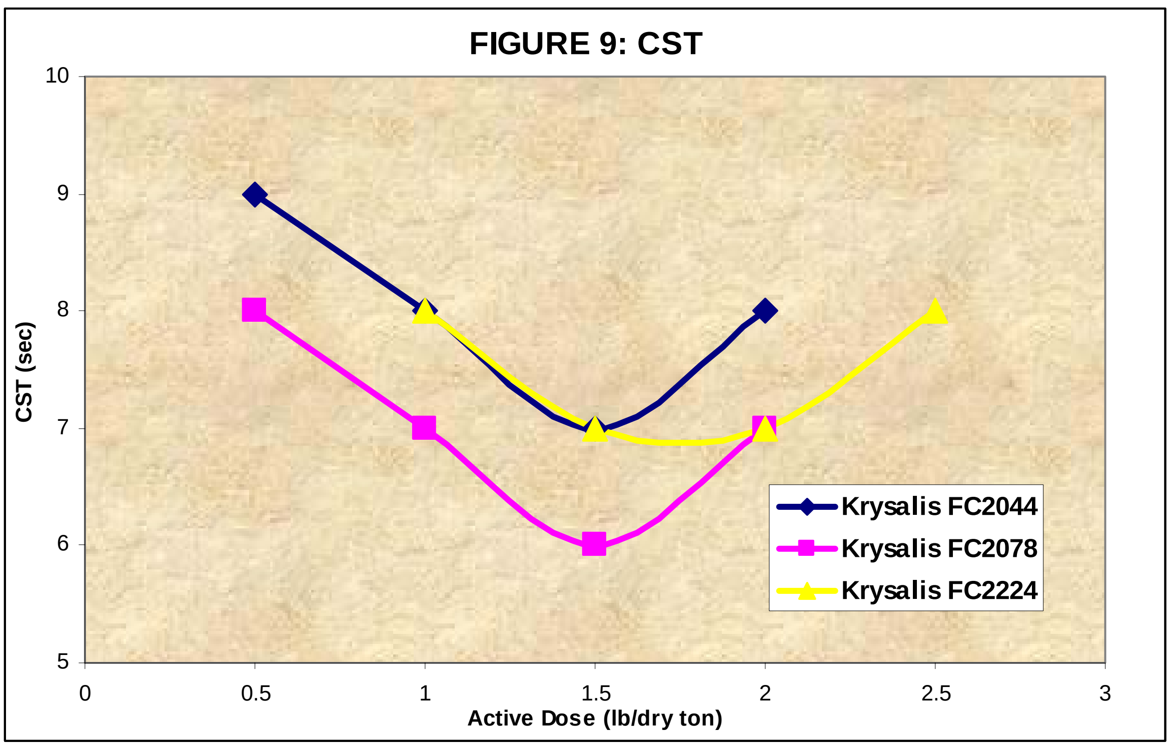


FIGURE 9: CST
CST (sec)
10
9
8
7
6
5
0
0.5
1
1.5
2
2.5
3
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2224

3.0 DISCUSSION

Considering these results, **Krysalis FC2044** is the best product to aid in the Geotube dewatering of the dredge material. This product provides filtrate turbidity of 22 NTU at an optimum dosage of 1lb/dry ton. The dewatering simulation provides cake solids of 69.0%. This is the recommended treatment for the sample as received. This treatment may change due to characteristics of the sediment changing at different locations along the dredge site.

The sample itself contains a large portion of particles (~61%) above 106um in size. The slurry at 10% solids settles very rapidly due to the larger/heavier particles. This rapid settling led to additional testing on material with the larger/heavier particles removed representing the possible usage of hydro-cyclones or another screening process. This slurry with a much smaller average particle size, due to larger particles removal, shows a change in charge demand as well as dosage level. The best product for this additional testing is **Krysalis FC2078** at an optimum active dose of 1.5lb/dry ton. There is a marginal difference in performance between **Krysalis FC2044** and **Krysalis FC2078** and **Krysalis FC2044** would still achieve acceptable performance in this case.

This additional work shows that the material can be treated readily with the larger particles removed. This work also shows that if the characteristics of material change the treatment may also change.

4.0 CONCLUSIONS

- The best technical performance is generated using **Ciba®KRYSALIS®FC2044**. Optimal performance is achieved, using 10% solids slurry, at an active dose of 1lb/dry ton. This treatment generates cake solids of 69.0% with filtrate turbidity of 22NTU.

- The sample as received contained dry solids of 63.7% with a SG of 1.690. The substrate also had ~61% of the particles above 106um in size.

- This treatment is recommended based on the material received and may vary if the characteristics change.

Will Morse
Applications Specialist
Waste Water Specialties – NAFTA

Distribution: Dewey Hunter
Matthew Englis
Steve Laszewski

Ciba Specialty Chemicals Corp.
USA

Water & Paper Treatments

WASTE WATER SPECIALTIES TECHNICAL REPORT

Report Number: WWS/06/956/01 **Date:** February 7, 2005

AUTHOR: Will Morse
CUSTOMER: Foth and Van Dyke
PROJ / TSE #: 06/956
SUBJECT: Hanging Bag Test for Geotube Dewatering of River Sediment from the Sheboygan River, Sheboygan Falls, WI

SUMMARY

In support of this treatment opportunity, samples of in-place solids and top water were delivered to the laboratory in Suffolk to allow test work to be undertaken.

The test work indicated the following.

- The best technical performance from the laboratory bench work and Cone Filter testing was generated using **Ciba®KRYSALIS®FC2044** for both sites 26 and 385.
- The Hanging Bag test for site 26, using the selected product, resulted in filtrate turbidity averaging 11 NTU and a TSS of 2.7 mg/L. The 1 day dry cake solids were 68.5%.
- The Hanging Bag test for site 385, using the selected product, resulted in filtrate turbidity averaging 10 NTU and a TSS of 2.0 mg/L. The 1 day dry cake solids were 59.4%.
- In this evaluation the dosages used to obtain these results from the Hanging Bag tests were 0.21lb dry ton for site 26, and 0.20lb/dry ton for site 385.
- The specific gravities of the sediment samples as received were 1.690 and 1.440 and contained dry solids of 63.5% and 68.7% for site 26 and for site 385 respectively.

1.0 INTRODUCTION

A request was received on behalf of Foth and Van Dyke for Hanging Bag tests using samples of dredge material from the Sheboygan River, Sheboygan Falls, WI, to be undertaken. Samples of in-place solids were taken from sites 26 and 385 and delivered to the Suffolk laboratory for evaluation. Two 5 gallon pails of sediment from each site along with sixteen 5 gallon pails of top water were delivered for this evaluation. This evaluation consisted of laboratory bench testing, followed by Cone Filter tests, and lastly the Hanging Bag tests. This is a multi year project planned to be undertaken from 2006 to 2008.

This report details the results of this evaluation.

2.0 EXPERIMENTAL AND RESULTS

2.1 Characterization of Sample

The samples were characterized in the laboratory, and the obtained results are presented below in Tables 1-6.

TABLE 1: Sample Characteristics (Site 26) (as received)

CHARACTERISTIC	RESULT
Sample Type	River Sediment
pH	7.2
Physical Characteristics	Brown Color, Earthy Odor
Dry Solids	63.5%
Specific Gravity (of slurry)	1.690
Particle Size	
- d_{10}	211 um
- d_{50}	406 um
- d_{90}	7100 um
Mean	426 um

TABLE 2: Slurry Specific Gravity Range (Site 26)

Slurry Solids (%)	Specific gravity (SG)
1.9	1.021
4.2	1.046
5.8	1.063
7.1	1.077
9.1	1.099
11.7	1.127
13.6	1.148
16.2	1.176
18.3	1.199
19.6	1.213

This information is also included graphically – see Figure 1.

FIGURE 1: Specific Gravity Range (Site 26)

TABLE 3: Grain Size Analysis (Site 26)

Mesh Size	Aperture (um)	Solids (% by volume)
	1	0.31
	2	0.01
	3	0.00
	4	0.00
	5	0.01
	10	0.24
	15	0.45
	20	0.39
	30	0.55
325	45	0.39
250	60	0.16
200	75	0.10
150	106	0.06
100	150	0.13
45	355	42.97
35	500	10.71
20	850	6.76
12	1700	5.66
6	3350	7.62
4	6300	9.67
	>6300	13.79

This information is also included graphically – see Figures 2 & 3.

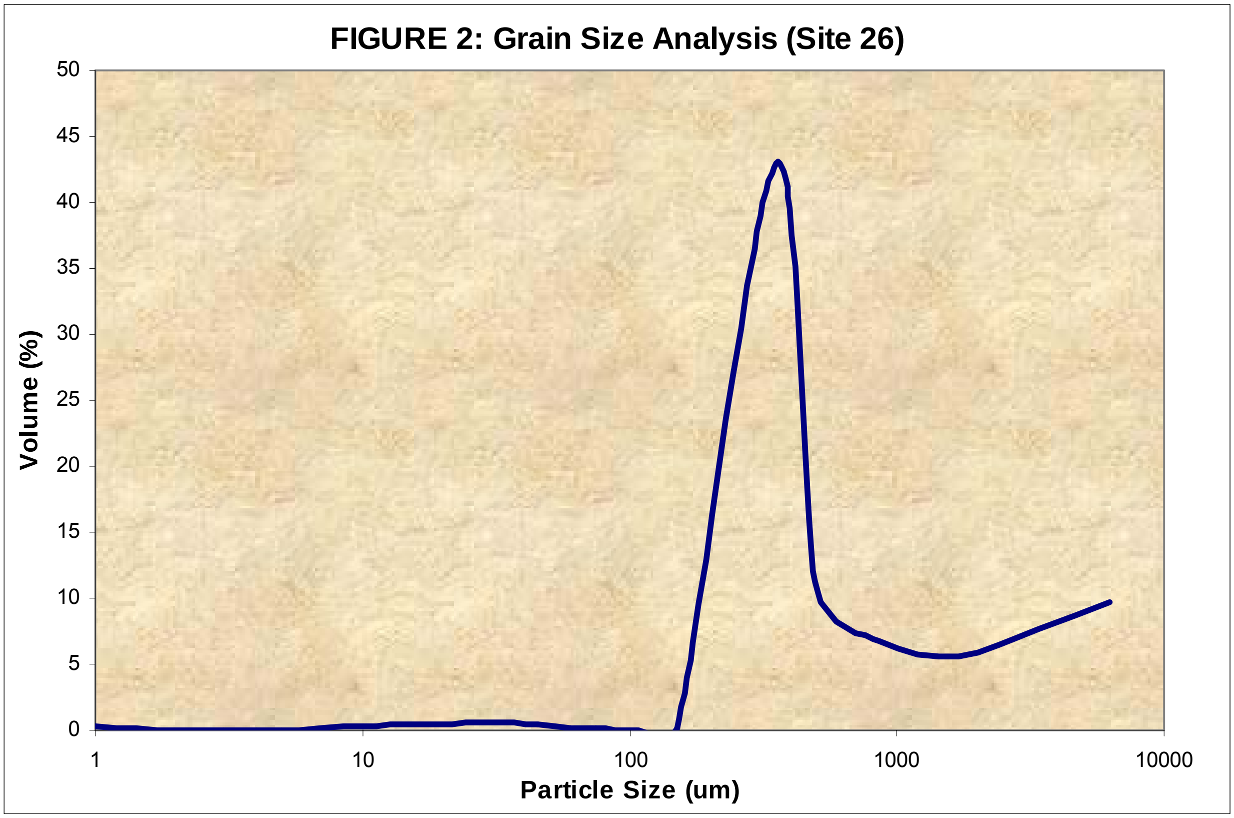


FIGURE 2: Grain Size Analysis (Site 26)
Volume (%)
50
45
40
35
30
25
20
15
10
5
0
1
10
100
1000
10000
Particle Size (um)

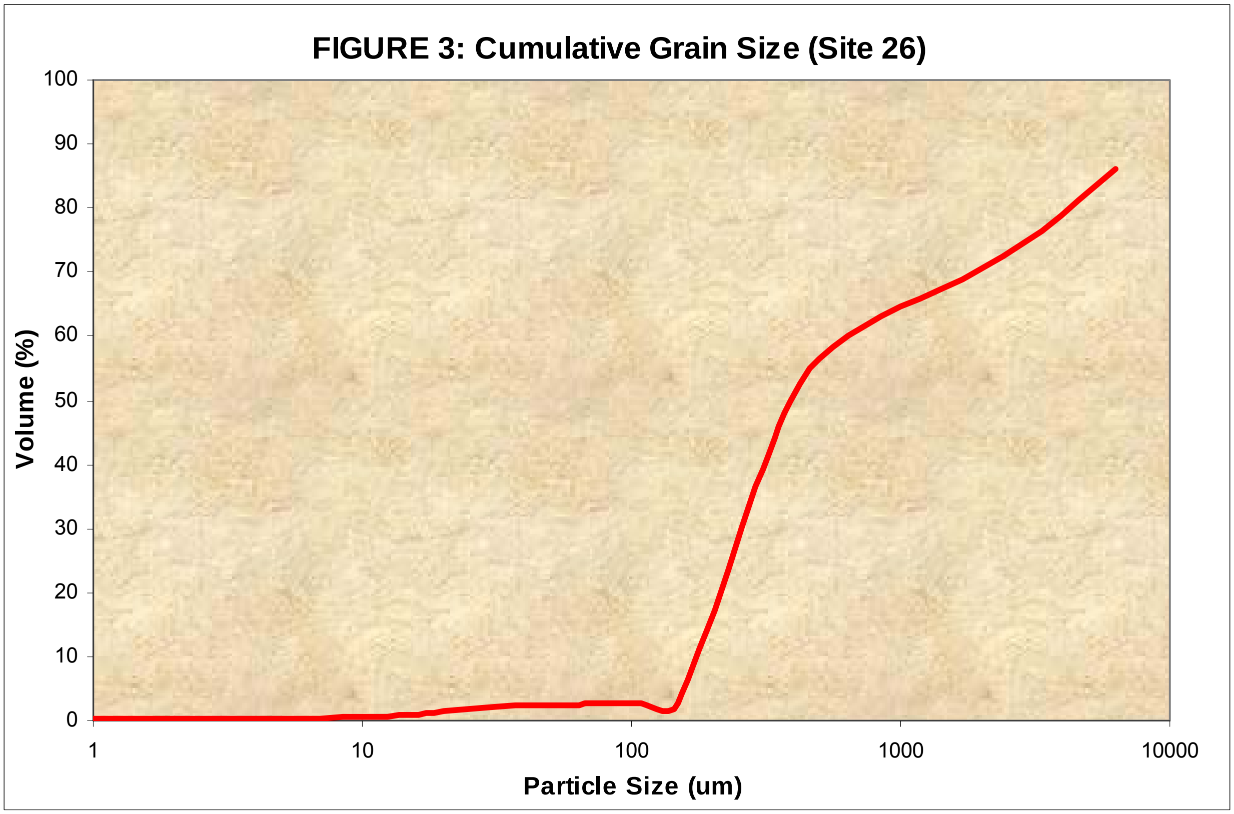


FIGURE 3: Cumulative Grain Size (Site 26)
Volume (%)
100
90
80
70
60
50
40
30
20
10
0
1
10
100
1000
10000
Particle Size (um)

TABLE 4: Sample Characteristics (Site 385) (as received)

CHARACTERISTIC	RESULT
Sample Type	River Sediment
pH	7.4
Physical Characteristics	Brown Color, Earthy Odor
Dry Solids	68.7%
Specific Gravity (of slurry)	1.440
Particle Size	
- d_{10}	13 um
- d_{50}	481 um
- d_{90}	1656 um
Mean	438 um

TABLE 5: Slurry Specific Gravity Range (Site 385)

Slurry Solids (%)	Specific gravity (SG)
2.2	1.014
3.8	1.024
5.9	1.038
7.0	1.045
8.5	1.054
10.6	1.068
13.8	1.088
15.7	1.101
17.4	1.111
19.8	1.127

This information is also included graphically – see Figure 4.

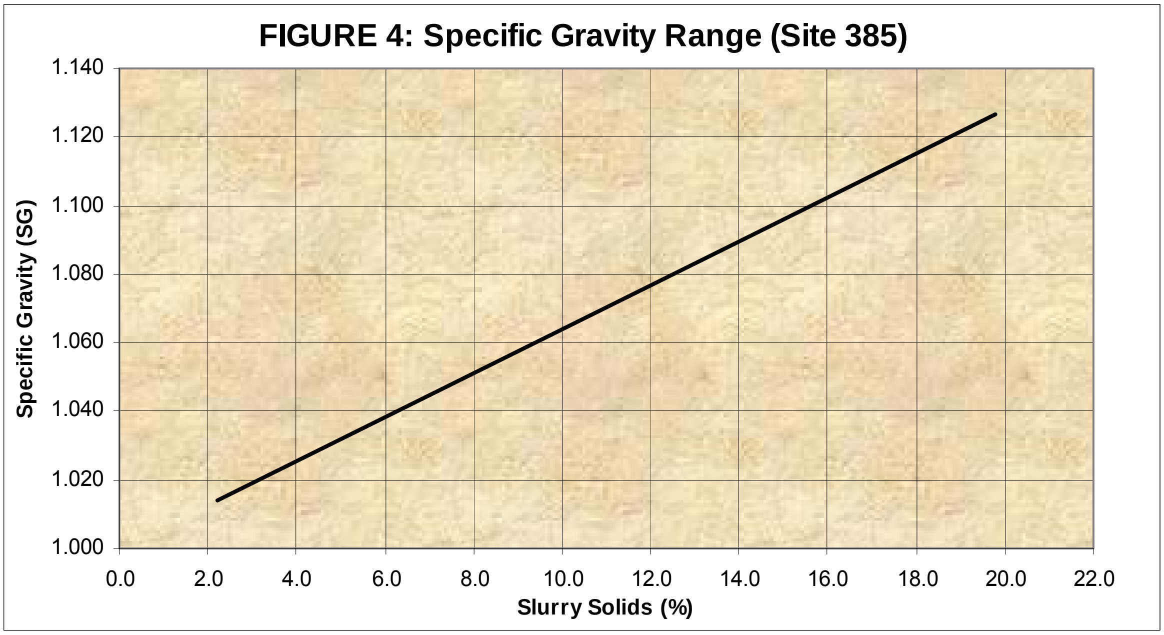


TABLE 6: Grain Size Analysis (Site 385)

Mesh Size	Aperture (um)	Solids (% by volume)
	1	4.80
	2	0.73
	3	0.00
	4	0.04
	5	0.19
	10	2.74
	15	4.46
	20	3.69
	30	5.88
325	45	6.02
250	60	3.89
200	75	3.46
150	106	2.69
100	150	4.01
45	355	2.75
35	500	6.62
20	850	30.12
12	1700	9.01
6	3350	4.08
4	6300	2.26
	>6300	2.55

This information is also included graphically – see Figures 5 & 6.

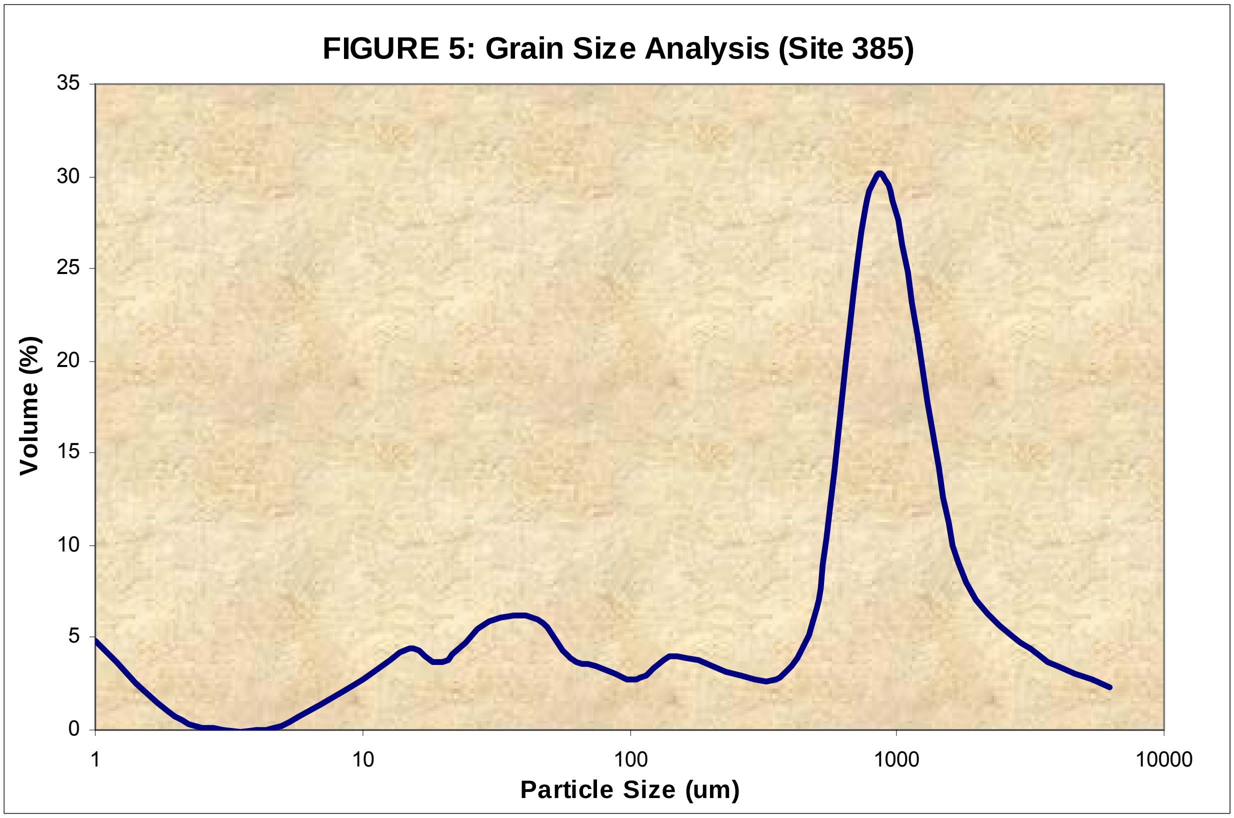


FIGURE 5: Grain Size Analysis (Site 385)
Volume (%)
35
30
25
20
15
10
5
0
1
10
100
1000
10000
Particle Size (um)

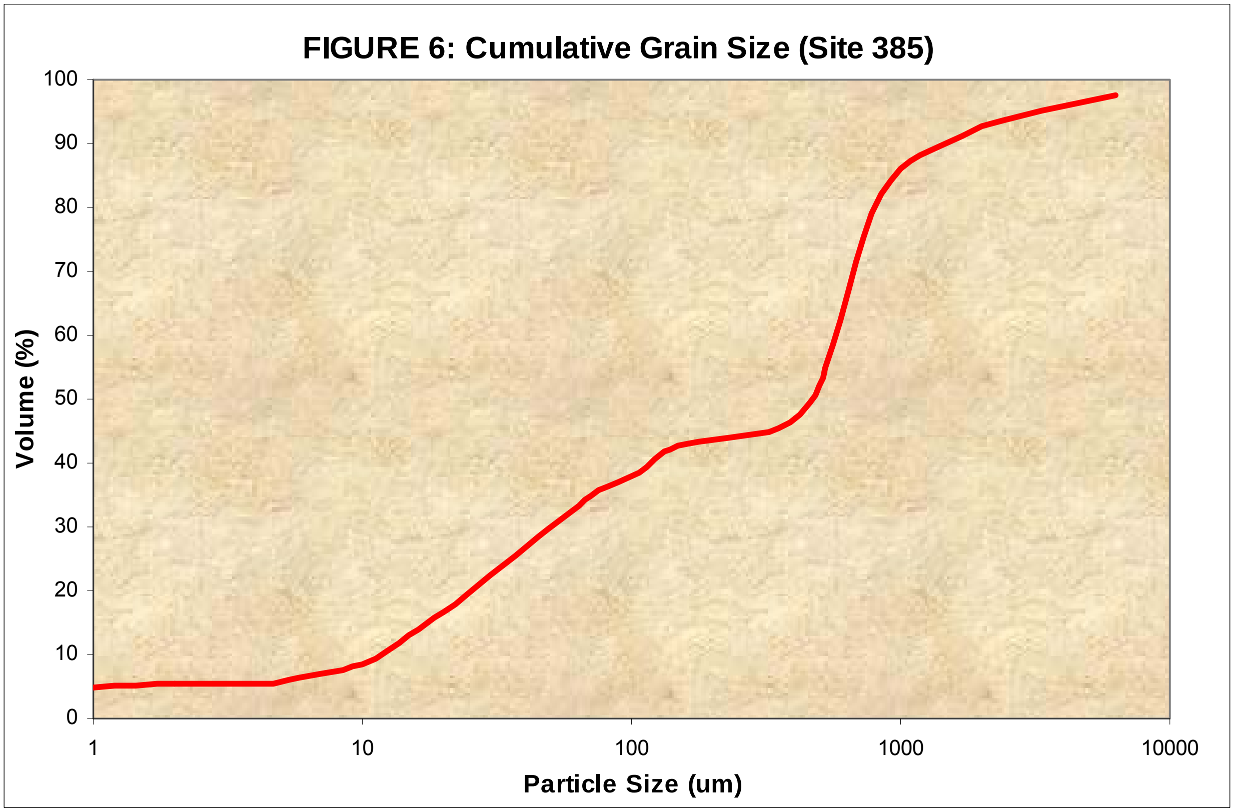


FIGURE 6: Cumulative Grain Size (Site 385)
Volume (%)
100
90
80
70
60
50
40
30
20
10
0
1
10
100
1000
10000
Particle Size (um)

2.2 Product Screening

The as supplied solids were homogenized and portions were mechanically sieved to remove the very large particles >6.3mm in size. This can be viewed in the pictures to the right; site 26(top) and site 385(bottom). This was done to allow the relatively small scale bench work to be performed with a more representative sample of the material to be treated and allow for a more accurate product selection. The screened solids were then diluted with the supplied top water down to a ~10% solids slurry for this evaluation. In all cases sample aliquots of 200mL were taken. Polymer was diluted to 0.2% active solutions and added under moderate shear induced through the repeated transfer of the slurry/polymer mix from one beaker to another until a visually optimal floc had formed. This mixing method most accurately simulates the mixing conditions typical of Geotube applications. A small sample of the flocculated material was then analyzed using the Capillary Suction Time (CST) test. The remaining conditioned material was then allowed to drain through a section of Geotube material with the filtrate volumes collected after 20 seconds being recorded. In addition, the filtrate collected from each evaluation was also tested for turbidity.

The results of this work are presented in Tables 7 & 8.

The products that obtained the highest filtrate volumes with correspondingly low CST and residual turbidity were selected for dewatering work simulating a Geotube application by Cone Filter test. The Cone Filter test employed the use of a circular portion of Geotube® GT500 material folded to form a cone shaped filter. To this a 1 liter portion of treated slurry was added and allowed to drain for 15 minutes. The resulting cake was then placed in a convection oven and dried overnight to determine the dry cake solids.

The Cone Filter test results are displayed in Table 9.

2.2 Product Screening, Continued

Using the results from the Cone Filter test the best product for each site was selected for use in the Hanging Bag Test. The Hanging Bag test involved the use of a bag made of Geotube® GT500 material ~5 feet long and 18 inches in diameter suspended from a scaffold. Approximately 7.5 gallons of homogenized sediment was split evenly between eight 5 gallon pails of supplied top water making ~40 gallons of slurry. Polymer was added to each pail and mixed using a hand held mixer until a visually optimal floc was formed. To each bag, the ~40 gallons of treated slurry was added and allowed to drain. The weep water was collected in 30 gallon containers placed under each of the hanging bags. Weep water samples were taken at 1min, 10min, and 60min for analysis of turbidity and total suspended solids (TSS). During this period various samples were also collected for external laboratory analysis of contaminant levels. The drainage volumes at 30min were also recorded for each hanging bag. In addition samples of cake were taken from each bag to determine the dry cake solids of the dewatered material. These samples were taken at 1 day, 7 days, and 10 days from the time the test was performed. At the 10 day mark the remaining dewatered material was packaged and sent to Foth and Van Dyke by request.

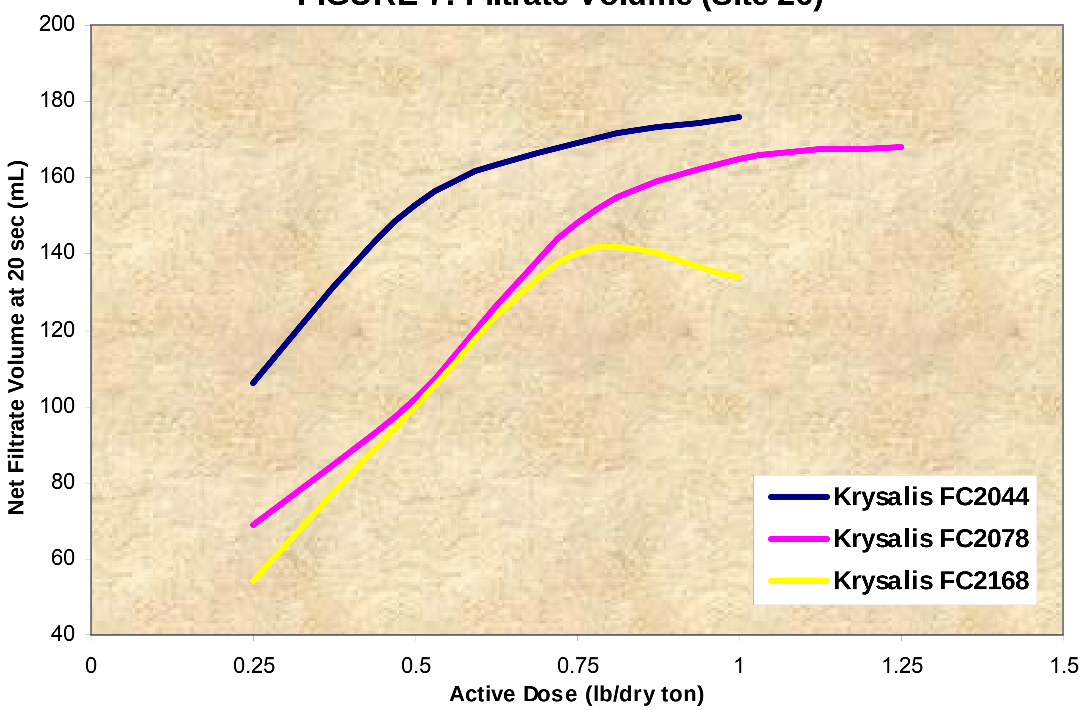
The results of Hanging Bag test are presented in Table 10.

TABLE 7: Product Screening (Site 26, 9.1% Slurry Solids)

Product	Active Dose (lb/dry ton)	Net Filtrate Volume (mL) after 20 (sec)	CST (sec)	Filtrate Turbidity (NTU)
Krysalis FC2044	0.25	106	15	
	0.5	153	11	35
	0.75	169	10	29
	1	176	10	42
Krysalis FC2078	0.25	69	17	
	0.5	102	13	37
	0.75	148	11	34
	1	165	11	45
	1.25	168		
Krysalis FC2168	0.25	54	19	
	0.5	100	14	39
	0.75	140	12	36
	1	134	13	46

This information is also displayed graphically - see Figures 7-9.

FIGURE 7: Filtrate Volume (Site 26)



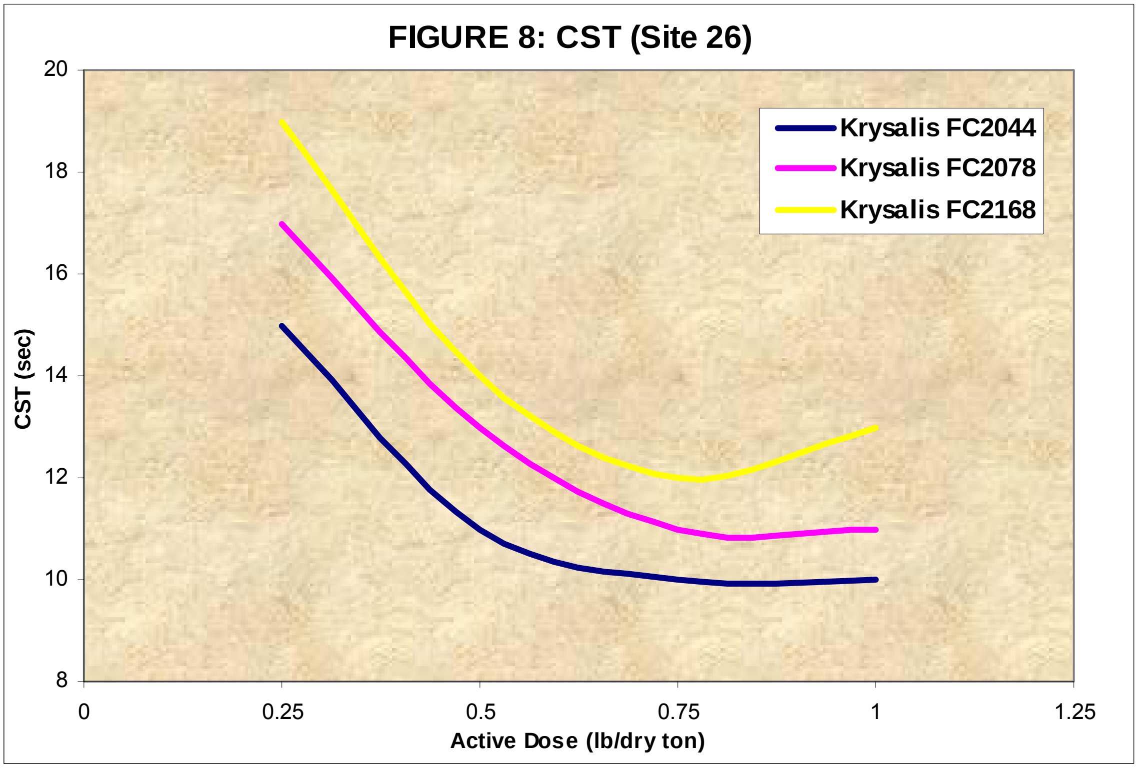


FIGURE 8: CST (Site 26)
CST (sec)
20
18
16
14
12
10
8
0
0.25
0.5
0.75
1
1.25
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2168

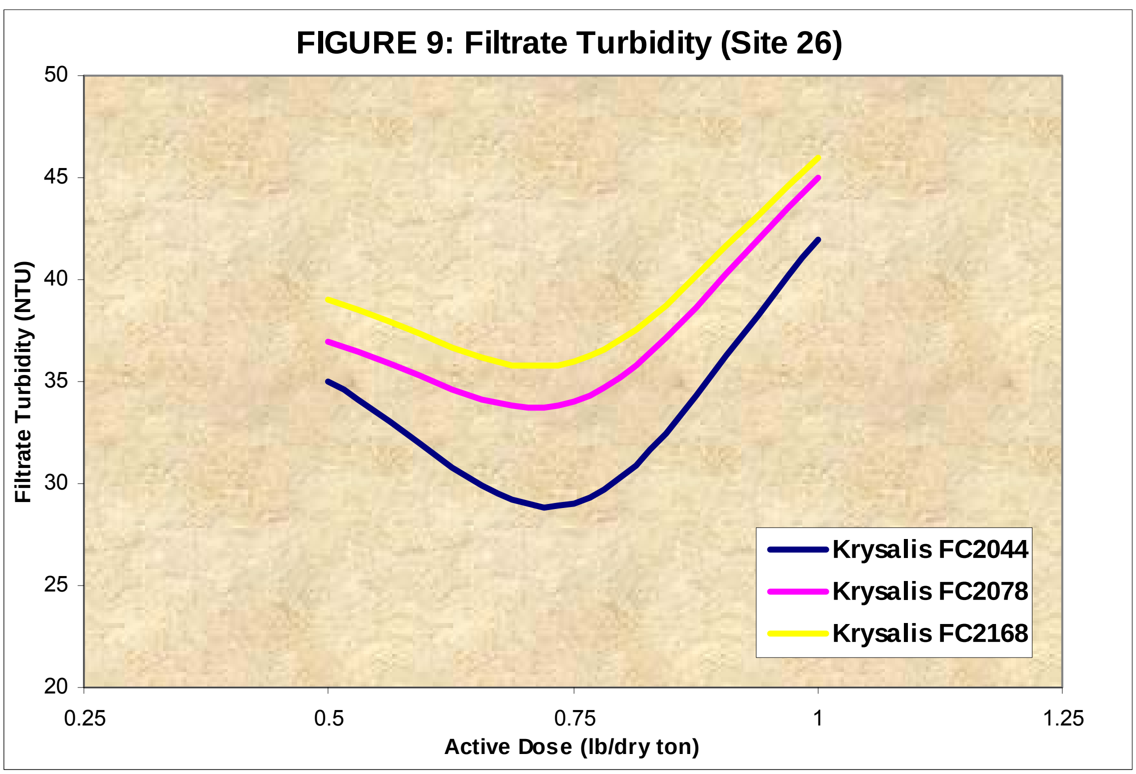


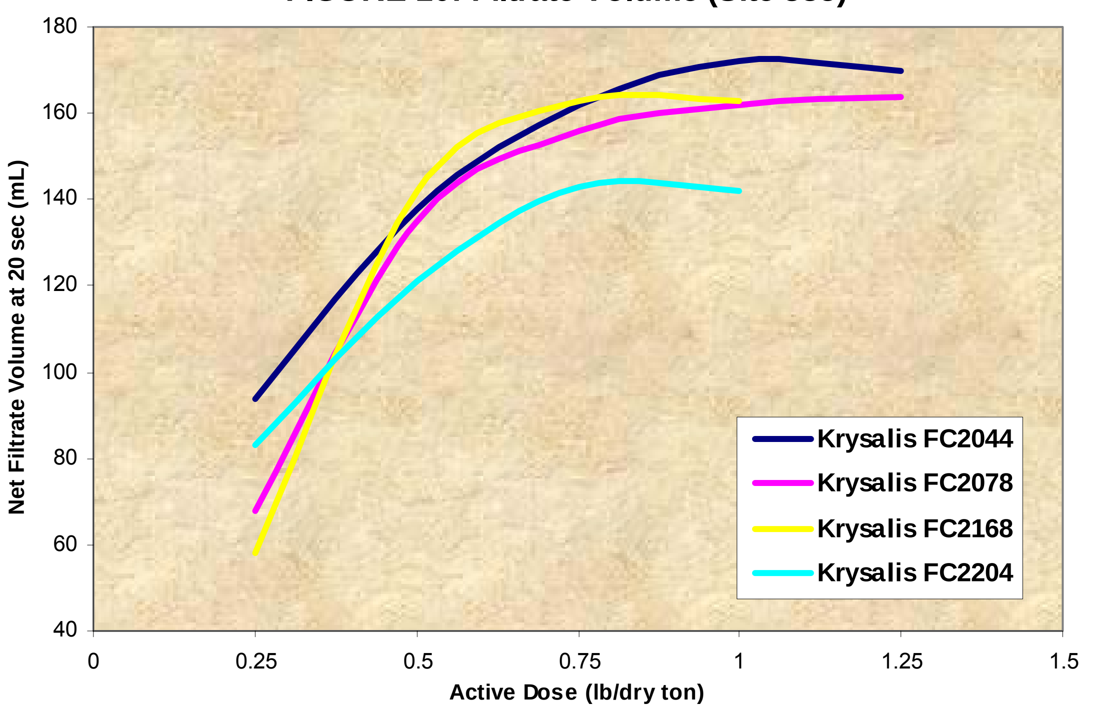
FIGURE 9: Filtrate Turbidity (Site 26)
Filtrate Turbidity (NTU)
50
45
40
35
30
25
20
0.25
0.5
0.75
1
1.25
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2168

TABLE 8: Product Screening (Site 385, 10.6% Slurry Solids)

Product	Active Dose (lb/dry ton)	Net Filtrate Volume (mL) after 20 (sec)	CST (sec)	Filtrate Turbidity (NTU)
Krysalis FC2044	0.25 0.5 0.75 1 1.25	94 138 162 172 170	15 11 10 11	139 34 22 32
Krysalis FC2078	0.25 0.5 0.75 1 1.25	68 135 156 162 164	18 12 12 13	154 29 22 32
Krysalis FC2168	0.25 0.5 0.75 1	58 142 163 163	19 12 13 16	180 21 29
Krysalis FC2204	0.25 0.5 0.75 1	83 121 143 142	17 11 12 14	17 16 30

This information is also displayed graphically - see Figures 10-12.

FIGURE 10: Filtrate Volume (Site 385)



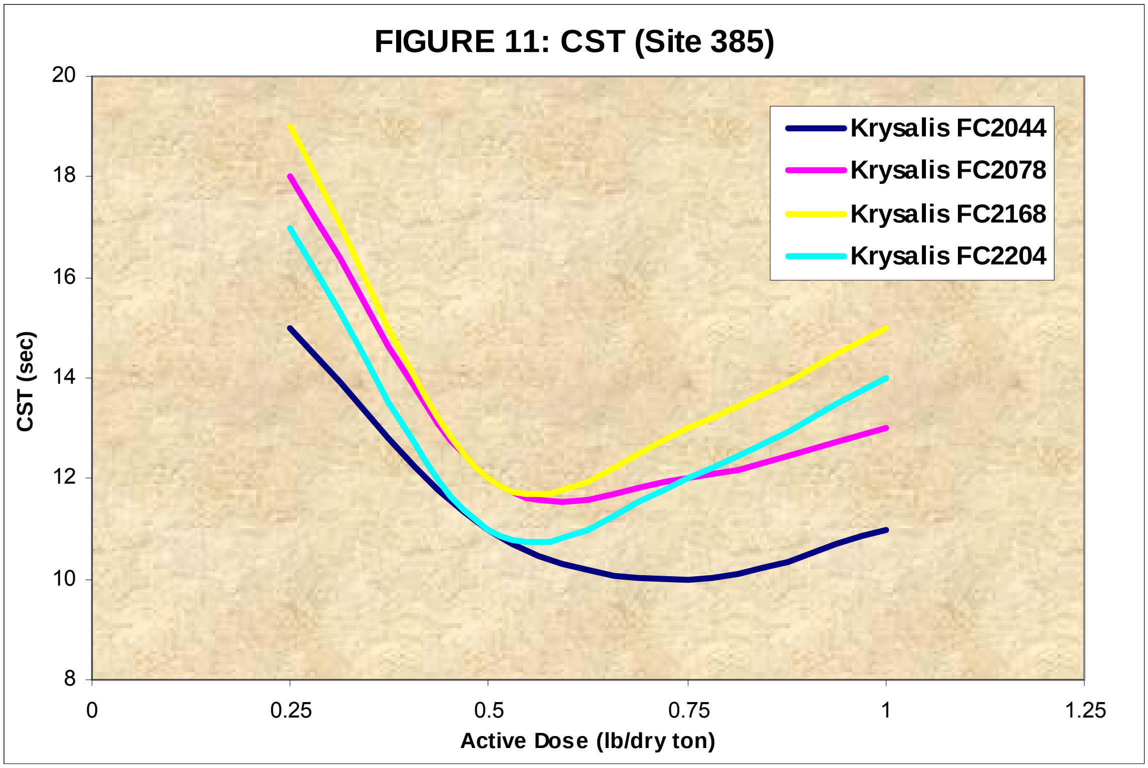


FIGURE 11: CST (Site 385)
CST (sec)
20
18
16
14
12
10
8
0
0.25
0.5
0.75
1
1.25
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2168
Krysalis FC2204

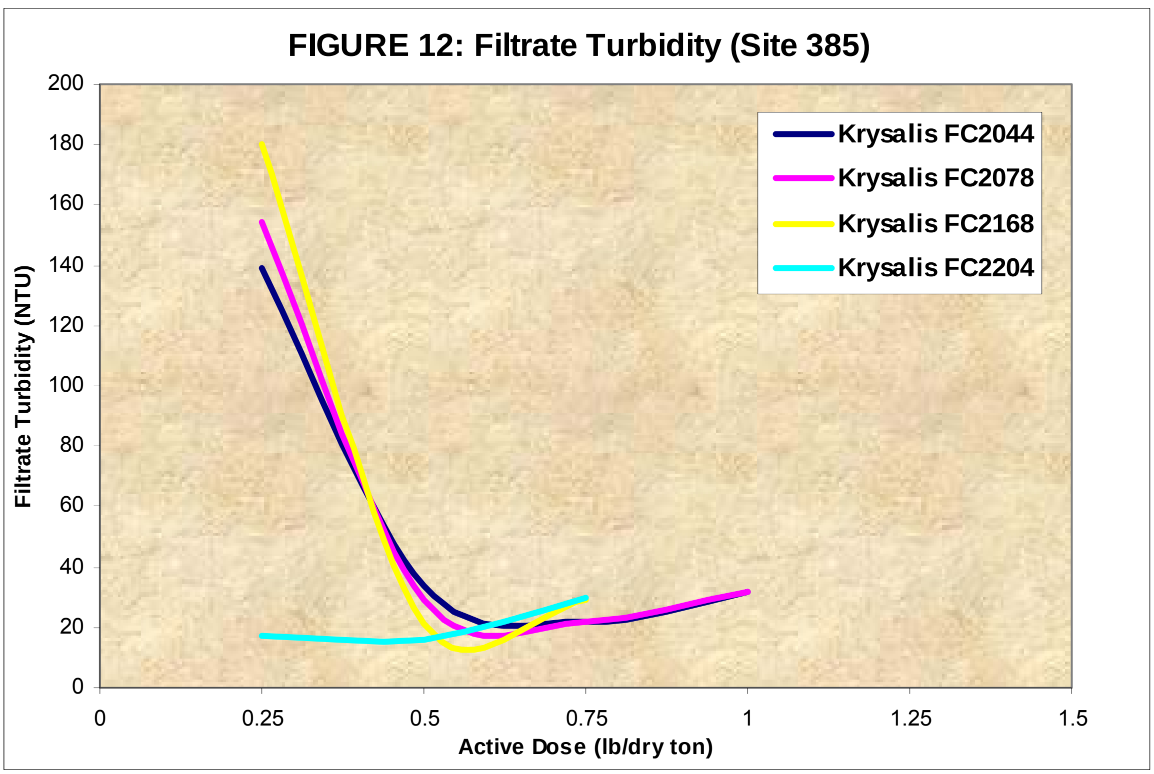


FIGURE 12: Filtrate Turbidity (Site 385)
Filtrate Turbidity (NTU)
200
180
160
140
120
100
80
60
40
20
0
0
0.25
0.5
0.75
1
1.25
1.5
Active Dose (lb/dry ton)
Krysalis FC2044
Krysalis FC2078
Krysalis FC2168
Krysalis FC2204

From this, dewatering work using the Cone Filter test was preformed using **Krysalis FC2044** for site 26. **Krysalis FC2044** and **Krysalis FC2078** were selected for site 385.

TABLE 9: Cone Filter Test

Product	Active Dose (lb/dry ton)	Cake Solids (%)
Krysalis FC2044 (Site 26)	0.75	46.6
Krysalis FC2044 (Site 385)	0.75	32.3
Krysalis FC2078 (Site 385)	0.75	29.2

From this, the Hanging Bag test was preformed using **Krysalis FC2044** for both sites 26 and 385.

TABLE 10: Hanging Bag Test

Site/Product	(Site 26) Krysalis FC2044	(Site 385) Krysalis FC2044
Dosage Applied (lb/dry ton)	0.21	0.20
Drainage @ 30min (Gal)	29.9	28.8
Filtrate Turbidity (NTU)		
1min	13	9
10min	10	10
60min	10	10
TSS (mg/L)		
1min	4	2
10min	2	2
60min	2	2
Dry Cake solids (%)		
1 Day	68.5	59.4
7 Days	71.5	75.2
10 Days	85.9	85.4

The Hanging Bag test was performed in the laboratory. The average conditions for the duration of the test were a temperature of 23^{o}C and 30% humidity.

3.0 DISCUSSION

Considering the results form the laboratory bench work and Cone Filter test, **Krysalis FC2044** is the best product to aid in the Geotube dewatering of the dredge material from both sites 26 and 385. In the Hanging Bag tests this product provides an average filtrate turbidity ≤ 11 NTU, TSS ≤ 2.7mg/L, at a dose of ~0.2lb/dry ton for both sites 26 and 385. This is the recommended treatment for the samples as received. This treatment may change due to characteristics of the sediment changing at different locations along the dredge site.

The samples contain a large portion of relatively large particles, in particular site 26. The sample from site 26 has 2.68% of its particles by volume below 106um in size. The sample from site 385 has 38.59% of its particles by volume below 106um in size. The effects of these particle sizes can be seen in the relatively low dose required for treatment and the dry cake solids produced via the Hanging Bag tests which were ≥ 59.4% for both sites after only 1 day in the bag.

4.0 CONCLUSIONS

- The best technical performance from the laboratory bench work and Cone Filter test is generated using **Ciba®KRYSALIS®FC2044** for both sites 26 and 385.

- The Hanging Bag test for site 26, using the selected product, results in filtrate turbidity averaging 11 NTU and a TSS of 2.7 mg/L. The 1 day dry cake solids are 68.5%.

- The Hanging Bag test for site 385, using the selected product, results in filtrate turbidity averaging 10 NTU and a TSS of 2.0 mg/L. The 1 day dry cake solids are 59.4%.

- In this evaluation the dosages used to obtain these results from the Hanging Bag tests are 0.21lb dry ton for site 26, and 0.20lb/dry ton for site 385.

- This treatment is recommended based on the material received and may vary if the characteristics change.

Will Morse
Applications Specialist
Waste Water Specialties – NAFTA

Distribution: Dewey Hunter
Matthew Englis
Jim Hutchinson
Steve Laszewski
Michael Heard

JAN 2004

Summary of
Geotechnical Sediment Sampling
Sheboygan River and Harbor Superfund Site

The first phase of geotechnical analyses completed on sediment samples from the Upper River portion of the Sheboygan River included the following tests:

- Bulk Density,
- Water Content,
- Particle Size Distribution,
- Atterberg Limits,
- Unconfined Compressive Strength,
- Modified Proctor,
- One-Dimensional Settlement, and
- One-Dimensional Consolidation

The suite of geotechnical tests were performed per the direction of PRS.

Results of the geotechnical analyses were reported to URS Corporation on January 12, 2004. Based on these results, the following conclusions have been made.

<u>In-Situ Density and Moisture Content</u>

Based on the Bulk Density and Moisture Content results, sediments in the Upper River portion of the Sheboygan River project area have dry unit weights ranging between 31.2 pounds per cubic foot (pcf) and 106.2 pcf with moisture contents ranging between 20.4 percent (%) and 154.2 %. These results relate to wet unit rates ranging between 47.9 pcf and 135.8 pcf. The average wet unit weight of the sediments was 98.9 pcf with an average moisture content of 69.7 %. Test results indicated an average saturation of the pore space of 95.3 %.

<u>Atterberg Limits</u>

Atterberg limits measure the plasticity of the soil. Results are provided as a moisture content that the soil becomes plastic and liquid. Of the 15 samples submitted for Atterberg Limits, 7 of the samples were determined to be non-plastic (NP). The 8 samples determined to be plastic had plasticity indexes (the difference in moisture content between the liquid limit and the plastic limit [PI]) ranging between 7% and 19%, indicating moderately plastic soils.

<u>Grain Size Distributions</u>

All 15 of the samples submitted were tested for grain size distribution through hydrometer. None of the samples contained any gravel. The percent of sand (P4 / R200) ranged between 21.8% and 68.7% with an average of 45.1%. The percentage of fines (P200) ranged between 31.3% and 78.2% with an average of 54.9%. Based on the hydrometer results, the majority of the fines contained in the sediment samples consisted of silts, with the silt contents ranging between 23.3% and 75.2% with an average of

43.9%. The fraction of the fines attributed to clay ranged between 8.0% and 21.9% with an average of 11.8%. With the exception of Sediment Sample 015 which was classified as a clay, the remainder of the samples were either classified as a silt or a sand using the Unified Soil Classification System (USCS).

Modified Proctor

Modified proctor tests were performed on 12 of the 15 samples submitted. The modified proctor test is utilized to identify the maximum dry unit weight of soil that can be obtained under controlled compaction procedures at an optimal moisture content. According to the results provided, the maximum dry unit weight (proctor value) ranged between 79.6 pcf and 117 pcf with an average of 96.3 pcf. These proctor values were obtained at optimum moisture contents ranging between 10.8% and 17.4% with an average of 15.2%.

Unconfined Compressive Strength

Unconfined compressive strength tests were performed on 3 of the samples submitted. Unconfined compressive strength ranged between 98 pounds per square foot (PSF) and 214 psf with shear strengths ranging between 49 psf and 107 psf at approximately 13 % to 15 % strain at failure.

One-Dimensional Consolidation

One-dimensional consolidation tests were performed on 5 of the samples submitted. In general, the consolidation tests increased the dry density by between 3.8 pcf and 21.1 pcf, increased the wet density by between 5 pcf and 12.54 pcf and decreased the void ratio by between 0.12 and 1.955.

One-Dimensional Settlement

One-dimensional settlement tests were performed on 5 of the samples submitted. Results of the tests indicated settlements ranging between 0.02 and 0.19 percent.

Conclusions

Based on the results of the geotechnical tests performed to date, we conclude that in general the sediments are nearly 100% saturated in their natural state. On average the in-place sediments have a wet density of 98.9 pcf with an average moisture content of 69.7 %, resulting in an average dry density of 63.7 pcf. Based on the modified proctor results, at an average optimal moisture content of 15.2%, the sediments can be compacted to an average 110.9 pcf wet density. Assuming that the sediments will free drain to approximately the optimal moisture content and that compaction to 90% of the modified proctor value could be achieved with minimal effort, the volume of the sediments would be reduced by approximately 27% as compared to the in-place volume.

It is not possible to calculate the reduction in volume due to free draining at 24 and 48 hours with the information obtained. However, this type of test can be designed and performed as part of the second phase of geotechnical testing. An attempt can then be made to correlate the results of the free-draining test to the existing data obtained from the first phase of testing.

Summary of Shelby Tube Laboratory Test Results

Project: PRS - Sheybogan
Client: URS

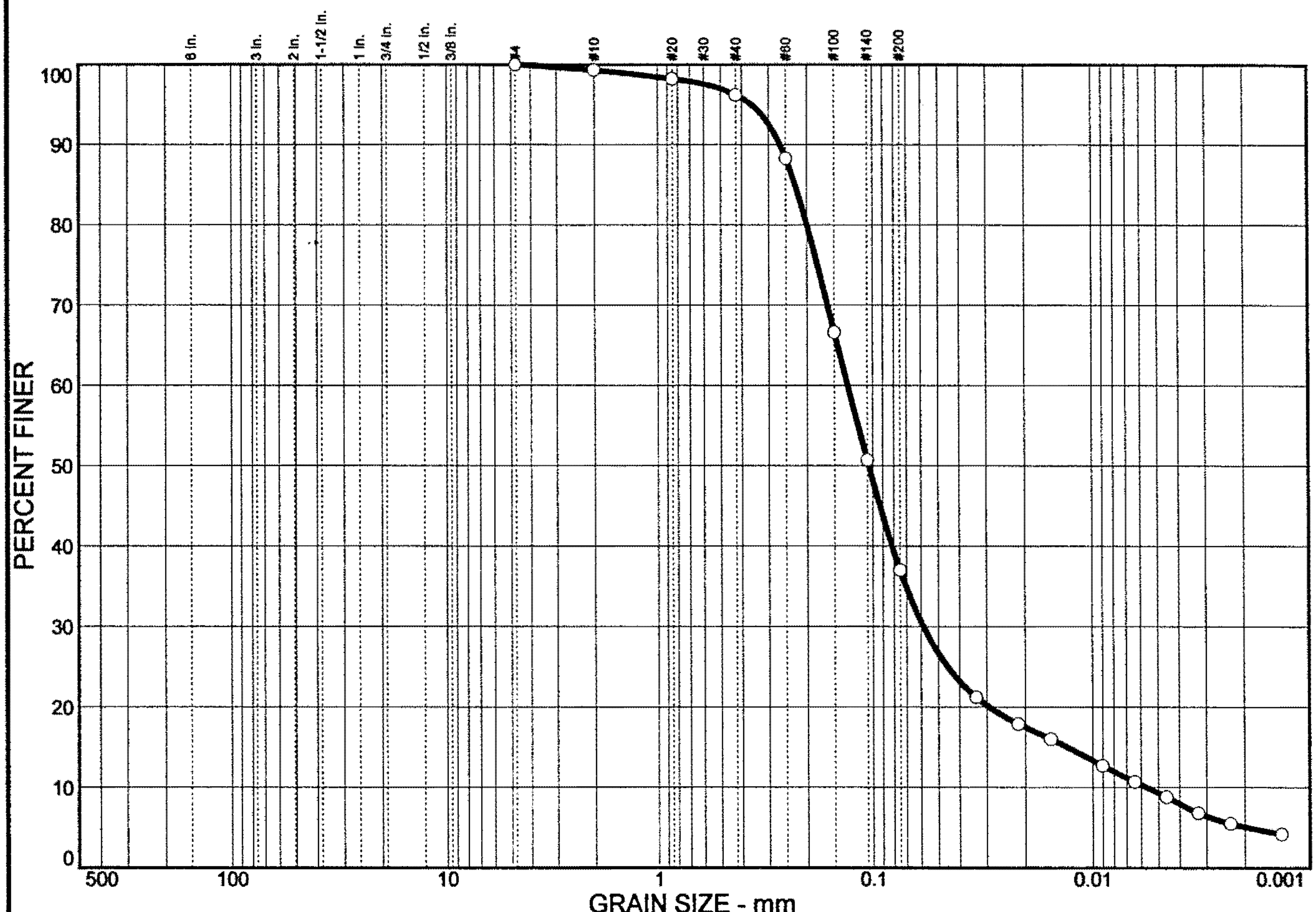
Test No.: 1003001319 & 1003001320
Date Received: 11/6/2003 & 11/10/2003
Date Revised: 1/9/2004

Boring No.	Sample No.	Depth (ft)	Visual Description	USCS	Water Content (%)	Dry Unit Weight (pcf)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Gravel (%)	Sand (%)	Fines (%)
					Test Result							
SED	001		Dark gray silty SAND with organics	SM	55.7	60.0	NP	NP	NP	0.0	63.0	37.0
SED	002		Dark gray SILT, some sand with organics	ML	154.2	---	NP	NP	NP	0.0	24.8	75.2
SED	003		Dark gray silty SAND with organics	SM	52.3	65.7	NP	NP	NP	0.0	65.0	35.0
SED	004		Dark gray sandy SILT with organics	ML	40.0	75.7	41	30	11	0.0	37.6	62.4
SED	005		Dark gray sandy SILT with organics	ML	57.6	67.7	52	38	14	0.0	30.1	69.9
SED	006		Dark gray sandy SILT with organics	MH	103.4	40.3	49	33	16	0.0	34.6	65.4
SED	007		Dark gray silty SAND with organics	SM	54.2	77.8	NP	NP	NP	0.0	63.7	36.3
SED	008		Dark gray SILT, some sand with organics	MH	20.4	73.5	58	39	19	0.0	26.8	73.2
SED	009		Dark gray silty SAND with organics	SC-SM	31.5	103.3	26	19	7	0.0	64.0	36.0
SED	010		Dark gray silty SAND with organics	SM	53.6	31.2	NP	NP	NP	0.0	68.7	31.3
SED	011		Dark gray sandy SILT with organics	ML	90.6	46.9	NP	NP	NP	0.0	47.3	52.7
SED	012		Dark gray silty SAND with organics	SM	77.3	56.4	NP	NP	NP	0.0	64.2	35.8
SED	013		Dark gray sandy SILT with organics	ML	82.6	51.0	49	34	15	0.0	32.4	67.6
SED	014		Dark gray sandy SILT with organics	MH	145.5	35.6	51	36	15	0.0	33.0	67.0
SED	015		Dark gray lean CLAY, some sand w/ organics	CL	26.8	106.2	26	15	11	0.0	21.8	78.2

File: Summary of Shelby Tube Samples 11-6-03
Date Prepared: 1/8/2004
Reviewed By:

GeoTest
2135 S. 116th Street
West Allis, WI 53227
414-321-TEST

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	63.0	27.7	9.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.3		
#20	98.2		
#40	96.2		
#60	88.3		
#100	66.6		
#140	50.7		
#200	37.0		

* (no specification provided)

Soil Description

Dark gray silty SAND, with organics

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.227 D_{60}= 0.130 D_{50}= 0.104
D_{30}= 0.0587 D_{15}= 0.0130 D_{10}= 0.0057
C_u= 22.99 C_c= 4.66

Classification

USCS= SM AASHTO=

Remarks

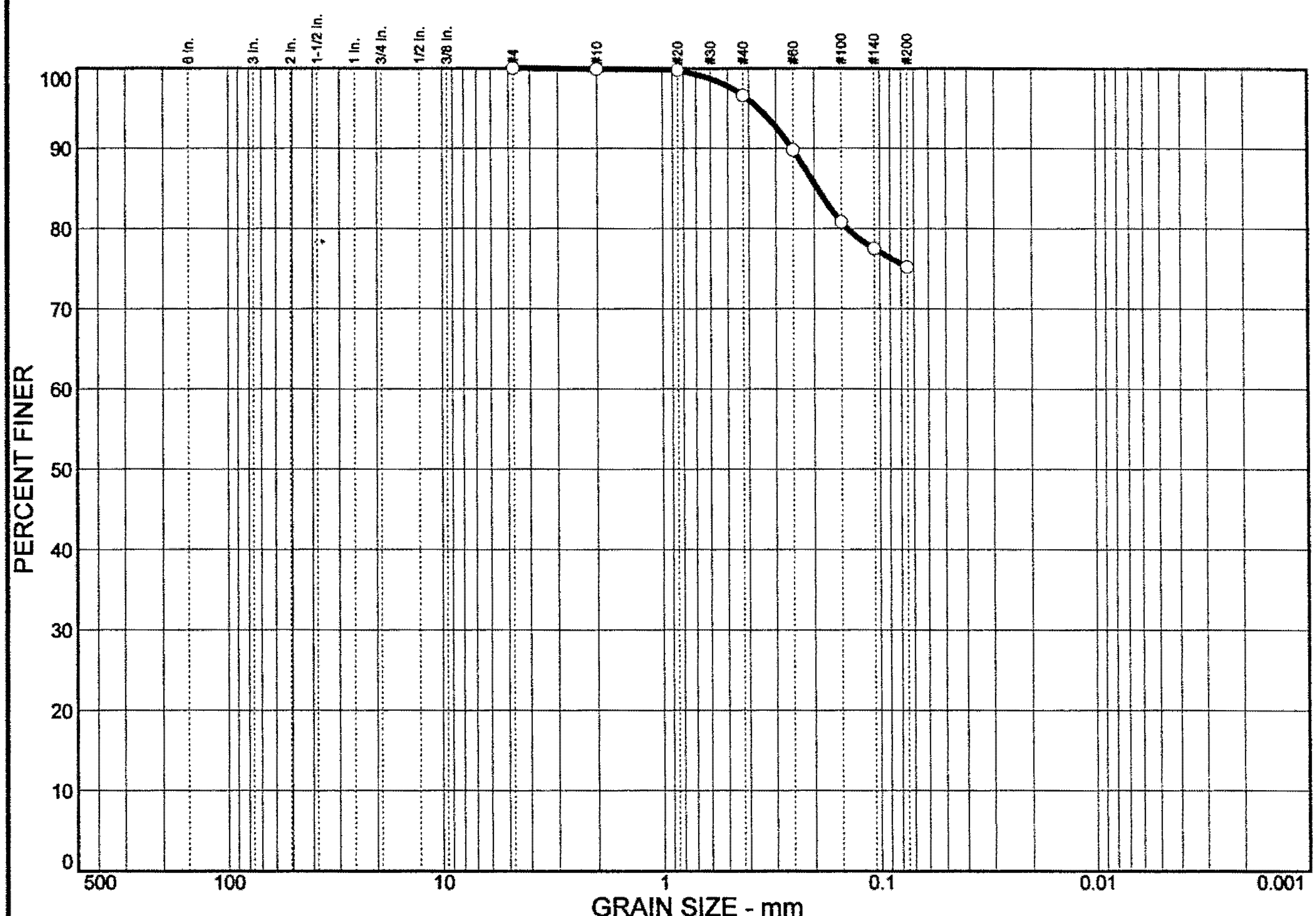
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 001 **Source of Sample:** 1003001319 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	24.8	75.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.8		
#40	96.6		
#60	89.8		
#100	80.8		
#140	77.5		
#200	75.2		

* (no specification provided)

Soil Description

Dark gray SILT, some sand with organics

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.193 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

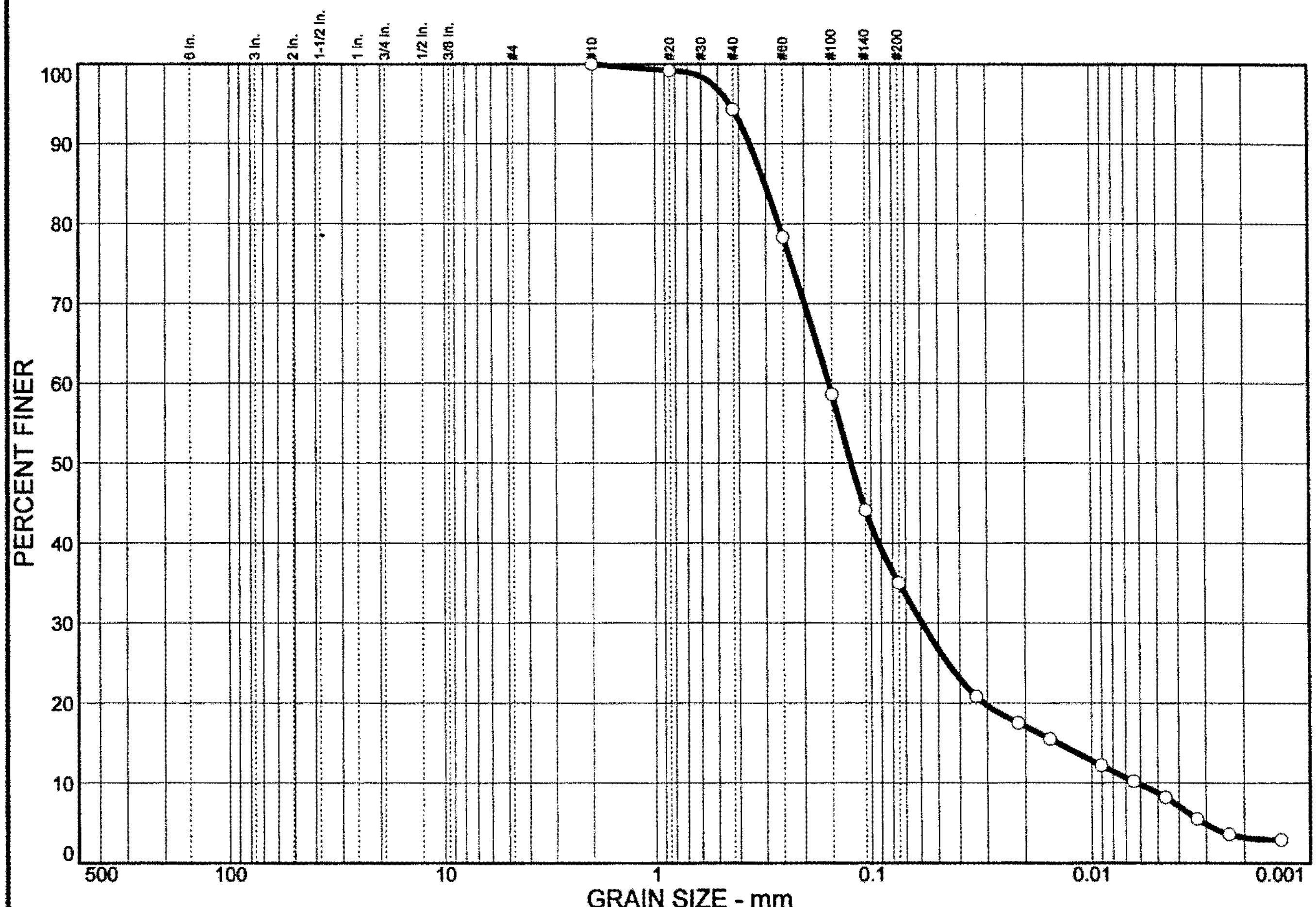
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 002 **Source of Sample:** 1003001319 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	65.0	26.2	8.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.2		
#40	94.3		
#60	78.3		
#100	58.6		
#140	44.1		
#200	35.0		

* (no specification provided)

Soil Description

Dark gray silty SAND, with organics

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.303 D_{60}= 0.155 D_{50}= 0.123
D_{30}= 0.0592 D_{15}= 0.0142 D_{10}= 0.0062
C_u= 24.92 C_c= 3.64

Classification

USCS= SM AASHTO=

Remarks

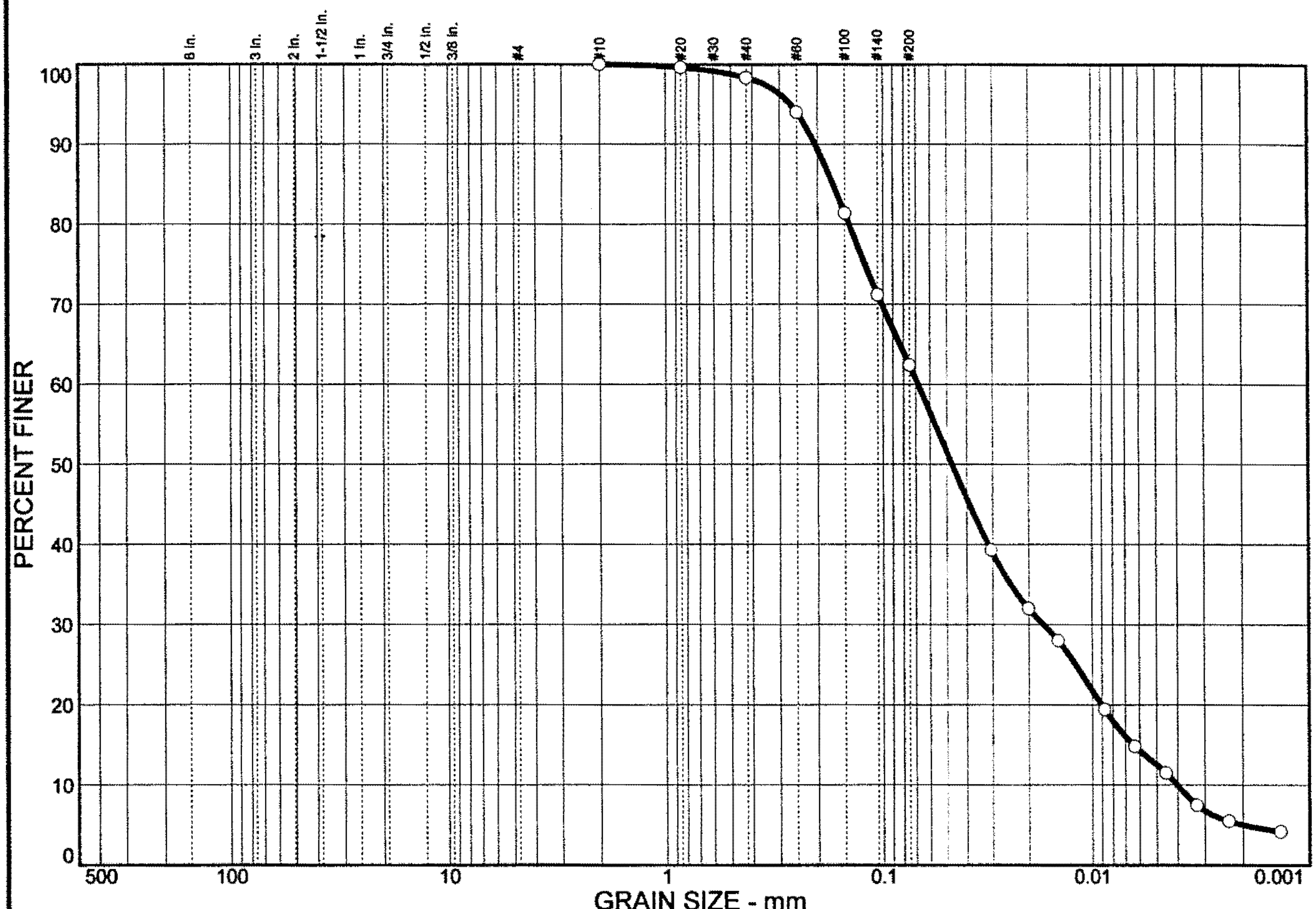
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 003 **Source of Sample:** 1003001319 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	37.6	49.9	12.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.6		
#40	98.3		
#60	94.0		
#100	81.4		
#140	71.2		
#200	62.4		

* (no specification provided)

Soil Description

Dark gray sandy SILT, with organics

Atterberg Limits

PL= 30 LL= 41 PI= 11

Coefficients

D_{85}= 0.170 D_{60}= 0.0683 D_{50}= 0.0471
D_{30}= 0.0170 D_{15}= 0.0064 D_{10}= 0.0040
C_u= 17.02 C_c= 1.06

Classification

USCS= ML AASHTO=

Remarks

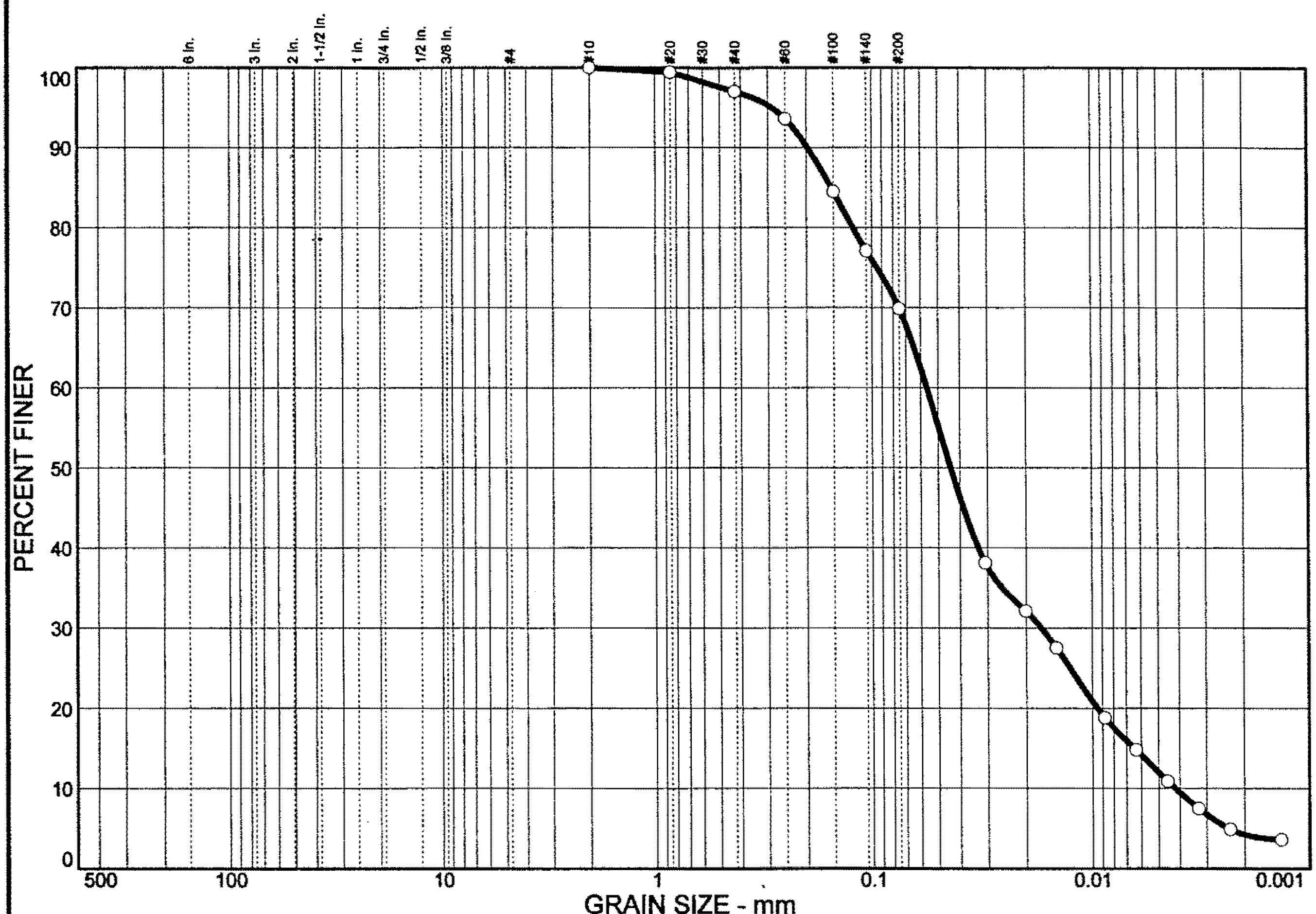
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 004 **Source of Sample:** 1003001319 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	30.1	57.9	12.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.4		
#40	97.0		
#60	93.6		
#100	84.5		
#140	77.1		
#200	69.9		

* (no specification provided)

Soil Description

Dark gray sandy SILT, with organics

Atterberg Limits

PL= 38 LL= 52 PI= 14

Coefficients

D_{85}= 0.154 D_{60}= 0.0563 D_{50}= 0.0440
D_{30}= 0.0171 D_{15}= 0.0064 D_{10}= 0.0042
C_u= 13.42 C_c= 1.24

Classification

USCS= MH AASHTO=

Remarks

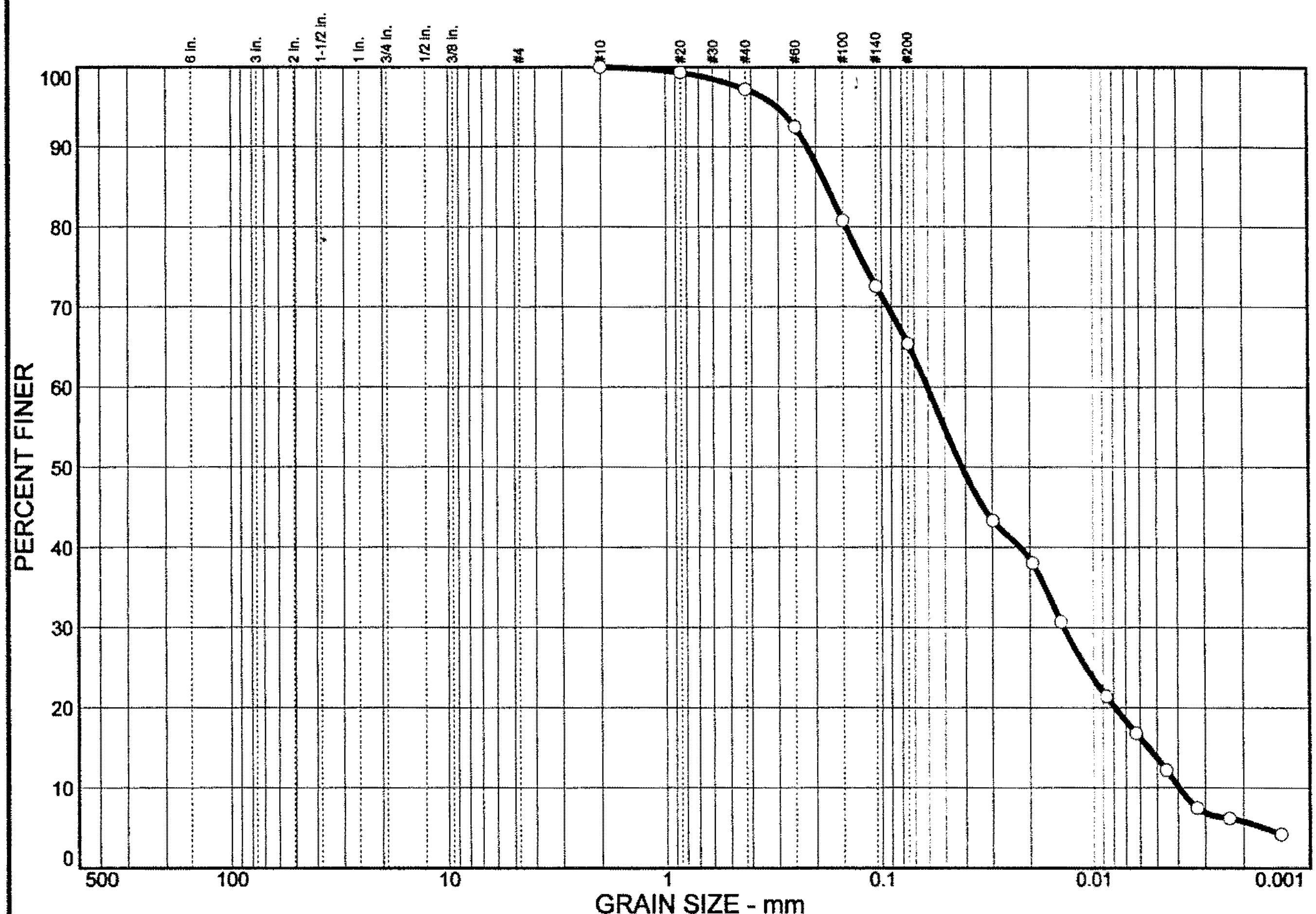
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 005 **Source of Sample:** 1003001319 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	34.6	51.7	13.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.3		
#40	97.2		
#60	92.5		
#100	80.8		
#140	72.6		
#200	65.4		

* (no specification provided)

Soil Description

Dark gray sandy SILT, with organics

Atterberg Limits

PL= 33 LL= 49 PI= 16

Coefficients

D_{85}= 0.177 D_{60}= 0.0605 D_{50}= 0.0415
D_{30}= 0.0139 D_{15}= 0.0055 D_{10}= 0.0039
C_u= 15.33 C_c= 0.81

Classification

USCS= ML AASHTO=

Remarks

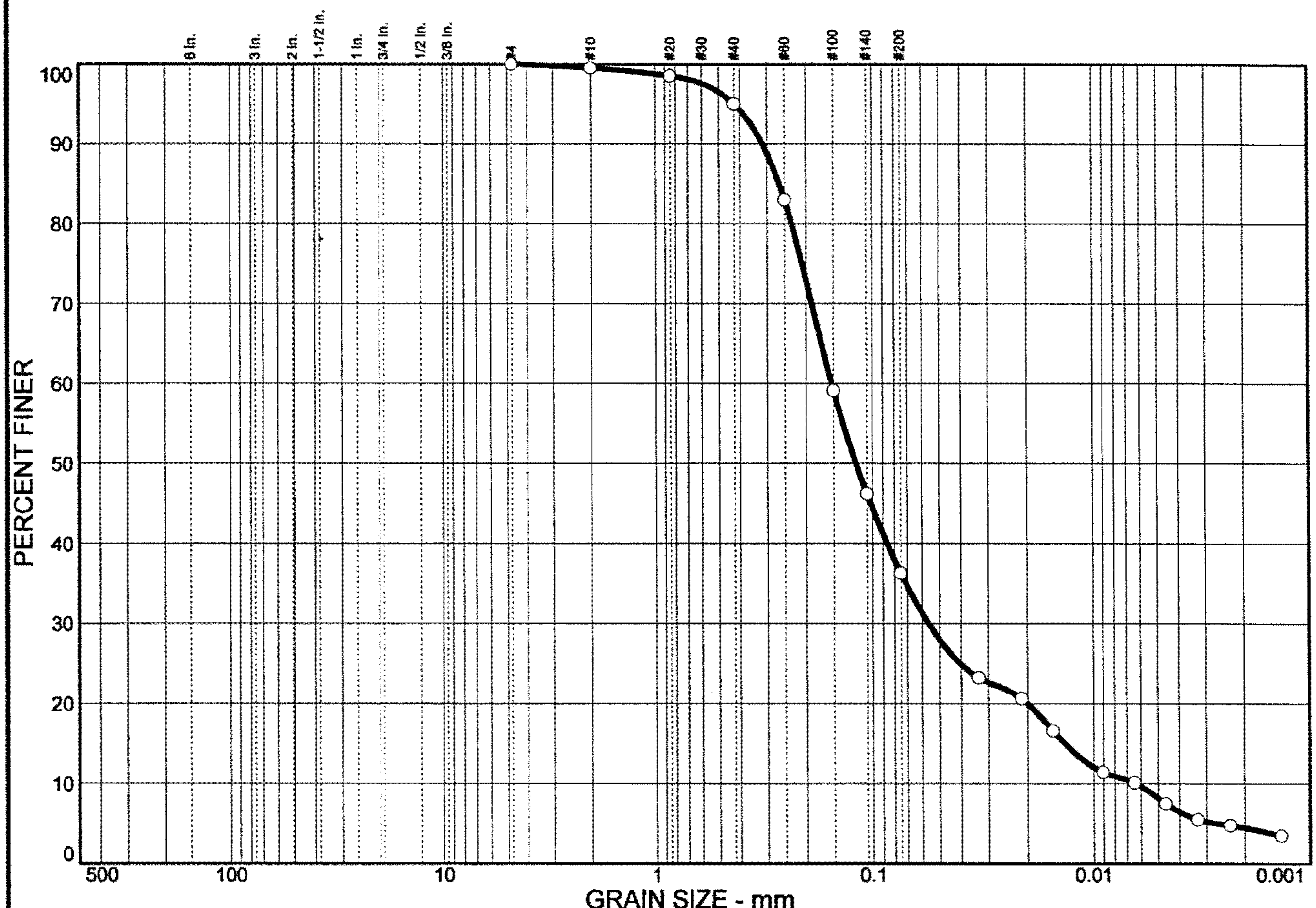
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 006 **Source of Sample:** 1003001319 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	63.7	28.1	8.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#20	98.5		
#40	95.0		
#60	83.0		
#100	59.1		
#140	46.2		
#200	36.3		

* (no specification provided)

Soil Description

Dark gray silty SAND, with organics

Atterberg Limits

PL= NP   LL= NP   PI= NP

Coefficients

D_{85}= 0.264 D_{60}= 0.153 D_{50}= 0.119
D_{30}= 0.0563 D_{15}= 0.0135 D_{10}= 0.0063
C_u= 24.15 C_c= 3.27

Classification

USCS= SM   AASHTO=

Remarks

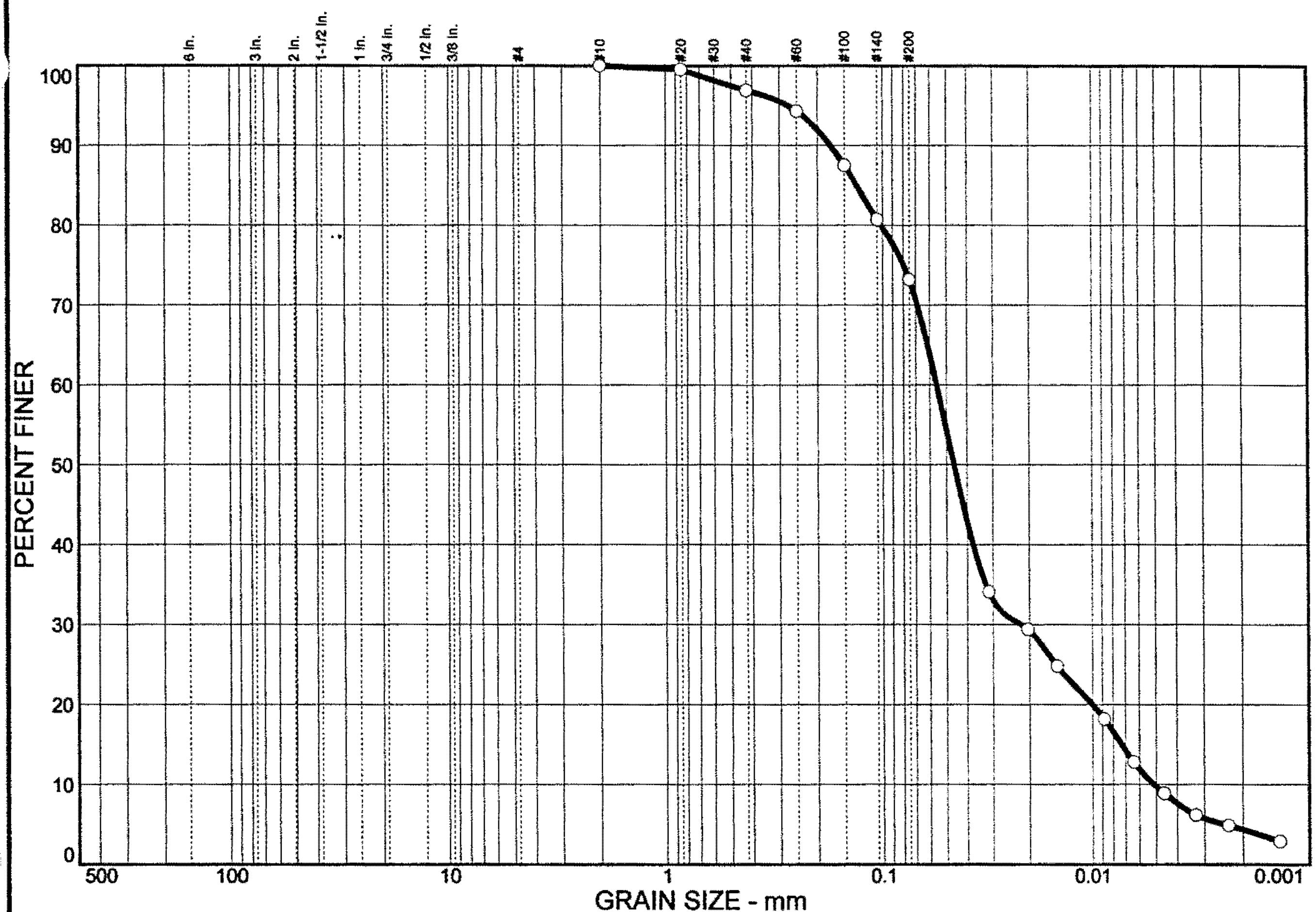
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 007   **Source of Sample:** 1003001319   **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005   **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	26.8	63.4	9.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.5		
#40	96.9		
#60	94.3		
#100	87.5		
#140	80.7		
#200	73.2		

* (no specification provided)

Soil Description

Dark gray SILT, some sand, with organics

Atterberg Limits

PL= 39 LL= 58 PI= 19

Coefficients

D_{85}= 0.132 D_{60}= 0.0556 D_{50}= 0.0460
D_{30}= 0.0219 D_{15}= 0.0073 D_{10}= 0.0051
C_u= 10.88 C_c= 1.69

Classification

USCS= MH AASHTO=

Remarks

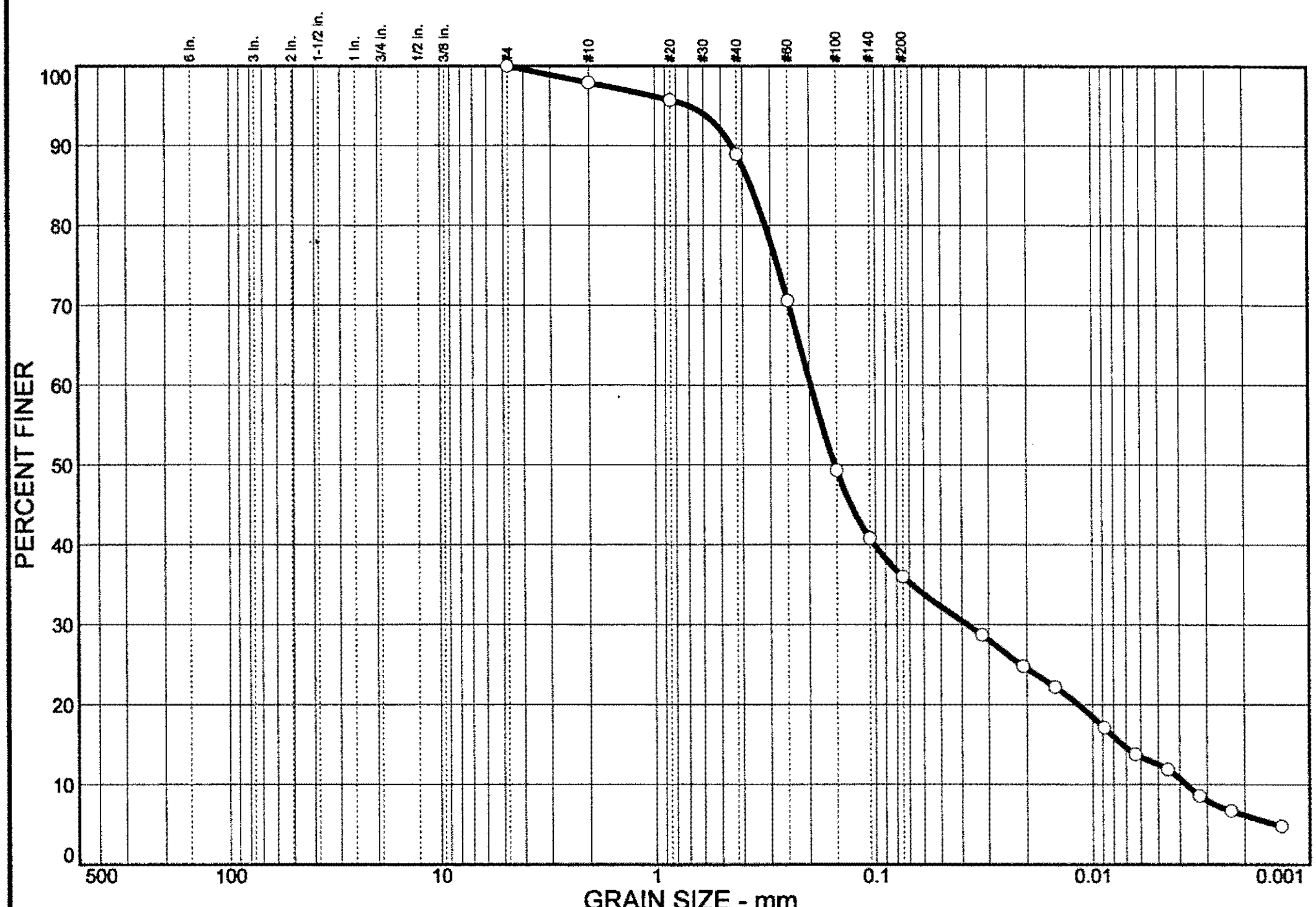
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 008 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	64.0	23.5	12.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.9		
#20	95.7		
#40	88.9		
#60	70.6		
#100	49.3		
#140	40.8		
#200	36.0		

* (no specification provided)

Soil Description

Dark gray silty SAND, with organics

Atterberg Limits

PL= 19 LL= 26 PI= 7

Coefficients

D_{85}= 0.367 D_{60}= 0.197 D_{50}= 0.153
D_{30}= 0.0377 D_{15}= 0.0073 D_{10}= 0.0037
C_u= 52.78 C_c= 1.94

Classification

USCS= SC-SM AASHTO=

Remarks

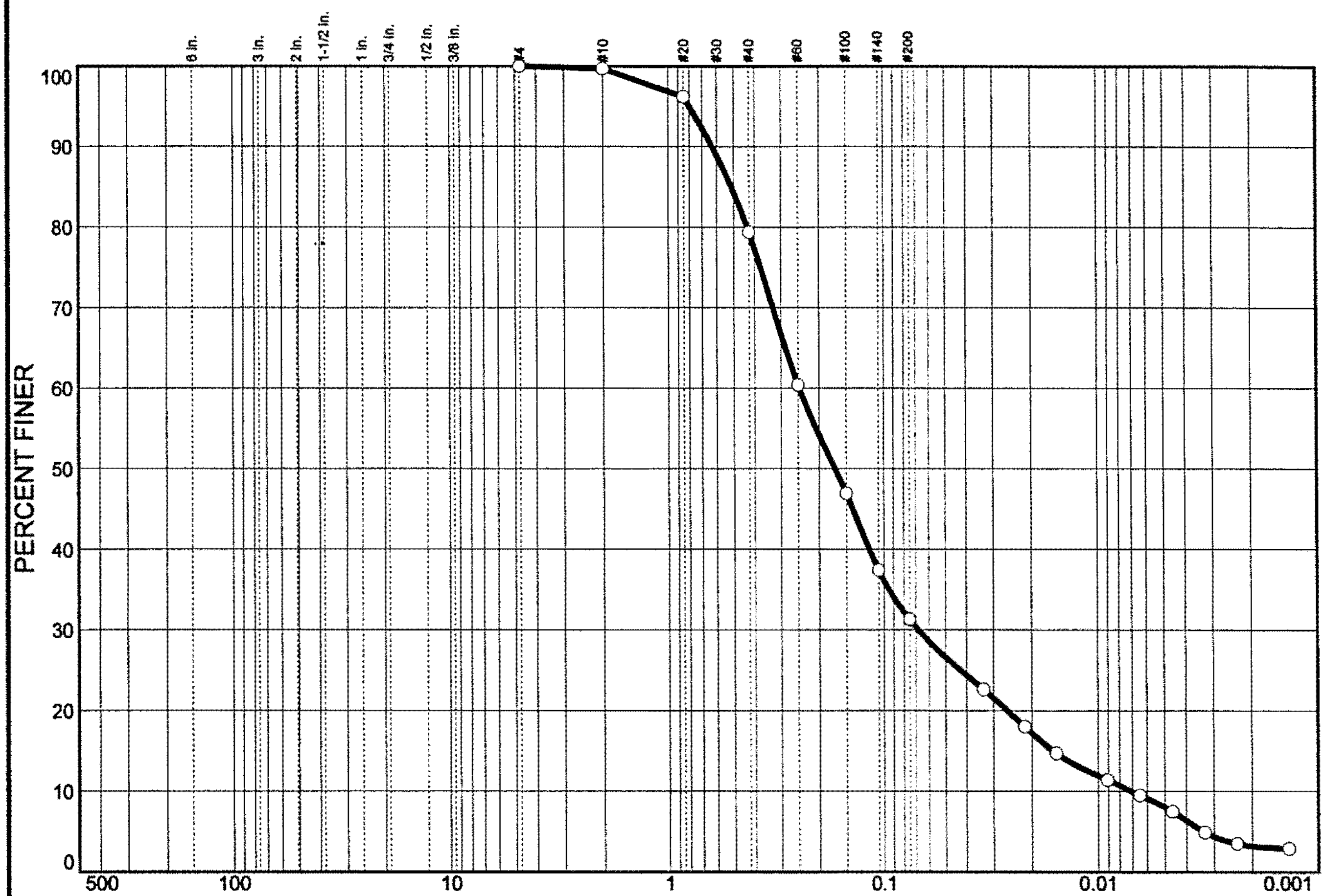
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 009 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	68.7	23.3	8.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	96.2		
#40	79.4		
#60	60.4		
#100	46.9		
#140	37.4		
#200	31.3		

* (no specification provided)

Soil Description

Dark gray silty SAND, with organics

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.513 D_{60}= 0.247 D_{50}= 0.169
D_{30}= 0.0679 D_{15}= 0.0160 D_{10}= 0.0071
C_u= 34.88 C_c= 2.64

Classification

USCS= SM AASHTO=

Remarks

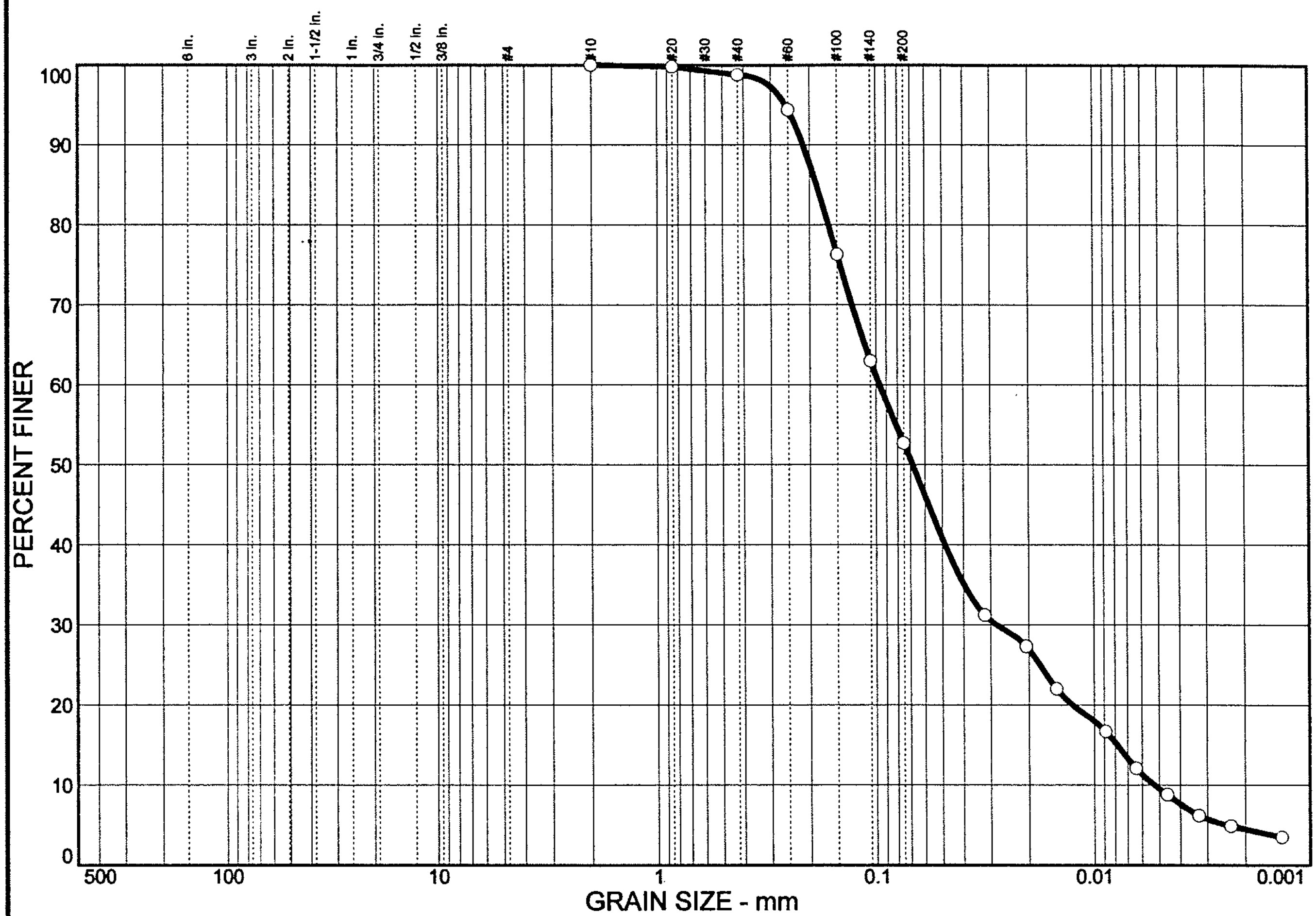
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 010 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	47.3	43.2	9.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	98.8		
#60	94.4		
#100	76.3		
#140	63.0		
#200	52.7		

* (no specification provided)

Soil Description

Dark gray sandy SILT, with organics

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.186 D_{60}= 0.0965 D_{50}= 0.0684
D_{30}= 0.0282 D_{15}= 0.0078 D_{10}= 0.0053
C_u= 18.34 C_c= 1.57

Classification

USCS= ML AASHTO=

Remarks

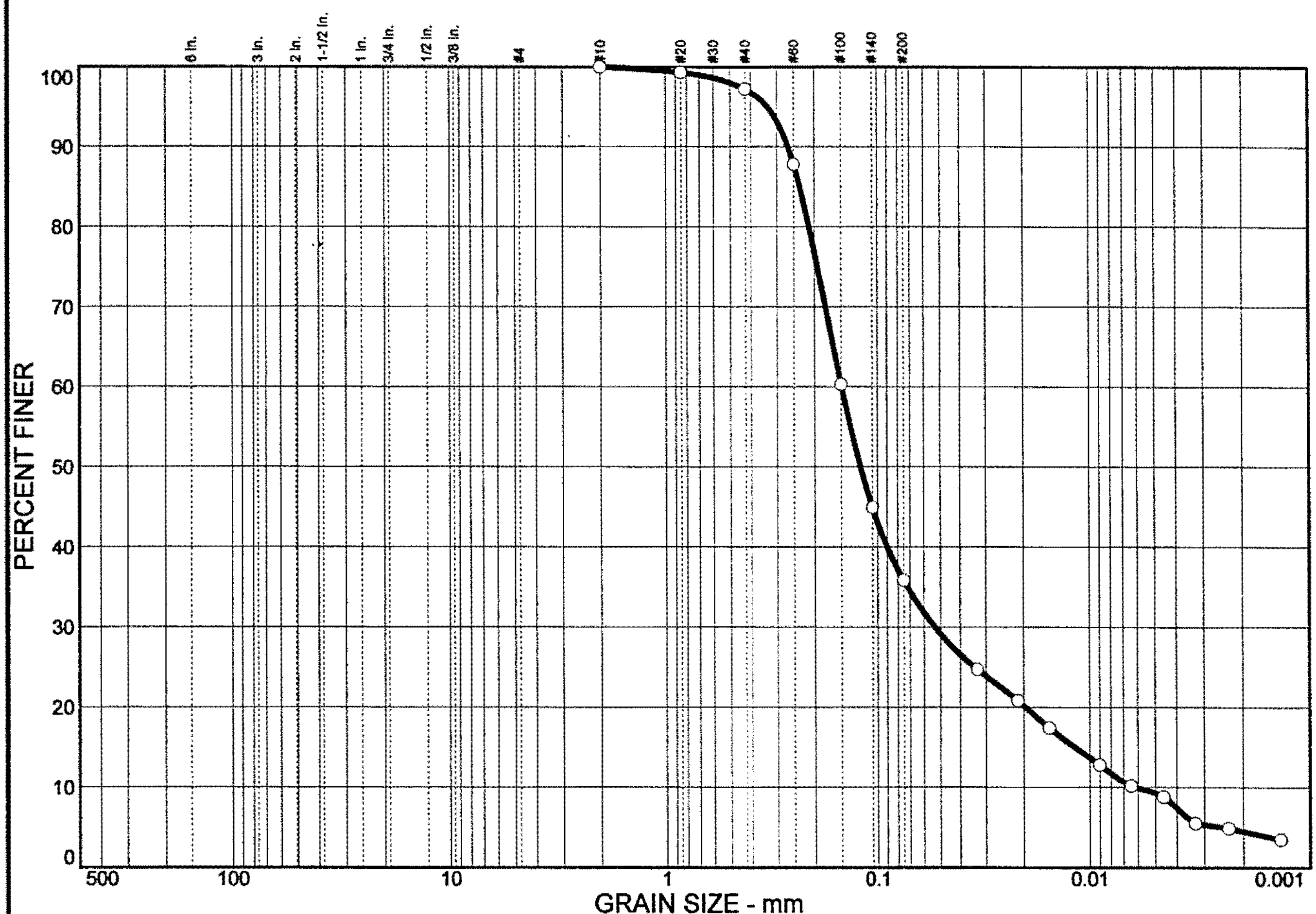
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 011 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	64.2	26.5	9.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.3		
#40	97.2		
#60	87.8		
#100	60.3		
#140	44.9		
#200	35.8		

* (no specification provided)

Soil Description

Dark gray silty SAND, with organics

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.234 D_{60}= 0.149 D_{50}= 0.121
D_{30}= 0.0533 D_{15}= 0.0117 D_{10}= 0.0062
C_u= 24.25 C_c= 3.09

Classification

USCS= SM AASHTO=

Remarks

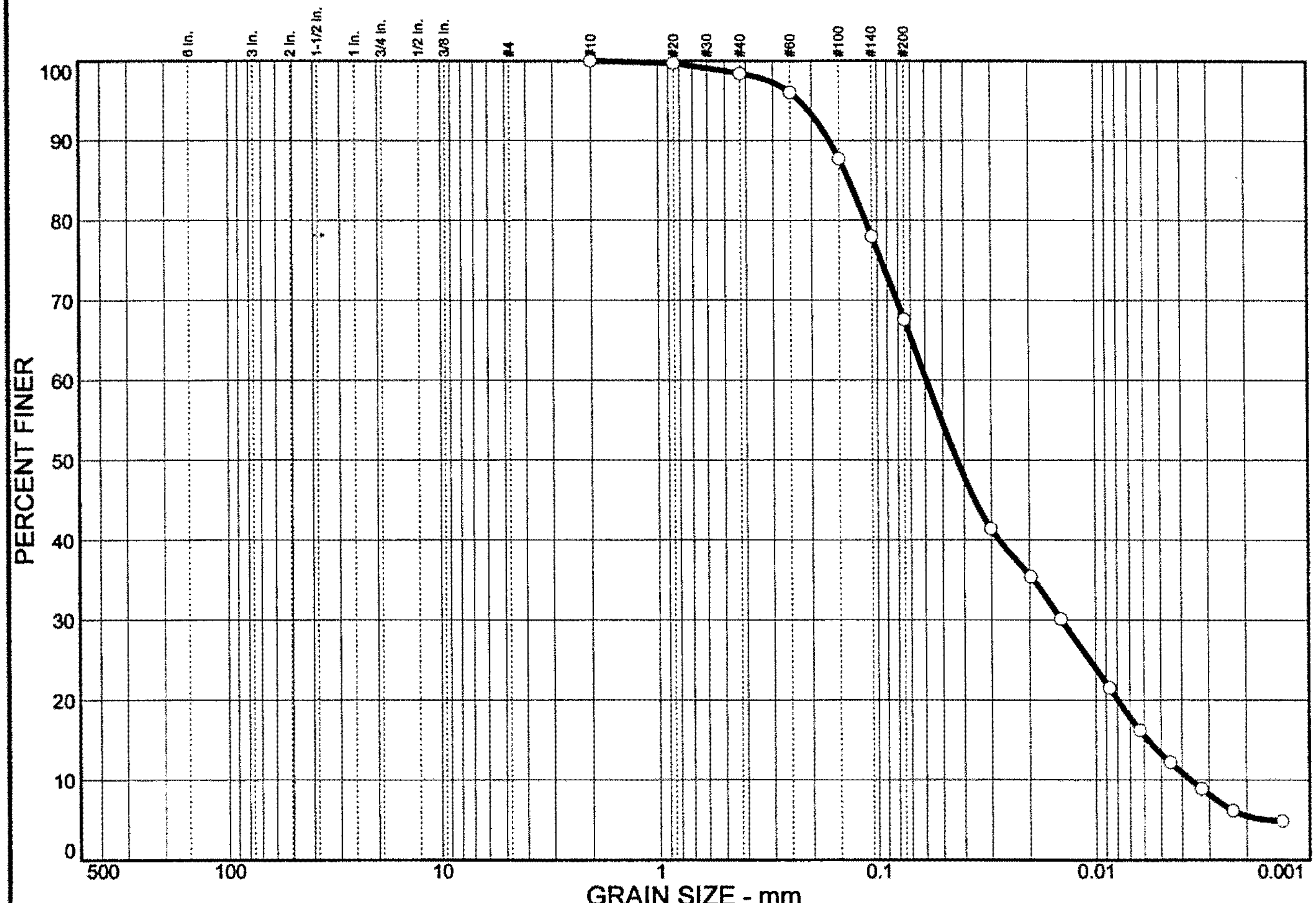
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 012 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	32.4	54.3	13.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	98.4		
#60	96.0		
#100	87.7		
#140	78.0		
#200	67.6		

* (no specification provided)

Soil Description

Dark gray sandy SILT, with organics

Atterberg Limits

PL= 34 LL= 49 PI= 15

Coefficients

D_{85}= 0.135 D_{60}= 0.0592 D_{50}= 0.0430
D_{30}= 0.0143 D_{15}= 0.0058 D_{10}= 0.0036
C_u= 16.27 C_c= 0.95

Classification

USCS= ML AASHTO=

Remarks

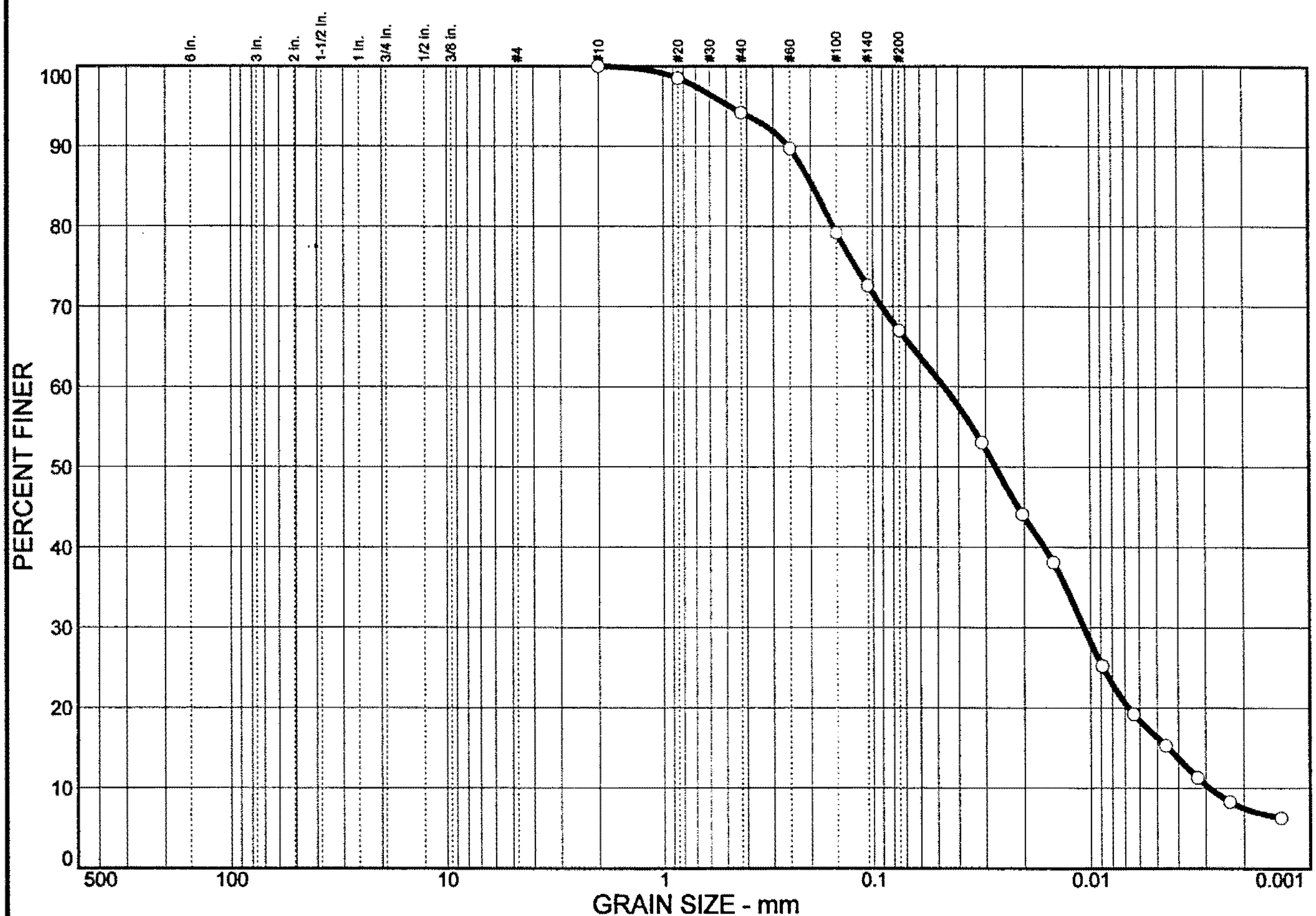
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 013 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	33.0	50.7	16.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.5		
#40	94.2		
#60	89.7		
#100	79.2		
#140	72.6		
#200	67.0		

* (no specification provided)

Soil Description

Dark gray sandy SILT, with organics

Atterberg Limits

PL= 36 LL= 51 PI= 15

Coefficients

D_{85}= 0.195 D_{60}= 0.0467 D_{50}= 0.0271
D_{30}= 0.0107 D_{15}= 0.0044 D_{10}= 0.0029
C_u= 16.22 C_c= 0.85

Classification

USCS= MH AASHTO=

Remarks

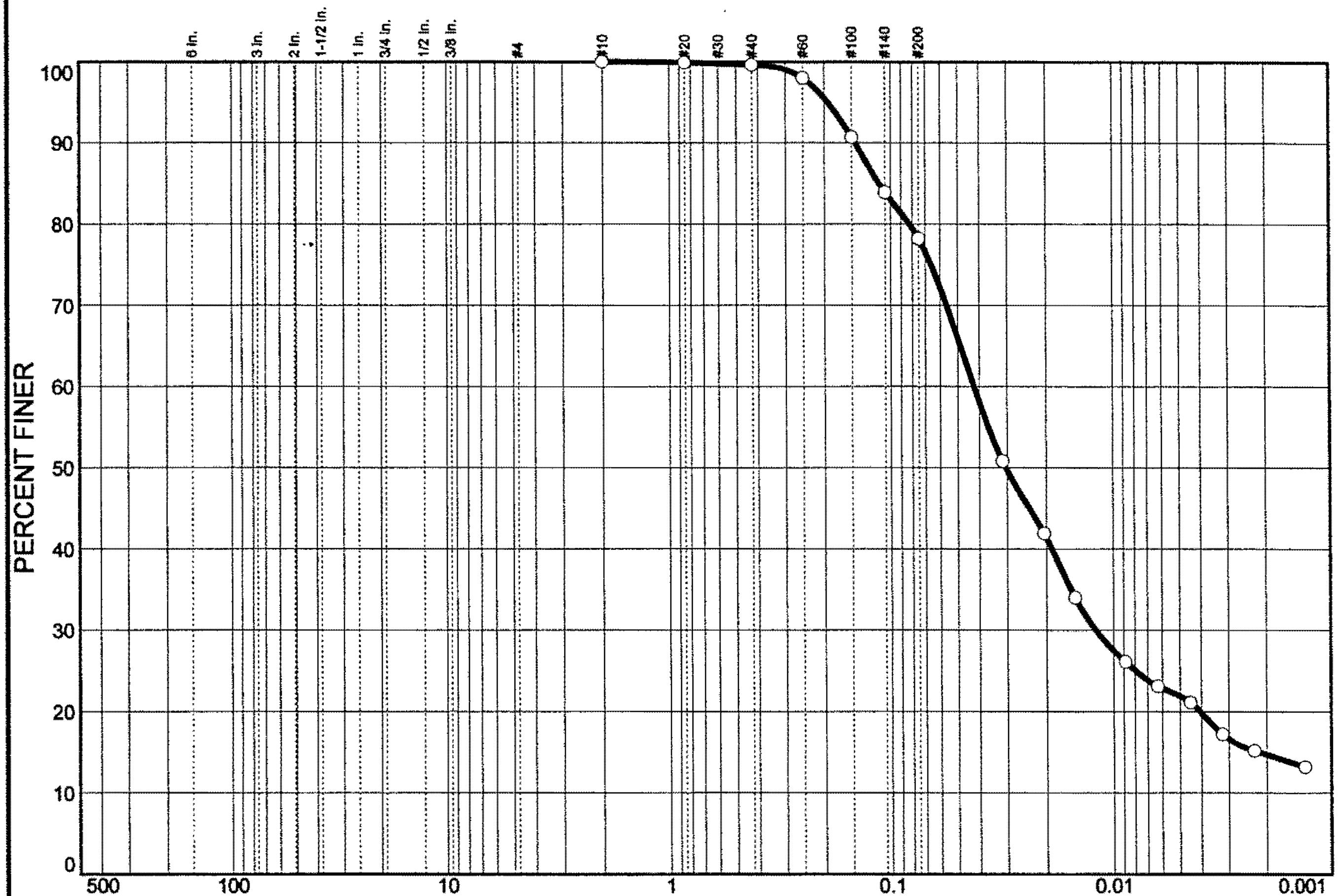
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 014 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	21.8	56.3	21.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.6		
#60	98.0		
#100	90.7		
#140	83.9		
#200	78.2		

* (no specification provided)

Soil Description

Dark gray lean CLAY, some sand with organics

Atterberg Limits

PL= 15 LL= 26 PI= 11

Coefficients

D_{85}= 0.113 D_{60}= 0.0423 D_{50}= 0.0304
D_{30}= 0.0120 D_{15}= 0.0022 D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

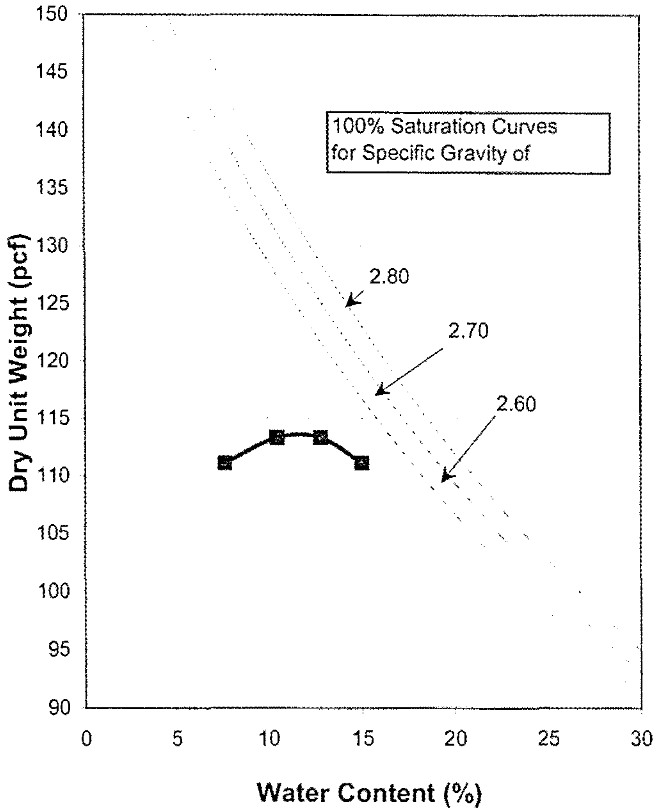
Tested By: NL
Checked By:
Reviewed By:

Sample No.: SED 015 **Source of Sample:** 1003001320 **Date:** 12/12/03
Location: **Elev./Depth:**

GeoTest

Client: URS
Project: PRS - Sheboygan
Project No: 062-005 **Plate**

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	113.5
Optimum Water content, %	11.7
Oversize Correction [1]	
Maximum Dry Unit Weight, lbf/ft^3	113.5
Optimum Water Content, % [2]	11.7

Specimen Data	
As Received Water Content, %	55.7
Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	63.0
% Fines	37.0
USCS	SM
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 001
Description:	Dark gray silty SAND with organics
Specimen Source:	
Date Sampled:	6-Nov-03
Date Received:	6-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001319
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

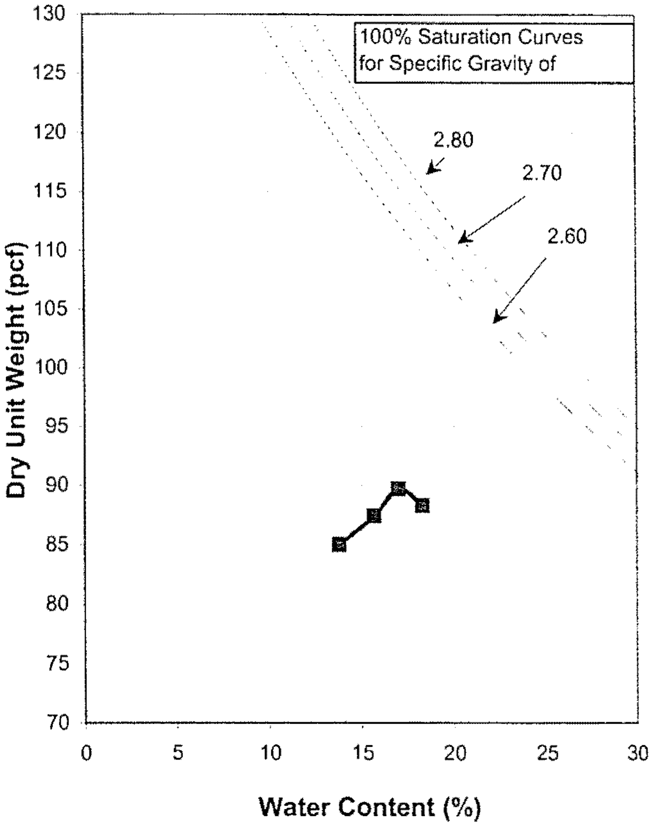
Checked By:

Reviewed By:

Test Date: 10-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	89.9
Optimum Water content, %	17.0
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	89.9
Optimum Water Content, % (2)	17.0

Specimen Data	
As Received Water Content, %	154.2
Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	65.0
% Fines	35.0
USCS	SM
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.: SED 003
Description: Dark gray silty SAND with organics
Specimen Source:
Date Sampled: 6-Nov-03
Date Received: 6-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

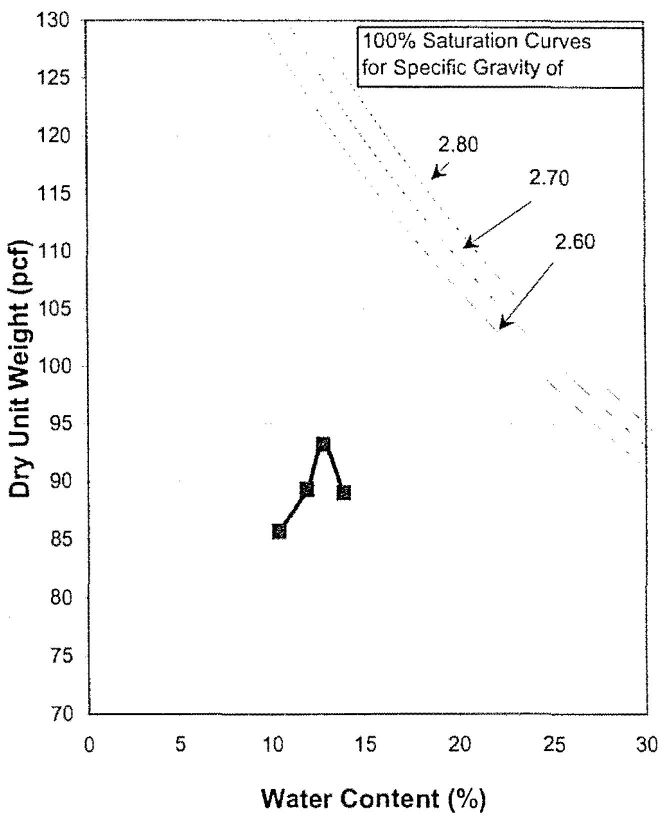
Test No.: 1003001319
Project: PRS - Sheboygan
Project Number: 062-055

Laboratory Compaction Test Report
ASTM D1557-00

GeoTest | Checked By: | Reviewed By: | Test Date: 10-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	93.2
Optimum Water content, %	12.8
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	93.2
Optimum Water Content, % (2)	12.8

Specimen Data	
As Received Water Content, %	40.0
Liquid Limit	41
Plastic Limit	30
Plasticity Index	11
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	37.6
% Fines	62.4
USCS	ML
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 004
Description:	Dark gray sandy SILT with organics
Specimen Source:	
Date Sampled:	6-Nov-03
Date Received:	6-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001319
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

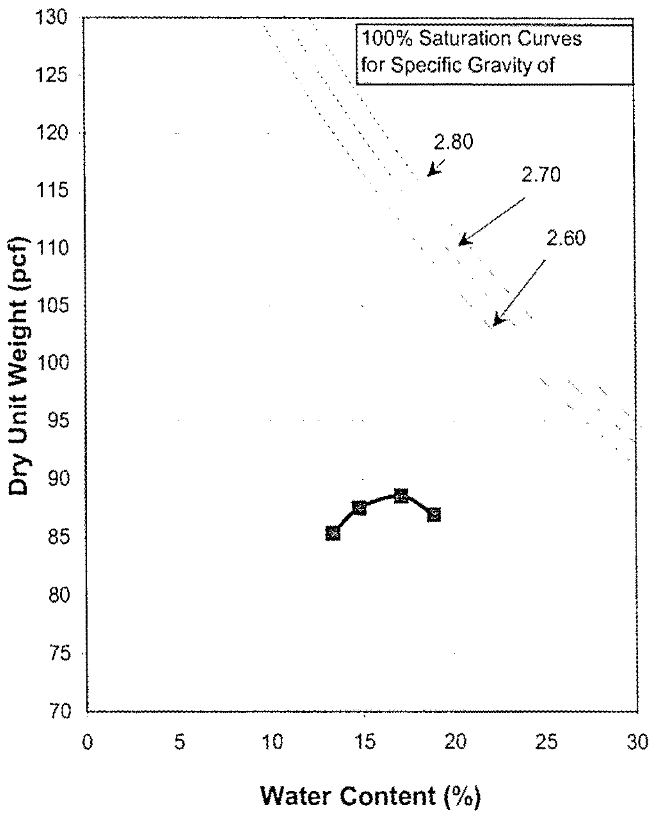
Checked By:

Reviewed By:

Test Date: 10-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	88.5
Optimum Water content, %	17.4
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	88.5
Optimum Water Content, % (2)	17.0

Specimen Data	
As Received Water Content, %	57.6
Liquid Limit	52
Plastic Limit	38
Plasticity Index	14
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	30.1
% Fines	69.9
USCS	ML
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 005
Description:	Dark gray sandy SILT with organics
Specimen Source:	
Date Sampled:	6-Nov-03
Date Received:	6-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001319
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

Checked By:

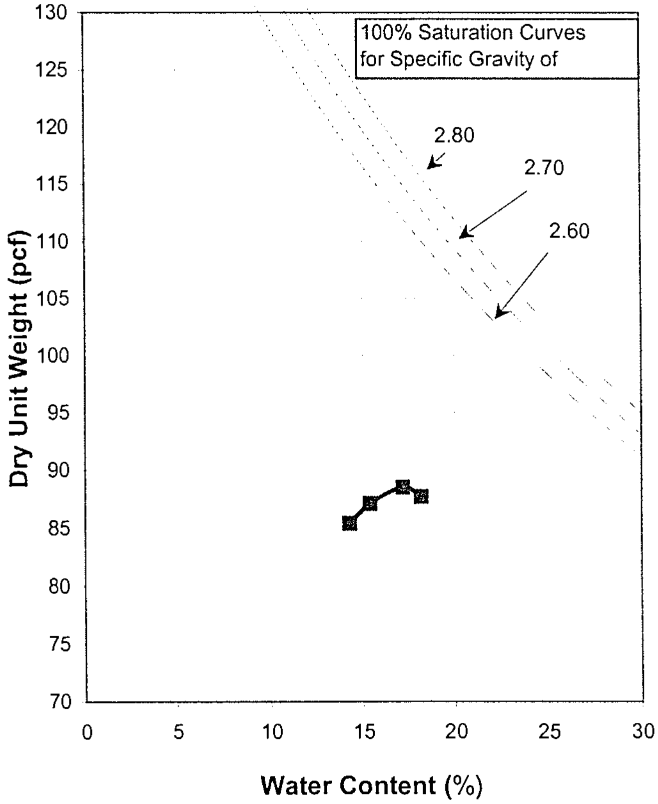
Reviewed By:

Test Date: 11-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Modified Proctor SED 005

Modified Proctor Test Report



Test Results

Maximum Dry Unit Weight, lbf/ft^3	88.5
Optimum Water content, %	17.4
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	88.5
Optimum Water Content, % (2)	17.4

Specimen Data

As Received Water Content, %	103.4
Liquid Limit	49
Plastic Limit	33
Plasticity Index	16
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	34.6
% Fines	65.4
USCS	ML
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 006
Description:	Dark gray sandy SILT with organics
Specimen Source:	
Date Sampled:	6-Nov-03
Date Received:	6-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001319
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report
ASTM D1557-00

GeoTest

Checked By:

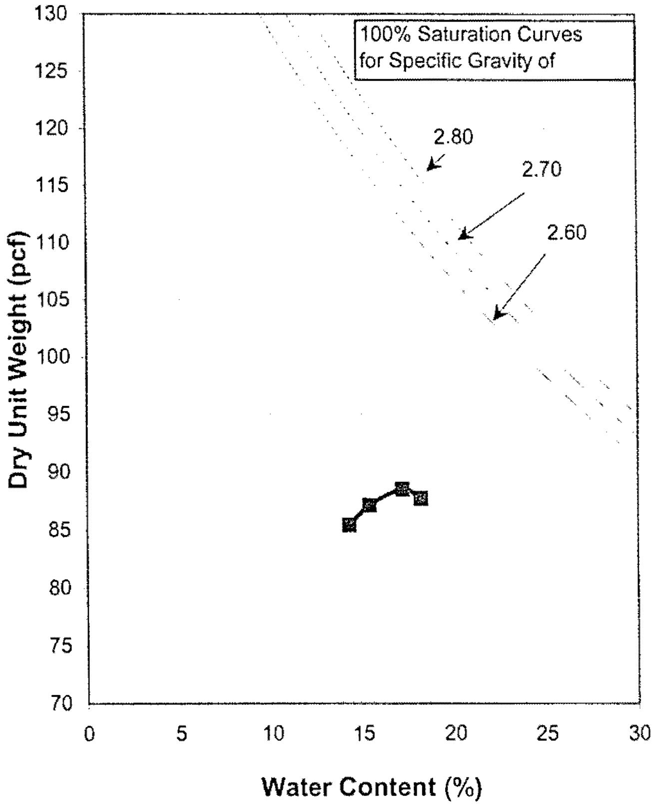
Reviewed By:

Test Date: 12-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Modified Proctor SED 006

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	88.5
Optimum Water content, %	17.3
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	88.5
Optimum Water Content, % (2)	17.3

Specimen Data	
As Received Water Content, %	54.2
Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	63.7
% Fines	36.3
USCS	SM
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.: SED 007
Description: Dark gray silty SAND with organics
Specimen Source:
Date Sampled: 6-Nov-03
Date Received: 6-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

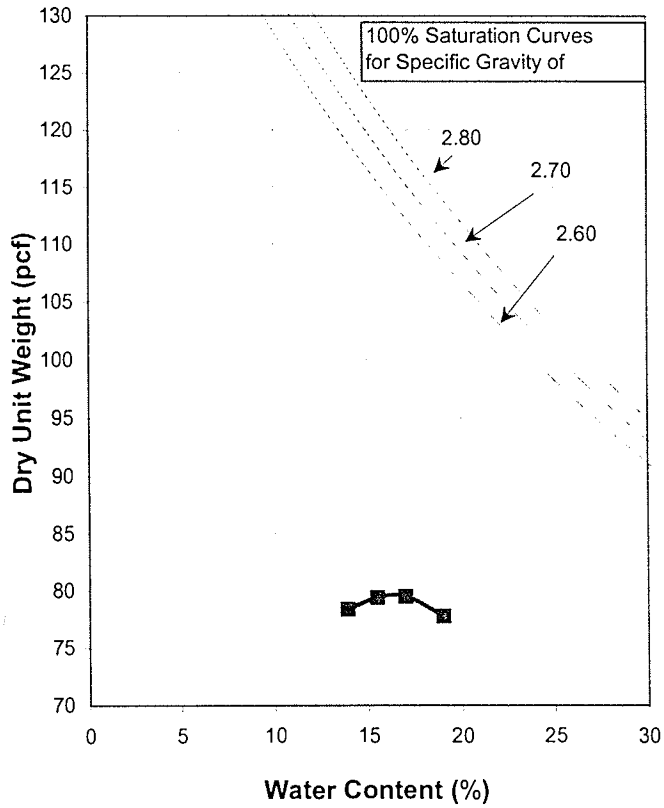
Test No.: 1003001319
Project: PRS - Sheboygan
Project Number: 062-055

Laboratory Compaction Test Report
ASTM D1557-00

GeoTest | Checked By: | Reviewed By: | Test Date: 9-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

Modified Proctor Test Report



Test Results

Maximum Dry Unit Weight, lbf/ft^3	79.6
Optimum Water content, %	16.5
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	79.6
Optimum Water Content, % (2)	16.5

Specimen Data

As Received Water Content, %	20.4
Liquid Limit	58
Plastic Limit	39
Plasticity Index	19
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	26.8
% Fines	73.2
USCS	MH
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 008
Description:	Dark gray SILT, some sand with organics
Specimen Source:	
Date Sampled:	7-Nov-03
Date Received:	10-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001320
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

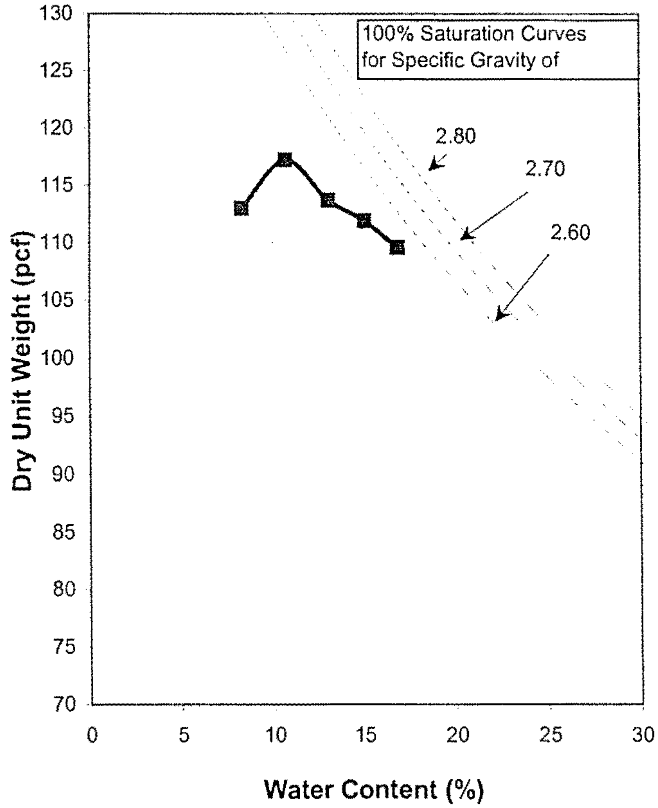
Checked By:

Reviewed By:

Test Date: 11-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	117.0
Optimum Water content, %	10.8
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	117.0
Optimum Water Content, % (2)	10.8

Specimen Data	
As Received Water Content, %	31.5
Liquid Limit	26
Plastic Limit	19
Plasticity Index	7
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	64.0
% Fines	36.0
USCS	SC-SM
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 009
Description:	Dark gray silty SAND with organics
Specimen Source:	
Date Sampled:	7-Nov-03
Date Received:	10-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001320
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report
ASTM D1557-00

GeoTest

Checked By:

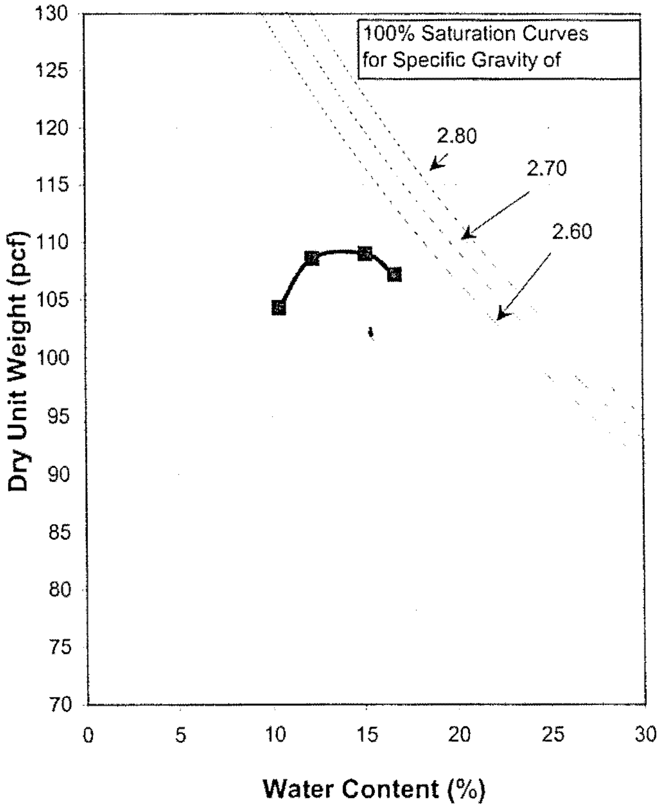
Reviewed By:

Test Date: 9-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Modified Proctor SED 009

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	109.0
Optimum Water content, %	14.0
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	109.0
Optimum Water Content, % (2)	14.0

Specimen Data	
As Received Water Content, %	53.6
Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	68.7
% Fines	31.3
USCS	SM
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 010
Description:	Dark gray silty SAND with organics
Specimen Source:	
Date Sampled:	7-Nov-03
Date Received:	10-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001320
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

Checked By:

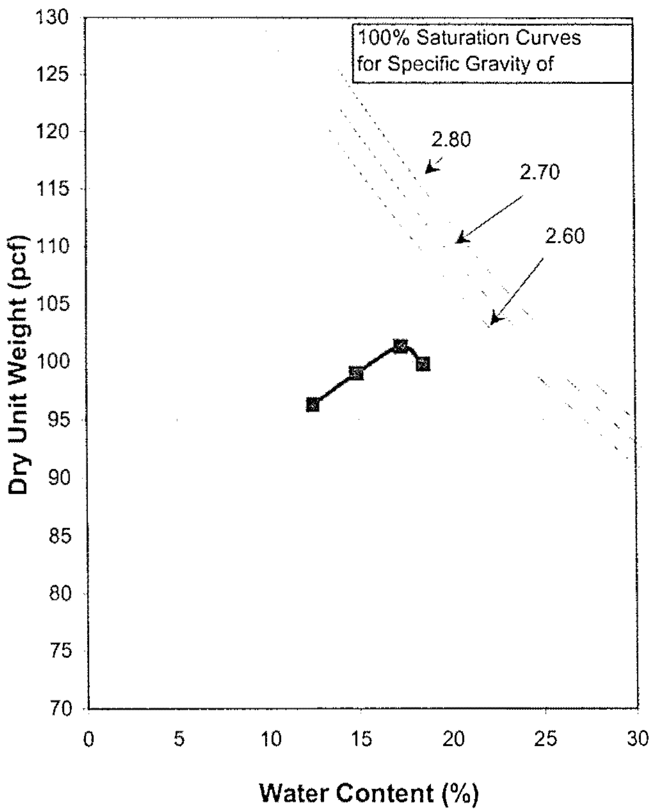
Reviewed By:

Test Date: 9-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Modified Proctor SED 010

Modified Proctor Test Report



Test Results

Maximum Dry Unit Weight, lbf/ft^3	101.3
Optimum Water content, %	17.4
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	101.3
Optimum Water Content, % (2)	17.4

Specimen Data

As Received Water Content, %	90.6
Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	47.3
% Fines	52.7
USCS	ML
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 011
Description:	Dark gray sandy SILT with organics
Specimen Source:	
Date Sampled:	7-Nov-03
Date Received:	10-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001320
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

Checked By:

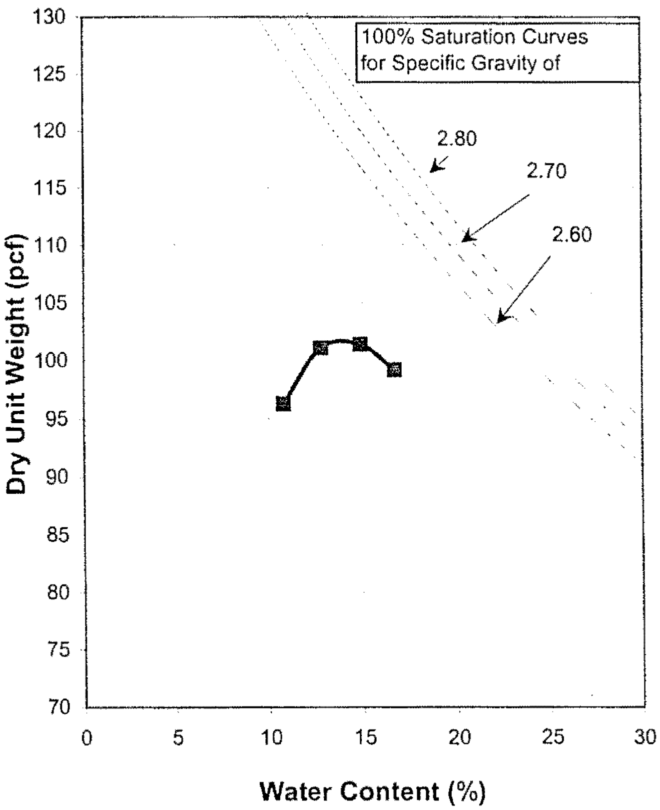
Reviewed By:

Test Date: 11-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Modified Proctor SED 011

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	101.8
Optimum Water content, %	14.0
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	101.8
Optimum Water Content, % (2)	14.0

Specimen Data	
As Received Water Content, %	77.3
Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	64.2
% Fines	35.8
USCS	SM
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.: SED 012
Description: Dark gray silty SAND with organics
Specimen Source:
Date Sampled: 7-Nov-03
Date Received: 10-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.: 1003001320
Project: PRS - Sheboygan
Project Number: 062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

Checked By:

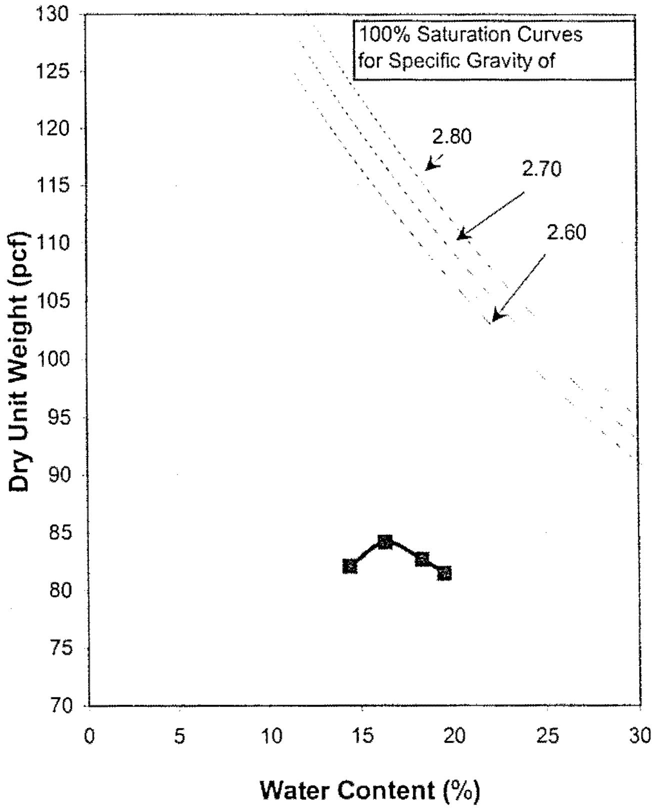
Reviewed By:

Test Date: 9-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Modified Proctor SED 012

Modified Proctor Test Report



Test Results	
Maximum Dry Unit Weight, lbf/ft^3	84.2
Optimum Water content, %	16.5
Oversize Correction (1)	
Maximum Dry Unit Weight, lbf/ft^3	84.2
Optimum Water Content, % (2)	16.5

Specimen Data	
As Received Water Content, %	82.6
Liquid Limit	49
Plastic Limit	34
Plasticity Index	15
Specific Gravity (Estimated)	2.70
% Gravel	0.0
% Sand	32.4
% Fines	67.6
USCS	ML
% Oversize	0.0
Oversize Sieve	No. 4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manual

Sample No.:	SED 013
Description:	Dark gray sandy SILT with organics
Specimen Source:	
Date Sampled:	7-Nov-03
Date Received:	10-Nov-03

Note (1): Corrected for oversize particles in accordance with ASTM D 4718-87.

Note (2): Assumed 1.5% moisture in oversize portion.

Test No.:	1003001320
Project:	PRS - Sheboygan
Project Number:	062-055

Laboratory Compaction Test Report

ASTM D1557-00

GeoTest

Checked By:

Reviewed By:

Test Date: 10-Dec-03

2135 S. 116th Street West Allis, WI 53227
414-321-TEST 414-321-8359 Fax

File: Modified Proctor SED 013

Quality Assurance Project Plan

Upper River – Phases I and II
Sheboygan River and Harbor Superfund Site
Sheboygan County, Wisconsin

Addendum
March 2006

Prepared By
Pollution Risk Services, LLC & Foth & Van Dyke

A-1 – Title/Approval Sheet

Reviewed by:

STL Laboratory Quality Manager — Date

Reviewed by:

Great Lakes Laboratory Quality Manager — Date

Approved by: Ken Aukerman — 9/1/2005

Ken Aukerman — Date
Project Manager
Pollution Risk Services, LLC

Approved by: Steve Laszewski — 9/1/2005

Steve Laszewski — Date
Supervising Contractor Manager
Foth & Van Dyke

Approved by: Jim Hutchison — 9/1/2005

Jim Hutchison — Date
QA Manager
Foth & Van Dyke

Approved by:

Region V Quality Assurance Reviewer — Date
U.S. Environmental Protection Agency

Approved by:

Project Coordinator — Date
U.S. Environmental Protection Agency

A-2 Table of Contents

TABLES

FIGURES

APPENDICES

LISTING OF ACRONYMS

A1	Area 1
ARARs	Applicable or Relevant and Appropriate Requirements
ASRI	Alternative Specific Remedial Investigation
BBL	Blasland, Bouck and Lee, Inc.
CD	Consent Decree
CFR	Code of Federal Regulation
COC	Chain-Of-Custody Record
CY	Cubic Yards
DDM	De-Watered Dredged Material
DL	Detection Limit
DOT	Department of Transportation
DQO	Data Quality Objective
DUP	Duplicate
ECD	Electron Capture Detector
FS	Feasibility Study
FSP	Field Sampling Plan
FVD	Foth & Van Dyke and Associates, Inc.
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
GMIT	Groundwater Monitoring/Interceptor
GPS	Global Positioning System
HASP	Health and Safety Plan
Hazmat	Hazardous Materials
Hazwoper	40-hour Hazardous Waste Site Operator
HDPE	High Density Polyethylene
ID	Identification
LCS	Laboratory Control Samples
LIMS	Laboratory Information Management Systems
MCAWW	Methods for Chemical Analysis of Water and Waste
MDL	Method Detection Limit
mg/kg	Milligrams Per Kilogram
mg/L	Milligrams Per Liter
MS	Matrix Spike
MSD	Matrix Spike Duplicates
mV	Millivolts

NIOSH	National Institute for Occupation Safety and Health
NS	North Shore Sediments
NTUs	Nephelometric Turbidity Units
OSC	On-Site Coordinator
OSR	On-Site Representative
OSWER	Office of Solid Waste and Emergency Response
PE	Performance Evaluation
PI	Phase I Pre-Design Investigation
PCB	Polychlorinated Biphenyl
ppm	Parts Per Million
PRACC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PRS	Pollution Risk Services, LLC
QA/QC	Quality Assurance/Quality Control
QAP	Quality Assurance Program
QAPP	Quality Assurance Project Plan
QAR	Quality Assurance Reviewer
Qt	Quart
RI	Remedial Investigation
RL	Reporting Limit
RMU	Remedial Management Unit
ROD	Record of Decision
RPD	Relative Percent Difference
SAR	Sample Analysis Request
SOP	Standard Operating Procedures
STL	Severn Trent Laboratories
SW-846	Test Methods for Evaluating Solid Waste
SWAC	Surface Weighted Average PCB Concentration
TBD	To be determined
TPC	Tecumseh Products Company
TSCA	Toxic Substance Control Act
TSS	Total Suspended Solids
µg/l	Micrograms Per Liter
Umho	Micromhos
URSOW	Upper River Statement of Work
USEPA	United States Environmental Protection Agency
WDNR	Wisconsin Department of Natural Resources

A-3 Distribution List

Pollution Risk Services, LLC (PRS) has the responsibility to ensure that appropriate project personnel receive a copy of this Quality Assurance Project Plan (QAPP) and any updates, so as to have the most current approved version of the QAPP at all times.

To accomplish this, PRS will maintain the QAPP distribution list (see below). This QAPP is bound in a three-ring binder. Dated updates will be provided to those on the distribution list with instructions to discard the out-dated pages and replace them with the updates provided. The QAPP distribution list is as follows:

• USEPA	Pablo Valentin
• WDNR	Tom Wentland
• Pollution Risk Services, LLC (PRS)	Mark Mather Brandy Proffitt Ken Aukerman
• Petro Environmental, LLC	Steve Carpenter
• Foth & Van Dyke and Associates, Inc.	Steve Laszewski Jim Hutchison
• Chubb & Son, Inc.	Megan Trend
• STL (Chicago, IL)	Eric Lang
• Great Lakes Analytical (Buffalo Grove, IL)	Debi Lowe

A.4 Project/Task Organization

PRS, WDNR, and the USEPA have designated a project team for the Sheboygan River and Harbor Superfund project as shown in Table A-1-1 and in Appendix A of the Remedial Design Work Plan, Upper River – Phase I and II, Sheboygan River and Harbor Superfund Site, Sheboygan County, Wisconsin. This group consists of members representing Pollution Risk Services (PRS), PRS' Supervising Contractor Foth & Van Dyke (FVD), the Wisconsin Department of Natural Resources (WDNR), United States Environmental Protection Agency (USEPA), and analytical laboratories. Overall technical responsibility for conducting the sampling and monitoring activities specified in the Quality Assurance Project Plan (QAPP) will be by PRS. Project roles and responsibilities are identified below.

A-4.1 Management Responsibilities

A-4.1.1 USEPA Project Coordinator

Responsibilities and duties of the USEPA Project Coordinator include the following:

- Track overall progress of the settling defendant's actions in meeting the conditions of the statement of work and Consent Decree (CD);
- Approval of initial project design and subsequent changes; and,
- Communications with the PRS Project Coordinator, WDNR Project Manager, and Supervising Contractor.

A-4.1.2 WDNR Project Manager

Responsibilities and duties of the WDNR Project Manager include the following:

- Provide WDNR review for overall project activities;
- Monitor progress of project activities; and,
- Communications with other WDNR project personnel.

A-4.1.3 PRS Project Coordinator

The responsibilities of the PRS Project Coordinator include the following:

- Within the parameters of the CD will define the work to be supervised and directed by the Supervising Contractor;
- Perform all administrative and decision-making activities, as well as provide necessary authorizations related to the project on behalf of PRS;
- Assure that all activities are performed in accordance with the requirements of applicable federal and state laws, regulations, and applicable or relevant and appropriate requirements (ARARs);

- Assume responsibility for ensuring that its contractors and subcontractors perform the Upper River Work as defined in the CD;
- Coordination of communications, submittals, and meetings with the USEPA Project Manager, Supervising Contractor, and WDNR Project Manager and other appropriate project team members.;
- Facilitate coordination of QAPP/FSP production;
- Responsible for maintaining the official, approved QAPP;
- Obtain all necessary federal or state permits; and
- Maintain contact with the USEPA, WDNR, and Supervising Contractor.

A-4.1.4 Supervising Contractor

Responsibilities of the Supervising Contractor are to perform all tasks as Supervising Contractor as defined in the CD; this includes but is not limited to the following:

- Assist the Project Coordinator in the preparation, review and/or editing of submittals (plans, specifications, drawings, reports, contracts, etc.). Function as primary consultant to the Project Coordinator to verify that all work performed is in accordance with the CD. Review all aspects of Upper River work to be performed by the Project Coordinator pursuant to Sections VI, VII, and XIV of the CD are in accordance with the approved project documents, the CD, the existing Chubb insurance policy, and performed in a manner that is protective of human health and the environment;
- Establish QA/QC procedures with the laboratory(s); and,
- Receive QC Reports, review and verify QC, prepare QA documentation for field and laboratory work performed.

A-4.1.5 Remediation Construction Manager

Responsibilities and duties of the Remediation Construction Manager include the following:

- Coordination and communication with PRS Project Coordinator, Supervising Contractor, OSC, and OSR;
- Manage contractor and subcontractors including performance of work in accordance with Upper River Statement of Work (URSOW), CD, QAPP, Field Sampling Plan (FSP), and Health and Safety Plan (HASP); and,
- Monitor contractor schedules and compliance with URSOW and CD.

A-4.1.6 Health and Safety Manager

Responsibilities and duties of the Health and Safety Manager include the following:

- Coordination and communication with PRS Project Coordinator, Supervising Contractor, Remediation Construction Manager and subcontractors regarding all health and safety issues;

- Implement requirements of the HASP;

A-4.1.7 Engineering & Design Manager

Responsibilities of the Engineering & Design Manger include the following:

- Coordination and communication with PRS Project Coordinator, Supervising Contractor, OSC, and OSR;

- Review project design data to confirm compliance with Quality Assurance/Quality Control (QA/QC) criteria set forth by CD, URSOW, Work Plans, and the QAPP/FSP;

- Assist PRS Project Coordinator and Supervising Contractor with design aspects of the project; and

- Oversee the design portions of the project.

A-4.2 QA Responsibilities

A-4.2.1 QA Manager

Responsibilities and duties of the Project Quality Assurance (QA) Manager include the following:

- Ensure QA/QC requirements outlined in QAPP/FSP are followed; and,

- Document and approve any deviation from the QAPP/FSP, transmit changes to the project team, and where possible obtain prior approval of changes from the OSC and OSR.

A-4.2.2 USEPA Quality Assurance Reviewer

Responsibilities and duties of the USEPA Quality Assurance Reviewer (QAR) include the following:

- Review and approval of the project QAPP; and,

- Reviewing and evaluating analytical field and laboratory procedures.

A-4.2.3 Independent Data Validator

Responsibilities of the Independent Data Validator include the following:

- Review laboratory data to confirm compliance with QA/QC criteria set forth by USEPA and in the QAPP/FSP;

- Prepare QA/QC (validation) reports at an agreed to frequency for incorporation into the Final Report; and

- Communicate to the QA Manager immediately if serious QC issues are observed in the data quality. Serious issues are those that require rejection of analytical data.

A-4.3 Field Responsibilities

A-4.3.1 Project Field Team Leader

The Project Field Team Leader has the responsibility for completion of the field activities in accordance with the appropriate QAPP, FSP and/or any other applicable documents. The specific responsibilities of the Project Field Team Leader include the following:

- Coordinate activities at the site;

- Assign specific duties to field team members;

- Mobilize and demobilize of the field team and subcontractors to and from the site;

- Direct the activities of the subcontractors on site;

- Resolve any logistical problems that could potentially hinder field activities such as equipment malfunctions or availability, personnel conflicts, or weather dependent working conditions;

- Implement field QC including issuance and tracking of measurement and test equipment; the proper labeling, handling, storage, shipping, and chain-of-custody procedures used at the time of sampling; and control and collection of all field documentation;

- Determine if a sample location must be moved and if so, communicating this decision to the appropriate personnel; and

- Assist with report preparation.

A-4.3.2 Project Field Team Staff

The Project Field Team Staff report directly to the Project Field Team Leader. The responsibilities of the field team include:

Collect samples, conduct field measurements, and decontaminate equipment according to documented procedures stated in the program QAPP and the field Standard Operating Procedures (SOPs);

Verify that field instruments are properly operated, calibrated, and maintained, and that adequate documentation is kept for all instruments;

Collect the required QC samples and thoroughly document QC sample collection;

Ensure that field documentation and data are complete and accurate; and,

Communicate any nonconformance or potential data quality issues to the Project Field Team Leader.

A-4.4 Laboratory Responsibilities

Overall responsibilities and duties of the laboratories include the following:

- Perform sample analyses and follow associated laboratory QA/QC procedures;
- Supply sample containers and shipping cartons;
- Maintain laboratory custody of samples; and,
- Adhere to all protocols in the QAPP/FSP.

A-4.4.1 Laboratory Project Managers

The responsibilities and duties of the Laboratory Project Managers include the following:

- Serve as primary communication link between the project team, sampling personnel, and laboratory technical staff;
- Monitor workloads and ensure availability of resources; and,
- Verify final analytical data prior to transmittal to the Supervising Contractor and Independent Data Validator.

A-4.4.2 Laboratory Quality Assurance Managers

The responsibilities and duties of the Laboratory Quality Assurance Manager (QA Manager) include the following:

- Ensure that laboratory follows the project specific QAPP;
- Oversee the quality assurance aspects of the data;
- Oversee preparation of analytical reports; and
- Supervise in-house chain-of-custody.

A-4.5 Special Training Requirements/Certification

Personnel working on-site and who may potentially come in contact with hazardous waste are required to have 40-hour Hazardous Waste Site (Hazwoper) worker training in accordance with 29 Code of Federal Regulation (CFR) 1910.120. Personnel are also required to be current with their annual 8-hour Hazwoper refresher training in accordance with 29 CFR 1910.120. The Health and Safety Manager is responsible for verifying that all personnel working on site have the required training. A person with Competent Person and Occupational Safety and Health Administration (OSHA) 8-hour Site Supervisor Training will be on Site during the completion of the work.

Individuals involved in the shipment of hazardous materials are required to have Department of Transportation (DOT) Hazardous Materials (Hazmat) shipper training in accordance with 40 CFR 172 Subpart H.

Any individual who has the potential to encounter or handle hazardous materials must have Hazard Communication training in accordance with 29 CFR 1910.1200.

At least one person on each team will be certified in First Aid.

Copies of the certificates for the training required above must be filed on-site for each individual working at the site.

A-4.6 Project Organization Chart

A project organization chart is included as Figure 1 of this QAPP.

TABLE A-1-1

PROJECT ORGANIZATION

Affiliation	Name	Title	Responsibilities	Telephone
USEPA	Pablo Valentin	USEPA Project Coordinator	Section A-4	312-353-2886
USEPA	Richard Byvik	USEPA Quality Assurance Reviewer	Section A-4	312-353-3114
WDNR	Tom Wentland	WDNR Project Manager	Section A-4	920-892-8756
PRS	Ken Aukerman	Project Coordinator	Section A-4	513-489-2793
Foth & Van Dyke	Steve Laszewski	Supervising Contractor	Section A-4	920-496-6823
Petro Environmental, LLC	Steve Carpenter	Remediation Construction Manager	Section A-4	513-489-6789
Foth & Van Dyke	Janis Kesy	Health & Safety Manager	Section A-4	920-496-6819
PRS	Dan Duffy	Engineering and Design Manager	Section A-4	513-489-2793
Foth & Van Dyke	Jim Hutchison	QA Manager	Section A-4	920-496-6813
M.A. Kuehl Co.	Marcia Kuehl	Independent Data Validator	Section A-4	920-469-9113
TBD	TBD	Field Team Leader	Section A-4	TBD
STL Great Lakes (TestAmerica Analytical)	Richard Mannz TBD	Laboratory Project Manager(s)	Section A-4	708-534-5200 1-800-344-5759
STL Great Lakes (TestAmerica Analytical)	Donna McCarthy TBD	Laboratory QA Manager(s)	Section A-4	708-534-5200 1-800-344-5759

TBD – To Be Determined

A-5 Problem Definition/Background Information

This Quality Assurance Project Plan (QAPP) contains detailed quality assurance/quality control (QA/QC) procedures to be utilized for all work activities associated with "treatability, design, compliance, disposal and monitoring samples", including, but not limited to sampling and analysis of sediment, soils, waters (surface and ground), turbidity, air, overburden material (Armored Areas) and de-watered dredged material (DDM) in conjunction with the Upper River Work portion of Sheboygan River and Harbor Superfund Site (Figure 2). This project will be performed by Pollution Risk Services, LLC, (PRS), pursuant to the Consent Decree (lodged on May 7, 2003). In accordance with "EPA Requirements for QAPP's (QA/R-5)" (EPA/240/B-01/003, March 2001) and "Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/600R-98, February 1998), the purpose of this QAPP is to document the planning, implementation, and assessment procedures and how specific QA/QC activities will be applied during the various work activities involved in this project. This QAPP was also prepared in accordance with the Region 5 Instructions on the Preparation of A Superfund Division Quality Assurance Project Plan (June 2000) and demonstrates conformance to Part B requirements of ANSI/ASQC E4-1994.

A-5.1 Overview/Problem Definition

Potential sources of Polychlorinated Bi-phenyl (PCB) contaminated media exist at the Tecumseh Products Company (TPC) Plant Site as identified during previous investigations of the Site. These sources will have an on-going impact to the Sheboygan River if left unmanaged. Additionally, Armored Areas, Near-Shore sediments, Upper River Soft Sediments, and Floodplain soils must be re-characterized to determine the current level of PCB contamination associated with and within the river and provide an estimate of contaminant/sediment removal volumes for effective remedial action.

The overall objective of the monitoring program for the Sheboygan River and Harbor Superfund Site project, as more fully described herein and in the Upper River Statement of Work (URSOW), is to determine whether the investigative, re-characterization, and remedial action objectives as set forth in the CD and URSOW are met, and to monitor the effectiveness of the work described in the CD/URSOW. Individual components of the program seek to provide data on the effectiveness of the investigation and remedial action concerning the Plant Site and Source Materials, re-characterization of Upper River Soft Sediments and Floodplains, excavation, dredging and/or capping operations, installation of a groundwater monitoring/interceptor trench, proper disposal of excavated/dredged materials (i.e., Toxic Substance Control Act (TSCA) vs. non-TSCA material), re-use for stabilization or disposal of overburden material from Armored Areas, and to ensure environmental controls of the system are properly in place (i.e., turbidity and surface water monitoring, air monitoring, and discharge water quality monitoring) during all phases of work.

This QAPP describes necessary QA procedures, QC activities, and other technical activities that will be implemented during the performance of work associated with this project. This plan documents the results of this project's technical planning process, providing in one document a clear, concise, and complete plan for the environmental data collection and its quality objectives. This plan also identifies key project personnel responsible for these activities. It includes QA/QC assessment procedures sufficient for confirming that data of the type and quality needed and expected are obtained for the following major tasks:

- Phase I – Plant Site and Source Materials remedial action.

- Phase II - Upper River Soft Sediments, Armored Areas, Near-Shore Sediments, and Floodplains re-characterization and remedial action.

This QAPP addresses data collection and quality assurance associated with work activities to be performed in the field and laboratory. Two analytical laboratories have been selected to support this project. The laboratories include Severn Trent Laboratories (STL) (Chicago, IL) and Great Lakes (Test America) Analytical (Buffalo Grove, IL). The laboratories' Quality Assurance Program (QAP) Manuals and Standard Operating Procedures (SOPs) associated with the methods of analysis for this project is provided in Appendix A. This documentation addresses the laboratories' analytical methods, laboratory quality control, instrument/equipment testing, maintenance and inspection, instrument/equipment calibration and frequency, laboratory data management, and laboratory data reporting procedures. Table A-5-1 provides a general summary of the various samples to be collected as part of the remedial efforts.

A-5.2 Site Information and Background

The following documents should be referenced for site background information:

- Blasland, Bouck and Lee, Inc. (BBL), *Technical Memorandum – External Source Assessment*, November 1999

- BBL, *Feasibility Study report, Sheboygan River and Harbor Site*, April 1998

- BBL, *Alternative Specific Remedial Investigation (ASRI)*, October 1995

This QAPP is intended to deal with activities associated with the Upper River only. Therefore, additional details of the downstream sections of the Site are not provided.

To achieve proper source control and to avoid potential recurring impacts from the Tecumseh Products Company (TPC) plant site (Plant Site), activities in the Upper River will be phased.

- Phase I will address the TPC Plant Site groundwater, riverbank soils, source materials with significantly elevated polychlorinated biphenyl (PCB) concentrations, and other significant source areas or preferential pathways identified during the previous investigations of the Plant Site.

- Phase II will address the remainder of the Upper River remedial action including Armored Areas (as designated in the final Alternative-Specific Remedial Investigation (ASRI) report (BBL, 1995b)), Near-Shore sediments, Soft Sediments and Floodplains.

Remedial design and remedial action work for the Plant Site and Source Materials (Phase I) will be performed concurrently with design for the Armored Areas, Near-Shore Sediments, Soft Sediments and Floodplains (Phase II). Once USEPA has determined that the Phase I remedial design and remedial action work has been substantially completed, USEPA will send PRS a Notice of Authorization to Proceed with the Phase II and remedial action work.

The project schedule is shown in Figure 3.

TABLE A-5-1

SUMMARY OF DATA TO BE COLLECTED

Sampling for Disposal	**Parameter(s)**	**Approximate Number of Samples**
Soil – PH I & II	PCBs	100
DDM – PH II	PCBs , Percent Solids, Undrained shear strength, Grain size distribution, Laboratory consolidation	62
Groundwater – PH I	PCBs & TSS	10
Decontamination Water/Contact Water – PH I	PCBs & TSS	10
Overburden Material from Armored Areas – PH II	PCBs	14
Sampling for Recharacterization, Confirmation & Verification		
Soil/Sediment – PH I & II	PCBs/Percent Solids	1556
Turbidity – PH II	TSS	240
Discharge Water – Wastewater Treatment Plant – PH II	PCBs & TSS	162
Air Monitoring – PH II	PCBs	25
Sampling for Compliance Monitoring		
Sediment	PCBs	173/event
Groundwater	PCBs	13 – Initial 9 – Semi-annual
Fish Tissue	PCBs	150/event

TSS – Total Suspended Solids
PCBs – Polychlorinated biphenyls

A-6 Project/Task Description

A-6.1 Plant Site and Source Materials Investigation and Control

The remedy for the Plant Site and Source Materials will utilize information from previous investigations and information gathered during the remedial activity to address the Site. Additional groundwater monitoring wells and a groundwater monitoring/interceptor trench (GMIT) will be installed to further define the degree and extent of PCB impacted groundwater at the Plant Site. The wells at the Plant Site may be used to assess hydrogeologic parameters, including horizontal and vertical hydraulic gradients. The monitoring well borings and the trench will be used to further assess the stratigraphy of the subsurface at the Plant Site.

In conjunction with evaluating groundwater to surface water migration, further investigation will be conducted to identify potential PCB sources to the River, including trenching (GMIT installation) and an evaluation of existing sewer lines that may act as preferential pathways for PCB migration. As the sewer lines or discharge conduits are exposed during trenching activity related to the installation of the groundwater monitoring/interceptor trench, portions of the pipe and surrounding impacted bedding materials and soil will be removed. Details of the investigation/remediation activities are presented in the Remedial Design Workplan and the FSP. If PRS determines that there are additional continuing sources of PCBs to the River as a result of these investigations, remaining sources from the Plant Site will be removed and/or controlled.

Long-term monitoring of the Plant Site groundwater will be conducted on a semi-annual basis for the first five years, and then on an appropriate frequency based on the results of the groundwater investigations. If PRS determines that groundwater at the Plant Site is discharging PCBs to the Sheboygan River at levels requiring active remediation, a remedy will be implemented as generally described in the Record of Decision (ROD) to eliminate/control the pathway to the River. This will include pumping and treatment of water from the GMIT as necessary.

A-6.2 Re-characterization and Removal of Soft Sediment in the Upper River

A-6.2.1 Re-characterization and Designation of Soft Sediment Deposits

Remedial design and remedial action work for the Plant Site and Source Materials (Phase I) will be performed concurrently with design for the Soft Sediments and Floodplains (Phase II). The Upper River Soft Sediments will be re-characterized to document the current locations, surface weighted average PCB concentration (SWAC), and PCB mass of the soft sediment deposits. Re-characterization of the soft sediment will consist of sediment probing followed by sediment sampling and analysis. Consistent with the ASRI, (BBL, 1995b), a soft sediment deposit will be defined as an area containing a soft sediment thickness of 1 foot or greater as determined by probing. The lateral extent of the sediment deposits will be determined during recharacterization of the sediments by probing and sampling as described in the Field Sampling Plan. The goal of the remediation is to remove 88% of the remaining PCB mass with an expected outcome of $\leq$ 0.5 parts per million (ppm) SWAC; therefore, sediment deposits that contribute mass, regardless of size, will be removed if necessary, to achieve the remediation goals.

Based on the scope of work, additional considerations of soft sediment deposit removal may include: accessibility of deposits, contributions of particular deposits to mass and SWAC reduction relative to the incremental effort needed to address these deposits, and any other relevant factors raised during recharacterization.

Prior to remediation, PCB mass and SWAC will be recalculated for soft sediment deposits using the same methodology presented in the Feasibility Study (FS) report (BBL, 1998). Re-characterized soft sediment deposits will be located using Global Positioning System (GPS), where technically feasible, in a format acceptable to USEPA, as stated in the URSOW.

Based on the re-characterization, PRS will design a plan for removal of soft sediment deposits that will result in meeting the ROD goals to 88% PCB mass removal in the Upper River and a resulting PCB SWAC in the Upper River of ≤ 0.5 ppm.

A-6.2.2 Sediment Removal

Sediment deposits that have been designated for removal as provided above will be removed by excavating and/or dredging. For clarity and hereafter, dredging shall be defined as the removal of sediments using a dredge or conventional earthwork equipment. Removal of a soft sediment deposit will be deemed complete when 3-4 inches, on average, of residual sediment remains in the deposit as determined by sediment probing after dredging, or after three passes with conventional dredging equipment (or an equivalent level of effort with alternative dredging equipment), whichever goal is achieved first. If USEPA determines that achieving these goals in a particular soft sediment deposit or set of deposits is impracticable or undesirable, USEPA may deem sediment removal complete when more than 3-4 inches of residual material remains in the deposit or fewer than three dredge passes have occurred. In consultation with USEPA, PRS may elect to conduct more than three dredging passes in an attempt to achieve a residual sediment thickness of less than 3-4 inches.

A-6.3 Monitoring Program Components

A brief description of each component of the monitoring program that will be conducted during the applicable phases of the Upper River work is described below.

A-6.3.1 Plant Site Groundwater

Long-term monitoring of the Plant Site groundwater will be conducted on a semi-annual basis for the first five years following source removal, and then on a frequency based on the results of the groundwater monitoring.

A-6.3.2 Evaluation of Sediment Removal

Prior to sediment removal, PRS will define a relationship between PCB mass and sediment volume for each deposit selected for removal based on the re-characterization data. PRS will use this relationship and the post-dredging sediment probing data (residual sediment depth) to track cumulative PCB mass removal as groups of Remedial Management Units (RMUs) are dredged (grouped by access area, construction season, or another appropriate method) consistent with the methodology presented in the VSP.

The SWAC is defined as the surface area-weighted average surficial PCB concentration. To determine the SWAC, PRS will take representative grab samples of residual sediment after dredging has been completed in each RMU area, composite these grab samples, and have the composite sample analyzed to provide the post-dredging SWAC of the deposit consistent with the VSP.

The Upper River SWAC is calculated by first determining surficial PCB concentrations and SWACs for individual sediment RMUs. Samples will be collected at a frequency of 1 composite comprised of 4 randomly grabbed samples, with those RMU probed locations having residual sediment, per 2700 square feet. RMUs where dredging has removed sediment to hardpan or consolidated material will be assigned a value of the detection limit (0.017 ppm) as indicated from Table B-4-2. As determined from *RMU Verification Sampling & Calculation of SWAC, WDNR (1/24/2006)*, RMUs where no recovery of a sample (unconsolidated material) is obtained with 2 attempts using a Ponar will be assigned a value of 0.5 parts per million (ppm). If a sample can be collected anywhere in the RMU, that PCB concentration is used to represent all residual sediment areas in that RMU. The Upper River SWAC is then determined by summing the individual sediment RMU concentrations and dividing by the total surface area of sediment RMU within the Upper River area. Each RMU can be comprised of multiple PCB results, i.e. hardpan (consolidated material), or unconsolidated material where a sample could or could not be collected. PCB concentration values will be multiplied by the surface weighted area adjustment they encompass within that RMU. These areas will be calculated from of the total RMU surface area determined from poling. These steps are summarized below:

1. Determine surficial PCB Concentration (in ppm):

= 0.017 ppm (Hardpan), 0.5 ppm (unconsolidated, no sample), x.x ppm (unconsolidated, sample)

2. Determine Surface Weighted Area Adjustment

= Surface area of RMU / 2700

3. Determine RMU SWAC (in ppm)

= RMU Concentration X Surface Weighted Area Adjustment

<u>Example SWAC Calculation for deposit 29, RMU 1 with hardpan (1000 ft^2) and RMU 2 with unconsolidated material , no sample (1700ft^2)</u>

Sample Number	PCB Conc. (ppm)	x	Surface Weighted Area Adjustment	=	(ppm)
DEP-29-1	0.017	x	0.80	=	0.014
DEP-29-2	0.5	x	<u>0.20</u>	=	<u>0.100</u>
	Total =		1.0		0.114

SWAC (DEP 29) = <u>*0.11 ppm* PCBs</u>

As stated in the ROD, the goals of the soft sediment response action are to remove at least 88% of the PCB mass in the Upper River soft sediment deposits and to achieve an Upper River soft sediment SWAC less than or equal to 0.5 ppm PCBs. As provided for in the CD, PRS may provide information to USEPA, including but not limited to post-dredging data from a significant number of soft sediment deposits addressed under this URSOW, indicating that dredging is not achieving and is unlikely to achieve an average soft sediment SWAC equal to or less than 0.5 ppm PCBs.

A-6.3.3 Monitoring Turbidity During Sediment Removal

Turbidity monitoring will be performed during dredging activities to assess whether dredging activities are significantly contributing solids to the river. Turbidity will be measured in nephelometric turbidity units (NTU's). Turbidity monitoring will be conducted at two or more locations, one upstream and one or more downstream at least every four hours during dredging operations. The upstream and downstream locations will vary as determined by PRS. Monitoring stations will be located to measure potential impacts due to sediment removal activities. Turbidity will be collected directly from the river, and will be measured immediately ex-situ.

A trigger and action level of turbidity will be used to inform the dredging contractor when turbidity due to sediment removal operations is above acceptance criteria. The trigger level for turbidity will be when the total suspended solids (TSS) measured approximately 500 feet downstream of dredging activities is 35 parts per million (mg/l) greater than the background TSS concentration measured 150 feet upstream of the dredging activities. The action level for turbidity will be when the total suspended solids (TSS) measure approximately 500 feet downstream of dredging activities is 70 parts per million greater than the background TSS concentration measured 150 feet upstream. TSS will be correlated to NTUs using a field turbidity meter. Ten (10) surface water samples from the river will be collected and analyzed for NTUs using the field turbidity meter in bench test work prior to the field remedial action implementation. These samples will also be analyzed for TSS and a correlation curve generated. The field reporting of TSS will be then made by measuring turbidity and using the correlation curve for TSS estimates. Specific locations for collection of the samples will be determined in the field during each day of dredging depending on the location of the dredge and downstream dispersion of the sediment. The downstream sample will be collected at the point that appears to have the highest levels of turbidity. The upstream sample will be collected at a point that appears to have the highest levels of turbidity. In the event that there is no noticeable increase in turbidity at the downstream point, the downstream and upstream samples will be collected at a point corresponding to the same distance from the shore where dredging is occurring. The samples will be collected from the river approximately at the midpoint of the water column.

Samples exceeding TSS trigger levels of 35 ppm above background will prompt dredging contractor to implement Best Management Practices (BMP's). Samples exceeding TSS action levels of 70 ppm above background will prompt shutdown of dredging operations to evaluate corrective measures for restarting the process.

A-6.3.4 In River Water Quality Monitoring for PCBs During Dredging

As described in the previous section, if the action level for downstream turbidity is exceeded, then the cause of the exceedance will be addressed. Corrective actions and/or additional sampling requirements will be made on a case-by-case basis by agreement between PRS, the USEPA OSC, and the WDNR. Surface water sampling for PCBs may be conducted, if initial corrective actions are not sufficient to limit turbidity/sediment re-suspension. Surface water samples will collected at locations consistent with turbidity monitoring.

A-6.3.5 Determination of PCBs and Free Liquids for Characterization of Dredged Dewatered and Overburden (Armored Areas) Material

Dredge Dewatered Material (DDM) will be analyzed for PCBs to determine the landfill disposal location (TSCA vs. Non-TSCA). DDM will be placed in geotextile tubes of approximately 1,000 cubic yards (cy) or less. Excavated sediments (Armored Areas and Near-Shore) will be placed in piles of approximately 250 cubic yards (cy). If the PCB concentration of a pile is ≥50 ppm (i.e., TSCA material), the pile will be disposed at an approved out-of-state TSCA waste landfill, or Wisconsin landfill licensed to receive such TSCA waste. If the PCB concentration of a pile is <50 ppm (i.e., non-TSCA material), the pile will be disposed of at an approved in-state or out-of-state landfill.

Each geotextile tube is expected to contain 800 to 1,200 cy of sediment. A single composite of five grab samples will be tested from each geotextile tube, prior to loading out the sediment for transport to the disposal site. The following laboratory test on these composite samples will be completed:

- Analysis for PCB concentration by the analytical laboratory

In addition, all DDM will be field tested for the following parameters at a minimum frequency of one sample every 500 cubic yards for the first 10,000 cubic yards and then at a rate of one sample every 3,000 cubic yards:

1. Percent solids/moisture content (ASTM D2216 or 2974)
2. Undrained shear strength (ASTM D2573 or D4648)

Laboratory testing for grain size distribution (ASTM D4222) and undrained shear strength (ASTM D2850 or D4767) will be performed at a frequency of one per 10,000 cubic yards. In addition, laboratory consolidation test (ASTM D2455) will be performed at a frequency of one per 30,000 cubic yards.

The SOP for DDM sampling is included in the FSP. This SOP describes the materials and equipment required; procedures for collecting samples, containerizing samples, preserving sample, labeling samples and recordkeeping. Table B-1-1 of this QAPP lists the sampling locations, parameters and rationale. Table A-7-2 of this QAPP contains the quality assurance project plan for DDM analysis.

A-6.3.6 Determination of PCBs Overburden (Armored Areas) Material

"Overburden" material is described as rocks cobbles and re-deposited sediment overlaying the sediment deposits in the Armored Areas. "Overburden" material in direct contact with the contaminated sediments will be sampled to determined PCB concentration per location. "Overburden" material with concentration less than the detection limit may be used for bank stabilization. "Overburden" material with concentrations greater than the detection limit will be disposed at an approved off-site facility. "Overburden" material not in direct contact with contaminated sediment will not be sampled and may be used for bank stabilization. "Overburden material with a PCB concentration will be applied to the PCB mass calculation by determination from weight tickets (tons).

A-6.3.7 Approach to Sediment PCB Cleanup Confirmatory Sampling

Confirmatory sampling for total PCBs will be performed to determine whether project goals have been attained. Confirmatory sampling will occur at soft sediment RMUs that have been dredged to target residual sediment depth and after confirmatory QA sediment probing has been performed. A representative grab sample of surficial sediments (i.e., 0-4 inches) from each RMU will be collected and composited for PCB analysis. Details of the sampling procedure are included in the project's Verification Sampling Plan. The results of the analysis will be used to determine the post-removal SWAC for that RMU (see Section A-6.3.2 for SWAC Calculation). A database will be established to track in real time the mass removal and SWAC values as RMUs have been dredged and assess them to the projects overall objectives.

Pursuant to the URSOW, dredging of each deposit area will proceed until any of the following goals are met:

- Removal of a soft sediment deposit will be deemed complete when 3-4 inches (or less), on average, of residual sediment remains in the deposit as determined by sediment probing after dredging, or after three passes with conventional dredging equipment (or an equivalent level of effort with alternative dredging equipment), whichever goal is achieved first.

- If USEPA determines that achieving these goals in a particular soft sediment deposit or set of deposits is impracticable or undesirable, USEPA may deem sediment removal complete when more than 3-4 inches of residual material or more remains in the deposit or fewer than three dredge passes have occurred.

In consultation with USEPA, PRS may elect to conduct more than three dredging passes in an attempt to achieve a residual sediment level of less than 3-4 inches.

A-6.3.8 Discharge Water Quality Monitoring

Water from sediment dewatering and equipment/personnel decontamination operations will be collected and treated on-site as required to meet the effluent discharge limitations prior to discharging to the river. Effluent discharge limitations, if necessary, are anticipated to be monthly averages established under Wis. Adm. Code NR 106.06(6).

Effluent will be sampled at a rate designated by Wisconsin Pollution Discharge Elimination System (WPDES) requirements as needed to comply with effluent discharge limitations.

A-6.3.9 Air Monitoring

Prior to loading out DDM from the site, baseline air monitoring/sampling will be performed at selected points near the dredged material staging area to establish background PCB levels in the air. In addition, sampling at the staging area during DDM load-out will occur for one week to assess airborne PCBs.

Air monitoring will be accomplished using a high-volume sampler. Procedures will be consistent with USEPA Compendium Method TO-4A, Determination of Pesticides and PCBs in ambient air using high-volume polyurethane foam (PUF) sampling followed by gas chromatographic/multi-detector detection (GC/MD). The air sampler will be capable of pulling ambient air through the filter at a flow rate of approximately 8 standard cubic feet per minute (scfm). Samples will be analyzed using gas chromatography with election capture detection (GC/ECD).

The standard operating procedures (SOPs) for air monitoring are included in the FSP. This SOP includes a description of the materials required, procedures for, sampler set-up, operation and maintenance, sample collection, sample containerization and preservation, laboratory analysis and the calculation of concentrations. Air samples will be collected at the staging area. Table B-1-1 of this QAPP lists the sampling location, parameters and rationale.

Table A-7-2 of this QAPP contains the Quality Assurance project plan of PCB air analysis.

A-6.3.10 Post-Remedial Action Monitoring

If performance requirements of the Consent Decree are not met (88% Mass Removal and SWAC of less than or equal to 0.5 ppm), PRS will monitor fish tissue PCB concentrations in the Upper River until consumption advisories for the Upper River, based on PCBs, are lifted by the Wisconsin Department of Health, until fish fillet concentrations of PCBs decrease to the target levels specified in the ROD, or for 30 years, whichever comes first.

PRS will collect adult smallmouth bass, walleye, trout, and catfish, and juvenile white suckers or carp, for PCB analysis. PRS will document in the monitoring report if it was unsuccessful in collecting certain fish species. Fish monitoring will occur annually. The fish monitoring program may be adjusted if it is demonstrated that less frequent sampling still provides the information necessary to track trends.

Details on fish monitoring will be presented in the *Phase II, Operation and Maintenance Plan*. This plan will address the following:

- Where and how the fish to be sampled will be caught;
- How the fish tissue samples will be collected;
- Extraction and sampling methods; and
- QA/QC to be conducted for fish tissue samples.

PRS will also collect and analyze composite surficial soft sediment samples at least once every five years after completion of Upper River remediation to document changes in the PCB SWAC. The soft sediment sampling density will be selected so that each sample analyzed represents an area of approximately 250 square meters (as calculated prior to remediation). In smaller deposits, denser sampling may be performed, with individual samples composited for analysis. After the first monitoring event, USEPA will determine if a representative subset of sediment RMUs can be selected for future monitoring of soft sediment SWAC trends.

PRS will inspect the remediated areas of the floodplains for evidence of erosion on a semi-annual basis for two years following completion of the Upper River Remedial Action. If floodplain soils/river bank areas are remediated through stabilization instead of removal, PRS will inspect such areas annually for two years following completion of the Upper River Remedial Action, and every five years thereafter for 30 years.

An annual monitoring data report will be prepared by PRS and will be submitted to both the WDNR and USEPA. Results will be summarized in tables and may be presented graphically to provide changes over time as necessary.

A-7 Quality Objectives & Criteria for Measurement Data

This section is to be used in conjunction with the FSP and the Remedial Design Work Plan to outline the sampling approach and DQOs for the Upper River Phase I and Phase II investigations and remedial actions.

A-7.1 Data Quality Objectives Process

The Data Quality Objective (DQO) process is a "systematic planning tool based on the Scientific Method for establishing criteria for data quality and for developing data collection designs" (USEPA, 2000). It was developed by the USEPA to accurately describe the type, quantity, and quality of data to be used in decision-making for an investigation or corrective action implementation. DQOs are developed to verify that data of sufficient quantity and quality are collected to satisfy the project objectives. The DQO's for the Sheboygan River and Harbor Superfund Site are developed in accordance with data quality requirements specified in USEPA guidance documents.

The overall objective of the Phase I and Phase II sampling program is to collect representative sediment, groundwater, and soil samples that will characterize the degree and extent of PCB contamination. For the Phase I sampling, media that may act as a source of PCBs to the Sheboygan River will be investigated. For the Phase II sampling, sediments and floodplain soils will be collected to estimate the sediment removal criteria required for remedial action of the River. The data produced from sample analyses must be of acceptable quantity and quality to allow a comparison to action levels established in the URSOW, and to determine whether re-characterization, remedial design, and cleanup objectives in the URSOW are met, as well as to monitor the effectiveness of work described in the CD and URSOW.

This objective will be achieved by controlling sample collection, sample custody, sample analysis, data reporting, analytical data review, and the final data evaluation. Sample collection practices are listed in Section A-6.1 through A-6.3. Custody procedures are discussed in Section B-3.2 of this QAPP. Sample analysis is discussed in Section B-4. Data reporting and the analytical data review process are discussed in Section A-9 and Section D.

The process of establishing DQOs for the Phase I and Phase II investigations and remedial actions follows the USEPA's seven-step process (USEPA, 2000) as presented in Sections A-7.1.1 through A-7.1.7.

A-7.1.1 Problem Statement

Potential sources of PCB contaminated media exist at the TPC Plant Site as identified during previous investigations of the Site. These sources will have an on-going impact to the Sheboygan River if left unmanaged. Additionally, Near-Shore Sediments, Armored Areas, Upper River Soft Sediments, and Floodplain Soils must be assessed to determine the current level of PCB contamination associated with and within the river and to provide an estimate of contaminant/sediment removal volume for effective remedial action.

A-7.1.2 Decision Identification

The Phase I and Phase II investigation data will be used to support the following decisions that are necessary for measuring if the objectives of the CD and ROD are met:

Phase I

- At the TPC Plant Site and surrounding areas, are PCBs present in the environment from the potential sources (i.e., groundwater, riverbank soils, source materials, and other significant source areas)?
- Are PCBs present in these environmental media above project-specific action levels (Table A-7.1)?
- Do the quantities of PCBs indicate a potential risk to human health or the environment?
- What are the migration pathways and transport of contaminants?
- What are the potential remedial alternatives (i.e., Can PCB sources to the Sheboygan River and Harbor system be effectively mitigated to reduce PCB transport to the river?)?
- What remedial action work will be implemented for the plant Site?

Phase II

- Are PCBs present in the Near-Shore Sediments (as designated in the final ASRI report (BBL, 1995b)), Armored Areas, Soft Sediments and Floodplain Soils?
- Do re-characterization results (i.e., relationship between PCB mass and sediment volume for each deposit) confirm planned remedial design criteria?
- Does post-dredging sediment probing data (residual sediment depth) define/track cumulative PCB mass removal as groups of areas are dredged?
- Have field sampling and analytical testing confirmed removal of sufficient PCB mass?
- Are PCB sources to the Sheboygan River and Harbor system being effectively mitigated to reduce PCB transport to and within the river?

Remedial design and remedial action work for the Plant Site and Source Materials (Phase I) will be performed concurrently with design for the Near-Shore Sediments, Armored Areas, Soft Sediments and Floodplains (Phase II). USEPA will send PRS a Notice of Authorization to Proceed with the Phase II remedial design and remedial action work.

A-7.1.3 Decision Input

For Phase I work, the decision will be based on comparison of laboratory analytical data to project-specific action levels. The data will be validated and defensible with sufficiently low detection limits to correspond with project-specific action levels. In general, the soil sampling to identify the extent of

PCBs in environmental media will be done in a representative biased fashion. Biased samples will be collected when there is a strong indication that contamination is present (e.g., stained soil, presence of oil, etc.). For the groundwater investigation, samples will be collected semi-annually for a period of 5 years and thereafter as needed based on collected data. Sample location and potential frequency for the Phase I and II investigations are described in the FSP and VSP.

In addition to laboratory results there are other inputs to the decision including:

- Sample location information,
- Visual characterization of soils,
- Field measurements (if any),
- Physical property results, and
- Project-specific action levels.

A-7.1.4 Investigation Boundaries

The study will be limited to potential source areas within and adjacent to the Plant Site for the Phase I investigation. Media of interest for the Phase I sampling include groundwater, plant source materials, and riverbank soils. Surface and subsurface soil samples may be collected using hand-augers, Geoprobe borings, or conventional auger drilling. Groundwater samples will be collected from existing and new monitoring wells and potentially piezometers for PCBs and other select parameter groups.

Media of interest for the Phase II sampling include Near-Shore Sediments, Armored Areas, Upper River Soft Sediments, and Floodplain Soils. Sediment samples will be collected primarily using a Ponar device. The study boundaries for Phase II are shown on Drawings 3, 4 and 5 in the Phase II Remedial Design Work Plan.

For Phase I sampling, the potential source mediums were evaluated by PRS during the preparation of the remedial design and determined to be areas that are suspected to be impacted, or areas where known contamination exists. Similarly for the Phase II sampling, the sediments and soils are suspected to be impacted.

Initially, monitoring of fish will occur between the months of June – September. During post-remedial action monitoring (e.g. fish tissue analysis), DQOs may be updated to reflect seasonal conditions necessary for accurate sample collection.

Description of practical constraints that may impede sampling during Phase I and Phase II activities will be considered. In Phase I, buildings, utility lines, or process equipment may prevent collection of appropriate samples. Practice constraints that may impede sampling during Phase II will include weather and shore-line accessibility.

A-7.1.5 Decision Rules

PCB-impacted media has been defined as soil, sediment, groundwater, or other material that contain chemical concentrations that exceed relevant cleanup standards and/or action levels. If chemical concentrations within any medium are above associated action levels listed in Table A-7.1, it will be concluded that contamination exists and implementation of remediation measures will be warranted.

A-7.1.6 Limits on Decision Error

The possibility of decision error may occur as a result of sampling design error and/or measurement error. Although the possibility of decision error can never be totally eliminated, it can be minimized and controlled. For this project, sampling and measurement decision errors are to be controlled. The FSP employs a biased sampling scheme that includes assessment of the potential source areas for the Phase I and Phase II activities. The spatial bias of the sampling scheme is discussed in the FSP and the Verification Sampling Plan. Measurement errors are controlled through the use of analytical methods that achieve reporting limits less than the established action levels. The following describes the possible decision errors and potential consequence of each error:

- ***Decision error based on a false positive*** (i.e., the chemical concentration is identified as greater than the action level when in fact it is less than the action level.)

  If this occurs, additional characterization of the environmental media would be conducted when it is warranted. This will incur additional costs and potentially delay the schedule. This error, however, is being minimized by use of standardized test methods for sample analysis at analytical laboratories that have fully-implemented and integrated quality assurance programs

- ***Decision error based on a false negative*** (i.e., the chemical concentration is identified as less than the action levels when in fact it is greater than the action level.)

  If this occurs, additional characterization would not be performed. This error may lead to soil with chemical concentrations greater than the action level left in place. The likelihood of a decision error based on a false negative is minimal for the following reasons:

  - The sampling program is biased toward known or suspected contamination and/or release areas, based on the historical operations at the Site, and where there is the highest probability of encountering contamination.

  - Samples will be collected from various media and locations at the Site to ensure adequate positive-bias sampling of the potential source areas.

  - The use of standardized test methods, and the validation of the results minimize the likelihood of false negatives.

  - The analytical program is designed to be sensitive enough to record chemical concentrations below the project-specific action levels for PCBs.

- Any potential implications associated with this decision error are likely to be mitigated by the verification sampling that will be performed as part of the Phase I and Phase II remedial activities.

A-7.1.7 Decision Optimization

The most cost-effective sampling approach to achieve the objectives of the Phase I investigations is sampling based on historical knowledge of the Site and field-based identification of contamination when encountered (e.g., during groundwater/interceptor trench installation). For Phase II, the sampling approach will be conducted as a single event that will minimize disturbance to the river as well as allow for a single river mobilization resulting in a more efficient and cost effective operation for sediment removal.

The project FSP and Remedial Design Work Plan have been designed to maximize the project objectives and usability of the data. Conditions encountered in the field (e.g., inability to access a sampling location) or during validation, potentially could result in limitations to the data.

A-7.2 Measurement Performance Criteria – Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC)

A-7.2.1 Levels of Data Quality

Three data categories have been defined to address various analytical data uses and the associated QA/QC efforts and methods required to achieve the desired level of quality. These categories, as described in greater detail below, are: screening data, screening data with definitive confirmation, and definitive data.

A-7.2.1.1 Screening Data (Level I)

Screening data afford a quick assessment of site characteristics or conditions. This objective for data quality is applicable to data collection activities that involve rapid, non-rigorous methods of analysis and quality assurance. This objective generally is applied to data that will be used for:

- Determination of the physical and/or chemical properties of samples;
- Evaluation of the relative degree of contamination, and;
- Conduct a preliminary health and safety assessment.

Examples of screening data generated for this project include turbidity data and other field water quality measurements.

A-7.2.1.2 Screening Data with Definitive Confirmation (Level II)

Screening data, used alone, allow rapid identification and quantitation, but the quantitation can be relatively imprecise. In cases where data collection activities require qualitative and/or quantitative verification of a select portion of the qualitative results, screening data with definitive confirmation is the applicable DQO category. This objective can also be used to verify less rigorous methods. An example of screening data with definitive confirmation that could be used is immunoassays to provide a near real-time determination of whether surficial soil concentrations are above or below a threshold concentration. If this technique is employed, it will be used to make a rapid determination whether re-characterization, remedial design, and/or cleanup objectives have been met. A representative number of immunoassay samples will be collected (as determined in the field) from the area in question. Following review of the immunoassay data, definitive determination of the cleanup objective for PCBs would then be conducted by submitting a representative number of samples (10%) for PCB analysis by means of gas chromatography (SW846 Method 8082).

A-7.2.1.3 Definitive Data (Level III)

Definitive data are generated using analytical methods, such as approved USEPA referenced methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Definitive methods produce raw data (e.g., chromatograms) in the form of paper printouts or computer generated electronic files. All offsite laboratory-generated data are characterized as definitive data.

It is possible that all three data categories will be used during this project. Field parameters (e.g., turbidity) will be determined using screening techniques. When immunoassays are used, this will be done using screening data with definitive confirmation. All remaining parameters will be determined using definitive techniques.

A-7.2.2 Precision

Precision is a measure of reproducibility of sample results. To maximize precision, sampling and analytical procedures will be strictly followed. All work performed for re-characterization, remedial design, and cleanup objectives will adhere to established protocols presented in the QAPP, FSP, and VSP. Checks for analytical precision will include the analysis of matrix spike (MS), matrix spike duplicates (MSD), laboratory duplicates, and field duplicates. Duplicate field measurements will be collected to check field measurement precision.

A-7.2.2.1 Field Precision Objectives

Field precision is difficult to quantify due to temporal and spatial variations in field parameters. Experienced field personnel, properly calibrated field meters, and adherence to established protocols will aid in controlling precision of field measurements. Field duplicates (i.e., collecting two aliquots of a single sample or composite) will be used to assess precision for the entire measurement system including sample handling, shipping, storage, preparation, and analysis. The frequency and estimated number of duplicates is summarized in Table A-7-2. Field precision objectives are presented in Table A-7-3.

A-7.2.2.2 Laboratory Precision Objectives

Matrix spike/matrix spike duplicates (MS/MSDs) will be used to measure the precision and accuracy of organic analyte recovery from the sample matrices. For PCBs, MS/MSD pairs will be analyzed at a five percent frequency (one for every 20 samples, see Table A-7-2).

Laboratory precision objectives are presented in Table A-7-4. When matrix spike recoveries are outside QC limits, associated control sample and surrogate spike recoveries will be evaluated, as applicable, to attempt to verify the reason for the deviation and determine the effect on reported sample results.

A-7.2.2.3 Assessing Precision

Precision is the degree of agreement among repeated measurements of the same characteristic (analyte, parameter, etc.) under the same or similar conditions. Precision data indicate how consistent and reproducible the field sampling or analytical procedures have been. Comparing field and laboratory precision will help to identify sources of imprecision if a problem exists.

Duplicate precision is evaluated by calculating a Relative Percent Difference (RPD) using the following equation (the smaller RPD; the greater the precision):

$$RPD = S - D/((S + D)/2) \times 100$$

Where: S = First sample value (original or matrix spike value);
D = Second sample value (duplicate or matrix spike duplicate value)

A-7.2.3 Accuracy

Accuracy is the extent of agreement between an observed value (sample results) and the accepted, or true, value of the parameter being measured. Analyte accuracy can be evaluated using different types of QC samples. For example, a Standard Reference Material (SRM) or Laboratory Control Sample (LCS), containing a known concentration of analyte(s) provide information about how accurately the laboratory (analysts, equipment, reagents, etc.) can analyze for a specific analyte(s) using a selected method. The laboratory and method accuracy are calculated as a percentage using the following equation (the higher the value, the greater the accuracy):

$$\text{Accuracy} = \frac{\text{Measured Value}}{\text{True Value}} \times 100$$

Because environmental samples contain interferences (i.e., other compounds that may interfere with the analysis of specific analyte) the accuracy for a specific analyte should be evaluated in relation to the sample matrix. This is done by analyzing matrix spike samples. A known concentration of analyte is added to an aliquot of the sample. The difference between the concentration of analyte in the unspiked sample and the concentration of the analyte in the spiked sample should be equal to the concentration of the analyte that was spiked into the sample. The spike recovery is calculated in percentage using the following equation:

$$\%\ \text{Recovery Accuracy} = \frac{\text{Spiked Sample Conc.-Unspiked Sample Conc.}}{\text{Spiked Concentration added}} \times 100$$

This formula uses an assumption of constant accuracy between the original and spiked measurements. Accuracy objectives for matrix spike, surrogate, and laboratory control sample recoveries are identified in Table A-7-4.

A-7.2.3.1 Field Accuracy Objectives

The analytical laboratories will supply certified-clean sample containers (I-Chem 300 Series or equivalent). Certificates of analysis will be filed in the project file.

Rinse blanks will be used to monitor cleanliness of sampling equipment and the effectiveness of cleaning procedures. Rinse blanks will be prepared by filling sample containers with distilled water that has been routed through a cleaned sampling device. When dedicated sampling devices or sample containers are used to collect samples, rinse blanks will not be necessary. Table A-7-2 summarizes the frequency and estimated number of rinse blanks that will need to be collected during this project. Field accuracy objectives are presented in Table A-7-3.

A-7.2.3.2 Laboratory Accuracy Objectives

<u>Method Blanks</u>

Sources of contamination in the analytical process must be identified, isolated, and corrected. Method blanks are useful in identifying possible sources of contamination within analytical processes. For this reason, it is necessary that method blanks are initiated at the beginning of the analytical process and encompass all aspects of analytical work. Method blanks will assist in accounting for any potential contamination attributable to glassware, reagents, instrumentation, or other sources that could affect sample analysis. One method blank will be analyzed with each analytical batch of no more than 20 samples. The data quality objectives for PCBs are for the method blank concentrations to be below detection limits.

<u>Surrogate Spikes</u>

Surrogates are compounds that are unlikely to occur under natural conditions and have properties similar to the analytes of interest and are generally used for organic samples analyzed by gas chromatographic (GC) methods. Surrogates are added to samples prior to extraction. Surrogate spikes are utilized to provide broader insight into the proficiency and efficiency of analytical methods on a sample-specific basis.

If surrogate spikes recoveries exceed specified QC limits (Table A-7-4) and sufficient sampling material is present, analytical results need to be evaluated thoroughly in conjunction with other control measures. In the absence of other control measures (i.e., matrix spikes), the integrity of the data may not be verifiable, and reanalysis of samples may be necessary. Corrective action based on surrogate results will be performed in accordance with the guidance in the National Functional Guidelines (USEPA, 1999) and data validation protocols described in Section D.

Surrogate spike compounds will be selected utilizing guidance provided in analytical methods, such that spiking levels will be in the expected range of concentrations in samples and within the calibration ranges of the analytical instruments. For this project, sample results will not be corrected based on surrogate recoveries.

Calibration Standards

Calibration check standards analyzed within a particular analytical series provide data regarding instrument stability. Calibration check standards will be analyzed at the beginning and end of each analytical batch, and periodically throughout a batch containing a large number of samples.

Calibration requirements and criteria are summarized in Section B-7. For analyses where internal standards are used, a calibration check standard will only be analyzed in the beginning of an analytical batch. Note: Not applicable to PCB analysis by GC. If results of calibration check standards exceed specified tolerances, all positive samples analyzed since the acceptable calibration check standard will be reanalyzed. Note: if a check standard is high, but all samples analyzed prior to the check are below the reporting limit (or non-detected), reanalysis is not necessary. The high check standard indicates a high bias that may be present, but the samples are not positive even with the bias therefore reanalysis is unnecessary. If a check standard is below the acceptable range, reanalysis is necessary.

Laboratory instrumentation calibration standards will be selected utilizing the guidance provided in the analytical methods.

A-7.2.4 Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions and is dependent on sampling and variability of environmental media at the site. Representativeness is a qualitative "measure" of data quality.

A-7.2.4.1 Field Considerations to Ensure Representative Data

The goal of achieving representative data starts with a properly designed and executed sampling plan that carefully considers the overall data quality objectives for the project. Proper location controls and sample handling are critical to obtaining representative samples.

A-7.2.4.1 Laboratory Considerations to Ensure Representative Data

The goal of achieving representative data in the laboratory is measured by assessing accuracy and precision. A laboratory will provide representative data when all of the analytical systems are in control and most importantly when the sample provided represents the field constituents. Therefore, representativeness is a redundant DQO for laboratory systems if proper analytical procedures are followed and holding times are met.

A-7.2.5 Comparability

Data comparability is a qualitative "measure" of the degree of confidence with which one data set can be compared to another.

A-7.2.5.1 Field Considerations to Ensure Comparable Data

The goal of achieving comparable data starts with a properly designed and executed sampling program that carefully considers the overall data quality objectives for the project. Proper location controls and sample handling are critical to obtaining comparable samples.

A-7.2.5.2 Laboratory Considerations to Ensure Comparable Data

The goal of achieving comparable data in the laboratory is measured by assessing accuracy and precision. A laboratory will provide comparable data if proper analytical procedures are followed and holding times are met.

Note: As previously noted in the section on check standards, an out of control (high check standard) system may still provide comparable data.

A-7.2.6 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an investigation compared to the total amount that was obtained and is completed upon final assessment of the analytical results.

The completeness of a field or laboratory data set will be calculated by comparing the number of valid sample results (as determined by the Data Validator and Project Team) generated to the total number of results generated such that:

% Completeness = (Number of Valid Results)/(Total number of results generated) x 100

Professional judgment will be used to assess completeness and to determine data usability for its intended purposes. Project completeness is expected to be at least 90 percent.

Should project data completeness not meet the 90 percent goal, PRS will have the laboratory perform additional QC and/or re-analyze samples as necessary. Should the laboratory not be able to resolve the issues through additional QC and re-analyzing samples, additional samples may be collected (if possible).

Table A-7-1
Project Specific Action Levels for PCB
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Removal Area	PCB Cleanup Level (ppm)	Comments
Preferential Pathways	Surface (0 to 1 foot) = ≤1 ppm Subsurface (Riverbank = ≤10) (Source Area = NA)	This includes bedding material and significant source material around underground pipes and utilities that are bisected by the groundwater monitoring/interceptor trench (GMIT), and any impacted material adjacent to the outfall on the river side of the GMIT. A bentonite plug shall be placed around pipes on the facility side of the GMIT to mitigate potential for future migration.
Source Materials	Surface (0 to 1 foot) = ≤1 ppm Subsurface Not Relevant	Potential erosion/runoff addressed by cleaning upper foot of soil. Impacted soils at depth will be contained by GMIT. Any potential groundwater impacts will be monitored by GMIT and downgradient wells.
River bank Soils	Surface (0 to 1 foot) = ≤1 ppm Subsurface = ≤10 ppm	Potential erosion/runoff addressed by cleaning upper foot of soil. Subsurface soils will be cleaned to the established floodplain soil cleanup level from the GMIT to the river.
Near-Shore Sediment	NA	Near-Shore Sediments were originally a Phase I activity but were deferred to Phase II so that only one river mobilization would be required. Near-Shore sediments will not be included as part of mass removal and SWAC calculations.
Soft Sediment Deposits	A minimum of 88 percent of the remaining PCB mass in the soft sediment deposits will be removed to remove mobile mass and achieve a soft sediment surface weighted average concentration (SWAC) in the Upper River of less than or equal to 0.5 ppm for PCB.	As per ROD (page 61)
Armored Sediment Area No. 1	A minimum of 88 percent of the remaining PCB mass in the soft sediment deposits will be removed to remove mobile mass and achieve a soft sediment surface weighted average concentration (SWAC) in the Upper River of less than or equal to 0.5 ppm for PCB.	As per ROD (page 61)
Flood Plain Soils	≤10 ppm	As per ROD (page 80)

NA = Not Applicable

Table A-7-2
Environmental and Quality Control Analyses
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Parameters	Approx No. of samples[1]	Field QC Analyses						Laboratory QC Sample						Estimated Total
		Rinse Blanks		Field Blanks		Field Dup		Matrix Spike		Matrix Spike Dup		Lab Blank		
		Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	
Groundwater/Surface Water/Turbidity/Air/Discharge Water[3]														
PCBs – (Aroclor) Groundwater	22	1/20	2	1/20	2	1/10	2	1/20	2	1/20	2	1/20	2	12
Surface Water	20	1/20	1	1/20	1	1/10	2	1/20	1	1/20	1	1/20/	1	7
Turbidity	240	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	-
PCBs – (Aroclor) Air	20	NA	-	NA	-	1/10	2	-	NA	-	NA	1/20	1	5
PCBs - (Aroclor) Discharge Water	120	1/20	6	1/20	6	1/10	12	1/20	6	1/20	6	1/20	6	42
TSS Discharge Water	120	NA	-	1/20	6	1/10	12	NA	-	NA	-	1/20	6	24
Soil/Sediment/DDM/Overburden (Armored Areas)														
PCBs (Aroclor) Soils/Sediment	1150	1/20	58	1/20	58	1/10	116	1/20	58	1/20	58	1/20	58	406
Percent Solids Soils/Sediment	1150	1/20	58	1/20	58	1/10	116	1/20	58	1/20	58	1/20	58	406
PCBs (Aroclor) DDM	40	NA[2]	-	1/20	2	1/10	4	1/20	2	1/20	2	1/20	2	12
Percent Solids, Unconfined compressive strength, or Undrained shear strength DDM	30	NA	-	NA	-	1/10	3	NA	-	NA	-	NA	-	3
PCBs (Aroclor) Overburden	9	1/20	1	1/20	1	1/10	1	1/20	1	1/20	1	1/20	1	6

[1] The actual number of samples collected and analyzed may be modified during project implementation.
[2] Rinse blanks not applicable to DDM (disposal)
[3] If possible, two 1- Liter bottles will be collected for each sampling location in case re-analysis is required. Additional sample volume will be required for field duplicate and MS/MSD samples.

NA = Not analyzed.

TSS = Total suspended solids

Table A-7-3
Field Measurement Accuracy and Precision Control Limits
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Field Parameter	Matrix	Sensitivity	Accuracy[1]	Precision[2]
Temperature (ºC)	Water	1° C	NA	< 20%
pH (s.u.)	Water	0.1 pH units	± 0.2 s.u.	± 0.5 s.u.
Specific Conductance (umho)	Water	10 umho units	± 1 % of scale	≤ 10%
Turbidity (NTU)	Water	0.1 NTU	± 5 %	≤ 10%
Dissolved Oxygen	Water	0.2 mg/L	NA	≤20%
Redox Potential (mV)	Water		± 10 mV	
Percent Solids	DDM	NA	NA	≤20%
Undrained shear strength	DDM	NA	NA	≤20%

NTU Nephelometric turbidity units
RPD Relative percent difference
mg/L Milligrams per liter
mV Millivolts
s.u. Standard Units
umho micromhos
NA not applicable
ºC degrees Celsius
DDM Dewatered Dredged Material

[1] Accuracy will be determined using available standards for pH, conductivity and turbidity. Not applicable for temperature, dissolved oxygen, or redox potential.
[2] Duplicate samples will be collected at a frequency of one QC sample for every twenty project samples

Table A-7-4

Laboratory Measurement Accuracy and Precision Control Limits
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Parameter	ACCURACY - % RECOVERY			Precision – RPD	
	MS/MSD [1]	LCS	Surrogate	MS/MSD	Duplicate
Soil/Sediment/DDM/Overburden Material (Armored Areas)					
PCBs	STL AR1016: 60-112 AR1242: 50-150 AR1254: 50-150 AR1260: 64-119	STL AR1016: 60-112 AR1242: 50-150 AR1254: 50-150 AR1260: 64-119	STL 40-116 (TCX); 24-129 (DCBP)	STL ≤50	STL ≤30
	Great Lakes AR1016: 10-110 AR1242: 50-150 AR1254: 50-150 AR1260: 10-110	Great Lakes AR1016: 17.8 - 110 AR1242: 50-150 AR1254: 50-150 AR1260:15-110	Great Lakes 10-110 (TCX); 10-110 (DCP)	Great Lakes AR1016: ≤60.9 AR1242: <50 AR1254: <50 AR1260: ≤55.2	Great Lakes ≤50
Percent Solids	NA	NA	NA	NA	≤20
Undrained Shear Strength	NA	NA	NA	NA	≤20
Grain Size Distribution	NA	NA	NA	NA	≤20
Laboratory Consolidation	NA	NA	NA	NA	≤20
Water					
PCBs	STL AR1016: 62-104 AR1242: 50-150 AR1254: 50-150 AR1260: 69-105	STL AR1016: 62-104 AR1242: 50-150 AR1254: 50-150 AR1260: 69-105	STL 33-111 (TCX); 20-116 (DCBP)	STL ≤30	STL ≤20
	Great Lakes AR 1016:10-151 AR1242: 50-150 AR1254: 50-150 AR 1260:10-124	Great Lakes AR 1016:13.6 - 110 AR1242: 50-150 AR1254: 50-150 AR 1260:18.7-110	Great Lakes 10-110 (TCX); 10-110 (DCP)	Great Lakes AR1016:≤71.2 AR1260:≤64.6	Great Lakes ≤50

TSS	STL 75-125	STL 80-120	NA	STL ≤20	STL ≤20
	Great Lakes NA	Great Lakes 75-125	NA	Great Lakes NA	Great Lakes ≤20
Turbidity	NA	± 5 %	NA	NA	≤20
Air					
PCBs	NA[2]	NA[2]	NA[2]	NA[2]	NA[2]

[1] Matrix spike samples will be spiked with Aroclors 1242 and 1254 at 5 ppb for water samples and a pre-determine amount for soil, sediment and DDM samples. The laboratory will provide the concentration of the spike to PRS prior to the initiation of sampling. PRS will provide this information to the USEPA shortly thereafter.

[2] Quality Assurance analysis is not possible on NIOSH Method 5503 as the process would destroy the sample or invalidate the results. NIOSH has determined that precision is 4% but the accuracy has not been determined.

TCX/DCBP	Surrogates for PCB analysis.
MS/MSD	Matrix spike/Matrix spike duplicate.
RPD	Relative Percent Difference.
NA	Not analyzed
LCS	Laboratory Control Sample

A-8 Special Training Requirements/Certification

Personnel working on-site and who may potentially come in contact with hazardous waste are required to have 40-hour Hazardous Waste Site (Hazwoper) worker training in accordance with 29 Code of Federal Regulation (CFR) 1910.120. Personnel are also required to be current with their annual 8-hour Hazwoper refresher training in accordance with 29 CFR 1910.120. The Health and Safety Manager is responsible for ensuring that all personnel working on site have the required training. A person with Competent Person and Occupational Safety and Health Administration (OSHA) 8-hour Site Supervisor Training will be on Site during the completion of the work.

Individuals involved in the shipment of hazardous materials are required to have Department of Transportation (DOT) Hazardous Materials (Hazmat) shipper training in accordance with 40 CFR172 Subpart H.

Any individual who has the potential to encounter or handle hazardous materials must have Hazard Communication training in accordance with 29 CFR 1910.1200.

At least one person on each team will be certified in First Aid.

Copies of the certificates for the training required above must be filed on-site for each individual working at the site.

A-9 Documentation Records

A-9.1 Documents Generated for All Aspects of Project

A-9.1.1 Field Documentation and Reporting

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and sample chain-of-custody. This documentation constitutes a record that allows reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the fieldwork will be retained in the project file.

Level I – Minimal Reporting: Minimal or "results only" reporting is used for analyses which, either due to their nature (i.e., field monitoring) or the intended data use (i.e., preliminary screening), do not generate or require extensive supporting documentation.

Level II – Limited Reporting: Limited reporting is used for analyses that are performed following standard USEPA-approved methods and QA/QC protocols. A laboratory report for Level II analyses, will contain the sample log-in information (to assess sample condition), the associated laboratory batch QC (to evaluate dataset quality), and a laboratory case narrative (to document the laboratory's QC evaluation of the dataset). Full supporting documentation is not required for Limited Reporting.

Level III – Full Reporting: Full reporting is used for those analyses that, based on the intended data use, require complete supporting documentation from the laboratory so that the data can be assessed for defensibility.

All levels of data are expected to be generated during this Project. The investigation objectives and reporting levels are summarized in Table A-9-1.

A-9.1.1.1 Field Data Reporting

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field logbooks, data sheets, and/or forms and then entered into an electronic data log. Data will be reviewed by the Supervising Contractor for adherence to this QAPP and consistency of data. Any concerns identified as a result of this review will be discussed with the QA Manager and Project Coordinator, corrected if possible and incorporated into the data evaluation process.

Field data calculations, transfers, and interpretations will be conducted by the field crew and reviewed for accuracy by the appropriate contractor. The appropriate team member will review field documentation, data reduction, and accuracy of data entries into the data log. The data logs and documents will be checked for:

- General completeness;
- Readability;
- Usage of appropriate procedures and modifications to sampling procedures are clearly stated;

- Appropriate instrument calibration and maintenance records (as appropriate);
- Reasonability of data collected;
- Correctness of sample locations; and
- Correctness of reporting units, calculations, and interpretations.

Where appropriate, field data forms and calculations will be processed and included in appendices to the appropriate report. Original field logs, documents, and data reductions will be kept in the project file.

A-9.1.1.2 Field Reports

To assist in the timely preparation of monthly project progress reports, a summary of all data-related activities will be prepared by the Project Team on an approximated needs basis. This summary will include, for the specified period:

Number, location, medium, and purpose of all samples collected;

Number of data packages received from each analytical laboratory, analyses performed on samples in each data package, and the identity of the samples in each data package; and

Changes in the status of data packages received (i.e., validation begun, validation completed, database update completed).

This information will be summarized in narrative or tabular form, as appropriate, for inclusion in progress reports.

A-9.1.2 Laboratory Data Reporting

Calculations to be used for data reduction are specified in each of the analytical methods referenced.

Calculations for organic analyses (PCBs) are based on regression analysis of calibration curves. Quantitation is performed using external (Aroclors) standards. Regression analysis is used to fit a curve through calibration standard data. Sample concentrations are calculated using the resulting regression equations.

Raw data will be stored electronically and a hard copy file will be maintained. Laboratory data entered will be sufficient to document information used to arrive at reported values.

Electronic data storage will be utilized when possible. All electronic data will be maintained in a manner that prevents inadvertent loss, corruption, and inappropriate alteration.

Raw data will be examined to assess compliance with quality control guidelines. Surrogate, matrix spike, and QC check sample recoveries will be checked. In addition, samples and lab blanks will be checked for possible contamination or interferences. Chromatograms and concentrations will be checked to ensure that sample results are within the calibration range; if necessary, dilutions will be performed as defined by the initial calibration range.

Any deviations from guidelines will call for corrective action. Deviations caused by factors outside the laboratory's control, such as matrix interference, will be noted with an explanation in the report. Calculations will be checked and the report reviewed for errors and oversights.

Upon completion, a report will be reviewed for discrepancies, errors, or omissions. Data will then be submitted to the Laboratory Project Manager for review and approval. The Laboratory PM will review the package and see that any necessary corrections are made. A copy of the data package will be filed in the project file. Mailed data packages, along with applicable electronic data deliverables, will be sealed in an appropriate shipping container with a custody seal and logged into a document mailing log.

Data reports for all parameters will include, at a minimum, the following items:

Narrative: Summary of activities that took place during the course of sample analysis, including the following information:

- Laboratory name and address;
- Date of sample receipt;
- Cross reference of laboratory identification number to contractor sample identification;
- Analytical methods used;
- Deviations from specified protocol; and
- Corrective actions taken.

Included with the test report are any sample handling documents, including field and internal COC forms and air bills or bills of lading from couriers.

Analytical Results: The following information, as applicable, will be reported with the results:

- Sample identification (ID);
- Laboratory ID;
- Date of collection;
- Date of receipt;
- Date of extraction or preparation;
- Date of analysis;
- Reporting units; and
- Detection limits.

Sample results on the report forms will be corrected for dilutions. Sample results will be reported on a dry weight basis. Sample results will be reported uncorrected for blank contamination.

Data reports for all PCB results will be expanded to include all supporting documentation necessary to evaluate the accuracy of the data. This additional documentation for PCBs includes, but is not limited to, all raw data required to recalculate any results, including printouts and manual peak integrations, chromatograms, and quantitation reports. The report also will include: standards used in calibration and calculation of analytical results; documentation of document response factors (including calibration curve regression analysis); sample extraction and other preparation logs; standard preparation logs; instrument run logs; and moisture content calculations.

A-9.1.3 Laboratory Reports

Laboratories will prepare project status summaries at a frequency specified by the Project Coordinator. Project status summaries will list:

- Number, medium, sample parameters, and sample ID of all samples received during the bi-weekly period;

- Sample names and laboratory ID for all samples which have pending analyses, and the status and estimated completion date for those samples; and

- Sample names and laboratory ID of all sample data packages sent during the bi-weekly period.

PCB Analysis by SW-846 Method: 8082 Reporting Requirements

Soil, sediment, overburden material, and DDM samples will be analyzed for PCBs using SW-846 Methods 3540 (soxhlet preparation) and Method 8082 (definitive analysis). Water samples will be extracted using liquid-liquid extraction (e.g., SW-846 3500 Series or another approved method), cleaned up (if necessary), and analyzed for Aroclor PCBs using SW-846 Method 8082. Air samples will be analyzed for Aroclor PCBs using National Institute for Occupation Safety and Health (NIOSH) Method 5503. Results will be accompanied by the following supporting documentation for Level III data:

- COC forms, including documentation of internal;

- Current method detection limits (MDLs) and how determined, results of initial method validation;

- Copies of lab analyst notebook pages and/or instrument logs relating to sample prep, initial and continuing standard preparation and source, matrix spike and surrogate standard source and preparation and injection sequence;

- Example of how reported results can be calculated from GC/ECD data system printout; and

- Explanation of any data qualifiers used by laboratory.

<u>GC/ECD Calibration</u>:

- Concentrations/source and date prepared for standards used for initial calibration and applicability;
- Chromatograms and data system printouts for initial and continuing calibration;
- Calculation of continuing calibration response and deviation from expected response, limits used to define acceptable calibration;
- Retention time window criteria used for acceptable Aroclor peak identification; and
- Criteria used for Aroclor identification (number of peaks that must match, magnitude of peak responses/ratios).

<u>Sample Analysis</u>:

- Chromatograms and data system printouts for all samples, lab blanks, QC check samples and lab QC (duplicates, spikes);
- Surrogate spike recovery and example of how recoveries are calculated from GC/EC system printout information; and
- Confirmation column chromatograms and data system printouts, if necessary.

<u>QC Sample Analysis</u>:

- QC check standard chromatogram, data system printout and recovery calculations, limits used for assessment;
- MS/MSD and/or lab duplicate chromatograms, data system printouts and calculations of recovery and RPD limits used for assessment;
- Lab blank chromatograms, data system printouts and limits used for assessment; and
- Surrogate recovery limits and how established.

Discharge Water Quality Monitoring Reporting

Discharge water may be analyzed for parameters such as pH, PCBs, and TSS (as well as other parameters), as required. A summary of all monitored parameters will be included in the monthly report.

Surface Water Quality Monitoring Reporting

Surface water may be analyzed for parameters such as turbidity, PCBs, and TSS (as well as other parameters), as required. A summary of all monitored parameters will be included in the monthly report.

Air Quality Monitoring Reporting

Air may be analyzed for parameters such as PCBs (as well as other parameters), as required. A summary of all monitored parameters will be included in the monthly report.

A-9.2 Data Reporting Format and Documentation Control

Reporting requirements as more fully described in the CD and URSOW are summarized below:

1. Monthly progress reports submitted to the USEPA Project Coordinator, including the following information:

   a. Activities conducted during the period.
   b. Problems encountered during the period.
   c. Schedule variances and corrective actions (if necessary).
   d. Projected activities for the next period.

2. Completion of remedial action report:

   a. To be submitted to USEPA Project Coordinator within 60 days after PRS concludes that the final phase of the Upper River Remedial Action has been fully performed.

3. Completion of work report:

   a. To be submitted to USEPA Project Coordinator within 90 days after PRS concludes that all phases of the Upper River Work have been fully performed.

A-9.3 Records Keeping

Project documentation will be placed in a single, secured project file in a location to be determined by PRS, which will be maintained by the Project Team. This file will consist of the following components, all filed chronologically:

- Agreements;
- Correspondence;
- Memos;
- Notes and Data; and
- News Clippings.

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation, field records (e.g. waste manifests), photographs and field data will be filed with notes and data. Filed materials may only be removed by authorized personnel on a temporary basis. The date removed and the name of the person removing the file will be recorded.

In accordance with the CD, all project documents and records, including those of PRS and PRS' contractors and agents, must be maintained for a period of 10 years following receipt of Certification of Completion of the Upper River work.

Table A-9-1
Data Reporting Levels
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

DATA TYPE	Investigation Objectives	Reporting Level[1.)]
Soil/Sediment/DDM/Overburden Material (Armored Areas)		
PCBs – Aroclors	Define extent and mass of PCBs for balance calculations	III
	Define lateral and vertical extent of PCB contamination for design	II & III
Percent Solids	Evaluate physical characteristics of media. Used in the calculation of PCB mass on a dry weight basis.	I
Undrained shear strength, grain size distribution, laboratory consolidation	Evaluate physical characteristics of media.	I
Water		
PCBs – Aroclors	Determine PCB concentrations and assess potential transport of PCBs.	III
Total Suspended Solids	Assess potential transport of PCBs contained on suspended sediments.	III
Turbidity	Characterize general water quality.	I
Temperature, pH, Specific Conductance, Dissolved Oxygen, and Oxidation/Reduction Potential	Characterize general water quality.	I
Air		
PCBs – Aroclors	Determine PCB concentrations and assess potential health and safety impact to on-site workers.	I

Notes:
[1.)] Refer to Section A-9.1 of this QAPP for a description of the reporting levels

B-1 Sampling Process Design

The FSP of the Upper River RD Work Plan contains information pertaining to the frequency of sampling and procedures to be performed for carrying out the investigative and remedial design work required by the URSOW for the Upper River. The procedures will be implemented by PRS' selected Contractor responsible for collecting samples at the correct intervals, appropriately labeling the samples and completing the chain-of-custody, and sending the samples to an approved laboratory for analysis. A summary of sample location parameters and rationale can be found in Table B-1-1.

Table B-1-1
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Upper River Soft Sediments – Recharacterization	Upper River Soft Sediments - Verification
Sample Location	Recharacterization will include probing along transects parallel to the river on the left and right sides of the river. A minimum of two transects spaced approximately 20 feet apart will be established along each side of the river. Probe measurements will be taken approximately every 30 feet along each transect. Sediment deposits greater than 1 foot in thickness will be sampled at four random locations and composited at a rate of one sample per 100 cubic yards. A minimum of one composite sample will be collected per deposit.	Verification will include: A maximum of four transects (depending on area) spaced approximately 12.5 feet apart will be established along the riverbank within the sediment portion located in an RMU. Probe measurements will be taken approximately every 12.5 feet along each transect. Resulting probe measurements will be averaged to provide a single thickness for that RMU. Sediment samples will be collected at a rate of four grab samples per 2700 square feet in each of the remediated sediment RMUs and composited into a single sample. Sampling will be collected from those locations determined to have sediment present after probing. If a sample is not obtained from a potential location attempts will be made at other RMU locations where sediment is present. If less than four grab samples are able to be collected, then the samples collected will be used to develop the sampled obtained SWAC component of an RMU. If hardpan or consolidated material is determined by probing, a value of the detection limit (0.017 ppm) will be assigned to this location and used in the SWAC calculations as it relates to the percentage of area within that RMU. Soft sediment or consolidated material that cannot be collected after 2 unsuccessful attempts with a Petite Ponar dredge will be assigned a value 0.5 ppm as determined from the *RMU Verification Sampling & Calculation of SWAC* provided by the WDNR on 1/24/2006 and used in the SWAC calculations as it relates to the percentage of area within that RMU. If a sample can be collected anywhere in the RMU, that PCB concentration is used to represent all residual sediment areas in that RMU.
Estimated Number of Laboratory Samples & Media	428 Sediment Samples	225 Composite Sediment Samples

Analytical Parameters	PCB	PCB
Rationale	Recharacterization sampling is designed to identify the location of existing soft sediment deposits, determine the volume of existing sediment deposits, and calculate the PCB mass in each deposit and the entire Upper River.	Verification probing and sampling is designed to confirm mass removal of soft sediment and calculate the surface weighted average concentration of remaining sediments.
Estimated Number of Field Samples & Media	5237 probe locations; 428 Individual Sediment Samples	2960 individual probe locations; 740 Individual Sediment Samples
Field Parameters	The location of each probing point will be identified using GPS. Sediment thickness will be determined by inserting probe to the top of the sediment, recording the depth to the top of the sediment, pushing probe to refusal (assumed to be base of sediments) and recording the measurement. Samples will be described in the field with respect to color, consistency, relative grain size, visible sheens, and odors.	Sediment will be described in the field with respect to color, odor, and staining. Sediment thickness average for 2700 square feet will be calculated
Rationale	Information will be used to determine location and volume of sediment deposits. Information will further be used to calculate PCB mass in sediments	Information will be used in conjunction with PCB concentration to calculate mass removal and SWAC.

Table B-1-1 (continued)
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Floodplain Soils – Recharacterization	Floodplain Soils –Verification[1]
Sample Location	Soil samples will be collected at nodes of a triangular-shaped grid pattern designed by Visual Sample Plan software in each floodplain area. Each grid node is spaced approximately 96 feet apart. Soil samples will be collected at continuous intervals to the depth of the water table (assumed to be 2.5 feet below ground surface). Individual samples will be collected from 0.0-0.5 feet, 0.5-1.5 feet, and 1.5-2.5 feet, etc.	Delineation sampling will be performed to define the vertical/lateral extents of remediation. Post-removal verification sampling will be conducted on excavated grids > 10 ppm. Soil sample(s) will be collected from the floor and sidewall of each non-adjacent grid. For sample quantity estimates only, it is assumed that 25% of the grid nodes will require remediation.
Estimated Number of Laboratory Samples & Media	234 Individual Soil Samples	240 Individual Soil Samples
Analytical Parameters	PCB	PCB
Rationale	Sampling will identify hot spot soils with PCB concentrations exceeding 10 ppm that have a 50-foot or greater radius. Only soil samples collected from 0.0-0.5 feet will be analyzed; remaining samples will be archived and will only be analyzed to further define vertical extent of PCB impacts or as confirmation that vertical extent of impacts has been reached.	Sampling will confirm removal of PCB-impacted soils to below project-specific action levels.
Estimated Number of Field Samples & Media	194 Individual Soil Samples	200 Individual Soil Samples
Field Parameters	The location of each sample will be logged using GPS coordinates. Soils will be described in the field with respect to color, soil type, moisture content, relative grain size, odor, and staining.	Soils will be described in the field with respect to color, soil type, odor, and staining.
Rationale	Information will be used in conjunction with PCB concentration for determining areas requiring remediation.	Information will be used in conjunction with PCB concentration to confirm project-specific action levels have been achieved.

1 Floodplain soils design will be finalized after access negotiations have been determined. This may require changes to this section of the document.

Table B-1-1 (continued)
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Preferential Pathway Soils - Verification	Source Material - Verification
Sample Location	Soil samples will be collected and analyzed during removal activities from the base and sidewalls of excavations and radially outward from the outfall of each identified preferential pathway to confirm cleanup to below project-specific action levels.	Soil samples will be collected from within the Plant Area to address data gaps and confirm cleanup to below project-specific action levels. Four grab samples will be collected from the 0.0-1.0 foot interval on 50-foot grids and will be composited into one sample per grid.
Estimated Number of Laboratory Samples & Media	24 Soil Samples	35 Composite Soil Samples
Analytical Parameters	PCB	PCB
Rationale	Samples will confirm that project-specific action levels have been achieved following removal of impacted soils.	Surficial soil samples are to be collected to identify grids with surficial PCB concentrations exceeding 1 ppm that require remediation.
Estimated Number of Field Samples & Media	20 Soil Samples	27 Individual Soil Samples
Field Parameters	Soils will be described in the field with respect to color, soil type, moisture content, relative grain size, odor, and staining.	Soils will be described in the field with respect to color, soil type, moisture content, relative grain size, odor, and staining.
Rationale	Information will be used in conjunction with PCB concentration to confirm project-specific action levels have been achieved.	Information will be used in conjunction with PCB concentration to confirm project-specific action levels have been achieved.

Table B-1-1 (continued)
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Riverbank Soils –Verification
Sample Location	Soil samples will be collected from the base and sidewalls of each excavation to characterize soil remaining in place. In addition, soil samples will be collected in the vicinity of G-41, COMP-8, B-1, B-2, B-3, NRB-5, NB-SS-44, NB-COMP-5 and NB-SS-50.
Estimated Number of Laboratory Samples & Media	43 Individual Soil Samples
Analytical Parameters	PCB
Rationale	Sampling will confirm removal of PCB-impacted soils to below project-specific action levels.
Estimated Number of Field Samples & Media	35 Soil Samples
Field Parameters	Sample locations will be documented to identify sampling point.
Rationale	Information will be used in conjunction with laboratory results to confirm remediation to below project-specific action levels.

Table B-1-1 (continued)
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Near Shore Sediments – Delineation	Near Shore Sediments - Verification
Sample Location	Area delineation will be conducted by locating the extents with poling.	Verification: Four grab samples will be collected from each area and will be composited into one sample for that area. Sediment samples will be collected at a minimum rate of one sample per 2700 square feet of sediment.
Estimated Number of Laboratory Samples & Media	NA	6 Composite Sediment Samples
Analytical Parameters	NA	PCB
Rationale	Delineation is designed to identify the location of sediments.	Verification sampling is designed to confirm removal of sediment.
Estimated Number of Field Samples & Media	NA	12 Individual Sediment Samples
Field Parameters	NA	Sediment will be described in the field with respect to color, odor, and staining.
Rationale	NA	NA

Table B-1-1 (continued)
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Armored Areas – Delineation	Armored Areas Verification
Sample Location	Area delineation will be conducted by visually locating the extents as shown in the Design Drawings. Overburden from the armored areas will be sampled to determine the PCB concentration. Overburden material resulting in PCB concentrations less than the detection limit will be permitted as potential stabilization material. Overburden material resulting in PCB concentrations greater than the detection limit will be stockpiled for disposal in appropriate landfill.	Verification will include: A maximum of four transects (depending on area) spaced approximately 12.5 feet apart will be established along the riverbank within the sediment portion located in an RMU. Probe measurements will be taken approximately every 12.5 feet along each transect. Resulting probe measurements will be averaged to provide a single thickness for that RMU. Sediment samples will be collected at a rate of four grab samples per 2700 square feet in each of the remediated sediment RMUs and composited into a single sample. Sampling will be collected from those locations determined to have sediment present after probing. If a sample is not obtained from a potential location attempts will be made at other RMU locations where sediment is present. If less than four grab samples are able to be collected, then the samples collected will be used to develop the sampled obtained SWAC component of an RMU. If hardpan or consolidated material is determined by probing, a value of the detection limit (0.017 ppm) will be assigned to this location and used in the SWAC calculations as it relates to the percentage of area within that RMU. Soft sediment or consolidated material that cannot be collected after 2 unsuccessful attempts with a Petite Ponar dredge will be assigned a value 0.5 ppm as determined from the *RMU Verification Sampling & Calculation of SWAC* provided by the WDNR on 1/24/2006 and used in the SWAC calculations as it relates to the percentage of area within that RMU. If a sample can be collected anywhere in the RMU, that PCB concentration is used to represent all residual sediment areas in that RMU.
Estimated Number of Laboratory Samples &	NA	15 Composite Sediment Samples

Media		
Analytical Parameters	NA	PCB
Rationale	Delineation is designed to identify the location of armored areas.	Verification probing and sampling is designed to confirm mass removal of soft sediment and calculate the surface weighted average concentration of remaining sediments.
Estimated Number of Field Samples & Media	NA	160 Probe Locations; 40 Individual Sediment Samples
Field Parameters	NA	Sediment will be described in the field with respect to color, odor, and staining. Sediment thickness average for 2700 square feet will be calculated
Rationale	NA	Information will be used in conjunction with PCB concentration to calculate mass removal and SWAC.

Table B-1-1 (continued)
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Groundwater
Sample Location	Groundwater samples will be collected from the existing and newly installed monitoring wells and the cleanouts of the groundwater monitoring/interceptor trench during the baseline event consistent with FSP. Samples will be collected on subsequent events semi-annually for a period of five years from monitoring wells downgradient of the GMIT.
Estimated Number of Laboratory Samples & Media	15 Groundwater Samples (Baseline event), 10 Groundwater Samples (Semi-annual events).
Analytical Parameters	PCBs (filtered/unfiltered - Baseline), PCBs (filtered- Semi-annual).
Rationale	Samples will identify the magnitude and trends of PCB impacts to groundwater and will aid in determination of operation of the GMIT.
Estimated Number of Field Samples & Media	13 Individual Samples (Baseline event), 9 Individual Samples (Semi-annual events).
Field Parameters	Each sample will be evaluated in the field for pH, temperature, turbidity, specific conductivity, dissolved oxygen, and oxidation/reduction potential.
Rationale	Information will be used to confirm that representative groundwater samples are being collected.

Table B-1-1 (continued)
Sample Location Parameters and Rationale
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Air
Sample Location	Air samples will be collected from the staging area location.
Estimated Number of Laboratory Samples & Media	A baseline event and samples for one week during load-out.
Analytical Parameters	PCBs
Rationale	Samples will identify the potential magnitude of PCB impact to workers in the area.
Estimated Number of Field Samples & Media	One background and one staging area location for total PCBs.
Field Parameters	General weather conditions
Rationale	Information will be used to confirm that representative air samples are being collected.

B-2 Sampling Methods Requirements

B-2.1 Sampling SOPs

Sampling SOPs are provided in the FSP with the respective phase of work.

B-2.2 Cleaning and Decontamination of Equipment/Sample Containers

SOPs for cleaning and decontamination of equipment/sample containers are provided in the FSP with the respective phase of work.

B-2.3 Field Equipment Maintenance, Testing and Inspection Requirements

Field equipment maintenance, testing and inspection requirements are discussed in Section B-6 of this QAPP.

B-2.4 Inspection and Acceptance Requirements for Supplies/Sample Containers

Inspection and acceptance requirements for supplies and sample containers are discussed in Section B-8 of this QAPP.

B-3 Sampling Handling & Custody Requirements

B-3.1 Sample Handling

B-3.1.1 Sample Identification

B-3.1.1.1 Phase I

Samples collected during the Phase I Pre-Design Investigation (PI) will consist of groundwater collected from existing and planned monitoring wells, groundwater monitoring/interceptor trench, soils and sediments collected from specific areas of interest. These specific areas may include: the Plant Site (including backyard area, and the east yard), the Flood Control Berm, the North River Bank soils, the CTF/SMF area, and Preferential Pathways. River sediment areas will also be a part of PI activities with areas of interest including Upper River Soft Sediments.

Soil and sediment samples collected during the Phase I Pre-Design effort, regardless of media type, will be denoted with a prefix of "PI". Groundwater samples will not receive a pre-design investigation prefix.

Groundwater

Samples collected from the Plant Site monitoring wells will be designated and identified using the nomenclature of the existing monitoring network. In addition the date of the sample will be included.

Groundwater monitoring wells at the Plant Site consist of shallow water table wells and deeper piezometers. Samples collected from the wells will be designated and identified as monitoring wells by using the "MW" prefix, followed by the numerical identification number of the well (e.g., MW-1). An additional letter designator consisting of an R, S, D, or P may be used to denote the following:

- R - Replacement
- S - Shallow
- D - Deep
- P – Piezometer

A groundwater sample collected from MW-7D on August 5, 2003 would be represented as the following:

MW7D-080503

Groundwater trench samples will be identified by the sample port/clean out identification followed by the date of collection. Therefore a sample collected on August 5, 2003 from clean out number 1 would be represented as follows:

SP01-080503

Soil Samples

Soil samples collected from the Plant Site may include samples collected from the Plant Site, Flood Control Berm, North River Bank soils, CTF/SMF area soils, and from areas of preferential contaminant travel pathways (Preferential Pathways), for example, within soils along the Non-Contact Cooling Line.

Soils samples will be designated and identified using a two-part nomenclature. The first part consists of the designation of the type of sample collected based on media, followed by a number in sequence with sample collection. For example, soil samples will be denoted with a prefix of "SS" which denotes intuitively the designation of soil sample, followed by a numeric character in sequence (i.e., 1, 2, 3, etc.) which uniquely identifies the soil sample as depicted below:

PI-SS1, PI-SS2, PI-SS3, Etc.

Further soil sample designation and identification will consist of: the addition of a second set of unique identifiers, identifying the grid cell of the sample location and a numerical description of the samples' vertical orientation. In addition, a miscellaneous sample designator (e.g., COMP – for composite sample) may be used as required as described in Section B-3.1.1.3.

Plant Site Soils

Plant Site soils will receive the designation of "PS". An example identification of a soil sample collected from the Plant Site from grid cell B5 at a 0-2 foot depth interval would be as follows:

PI-SS1,PSB5,0-2'

Soft Sediment Samples

Soft sediment samples will be collected from the Upper Sheboygan River. Sediment samples will be designated and identified using a two-part nomenclature similar to site soils as described above. The first part consists of the designation of the type of sample collected based on media, followed by a number in sequence with sample collection. Sediment samples will be denoted with a prefix of "SED" which denotes the sample media type as sediment. The designation of sediment sample will be followed by a numeric character in numerical sequence as depicted below:

PI-SED1, PI-SED2, PI-SED3, etc.

Additional sediment sample designation and identification will consist of: a miscellaneous sample designator (e.g., RETEST) may be used as required, as described in Section B-3.1.1.3.

Floodplain Soils

Floodplain samples will be collected from the general locations identified as Floodplain FPR-3, FPL-4, FPR-5, FPR-6, FPR-7 and FPL-8 (as modified by Phase II Pre-Design Investigations).

Floodplain soil samples will be designated and identified using a two-part nomenclature as described above for "Soil Samples". Floodplain soil samples will be denoted with the prefix "FP" which intuitively denotes the designation of Floodplain soil sample, followed by a numeric character in sequence, (i.e., 1, 2, 3 etc.) which uniquely identifies the Floodplain soil sample as depicted below:

PII-FP1, PII-FP2, Etc.

Further Floodplain soil sample designation and identification will consist of: the addition of a second set of unique identifiers consisting of letters and numbers which identify the Floodplain area in which sampling has occurred and; a numerical description of the samples' vertical orientation. In addition, a miscellaneous sample designator (e.g., RETEST) may be used as required as described in Section B-3.1.1.3.

The following Floodplain soil area designators will be appended to the sample I.D., depending on the actual location of sample collection:

FPR-3	"Floodplain Right – 3"
FPL-4	"Floodplain Left – 4"
FPR-5	"Floodplain Right – 5"

"Right" and "Left" designators are referenced to the Floodplain location on the right or left river bank area facing in a downstream direction.

An example identification of a Floodplain soil sample collected from floodplain FPL-4, at the 0-6" interval would be as follows:

PII-FP1, FPL4 0-6"

B-3.1.1.2 Phase II

Soft Sediments

Sediment samples collected to verify concentrations following dredging will be denoted with the prefix "PD" which intuitively denotes the designation of post dredging sediments followed by the deposit location and then by a numeric character in sequence (i.e., 1, 2, 3 etc.) which uniquely identifies the Soft Sediment sample collected representing the 2700 square feet RMU area.

Post dredging sample collected from Deposit 5, RMU 1 would be identified as depicted below:

PII-PD-DEP5-1

Armored Area 1

Sediment samples collected to verify concentrations following excavating will be denoted with the prefix "PD" which intuitively denotes the designation of post dredging sediments followed by the Armored Area location and then by a numeric character in sequence (i.e., 1, 2, 3 etc.) which uniquely identifies the Armored Area sample collected representing the 2700 square feet RMU area.

An example identification of a sediment sample collected from Armored Area 1, RMU 1 would be as follows:

PII-PD-AA1-1

"Overburden" material is described as gabions (rocks and cobbles) overlaying sediment deposits in the Armored Areas. "Overburden" material in direct contact with the contaminated sediments will be sampled to determined PCB concentration. A sample designator “O” will be used to define “Overburden Material”.

An example identification of an “Overburden” sample collected from Armored Area 1 would be as follows:

PII-O, AA-1

Near-Shore Sediments

Sediment samples collected to verify concentrations following excavating will be denoted with the prefix “PD” which intuitively denotes the designation of post dredging sediments followed by a numeric character in sequence (i.e., 1, 2, 3 etc.) which uniquely identifies the Near-Shore sample collected representing the 2700 square feet.

An example identification of a sediment sample collected from the first 2700 square feet of Near Shore Sediments would be as follows:

PII-PD-NS-1

Floodplain Soils

After remediation, verification samples will be collected from the floor and sidewall of each nonadjacent grid of the excavated grid area. An additional sample designator “F” will be used to define the floor and N, S, E, W to define the sidewall of each non-adjacent grid.

An example identification of a Floodplain soil samples collected from the floor and north wall of grid A3 in floodplain 6 would be as follows:

PII-F-FP6, A3
PII-N-FP6, A3

B-3.1.1.3 QA/QC and Miscellaneous Sample Designations and Identifications

Several unique identifiers will be used as needed to designate and identify quality assurance/quality control (QA/QC) samples and other sample characteristics as described below.

Water Treatment Effluent Discharge

Grab samples of treatment effluent will be collected daily. Samples will be collected as per the requirements of the Wisconsin Pollution Discharge Elimination System (WPDES) permit. The sample parameters will also be determined by the requirements of the WPDES permit.

An example identification of an effluent sample collected from Water Treatment System on 2/1/06 would be as follows:

PII-DWE, 6/6/06

Air Sampling

Prior to loading out DDM from the site, baseline air monitoring/sampling will be performed at selected points (two) near the staging area to establish background PCB levels in the air. If visible dust emissions are noticed, action will be taken to wet the surface of the material. In addition, monitoring/sampling of the air within the staging area will occur during the first three days of load-out of the DDM to assure that there are no PCBs that may pose a health hazard to workers in the area.

An example identification of an air sample collected on 6/6/06 at location 1 would be as follows:

PII-AIR, 6/6/06, 1

Surface Water

If the action level (70 ppm) for downstream turbidity, as compared to upstream turbidity is exceeded as described above, corrective actions and/or additional sampling requirements will be made on a case-by-case basis by agreement between PRS, the USEPA OSC, and the WDNR OSC. Water sampling for PCBs may be conducted, if trigger level corrective actions are not sufficient to limit turbidity/sediment re-suspension.

An example identification of a surface water sample collected on 6/6/06 would be as follows:

PII-SW, 6/6/06

Dredge Dewatered Material

During the sediment dewatering period, measurement of moisture content in the DDM will be made on a daily basis. Grab samples will be collected from 5 locations and composited. For disposal purposes, DDM are typically sampled at a frequency of approximately one composite sample per geotextile tube (approximately 1000 cubic yards) or as required by the landfill for disposal. In addition, geotechnical data (moisture content & undrained shear strength) will be collected in the field at a rate of once sample every 500 cubic yards for the first 10,000 cubic yards and then at a rate of 3,000 cubic yards thereafter. Laboratory testing for grain size distribution and undrained shear strength will also be performed at a frequency of one sample every 10,000 cubic yards. Finally, a laboratory consolidation test will be performed at a rate of one sample per 30,000 cubic yards. Excavated sediment from the armored areas and near-shore sediments will be stockpiled and sampled per location at or at a minimum frequency of one composite (5 grab locations) per 250 cubic yards. The landfill will be contacted prior to dewatering to ascertain their exact acceptance criteria including sample frequency and analytical parameters.

An example identification of a dredge dewatered material sample collected on 2/1/06 at 1 p.m. from Geotube #1 would be as follows:

PII-DWM, 6/6/06, 13:00, TUBE 1

QA/QC

Standard sample designations for QA/QC will be used as needed during the Phase I and II sampling efforts. The QA/QC[3] letter suffixes that will be appended to the second part of the two-part designation and naming convention will be taken from the following list:

- Sample Duplicate – "DUP";
- Field Blank – "FB"; and,
- Matrix Spike/Matrix Spike Duplicate – "MS"/ "MSD"

For example, a duplicate sample collected for QA/QC purposes may be designated and identified as follows:

PII-PD-SS1, DUP

Miscellaneous

Miscellaneous sample designations and identifications will be used as needed throughout the Phase I and II sampling effort. Letter suffixes will be appended to the second part of the two-part designation and naming convention. An example of a miscellaneous sample designation may be as follows:

- Sample Composite – "COMP"; and
- Sample Retest – "RETEST"

Where "retest" designates a sample collected from the same location as a previously collected sample, for example, after additional dredging passes. In this case, an example identifier would be:

PII-PD-SS1, RETEST

Fish Tissue

The fish tissue sampling plan will generally be consistent with the Operation and Maintenance Plan if performance criteria of the Consent Decree are not met. Given the need for consistency in collection methods and analytical work, in order to identify trends, the Operation and Maintenance Plan will form the basis for this sampling effort as modified to fit the Remedial Action work.

B-3.2 Sample Custody

Sample Custody will be approached in two parts: field custody and laboratory custody. Samples are considered to be in a person's custody if they are:

1. In a person's physical possession.

[3] QC samples, such as MS/MSD require additional sample volume be submitted to the laboratory.

2. In view of a person after taking possession.

3. Secured by that person so that no one can tamper with it, or secured by that person in an area that is restricted to authorized personnel.

B-3.2.1 Field Custody Procedures

Field logbooks will be completed to provide a means of recording the field activities during the investigation. Each field log book will be numbered, the name of the person the logbook was assigned will be noted. Additionally, the start and end date for each logbook will be clearly indicated. Pertinent sampling activities will be recorded in the field notebook on sequentially numbered pages. The beginning of each logbook entry will include the date, the start time, the weather, the names of the sampling team members, and the signature of the individual making the logbook entries. The following information will be recorded in the logbook:

- Sample Identification
- Type and number of samples
- Reference to a particular sample location
- Measurements taken
- Equipment used to collect samples
- Date and time of sampling

All entries will be made in permanent ink, signed and dated. No erasures will be made. If corrections are necessary, the incorrect information will be crossed out with a single strike mark that is initialed and dated and correct information will be recorded.

Samples will be collected using the procedures documented in Section B-2.1 of this QAPP. All sample bottles will be identified using sample labels. Sample handling, preservation, and storage procedures that will be used for field and laboratory investigations are presented in Table B-3-1. Sample containers will be provided by the laboratory and prepared in accordance with U.S. Environmental Protection Agency guidelines (USEPA, 1998) prior to field operations. Sample containers will be purchased by the laboratory pre-cleaned to requirements of the USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9240.05A. Sample containers will be kept closed and in a cooler until used. Sample labels will be securely affixed to sample containers prior to or at the time of sample collection. After sample collection, bottles will be put into coolers with ice to maintain a temperature of four degrees Celsius. Samples will be stored and transported with the intent to maintain a temperature of four degrees Celsius.

Upon completion of sample collection, a chain-of-custody record (COC)/sample analysis request (SAR) forms will be completed. If more than one sample-shipment container is used, a separate chain-of-custody form should be completed for each container.

The chain-of-custody record will include the following information (Examples of the COC forms from each analytical laboratory are provided in Appendix B).

- Project name.
- Sampler's signature.
- Unique sample (station) identification.
- Date and time of collection.
- Composite or grab sample designation.
- Sample (station) location or description.
- Number of containers.
- Indication of analytical parameters to be performed (including analytical method and preservation if any).
- Remarks, if necessary.
- Signature of persons involved in the chain of possession.

Upon completion of a COC, it will be placed in a water-tight (zip-lock type) plastic bag and placed inside the sample shipment container (cooler). Using bubble packing, styrofoam sheets, or similar packaging material the samples will be securely wrapped and arrange in the shipping cooler in such a way as to minimize the chance for breakage during shipment. Samples will be properly packaged on ice at approximately four degrees Celsius. Shipping containers will be secured with shipping tape and custody seals.

COCs and SAR forms will be completed and signed by the responsible person at the end of each day and shipped or sent by courier with the samples to the analytical laboratories. The actual chain-of-custody document may contain three separate copies. The pink copy will be kept by the sampling personnel and will be retained in the project file. The yellow and white copies will be shipped to the laboratory with the samples (the white copy will be returned by the laboratory as part of the final data package). All samples will be transported or shipped in a manner that protects the integrity of the samples and safety of the handlers.

Samples will be shipped for weekday delivery only by express overnight service or courier service. At the time of shipment, the bill of lading number will become a part of the chain-of-custody documentation. Packaging, marking, labeling, and shipping of samples will comply with the regulations promulgated by the U.S. DOT in 49 CFR 171-177. Field samples will be analyzed within acceptable analytical method holding times or per sampling turnaround request.

B-3.2.2 Laboratory Custody Procedures

Laboratory custody procedures will be in place to ensure the integrity of sample and laboratory-produced data handling. Custody procedures will include laboratory project files, sample receipt, sampling storage, logbooks, and computer tapes and hardcopy storage. Laboratory custody procedures are included in the laboratories' Quality Assurance Manuals in Appendix A.

B-3.2.3 Final Evidence Files

Project documentation will be placed in a single, secured project file in a location to be determined by PRS, which will be maintained by the Project Team. This file will consist of the following components, all filed chronologically:

- Agreements;
- Correspondence;
- Memos
- Notes and Data; and
- News Clippings.

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation, field records (e.g. waste manifests), photographs and field data will be filed with notes and data. Filed materials may only be removed by authorized personnel on a temporary basis. The date removed and the name of the person removing the file will be recorded.

In accordance with the CD, all project documents and records, including those of PRS and PRS' contractors and agents, must be maintained for a period of 10 years following receipt of Certification of Completion of the Upper River work.

Table B-3-1
Analytical Methods, Sample Containers, Preservation, and Handling Procedures
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Analytical Parameter	Analytical Method	Container[2]	Preservation, Handling, and Holding Time[1]	Maximum Holding Times[1]
Groundwater/Surface Water				
PCB – Aroclors	8082	Two 1–L amber glass bottles with Teflon-lined lid[3]	Cool (4° C), 14 days to extract and 40 days to analyze	7 days – extraction 40 days - analysis
pH, Turbidity				pH – immediately Turbidity – 48 h
Total Suspended Solids	160.2	500-mL HDPE bottle	Cool (4° C), analyze as soon as possible	7 days
Soft Sediment/DDM/Overburden Material (Armored Areas)				
PCB – Aroclors	8082	250-mL glass jar with Teflon-lined lid	Cool (4° C), 14 days to extract and 40 days to analyze	7 days – extraction 40 days - analysis
Paint Filter	9095A	4 oz glass jar	Cool (4° C) analyze as soon as possible	
Percent Solids	D2216	NCS	NCS	Analyze as soon as practical
Undrained Shear Strength	ASTM D2850 or D4767	4 oz glass jar	Cool (4° C) analyze as soon as possible	
Grain size distribution	ASTM D422	4 oz glass jar	Cool (4° C) analyze as soon as possible	
Laboratory consolidation	ASTM D2435	4 oz glass jar	Cool (4° C) analyze as soon as possible	
Air				
PCB – Aroclors	NIOSH 5503	Florisil sorbent tube	Cool (4° C) analyze as soon as possible	60 days

Notes:
NA = Not Applicable
NCS = No container, preservation etc. specified
[1] Unless otherwise specified, all holding times are measured from date of collection.
[2] Double sample containers required when MS/MSD or duplicates are being analyzed.
[3] When adequate volume is available two 1-L amber glass bottles will be collected at each sampling location.

B-4 Analytical Method Requirements

Once samples have been properly collected and documented, they will be submitted to the analytical laboratory for analysis of specified parameters. Samples will be analyzed in accordance with USEPA methods and guidelines (1983, 1998), approved standard operating procedures (SOPs), or as required by the guidelines set in the laboratory QAPP. Analyses will include all associated QA/QC procedures recommended in each method.

Specific parameters and analytical methods to be utilized for each matrix are summarized in Table B-4-1. Reporting limits and laboratory method detection limits are presented in Table B-4-2. Deviations from specific methods will be communicated to the QA Manager prior to initiation of test procedures. Any deviations must also be addressed in the laboratory case narrative. The laboratory is to report results below the detection limit as "<DL" where DL = the numeric detection limit.

B-4.1 PCB Analysis

PCB analysis will be performed by GC using electron capture detectors (ECD). SW-846 Method 8082 will be employed, using a five-point calibration for Aroclors 1016 and 1260 with a correlation coefficient of at least 0.995 or with an RSD of less than 20%. Other Aroclors will be calibrated using a single point for calibration for quantitation. Water samples may be prepared by liquid-liquid extraction, solid phase extraction, or separatory funnel extraction. Solid samples will be prepared by soxhlet extraction (SW846 Method 3540). Clean-up procedures for solids or liquids can include sulfur clean-up, gel permeation chromatography, or florisil. Because Aroclors 1242 and 1254 are the predominant mix of PCBs detected at the site, all QC samples (e.g., LCS, MS/MSD) must be spiked with Aroclors 1242 and 1254.

For water samples, and for purposes of characterizing PCB concentrations of dewatered sediments and soils, detection limits have been established as shown in Table B-4-2. The detection limit for soils, sediments, "Overburden" material, and air is also shown in Table B-4-2.

Air samples will be analyzed by GC using electron capture detectors (ECD) using NIOSH Method 5503. Extraction of the sorbent tubes prior to analysis is performed using hexane. A five-point calibration with a correlation coefficient of at least 0.995 or with an RSD of less than 20% is required.

B-4.2 Total Suspended Solids

TSS analysis will be conducted in accordance with Method 160.2.

B-4.3 Percent Solids by SW-846 Method: 9095A

DDM will be subject to the paint filter test for free liquids in either the lab or the field. The test will be conducted according to SW-846 Method 9095A unless otherwise agreed to. As part of the dewatering process, materials may be blended with the dredge material to aid in dewatering. Results will include amount of sample placed on paint filter paper and whether or not any liquid passes into the 100-ml graduated cylinder (pass/fail).

Table B-4-1
Laboratory Sample Preparation and Analytical Procedures
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Parameter	Reference[1]	Analysis		Extraction		Clean-up	
		Type	Method	Type	Method	Type	Method
Soil/Sediment/DDM/Overburden Material (Armored Areas)							
PCBs[5]	USEPA, 1998	GC/ECD	8082	Soxhlet[4]	3540[4]	Florisil[2] Sulfuric Acid Copper/mercury	3620[2] 3665[2] 3660[2]
Percent Solids	ASTM, 1996	--	9095A	--	--	--	--
Undrained Shear Strength	ASTM, 1996	ASTM	D2850 or D4767	--	--	--	--
Grain size distribution	ASTM, 1996	ASTM	D422	--	--	--	--
Laboratory consolidation	ASTM, 1996	ASTM	D2435	--	--	--	--
Groundwater/Surface Water/ Discharge Water							
PCBs	USEPA, 1998	GC/ECD	8082	Separatory Funnel, liquid/ liquid extraction, or solid phase extraction	3510	Sulfuric Acid	3665
TSS	USEPA, 1983	Gravimetric	160.2[3]	Filtration	160.2	NA	--
Air							
PCBs	NIOSH, 1994	GC/ECD	NIOSH 5503	Hexane extraction	NIOSH 5503	None	None

1 ASTM, *Annual Book of ASTM Standards, Volume 04.08, Soil and Rock (I).* American Society for Testing and Materials Philadelphia, Pa 1996.
USEPA, 1998. *Test Methods for Evaluating Solid Waste.* SW-846 3rd ed. Washington, DC, 1986, 1996, updated 1998
USEPA. *Methods for Chemical Analysis of Water and Waste.* EMSL-Cincinnati, EPA-600/4-79.020. March 1983

2 Either Florisil or sulfuric acid clean-up may be used for PCB analysis. Additional sulfur clean-up to be performed with copper or mercury if necessary.

3 Filters in accordance with method 160.2 must be used for all TSS analyses to meet data quality objectives.

4 Soxhlet extraction will be used for PCB analysis.

5 Water must be decanted by laboratory prior to solids extraction. The laboratory must document whether water was removed.

Table B-4-2
Analytical Method Reporting Limits
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Analyte	Method[1]	PCB Cleanup Level	Laboratory Reporting Limits[2,3]	Method Detection Limits[3]
Soil/DDM/Overburden Material/Sediment[2] PCBs – Aroclors - milligrams per kilogram (mg/kg)				
Aroclor 1016	SW846 8082	PS	0.017	0.0109
Aroclor 1221	SW846 8082	PS	0.017	0.0119
Aroclor 1232	SW846 8082	PS	0.017	0.0113
Aroclor 1242	SW846 8082	PS	0.017	0.0130
Aroclor 1248	SW846 8082	PS	0.017	0.0117
Aroclor 1254	SW846 8082	PS	0.017	0.0124
Aroclor 1260	SW846 8082	PS	0.017	0.0107
Waters (Ground, Surface and Treated Effluent)				
PCBs – Aroclors (µg/l)[4]				
Aroclor 1016	SW846 8082	-	0.5	0.18
Aroclor 1221	SW846 8082	-	0.5	0.42
Aroclor 1232	SW846 8082	-	0.5	0.35
Aroclor 1242	SW846 8082	-	0.5	0.43
Aroclor 1248	SW846 8082	-	0.5	0.48
Aroclor 1254	SW846 8082	-	0.5	0.35
Aroclor 1260	SW846 8082	-	0.5	0.17
TSS (mg/L)	MCAWW 160.2		5.0	NA
Air				
PCBs – Aroclors (mg/m^3)[4]				
Aroclor 1016	NIOSH 5503	-	0.5	0.1
Aroclor 1221	NIOSH 5503	-	0.5	0.1
Aroclor 1232	NIOSH 5503	-	0.5	0.1
Aroclor 1242	NIOSH 5503	-	0.5	0.1
Aroclor 1248	NIOSH 5503	-	0.5	0.1
Aroclor 1254	NIOSH 5503	-	0.5	0.1
Aroclor 1260	NIOSH 5503	-	0.5	0.1

PS = Project Specific Cleanup Levels provided in Table A-7-1

1 USEPA. Office of Solid Waste and Emergency Response. *Test Methods for Evaluating Solid Waste.* (SW-846) 3rd ed. Washington DC, revised April 1998.

USEPA. *Methods for Chemical Analysis of Water and Waste.*(MCAWW) EMSL-Cincinnati. EPA-600/4-79.020. 1983.

2 Sediment samples will be reported on a dry weight basis.
3 Laboratory Reporting Limits and Method Detection Limits provided by STL
4 Based on a 1-liter sample volume, highest instrument MDL listed.

B-5 Quality Control Requirements

This section describes all specific quality control checks to be addressed for both field analysis and data collection and laboratory analysis in order to comply with the requirements of the project.

B-5.1 Field Sampling Quality Control

Field duplicates, field blanks, and duplicate measurements will be collected in order to assess field sampling precision and bias. Collection of the samples will be in accordance with the applicable procedures at the frequency indicated in Table A-7-2. Field blanks will be evaluated to the associated method detection limits. Sample results will be evaluated with associated field blanks and qualified accordingly. Use of data qualifiers is explained in Appendix D.

B-5.2 Analytical Quality Control Checks

The analytical laboratories identified in Section A-5 of this QAPP have QC programs in place to ensure the reliability and validity of the analyses performed in accordance with this project's QA/QC requirements. All analytical procedures are documented in writing as SOPs. Each SOP includes a QC section, which addresses the minimum QC requirements for the procedure. Internal quality control checks may differ slightly for each analytical procedure, but in general the QC requirements will include the following:

- Method blanks;
- Instrument blanks;
- Matrix spikes/matrix spike duplicates;
- Surrogate spikes;
- Laboratory duplicates;
- Laboratory control samples (LCS)
- The QC criteria are also described in the standardized method for each analytical procedure.

Project QC limits for duplicates and matrix spikes are identified in Table A-7-4. Laboratory control charts will be used to determine long-term instrument trends. LCS samples must be within control limits (Table A-7-4) for analysis of the associated batch of samples to be acceptable or all associated samples in the batch must be re-extracted and/or reanalyzed.

All data obtained will be properly recorded. The data package will include a deliverable package capable of allowing the recipient to reconstruct QC information and compare it to QC criteria. Any samples analyzed that are in nonconformance with the QC criteria will be reanalyzed by the laboratory, if sufficient volume is available. It is expected that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary.

B-6 Instrument Equipment Testing/Inspection & Maintenance Requirements

B-6.1 Field Instrument Maintenance

Field Equipment will be maintained in accordance with the manufacturer's requirements. Specific field preventive maintenance procedures are presented in Table B-6-1.

B-6.2 Laboratory Instrument Maintenance

Only qualified personnel will service instruments and equipment. Repairs, adjustments, and calibrations are documented in the appropriate equipment/instrument logbook or data sheet. Laboratory equipment and instruments will be maintained in accordance with the procedures outlined in the laboratories' quality assurance program manual provided in Appendix A.

Laboratory Equipment maintenance and procedures are presented in the individual Laboratory QAPPs.

Table B-6-1
Field Equipment Preventative Maintenance
Quality Assurance Project Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Maintenance	Frequency
Thermometer	
Store in protective casing	Daily
Inspect equipment after use	Daily
Have replacement available	Daily
pH Meter	
Store in protective casing	Daily
Inspect equipment after use	Daily
Clean probe	Daily
Update equipment logbook	Daily
Replace probe	At operator's discretion
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator's discretion
Nephelometer (turbidity)	
Store in protective casing	Daily
Inspect equipment after use	Daily
Check and recharge batteries	Daily
Clean sample cells	Daily
Clean lens	Monthly, or at operator's discretion
Update instrument logbook	Daily
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator's discretion
Hydrolab (or equivalent)	
Store in protective casing	Daily
Inspect equipment after use	Daily
Clean probes	Daily
Update equipment logbook	Daily
Replace probes	At operator's discretion
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator's discretion
Dissolved Oxygen	
Store in protective casing	Daily
Inspect equipment after use	Daily
Update equipment logbook	Daily
Check and recharge batteries	Daily
Clean and replace probe membrane with HCl solution	At operator's discretion
Calibrate	Daily and/or according to manufacturers specifications

Maintenance	Frequency
Return to manufacturer for service	At operator's discretion
Redox Meter	
Store in protective casing	Daily
Inspect equipment after use	Daily
Update equipment logbook	Daily
Check and recharge batteries	Daily
Replace probe	At operator's discretion
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator's discretion
Air Sampling	
Store in protective casing	Daily
Inspect equipment after use	Daily
Update equipment logbook	Daily
Check and recharge batteries	Daily
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator's discretion
Percent Solids	
Store in protective casing	Daily
Inspect equipment after use	Daily
Update equipment logbook	Daily
Return to manufacturer for service	At operator's discretion
Balances	Monthly
Undrained shear strength	
Store in protective casing	Daily
Inspect equipment after use	Daily
Update equipment logbook	Daily
Check and recharge batteries	Daily
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator's discretion
ISCO Type Sampler	
Inspect equipment after use	Daily
Check and recharge batteries	Daily
Clean sample cells	Daily
Calibrate	Daily and/or according to manufacturers specifications

B-7 Instrument Calibration & Frequency

This section describes procedures for maintaining accuracy and precision of all instruments and measuring equipment used for conducting field tests and laboratory analyses. Instruments and equipment should be calibrated prior to each use or on a scheduled, periodic basis. Each instrument used will be calibrated prior to use as a measurement device to establish the instrumental response to known reference materials. All sample measurements will be made within the calibrated range of the instrument.

B-7.1 Field Instruments/Equipment

Instruments and equipment used to generate, or measure environmental data will be calibrated in accordance with the manufacturer's specifications. Instrument and equipment calibration will be documented in the appropriate field logs and will be retained in the project file.

Field measurement devices will be calibrated upon first use for this project. Maintenance and procedural requirements from the manufacturer will be followed to ensure that the field equipment is operating properly. Field measurement devices will be calibrated each day according to manufacturer's specifications.

Equipment to be used during field sampling will be examined to certify that it is in operating condition. This includes following recommendations of the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Calibration of field instruments will be performed at intervals specified by the manufacturer or more frequently as conditions dictate. Field instruments will include a pH meter, thermometer, nephelometer (or turbidity meter), immunoassay and hydro lab. In the event that an internally calibrated field instrument fails to meet calibration/ checkout procedures, it will be returned to the manufacturer for servicing.

Calibration of field instruments is governed by specific SOPs for applicable field methods, and such procedures take precedence over the following general discussions.

- pH Calibration - The pH meter will be calibrated with standard buffer solutions as specified in the FSP.

- Temperature Calibration - The thermometers will be inspected before use to ensure there is no mercury separation. Thermometers should be rechecked in the field before and after use to see if readings are logical and the mercury is still intact.

- Nephelometer (Turbidity Meter) Calibration - The instrument chosen will be calibrated per the manufacturer's specifications.

- Hydro Lab (or equivalent) - The instrument chosen will be calibrated per the manufacturer's specifications.

- Dissolved Oxygen Meter - The instrument chosen will be calibrated per the manufacturer's specifications.

- Redox Meter - The instrument chosen will be calibrated per the manufacturer's specifications.

- Immunoassay Test System - One example of a potential test kit under consideration for this work is manufactured by Strategic Diagnostics, Inc. (Newark, DE). Appendix C contains the manufacturer's operating instructions for this method. The system chosen will be calibrated and operated per the manufacturer's specifications. QC analyses will be performed during field applications to assess the accuracy, precision, and sensitivity of the kit. Per guidelines established by USEPA Region I (USEPA, 1996), the accuracy of the unit will be $\pm$35% as checked with an external performance evaluation sample; the precision of the unit for waters will be $\leq$30% RPD and for soils <50% RPD.

- Global Positioning System - A GPS will be used to identify the position of the sample collection points for riverbank soils and source materials during Phase I, and near-shore sediments, Upper River soft sediments, and floodplain soils for Phase II. The GPS system will be operated by competent personnel. Specifications for the accuracy and precision of the X (latitude), Y (longitude), and Z (height) coordinates are contained within the operating instruction manual. Standard survey methods may be used for sample points located at the plant site.

- Air sampling – The instrument chosen will be calibrated per the manufacturer's specification.

- Percent Solids/Moisture Content - Based on their determination methods no calibration is necessary. Balances should be calibrated and checked per manufacturer's specifications. Balance calibration should be verified and documented at least monthly with ASTM Class 1 (or equivalent) weights.

- Undrained shear strength – The instrument chosen will be calibrated per the manufacturer's specification.

B-7-2 Laboratory Instruments

For analyses conducted according to the USEPA SW-846 methods, calibration procedures and frequencies specified in the applicable method will be followed. For analyses governed by SOPs, appropriate SOP calibration procedures and frequencies will be applied in accordance with the laboratories' Quality Assurance Manuals provided in Appendix A. Records of calibrations will be filed and maintained by the laboratory. These records will be subject to QA audit. For all instruments, the laboratory will maintain trained repair staff with in-house spare parts or will maintain service contracts with vendors.

If following corrective action, continuing calibration criteria are not met, a full multi-point initial calibration may be performed, and the associated positive samples reanalyzed with a new in-control continuing calibration run as required in accordance with SW-846, EPA Method 8000B

The laboratories' Quality Assurance Manual(s), contained in Appendix A, describe method-specific calibration procedures for the Sheboygan River Project.

- GC/ECD for PCBs – Aroclors (Method 8082) - Gas chromatographs will be calibrated by analysis of a standard solution containing Aroclors 1016 and 1260 in accordance with the laboratories' SOPs provided in Appendix A. All other Aroclors will only be calibrated with a one-point standard.

- TSS (Method 160.2) - Based on their determination methods (i.e., gravimetric), no calibration is necessary. Balances should be calibrated and checked per manufacturer's specifications. Balance calibration should be verified and documented at least monthly with ASTM Class 1 (or equivalent) weights.

- Percent Solids/Moisture Content (Method 9095) - Based on their determination methods no calibration is necessary. Balances should be calibrated and checked per manufacturer's specifications. Balance calibration should be verified and documented at least monthly with ASTM Class 1 (or equivalent) weights.

- Undrained shear strength – The instrument chosen will be calibrated per the manufacturer's specification.

- Grain size distribution – The instrument chosen will be calibrated per the manufacturer's specification.

B-8 Inspection Acceptance Requirements for Supplies and Consumables

Individual laboratory QA Managers will be responsible for inspection of supplies and consumables for conformance with the requirements of this QAPP and the standard test methods referenced herein. Supplies and consumables not meeting the specified requirements will be rejected and either returned to the supplier or otherwise removed from the site to avoid unauthorized or inappropriate use.

B-9 Data Acquisition Requirements for Non-Direct Measurements

Data from the following documents may be used for determining site background information:

- Blasland, Bouck and Lee, Inc. (BBL), *Technical Memorandum – External Source Assessment*, November 1999
- BBL, *Feasibility Study report, Sheboygan River and Harbor Site*, April 1998
- BBL, *Alternative Specific Remedial Investigation (ASRI)*, October 1995

B-10 Data Management

Complete and accurate records of sample collection, sample analysis, quality assurance, data corrections, and data analysis will be maintained to ensure that field and analytical data are of sufficient quality so reconstruction of procedural and analytical steps is possible for each sample or measurement. Integrity of this information must be maintained throughout all transfers and manipulations. Procedures used to generate, transform, and validate data are critical for effective data management. After data have been validated, they will be entered into a project database.

B-10.1 Data Recording

Hardcopy analytical reports and Electronic Data Deliverables (EDD) will be sent to the Supervising Contract Manager, who will route copies of applicable information to the QA Manager, Data Manager, and Data Validator. The QA Manager is responsible for ensuring that the data packages are correctly entered into the project files while the Data Manager performs a comparison of the data in the electronic files to the hardcopy reports prior to data loading. The Data Manager is also responsible for data tracking which includes knowing the status of any sample or analytical data package at any time during the project. To track samples, the Data Manager will note the current location of the sample or data package; readily retrieve COC information; note the date the sample was received by the laboratory; and print a copy of the original EDD file to forward to the Data Validator. The Data Manager will also report any discrepancies (between items received and requested) to the QA Manager and to the Supervising Contract Manager. The Data Manager will also work closely with the Data Validator to ensure that the information reported in the electronic database correlates to the records on the hardcopy analytical report. Any corrections to the database are documented in a selected comment field in the EDD.

Additionally, the Data Manager will scan electronically submitted files for viruses using the network anti-virus program. It is the responsibility of the Office Local Area Network (LAN) Administrator to keep the anti-virus programs current. If viruses are detected, they must be eradicated before the database is used. The Laboratory Project Manager, QA Manager, and Supervising Contract Manager will be notified of the virus.

After virus scanning, the files contained in the EDD are copied to the LAN. Under no circumstances should changes be made to the original laboratory EDD. Incoming EDD files are processed by the Quality Control Database. The main purpose of this database is to translate the EDD format into a format suitable for loading into the Reporting Database. This intermediate step is required because sample identifications can be associated with physical locations, wells, sumps, etc., which are constant across all sampling events. This location data is not contained in the EDD file and has to be retrieved from the Sampling Database.

During the pre-loading step, inconsistencies and errors in the data are sought out and corrected to ensure a smooth data load. The Data Manager will evaluate the accuracy of the following prior to data loading:

- Field sample identification numbers;
- Duplicate project samples and corresponding field sample identification;

- Re-extraction data;
- Spelling of synonymous parameter names; and
- Sample collection date.

The Data Manager will be supported by the Data Validator to assess the accuracy of the information in the incoming EDD file. A summary table regarding the corrections made during pre-loading is to be completed by the Data Manager and retained in the final evidence file. The narrative will contain a log of the results of all the QA/QC tests performed. After completion of pre-loading activities, the sample results will be loaded into the Reporting Database. The Data Manager will review the loaded file to ensure that the result of the load was accurate. The Reporting Database has its own set of reports to check analyte counts, results, etc.

B-10.2 Data Validation

Data review and validation procedures are discussed in Section D of the QAPP.

B-10.3 Data Transformation/Data Reduction

Data transformation/data reduction procedures are provided in analytical laboratory SOPs provided in Appendix A.

B-10.4 Data Transmittal/Transfer

Environmental data obtained during the Phase I and Phase II projects will be documented using three methods: primary, secondary, and tertiary. Primary data documentation is raw data gathered directly from the field or laboratory instruments. This type of data requires some form of manipulation to be of use in decision-making. Secondary data documentation is the transformation of the raw data into a usable and computer accessible format. However, the data have not undergone data validation, and therefore are considered part of the working data record. Tertiary data documentation is data that have been validated and can be used for technical decision-making during the Phase I and II projects. These validated data would be considered part of the permanent data record.

Primary data documentation includes any raw data, data from field data logbooks, photographs, laboratory electronic and hardcopy analytical data. Raw data will consist of manual transcription of records, measurements, and observations written directly into field data logbooks and field data sheets. Electronic data will be obtained directly from field measuring equipment, as well as the paper printouts provided by such equipment. Manual laboratory reports, which include the spectral analysis, graphs, and hand written notes and observations, are also considered raw data. Field data logbooks will be used to record events that occur during a particular field activity, as well as measurement readings and other information. All field entries will be legible, recorded in ink, and signed and dated by the person recording the data. Photographs will also be considered a form of raw data. The photographic log will contain a description of the object and field of view being photographed, direction faced, film type and speed, film roll number, frame number, time and date the photograph was taken. The electronic data obtained directly from field measuring equipment, such as a photo-ionization detector (PID) and/or flame-ionization detector (FID) will be documented on the field forms, and the hard copy will be labeled, signed and dated for the final evidence file. Secondary data documentation will consist of the transcription of written field and laboratory data to computerized database formats. Tertiary data documentation will consist of the validated data and is the permanent data record.

A QC check will be performed on 50% of the primary and secondary data by designated personnel (e.g., field forms will be checked by field supervisors; photographs will be checked by the Contract Manager). For the tertiary data, a QC check will be performed on 20% of the records. The QC checks will be documented and the documentation record will be placed in the final evidence file.

To enable efficient and accurate documentation, tracking, retrieval, use, and presentation of field and laboratory data, this information will be transcribed or downloaded into a computerized database located at PRS and/or Foth & Van Dyke. The database system will be used to collect, organize, revise, protect, and interrogate project-specific data. The database system will be structured to load electronic data, and non-electronically stored data will be hand entered. In addition, data summary tables can be generated according to sample media, sampling location, and other major variables as dictated by project requirements.

B-10.5 Data Analysis

Data analysis procedures are provided in the Remedial Design Work Plan, the Verification Sampling Plan, and the FSP.

B-10.6 Data Assessment

This section describes how data obtained during the Phase I and Phase II projects will be assessed and then displayed in tabular fashion. The information contained within the permanent data record will be used to prepare tabular displays of data sets that can be statistically manipulated and evaluated to ease decision-making. Such tables will include data from the data sets, as well as the statistics derived from the data evaluation (i.e., mean, median, standard deviation, etc.). A statistical software program will be used to perform the statistical calculations.

Both the working data record, as well as the permanent data record, will be managed and presented in a tabular format. The raw data obtained from the field, which will be entered and stored within the electronic database, can be presented in a tabular format. Information such as PID and/or FID readings, depth to sediments, or specific conductance, will be sorted and have the ability to be displayed as a table. In addition, the analytical results obtained directly from the laboratory will be presented in tabular format. Upon completion of the validation process, the information in the permanent data record will be displayed in a tabular format. The information will be exported from the electronic database system and a spreadsheet software program (e.g., Microsoft Access or Excel) will be used to display the information in a tabular format. This section of the Data Management Plan provides the procedures and format for the tabular displays

Analytical data will be reported digitally in a tabular format with the following fields for each record.

- Sampling Date: Month, day, and year;
- Sample Location
- Sample Type: Regular, duplicate(s), trip blank(s), equipment blank(s), verification resample(s), etc.;
- Species Name: PCB, TSS, etc.;
- Concentration (results);
- Concentration Units: mg/l, standard units for pH, degrees centigrade (˚C) for temperature, mmhos/cm for specific conductance, etc.;
- Detected: Yes or No; (a “U” qualifier means No, absence means Yes);

- Reporting Limit;
- Method Detection Limit;
- Analytical method;
- Chemical Abstract Service Registration Number (CAS);
- Estimated Value: (a "J" qualifier means Yes, absence means No): If a value is estimated, use the comment field to explain why.
- Comment: Analytical lab and/or field personnel comments regarding the reported results. For example, if the result is estimated due to dilution necessary to run the analysis, include the dilution factor.

B-10.7 Data Tracking

Every data set received from analytical laboratories and measurement collected from the field will be individually tracked. Analytical laboratory reports of chemical analysis results will be tracked in a consistent fashion. Every data set will be assigned a unique identifier. The date of receipt, status of data validation, and status of database entry for each data set will be tracked and recorded in the project database, and through the use of project data management control memorandums.

B-10.8 Data Storage and Retrieval

A copy of all documents related to sample collection and analysis will be kept in project files. Documents will be maintained, including planning documents such as this QAPP, field logbooks, daily summary sheets, and reports or technical memoranda that summarize analytical results and other findings. All documents will be assigned a unique identifier by the originating contractor. The document identifier should consist of three parts, the first part being an abbreviation of the contractor's name, the second part being the year of production, and the third part being a sequence number to ensure a unique identifier. PRS will create a master list of all documents. See Section B-3.2.3 for an overall description of project document management.

B-10.9 Data Security

B-10.9.1 Procedures for computer security

Computer security is accomplished via the Windows Operating System. Access to the computers will be by User ID and password assigned by the Network Administrator. Stand-alone computers/laptops will require a list of users/passwords that is maintained on the individual computers. Only the Network Administrator will have administrative rights on the computers to prevent the user/password list from being compromised.

B-10.9.2 Procedures for data security

Independent of computer security, databases can maintain their own user/password lists. Here the user rights are more rigidly defined. Typically, the following scheme suits most security needs:

Group	Members	Rights
Users	Project Managers	Read
Editors	Data Validators	Read/Write/Change
Administrators	Data Administrators	Read/Write/Change/Delete

B-10.10 Data Handling Equipment

Computerized data management systems will be used to the extent possible to maximize integrity of data handling and analysis procedures. Recommended automated systems for this project cover activities associated with fieldwork, laboratory analyses, and final data presentation. The data management system will be compliant with USEPA Good Automated Laboratory Practices. The software suite of the automated system will include the following:

- Software to support field crews in the recording of sampling information and production of COC forms, sample analysis request forms, and packing lists;

- Software to record analytical results for environmental and quality control samples and summarize this information to support the validation of data and preparation of quality control reports;

- Windows-based relational database to store validated data and all associated information (e.g., station and sample descriptions) and allow flexible selection and export of data to analytical software;

- Other general- and special-purpose software, including spreadsheets, statistical software, text editors, and models to be used for data transformation, analysis, or presentation; and

Although each of the software elements described above can be used alone, automated transfer of data enables elements to work as an integrated system that supports all data management tasks and minimizes transcription errors. Laboratory personnel will enter all biographical information, sample analytical results and associated QC data into their laboratory information management systems (LIMS). An electronic version will be transmitted to the Independent Data Validator along with the data packages. All data generated by analytical laboratories will be reported in a pre-defined electronic format. The Independent Data Validator will conduct data validation as discussed in Section D. Upon completion of data validation, the Independent Data Validator will add data qualifiers to the data. Validated data will be stored in a database designed so that data integrity is automatically maintained whenever data are added, edited, or deleted.

C-1 Assessments & Response Actions

Performance and system audits are critical to ensuring technical and procedural compliance with the QAPP/FSP. Purposes of the audits are to:

- Verify that field and laboratory quality assurance procedures called for in this QAPP/FSP are properly followed and executed;

- Confirm appropriate documents are properly completed and are kept current and orderly;

- Ensure measurement systems are accurate; and

- Identify nonconformance or deficiencies and to initiate necessary corrective actions.

Project Managers and Laboratory QA Manager are responsible for ensuring conformance with standard operating procedures. Activities selected for audit will be evaluated against specified requirements, which will include an evaluation of the method, procedures, and instructions. Documents and records will be examined as necessary to evaluate whether the QA program is effective and properly implemented. Reports and recommendations must be prepared on all audits and submitted to the QA Coordinator for retention in the project files.

C-1.1 Planned Assessments

Planning, scheduling, and conducting of QA audits and surveillances are required to verify site activities are being performed efficiently in conformance with approved plans, standards, federal and state regulatory requirements, sound scientific practices, and contractual requirements. Planned and scheduled audits may be performed by the QA Manager, or designee, to verify compliance with aspects of the QA program and to evaluate the effectiveness of the QA program. Audits include an objective examination of work areas, activities, processes, review and documents and records, interviews with project personnel, and review of plans and standards.

Internal review of the sampling program will be conducted on a regular basis during the investigation phase. Reviewers will pay particular attention to the sampling program with respect to representativeness, comparability, and completeness of the specific measurement parameters involved.

C-1.1.1 Field Audits

Field documentation (e.g., COC, field daily sheets, and log books) will be reviewed as generated, by the Project Manager or designee for accuracy, completeness, and compliance with QAPP requirements. Project Managers will audit field-sampling procedures periodically for compliance with QAPP procedures. The auditor will check that:

- Sampling protocols are being followed;

- Field measurements are done correctly;

- Samples are placed in proper containers;
- Samples are stored and transported properly; and
- Field documentation is completed.

The results of the field audit will be summarized by the QA Manager or his/her designee in a technical report (or memorandum) and submitted to the Project Coordinator for review. If the field audit identifies that corrective actions are required for field activities, the Project Coordinator or designee, with assistance from the QA Manager, will implement appropriate corrective actions immediately, or as required to meet the DQOs of the project. The QA Manager may conduct subsequent field audits to confirm that corrective actions were implemented as required and to verify that QA procedures are maintained throughout the investigation. All documentation prepared for this system audit will be included in the final evidence file for the project.

External field audits may be conducted by the USEPA. Audits may be conducted at any time during field operations. These audits may or may not be announced and are at the discretion of the USEPA.

C-1.1.2 Laboratory Audits

The Laboratory QA Manager may conduct internal system audits. An internal audit is a qualitative evaluation of all components of the laboratory quality control measurement system. The audit serves to determine if all measurement systems are being used appropriately. The system audits are conducted to evaluate the following:

- Sample handling procedures;
- Calibration procedures;
- Analytical procedures;
- QC results;
- Safety procedures;
- Record keeping procedures; and
- Timeliness of analysis and reporting.

The Laboratory QA Manager will review internal laboratory performance. The Laboratory QA Manager will evaluate laboratory precision and accuracy by comparing results of duplicate samples, QC samples, spikes, and blanks. When a beyond-control limit situation is encountered, analytical results are checked by the laboratory manager or other client services individual prior to distribution.

In addition, laboratories are subject to external audits by PRS or the agencies. The focus of these audits is to assess general laboratory practices and conformance to the QAPP. PRS, the OSR, and the OSC reserve the right to conduct an on-site audit of the laboratory prior to the start of analyses for this project and at any time during the course of the project as deemed necessary.

If performed, the results of an external laboratory audit will be summarized by the auditing authority in a technical report and submitted to the laboratory and Project Manager within 10 days of completion of the audit (recommended). The audit should summarize the findings and/or deficiencies related to sample handling, sample analysis, data reporting, and compliance to the project QAPP. If the audit identifies that corrective actions are required to meet the DQOs of the project, the laboratory should be given an opportunity to respond to the deficiencies and/or implement corrective actions as needed. The QA Manager then bears responsibility to assess whether corrective actions were implemented by the laboratory and may conduct a follow-up audit to confirm the laboratory's program. All documentation related to external laboratory audits should be included in the final evidence file for the project.

External reviews of laboratory performance may also be conducted based on evaluation of the results of check samples analyzed as part of the USEPA and/or state certification requirements. In addition, PRS, the OSR, and the OCS may conduct performance audits by sending "double blind" performance evaluation (PE) samples (e.g., samples which are not discernable from routine field samples) to the analytical laboratory.

C-1.2 Assessment Findings and Corrective Action Responses

Corrective actions may be required for two classes of problems: analytical/equipment problems and noncompliance problems. Analytical/equipment problems may occur during sampling, sample handling, sample preparation, laboratory instrumental analysis, or data review.

For noncompliance problems, a corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem will be responsible for notifying the proper project member. If the problem is analytical in nature, information on these problems will be communicated to the Laboratory QA Manager and the Lab QA Task Coordinator, who will in turn direct information to proper project members. Implementation of corrective action will be confirmed through similar channels.

Implementation of all corrective actions will be documented. Corrective actions will be documented in the field record book and the OSC and OSR will be notified verbally within 24 hours with a written follow-up within 7 days. No staff member will initiate corrective action without prior communication of action needing correction and propose corrective action through the proper channels. If corrective actions are insufficient, the Project Manager or the Supervising Contractor's QA Manager may stop work by issuing a stop-work order.

C-1.2.1 Sample Collection/Field Measurements

Technical staff and project personnel will be responsible for reporting suspected technical or QA non-conformances or suspected deficiencies by reporting the situation to the Supervising Contractor. The Supervising Contractor will be responsible for assessing suspected problems, in consultation with the QA Manager and the PRS Project Coordinator, and making a decision based on the potential for the situation to impact data quality. If it is determined that the situation warrants a reportable non-conformance requiring corrective action, a non-conformance report will be initiated by the Field Team Leader.

The Supervising Contractor will be responsible for ensuring that corrective action for non-conformances are initiated by:

- Evaluating all reported non-conformances.
- Controlling additional work on non-conforming items.
- Determining disposition or action to be taken.
- Maintaining a log of non-conformances.
- Reviewing non-conformance reports and corrective actions taken.
- Ensuring non-conformance reports are included in the final documentation in the project files.

If appropriate, the Supervising Contractor will ensure that no additional work that is dependent on the non-conforming activity is performed until the corrective actions are completed. Corrective action for field measurements may include:

- Repeating the measurement to check errors.
- Checking for all proper adjustments for ambient conditions such as temperature (as appropriate).
- Checking batteries.
- Recalibrating.
- Replacing instrument or measurement devices.
- Stopping work (if necessary).

C-1.2.2 Laboratory Analyses

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action taken is somewhat dependent on the analysis and the event. The laboratory will have a written SOP, a part of the laboratory QAPP, specifying corrective action to be taken when an analytical error is discovered or the analytical system is determined to be out of control. The SOP requires documentation of the corrective action and notification by the analyst about the errors and corrective procedures. Laboratory personnel are alerted that corrective actions may be necessary if:

- QC data are outside the warning or acceptable windows for precision and accuracy.
- Blanks contain target analytes above acceptable levels.
- Undesirable trends are detected in spike recoveries or RPD between duplicates.
- Unusual changes in detection limits occur.

- Deficiencies are detected by the QA Department during internal or external audits or from results of performance evaluation (PE) samples.

- Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst, who reviews preparation or extraction procedures for possible errors, checks instrument calibrations, spike and calibration mixes, instrument sensitivity, and so on. If problems persist or cannot be identified, matters are referred to the laboratory supervisor, manager and/or QA department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the QA department. Corrective action may include:

- Re-analyzing the samples, if sample or extract volume is adequate and holding time criteria permits,

- Re-sampling and/or reanalyzing,

- Evaluating and amending sampling procedures,

- Evaluating and amending analytical procedures, or

- Accepting data and acknowledging the level of uncertainty.

If re-sampling is deemed necessary due to laboratory problems, the Project Manager must identify the appropriate approach, including cost recovery from the laboratory for the additional sampling required.

C-2 Reports to Management

Quality control measures being implemented on the project will be evaluated for compliance with Project QA/QC objectives by the Supervising Contractor and QA Manager, with input from the Independent Data Validator evaluating data usability. Results of the QA/QC evaluation will be provided to PRS, USEPA and WDNR as part of the month's progress reports described in Section A-9.2. The QA/QC evaluation may include:

- Changes in the QAPP;
- Summary of QA/QC programs;
- Results of system and performance audits;
- Significant QA/QC problems, recommended solutions, and results of corrective action;
- Data quality assessment;
- Evaluation of compliance with data quality objectives and the resulting impact on decision making; and
- Limitations on the use of measurement data.

D-1 Data Review, Validation & Verification Methods

D-1.1 Laboratory Validation

All data collected as part of this monitoring plan will be consistent with this QAPP/FSP. All data reports (Level III analyses) will be validated using guidance from the USEPA National Functional Guidelines for Organics (USEPA, 1999). Criteria for assessment (e.g., DQOs contained in these referenced documents) are superceded by the methods and this QAPP/FSP.

A full validation of 20% of all data and a forms review of the remaining 80% of the data will be conducted. In addition, a full validation will be conducted on the first data package received from each laboratory to ensure the requirements of this QAPP are being met. Validation of laboratory data packages will include an assessment of compliance with method guidelines and project specific requirements. Specifically included will be an evaluation of holding times, blank contamination, calibration requirements (initial and continuing), surrogate spike recovery, matrix spike and duplicate recoveries, instrument performance, and compound identification and quantitation, as applicable.

The following steps are included as part of the data validation process:

- Evaluation of completeness of data package;
- Verification that field COC forms were completed and that samples were handled properly;
- Verification that holding times were met for each parameter. Holding time exceedances will be documented. Data for all samples exceeding holding time requirements will be flagged as holding time exceeded. The Validator on a case-by-case basis will make the decision as to which qualifiers are more appropriate;
- Verification that parameters were analyzed according to methods specified;
- Review of QA/QC data (i.e., assurance that duplicates, blanks, and spikes were analyzed on the required number of samples as specified in the method; verification that duplicate and matrix spike recoveries were acceptable); and
- Investigation of anomalies identified during review. Anomalies that are identified will be discussed with the QA Manager and the Laboratory Manager.

The forms to be used for the independent data validation are included in Appendix E. Deficiencies discovered as a result of data validation, as well as corrective actions implemented in response, will be documented and submitted in the form of a written report with supporting documentation supplied as check sheets. USEPA Functional Guidelines will be used as guidance to perform data validation. QC requirements specified in the QAPP will take precedence over the Functional Guidelines requirements. When no specific guidance exists, project specifications and method requirements will be utilized. A list of data qualifiers and their associated meaning are summarized in Appendix D.

Complete analytical results will be reported at the completion of the project (or otherwise as scheduled). Laboratories will send data simultaneously to the Independent Data Validator, PRS and the Supervising Contractor. Analytical results will be presented in tabular form at two different levels of detail:

- Data validation reports will include every individual analytical result, including field duplicates (or replicates) and laboratory matrix spike and matrix spike duplicates.

- Technical study reports will be generated by the data user that will present results that have been averaged across field duplicates to provide a single result for each sample identifier suitable for data interpretation and decision-making. All averaged data will be identified as such.

Data qualifiers will be appended to each reported analytical result, and analytical results will be reported only to the appropriate number of significant digits, as determined during data validation. The Independent Data Validator will add data qualifiers to the database after the completion of data validation and prior to final data reporting. Data validation codes are provided in Appendix D. Data management personnel will update the database based on the following:

- Undetected analytical results will be reported as less than the detection limit.

- Different detection limits have been reported for the same sample (e.g., for field duplicates), the lowest detection limit will be reported in data summary reports.

If undetected values are averaged with detected values, or otherwise used for data interpretation, the detection limit will be used.

D-1.2 Data Analysis

The DQOs for this project have been developed using criteria identified in Section 1.5 of the *Phase I Remedial Design Work Plan Narrative*. This section summarized (in table form) the relevant soil cleanup standards for PCBs and project specific action levels for PCBs (Table A-7-1). The data validators will use this information when evaluating the applicability of the analytical laboratory data for its intended use (e.g., presence of contamination at or above the cleanup level), and to resolve analytical issues as well as limitations in the data set. Several decision rules were developed to guide the data user as to the applicability of the data. These decision rules are based on comparing results to the project-specific cleanup levels provided in the RD Work Plan:

- If the total PCB concentration is below the cleanup level in a sample, then the data suggests that the sample does not warrant further evaluation and the location will be removed from further investigation. "Location" is used as a generic term used to reference specific limits/boundaries associated with that sample as determined by the requirements of the Field Sampling Plan (FSP) and Verification Sampling Plan (VSP).

- If the total PCB concentration is above the cleanup level in a sample, then the data suggest that the location (limits/boundaries) as determined by the FSP and VSP will require either supplemental samples to further characterize the extent of the residual contamination, or will be remediated and confirmation samples will be collected from these locations following completion of remediation.

- If the total PCB concentration is reported as a non-detect concentration above the cleanup level, re-sampling and additional analyses may be warranted to achieve a lower laboratory-reporting limit. Non-detect results reported above the clean-up level will be evaluated on a case by case basis. Further evaluation may be necessary by the collection of supplement samples and possible use of an alternate test method for analysis. A thorough discussion of the logic and justification for further testing or no further testing will be provided in the remedial report.

- If analytical results are rejected due to sample handling or laboratory performance, supplemental samples will be collected (if possible) to obtain sufficient information for decision-makers.

- If analytical results are rejected due to sample matrix issues (presence of interferents), additional samples may need to be collected and analyzed using an alternate method for analysis. A thorough discussion of the logic and justification for further testing or no further testing will be described in the individual validation reports and the QA Report to Management.

E-1 References

ASTM, 1996. *Annual Book of ASTM Standards, Volume 04.08, Soil and Rock (I).* American Society for Testing and Materials. Philadelphia, PA. 1996.

B&B, 1992. *Draft Alternative Array Document*. July 1992.

BBL, 1995a. *Groundwater Investigation Report (ASRI).* April 1995.

BBL, 1995b. *Alternative Specific Remedial Investigation Report.* October 1995.

BBL, 1998. *Feasibility Study Report, Sheboygan River and Harbor Site.* April 1998.

BBL, 1999a. *Tecumseh Memorandum, External Source Assessment*. November 1999.

BBL, 1999b. *Interim Monitoring Program, Sheboygan River and Harbor, 1998 Progress Report*. February 1999.

NIOSH, 1994. *NIOSH Manual of Analytical Methods, Fourth Edition,* August 1994.

PRS, 2003. *Draft Field Sampling Plan*, Upper River Phase I and II, Sheboygan River and Harbor Superfund Site, Sheboygan County, Wisconsin. December 2003.

PRS and URS, 2003. *Remedial Design Work Plan Narrative*, Upper River - Phases I and II, Sheboygan River and Harbor Superfund Site, Sheboygan County, Wisconsin. December 2003.

USEPA, 1996. *Immunoassay Guidelines for Planning Environmental Projects.* USEPA New England Region I. October 1996.

USEPA, 1997. *Region 5 Standard Operating Procedure for Validation of CLP Organic Data.* dated April 1991, Revised February 1997.

USEPA, 1998. *Requirements for Quality Assurance Project Plans for Environmental Data Operations, External Review Draft Final*. EPA QA/R-5. October 1998.

USEPA, 1998. *Test Methods for Evaluating Solid Waste.* SW-846 3rd ed. Washington, DC, 1986, 1996, updated 1998.

USEPA, 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA-540/R-99-008. October 1999.

USGS, 1990. *Daily Mean Flow Date for the Sheboygan River*. 1990

USEPA, 2000. *Region 5 Instructions on the Preparation of A Superfund Division Quality Assurance Project Plan*. June 2000

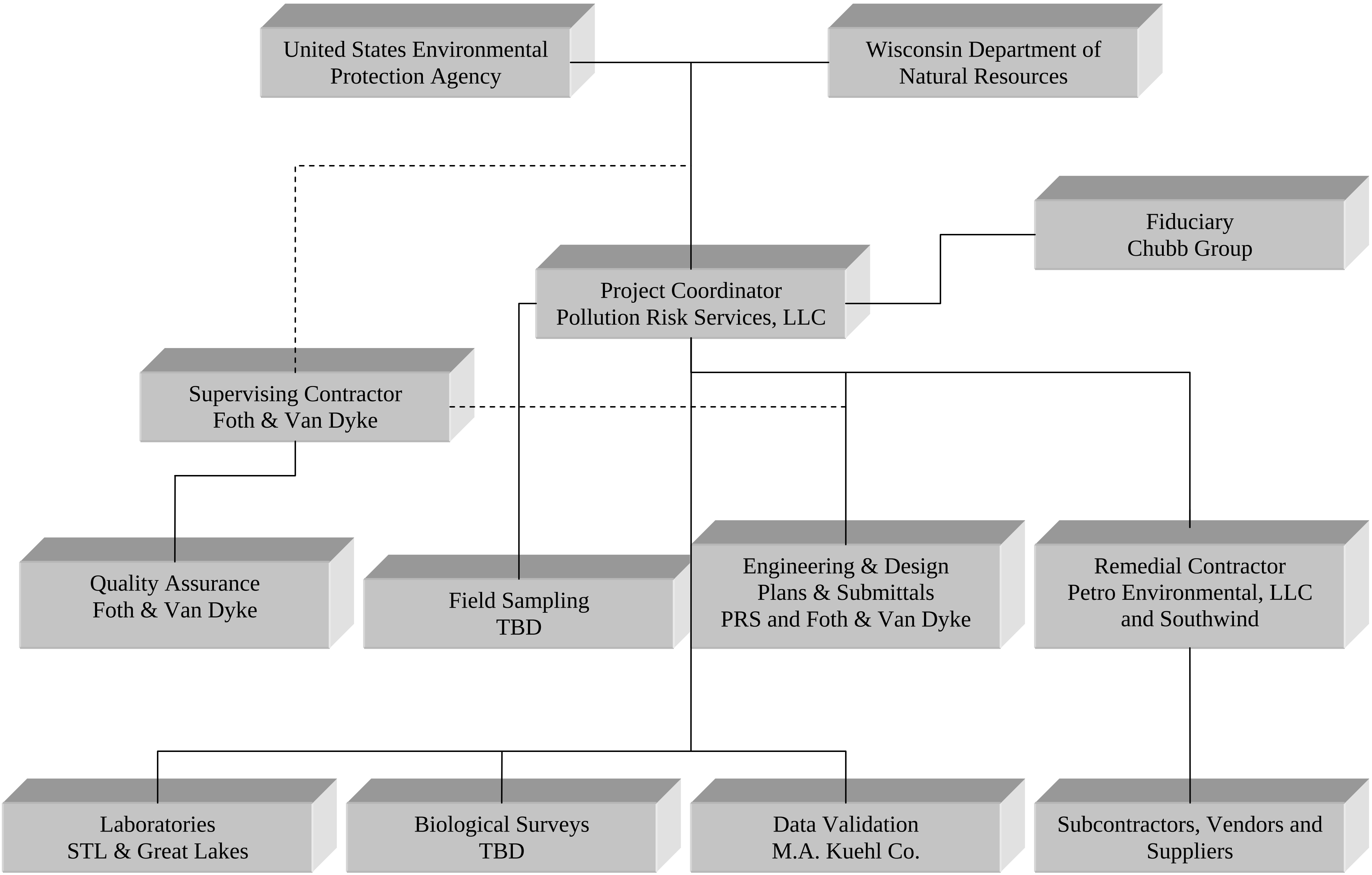
USEPA, 2002. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA-540/R-01-0084-00-008. July 2002.

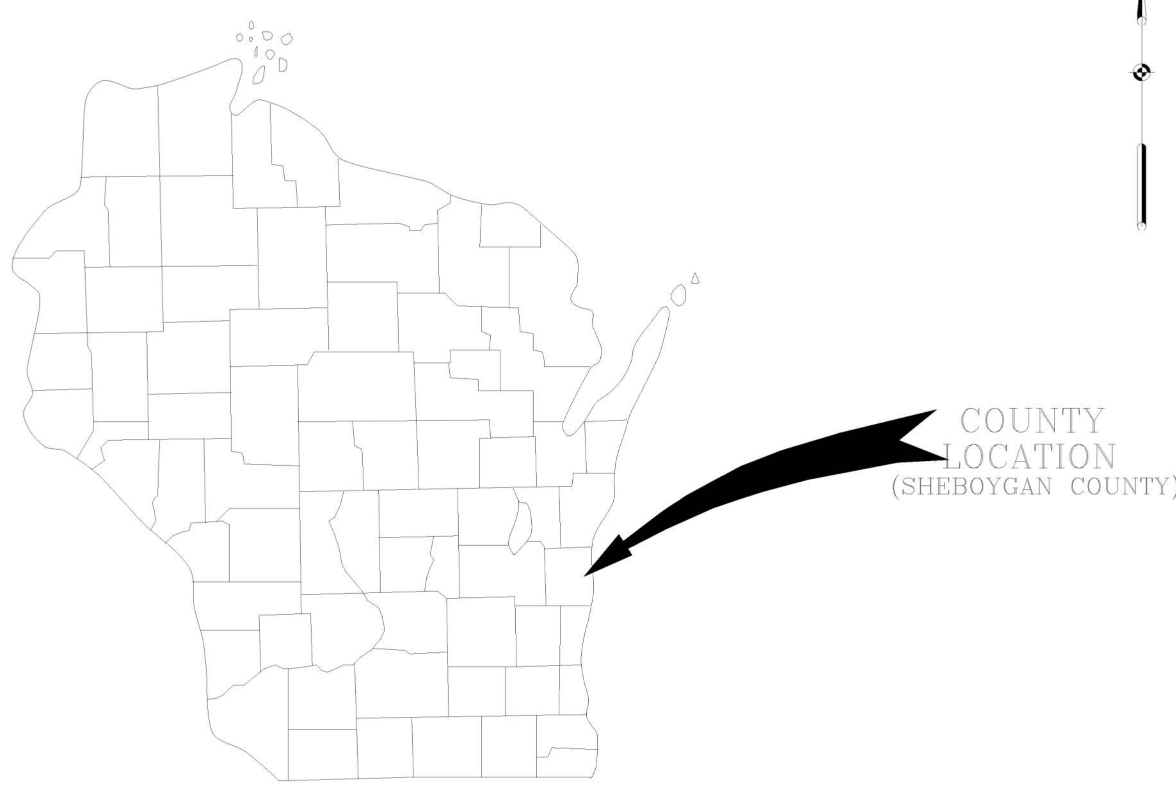
USEPA, 2000 *Guidance for the Data Quality Objectives Process*. EPA QA/G-4. EPA/600/R-96/055. USEPA Office of Environmental Information, Washington, D.C. August 2000.

USEPA, 1998 *Test Methods for Evaluating Solid Waste.* Office of Solid Waste and Emergency Response. Washington, D.C. Third Edition, April 1998.

ANSI/ASQC E4-1994. *American National Standard ANSI/ASQC E4-1994, Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*. 1994

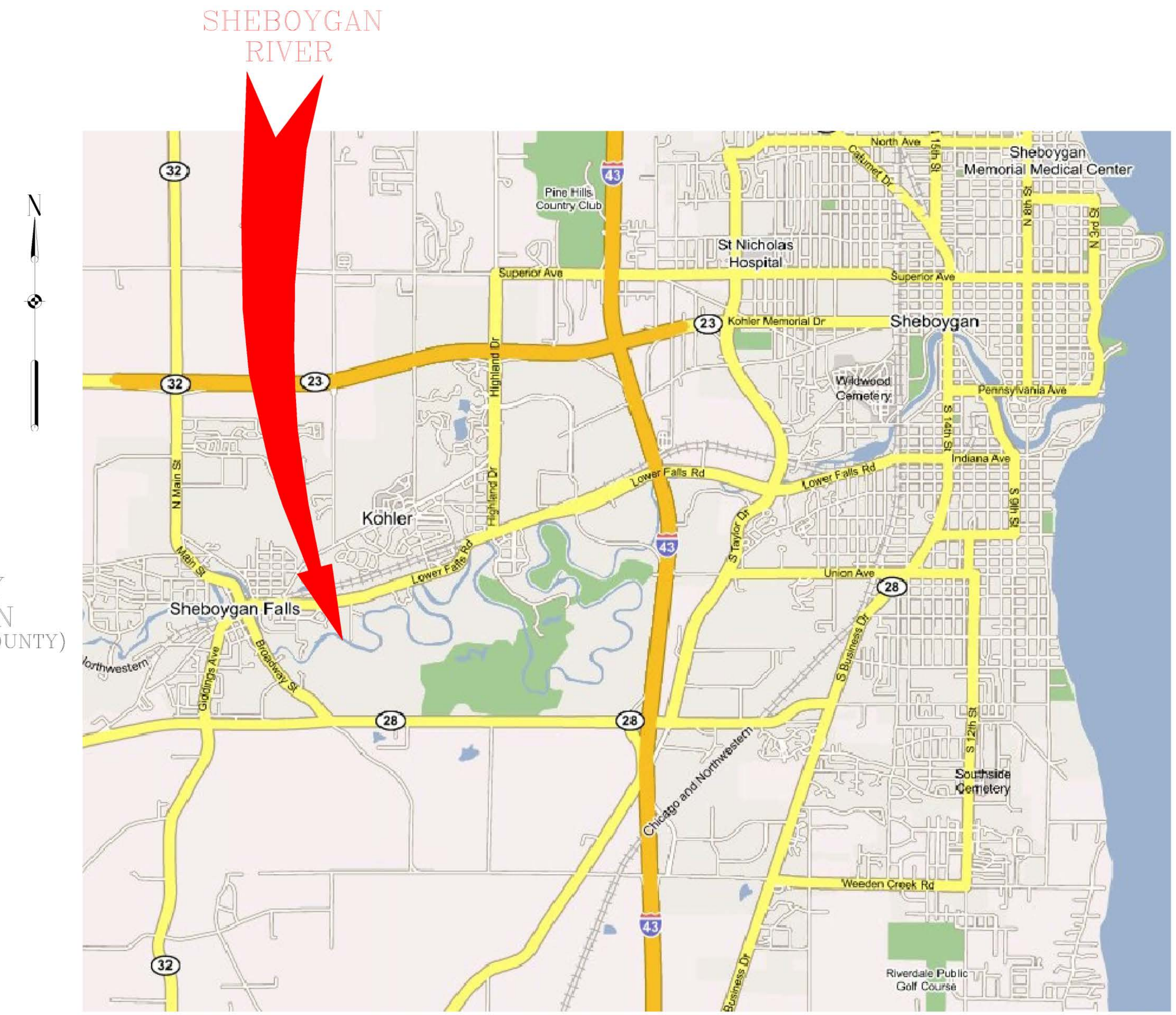
SHEBOYGAN RIVER, UPPER RIVER REMEDIATION ORGANIZATIONAL CHART





COUNTY LOCATION MAP

NOT TO SCALE



SITE LOCATION MAP

NOT TO SCALE

FILE NAME: $$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$$

DRAWN BY: JRB2 DATE: MAY 2005

Foth & Van Dyke

REUSE OF DOCUMENTS

THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△			APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDSBY ______ DATE ______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
100% DESIGN – PHASE II – UPPER RIVER
ARMORED, NEAR-SHORE &
SOFT SEDIMENTS REMEDIATION
SHEBOYGAN FALLS, WISCONSIN

SITE LOCATION

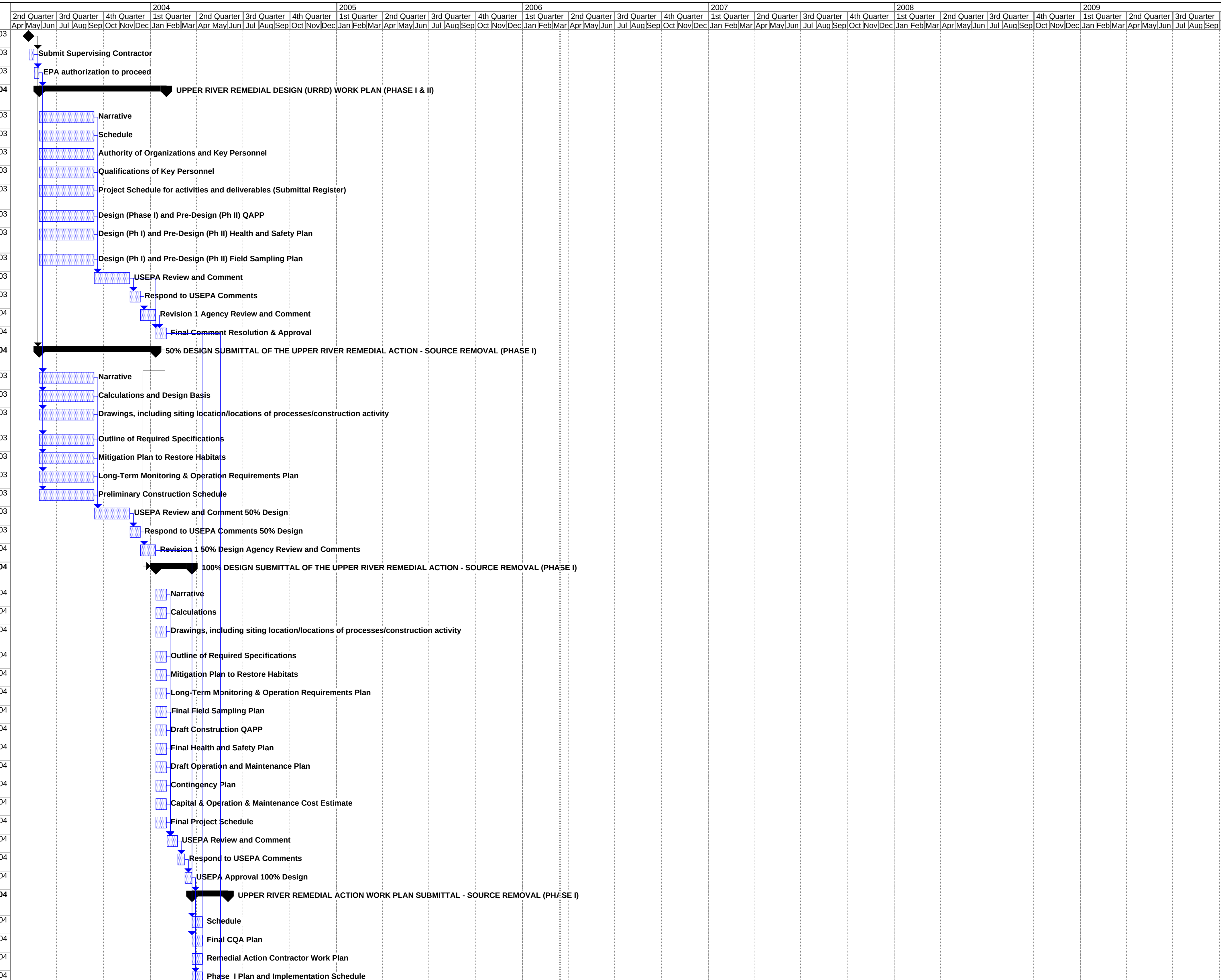
SCALE NOT TO SCALE

SCOPE ID 05P031

DRAWING NO. 2

Upper River Remedial Design Work Plan
Pre-Design Investigation and Design Schedule
Sheboygan River and Harbor Superfund Site

ID	Task Name	Duration	Start	Finish
1	Lodging of Consent Decree	1 day	Wed 5/7/03	Wed 5/7/03
2	Submit Supervising Contractor	10 days	Thu 5/8/03	Sat 5/17/03
3	EPA authorization to proceed	10 days	Sun 5/18/03	Tue 5/27/03
4	**UPPER RIVER REMEDIAL DESIGN (URRD) WORK PLAN (PHASE I & II)**	**250 days**	**Wed 5/28/03**	**Sun 2/1/04**
5	Narrative	108 days	Wed 5/28/03	Fri 9/12/03
6	Schedule	108 days	Wed 5/28/03	Fri 9/12/03
7	Authority of Organizations and Key Personnel	108 days	Wed 5/28/03	Fri 9/12/03
8	Qualifications of Key Personnel	108 days	Wed 5/28/03	Fri 9/12/03
9	Project Schedule for activities and deliverables (Submittal Register)	108 days	Wed 5/28/03	Fri 9/12/03
10	Design (Phase I) and Pre-Design (Ph II) QAPP	108 days	Wed 5/28/03	Fri 9/12/03
11	Design (Ph I) and Pre-Design (Ph II) Health and Safety Plan	108 days	Wed 5/28/03	Fri 9/12/03
12	Design (Ph I) and Pre-Design (Ph II) Field Sampling Plan	108 days	Wed 5/28/03	Fri 9/12/03
13	USEPA Review and Comment	70 days	Sat 9/13/03	Fri 11/21/03
14	Respond to USEPA Comments	21 days	Sat 11/22/03	Fri 12/12/03
15	Revision 1 Agency Review and Comment	30 days	Sat 12/13/03	Sun 1/11/04
16	Final Comment Resolution & Approval	21 days	Mon 1/12/04	Sun 2/1/04
17	**50% DESIGN SUBMITTAL OF THE UPPER RIVER REMEDIAL ACTION - SOURCE REMOVAL (PHASE I)**	**229 days**	**Wed 5/28/03**	**Sun 1/11/04**
18	Narrative	108 days	Wed 5/28/03	Fri 9/12/03
19	Calculations and Design Basis	108 days	Wed 5/28/03	Fri 9/12/03
20	Drawings, including siting location/locations of processes/construction activity	108 days	Wed 5/28/03	Fri 9/12/03
21	Outline of Required Specifications	108 days	Wed 5/28/03	Fri 9/12/03
22	Mitigation Plan to Restore Habitats	108 days	Wed 5/28/03	Fri 9/12/03
23	Long-Term Monitoring & Operation Requirements Plan	108 days	Wed 5/28/03	Fri 9/12/03
24	Preliminary Construction Schedule	108 days	Wed 5/28/03	Fri 9/12/03
25	USEPA Review and Comment 50% Design	70 days	Sat 9/13/03	Fri 11/21/03
26	Respond to USEPA Comments 50% Design	21 days	Sat 11/22/03	Fri 12/12/03
27	Revision 1 50% Design Agency Review and Comments	30 days	Sat 12/13/03	Sun 1/11/04
28	**100% DESIGN SUBMITTAL OF THE UPPER RIVER REMEDIAL ACTION - SOURCE REMOVAL (PHASE I)**	**71 days**	**Mon 1/12/04**	**Mon 3/22/04**
29	Narrative	21 days	Mon 1/12/04	Sun 2/1/04
30	Calculations	21 days	Mon 1/12/04	Sun 2/1/04
31	Drawings, including siting location/locations of processes/construction activity	21 days	Mon 1/12/04	Sun 2/1/04
32	Outline of Required Specifications	21 days	Mon 1/12/04	Sun 2/1/04
33	Mitigation Plan to Restore Habitats	21 days	Mon 1/12/04	Sun 2/1/04
34	Long-Term Monitoring & Operation Requirements Plan	21 days	Mon 1/12/04	Sun 2/1/04
35	Final Field Sampling Plan	22 days	Mon 1/12/04	Mon 2/2/04
36	Draft Construction QAPP	21 days	Mon 1/12/04	Sun 2/1/04
37	Final Health and Safety Plan	21 days	Mon 1/12/04	Sun 2/1/04
38	Draft Operation and Maintenance Plan	21 days	Mon 1/12/04	Sun 2/1/04
39	Contingency Plan	21 days	Mon 1/12/04	Sun 2/1/04
40	Capital & Operation & Maintenance Cost Estimate	21 days	Mon 1/12/04	Sun 2/1/04
41	Final Project Schedule	21 days	Mon 1/12/04	Sun 2/1/04
42	USEPA Review and Comment	21 days	Tue 2/3/04	Mon 2/23/04
43	Respond to USEPA Comments	14 days	Tue 2/24/04	Mon 3/8/04
44	USEPA Approval 100% Design	14 days	Tue 3/9/04	Mon 3/22/04
45	**UPPER RIVER REMEDIAL ACTION WORK PLAN SUBMITTAL - SOURCE REMOVAL (PHASE I)**	**70 days**	**Tue 3/23/04**	**Tue 6/1/04**
46	Schedule	21 days	Tue 3/23/04	Mon 4/12/04
47	Final CQA Plan	21 days	Tue 3/23/04	Mon 4/12/04
48	Remedial Action Contractor Work Plan	21 days	Tue 3/23/04	Mon 4/12/04
49	Phase I Plan and Implementation Schedule	21 days	Tue 3/23/04	Mon 4/12/04



Project: Sheboygan River

Task | Progress | Summary | Rolled Up Critical Task | Rolled Up Progress | External Tasks | Group By Summary

Critical Task | Milestone | Rolled Up Task | Rolled Up Milestone | Split | Project Summary | Deadline

Upper River Remedial Design Work Plan
Pre-Design Investigation and Design Schedule
Sheboygan River and Harbor Superfund Site

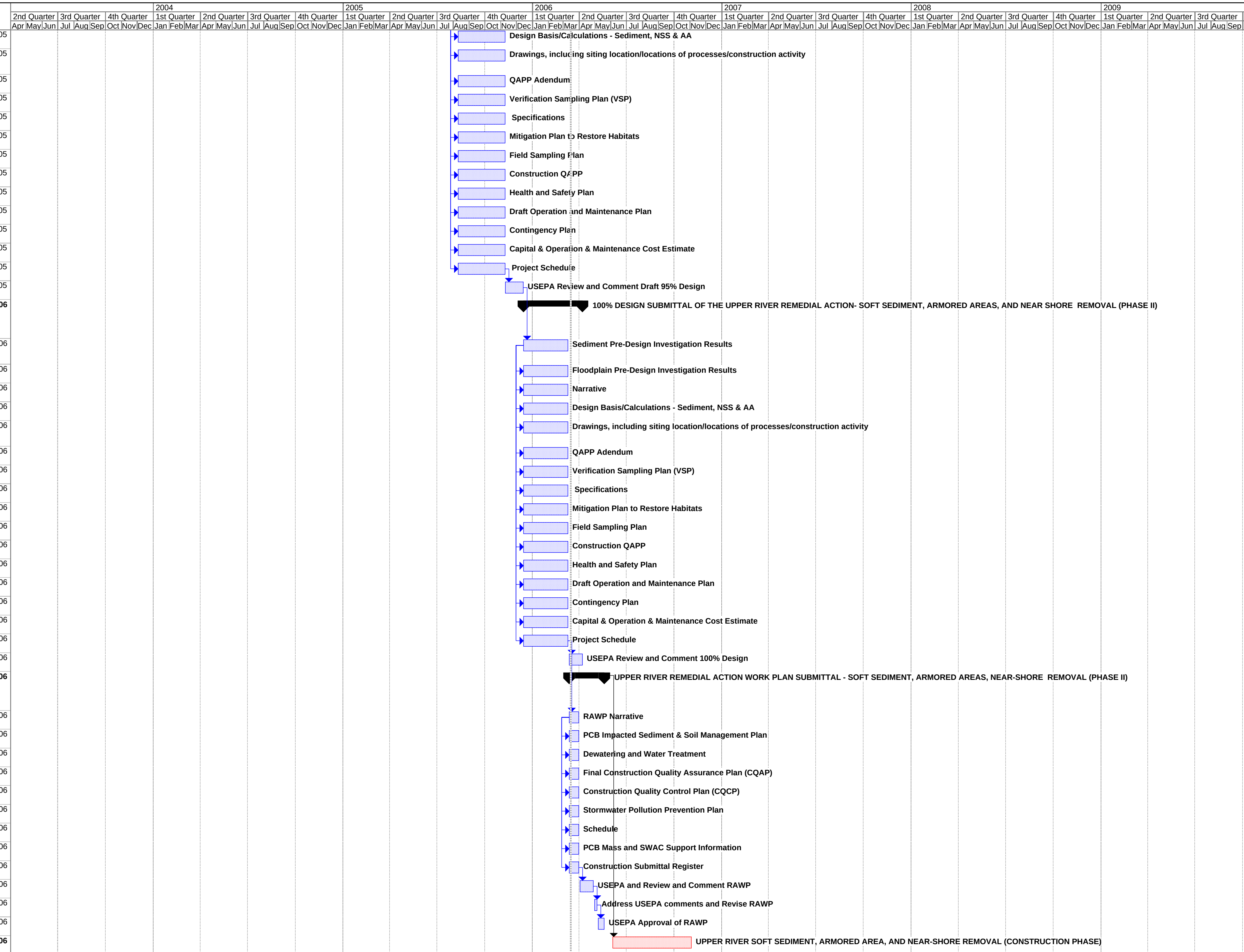
ID	Task Name	Duration	Start	Finish
50	Final CQAP	21 days	Tue 3/23/04	Mon 4/12/04
51	Methods for Satisfying Permit Requirements	21 days	Tue 3/23/04	Mon 4/12/04
52	Methodology for Implementation of the Contingency Plan	21 days	Tue 3/23/04	Mon 4/12/04
53	Form Upper River Remedial Action Project Team	21 days	Tue 3/23/04	Mon 4/12/04
54	Contractor Quality Control/Assurance Plan	21 days	Tue 3/23/04	Mon 4/12/04
55	Decontamination Procedures	21 days	Tue 3/23/04	Mon 4/12/04
56	USEPA and Review and Comment RAP	21 days	Tue 4/13/04	Mon 5/3/04
57	Address USEPA comments and Revise RAP	14 days	Tue 5/4/04	Mon 5/17/04
58	USEPA Approval of RAP	14 days	Tue 5/18/04	Tue 6/1/04
59	**PHASE II PRE-DESIGN INVESTIGATION**	**216 days**	**Mon 4/12/04**	**Tue 11/16/04**
60	Floodplain Sampling	21 days	Mon 4/12/04	Sun 5/2/04
61	PCB Analysis of Floodplain Samples	55 days	Thu 4/15/04	Wed 6/9/04
62	Data Validation	35 days	Sun 5/30/04	Sun 7/4/04
63	Agency Review of Data	35 days	Fri 6/25/04	Fri 7/30/04
64	Comment Resolution	21 days	Sat 7/31/04	Fri 8/20/04
65	Perform Critical Habitat Evaluation	45 days	Sat 8/21/04	Tue 10/5/04
66	Agency Review of Evaluation	21 days	Wed 10/6/04	Tue 10/26/04
67	Comment Resolution on Habitat Evaluation	21 days	Wed 10/27/04	Tue 11/16/04
68	Sediment Probing	65 days	Tue 5/18/04	Fri 7/23/04
69	Sediment Sample Collection	75 days	Mon 5/24/04	Sun 8/8/04
70	PCB Analysis of Sediment Samples	75 days	Fri 6/4/04	Wed 8/18/04
71	Data Validation	65 days	Fri 7/2/04	Sun 9/5/04
72	Agency Review of Data	45 days	Tue 9/7/04	Thu 10/21/04
73	Comment Resolution	21 days	Fri 10/22/04	Thu 11/11/04
74	**75% DESIGN SUBMITTAL OF THE UPPER RIVER REMEDIAL ACTION- SOFT SEDIMENT, ARMORED AREAS, AND NEAR SHORE REMOVAL (PHASE II)**	**125 days**	**Mon 2/21/05**	**Wed 8/10/05**
75	Sediment Pre-Design Investigation Results	48 days	Mon 2/21/05	Mon 4/25/05
76	Floodplain Pre-Design Investigation Results	56 days	Mon 2/21/05	Thu 5/5/05
77	Narrative	62 days	Mon 2/21/05	Fri 5/13/05
78	Design Basis/Calculations - Sediment	56 days	Mon 2/21/05	Thu 5/5/05
79	Design Basis/Calculations - Floodplains	56 days	Mon 2/21/05	Thu 5/5/05
80	Design Basis/Calculations - NSS & AA	56 days	Mon 2/21/05	Thu 5/5/05
81	Drawings, including siting location/locations of processes/construction activity	56 days	Mon 2/21/05	Thu 5/5/05
82	QAPP Adendum	62 days	Mon 2/21/05	Fri 5/13/05
83	Verification Sampling Plan (VSP)	62 days	Mon 2/21/05	Fri 5/13/05
84	Outline of Required Specifications	62 days	Mon 2/21/05	Fri 5/13/05
85	Mitigation Plan to Restore Habitats	62 days	Mon 2/21/05	Fri 5/13/05
86	Final Field Sampling Plan	62 days	Mon 2/21/05	Fri 5/13/05
87	Draft Construction QAPP	62 days	Mon 2/21/05	Fri 5/13/05
88	Final Health and Safety Plan	62 days	Mon 2/21/05	Fri 5/13/05
89	Draft Operation and Maintenance Plan	62 days	Mon 2/21/05	Fri 5/13/05
90	Contingency Plan	62 days	Mon 2/21/05	Fri 5/13/05
91	Capital & Operation & Maintenance Cost Estimate	62 days	Mon 2/21/05	Fri 5/13/05
92	Final Project Schedule	62 days	Mon 2/21/05	Fri 5/13/05
93	USEPA Review and Comment 75% Design PH II	48 days	Mon 5/16/05	Wed 7/20/05
94	Respond to USEPA Comments 75% Design PH II	15 days	Thu 7/21/05	Wed 8/10/05
95	**95% DESIGN SUBMITTAL OF THE UPPER RIVER REMEDIAL ACTION- SOFT SEDIMENT, ARMORED AREAS, AND NEAR SHORE REMOVAL (PHASE II)**	**90 days**	**Thu 8/11/05**	**Wed 12/14/05**
96	Sediment Pre-Design Investigation Results	65 days	Thu 8/11/05	Wed 11/9/05
97	Floodplain Pre-Design Investigation Results	65 days	Thu 8/11/05	Wed 11/9/05
98	Narrative	65 days	Thu 8/11/05	Wed 11/9/05

Project: Sheboygan River

Task; Critical Task; Progress; Milestone; Summary; Rolled Up Task; Rolled Up Critical Task; Rolled Up Milestone; Rolled Up Progress; Split; External Tasks; Project Summary; Group By Summary; Deadline

Upper River Remedial Design Work Plan
Pre-Design Investigation and Design Schedule
Sheboygan River and Harbor Superfund Site

ID	Task Name	Duration	Start	Finish
99	Design Basis/Calculations - Sediment, NSS & AA	65 days	Thu 8/11/05	Wed 11/9/05
100	Drawings, including siting location/locations of processes/construction activity	65 days	Thu 8/11/05	Wed 11/9/05
101	QAPP Adendum	65 days	Thu 8/11/05	Wed 11/9/05
102	Verification Sampling Plan (VSP)	65 days	Thu 8/11/05	Wed 11/9/05
103	Specifications	65 days	Thu 8/11/05	Wed 11/9/05
104	Mitigation Plan to Restore Habitats	65 days	Thu 8/11/05	Wed 11/9/05
105	Field Sampling Plan	65 days	Thu 8/11/05	Wed 11/9/05
106	Construction QAPP	65 days	Thu 8/11/05	Wed 11/9/05
107	Health and Safety Plan	65 days	Thu 8/11/05	Wed 11/9/05
108	Draft Operation and Maintenance Plan	65 days	Thu 8/11/05	Wed 11/9/05
109	Contingency Plan	65 days	Thu 8/11/05	Wed 11/9/05
110	Capital & Operation & Maintenance Cost Estimate	65 days	Thu 8/11/05	Wed 11/9/05
111	Project Schedule	65 days	Thu 8/11/05	Wed 11/9/05
112	USEPA Review and Comment Draft 95% Design	25 days	Thu 11/10/05	Wed 12/14/05
113	**100% DESIGN SUBMITTAL OF THE UPPER RIVER REMEDIAL ACTION- SOFT SEDIMENT, ARMORED AREAS, AND NEAR SHORE REMOVAL (PHASE II)**	**82 days**	**Thu 12/15/05**	**Fri 4/7/06**
114	Sediment Pre-Design Investigation Results	62 days	Thu 12/15/05	Fri 3/10/06
115	Floodplain Pre-Design Investigation Results	62 days	Thu 12/15/05	Fri 3/10/06
116	Narrative	62 days	Thu 12/15/05	Fri 3/10/06
117	Design Basis/Calculations - Sediment, NSS & AA	62 days	Thu 12/15/05	Fri 3/10/06
118	Drawings, including siting location/locations of processes/construction activity	62 days	Thu 12/15/05	Fri 3/10/06
119	QAPP Adendum	62 days	Thu 12/15/05	Fri 3/10/06
120	Verification Sampling Plan (VSP)	62 days	Thu 12/15/05	Fri 3/10/06
121	Specifications	62 days	Thu 12/15/05	Fri 3/10/06
122	Mitigation Plan to Restore Habitats	62 days	Thu 12/15/05	Fri 3/10/06
123	Field Sampling Plan	62 days	Thu 12/15/05	Fri 3/10/06
124	Construction QAPP	62 days	Thu 12/15/05	Fri 3/10/06
125	Health and Safety Plan	62 days	Thu 12/15/05	Fri 3/10/06
126	Draft Operation and Maintenance Plan	62 days	Thu 12/15/05	Fri 3/10/06
127	Contingency Plan	62 days	Thu 12/15/05	Fri 3/10/06
128	Capital & Operation & Maintenance Cost Estimate	62 days	Thu 12/15/05	Fri 3/10/06
129	Project Schedule	62 days	Thu 12/15/05	Fri 3/10/06
130	USEPA Review and Comment 100% Design	20 days	Mon 3/13/06	Fri 4/7/06
131	**UPPER RIVER REMEDIAL ACTION WORK PLAN SUBMITTAL - SOFT SEDIMENT, ARMORED AREAS, NEAR-SHORE REMOVAL (PHASE II)**	**50 days**	**Mon 3/13/06**	**Fri 5/19/06**
132	RAWP Narrative	15 days	Mon 3/13/06	Fri 3/31/06
133	PCB Impacted Sediment & Soil Management Plan	15 days	Mon 3/13/06	Fri 3/31/06
134	Dewatering and Water Treatment	15 days	Mon 3/13/06	Fri 3/31/06
135	Final Construction Quality Assurance Plan (CQAP)	15 days	Mon 3/13/06	Fri 3/31/06
136	Construction Quality Control Plan (CQCP)	15 days	Mon 3/13/06	Fri 3/31/06
137	Stormwater Pollution Prevention Plan	15 days	Mon 3/13/06	Fri 3/31/06
138	Schedule	15 days	Mon 3/13/06	Fri 3/31/06
139	PCB Mass and SWAC Support Information	15 days	Mon 3/13/06	Fri 3/31/06
140	Construction Submittal Register	15 days	Mon 3/13/06	Fri 3/31/06
141	USEPA and Review and Comment RAWP	20 days	Mon 4/3/06	Fri 4/28/06
142	Address USEPA comments and Revise RAWP	5 days	Mon 5/1/06	Fri 5/5/06
143	USEPA Approval of RAWP	10 days	Mon 5/8/06	Fri 5/19/06
144	**UPPER RIVER SOFT SEDIMENT, ARMORED AREA, AND NEAR-SHORE REMOVAL (CONSTRUCTION PHASE)**	**110 days**	**Mon 6/5/06**	**Fri 11/3/06**



Project: Sheboygan River

Task		Progress		Summary		Rolled Up Critical Task		Rolled Up Progress		External Tasks		Group By Summary	
Critical Task		Milestone		Rolled Up Task		Rolled Up Milestone		Split		Project Summary		Deadline	

Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Verification Sampling Plan

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Verification Sampling Plan (VSP)

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

Verification Sampling Plan (VSP)

Contents

Drawings

1 Introduction

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County (Drawing No. 1). The Site includes the former Tecumseh Manufacturing facility and the lower fourteen miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the Remedial Investigations (RI), the river was segmented in separate sections based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four miles to the Waelderhaus Dam in Kohler. The Middle River extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. The Lower River extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work which included plant site soils, groundwater, and riverbank soils was completed in 2004. Phase II remedial action work for Upper River Near-Shore Sediments, Armored Areas, and Soft Sediment deposits is scheduled for 2006 implementation. Remedial construction methods for the Floodplains are deferred pending the outcome of additional discussions between United States Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), Pollution Risk Services, LLC (PRS), and property owners of potentially impacted Floodplains.

This RD document presents the approach and rationale to verify that the Phase II RA work planned for the Upper River meets the Remediation Objectives outlined in the *Record of Decision (ROD),* (May 2000), *Consent Decree (CD),* (May 2004), and *Upper River Statement of* Work *(URSOW),* (Jan. 2003). Specific sampling procedures are provided in the *Field Sampling Plan* (Vol. II, Appendix H).

2 Objectives

2.1 Remedial Objectives

Phase II Remediation Objectives for the Site address Upper River Near-Shore Sediments, Armored Areas and Soft Sediment deposits. The *ROD* presents a complete discussion of the Remediation Objectives for the Site. A summary of the Remediation Objectives includes:

- Near-Shore Sediments:
  - The Phase I activities were to address Near-Shore Sediments with significantly elevated PCB concentration. The Near-Shore Sediments were deferred to Phase II Work activities so that only one river mobilization would be required as Phase I work did not include in-river work. Since, Near-Shore Sediments were originally a Phase I activity they will not be included as part of the overall mass (88%) and Surface Weighted Average Concentration (SWAC of less than or equal to 0.5 ppm) calculations. Near-Shore Sediments will be removed as determined by field poling

- Armored Areas:
  - The objective is to remove 88% of the remaining PCB mass in the Upper River to achieve an expected outcome of less than or equal to 0.5 ppm SWAC. Pursuant to the *URSOW*, PCB mass from the Armored Areas may be counted toward the *ROD* mass removal goal.

  - Since the actual quantity of concentration of "overburden" material is unknown, determination will be measured following removal by sampling disposal and truck weight tickets (tons).

- Soft Sediment Deposits and Armored Areas:
  - Based on the re-characterization data, the Remedial Objective is to remove 88% of the remaining PCB mass in the Upper River to achieve an expected outcome of less than or equal to 0.5 ppm SWAC.

  - As provided for in the *CD*, Pollution Risk Services, LLC may provide information to USEPA, including but not limited to post-dredging data from a significant number of Soft Sediment deposits addressed under this *URSOW*, indicating that dredging is not achieving and is unlikely to achieve an average Soft Sediment SWAC equal to or less than 0.5 ppm PCBs.

2.2 Verification Objectives

This Verification Sampling Plan (VSP) provides the methodology and outlines the data collection program to verify that the Upper River Remedial Actions meet the Performance Standards set forth in the *ROD* and as further delineated by the *URSOW* and *CD*. The VSP will reference the *Field Sampling Plan (FSP)*, (Vol. II, Appendix H) where applicable, for Standard Operating Procedures (SOPs).

Verification data will be collected from the Upper River Near-Shore Sediments, Armored Areas, and Soft Sediments.

3 Methodology

3.1 Verification Approach

Verification sampling will be performed to document attainment of the PCB mass removal and SWAC objectives. The Calculation Section of the *Sediment Removal Design* (Vol. I) provides the calculations which support the verification sampling program.

Pursuant to the *URSOW*, re-stated below in italics, sediment removal will be accomplished by dredging each targeted deposit area until any of the following criteria are met:

- *"Less than 3-4 inches, on average, of residual sediment remains in the deposit as determined by probing, or after three passes with conventional dredging equipment (or an equivalent level of effort with alternative dredging equipment), whichever goal is achieved first."*

- *"If conventional excavation methods are used, one pass (e.g., downward movement of backhoe) would allow excavation of sediment such that 3-4-inches or less of residual sediment remains."*

- USEPA determines that achieving these goals in a particular Soft Sediment deposit or set of deposits is impracticable or undesirable; USEPA may deem sediment removal complete when more than 3-4 inches of residual material or more remains in the deposit or fewer than three dredge passes have occurred.

- More than three dredging passes in an attempt to achieve a residual sediment level of less than 3-4 inches, subject to USEPA approval, may be conducted.

The in place mass is calculated by multiplying the Volume x Dry Unit Weight x Concentration. For all PCB mass removal locations, the quantities are defined in the Remedial Design.

Verification will be performed by measuring the post-removal volume of material in a selected location. The removed volume is related to the pre-remediation quantities as a % removal.

<u>PCB Mass Removal Verification</u>

- A maximum of four transects (dependent on area) spaced at approximately 12.5 feet will be established along the riverbank within the sediment portion located in a Remedial Management Units (RMU). Probe measurements will be taken every 12.5 feet along each transect. Drawing No. 2 shows a typical plan view of a probe measurement layout. Resulting probe measurements will be averaged to provide a single residual sediment thickness for the RMU.

SWAC Verification

- Sediment samples will be collected at a rate of four grab samples per 2700 square feet in each of the remediated sediment RMUs and composited into a single sample. Drawing No. 2 shows a typical plan view of sediment sampling. Sampling will be collected from those locations determined to have sediment present after probing. If a sample is not obtained from a potential location, attempts will be made at other locations where sediment is present. If hardpan or consolidated material is determined by probing, a value of the detection limit (0.017 ppm) will be assigned to this location and used in the SWAC calculations as it relates to the percentage of hardpan or consolidated area within that RMU.

  Soft Sediment or unconsolidated material that cannot be collected after two attempts with a Petite Ponar dredge will be assigned a value of 0.5 ppm as determined from the WDNR, *RMU Verification Sampling & Calculation of SWAC* (Jan. 2006) and used in the SWAC calculation as it relates to the percentage of "no sample recovery" area within that RMU. If a sample can be collected anywhere in the RMU, that PCB concentration or the PCB concentration of the composite sample of up to four samples will be used to represent all residual sediment areas in the RMU.

Sediment probing and sampling will be collected in accordance with the detailed procedures outlined in SOP #P40-1 and #P41-1 of the *Field Sampling Plan (FSP),* (Vol. II, Appendix H).

3.1.1 Near-Shore Sediments

The area of concern for Near-Shore Sediment is presented on Drawing No. 3 of the *Sediment Removal Design* (Vol. I). Prior to removal, this area will be poled to verify the location of sediment. If poling indicates that sediment is not present, then removal action will not be required. Originally a Phase I activity, Near-Shore Sediments will not be included as part of the overall mass (88%) and SWAC (less than or equal to 0.5 ppm) calculations. Verification sampling will be performed following sediment removal activities as follows:

PCB Removal Verification

- Where sediment is present and removed, samples will be collected at a minimum rate of one composite sample per 2700 square feet of sediment. A composite sample will be comprised of four grab samples.

Sediment sampling will be collected in accordance with the procedures outlined in SOP #P41-1 of the *FSP* (Vol. II, Appendix H). All composite sediment samples will be analyzed for PCBs.

3.1.2 Armored Areas

Armored area locations proposed for RA work are presented on Drawing No. 4 of the *Sediment Removal Design* (Vol. I). Prior to removal this area will be poled to verify the location of sediment. If poling indicates that sediment is not present then no removal action will be required. Verification sampling will occur following sediment removal activities and will be conducted as follows:

PCB Mass Removal Verification

- A maximum of four transects (dependent on area) spaced at approximately 12.5 feet will be established along the riverbank within the sediment portion located in an RMU. Probe measurements will be taken every 12.5 feet along each transect. Drawing No. 2 shows a typical plan view of a probe measurement layout. Resulting probe measurements will be averaged to provide single residual sediment thickness for the RMU.

SWAC Verification

- Sediment samples will be collected at a rate of up to four grab samples per 2700 square feet in each of the remediated sediment RMUs and composited into a single sample. Drawing No. 2 shows a typical plan view of sediment sampling. If hardpan or consolidated material is determined by probing, a value of the detection limit (0.017 ppm) will be assigned to this location and used in the SWAC calculations as it relates to the percentage of hardpan or consolidated area within that RMU.

  Soft Sediment or unconsolidated material that cannot be collected after two unsuccessful attempts with a Petite Ponar dredge will be assigned a value of 0.5 ppm as determined from the WDNR, *RMU Verification Sampling & Calculation of SWAC* (Jan. 2006) and used in the SWAC calculation as it relates to the percentage of "no sampling recovery" area within that RMU. If a sample can be collected anywhere in the RMU, that PCB concentration or the PCB concentration of the composite sample of up to four samples will be used to represent all residual sediment areas in the RMU.

Sediment probing and sampling will be collected in accordance with the procedures outlined in SOP #P40-1 and #P41-1 of the *FSP* (Vol. II, Appendix H). All composite sediment samples will be analyzed for PCBs.

3.1.3 Soft Sediments

Soft Sediment deposits proposed for RA work for the Upper River are presented on Drawing No. 5 of the *Sediment Removal Design* (Vol. I). The verification tasks for Soft Sediments are summarized as follows:

PCB Mass Removal Verification

- A maximum of four transects (dependent on area) spaced at approximately 12.5 feet will be established along the riverbank within the sediment portion located in an RMU. Probe measurements will be taken every 12.5 feet along each transect. Drawing No. 2 shows a typical plan view of a probe measurement layout. Resulting probe measurements will be averaged to provide single residual sediment thickness for the RMU.

SWAC Verification

- Sediment samples will be collected at a rate of up to four grab samples per 2700 square feet in each of the remediated sediment RMUs and composited into a single sample. Drawing No. 2 shows a typical plan view of sediment sampling. If hardpan or consolidated material is determined by probing, a value of the detection limit (0.017 ppm) will be assigned to this location and used in the SWAC calculations as it relates to the percentage of hardpan or consolidated area within that RMU.

> Soft Sediment or unconsolidated material that cannot be collected after two unsuccessful attempts with a Petite Ponar dredge will be assigned a value of 0.5 ppm as determined from the WDNR, *RMU Verification Sampling & Calculation of SWAC* (Jan. 2006) and used in the SWAC calculation as it relates to the percentage of "no sampling recovery" area within that RMU. If a sample can be collected anywhere in the RMU, that PCB concentration or the PCB concentration of the composite sample of up to four samples will be used to represent all residual sediment areas in the RMU.

Sediment probing and sampling will be collected in accordance with the procedures outlined in SOP #P40-1 and #P41-1 of the *FSP* (Vol. II, Appendix H). All composite sediment samples will be analyzed for PCBs.

3.2 Quality Control

The Quality Control (QC) analyses required during the Upper River Phase II are summarized in Table A-7-2 of the *Quality Assurance Project Plan (QAPP),* (Vol. II, Appendix D). Both laboratory and field quality control samples are required.

4 Sample Designation

Sample collection will consist of collecting samples from specific areas of interest in the Upper River area (i.e., Near-Shore, Armored Areas, Soft Sediments). A detailed description of the sample designation and identification nomenclature for samples to be collected during the work is provided in SOP #P200SR of the *FSP* (Vol. II, Appendix H).

Remedial construction methods for the Floodplains are deferred pending the outcome of additional discussions between USEPA, WDNR, PRS, and property owners of potentially impacted Floodplains.

5 References

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River (CD).* May 2004.

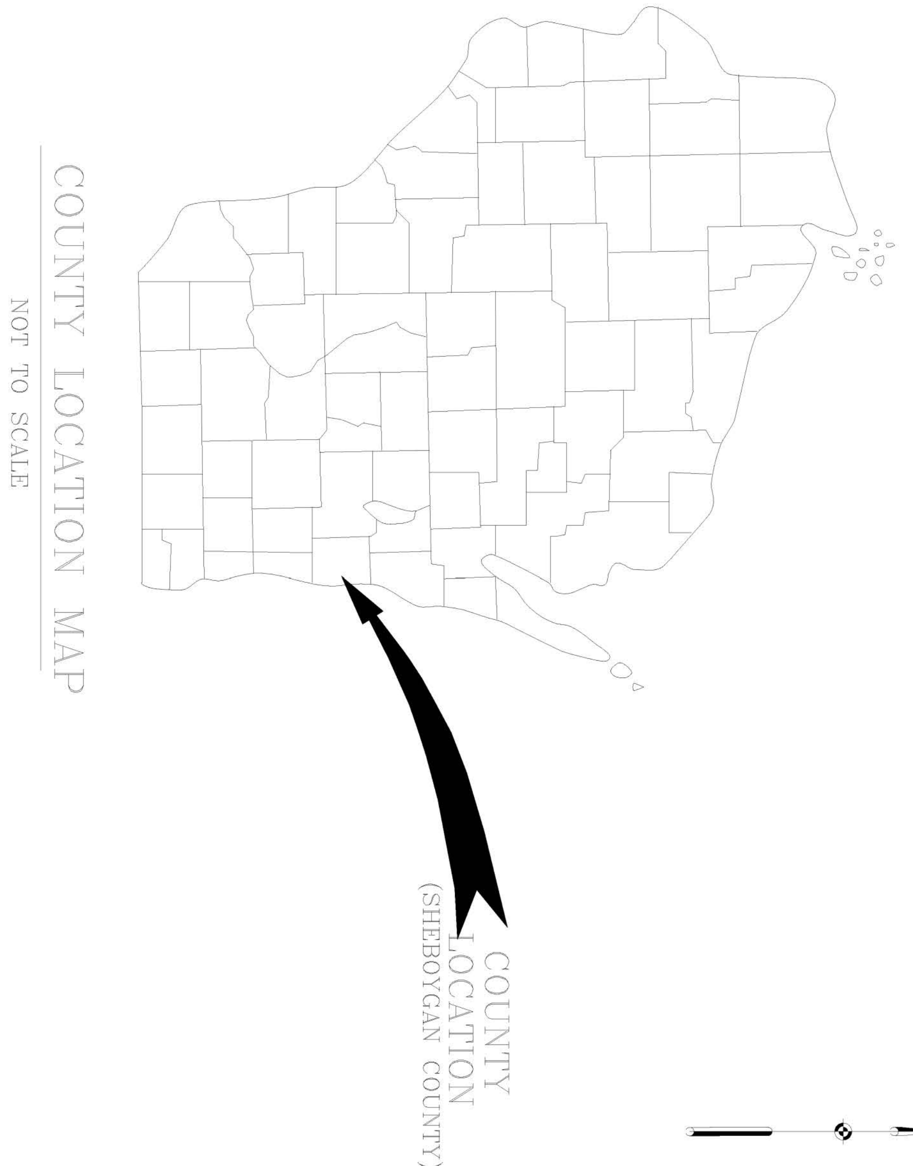
United States Environmental Protection Agency. *EPA Superfund Record of Decision (ROD).* May 2000.

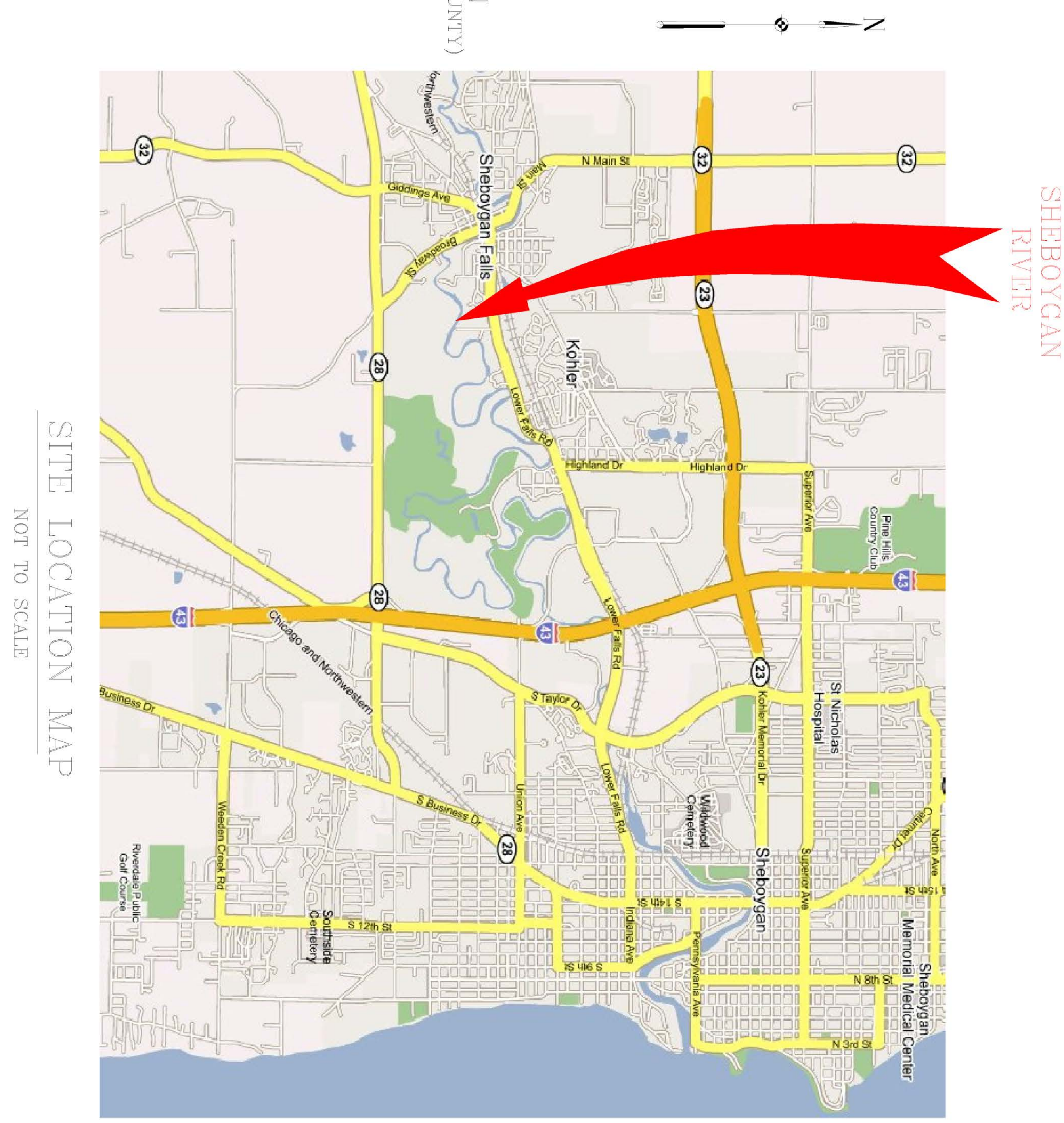
United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site (URSOW).* January 2003 (revised).

Pollution Risk Services, LLC and Foth & Van Dyke. *Field Sampling Plan (FSP)*. Vol. 2, Appendix H of *Sediment Removal Design*. March 2006

Pollution Risk Services, LLC and Foth & Van Dyke. *Quality Assurance Project Plan (QAPP).* Vol. 2, Appendix D of Sediment *Removal Design*. March 2006.

Wisconsin Department of Natural Resources. *RMU Verification Sampling & Calculation of SWAC*. (Jan. 2006).





DRAWING NO. 1	SCOPE ID 05P031	SCALE NOT TO SCALE	SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE 100% DESIGN – PHASE II – UPPER RIVER ARMORED, NEAR-SHORE & SOFT SEDIMENTS REMEDIATION SHEBOYGAN FALLS, WISCONSIN SITE LOCATION

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
			APPROVED	
			REVIEWED	
			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDSBY________ DATE________

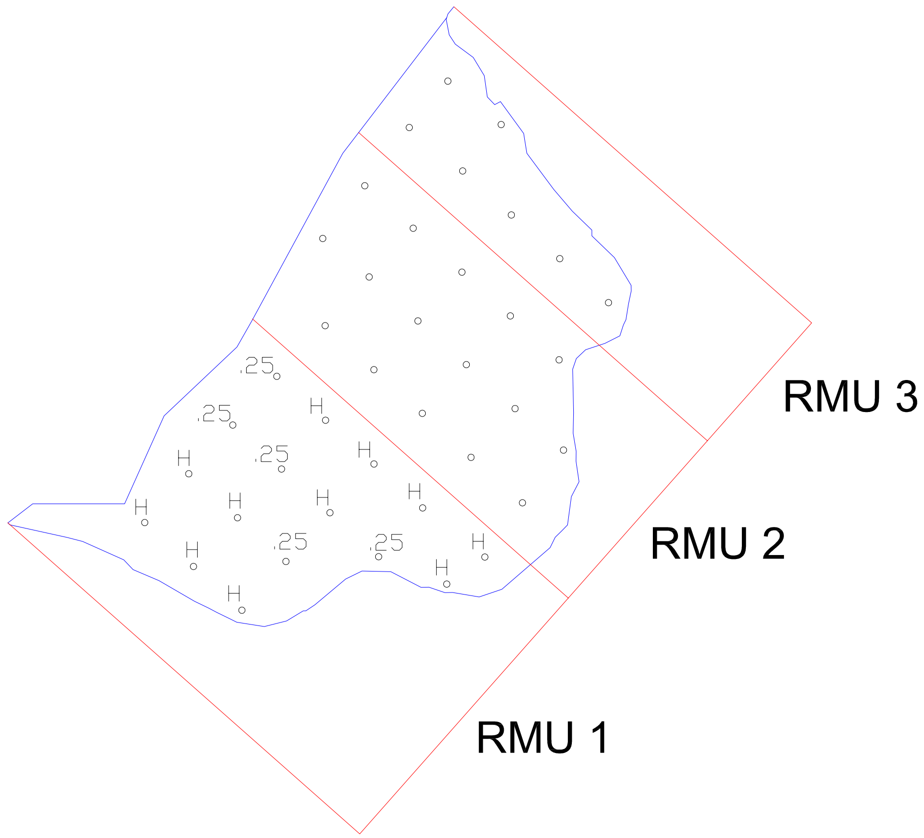
FILE NAME: $$$$DGNSPEC$$$$$$$$$$$$$$$$$

DRAWN BY: JRB2 | DATE: MAY 2005

Foth & Van Dyke

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

PCB MASS DETERMINATION



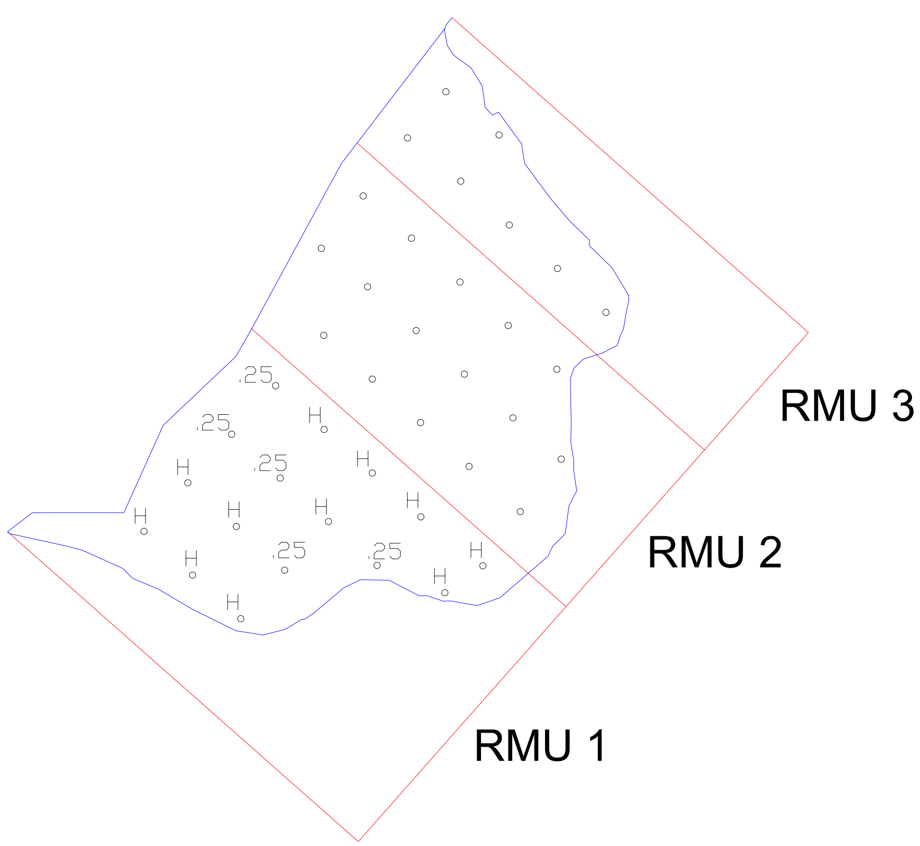
Probing Locations within RMU, Spaced Approx. 12.5'

H Desingated Hardpan = Thickness of 0 feet

.25 Value of thickness in feet

Average thickness = Sum (thickness)/Total
= 1.25/16
= 0.078 feet

PCB CONCENTRATION DETERMINATION



Probing Locations within RMU

H Desingated Hardpan = 0.017 ppm

.25 Sample Location = 0.5 ppm for unconsolidated, no sample collected anywhere.

.25 Sample Location = X.X ppm for unconsolidated, sample collected anywhere that represent all residual sediment

SWAC = Sum of Conc./Total Conc.
= [0.017 (11/16*2700) + 0.5 (5/16*2700)]/2700
= [0.017(1856) + 0.5(844)]/2700
= 0.168 ppm

FILE NAME: $$$DGNSPEC$$$$$$$$$$$$$$$

DRAWN BY: JRB2 | DATE: MAY 2005

Foth & Van Dyke

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△			APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDSBY ______ DATE ______

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
100% DESIGN - PHASE II - UPPER RIVER
ARMORED, NEAR-SHORE &
SOFT SEDIMENTS REMEDIATION
SHEBOYGAN FALLS, WISCONSIN

PCB MASS AND SWAC DETERMINATION

SCALE: NOT TO SCALE

SCOPE ID: 05P031

DRAWING NO. 2

PHASE II
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01050
CONSTRUCTION STAKING

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications.

PART 1 GENERAL

1.1 SUMMARY

Each proposed work area will be surveyed/staked by the SUPERVISING CONTRACTOR. This surveying/staking will be used to delineate a local system for each area to regulate sampling and other work performed at the site. The surveying/staking system will be used for horizontal and vertical control. Each local area will be tied to an established station or as shown on the Design Drawings. Vertical and elevation measurements will be relative to existing ground and benchmark elevations. Should the CONTRACTOR require resurveying/restaking, this Work will be done as the SUPERVISING CONTRACTOR'S schedule permits and at expense of CONTRACTOR. CONTRACTOR shall maintain survey/stake markers.

1.2 PRIMARY CONTROL MONUMENT(S)

Bench marks provided by local government agencies to establish primary vertical control for Work will be indicated on the final Design Drawings. These will be either official benchmarks tied into the state plane coordinate grid or local benchmarks established at known points (building corners, manhole lids, etc.). These are shown in relation to previously surveyed site elevation contours. Monuments or references for primary horizontal control for the construction of Work are indicated on Design Drawings. Preserve and maintain primary control monuments.

1.3 PRIMARY LINE AND GRADE

Primary line and grade will be provided by SUPERVISING CONTRACTOR and established by SUPERVISING CONTRACTOR by means of stakes placed at site of Work.

1.3.1 Excavation and Embankments

Stakes for excavation and embankment will be set:

a. Offset to best serve CONTRACTOR.
b. Other settings as approved by the PROJECT MANAGER

1.3.2 Contractor Responsibilities

CONTRACTOR shall:

a. Set stakes as required to delineate the work site.
b. Arrange operations to avoid interference with establishment of primary lines and grades.
c. Check accuracy of line and grade by visual inspection, checks between stakes, and periodic checks (with surveying equipment) between primary control monuments and stakes.
d. Be responsible for protection and preservation of stakes. Resurveying/Restaking will be done as SUPERVISING CONTRACTOR'S schedule permits, and at CONTRACTOR'S expense.

1.4 CONSTRUCTION LINE AND GRADE

The SUPERVISING CONTRACTOR shall bear sole responsibility for correct transfer of construction lines and grades from primary line and grade points and for correct alignment and grade of completed Work based on lines and grades shown on Design Drawings. “Grades” are to mean relative depths below pre-construction grades at individual work locations.

1.5 SURVEY MONUMENTS

Protect survey monuments shown on Design Drawings. If such marked monuments are damaged by CONTRACTOR, replace by Registered Land Surveyor at CONTRACTOR'S expense.

--- END OF SECTION ---

PHASE II
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01055
ROLES AND
RESPONSIBILITIES DURING CONSTRUCTION

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications. The project shall be identified as the “Sheboygan River and Harbor Superfund Site, Upper River Project”.

PART 1 ROLES AND RESPONSIBILITIES

1.1 PROJECT COORDINATOR

Pollution Risk Services (PRS) is the Project Coordinator and OWNER. As Project Coordinator, PRS has accepted the role of the Settling Defendant for the Project. The Project Coordinator is also referred to as the Project Manager and OWNER in the Project Specifications. The responsibilities of the PRS Project Coordinator include the following:

a. Within the parameters of the Consent decree will define the work to be supervised and directed by the Supervising Contractor (Foth & Van Dyke).

b. Perform all administrative and decision-making activities, as well as provide necessary authorizations related to the project on behalf of PRS.

c. Assure that all activities are performed in accordance with the requirements of applicable federal and state laws, regulations, and applicable or relevant and appropriate requirements (ARARs).

d. Assume responsibility for ensuring that its contractors and subcontractors perform the Upper River Work as defined in the Consent Decree.

e. Coordination of communications, submittals, and meetings with the USEPA Project Manager, and WDNR Project Manager and other appropriate project team members.

f. Obtain all necessary federal or state permits.

g. Maintain communication with the USEPA, WDNR, and Supervising Contractor.

1.2 SUPERVISING CONTRACTOR

Responsibilities of the Supervising Contractor are to perform all tasks as defined in the Consent Decree (CD) and Quality Assurance Project Plan (QAPP); this includes but is not limited to the following:

a. Assist the Project Coordinator in the preparation, review and/or editing of submittals (i.e., designs, plans, specifications, drawings, reports, contracts, etc…).

b. Function as primary consultant to the Project Coordinator to ensure that all work performed is in accordance with the CD.

c. Assist the Project Coordinator in identifying all necessary Federal or State permitting requirements and coordinate with agencies.

d. Ensure all aspects of Upper River work to be performed by the Project Coordinator, pursuant to Sections VI, VII, and XIV of the Consent Decree, are in accordance with the approved project documents, the Consent Decree, the existing Chubb insurance policy, and performed in a manner that is protective of human health and the environment.

e. Receive Contractor QC Reports, review and verify QC Data, prepare QA documentation for field and laboratory work performed in accordance with the approved Design Documents.

f. Conduct and/or oversee QA field work.

1.3 CONTRACTOR

The Contractor is responsible for performing the work activities in accordance with the approved contract documents, the Consent Decree and Statement of Work, and in accordance with existing laws and regulations. The Contractor is also responsible for performing all tasks in accordance with the Site Health and Safety Plan and Quality Assurance Project Plan.

PART 2 GENERAL

Not used.

PART 3 PRODUCTS

Not used.

PART 4 EXECUTION

Not used.

--- END OF SECTION ---

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01100
SUMMARY OF WORK

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled “Section 01110N - SUMMARY OF WORK”.

PART 1 GENERAL

1.1 REFERENCES

1.1.1 Documents

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

a. Consent Decree
b. Record of Decision
c. Health and Safety Plan
d. Quality Assurance Project Plan
e. Construction Quality Assurance Plan
f. Design Plan Drawings and Specifications
g. Contingency Plan
h. Operations and Maintenance Plan
i. Record Drawings
j. Scope of Work
k. Project Schedule
l. Project Budget
m. Field Sampling Plan
n. Daily Reports
o. COE Requirements
p. USEPA Requirements
q. WDNR Requirements
r. Utility Requirements
s. Remedial Action Work Plan
t. Contractor Submittals

1.1.2 Definitions

Basic contract definitions are included in the General Conditions of the contract.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

The work includes those tasks described in the Project Proposal and the Scope of Work as well as incidental related work, including but not limited to:

1. Mobilization of equipment, personnel, materials, and facilities as required
2. Submittals
3. Site preparation
4. Soft sediment dredging and piping to dewatering system (equipment and material supplied by owner)
5. Dewatering (material supplied by owner)
6. Installation and maintenance of surface water and erosion control features
7. Treatment and discharge of carriage and contact water (equipment by owner)
8. Transportation and disposal of PCB contaminated sediment
9. Backfilling, compacting, and grading (Floodplains only)
10. Restoration

1.2.2 Location

The work shall be located along the Sheboygan River approximately as indicated on the Design Drawings.

1.3 EXISTING WORK

Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work.

1.4 LOCATION OF UNDERGROUND FACILITIES

The CONTRACTOR is responsible for locating all utilities prior to start of excavation. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but indicated in locations to be traversed by piping, ducts, and other work to be installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.4.1 Notification Prior to Excavation

Contact the Diggers Hotline 72 hours prior to excavating. CONTRACTOR is responsible for marking all utilities not marked by Diggers Hotline.

1.5 OWNER-FURNISHED MATERIAL & EQUIPMENT

The owner will furnish the equipment and material used to dredge sediment, dewatering, and treat carriage and contact water from the dewatering pad. The owner-furnished equipment is listed in 01600.

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01285
MEASUREMENT AND PAYMENT

TABLE OF CONTENTS

PART 1 GENERAL

1.1 PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum, time and material, or unit price payments will be made are described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum, time and material, or unit price payment item, shall be included in the listed item most closely associated with the work involved. The price and payment shall constitute full compensation for furnishing all labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.1.1 Submittals

1.1.1.1 Payment

Payment will be made for costs associated with preparing contractor submittals and work plans as defined in Contract Documents.

1.1.2 Mobilization

1.1.2.1 Payment

Payment will be made for costs associated with mobilization. This includes equipment and facilities as defined in the Contract Documents.

1.1.3 Site Preparation and Dewatering System Set-Up

1.1.3.1 Payment

Payment will be made for costs associated with the site preparation and dewatering system set-up, as defined in Contract Documents.

1.1.4 Dredging of Soft Sediment

1.1.4.1 Payment

Payment will be made for costs associated with providing labor and ancillary equipment to dredge soft sediment and perform sediment dewatering. Major equipment items, i.e. dredge, booster pumps, and geotextile tubes will be provided by OWNER as described in 01600. Payment will be made on a monthly basis for work completed to date.

1.1.4.2 Measurement

For planning purposes, the total quantity of dredged material to be removed approximately 35,000 cubic yards (in-river). Based on a production rate of 350 cy/day results in an approximately 100 day schedule. Allowance will be made for fewer or additional days where authorized, meaning, work performed less than or greater than the calculated number of theoretical days projected will be payed on a daily rate as defined in the Contract Documents.

1.1.4.3 Unit of Measure

Unit of measure: day.

1.1.5 Excavation

1.1.5.1 Payment

Payment will be made for costs associated with sediment excavation for Near Shore Sediments, and Armored Areas.

1.1.5.2 Measurement

The total quantity of the excavated material for which payment will be made will be based on estimated quantities from the Design Documents.

1.1.5.3 Unit of Measure

Unit of measure: day

- END OF SECTION -

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01330
SUBMITTALS

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled "Section 01300 – Submittals".

PART 1GENERAL

1.1 SUMMARY

Section includes procedural requirements for Work-related submittals:

a. Construction Progress Schedules.
b. Shop Drawings.
c. Product Data.
d. Samples.
e. Operation and maintenance (O&M) information, if any.
f. Schedule of values.
g. Other miscellaneous submittals (MSDS Sheets).
h. Work Plans.

1.2 DEFINITIONS

1.2.1 Submittal for Review

Any submittal for PROJECT MANAGER will be reviewed in accordance with Contract Documents.

1.2.2 Submittal for Record

Submittal for inclusion into PROJECT MANAGER'S records prior to Substantial Completion.

1.3 CONSTRUCTION PROGRESS SCHEDULES

a. Provide separate horizontal bar for each operation or activity.
b. Horizontal Time Scale: Identify first Work day of each week.
c. Scale and spacing to allow space for notations and future revisions.
d. Arrange listings in order of start of each item of Work.

1.3.1 Construction Progress Schedule Elements

Show complete sequence of construction by activity. Show dates for beginning and completion of each major element of construction and installation dates for major items.

1.3.2 Schedule Revisions

a. As needed to reflect changes in progress of Work.
b. Indicate progress of each activity at date of submittal.
c. Show changes occurring since previous submittal of schedule, such as:

    1. Major changes in scope.
    2. Activities modified since previous submittal.
    3. Revised projections of progress and completion.
    4. Other identifiable changes.

d. Provide narrative report to define following.

    1. Problem areas and anticipated delays and their impact on schedule.
    2. Corrective action recommended and its effect.
    3. Effect of changes on schedules of other Contractors.

1.4 SHOP DRAWINGS AND PRODUCT DATA

1.4.1 Contractor’s Responsibilities

a. Review Shop Drawings and Product Data prior to submittal.
b. Determine and verify the following:

    1. Field measurements.
    2. Field construction criteria.
    3. Catalog numbers and similar data.
    4. Conformance with Specifications.

c. Coordinate each submittal with requirements of Work and Contract Documents.
d. Notify PROJECT MANAGER in writing, at time of submittal, of deviations in submittals from requirements of Contract Documents.
e. Begin no fabrication or Work requiring submittals until return of submittals with PROJECT MANAGER'S approval.
f. Submittals received but not requested in Specifications shall be returned without

review.

g. Submit 3 copies unless specified otherwise.

1.4.2 Submittal Requirements

a. Date of submittal and dates of previous submittals.
b. Project title and number.
c. Contract identification.
d. Names of:

    1. CONTRACTOR.
    2. Supplier.
    3. Manufacturer.

e. Identification of product, with identification numbers, and Drawing and Specification section numbers.
f. Field dimensions, clearly identified.
g. Identify details required on Drawings and in Specifications.
h. Show manufacturer and model number, give dimensions, and provide clearances.
i. Relation to adjacent or critical features of Work or materials.
j. Applicable standards, such as ASTM or Federal Specification numbers. Identification of deviations from Contract Documents.
k. Identification of revisions on resubmittals.
l. 8-in. by 3-in. blank space for CONTRACTOR and PROJECT MANAGER stamps.
m. CONTRACTOR'S stamp, signed, certifying to review of submittal, verification of products, field measurement, field construction criteria, and coordination of information within submittal with requirements of Work and Contract Documents.

1.4.3 Resubmittal Requirements

a. Comply with submittal requirements.
b. Make corrections or changes in submittals required by PROJECT MANAGER. Resubmit until approved.
c. Identify on transmittal form submittal is resubmission.
d. Shop Drawings and Product Data:

    1. Revise initial drawings or data and resubmit as specified for initial submittal.
    2. Indicate changes made other than those requested by PROJECT MANAGER.

1.4.4 Distribution

Distribute reproductions of Shop Drawings and copies of Product Data which carry PROJECT MANAGER'S approval stamp to following.

    a. Job site file.
    b. Record documents file.

1.4.5 Project Manager’s Duties

a. Review submittals in accordance with schedule.
b. Affix stamp and signature, and indicate requirements for resubmittal or approval of submittal.
c. Return submittals to CONTRACTOR.
d. For planning purposes, PROJECT MANAGER has set a goal of 5 days for review of submittals from the day received in PROJECT MANAGER'S office.

1.5 TEST RESULTS

Test results shall be submitted as follows:

a. Submit test results required in Specification sections.
b. Submit test results upon completion of test or submittal of results from testing laboratory.
c. Test results are submitted for review of conformance with specified requirements and information.

1.6 GUARANTEE, WARRANTIES, MAINTENANCE AGREEMENTS AND WORKMANSHIP BONDS

Refer to Specification sections for requirements. Submittal is considered final when submittal is received by PROJECT MANAGER.

1.7 ACTION ON SUBMITTALS

1.7.1 General:

a. Except for submittals for record and similar purposes, where action and return on submittal is required or requested, PROJECT MANAGER will review each submittal, mark with appropriate action, and return. Where submittal must be held for coordination, PROJECT MANAGER will so advise CONTRACTOR without delay.
b. PROJECT MANAGER will stamp each submittal with action stamp, appropriately marked with submittal action.

1.7.2 Notification of Insufficient Information:

a. If information submitted is not sufficient to complete review of submittal, PROJECT MANAGER will send transmittal to CONTRACTOR notifying CONTRACTOR that additional information is required.
b. Submittal will not be returned. Submittal will be placed in an "on hold" status until CONTRACTOR provides additional information.

PART 2 EXECUTION

2.1 SUBMITTAL REQUIREMENTS

Deliver submittals to PROJECT MANAGER. Provide complete copies of required submittals as follows and as required by the individual specification sections.

a. Construction Progress Schedule
b. Shop Drawings and Product Data
c. Test Results
d. Certifications
e. Other Submittals (as required)

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01355
ENVIRONMENTAL PROTECTION

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled "Section 01355A – Environmental Protection".

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications may be referred to in the text by basic designation only.

a. 33 CFR 328 Definitions
b. 40 CFR 68 Chemical Accident Prevention Provisions
c. 40 CFR 260 Hazardous Waste Management System: General
d. 40 CFR 261 Identification and Listing of Hazardous Waste
e. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
f. 40 CFR 279 Standards for the Management of Used Oil
g. 40 CFR 302 Designation, Reportable Quantities, and Notification
h. 40 CFR 355 Emergency Planning and Notification
i. 40 CFR 761 Polychlorinated Biphenyls
j. 49 CFR 171 - 178 Hazardous Materials Regulations
k. U.S. ARMY CORPS OF ENGINEERS (USACE) EM 385-1-1 (1996) U.S. Army Corps on Engineers Safety and Health Requirements Manual
l. Wisconsin Administrative Code
m. Wisconsin Construction Site Best Management Practice Handbook (WDNR Pub WT-222); and
n. Wisconsin Department of Transportation Erosion Control Product Acceptability Lists (PAL).

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

CONTRACTOR generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the CONTRACTOR to execute work, but are not fully consumed during the course of construction.

1.2.4 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require permission to discharge water from the governing agency.

1.2.5 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.3 GENERAL REQUIREMENTS

The CONTRACTOR shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The CONTRACTOR shall comply with all applicable environmental Federal, State, and local laws and regulations. The CONTRACTOR shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

1.4 SUBCONTRACTORS

The CONTRACTOR shall ensure compliance with this section by SUBCONTRACTORS.

1.5 SUBMITTALS

The following shall be submitted by the CONTRACTOR:

Site-Specific Environmental Protection Plan (EPP)

1.6 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, the CONTRACTOR shall submit a Site-Specific Environmental Protection Plan (EPP) for review and approval by the PROJECT MANAGER. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the CONTRACTOR must address during construction. Issues of concern shall be defined within the Environmental Protection Plan as outlined in this section. The CONTRACTOR shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but which the CONTRACTOR considers necessary, shall be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, the CONTRACTOR shall meet with the PROJECT MANAGER for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the CONTRACTOR's Environmental Plan. The Environmental Protection Plan shall be current and maintained onsite by the CONTRACTOR.

1.6.1 Compliance

No requirement in this Section shall be construed as relieving the CONTRACTOR of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the CONTRACTOR shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.6.2 Contents

The Environmental Protection Plan shall include, but shall not be limited to, the following:

a. Name(s) of person(s) within the CONTRACTOR's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
b. The Spill Control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. This plan shall include as a minimum:

    1. The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the PROJECT MANAGER and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.
    2. The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.
    3. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
    4. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.
    5. The methods and procedures to be used for expeditious contaminant cleanup.
    6. MSDS Sheets for chemical used during remediation.

1.6.3 Appendix

Copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents shall be attached, as an appendix, to the Environmental Protection Plan.

1.7 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, and IMPROVEMENTS. Prior to start of any onsite construction activities, the CONTRACTOR, SUPERVISING CONTRACTOR, LANDOWNER, and the PROJECT MANAGER shall make a joint condition survey. The CONTRACTOR shall protect those environmental features included in the survey and any indicated on the drawings, regardless of interference which their preservation may cause to the CONTRACTOR's work under the contract.

1.8 SPECIAL ENVIRONMENTAL REQUIREMENTS

The CONTRACTOR shall comply with the special environmental requirements listed in the Storm Water Pollution Prevention Plan.

1.9 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the CONTRACTOR, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the PROJECT MANAGER and may require an extended review, processing, and approval time. The PROJECT MANAGER reserves the right to disapprove alternate methods, even if they are more cost effective, if the PROJECT MANAGER determines that the proposed alternate method will have an adverse environmental impact.

1.10 NOTIFICATION

The PROJECT MANAGER will notify the CONTRACTOR in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the CONTRACTOR's Environmental Protection plan. The CONTRACTOR shall, after receipt of such notice, inform the PROJECT MANAGER of the proposed corrective action and take such action when approved by the PROJECT MANAGER. The PROJECT MANAGER may issue an order stopping all or part of the work until satisfactory corrective action has been taken. If necessary, this work stoppage will be reflected in a revised project schedule.

PART 2 EXECUTION

2.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

The CONTRACTOR shall be responsible for complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations.

2.2 LAND RESOURCES

The CONTRACTOR shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the CONTRACTOR shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the CONTRACTOR shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The CONTRACTOR shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the CONTRACTOR.

2.2.1 Work Area Limits (Land)

Prior to commencing construction activities, the CONTRACTOR shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The CONTRACTOR's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

2.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The CONTRACTOR shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

2.2.3 Erosion and Sediment Controls

The CONTRACTOR shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the CONTRACTOR shall be such that water quality standards are not violated as a result of the CONTRACTOR's construction activities. Areas exposed at any one time by construction operations should be kept to a minimum. The CONTRACTOR shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover (bioengineering), stream bank stabilization, slope stabilization, and silt fences. The CONTRACTOR's best management practices shall also be in accordance with the National Pollutant Discharge Elimination System (NPDES), Wisconsin Pollutant Discharge Elimination System (WPDES), and Design Specification Section #01356, *Storm Water Pollution Prevention Plan*. Any temporary measures shall be removed after the area has been stabilized.

2.2.4 Contractor Facilities and Work Areas

The CONTRACTOR's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the PROJECT MANAGER. Temporary movement or relocation of CONTRACTOR facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

2.3 WATER RESOURCES

The CONTRACTOR shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. All water areas affected by construction activities shall be monitored by the CONTRACTOR. For construction activities immediately adjacent to impaired surface waters, the CONTRACTOR shall be capable of quantifying sediment or pollutant loading to that surface water when required.

2.3.1 Cofferdams, Diversions, and Dewatering Operations

Construction operations for decontamination shall be controlled at all times to maintain compliance with existing State water quality standards and designated uses of the surface water body.

2.4 AIR RESOURCES

Equipment operation, activities, or processes performed by the CONTRACTOR shall be in accordance with all Federal and State air emission and performance laws and standards.

2.4.1 Particulates

Dust particles shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The CONTRACTOR shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The

CONTRACTOR must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The CONTRACTOR shall comply with all State and local visibility regulations.

2.4.2 Sound Intrusions

The CONTRACTOR shall keep construction activities under surveillance and control to minimize noise pollution.

2.4.3 Burning

Burning shall be prohibited on the premises.

2.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

2.5.1 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste.

2.5.2 CONTRACTOR Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The CONTRACTOR shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262.

2.5.3 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site shall be in accordance with all Federal, State, and local laws and regulations.

2.5.4 Waste Water

Disposal of waste water shall be as specified below:

a. Waste water from remediation activities, such as decontamination water and cleanup water shall be managed in accordance with Federal, State, and Local regulations.

2.6 PREVIOUSLY USED EQUIPMENT

The CONTRACTOR shall clean all previously used construction equipment prior to bringing it onto the project site. The CONTRACTOR shall ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds.

2.7 MAINTENANCE OF POLLUTION FACILITIES

The CONTRACTOR shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

2.8 POST CONSTRUCTION CLEANUP

The CONTRACTOR shall clean up all areas prior to demobilization. The CONTRACTOR shall, unless otherwise instructed in writing by the PROJECT MANAGER, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area shall be equivalently restored to prior conditions.

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01356
STORM WATER POLLUTION PREVENTION MEASURES

TABLE OF CONTENTS

INTRODUCTION

This guide specification was modified from the original Corps of Engineers specification entitled "Section 01356 – STORM WATER POLLUTION PREVENTION MEASURES".

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications may be referred to in the text by basic designation only.

a. ASTM D 4439 (1997) Standard Terminology for Geosynthetics
b. ASTM D 4491 (1996) Water Permeability of Geotextiles by Permittivity
c. ASTM D 4533 (1991; R 1996) Trapezoid Tearing Strength of Geotextiles
d. ASTM D 4632 (1991; R 1996)) Grab Breaking Load and Elongation of Geotextiles
e. ASTM D 4751 (1995) Determining Apparent Opening Size of a Geotextile
f. ASTM D 4873 (1995) Identification, Storage, and Handling of Geosynthetic Rolls
g. *Wisconsin Construction Site Best Management Practice Handbook* – Prepared by the Wisconsin Department of Natural Resources, Publication #1700
h. *Erosion Control Product Acceptability Lists (PAL),* February 2004 Edition – Prepared by the Wisconsin Department of Transportation
i. *Tech. Stds.* – http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm

1.2 GENERAL

The CONTRACTOR shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Project Specification Section #01355: *Environmental Protection* and be consistent with the *Erosion Control Product Acceptability Lists (PAL),* *Wisconsin Construction Site Best Management Practice Handbook, and Technical Standards*.

1.3 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the CONTRACTOR are described below and shall be consistent with the *Erosion Control Product Acceptability Lists (PAL),* *Wisconsin Construction Site Best Management Practice Handbook, and Technical Standards*.

1.3.1 Stabilization Practices

The stabilization practices to be implemented may include temporary seeding, mulching, geotextiles, erosion control mats, protection of trees, preservation of mature vegetation, bioengineering, etc. On his daily CQC Report, the CONTRACTOR shall record the dates when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Stabilization practices shall be initiated as soon as practicable (end of day), but no more than 7 days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.3.1.1 Unsuitable Conditions

Standards require that temporary stabilization measures are initiated if disturbed areas are inactive for 7 days. This is a minimum standard and normally require end of day temporary measures.

1.3.2 Structural Practices

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site during and post construction/remediation activities. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. General location and details of these practices are shown on the Design Drawings. Alternative practices may be found in the *Wisconsin Construction Site Best Management Practice Handbook,* *Erosion Control Product Acceptability Lists (PAL, and Technical Standards)* subject to approval of the PROJECT MANAGER.

1.3.2.1 Silt Fences

The CONTRACTOR shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation and embankment). Silt fences shall be installed in the locations indicated on the drawings or as required, based on field conditions. Final removal of silt fence barriers shall be upon approval by the PROJECT MANAGER.

1.3.2.2 Straw Bales

The CONTRACTOR shall provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. Bales shall be properly placed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation and embankment) in each independent runoff area (e.g., after clearing and grubbing in an area between a ridge and drain, bales shall be placed as work progresses, bales shall be removed/replaced/relocated as needed for work to progress in the drainage area). Straw bales shall be installed as shown on the drawings or as required, based on field conditions. Additional locations may be required by the PROJECT MANAGER. Final removal of straw bale barriers shall be upon approval by the PROJECT MANAGER. Rows of bales of straw shall be provided at a minimum, as follows:

a. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.
b. Along the toe of all cut slopes and fill slopes of the construction areas.
c. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas.
d. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced as shown on the drawings.
e. At the entrance to culverts that receive runoff from disturbed areas.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439 or as approved by the PROJECT MANAGER, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)	ASTM D 4632	30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

The CONTRACTOR may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

2.1.3 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

2.2 COMPONENTS FOR STRAW BALES

The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as Byhalia, Bermuda, etc., furnished in air dry condition. The bales shall have a standard cross section of 14 inches by 18 inches. All bales shall be either wire-bound or string-tied. The CONTRACTOR may use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have minimum dimensions of 2 inches x 2 inches in cross section and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 24 inches above the ground surface and shall not exceed 36 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the up slope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Project Manager.

3.2 INSTALLATION OF STRAW BALES

Straw bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 12 inches deep into the ground to securely anchor the bales.

3.3 MAINTENANCE

The CONTRACTOR shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

3.3.1 Silt Fence Maintenance

Silt fences shall be inspected and any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

3.3.2 Straw Bale Maintenance

Straw bale barriers shall be inspected and necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required, it shall be removed. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

3.4 INSPECTIONS

3.4.1 General

The CONTRACTOR shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site.

3.4.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.4.3 Inspection Reports

For each inspection conducted, the CONTRACTOR shall prepare a report summarizing the scope of the inspection, name(s) of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The inspection shall be documented on the required inspection form provided in the Storm Water Pollution Prevention Plan.

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01451
TESTING AND INSPECTION OF PIPING – WATER TREATMENT SYSTEM

TABLE OF CONTENTS

PART 1 GENERAL

1.1 SUMMARY

Section Includes

- Inspection of gravity pipelines.
- Pressure and leakage test for pressurized pipelines.

1.2 SUBMITTALS

1.1.2 Quality Control Submittals

- Test reports and results.
- Proposed method to correct deficiencies.
- Record of deficiency repair method and location.

1.3 PROJECT/SITE CONDITIONS

- Notify Supervising Contractor prior to any testing.
- Repeat failed test after correction of deficiencies until satisfactory tests are obtained.
- Repair visible leaks within the pipeline and/or pipeline appurtenances.

PART 2 PRODUCTS

2.1 EQUIPMENT

2.1.1 Standard Pressure and Leakage Test

- City water supply. City water pressure will be used in lieu of air on plastic piping (PVC) to omit any potential safety concerns.
- Provide certified pressure gauge calibrated in pounds per square inch of sufficient capacity to conduct test.

PART 3 EXECUTIONS

3.1 PREPARATION OF PIPELINE BEFORE TESTING

- Clean pipeline of any debris and construction material.

- Repair or replace piping, valves, fittings, and other parts of the piping system which have visible defects or leakage, before commencing tests, even though amount of leakage or pressure loss may be below the allowable limit.

3.2 INSPECTION OF GRAVITY PIPELINES

- Gravity pipelines shall be visually inspected and a record of the results furnished to the Engineer.

- Check vertical and horizontal alignment by sighting through newly constructed pipeline.

- Relay any section of pipe found to be out of alignment.

3.3 PRESSURE AND LEAKAGE TEST FOR PRESSURIZED PIPELINES

3.3.1 Pressure and Leakage Tests

Provide pressure and leakage tests for pressurized pipelines including but not limited to water treatment system.

- Testing shall be in accordance with AWWA C605 for PVC pipe, as modified herein.

3.3.2 Preparation

1) Install temporary plugs or caps, as required, prior to testing.
2) Filling and flushing with water.
   a) Fill each valved section with water slowly, venting air completely from the pipeline and appurtenances.
3) Provide test connections and pressurize the pipe to city water pressure.
   a) Inspect pipeline and repair visible leaks.
   b) Re-pressurize pipeline to city water pressure as many times as necessary until there are no visible leaks.
4) Provide backflow protection to the water system when city water mains are used to supply test water.

PART 4 REFERENCES

4.1 REFERENCES

American Society for Testing and Materials (ASTM)

- ASTM D3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- ASTM C828 Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Line.
- ASTM F679S Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

- END OF SECTION -

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01510
TEMPORARY CONSTRUCTION FACILITIES AND UTILITIES

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled “Section 01500 – TEMPORARY CONSTRUCTION FACILITIES”. Unless noted otherwise, the following products and execution will be the responsibility of the CONTRACTOR.

PART 1 GENERAL

1.1 QUALITY ASSURANCE

Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL). The term "NRTL" shall be as defined in OSHA Regulation 1910.7. The terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

1.1.1 Regulatory Requirements:

National Electrical Code: Components and installation shall comply with NFPA 70. Comply with federal, state, and local codes and regulations, and with utility company requirements.

PART 2 PRODUCTS

2.1 WATER FOR CONSTRUCTION

CONTRACTOR is responsible for making arrangements and pay costs to obtain suitable drinking water. Potable water is available at the Site.

2.2 SANITARY FACILITIES

Provide temporary sanitary toilet facilities conforming to state and local health and sanitation regulations, in sufficient number for use of CONTRACTOR'S and Subcontractor's employees. Maintain in sanitary condition and properly supply with toilet paper.

2.3 TEMPORARY FIRE PROTECTION

Provide and maintain fire extinguishers in accordance with OSHA regulations.

2.4 TEMPORARY SITE AND OTHER ROADS

Construct and maintain temporary site roadways in snow free, ice free, drivable condition necessary to carry out remediation operations.

2.5 SECURITY

CONTRACTOR shall be responsible for loss or injury to CONTRACTOR’S persons or property where Work is involved, and shall provide the necessary security and/or take precautionary measures to protect CONTRACTOR'S interests.

2.6 TEMPORARY PARKING

Designated areas of existing parking facilities may be used for parking of construction personnel's private vehicles and of CONTRACTOR'S light-weight vehicle. Do not allow heavy vehicles or construction equipment in parking areas.

2.7 TEMPORARY FENCING

Provide temporary fencing sufficient to prevent trespass by CONTRACTOR'S employees and suppliers onto private property and by public onto construction site. Materials shall be sufficiently durable to be effective for duration of construction period.

2.8 PROJECT IDENTIFICATION

Provide signs suitably supported and erected on Project site. Locate signs where designated by PROJECT MANAGER. Temporary warning signs will be posted at the staging area and for general public boating down river and areas in the vicinity of armored area removal.

2.9 FIELD OFFICES AND BUILDINGS

If required by CONTRACTOR, erect where designated by PROJECT MANAGER, and maintain in good condition, temporary field office, tool, and storage building(s) for CONTRACTOR'S use. Tool storage building(s) shall be of ample size to provide space for tools and equipment. Building(s) shall be neat and well constructed, surfaced with plywood, drop siding, masonite, or other similar material, well painted and void of advertisements.

2.10 TEMPORARY ELECTRICAL POWER

CONTRACTOR is required to provide temporary power and connections for field offices. A temporary power service is available at the Site.

PART 3 EXECUTIONS

3.1 GENERAL

Maintain and operate systems to ensure continuous service. Modify and extend systems as Work progress requires.

3.2 REMOVAL

Completely remove temporary materials, equipment, signs, and structures when no longer required. In unfinished areas, clean and repair damage caused by temporary installations or use of temporary facilities, restore drainage, and evenly grade, seed or plant as necessary to provide appearance equal to or better than original. In finished areas, restore existing or permanent facilities used for temporary services to specified or original condition.

3.3 DAMAGE TO EXISTING PROPERTY

CONTRACTOR is responsible for replacing or repairing damage to existing buildings, structures, sidewalks, roads, parking lot surfacing, and other existing assets.

--- END OF SECTION ---

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01600
OWNER SUPPLIED MATERIAL AND EQUIPMENT

TABLE OF CONTENTS

PART 1 GENERAL

1.1 IDENTIFICATION OF OWNER-FURNISHED PROPERTY

The Owner will furnish to the Contractor the following property to be incorporated or installed in the work or used in its performance. Such property will be furnished from storage at the project site and the Contractor will be required to load and transport the property to the work area. All such property will be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated herein. The Contractor shall verify the quantity and condition of such Owner furnished property when delivered to him, acknowledge receipt thereof in writing to the Project Manager, and in case of damage to or shortage of such property, he will within 24 hours report in writing such damage or shortage to the Project Manager.

Quantity	Item	Description
2	Sump Pump	1050 GPM
1	Equalization Tank(s)	35,000 – 63,000 Gallon
2	Filter Pumps	1050 GPM each
1	Backwash Pump	1200 GPM each
3	Sand Filter	10 Ft. diameter
3	GAC Filter	10 Ft. diameter
1	Effluent Tank(s)	35,000 Gallon
1	Dredge	8” Swing Arm Ladder – 2500 GPM max.
3-4	Booster Pumps	2500 GPM each
4,000 LF	8” HDPE Piping	SDR 11 (first 1000 ft after dredge and booster pumps)
13,000 LF	8” HDPE Piping	HDPE SDR 17
40	Geotextile Tube	Per Design Documents
450 LF	Portable Dams	Port-A-Dam

-- End of Section --

PHASE II
DIVISION 02 - GENERAL REQUIREMENTS

SECTION 02050
RIP RAP

TABLE OF CONTENTS

PART 1 - GENERAL

1.1 SUMMARY
a. Section Includes
1. Rip Rap

1.2 SUBMITTALS

a. Daily delivery tickets for each load of material delivered to the site.

1.3 QUALITY ASSURANCE

a. Not used.

PART 2 - PRODUCTS

2.1 RIP RAP

a. General
1. Material shall be clean, sound, hard, dense, durable, field or quarry stone which is free from seams, cracks, or other structural defects. It shall be angular material from shot rock (blasted) or crushed rock having substantially all face of which have resulted from artificial crushing.
2. Loss due to sulfate soundness test shall not exceed 10 percent.
3. Loss due to abrasion test shall not exceed 40 percent.
4. Material shall not be frozen.

b. Gradation

1. Soil Class A-2 (Light Riprap Rock)

Size of Stone	% Total Weight Smaller Than the Given Size
150 lbs.	100
60 lbs.	80
20 lbs.	20
2 lbs.	10

PART 1 - EXECUTION

1.1 APPLICATION

a. Place rip rap as specified or stated on Design Drawings.

b. Place material in accordance with the Design Drawings and appropriate Specification Sections for the type of work being performed.

PART 3 - REFERENCES

American Society for Testing and Materials (ASTM)

a. ASTM C88Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

b. ASTM C131Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

---END OF SECTION ---

PHASE II
DIVISION 02 - GENERAL REQUIREMENTS

SECTION 02073

GEOTEXTILE FABRICS

GENERAL

1.1 SUMMARY

A. Section Includes
   1. Geotextile fabrics under riprap

1.2 SUBMITTALS

A. Provide, at the time of delivery of the geotextile fabric, a manufacturer's Certificate of Compliance that the geotextile fabric meets the requirements of this Section.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver geotextile fabric in a wrapping which will protect the fabric from ultraviolet radiation and from abrasion due to shipping and hauling.

B. Store geotextile fabric in a dry location until installed.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide geotextile fabric consisting of either woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride. All fabric shall have the minimum strength values in the weakest principle direction. Non-woven fabric may be needle punched, heat bonded, resin bonded or combinations thereof.

B. The geotextile fabric shall be insect, rodent, mildew and rot resistant.

C. Clearly mark the geotextile fabric rolls showing the type of fabric.

D. If sewn seams are used, provide a field sewn seam sample produced from the geotextile fabric and thread and with the equipment to be used on the project, prior to its incorporation into the work.

2.2 MATERIALS

A. Non-Woven Geotextile Fabric, Type HR
   1. Type HR non-woven geotextile fabric shall be used beneath medium and heavy riprap, Soil Class A-1 and A-MR (Section 02050).
   2. The fabric shall comply with the following physical properties:

Test	Method	Value[1]
Grab Tensile Strength (lbs.)	ASTM D4632	300 min.
Puncture Strength (lbs.)	ASTM D4833	100 min.
Apparent Breaking Elongation (%)	ASTM D4632	15 min.
Apparent Opening Size (U.S. Standard Sieve)	ASTM D4751	30-140
Permittivity, sec.$^{-1}$	ASTM D4491	.30 min.

[1]All numerical values represent minimum/maximum average roll values (i.e., the average of minimum test results on any roll in a lot should meet or exceed the minimum specified values).

   3. The following fabrics are approved for Type HR:
      a. Amoco (Nilex) - 4512
      b. Carthage - FX-160HS
      c. Contech - C120NW
      d. Mirafi-1120N

PART 3 - EXECUTION

3.1 SEWING

A. Sew factory and field seams with a thread having the same or greater durability as the material in the fabric.

B. Use a 401 stitch conforming to Federal Standard No. 751a.

C. Seams shall develop a tensile strength equal to or greater than 80 percent of the specified grab tensile strength of the fabric, unless otherwise specified.

3.2 NON-WOVEN GEOTEXTILE FABRIC, TYPE HR

A. Grade the area smooth and remove all stones, roots, sticks or other foreign material which would interfere with the fabric being completely in contact with the soil.

B. Place the fabric loosely and parallel to the direction of water movement.
   1. Provide pinning or stapling to hold the geotextile in place.
   2. Join separate pieces of fabric by overlapping or sewing.
   3. Place the fabric in the overlapped joints with a minimum overlap of 24 inches in the direction of flow.

C. After placement, do not expose the fabric longer than 48 hours prior to covering.

D. Cover damaged areas with a patch of fabric using a three-foot overlap in all directions.

E. Place rip rap from the base of the slope upward.

F. Do not allow freefall of rip rap greater than 6 inches or less if required to prevent damage to the fabric.

3.3 WOVEN GEOTEXTILE FABRIC SUBGRADE REINFORCEMENT

A. Prior to the placement of geotextile fabric, grade smoothed and shaped to the required grade and section. After the fabric has been placed, do not permit traffic or construction equipment to travel directly on the fabric.

B. Roll out the fabric on the excavation and pull manually to remove wrinkles.
   1. Join separate pieces of fabric by overlapping or sewing.
   2. Place the fabric in the overlapped joints with a minimum overlap of 18 inches.
   3. Provide weights or pins to prevent lifting of the fabric by wind.

C. After placement, do not expose the fabric longer than 48 hours prior to covering.

D. Place the granular material over the fabric.

E. Use construction equipment such that ruts do not exceed three inches in depth.
   1. Fill ruts with additional material.
   2. Do not smooth ruts without adding additional material.

F. Repair damaged areas by covering with a patch of fabric using a three foot overlap in all directions.

PART 4 - REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM D4355 Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water.
   2. ASTM D4533 Test Method for Trapezoid Tearing Strength of Geotextiles.
   3. ASTM D4491 Test Methods for Water Permeability of Geotextiles by Permittivity.
   4. ASTM D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles.
   5. ASTM D4751 Test Method for Determining the Apparent Opening Size of a Geotextile.
   6. ASTM D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products

- END OF SECTION -

PHASE II
DIVISION 02 - SITE WORK

SECTION 02074
DEWATERING (GEOTEXTILE TUBES)

TABLE OF CONTENTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

The work covered by this Section consists of furnishing labor, material (owner supplied), and equipment and performing the operations required for sediment dewatering including placing and filling the Geotextile tubes as specified herein and as shown in Design Documents.

1.2 REQUIREMENT

1.2.1 General Requirements include:

1. Current design uses geotextile tubes for sediment dewatering.
2. Dewatering activities will occur on an asphalt covered pad as shown on Design Drawings.
3. Carriage water shall sheet drain to a sump and pump system for treatment.
4. Geotextile tube shall have a maximum circumference of 60 ft.

1.2.2 Performance Requirement

1. Through the use of geotextile tubes, dewatered sediment shall be attempted to be made workable and meet the requirements of the disposal facility (Onyx) such that it can be loaded into haul trucks with standard loading equipment.
2. Dewatered sediment shall pass the paint filter test.

1.3 REFERENCES

The publications listed below, form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designations only.

American Society for Testing and Materials (ASTM) Publications

D 2487-93	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D 3786-87	Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Test Method
D 3884-92	Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)
D 4354-96	Sampling of Geosynthetics for Testing
D 4355-92	Deterioration of Geotextile tubes from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
D 4491-96	Water Permeability of Geotextile tubes by Permittivity
D 4533-91 (R 1996)	Trapezoid Tearing Strength of Geotextile tubes
D 4595-86 (R 1994)	Tensile Properties of Geotextile tubes by the Wide- Width Strip Method
D 4632-91 (R 1996)	Grab Breaking Load and Elongation of Geotextile tubes
D 4751-95	Determining Apparent Opening Size of a Geotextile tubes
D 4759-88 (R 1996)	Determining the Specification Performance of Geosynthetics
D 4833-88	Index Puncture Resistance of Geotextile tubes, Geomembranes, and(R 1996) Related Products
D 4873-95	Identification, Storage, and Handling of Geotextile tubes
D 4884-96	Strength of Sewn or Thermally Bonded Seams of Geotextile tubes

1.4 SUBMITTALS

a. Owner shall provide Geotextile tube certificates.

1.4.1 Data

1.4.1.1 Geotextile tube:

Manufacturer’s data for geotextile tube shall be submitted by the vendors prior to delivery of the Geotextile tubes.

1.4.2 Certificates.

1.4.2.1 Geotextile tube

A written certificate of compliance from the vendor shall be submitted upon delivery of the Geotextile tubes. The certificate shall state that Geotextile tubes shipped to the site meet or exceed the minimum average roll values listed in the TABLE below.

1.4.2.2 Geotextile tube Seams:

A written certificate of compliance shall be submitted upon delivery of the Geotextile tubes. The certificate shall state that each Geotextile tube seam meets or exceeds the minimum average roll values listed in the TABLE below.

1.5 DELIVERY, STORAGE, AND HANDLING.

1.5.1 General

Geotextile tubes shall be delivered only after the required submittals have been received and approved. Geotextile tubes shall be labeled, shipped, stored, and handled in accordance with ASTM D 4873 and as specified herein. Each roll shall be wrapped in an opaque and waterproof layer of plastic during shipment and storage. The plastic wrapping shall be placed around the Geotextile tube roll in the manufacturing facility and shall not be removed until installation. Each roll shall be labeled with the manufacturer's name, Geotextile tube type, lot number, roll number, and roll dimensions, including length, width, or gross weight. Geotextile tube or plastic wrapping damaged as a result of delivery, storage, or handling shall be repaired or replaced, as directed, at no additional cost to the OWNER

1.5.2 Handling

No hooks, tongs, or other sharp instruments shall be used for handling the Geotextile tubes. Geotextile tubes shall not be dragged along the ground. The surface upon which it may be installed shall be smooth and free of burrs or protrusions that can snag and tear the fabric.

1.5.3 Storage

Geotextile tubes shall be stored in areas where water cannot accumulate, elevated off the ground, and protected from conditions that will affect the properties or performance of the Geotextile tube. Geotextile tube shall not be exposed to temperatures in excess of 140 degrees F or less if recommended by the manufacturer. Outdoor storage shall not be for periods which exceed the manufacturer's recommendations or 6 months, whichever is less. Prior to installation Geotextile tube shall not be exposed to direct sunlight for more than 14 days.

PART 2 - PRODUCTS

2.1 MATERIALS.

2.1.1 Fill Materials

Sediment for filling geotextile tubes shall consist of dredged materials.

2.2 MATERIALS AND MANUFACTURING REQUIREMENTS.

2.2.1 Geotextile tubes

The Geotextile tube shall be a woven monofilament or multi-filament pervious sheet of polymeric yarn. The Geotextile tube may be constructed to meet the Geotextile tube properties in Table 1. Fibers used in the manufacture of the Geotexile tubes shall consist of long-chain synthetic polymers composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. Stabilizers and inhibitors shall be added to the base polymer of the Geotextile tubes if necessary to make the filaments resistant to deterioration by ultraviolet light and heat exposure. Reclaimed or recycled fibers or polymer shall not be added to the formulation. Geotextile tubes shall be formed into a network so that the filaments or yarns retain dimensional stability relative to each other. The Geotextile tube physical properties shall equal or exceed the Minimum Average Roll Values (MARV) listed in TABLE 1, as determined by the standard test methods listed in the Paragraph: REFERENCES above. Acceptance of Geotextile tubes shall be in accordance with ASTM D 4759.

TABLE 1 - GEOTEXTILE TUBE PHYSICAL PROPERTIES
MINIMUM TEST

PROPERTY	TEST METHOD	UNIT	VALUE
Apparent Opening Size (U.S. Sieve)	ASTM D 4751	U.S.Sieve (mm)	#40 (0.425)
Flow Rate	ASTM D 4491	gal/min/ft^2 (l/min/m^2)	20 (813)
Permeability	ASTM D 4491	cm/sec	0.040
Permittivity	ASTM D 4491	sec-^{1}	0.26
Puncture	ASTM D 4833	lbs (kN)	280 (1.25)
Wide Width Tensile	ASTM D 4595		
Ultimate Tensile Strength Machine Direction(MD)		lbs/ft (kN/m)	4800 (70)
Ultimate Tensile Strength Cross Direction(CD)		lbs/ft (kN/m)	6600 (96.3)
Wide Width Tensile	ASTM 4595		
Elongation MD		%	18
Elongation CD		%	6
Mullen Strength	ASTM D 3786	psi (kPa)	1200 (8259)
Trapezoidal Tear	ASTM D 4533		
Machine Direction,		lbs (kN)	180 (0.80)
Cross Direction, lbs		(kN)	275 (1.22)
Ultraviolet Degradation (percent Strength retained 500 hours)	ASTM D 4355		70% strength Retained for all classes
Seam Strength Wide Width Tests In the MD and CD	ASTM D 4884	lbs/ft (kN/m)	3600 (52.5)
Percent Open Area	Specification Paragraph:	%	4

2.2.2 Fabrication

2.2.2.1 Geotextile tube

The Geotextile tube shall be fabricated by sewing together sheets of high strength woven Geotextile tube material to form a tubular shape. The tubes shall have the circumference as shown in the Design Drawings. Geotextile tube lengths are shown on the Design Drawings. The Geotextile tube shall be delivered with tube filling ports spaced at intervals not to exceed 50 feet or other approved interval, along the crest of the tube. Each fill port shall consist of a sleeve having a length of at least 3 feet and circumference slightly greater than that of the dredge discharge pipe (minimum 8-inch diameter). In addition, a pressure relief port, consisting of a 5-foot long sleeve, shall be located not more than 5 feet from each end of each tube. The port sleeves shall be fabricated of the same material as the geotextile tubes and have a "drawstring" closure system to assure a secure closure after the completion of filling. Loops or straps shall be incorporated along the sides of the tube every 20 feet to facilitate deployment. The loops or straps shall have the same tensile strength as the Geotextile tube. Seams shall be overlapped and folded. Geotextile tube seams shall be factory sewn.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS.

2.3.1 Manufacturing, Sampling, and Testing

Geotextile tubes and factory seams shall meet the requirements specified in TABLE 1 above. Conformance testing shall be performed on random samples by the Manufacturer in accordance with approved Quality Control practices.

PART 3 – EXECUTION

3.1 MOBILIZATION AND DEMOBILIZATION

The CONTRACTOR shall mobilize sufficient personnel and equipment at the work site to begin required operations at the site. Upon successful completion of the work required as specified herein, the CONTRACTOR shall remove all construction equipment, materials, and supplies from the site.

3.2 SURFACE PREPARATION

The underlying surface to receive the geotextile tube shall be constructed in accordance with the Design Drawings and prepared to a relatively smooth condition free of ruts, erosion rills, obstructions, depressions, or debris greater than 6 inches in height. Cracks will be sealed and new asphalt laid. Perimeter berms will also be installed.

3.3 INSTALLATION

Installation of the geotextile tubes will be in accordance with the Design Drawings. The CONTRACTOR shall visually inspect the Geotextile tubes, prior to installation, for damage and imperfections. Defective Geotextile tubes shall be marked and repaired. Trimming shall be performed using only an upward cutting hook blade. The Geotextile tube shall be placed at the locations shown on the Design Drawings.

3.3.1 Geotextile tube Placement

The Geotextile tube shall be so placed on the pad as to produce a smooth plane surface in continuous contact with the surface.

3.3.2 Geotextile tube

Before and during filling, the Geotextile tube shall be prevented from rolling or shifting from the alignment shown in the Design Drawings. The Geotextile tubes shall be filled and excess water allowed to drain. The inlet sleeve shall be secured to the injection pipe prior to pumping fill material. The tubes shall be monitored for settlement and deterioration for 2 weeks after initial filling is complete. Failed seams or ruptures in the tubes shall be repaired and tubes filled to the required elevation. The filling ports shall remain open during filling and shall be folded in accordance with the manufacturer's recommendations upon completion of filling the Geotextile tube.

3.4 PROTECTION

The Geotextile tube shall be protected during installation from blinding, clogging, penetrations, tears, or other damage. Damaged Geotextile tubes shall be repaired or replaced.

3.5 REPAIRS

Damaged or defective Geotextile tubes shall be replaced or repaired. Repair shall be made by placing a patch of the same type of material which extends a minimum of 18 inches beyond the edge of the damage or defect. Patches shall be continuously fastened using a sewn seam or other approved methods recommended by the manufacturer. The machine direction of the patch shall be aligned with the machine direction of the Geotextile tube being repaired. Geotextile which cannot be repaired shall be replaced.

3.6 SAFETY REQUIREMENTS

The proposed Geotextile tube foundation must be leveled in the cross direction prior to filling because the mostly water filled Geotextile tube has a tendency to roll down very shallow slopes of one to two percent during initial filling. During initial filling of the Geotextile tubes personnel should be warned to stay up hill from the Geotextile tube to prevent entrapment under the Geotextile tube if it happens to become unstable and roll.

-- END OF SECTION --

PHASE II
DIVISION 02 – SITE WORK

SECTION 02090
HIGH DENSITY POLYETHYLENE PRESSURE (HDPE) PIPE AND FITTINGS

TABLE OF CONTENTS

PART 1 GENERAL

1.1 SUMMARY

Section Includes

- Pressure pipe and fittings for water distribution supplied by Owner.

1.2 SUBMITTALS

1.2.1 Product Data

- Provide product data on pipe and fittings including dimensions.

1.2.2 Quality Assurance/Control Submittals

- Certification that the tests required by this specification section were performed and meet the stated minimum requirements.
- Evidence that the personnel completing joints is qualified to perform the thermal butt fusion.
- Manufacturer’s instructions and procedures for joining the pipe and pipe fittings.

1.3 QUALITY ASSURANCE

- Pipe shall be available for inspection.
- Personnel completing the joints shall be as being qualified to perform the thermal butt fusion.

1.4 DELIVERY, STORAGE AND HANDLING

- Upon delivery inspect pipe and fittings for damage, cracks, holes, or foreign inclusions.
- Check date of production to verify the pipe will be installed within six (6) months of date of production.
- Store pipe and accessories on flat level ground with no rocks or other objects under the pipe.

PART 2 PRODUCT

2.1 MATERIALS

2.1.1 Pipe Sizes 4-inch and Larger

- Pipe and fittings shall be high density polyethylene (HDPE) meeting AWWA C906 standards.
- Materials used for the manufacture of the HDPE pipe and fittings shall be made from a PE 3408 resin compound meeting the minimum cell classification of PE 345434C in accordance with ASTM D3350 and the hydrostatic design basis of 1,600 psi determined in accordance with ASTM D2837.
- Provide pipe with a dimension ratio (DR) of 17, pressure class 160 unless stated otherwise on the Drawings.
- Pipe shall be installed within 6 months of the production date.

2.2 FITTINGS

Fittings shall meet the requirements of AWWA C901 or AWWA C906 whichever applies.

2.2.1 Fittings for Pipe Greater than 3 inches Diameter

Fittings for pipe greater than 3 inches diameter shall be HDPE molded fittings and HDPE fabricated fittings of the same dimension ratio, pressure rating and outside diameter as the connecting pipe.

- The pipe manufacturer shall mold or fabricate and supply all HDPE molded fittings, fabricated fittings, accessories and adapters required to perform the Work. No Contractor fabricated fittings shall be used.
- Molded fittings shall be manufactured with thermal butt-fused joints meeting the requirements of ASTM D3261.
- Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings.

2.3 JOINTS

2.3.1 HDPE Pipe and Pipe Fittings Greater than 3 inches Diameter

- Pipe and pipe fittings shall be designed for joining by thermal butt fusion.
- Joining method shall be capable of conveying water at the pressure designated by the pressure class.
- Joints shall be pipe end to pipe end and pipe end to fitting.

PART 3 EXECUTION

3.1 POLYETHYLENE PIPE INSTALLATION

In addition to the applicable sections for installing piping, conform to the following:

- Thermal butt fuse all joints as per ASTM D2657.
- Utilize qualified personnel for jointing operation.

PART 4 REFERENCES

4.1 REFERENCES

i) American Society for Testing and Materials (ASTM)

(1) ASTM D638 Standard Test Method for Tensile Properties of Plastics
(2) ASTM D1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
(3) ASTM D1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique
(4) ASTM D1598 Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
(5) ASTM D1599 Standard Test Method for Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings
(6) ASTM D2122 Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
(7) ASTM D2290 Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method
(8) ASTM D2837 Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
(9) ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Pipe and Tubing
(10) AST`M D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

(11) American Water Works Association (AWWA)
(12) AWWA C901 Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½ in.(13 mm) Through 3 in. (76 mm) for Water Service
(13) AWWA C906 Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) Through 63 in. (1,575 mm), for Water Distribution and Transmission

ii) National Sanitation Foundation

(1) NSF No. 14 Plastics Piping Components and Related Materials

- END OF SECTION -

PHASE II
DIVISION 02 – SITE WORK

SECTION 02301
GENERAL EARTHWORK

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications.

PART 1 GENERAL

1.1 SUMMARY

Excavation and Grading to shape site entrance, roadways, berms, construction roads and dewatering pad.

1.2 RELATED SECTIONS

Not used.

PART 2 PRODUCTS

2.1 GENERAL EARTH FILL

The general earth fill will be free of organic material. The general earth fill can consist of soil fill or rock fill. Any earth fill used from an off-site borrow source will be sampled to assure that contaminants are not present.

2.2 STRUCTURAL FILL

The structural fill shall be free of organic material. The structural fill can consist of soil fill or rock fill.

2.3 COARSE AGGREGATE

Clean sands or gravels or other permeable material generally classified according to Unified Soil Classification System as SW, SP, GW or GP. The selected material should have rounded to sub-rounded grains.

2.4 GRANULAR MATERIAL

Clean sands or gravels or other permeable material generally classified according to Unified Soil Classification System as SW, SP, GW or GP. The selected material should have rounded to sub-rounded grains. The maximum particle size of the selected material is 3/8-inches.

2.5 COHESIVE BARRIER LAYER

Not used.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Survey Markers

SUPERVISING CONTRACTOR will Identify required lines, levels, contours, and datum. Protect bench marks and survey layout stakes from excavation equipment and vehicular traffic.

3.2 FIELD QUALITY CONTROL

3.2.1 Construction Testing and Documentation

During construction, the CONTRACTOR shall observe and document the items outlined in the CQA/CQC Plan.

3.3 GRADING

Uniformly grade areas to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent grades and new grades. Cut out soft spots, fill low spots and trim high spots to achieve a firm surface.

3.4 PROTECTION

Repair and reestablish grades where completed or partially completed surfaces become eroded, rutted, settled or where they loose compaction due to subsequent construction operations or weather conditions.

--- END OF SECTION ---

PHASE II
DIVISION 02 - SITE WORK

SECTION 02325
DREDGING

TABLE OF CONTENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The most recent version of the reference applies.

CODE OF FEDERAL REGULATIONS (CFR)

33 CFR 84	Annex I: Positioning and Technical Details of Lights and Shapes
33 CFR 85	Annex II: Additional Signal for Fishing Vessels in Close Proximity
33 CFR 86	Annex III: Technical Details of Sound Signal Appliances
33 CFR 89	Inland Navigation Rules: Implementing Rules
	U.S. COAST GUARD (USCG)
M16672.2	(1999) Navigation Rules Instruction Manual

1.2 SCOPE OF WORK

The Scope of work includes: furnishing all labor, material, equipment, and supervision to dredge and dewater sediments as specified herein and in accordance with the Contract Documents. Pursuant to the URSOW and the direction of the owner, sediment removal will be accomplished in this order by dredging each targeted deposit area until any of the following criteria are met:

- Sediment removal to hardpan or to consolidated material.
- Less than 3-4 inches, on average, of residual sediment remains in the deposit as determined by probing, or after three passes with conventional dredging equipment (or an equivalent level of effort with alternative dredging equipment), whichever goal is achieved first.
- If conventional excavation methods are used, one pass (e.g., downward movement of backhoe) would allow excavation of sediment such that 3-4-inches or less of residual sediment remains.
- USEPA determines that achieving these goals in a particular soft sediment deposit or set of deposits is impracticable or undesirable; USEPA may deem sediment removal complete when more than 3-4 inches of residual material or more remains in the deposit or fewer than three dredge passes have occurred.
- In consultation with USEPA, the Owner elects to conduct more than three dredging passes in an attempt to achieve a residual sediment level of less than 3-4 inches, subject to USEPA approval.

OWNER will provide equipment and material as specified in Section 01600.

1.3 SUBMITTALS

The contractor shall provide all submittals in accordance with Section 01300 – *Submittals*, and as further specified below:

1.3.1 ***Dredging Work Plan*** -- consisting of:

1.3.1.1 Methodology for mobilizing the dredge in the river.
1.3.1.2 Methodology of the dredging operation;
1.3.1.3 Dredging Accuracy and Control;
1.3.1.4 Method of transporting dredge slurry to the dewatering area;
1.3.1.5 Method of controlling and minimizing sediment resuspension;
1.3.1.6 Method of transporting the dredge between sediment deposit locations; and
1.3.1.7 Method of Sediment Dewatering and Management.

1.3.2 ***Decontamination Plan*** – procedure to decommission and decontaminate all dredge equipment, transfer piping, pumps, etc. associated with the dredging operation.

1.3.3 ***Contractor Daily Activity Reports*** – reports as defined in Section 3.1.3.

1.3.4 ***Contractor Quality Control Data*** – data as defined in Section 3.1.1.

1.4 MATERIAL TO BE REMOVED

The Contractor shall remove the soft sediment deposits to hard bottom. The soft sediment deposits are identified on the Design Drawings to the required depth. If sediment material is encountered that cannot be removed with normal dredging equipment, the Contractor shall promptly notify the Project Manager, and a determination shall be made as to its disposition with an alternative method provided. Dredging sediment with concentrations of total PCB's greater than 50 mg/lg (ppm) are designated at TSCA sediment. TSCA sediment locations are as shown on the drawings, or as defined by the site manager. All TSCA sediments shall be discharged into a separate geotube, as defined by the Project Manager.

Debris may be present (such as rock, boulders, vegetation, stumps, etc) and shall be removed or relocated, as appropriate, to an area outside the work area or for larger debris worked around as approved by the Project Manager. Owner will designate at least one access point upstream of the Waelderhaus Dam (Point B) and the Riverbend Dam (Point A). Alternative access points may be obtained from landowners upon request and would be used primarily for debris removal, personnel access to the river, and fueling.

1.5 QUANTITY OF MATERIAL

The total estimated amount of in-place material to be removed from within the specified limits, including side slopes, is approximately 35,000 cubic yards.

1.6 DEPTH DREDGING

The final dredge elevation shall be at or below the required residual sediment thickness (<3-4 inches). If post-dredge poling indicates that dredging operations failed to achieve the required residual depth or removal of the required soft sediment, the Contractor shall re-dredge the area until no recovery is obtained. After three passes are performed with the removal equipment consultation with the Owner and Regulatory Agencies will occur to determine the need for additional removal attempts.

1.7 NEAR STREAM BANK

Dredging near streambanks with slopes greater than 2 to 1 or where apparent trees warrant a safety concern will have a set back of a 1 foot from the cutterhead to the bank.

1.8 NEAR EXISTING DAM DREDGING

Dredging will not be allowed within 10 feet of an existing dam in order to protect existing structures and ensure proper safety.

1.9 ENVIRONMENTAL PROTECTION REQUIREMENTS

The Contractor shall provide and maintain during the life of the Contract, environmental protective measures in accordance with Section 01355 GENERAL ENVIRONMENTAL PROTECTION. These measures shall include, but are not limited to, erosion control, spill response, and water quality monitoring.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 QUALITY CONTROL

3.1.1 Work Quality

The Contractor shall inspect the Work, keep records of work performed, and ensure that gages, targets, ranges, and other markers are in place and usable for the intended purpose. The Contractor shall provide boats, boatmen, laborers, and materials necessary for inspecting, supervising, and surveying the Work. When required, the Contractor shall provide transportation for the Project Manager and inspectors to and from the dredging plant and adjacent points on shore.

3.1.2 Polling

Pre- and Post- Dredge poling will be conducted by or overseen by the Project Manager in the manner described in Verification Sampling Plan. The Project Manager will provide Contractor with Pre-Dredge Drawings, which will be the basis for Dredging Locations and Volume.

3.1.3 Contractor Daily Activity Report

The Contactor shall prepare and maintain a daily report of operations and furnish a copy to the Project Manager at the start of the work on the day after the first working date. At a minimum, information to be included in the report will be the date; period covered by the report; equipment used; description of activity as identified by the dredge area; RMUs dredged that day and to date based on the Design Documents; dredge movement; downtime and delays to the operation; cause of downtime and delays; health and safety performance; and other relevant comments concerning the conduct of the operation. The report shall include the results of all inspections and monitoring activities and shall be signed by Contractor's dredging superintendent or quality control manager.

3.2 DREDGING

3.2.1 Order of Work

The Contractor shall conduct the Work starting at the removal area closest to the former Tecumseh Products Company Property and working downstream to each successive sediment deposition, unless otherwise approved by the Project Manager.

3.2.2 General

Dredging equipment for this project shall be agreed to by Contractor, Project Manager and Owner prior to commencement of dredging. Dredging equipment and methods proposed for use by the Contractor shall be designed to minimize the dispersion of resuspended sediments during dredging. The Contractor's dredging operations shall conform to the requirements for water quality monitoring in accordance with Section 01355 GENERAL ENVIRONMENTAL PROTECTION. The Contractor shall maintain the plant, scows, coamings, barges, and associated equipment to meet the requirements of the Work.

Dredge methods shall be modified if turbidity monitoring indicates applicable trigger level (35 ppm) being exceeded. Dredge methods shall be stopped if turbidity monitoring indicates applicable action level (70 ppm) being exceeded. Dredging shall recommence once dredging techniques or methods are changed to minimize resuspension. Based on the results of the turbidity monitoring, the Project Manager may direct the Contractor to re-dredge certain areas.

The Contractor shall dredge sediment in accordance with performance criteria as defined in the Consent Decree (CD), Upper River Statement of Work (URSOW) and Upper River Remedial Design Work Plan.

3.2.3 Best Management Practices

The following BMPs will be implemented to minimize impacts to the aquatic environment during dredging operations:

a. The Contractor shall ensure that no fuel, garbage, or debris enters the waterway from the dredge, or other vessels associated with the project.
b. Wherever possible, dredging will be conducted using equipment that minimizes the release and redistribution of dredged material to the water column during dredging.
c. Dredging will be conducted using procedures that will minimize impacts to water quality and sediment quality to the extent practicable. These procedures include the following:
    - "Sweeping" the post dredge surface to smooth contours will not be allowed.
    - Stockpiling material on the bottom will not be allowed.
d. After project completion all equipment will be properly decontaminated to prevent potential spreading of contaminated sediment from the project area.

3.2.4 Lights

If dredging activities are performed during periods of restricted visibility, provide lights for floating pumps and pipelines.

3.2.5 Navigation Warnings

Furnish and maintain appropriate navigation warning signs along the pipeline and floating pumps in accordance to the US Coast Guard and/or other applicable federal, state, and/or local regulations. In addition, temporary warning signs will be posted for general public boating down river.

3.2.7 Method of Communication

Provide a system of communication between the dredge crew, the crew at the disposal area (if applicable) and points between. A portable two-way radio or cell phone is acceptable.

3.3 DEWATERING & WATER TREATMENT

3.3.1 General

Dewatering applies to the sediment slurry that is transferred upland for landfill disposal. The contractor shall minimize the water added to sediment during dredging to maximize free draining of water from recovered sediment.

Water Treatment applies to the treatment of PCB-impacted water resulting from the dredging operation and the dredged material dewatering or draining. Water treatment will be in accordance to the 11355 "Water Treatment System" specification.

3.4 TRANSFERRING SEDIMENT UPLAND

3.4.1 General

The discharge of sediment or drainage water outside of project boundaries is strictly prohibited. Sediment recovered from remediation areas shall be transferred upland to the dewatering pad using hydraulic methods unless otherwise agreed to by the Project Manager prior to commencement of the Work. Debris shall be transferred to an approved off-site disposal facility. In the event of failure of the geotextile tube during dredge operations, dredging shall be halted until a replacement geotube is available.

Dredging sediment with concentrations of total PCB's greater than 50 mg/kg (ppm) are designated at TSCA sediment. TSCA sediment locations are as shown on the drawings, or as defined by the site manager. All TSCA sediments shall be discharged into a separate geotube, as defined by the site MANAGER,

3.5 FINAL EXAMINATION AND ACCEPTANCE

3.5.1 Examination and Acceptance of Dredged Areas

Project Manager will conduct post-dredging sediment removal verification as described in the Work Plan. Contractor will be available to re-dredge areas that do not meet the required dredge depth (no recovery). The Project Manager shall accommodate the collection of sediment verification samples by coordinating dredging and sampling efforts and schedules with the Contractor.

3.5.2 Final Acceptance

When the dredge area is found to be complete and in satisfactory condition, with regard to dredge depth (no recovery) and cleanup criteria, it will be accepted.

--END OF SECTION--

PHASE II
DIVISION 02 – SITEWORK

SECTION 02740
ASPHALT PAVEMENT

TABLE OF CONTENTS

PART 1 GENERAL

1.1 SUMMARY

Section Includes;
- Sampling and Testing Requirements
- Surface Preparation
- Asphalt Paving

1.2 DELIVERY, STORAGE AND HANDLING

- Store asphalt in tanks free of foreign substances and caked asphalt.
- Storage period for hot mix shall not exceed 2 hours.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to WisDOT Standard Specifications for Highway and Structures Construction Sections 450, 455, and 460.

2.2 EQUIPMENT

All equipment shall conform to WisDOT Standard Specifications for Highway and Structure Construction Section 450.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

- Remove loose concrete and protruding joint material.
- Clean surface and joints of foreign material, e.g. dust, dirt, water, vegetation, etc.
- Seal cracks.
- Tack coat on existing asphalt or concrete pavements at minimum rate of 0.025 gallon per square yard.
- Fill potholes and depressions with a leveling course of asphalt mix compacted to required density of surface course.

3.2 ASPHALT INSTALLATION

3.2.1 Conditions

Do not place asphalt pavement when following conditions exist:

- Unstable or frozen base.
- During rain or snow.
- When air temperature is less than 35°F (1.5°C).

3.2.2 Thickness

Place to thickness, grade, section and location shown on the Design Drawings.

- When thickness is not shown, pavement thickness shall be 2 inches compacted.
- Finished surface shall be a true plane of 1/8 inch in 10 feet.

Establish course thickness by placing in layers in accordance with WisDOT Std. Spec. 460.3.2.

3.2.3 Spreading

- Permitted only in areas inaccessible to finishing machines.
- Place by means of a shovel, and shape with rake or lute.
- Do not rake over machine spread surfaces.

3.2.4 Compaction

- Roll as soon as mixture will support roller without displacing or hair line cracking:
  - Initial pass shall be with drive roller toward paver.
  - Start at center and continue toward either edge.
  - Overlap successive trips.
- Subsequent strips laid shall start adjacent to previous laid strip and continue to opposite edge.
- Roll until:
  - Roller marks are eliminated.
  - Surface is of uniform density.
  - Required density is obtained.

3.2.5 Bonding Joints

- Clean all joints.
- When joining new asphalt pavement to existing asphalt pavement, saw cut joints and tack coat.
- When joining new asphalt pavement to new asphalt pavement, saw cut end joints and tack coat cold joints.

PART 4 REFERENCES

4.1 REFERENCES

State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the items: method of measurement and basis of payment shall not apply.

- END OF SECTION -

PHASE II
DIVISION 02 – SITE WORK

SECTION 02931
LANDSCAPING, TURF AND VEGETATIVE COVER RESTORATION

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications used during restoration of Armored Areas. With regards to Floodplain restoration, consultation with landowner (Kohler) will be performed and an amended Restoration Specification developed.

PART 1 GENERAL

1.1 SUMMARY

Section Includes:

a. Preparing ground surface.
b. Sod or Seed.
c. Plants.
d. Fertilizing.
e. Maintenance.

1.2 REFERENCES

ANSI Z60.1-90 - American Standard for Nursery Stock.

1.3 SUBMITTALS

Not used.

1.4 QUALITY ASSURANCE

1.4.1 Ability to Deliver

Investigate sources of supply and satisfy they can supply plants mentioned on plant list in sizes, variety, and quality noted. Failure to take this precaution shall not relieve responsibility for furnishing and installing plant material in accordance with Contract requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Preparation for Delivery

Balled and Burlapped (B&B) Plants: Dig and prepare for shipment in manner that will not damage roots, branches, shape, and future development of plant. B&B Plants: Originate from soil which will hold good ball and be wrapped with burlap or similar approved material, bound with twine or cord so as to hold balls firm and intact. Ball Sizes: Not less than standard established by AAN for B&B stock.

Potted or Container Plants: Container to hold ball shape protecting root mass during delivery and handling.

1.5.2 Delivery

Deliver fertilizer to site in original, unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law. Deliver plants with legible identification labels. Label trees, evergreens, shrubs, and ground cover with waterproof labels remaining legible for at least 60 days. Label with correct plant name and size as indicated in plant list. Protect plants during delivery to prevent damage to roots or desiccation of leaves. Tag sod with name of each grass species.

1.5.3 Storage

Store plants in ground or other acceptable media if not to be planted within 4 hrs. Protect roots of plant material from drying or other possible injury. Water plants as necessary until planted. Protect sod root system from exposure to sun and wind.

1.5.4 Handling

Do not drop plants. Do not pick up container or B&B plants by stems or trunks. Do not tear, stretch or drop sod.

1.6 PROJECT SITE/CONDITIONS

Intent is existing trees within grading and seeding limits, not disturbed by building operations be saved and protected, unless specified to be removed. Clear trees required to be removed. Wherever landscape work takes place executed in conjunction with other Work, schedule procedures permitting execution of landscape work as specified.

1.7 WARRANTY

Warranty new plant material through one full growing season after plants are installed. Replace plant material and warranty plants replaced for one full growing season from date of replacement. Repair damage to plants or lawns during plant replacement. Warranty lawn areas for duration of 1 yr after seeding to be alive and in satisfactory growth at end of warranty period. For purpose of establishing acceptable standard, scattered bare spots, none larger than 1 sq ft will be allowed up to maximum of 3% of lawn area.

PART 2 PRODUCTS

2.1 SEED

2.1.1 General

Fresh, clean, and new crop seed included in specified varieties and proportioned by weight. Tests are for minimum percentages of germination indicated. Weeds shall not exceed 0.25%.

2.1.2 General Turf

Name	% by Weight	Germination
Kentucky Bluegrass	45	80%
Perennial Ryecross	5	90%
Creeping Red Fescue	35	80%
White Clover	15	90%

2.2 PLANT MATERIALS

Quality and Size: Equal or exceed sizes and measurements. Follow standards currently recommended in American Standard for Nursery Stock. Well formed and shaped, true to type, and free from disease, insects, and defects such as knots, sun scald, wind burn, injuries, abrasions or disfigurement.

2.3 FERTILIZER

Commercial type, uniform in composition, free flowing, conforming to state and federal laws, and suitable for application with equipment designed for that purpose. Fertilizer shall contain minimum basis percentage by weight of following.

a. Prior to Seeding or Sodding: 6-24-24.

1. 6% nitrogen.
2. 24% phosphorous.
3. 24% potash.

b. After Seeding or Sodding: 18-5-9.

1. 18% nitrogen.
2. 5% phosphorous.
3. 24% potash.

c. For Plant Material: 6-24-24.

1. 6% nitrogen.
2. 24% phosphorous.
3. 24% potash.

1/4 of nitrogen shall be in form of nitrates, 1/4 in form of ammonia salts, and 1/2 in form of organic nitrogen. Available phosphoric acid shall be derived from super phosphate having minimum analysis of 20% available phosphate. Potash shall be in form of sulfate or potash. Balance of fertilizer specified above shall be materials usually present in such products, free from dust, sticks, sand, stone, and other debris. Coordinate N-P-K requirements with those recommended by soils test report.

2.4 MULCH FOR LAWN AREAS

Straw or hay in air-dry condition or wood excelsior fiber, wood chips or other suitable material of similar nature substantially free of noxious weed seeds and objectionable foreign matter.

2.5 EROSION CONTROL BLANKET

Combination of knitted synthetic netting interwoven with curled wood excelsior fiber, with consistent thickness and fiber evenly distributed over entire area of blanket. Roll type, mesh size approximately 1 in. sq, nominal weight of 1.0 lb/sq yd. Staples for anchoring blanket made of wire, 0.091-in. dia. or more, U-shaped with legs 6 in. in length and 1 in. crown.

PART 3 EXECUTION

3.1 EXAMINATION

Is not contemplated planting be done where depth of soil over underground construction, obstruction or rock insufficient to accommodate roots or where pockets in rock or impervious soil requires drainage. Where such conditions are encountered in excavation or planting areas and where stone, boulders or other obstruction cannot be broken or removed by hand methods and where trees to be planted are located under overhead wires, alternate locations for planting may be designated. Remove rock or other underground construction and provide for drainage for planting areas. Do not damage underground utilities while removing existing trees or digging pits for new planting. Verify location of underground wires and pipes with utility companies.

3.2 PLANTING SEASONS

Perform actual planting only when weather and soil conditions suitable in accordance with locally accepted practice.

3.2.1 Recommended Spring Planting Season

From time soil can be satisfactorily worked until following dates at end of planting season.

a. Evergreens: June 30.
b. Trees and Shrubs: June 30.
c. Lawns (Seed): June 1.

3.2.2 Recommended Fall Planting Season

Commence and terminate at time listed below.

a. Evergreens: August 15 to October 15.
b. Trees and Shrubs: August 15 to November 1.
c. Lawns (Seed): August 15 to October 1.

3.3 PREPARATION

3.3.1 Topsoil

Do not commence placing topsoil or finish grading prior to completion of rough grading. Place or work no topsoil in frozen or muddy condition.

3.3.2 Seeding

Scarify areas where topsoil is not removed being careful of tree roots, adding topsoil to eliminate depressions and hollows, and cutting high points to create smooth uniform surface. Remove sticks, stones, and debris and legally dispose off-site. Do not seed prior to completion of finish grading. Do not seed on saturated or frozen soil.

3.4 LAWN

3.4.1 Topsoil/Finish Grading:

Finish grade is established final grade as shown on Drawings. Grades not otherwise indicated are uniform levels or slopes between points where elevations given or between such points and existing finished grades. If existing topsoil to required depth is undisturbed and of equal or better quality than are specified, existing topsoil may be left in-place and use only enough new topsoil to bring these areas up to grade.

3.4.2 Spreading Fertilizer:

Before seeding or sodding, distribute 6-24-24 commercial fertilizer uniformly at rate of 20 lbs/1,000 sq ft over area to be seeded or sodded using mechanical spreader. Make 2 passes at right angle to each other and incorporate fertilizer into soil to depth of at least 2 in. by disking or harrowing. After completion of required interim mowings, apply 18-5-9 commercial fertilizer at rate of 15 lbs/1,000 sq ft to turf areas using mechanical spreader. Make 2 passes at right angles to each other.

3.4.3 Seeding

Areas not required to be developed otherwise shall be planted to grass. Seeding method shall establish smooth, uniform turf composed of specified grasses. Do not seed following rain or if surface has been compacted by rain. Do not seed when wind velocity exceeds 6 mph.

3.4.4 Erosion Control Blanket

Install erosion control blanket in accordance with the manufacturer's installation instructions.

3.4.5 Mulching

Mulch lawn areas within 3 days after seeding have been completed. Place mulch loose or open enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade ground, conserve soil moisture, and prevent or reduce erosion. Do not mulch during periods of excessively high winds which would preclude proper placing of mulch.

3.5 PLANTINGS

3.5.1 Layout

Locate where shown on Drawings except where obstructions, below ground or overhead, are encountered or where changes were made in construction. Stake out locations for plants and outline of planting beds. Contractor to confirm locations with Project Manager.

3.5.2 Planting Pits

Dig pits and prepare soil prior to moving plants to ensure plants will not be exposed to drying elements or physical damage. Excavate circular pits with vertical sides. Diameter of Pits for Trees and B&B Shrubs: Minimum 1 ft-0 in. greater than diameter of ball or spread of roots. Depth of Pits for Trees and Shrubs: Minimum 6 in. greater than ball or roots when plant set to finished grade. Loosen soil at bottom of pit to minimum depth of 4 in.

3.5.3 Setting Plants

Plant in pits, centered, and set on 6 in. of compacted soil to depth of finished grade level at plant, after settlement, will be same as at which plant was grown. Plant upright and faced to give best appearance or relationship to adjacent structures or land features. Do not pull burlap from under balls of B&B plants. Remove platforms, wire, and surplus binding from top and sides of balls. Remove potted or container grown plants from pot or container at time of planting. Cleanly cut off broken or frayed roots. Place and compact soil carefully to avoid injury to roots and to fill voids. When hole is nearly filled, add water and allow to soak away. Fill hole to finished grade and form shallow saucer around edge of each pit. After ground settles, fill in additional soil to level of finished grade.

3.5.4 Staking and Anchoring

Support trees immediately after planting. Use approved staking methods standard to trade, protecting bark with rubber hose if guy wires used, being careful not to damage roots or balls with stakes.

3.5.5 Pruning

Prune new trees and shrubs at time of or upon completion of planting operation. Limit pruning to minimum, necessary to remove dead or injured twigs, branches, and to compensate for root loss resulting from transplanting. Perform pruning in manner retaining natural plant shape or habit. Make cuts flush, leaving no stubs. Treat cuts over 3/4 in. in dia. with tree paint. Trace back to living tissue and remove bruises and scars with injured cambium. Shape and smooth wounds so as not to retain water and treat with tree paint. Prune flowering trees only to remove dead or broken branches. Do not remove central leaders. Shrub pruning shall result in loose outline conforming to general shape of specified material shrub type. Do not use hedge shears.

3.6 WATERING

Provide water and furnish hose, equipment, attachments, and accessories for irrigation of lawns and planted areas. Water during the course of working day. Leave job thoroughly soaked at close of each working day.

3.7 PROTECTION

Protect seeded and planted areas against damage by trespass and other Work. Replace, repair, restake or replant damaged seeding or planting. If planting done after lawn preparation, protect lawn areas and repair damage resulting from planting operations. Protect slopes and embankments against erosion until Work is accepted. Repair eroded portions of seeded or sodded areas by refilling, resodding, remulching, and reseeding as required by condition. Protection may be by installation of sod strips or other methods.

3.8 FIELD QUALITY CONTROL

Not used.

3.9 CLEANING

Remove soil or similar material brought onto paved areas, keeping these areas broom clean. Upon completion of planting, remove excess soil, stones, and debris not previously cleaned up and legally dispose of off-site. Prepare lawns and planting areas for final inspection.

3.10 MAINTENANCE

For purposes of establishing standard, scattered bare spots, none larger than 1 sq ft, will be allowed up to maximum of 3% of lawn area. Maintain new plantings by watering, weeding, cultivating, mulching, tightening, and repairing of guys, removal of planting saucer, and other necessary operations. Top dress and resod excessive cracks appearing upon shrinkage. No mowing will be required in restored Armored Areas or Floodplains.

3.11 REPLACEMENT

Remove plants that are dead or not in satisfactory growth from site. Replace these and any plants missing due to CONTRACTOR'S negligence as soon as conditions permit, but during normal planting season. Provide same kind and size as specified.

--- END OF SECTION ---

PHASE II
DIVISION 11 - EQUIPMENT

SECTION 11355
WATER TREATMENT SYSTEM

TABLE OF CONTENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

a. ASTM D 4397 (1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
b. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
c. 29 CFR 1910.145 Accident Prevention Signs and Tags
d. 29 CFR 1910.1000 Air Contaminants
e. 40 CFR 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
f. 49 CFR 171 General Information, Regulations, and Definitions
g. 49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations

1.2 DEFINITIONS

1.2.1 PCB and PCBs (Polychlorinated Biphenyls)

40 CFR 761. PCB and PCBs means any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance.

1.2.2 PCB Contaminated Water

Surface water containing greater than 0.5 ppb.

1.2.4 Permissible Exposure Limits (PEL)

PEL for PCBs is 3.10 E-08 pound per cubic feet on an 8-hour time weighted average basis.

1.3 DESCRIPTION OF WORK

The work includes the dewatering of dredged and excavated sediment, and treatment of this water to meet the requirements of WPDES, to discharge back into the Sheboygan River.

1.4 QUALITY ASSURANCE

1.4.1 Training

Instruct employees on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.

1.4.2 Regulation Documents

Maintain at the job site one readily available copy each of 29 CFR 1910.1000, 40 CFR 761, and all CONTRACTOR prepared plans required under "Submittals" paragraphs.

1.4.3 PCB Contaminated Water Management Plan

Prepare and submit plan detailing methods and techniques for collection and treatment as needed of PCB contaminated water. CONTRACTOR to incorporate additional management and testing requirements as provided in the “Water Management Plan” prepared by PROJECT MANAGER.

1.4.4 Sampling and Testing Plan

Water to be sampled and tested as provided in the Water Management Plan and meet the requirements of the WPDES at a minimum rate of once every day.

1.4.5 Closeout Report

Prepare closeout report containing following items: test results including readings and locations, chain of custody forms, and description of the work completed.

1.5 SUBMITTALS

Submit a plan which addresses the following:

a. PCB Contaminated Water Management Plan

b. Closeout Report

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF WORKERS AND THE ENVIRONMENT

Protect workers and the environment from PCB hazards in accordance with the PCB protection plan and, as a minimum, as specified herein.

3.1.1 Worker Safety

Provide portable decontamination facilities. Workers shall wear and use PPE upon entering a PCB control area. If PPE is not required, specify this in the PCB removal work plan. Keep work footwear inside work area until completion of the job. Do not carry out PCB handling operations in confined spaces. Do not delay aid to a seriously injured worker for reasons of decontamination.

3.1.2 PCB Control Area

Establish a PCB control area to prevent unauthorized entry of personnel. Rope off area and provide 29 CFR 1910.145 signs at approaches and around perimeter. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Allow only personnel briefed on the elements and trained as specified herein into the area. Do not permit food, drink, or smoking materials in the control area. Smoking is not permitted within 50 feet of the PCB control area. Provide "No Smoking" signs as directed by the PROJECT MANAGER.

3.1.3 Special Hazards

Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not heat PCBs to temperatures of 135 degrees F or higher without PROJECT MANAGER's concurrence.

3.2 PCB SPILL PREVENTION

Use appropriate operating practices to prevent spillage or leakage of contaminated water from occurring during operations. Immediately report any spills to the PROJECT MANAGER and provide cleanup in accordance with 40 CFR 761, Subpart G.

3.3 CONTAMINATED WATER

Collect washwater. Collect surface, and rain water contaminated by operations including water collected in the dewatering of sediment. Containerize, sample, and analyze PCB absorbed material and treat of as specified in Water Management Plan.

3.4 COLLECTION, TREATMENT, AND DISCHARGE OF PCB-CONTAMINATED WATER

Furnish labor, materials to install owner-supplied equipment necessary for collecting, sampling, treating, and discharging of PCB-contaminated water.

3.4.1 Treatment System Requirements

The PROJECT MANAGER shall be responsible for all aspects of operating and maintaining owner-supplied treatment facilities as required to discharge treated waters within the treatment limits required (WPDES). Piping shall be tested for leaks prior to start-up pursuant to Section 01451.

3.4.2 Treatment System Operations

Monitor, test, and adjust the treatment system in accordance with the Water Management Plan, or as otherwise modified by special regulatory requirements. If there is a conflict between requirements, the more stringent requirement shall prevail.

3.4.3 Discharge of Treated Water

Discharge or properly dispose treated water in accordance with the requirements outlined in the Water Management Plan. Provide erosion control at outlet of piping to minimize erosion.

3.5 CLEANUP

Maintain surfaces of the PCB control area free of accumulations of PCB contaminated water. Do not remove the PCB control area and warning signs prior to the PROJECT MANAGER's approval. Re-clean areas visually showing residual PCB contaminated water.

3.5.1 Cleaning

Clean contaminated tools, containers, etc., after use by rinsing three times with Alconox or equivalent. cleaning agents will be containerized, labeled, and disposed at an appropriate off-site facility (i.e. Onyx).

3.6 REPORTS

Prepare and submit a closeout report at the completion of the work.

-- END OF SECTION --

PHASE II
DIVISION 13 - SPECIAL CONSTRUCTION (TSCA)

SECTION 13285
REMOVAL OF PCB CONTAMINATED ARMORED AREA SEDIMENTS AND NEAR-SHORE SEDIMENTS AND DISPOSAL OF EXCAVATED AND DREDGED PCB CONTAMINATED SEDIMENTS

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineer specification entitled "Section 13285N – REMOVAL AND DISPOSAL OF PCB CONTAMINATED SOILS".

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

a. ASTM D 4397 (1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
b. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
c. 29 CFR 1910.145 Accident Prevention Signs and Tags
d. 29 CFR 1910.1000 Air Contaminants
e. 40 CFR 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
f. 40 CFR 761.75 Chemical Waste Landfills
g. 49 CFR 171 General Information, Regulations, and Definitions
h. 49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
i. 49 CFR 173 Shipments and Packagings
j. 49 CFR 174 Carriage by Rail
k. 49 CFR 176 Carriage by Vessel
l. 49 CFR 177 Carriage by Public Highway
m. 49 CFR 178 Shipping Container Specification
n. 49 CFR 179 Tank Cars
o. EPA 530/F-93/004 (1986) Evaluating Solid Waste (Physical/Chemical Methods)
p. EPA 560/5-86-017 (1986) Grid Sampling of PCB Spill Sites to Verify Cleanup

1.2 DEFINITIONS

1.2.1 PCB and PCBs (Polychlorinated Biphenyls)

40 CFR 761. PCB and PCBs means any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance.

1.2.2 PCB Contaminated Sediments

Sediments exceeding project specific action levels are designated for removal.

1.2.3 Dredging

Dredging refers to the removal of sediments using a hydraulic dredge or conventional excavation equipment. See Dredging Specification 02325 for requirements.

1.3 DESCRIPTION OF WORK

The work includes removal and disposal of PCB contaminated sediments. Perform work in accordance with 40 CFR 761, 29 CFR 1910.120, and the requirements specified herein. Excavate to the horizontal and vertical limits of the identified contaminated sediment as indicated on the Design Drawings and as determined by verification poling. After removing contaminated sediments as indicated, sample and test as specified by the PROJECT MANAGER.

1.3.1 Existing Conditions

PCB contaminant levels range from "not detected" to 840 ppm.

1.4 QUALITY ASSURANCE

1.4.1 Training

Instruct employees on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.

1.4.2 Regulation Documents

Maintain at the job site one readily available copy each of 29 CFR 1910.1000, 40 CFR 761, and all CONTRACTOR prepared plans required under "Submittals" paragraphs.

1.4.3 PCB Contaminated Excavation Plan

PCB-contaminated sediments are present in nine (9) Armored Areas, and in Near-Shore Sediments adjacent to the Plant Site. The following requirements shall be incorporated into the Contractor's work plan:

1. Armored Areas and Near-Shore Sediments will be excavated to the limits in accordance with the Contract Documents. Overburden material on the Armored Areas will be sampled prior to removal to determine the appropriate disposal procedures greater than the detection limit and disposed of at an approved off-site facility, or less than the detection limit and re-used for stabilization purposes.
2. CONTRACTOR equipment used to haul PCB contaminated materials offsite shall be free of defects which may result in the spilling of PCB contaminated materials and will be inspected prior to leaving the site for evidence of PCB-impacted sediment.
3. Vehicles will be decontaminated in accordance to Standard Operating Procedure (SOP #P101) as/when necessary.

Prepare and submit, a minimum of 15 calendar days prior to initiating work, a plan describing methods, techniques, and phases of dealing with the contaminated sediment, including: a schedule to be employed in the excavation, a sequence of operations, the method of excavation, hauling, and handling of the contaminated sediment, and the proposed equipment. Define the CONTRACTOR's staging area requirements. Ensure that work operations or processes involving PCB-contaminated materials are conducted in accordance with 40 CFR 761 and the applicable requirements of this section, including but not limited to:

a. Obtaining advance approval of PCB storage sites.
b. Notifying PROJECT MANAGER prior to commencing the operation.
c. Reporting leaks and spills to the PROJECT MANAGER.
d. Cleaning up spills.
e. Maintaining an access log of employees working in a PCB control area and providing a copy to the PROJECT MANAGER upon completion of the operation.
f. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the PROJECT MANAGER.
g. Maintaining a spill kit
h. Maintaining inspection, inventory, and spill records.

1.4.4 Sampling and Testing Plan

Sampling and testing will be performed in accordance with the FSP, VSP and QAPP. The FSP outlines procedures for decontamination during site activities.

1.4.5 PCB Disposal

PCB sediment disposal must comply with applicable requirements of Federal, State, and local PCB waste regulations and address:

a. Identification of PCB wastes associated with the work.
b. Estimated quantities of wastes to be generated and disposed of.
c. Names and qualifications of each CONTRACTOR that will be transporting, storing, and disposing of the wastes. Include the facility location and a 24-hour point of contact.
d. Sediments containing less than 50 mg/kg PCB concentrations will be disposed of in an appropriate special waste landfill.
e. Sediments containing 50 mg/kg PCB concentrations or greater will be disposed of in an appropriate landfill licensed to receive TSCA material.

1.4.6 Closeout Report

Prepare closeout report containing following items: test results including readings and locations, a diagram of the limits of the excavated area with sample locations indicated, chain of custody forms, manifests, and description of the work completed.

1.5 SUBMITTALS

Submit a plan which addresses the following:

a. Management of excavated PCB Contaminated Sediment
b. Training certification
c. PCB Transportation and Disposal
d. Shipping documentation
e. Vehicle decontamination
f. Closeout Report

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF WORKERS AND THE ENVIRONMENT

Protect workers and the environment from PCB hazards as specified herein.

3.1.1 Worker Safety

Provide portable decontamination facilities. Workers shall wear and use PPE upon entering a PCB control area. If PPE is not required, specify this in the PCB removal work plan. Keep work footwear inside work area until completion of the job. Do not carry out PCB handling operations in confined spaces. Do not delay aid to a seriously injured worker for reasons of decontamination.

3.1.2 PCB Control Area

Establish a PCB control area to prevent unauthorized entry of personnel. Rope off area and provide 29 CFR 1910.145 signs at approaches and around perimeter. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Allow only personnel briefed on the elements and trained as specified herein into the area. Do not permit food, drink, or smoking materials in the control area. Smoking is not permitted within 50 feet of the PCB control area. Provide "No Smoking" signs as directed by the PROJECT MANAGER.

3.1.3 Special Hazards

Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not heat PCBs to temperatures of 135 degrees F or higher without PROJECT MANAGER's concurrence.

3.2 PCB SPILL PREVENTION

Use appropriate vehicles and operating practices to prevent spillage or leakage of contaminated materials from occurring during operations. Inspect vehicles leaving the site to ensure that no contaminated sediment adheres to the wheels or undercarriage. Immediately report any spills to the PROJECT MANAGER and provide cleanup in accordance with 40 CFR 761, Subpart G.

3.3 EXCAVATION PROCEDURES

Use methods and equipment that result in minimal disturbance beyond the excavation limits. Remove and dispose of any material that becomes contaminated as a result of the CONTRACTOR's operation at no additional cost to the PROJECT MANAGER. Stage operations to minimize the time the contaminated sediment is exposed to the weather. Provide protection measures around the area of contaminated sediments to divert runoff of water from within the excavation boundaries.

3.3.1 Underground Utilities

The existence of underground utilities is not expected due to the location of the Armored Areas and Near-Shore Sediments and depth of excavations. However, it remains the CONTRACTOR’S responsibility to verify prior to excavation.

3.3.2 Dust Control

Maintain strict dust control at all times to prevent dust particles with PCB attached from becoming airborne. Sprinkle or treat the sediment at the site and other areas disturbed by operations with dust suppressants or water.

3.3.3 Excavation Limits

Remove contaminated sediments to the horizontal and vertical limits as indicated in the Design Documents. Verify the limits of clean sediments by poling (no recovery). Handle and dispose of material within this area as PCB contaminated. If groundwater is encountered prior to reaching the vertical limits, notify the PROJECT MANAGER.

3.3.3.2 Verification Sampling and Testing

Verification Sampling and Testing shall be in accordance with the Verification Sampling Plan (VSP).

3.3.4 Additional Excavations

If poling results indicate that PCB contaminated sediments remain (recovery), continue using excavation as required.

3.3.5 Stockpiled Material

If stockpiled, place sediment removed from the excavations in the staging area. Divert water from the area. Place excavated sediment on the impervious barrier and cover with 6 mil polyethylene sheeting (if necessary). Provide berm around the outer limits of the area. Cover excavated contaminated sediment when not being worked. Maintain sheeting and replace when worn or ripped. As an option, sediment may be stockpiled in trucks suitable for carrying PCB contaminated sediments as specified herein. Dredged material will be placed directly into geotextile tubes for dewatering located on a impervious barrier.

3.3.5.1 PCB Testing of Stockpiled Sediment by Others

Collect composite samples from stockpiled material prior to removing from site. Analyze a minimum of one composite sample for every 250 cubic yards or fraction thereof of sediment to be disposed of from any one site. To develop a composite sample of the size necessary to run the required tests, take several samples (a minimum of 5 grab samples) from different areas along the surface and in the center of the stockpile. Combine these samples and thoroughly mix to develop the composite sample.

3.3.5.2 PCB Testing of Dredged Sediment by Others

Take composite samples from stockpiled material prior to removing from site. Analyze a minimum of one composite sample per geotextile tube (approximately 1000 cubic yards). To develop a composite sample of the size necessary to run the required tests, take several samples (a minimum of 5 grab samples) from different areas along geotextile tube along the surface and center. Combine these samples and thoroughly mix to develop the composite sample.

3.3.5.3 Moisture Test by Others

Dredged dewatered material will be subject to moisture testing for free liquids in either the lab or the field. The test will be conducted according to SW-846 Method 9095A. As part of the dewatering process, materials may be blended with the dredged material to aid in dewatering.

3.4 TRANSPORTATION AND DISPOSAL

Furnish labor, materials, and equipment necessary to store, transport, and dispose of PCB contaminated material in accordance with Federal, State, and local requirements. Prepare and maintain waste shipment records and manifests required by the Resource Conservation and Recovery Act (RCRA), U.S. Federal Department of Transportation (DOT), and State transportation department.

3.4.1 Transportation

Transport PCB contaminated sediments in vehicles designed to carry PCB contaminated sediments in accordance with Federal and State requirements. Transport PCB contaminated solid material, articles, or equipment in containers with removable heads. In addition to those requirements:

a. Inspect vehicles and containers for proper operation and covering. Repair or replace damaged containers.
b. Inspect vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.
c. Perform decontamination procedures prior to leaving the worksite and again before leaving the disposal site.

3.4.1.1 Weight Certification

Weigh vehicles transporting PCB contaminated materials at a State-certified weigh scale.

3.4.1.2 Shipping Documentation

Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB. Return a signed copy before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities and EPA identification numbers. Within 30 days from shipment date, the transporter shall provide a copy of the manifest signed and dated by the disposer.

3.4.2 Disposal

Dispose of PCB contaminated sediments in accordance with 40 CFR 761. The disposer shall forward a copy of the manifest to the PROJECT MANAGER within 30 days of receipt of PCBs. PCB impacted sediments must meet the requirements of the Moisture testing and any other specific requirements of the receiving landfill.

3.5 CLEANUP

Maintain surfaces of the PCB control area free of accumulations of PCBs. Restrict the spread of dust and debris; keep waste from being distributed over work area. Do not remove the PCB control area and warning signs prior to the PROJECT MANAGER's approval. Re-clean areas visually showing residual PCBs.

3.5.1 Solvent Cleaning

Clean contaminated tools, containers, etc., after use by rinsing three times with an appropriate solvent or by wiping down three times with a solvent wetted rag. Suggested solvents are Stoddard solvent or hexane.

3.6 REPORTS

Prepare and submit a closeout report at the completion of the work.

-- END OF SECTION --

PRS Pollution Risk Services

Foth & Van Dyke

Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Specifications

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Specifications

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

SHEBOYGAN RIVER AND SUPERFUND SITE
TABLE OF CONTENTS

PHASE II
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01050
CONSTRUCTION STAKING

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications.

PART 1 GENERAL

1.1 SUMMARY

Each proposed work area will be surveyed/staked by the SUPERVISING CONTRACTOR. This surveying/staking will be used to delineate a local system for each area to regulate sampling and other work performed at the site. The surveying/staking system will be used for horizontal and vertical control. Each local area will be tied to an established station or as shown on the Design Drawings. Vertical and elevation measurements will be relative to existing ground and benchmark elevations. Should the CONTRACTOR require resurveying/restaking, this Work will be done as the SUPERVISING CONTRACTOR'S schedule permits and at expense of CONTRACTOR. CONTRACTOR shall maintain survey/stake markers.

1.2 PRIMARY CONTROL MONUMENT(S)

Bench marks provided by local government agencies to establish primary vertical control for Work will be indicated on the final Design Drawings. These will be either official benchmarks tied into the state plane coordinate grid or local benchmarks established at known points (building corners, manhole lids, etc.). These are shown in relation to previously surveyed site elevation contours. Monuments or references for primary horizontal control for the construction of Work are indicated on Design Drawings. Preserve and maintain primary control monuments.

1.3 PRIMARY LINE AND GRADE

Primary line and grade will be provided by SUPERVISING CONTRACTOR and established by SUPERVISING CONTRACTOR by means of stakes placed at site of Work.

1.3.1 Excavation and Embankments

Stakes for excavation and embankment will be set:

a. Offset to best serve CONTRACTOR.
b. Other settings as approved by the PROJECT MANAGER

1.3.2 Contractor Responsibilities

CONTRACTOR shall:

a. Set stakes as required to delineate the work site.
b. Arrange operations to avoid interference with establishment of primary lines and grades.
c. Check accuracy of line and grade by visual inspection, checks between stakes, and periodic checks (with surveying equipment) between primary control monuments and stakes.
d. Be responsible for protection and preservation of stakes. Resurveying/Restaking will be done as SUPERVISING CONTRACTOR'S schedule permits, and at CONTRACTOR'S expense.

1.4 CONSTRUCTION LINE AND GRADE

The SUPERVISING CONTRACTOR shall bear sole responsibility for correct transfer of construction lines and grades from primary line and grade points and for correct alignment and grade of completed Work based on lines and grades shown on Design Drawings. “Grades” are to mean relative depths below pre-construction grades at individual work locations.

1.5 SURVEY MONUMENTS

Protect survey monuments shown on Design Drawings. If such marked monuments are damaged by CONTRACTOR, replace by Registered Land Surveyor at CONTRACTOR'S expense.

--- END OF SECTION ---

PHASE II
DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01055
ROLES AND
RESPONSIBILITIES DURING CONSTRUCTION

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications. The project shall be identified as the “Sheboygan River and Harbor Superfund Site, Upper River Project”.

PART 1 ROLES AND RESPONSIBILITIES

1.1 PROJECT COORDINATOR

Pollution Risk Services (PRS) is the Project Coordinator and OWNER. As Project Coordinator, PRS has accepted the role of the Settling Defendant for the Project. The Project Coordinator is also referred to as the Project Manager and OWNER in the Project Specifications. The responsibilities of the PRS Project Coordinator include the following:

a. Within the parameters of the Consent decree will define the work to be supervised and directed by the Supervising Contractor (Foth & Van Dyke).

b. Perform all administrative and decision-making activities, as well as provide necessary authorizations related to the project on behalf of PRS.

c. Assure that all activities are performed in accordance with the requirements of applicable federal and state laws, regulations, and applicable or relevant and appropriate requirements (ARARs).

d. Assume responsibility for ensuring that its contractors and subcontractors perform the Upper River Work as defined in the Consent Decree.

e. Coordination of communications, submittals, and meetings with the USEPA Project Manager, and WDNR Project Manager and other appropriate project team members.

f. Obtain all necessary federal or state permits.

g. Maintain communication with the USEPA, WDNR, and Supervising Contractor.

1.2 SUPERVISING CONTRACTOR

Responsibilities of the Supervising Contractor are to perform all tasks as defined in the Consent Decree (CD) and Quality Assurance Project Plan (QAPP); this includes but is not limited to the following:

a. Assist the Project Coordinator in the preparation, review and/or editing of submittals (i.e., designs, plans, specifications, drawings, reports, contracts, etc…).

b. Function as primary consultant to the Project Coordinator to ensure that all work performed is in accordance with the CD.

c. Assist the Project Coordinator in identifying all necessary Federal or State permitting requirements and coordinate with agencies.

d. Ensure all aspects of Upper River work to be performed by the Project Coordinator, pursuant to Sections VI, VII, and XIV of the Consent Decree, are in accordance with the approved project documents, the Consent Decree, the existing Chubb insurance policy, and performed in a manner that is protective of human health and the environment.

e. Receive Contractor QC Reports, review and verify QC Data, prepare QA documentation for field and laboratory work performed in accordance with the approved Design Documents.

f. Conduct and/or oversee QA field work.

1.3 CONTRACTOR

The Contractor is responsible for performing the work activities in accordance with the approved contract documents, the Consent Decree and Statement of Work, and in accordance with existing laws and regulations. The Contractor is also responsible for performing all tasks in accordance with the Site Health and Safety Plan and Quality Assurance Project Plan.

PART 2 GENERAL

Not used.

PART 3 PRODUCTS

Not used.

PART 4 EXECUTION

Not used.

--- END OF SECTION ---

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01100
SUMMARY OF WORK

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled "Section 01110N - SUMMARY OF WORK".

PART 1 GENERAL

1.1 REFERENCES

1.1.1 Documents

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

a. Consent Decree
b. Record of Decision
c. Health and Safety Plan
d. Quality Assurance Project Plan
e. Construction Quality Assurance Plan
f. Design Plan Drawings and Specifications
g. Contingency Plan
h. Operations and Maintenance Plan
i. Record Drawings
j. Scope of Work
k. Project Schedule
l. Project Budget
m. Field Sampling Plan
n. Daily Reports
o. COE Requirements
p. USEPA Requirements
q. WDNR Requirements
r. Utility Requirements
s. Remedial Action Work Plan
t. Contractor Submittals

1.1.2 Definitions

Basic contract definitions are included in the General Conditions of the contract.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

The work includes those tasks described in the Project Proposal and the Scope of Work as well as incidental related work, including but not limited to:

1. Mobilization of equipment, personnel, materials, and facilities as required
2. Submittals
3. Site preparation
4. Soft sediment dredging and piping to dewatering system (equipment and material supplied by owner)
5. Dewatering (material supplied by owner)
6. Installation and maintenance of surface water and erosion control features
7. Treatment and discharge of carriage and contact water (equipment by owner)
8. Transportation and disposal of PCB contaminated sediment
9. Backfilling, compacting, and grading (Floodplains only)
10. Restoration

1.2.2 Location

The work shall be located along the Sheboygan River approximately as indicated on the Design Drawings.

1.3 EXISTING WORK

Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work.

1.4 LOCATION OF UNDERGROUND FACILITIES

The CONTRACTOR is responsible for locating all utilities prior to start of excavation. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but indicated in locations to be traversed by piping, ducts, and other work to be installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.4.1 Notification Prior to Excavation

Contact the Diggers Hotline 72 hours prior to excavating. CONTRACTOR is responsible for marking all utilities not marked by Diggers Hotline.

1.5 OWNER-FURNISHED MATERIAL & EQUIPMENT

The owner will furnish the equipment and material used to dredge sediment, dewatering, and treat carriage and contact water from the dewatering pad. The owner-furnished equipment is listed in 01600.

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01285
MEASUREMENT AND PAYMENT

TABLE OF CONTENTS

PART 1 GENERAL

1.1 PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum, time and material, or unit price payments will be made are described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum, time and material, or unit price payment item, shall be included in the listed item most closely associated with the work involved. The price and payment shall constitute full compensation for furnishing all labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.1.1 Submittals

1.1.1.1 Payment

Payment will be made for costs associated with preparing contractor submittals and work plans as defined in Contract Documents.

1.1.2 Mobilization

1.1.2.1 Payment

Payment will be made for costs associated with mobilization. This includes equipment and facilities as defined in the Contract Documents.

1.1.3 Site Preparation and Dewatering System Set-Up

1.1.3.1 Payment

Payment will be made for costs associated with the site preparation and dewatering system set-up, as defined in Contract Documents.

1.1.4 Dredging of Soft Sediment

1.1.4.1 Payment

Payment will be made for costs associated with providing labor and ancillary equipment to dredge soft sediment and perform sediment dewatering. Major equipment items, i.e. dredge, booster pumps, and geotextile tubes will be provided by OWNER as described in 01600. Payment will be made on a monthly basis for work completed to date.

1.1.4.2 Measurement

For planning purposes, the total quantity of dredged material to be removed approximately 35,000 cubic yards (in-river). Based on a production rate of 350 cy/day results in an approximately 100 day schedule. Allowance will be made for fewer or additional days where authorized, meaning, work performed less than or greater than the calculated number of theoretical days projected will be payed on a daily rate as defined in the Contract Documents.

1.1.4.3 Unit of Measure

Unit of measure: day.

1.1.5 Excavation

1.1.5.1 Payment

Payment will be made for costs associated with sediment excavation for Near Shore Sediments, and Armored Areas.

1.1.5.2 Measurement

The total quantity of the excavated material for which payment will be made will be based on estimated quantities from the Design Documents.

1.1.5.3 Unit of Measure

Unit of measure: day

- END OF SECTION -

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01330
SUBMITTALS

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled "Section 01300 – Submittals".

PART 1 GENERAL

1.1 SUMMARY

Section includes procedural requirements for Work-related submittals:

a. Construction Progress Schedules.
b. Shop Drawings.
c. Product Data.
d. Samples.
e. Operation and maintenance (O&M) information, if any.
f. Schedule of values.
g. Other miscellaneous submittals (MSDS Sheets).
h. Work Plans.

1.2 DEFINITIONS

1.2.1 Submittal for Review

Any submittal for PROJECT MANAGER will be reviewed in accordance with Contract Documents.

1.2.2 Submittal for Record

Submittal for inclusion into PROJECT MANAGER'S records prior to Substantial Completion.

1.3 CONSTRUCTION PROGRESS SCHEDULES

a. Provide separate horizontal bar for each operation or activity.
b. Horizontal Time Scale: Identify first Work day of each week.
c. Scale and spacing to allow space for notations and future revisions.
d. Arrange listings in order of start of each item of Work.

1.3.1 Construction Progress Schedule Elements

Show complete sequence of construction by activity. Show dates for beginning and completion of each major element of construction and installation dates for major items.

1.3.2 Schedule Revisions

a. As needed to reflect changes in progress of Work.
b. Indicate progress of each activity at date of submittal.
c. Show changes occurring since previous submittal of schedule, such as:

    1. Major changes in scope.
    2. Activities modified since previous submittal.
    3. Revised projections of progress and completion.
    4. Other identifiable changes.

d. Provide narrative report to define following.

    1. Problem areas and anticipated delays and their impact on schedule.
    2. Corrective action recommended and its effect.
    3. Effect of changes on schedules of other Contractors.

1.4 SHOP DRAWINGS AND PRODUCT DATA

1.4.1 Contractor's Responsibilities

a. Review Shop Drawings and Product Data prior to submittal.
b. Determine and verify the following:

    1. Field measurements.
    2. Field construction criteria.
    3. Catalog numbers and similar data.
    4. Conformance with Specifications.

c. Coordinate each submittal with requirements of Work and Contract Documents.
d. Notify PROJECT MANAGER in writing, at time of submittal, of deviations in submittals from requirements of Contract Documents.
e. Begin no fabrication or Work requiring submittals until return of submittals with PROJECT MANAGER'S approval.
f. Submittals received but not requested in Specifications shall be returned without

review.

g. Submit 3 copies unless specified otherwise.

1.4.2 Submittal Requirements

a. Date of submittal and dates of previous submittals.
b. Project title and number.
c. Contract identification.
d. Names of:

    1. CONTRACTOR.
    2. Supplier.
    3. Manufacturer.

e. Identification of product, with identification numbers, and Drawing and Specification section numbers.
f. Field dimensions, clearly identified.
g. Identify details required on Drawings and in Specifications.
h. Show manufacturer and model number, give dimensions, and provide clearances.
i. Relation to adjacent or critical features of Work or materials.
j. Applicable standards, such as ASTM or Federal Specification numbers. Identification of deviations from Contract Documents.
k. Identification of revisions on resubmittals.
l. 8-in. by 3-in. blank space for CONTRACTOR and PROJECT MANAGER stamps.
m. CONTRACTOR'S stamp, signed, certifying to review of submittal, verification of products, field measurement, field construction criteria, and coordination of information within submittal with requirements of Work and Contract Documents.

1.4.3 Resubmittal Requirements

a. Comply with submittal requirements.
b. Make corrections or changes in submittals required by PROJECT MANAGER. Resubmit until approved.
c. Identify on transmittal form submittal is resubmission.
d. Shop Drawings and Product Data:

    1. Revise initial drawings or data and resubmit as specified for initial submittal.
    2. Indicate changes made other than those requested by PROJECT MANAGER.

1.4.4 Distribution

Distribute reproductions of Shop Drawings and copies of Product Data which carry PROJECT MANAGER'S approval stamp to following.

    a. Job site file.
    b. Record documents file.

1.4.5 Project Manager’s Duties

a. Review submittals in accordance with schedule.
b. Affix stamp and signature, and indicate requirements for resubmittal or approval of submittal.
c. Return submittals to CONTRACTOR.
d. For planning purposes, PROJECT MANAGER has set a goal of 5 days for review of submittals from the day received in PROJECT MANAGER'S office.

1.5 TEST RESULTS

Test results shall be submitted as follows:

a. Submit test results required in Specification sections.
b. Submit test results upon completion of test or submittal of results from testing laboratory.
c. Test results are submitted for review of conformance with specified requirements and information.

1.6 GUARANTEE, WARRANTIES, MAINTENANCE AGREEMENTS AND WORKMANSHIP BONDS

Refer to Specification sections for requirements. Submittal is considered final when submittal is received by PROJECT MANAGER.

1.7 ACTION ON SUBMITTALS

1.7.1 General:

a. Except for submittals for record and similar purposes, where action and return on submittal is required or requested, PROJECT MANAGER will review each submittal, mark with appropriate action, and return. Where submittal must be held for coordination, PROJECT MANAGER will so advise CONTRACTOR without delay.
b. PROJECT MANAGER will stamp each submittal with action stamp, appropriately marked with submittal action.

1.7.2 Notification of Insufficient Information:

a. If information submitted is not sufficient to complete review of submittal, PROJECT MANAGER will send transmittal to CONTRACTOR notifying CONTRACTOR that additional information is required.
b. Submittal will not be returned. Submittal will be placed in an "on hold" status until CONTRACTOR provides additional information.

PART 2 EXECUTION

2.1 SUBMITTAL REQUIREMENTS

Deliver submittals to PROJECT MANAGER. Provide complete copies of required submittals as follows and as required by the individual specification sections.

a. Construction Progress Schedule
b. Shop Drawings and Product Data
c. Test Results
d. Certifications
e. Other Submittals (as required)

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01355
ENVIRONMENTAL PROTECTION

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled "Section 01355A – Environmental Protection".

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications may be referred to in the text by basic designation only.

a. 33 CFR 328 Definitions
b. 40 CFR 68 Chemical Accident Prevention Provisions
c. 40 CFR 260 Hazardous Waste Management System: General
d. 40 CFR 261 Identification and Listing of Hazardous Waste
e. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
f. 40 CFR 279 Standards for the Management of Used Oil
g. 40 CFR 302 Designation, Reportable Quantities, and Notification
h. 40 CFR 355 Emergency Planning and Notification
i. 40 CFR 761 Polychlorinated Biphenyls
j. 49 CFR 171 - 178 Hazardous Materials Regulations
k. U.S. ARMY CORPS OF ENGINEERS (USACE) EM 385-1-1 (1996) U.S. Army Corps on Engineers Safety and Health Requirements Manual
l. Wisconsin Administrative Code
m. Wisconsin Construction Site Best Management Practice Handbook (WDNR Pub WT-222); and
n. Wisconsin Department of Transportation Erosion Control Product Acceptability Lists (PAL).

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

CONTRACTOR generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the CONTRACTOR to execute work, but are not fully consumed during the course of construction.

1.2.4 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require permission to discharge water from the governing agency.

1.2.5 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.3 GENERAL REQUIREMENTS

The CONTRACTOR shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The CONTRACTOR shall comply with all applicable environmental Federal, State, and local laws and regulations. The CONTRACTOR shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

1.4 SUBCONTRACTORS

The CONTRACTOR shall ensure compliance with this section by SUBCONTRACTORS.

1.5 SUBMITTALS

The following shall be submitted by the CONTRACTOR:

Site-Specific Environmental Protection Plan (EPP)

1.6 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, the CONTRACTOR shall submit a Site-Specific Environmental Protection Plan (EPP) for review and approval by the PROJECT MANAGER. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the CONTRACTOR must address during construction. Issues of concern shall be defined within the Environmental Protection Plan as outlined in this section. The CONTRACTOR shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but which the CONTRACTOR considers necessary, shall be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, the CONTRACTOR shall meet with the PROJECT MANAGER for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the CONTRACTOR's Environmental Plan. The Environmental Protection Plan shall be current and maintained onsite by the CONTRACTOR.

1.6.1 Compliance

No requirement in this Section shall be construed as relieving the CONTRACTOR of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the CONTRACTOR shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.6.2 Contents

The Environmental Protection Plan shall include, but shall not be limited to, the following:

a. Name(s) of person(s) within the CONTRACTOR's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
b. The Spill Control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. This plan shall include as a minimum:

    1. The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the PROJECT MANAGER and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.
    2. The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.
    3. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
    4. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.
    5. The methods and procedures to be used for expeditious contaminant cleanup.
    6. MSDS Sheets for chemical used during remediation.

1.6.3 Appendix

Copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents shall be attached, as an appendix, to the Environmental Protection Plan.

1.7 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, and IMPROVEMENTS. Prior to start of any onsite construction activities, the CONTRACTOR, SUPERVISING CONTRACTOR, LANDOWNER, and the PROJECT MANAGER shall make a joint condition survey. The CONTRACTOR shall protect those environmental features included in the survey and any indicated on the drawings, regardless of interference which their preservation may cause to the CONTRACTOR's work under the contract.

1.8 SPECIAL ENVIRONMENTAL REQUIREMENTS

The CONTRACTOR shall comply with the special environmental requirements listed in the Storm Water Pollution Prevention Plan.

1.9 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the CONTRACTOR, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the PROJECT MANAGER and may require an extended review, processing, and approval time. The PROJECT MANAGER reserves the right to disapprove alternate methods, even if they are more cost effective, if the PROJECT MANAGER determines that the proposed alternate method will have an adverse environmental impact.

1.10 NOTIFICATION

The PROJECT MANAGER will notify the CONTRACTOR in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the CONTRACTOR's Environmental Protection plan. The CONTRACTOR shall, after receipt of such notice, inform the PROJECT MANAGER of the proposed corrective action and take such action when approved by the PROJECT MANAGER. The PROJECT MANAGER may issue an order stopping all or part of the work until satisfactory corrective action has been taken. If necessary, this work stoppage will be reflected in a revised project schedule.

PART 2 EXECUTION

2.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

The CONTRACTOR shall be responsible for complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations.

2.2 LAND RESOURCES

The CONTRACTOR shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the CONTRACTOR shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the CONTRACTOR shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The CONTRACTOR shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the CONTRACTOR.

2.2.1 Work Area Limits (Land)

Prior to commencing construction activities, the CONTRACTOR shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The CONTRACTOR's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

2.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The CONTRACTOR shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

2.2.3 Erosion and Sediment Controls

The CONTRACTOR shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the CONTRACTOR shall be such that water quality standards are not violated as a result of the CONTRACTOR's construction activities. Areas exposed at any one time by construction operations should be kept to a minimum. The CONTRACTOR shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover (bioengineering), stream bank stabilization, slope stabilization, and silt fences. The CONTRACTOR's best management practices shall also be in accordance with the National Pollutant Discharge Elimination System (NPDES), Wisconsin Pollutant Discharge Elimination System (WPDES), and Design Specification Section #01356, *Storm Water Pollution Prevention Plan*. Any temporary measures shall be removed after the area has been stabilized.

2.2.4 Contractor Facilities and Work Areas

The CONTRACTOR's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the PROJECT MANAGER. Temporary movement or relocation of CONTRACTOR facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

2.3 WATER RESOURCES

The CONTRACTOR shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. All water areas affected by construction activities shall be monitored by the CONTRACTOR. For construction activities immediately adjacent to impaired surface waters, the CONTRACTOR shall be capable of quantifying sediment or pollutant loading to that surface water when required.

2.3.1 Cofferdams, Diversions, and Dewatering Operations

Construction operations for decontamination shall be controlled at all times to maintain compliance with existing State water quality standards and designated uses of the surface water body.

2.4 AIR RESOURCES

Equipment operation, activities, or processes performed by the CONTRACTOR shall be in accordance with all Federal and State air emission and performance laws and standards.

2.4.1 Particulates

Dust particles shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The CONTRACTOR shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The

CONTRACTOR must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The CONTRACTOR shall comply with all State and local visibility regulations.

2.4.2 Sound Intrusions

The CONTRACTOR shall keep construction activities under surveillance and control to minimize noise pollution.

2.4.3 Burning

Burning shall be prohibited on the premises.

2.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

2.5.1 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste.

2.5.2 CONTRACTOR Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The CONTRACTOR shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262.

2.5.3 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site shall be in accordance with all Federal, State, and local laws and regulations.

2.5.4 Waste Water

Disposal of waste water shall be as specified below:

a. Waste water from remediation activities, such as decontamination water and cleanup water shall be managed in accordance with Federal, State, and Local regulations.

2.6 PREVIOUSLY USED EQUIPMENT

The CONTRACTOR shall clean all previously used construction equipment prior to bringing it onto the project site. The CONTRACTOR shall ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds.

2.7 MAINTENANCE OF POLLUTION FACILITIES

The CONTRACTOR shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

2.8 POST CONSTRUCTION CLEANUP

The CONTRACTOR shall clean up all areas prior to demobilization. The CONTRACTOR shall, unless otherwise instructed in writing by the PROJECT MANAGER, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area shall be equivalently restored to prior conditions.

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01356
STORM WATER POLLUTION PREVENTION MEASURES

TABLE OF CONTENTS

INTRODUCTION

This guide specification was modified from the original Corps of Engineers specification entitled “Section 01356 – STORM WATER POLLUTION PREVENTION MEASURES”.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications may be referred to in the text by basic designation only.

a. ASTM D 4439 (1997) Standard Terminology for Geosynthetics
b. ASTM D 4491 (1996) Water Permeability of Geotextiles by Permittivity
c. ASTM D 4533 (1991; R 1996) Trapezoid Tearing Strength of Geotextiles
d. ASTM D 4632 (1991; R 1996)) Grab Breaking Load and Elongation of Geotextiles
e. ASTM D 4751 (1995) Determining Apparent Opening Size of a Geotextile
f. ASTM D 4873 (1995) Identification, Storage, and Handling of Geosynthetic Rolls
g. *Wisconsin Construction Site Best Management Practice Handbook* – Prepared by the Wisconsin Department of Natural Resources, Publication #1700
h. *Erosion Control Product Acceptability Lists (PAL),* February 2004 Edition – Prepared by the Wisconsin Department of Transportation
i. *Tech. Stds.* – http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm

1.2 GENERAL

The CONTRACTOR shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Project Specification Section #01355: *Environmental Protection* and be consistent with the *Erosion Control Product Acceptability Lists (PAL),* *Wisconsin Construction Site Best Management Practice Handbook, and Technical Standards*.

1.3 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the CONTRACTOR are described below and shall be consistent with the *Erosion Control Product Acceptability Lists (PAL),* *Wisconsin Construction Site Best Management Practice Handbook, and Technical Standards*.

1.3.1 Stabilization Practices

The stabilization practices to be implemented may include temporary seeding, mulching, geotextiles, erosion control mats, protection of trees, preservation of mature vegetation, bioengineering, etc. On his daily CQC Report, the CONTRACTOR shall record the dates when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Stabilization practices shall be initiated as soon as practicable (end of day), but no more than 7 days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.3.1.1 Unsuitable Conditions

Standards require that temporary stabilization measures are initiated if disturbed areas are inactive for 7 days. This is a minimum standard and normally require end of day temporary measures.

1.3.2 Structural Practices

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site during and post construction/remediation activities. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. General location and details of these practices are shown on the Design Drawings. Alternative practices may be found in the *Wisconsin Construction Site Best Management Practice Handbook,* *Erosion Control Product Acceptability Lists (PAL, and Technical Standards)* subject to approval of the PROJECT MANAGER.

1.3.2.1 Silt Fences

The CONTRACTOR shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation and embankment). Silt fences shall be installed in the locations indicated on the drawings or as required, based on field conditions. Final removal of silt fence barriers shall be upon approval by the PROJECT MANAGER.

1.3.2.2 Straw Bales

The CONTRACTOR shall provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. Bales shall be properly placed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation and embankment) in each independent runoff area (e.g., after clearing and grubbing in an area between a ridge and drain, bales shall be placed as work progresses, bales shall be removed/replaced/relocated as needed for work to progress in the drainage area). Straw bales shall be installed as shown on the drawings or as required, based on field conditions. Additional locations may be required by the PROJECT MANAGER. Final removal of straw bale barriers shall be upon approval by the PROJECT MANAGER. Rows of bales of straw shall be provided at a minimum, as follows:

a. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.
b. Along the toe of all cut slopes and fill slopes of the construction areas.
c. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas.
d. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced as shown on the drawings.
e. At the entrance to culverts that receive runoff from disturbed areas.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439 or as approved by the PROJECT MANAGER, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)	ASTM D 4632	30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

The CONTRACTOR may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

2.1.3 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

2.2 COMPONENTS FOR STRAW BALES

The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as Byhalia, Bermuda, etc., furnished in air dry condition. The bales shall have a standard cross section of 14 inches by 18 inches. All bales shall be either wire-bound or string-tied. The CONTRACTOR may use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have minimum dimensions of 2 inches x 2 inches in cross section and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 24 inches above the ground surface and shall not exceed 36 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the up slope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Project Manager.

3.2 INSTALLATION OF STRAW BALES

Straw bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 12 inches deep into the ground to securely anchor the bales.

3.3 MAINTENANCE

The CONTRACTOR shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

3.3.1 Silt Fence Maintenance

Silt fences shall be inspected and any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

3.3.2 Straw Bale Maintenance

Straw bale barriers shall be inspected and necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required, it shall be removed. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

3.4 INSPECTIONS

3.4.1 General

The CONTRACTOR shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site.

3.4.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.4.3 Inspection Reports

For each inspection conducted, the CONTRACTOR shall prepare a report summarizing the scope of the inspection, name(s) of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The inspection shall be documented on the required inspection form provided in the Storm Water Pollution Prevention Plan.

-- END OF SECTION --

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01451
TESTING AND INSPECTION OF PIPING – WATER TREATMENT SYSTEM

TABLE OF CONTENTS

PART 1 GENERAL

1.1 SUMMARY

Section Includes
- Inspection of gravity pipelines.
- Pressure and leakage test for pressurized pipelines.

1.2 SUBMITTALS

1.1.2 Quality Control Submittals
- Test reports and results.
- Proposed method to correct deficiencies.
- Record of deficiency repair method and location.

1.3 PROJECT/SITE CONDITIONS

- Notify Supervising Contractor prior to any testing.
- Repeat failed test after correction of deficiencies until satisfactory tests are obtained.
- Repair visible leaks within the pipeline and/or pipeline appurtenances.

PART 2 PRODUCTS

2.1 EQUIPMENT

2.1.1 Standard Pressure and Leakage Test

- City water supply. City water pressure will be used in lieu of air on plastic piping (PVC) to omit any potential safety concerns.
- Provide certified pressure gauge calibrated in pounds per square inch of sufficient capacity to conduct test.

PART 3 EXECUTIONS

3.1 PREPARATION OF PIPELINE BEFORE TESTING

- Clean pipeline of any debris and construction material.
- Repair or replace piping, valves, fittings, and other parts of the piping system which have visible defects or leakage, before commencing tests, even though amount of leakage or pressure loss may be below the allowable limit.

3.2 INSPECTION OF GRAVITY PIPELINES

- Gravity pipelines shall be visually inspected and a record of the results furnished to the Engineer.
- Check vertical and horizontal alignment by sighting through newly constructed pipeline.
- Relay any section of pipe found to be out of alignment.

3.3 PRESSURE AND LEAKAGE TEST FOR PRESSURIZED PIPELINES

3.3.1 Pressure and Leakage Tests

Provide pressure and leakage tests for pressurized pipelines including but not limited to water treatment system.

- Testing shall be in accordance with AWWA C605 for PVC pipe, as modified herein.

3.3.2 Preparation

1) Install temporary plugs or caps, as required, prior to testing.
2) Filling and flushing with water.
   a) Fill each valved section with water slowly, venting air completely from the pipeline and appurtenances.
3) Provide test connections and pressurize the pipe to city water pressure.
   a) Inspect pipeline and repair visible leaks.
   b) Re-pressurize pipeline to city water pressure as many times as necessary until there are no visible leaks.
4) Provide backflow protection to the water system when city water mains are used to supply test water.

PART 4 REFERENCES

4.1 REFERENCES

American Society for Testing and Materials (ASTM)

- ASTM D3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- ASTM C828 Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Line.
- ASTM F679S Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

- END OF SECTION -

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01510
TEMPORARY CONSTRUCTION FACILITIES AND UTILITIES

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineers specification entitled “Section 01500 – TEMPORARY CONSTRUCTION FACILITIES”. Unless noted otherwise, the following products and execution will be the responsibility of the CONTRACTOR.

PART 1 GENERAL

1.1 QUALITY ASSURANCE

Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL). The term "NRTL" shall be as defined in OSHA Regulation 1910.7. The terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

1.1.1 Regulatory Requirements:

National Electrical Code: Components and installation shall comply with NFPA 70. Comply with federal, state, and local codes and regulations, and with utility company requirements.

PART 2 PRODUCTS

2.1 WATER FOR CONSTRUCTION

CONTRACTOR is responsible for making arrangements and pay costs to obtain suitable drinking water. Potable water is available at the Site.

2.2 SANITARY FACILITIES

Provide temporary sanitary toilet facilities conforming to state and local health and sanitation regulations, in sufficient number for use of CONTRACTOR'S and Subcontractor's employees. Maintain in sanitary condition and properly supply with toilet paper.

2.3 TEMPORARY FIRE PROTECTION

Provide and maintain fire extinguishers in accordance with OSHA regulations.

2.4 TEMPORARY SITE AND OTHER ROADS

Construct and maintain temporary site roadways in snow free, ice free, drivable condition necessary to carry out remediation operations.

2.5 SECURITY

CONTRACTOR shall be responsible for loss or injury to CONTRACTOR’S persons or property where Work is involved, and shall provide the necessary security and/or take precautionary measures to protect CONTRACTOR'S interests.

2.6 TEMPORARY PARKING

Designated areas of existing parking facilities may be used for parking of construction personnel's private vehicles and of CONTRACTOR'S light-weight vehicle. Do not allow heavy vehicles or construction equipment in parking areas.

2.7 TEMPORARY FENCING

Provide temporary fencing sufficient to prevent trespass by CONTRACTOR'S employees and suppliers onto private property and by public onto construction site. Materials shall be sufficiently durable to be effective for duration of construction period.

2.8 PROJECT IDENTIFICATION

Provide signs suitably supported and erected on Project site. Locate signs where designated by PROJECT MANAGER. Temporary warning signs will be posted at the staging area and for general public boating down river and areas in the vicinity of armored area removal.

2.9 FIELD OFFICES AND BUILDINGS

If required by CONTRACTOR, erect where designated by PROJECT MANAGER, and maintain in good condition, temporary field office, tool, and storage building(s) for CONTRACTOR'S use. Tool storage building(s) shall be of ample size to provide space for tools and equipment. Building(s) shall be neat and well constructed, surfaced with plywood, drop siding, masonite, or other similar material, well painted and void of advertisements.

2.10 TEMPORARY ELECTRICAL POWER

CONTRACTOR is required to provide temporary power and connections for field offices. A temporary power service is available at the Site.

PART 3 EXECUTIONS

3.1 GENERAL

Maintain and operate systems to ensure continuous service. Modify and extend systems as Work progress requires.

3.2 REMOVAL

Completely remove temporary materials, equipment, signs, and structures when no longer required. In unfinished areas, clean and repair damage caused by temporary installations or use of temporary facilities, restore drainage, and evenly grade, seed or plant as necessary to provide appearance equal to or better than original. In finished areas, restore existing or permanent facilities used for temporary services to specified or original condition.

3.3 DAMAGE TO EXISTING PROPERTY

CONTRACTOR is responsible for replacing or repairing damage to existing buildings, structures, sidewalks, roads, parking lot surfacing, and other existing assets.

--- END OF SECTION ---

PHASE II
DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01600
OWNER SUPPLIED MATERIAL AND EQUIPMENT

TABLE OF CONTENTS

PART 1 GENERAL

1.1 IDENTIFICATION OF OWNER-FURNISHED PROPERTY

The Owner will furnish to the Contractor the following property to be incorporated or installed in the work or used in its performance. Such property will be furnished from storage at the project site and the Contractor will be required to load and transport the property to the work area. All such property will be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated herein. The Contractor shall verify the quantity and condition of such Owner furnished property when delivered to him, acknowledge receipt thereof in writing to the Project Manager, and in case of damage to or shortage of such property, he will within 24 hours report in writing such damage or shortage to the Project Manager.

Quantity	Item	Description
2	Sump Pump	1050 GPM
1	Equalization Tank(s)	35,000 – 63,000 Gallon
2	Filter Pumps	1050 GPM each
1	Backwash Pump	1200 GPM each
3	Sand Filter	10 Ft. diameter
3	GAC Filter	10 Ft. diameter
1	Effluent Tank(s)	35,000 Gallon
1	Dredge	8” Swing Arm Ladder – 2500 GPM max.
3-4	Booster Pumps	2500 GPM each
4,000 LF	8” HDPE Piping	SDR 11 (first 1000 ft after dredge and booster pumps)
13,000 LF	8” HDPE Piping	HDPE SDR 17
40	Geotextile Tube	Per Design Documents
450 LF	Portable Dams	Port-A-Dam

-- End of Section --

PHASE II
DIVISION 02 - GENERAL REQUIREMENTS

SECTION 02050
RIP RAP

TABLE OF CONTENTS

PART 1 - GENERAL

1.1 SUMMARY

a. Section Includes
   1. Rip Rap

1.2 SUBMITTALS

a. Daily delivery tickets for each load of material delivered to the site.

1.3 QUALITY ASSURANCE

a. Not used.

PART 2 - PRODUCTS

2.1 RIP RAP

a. General
   1. Material shall be clean, sound, hard, dense, durable, field or quarry stone which is free from seams, cracks, or other structural defects. It shall be angular material from shot rock (blasted) or crushed rock having substantially all face of which have resulted from artificial crushing.
   2. Loss due to sulfate soundness test shall not exceed 10 percent.
   3. Loss due to abrasion test shall not exceed 40 percent.
   4. Material shall not be frozen.

b. Gradation

1. Soil Class A-2 (Light Riprap Rock)

	% Total Weight Smaller
Size of Stone	Than the Given Size
150 lbs.	100
60 lbs.	80
20 lbs.	20
2 lbs.	10

PART 1 - EXECUTION

1.1 APPLICATION

a. Place rip rap as specified or stated on Design Drawings.

b. Place material in accordance with the Design Drawings and appropriate Specification Sections for the type of work being performed.

PART 3 - REFERENCES

American Society for Testing and Materials (ASTM)

a. ASTM C88Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

b. ASTM C131Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

---END OF SECTION ---

PHASE II
DIVISION 02 - GENERAL REQUIREMENTS

SECTION 02073

GEOTEXTILE FABRICS

GENERAL

1.1 SUMMARY

A. Section Includes
1. Geotextile fabrics under riprap

1.2 SUBMITTALS

A. Provide, at the time of delivery of the geotextile fabric, a manufacturer's Certificate of Compliance that the geotextile fabric meets the requirements of this Section.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver geotextile fabric in a wrapping which will protect the fabric from ultraviolet radiation and from abrasion due to shipping and hauling.

B. Store geotextile fabric in a dry location until installed.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide geotextile fabric consisting of either woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride. All fabric shall have the minimum strength values in the weakest principle direction. Non-woven fabric may be needle punched, heat bonded, resin bonded or combinations thereof.

B. The geotextile fabric shall be insect, rodent, mildew and rot resistant.

C. Clearly mark the geotextile fabric rolls showing the type of fabric.

D. If sewn seams are used, provide a field sewn seam sample produced from the geotextile fabric and thread and with the equipment to be used on the project, prior to its incorporation into the work.

2.2 MATERIALS

A. Non-Woven Geotextile Fabric, Type HR
   1. Type HR non-woven geotextile fabric shall be used beneath medium and heavy riprap, Soil Class A-1 and A-MR (Section 02050).
   2. The fabric shall comply with the following physical properties:

Test	Method	Value[1]
Grab Tensile Strength (lbs.)	ASTM D4632	300 min.
Puncture Strength (lbs.)	ASTM D4833	100 min.
Apparent Breaking Elongation (%)	ASTM D4632	15 min.
Apparent Opening Size (U.S. Standard Sieve)	ASTM D4751	30-140
Permittivity, sec.$^{-1}$	ASTM D4491	.30 min.

[1]All numerical values represent minimum/maximum average roll values (i.e., the average of minimum test results on any roll in a lot should meet or exceed the minimum specified values).

   3. The following fabrics are approved for Type HR:
      a. Amoco (Nilex) - 4512
      b. Carthage - FX-160HS
      c. Contech - C120NW
      d. Mirafi-1120N

PART 3 - EXECUTION

3.1 SEWING

A. Sew factory and field seams with a thread having the same or greater durability as the material in the fabric.

B. Use a 401 stitch conforming to Federal Standard No. 751a.

C. Seams shall develop a tensile strength equal to or greater than 80 percent of the specified grab tensile strength of the fabric, unless otherwise specified.

3.2 NON-WOVEN GEOTEXTILE FABRIC, TYPE HR

A. Grade the area smooth and remove all stones, roots, sticks or other foreign material which would interfere with the fabric being completely in contact with the soil.

B. Place the fabric loosely and parallel to the direction of water movement.
   1. Provide pinning or stapling to hold the geotextile in place.
   2. Join separate pieces of fabric by overlapping or sewing.
   3. Place the fabric in the overlapped joints with a minimum overlap of 24 inches in the direction of flow.

C. After placement, do not expose the fabric longer than 48 hours prior to covering.

D. Cover damaged areas with a patch of fabric using a three-foot overlap in all directions.

E. Place rip rap from the base of the slope upward.

F. Do not allow freefall of rip rap greater than 6 inches or less if required to prevent damage to the fabric.

3.3 WOVEN GEOTEXTILE FABRIC SUBGRADE REINFORCEMENT

A. Prior to the placement of geotextile fabric, grade smoothed and shaped to the required grade and section. After the fabric has been placed, do not permit traffic or construction equipment to travel directly on the fabric.

B. Roll out the fabric on the excavation and pull manually to remove wrinkles.
   1. Join separate pieces of fabric by overlapping or sewing.
   2. Place the fabric in the overlapped joints with a minimum overlap of 18 inches.
   3. Provide weights or pins to prevent lifting of the fabric by wind.

C. After placement, do not expose the fabric longer than 48 hours prior to covering.

D. Place the granular material over the fabric.

E. Use construction equipment such that ruts do not exceed three inches in depth.
   1. Fill ruts with additional material.
   2. Do not smooth ruts without adding additional material.

F. Repair damaged areas by covering with a patch of fabric using a three foot overlap in all directions.

PART 4 - REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM D4355 Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water.
   2. ASTM D4533 Test Method for Trapezoid Tearing Strength of Geotextiles.
   3. ASTM D4491 Test Methods for Water Permeability of Geotextiles by Permittivity.
   4. ASTM D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles.
   5. ASTM D4751 Test Method for Determining the Apparent Opening Size of a Geotextile.
   6. ASTM D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products

- END OF SECTION -

PHASE II
DIVISION 02 - SITE WORK

SECTION 02074
DEWATERING (GEOTEXTILE TUBES)

TABLE OF CONTENTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

The work covered by this Section consists of furnishing labor, material (owner supplied), and equipment and performing the operations required for sediment dewatering including placing and filling the Geotextile tubes as specified herein and as shown in Design Documents.

1.2 REQUIREMENT

1.2.1 General Requirements include:

1. Current design uses geotextile tubes for sediment dewatering.
2. Dewatering activities will occur on an asphalt covered pad as shown on Design Drawings.
3. Carriage water shall sheet drain to a sump and pump system for treatment.
4. Geotextile tube shall have a maximum circumference of 60 ft.

1.2.2 Performance Requirement

1. Through the use of geotextile tubes, dewatered sediment shall be attempted to be made workable and meet the requirements of the disposal facility (Onyx) such that it can be loaded into haul trucks with standard loading equipment.
2. Dewatered sediment shall pass the paint filter test.

1.3 REFERENCES

The publications listed below, form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designations only.

American Society for Testing and Materials (ASTM) Publications

D 2487-93	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D 3786-87	Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Test Method
D 3884-92	Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)
D 4354-96	Sampling of Geosynthetics for Testing
D 4355-92	Deterioration of Geotextile tubes from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
D 4491-96	Water Permeability of Geotextile tubes by Permittivity
D 4533-91 (R 1996)	Trapezoid Tearing Strength of Geotextile tubes
D 4595-86 (R 1994)	Tensile Properties of Geotextile tubes by the Wide- Width Strip Method
D 4632-91 (R 1996)	Grab Breaking Load and Elongation of Geotextile tubes
D 4751-95	Determining Apparent Opening Size of a Geotextile tubes
D 4759-88 (R 1996)	Determining the Specification Performance of Geosynthetics
D 4833-88	Index Puncture Resistance of Geotextile tubes, Geomembranes, and(R 1996) Related Products
D 4873-95	Identification, Storage, and Handling of Geotextile tubes
D 4884-96	Strength of Sewn or Thermally Bonded Seams of Geotextile tubes

1.4 SUBMITTALS

a. Owner shall provide Geotextile tube certificates.

1.4.1 Data

1.4.1.1 Geotextile tube:

Manufacturer’s data for geotextile tube shall be submitted by the vendors prior to delivery of the Geotextile tubes.

1.4.2 Certificates.

1.4.2.1 Geotextile tube

A written certificate of compliance from the vendor shall be submitted upon delivery of the Geotextile tubes. The certificate shall state that Geotextile tubes shipped to the site meet or exceed the minimum average roll values listed in the TABLE below.

1.4.2.2 Geotextile tube Seams:

A written certificate of compliance shall be submitted upon delivery of the Geotextile tubes. The certificate shall state that each Geotextile tube seam meets or exceeds the minimum average roll values listed in the TABLE below.

1.5 DELIVERY, STORAGE, AND HANDLING.

1.5.1 General

Geotextile tubes shall be delivered only after the required submittals have been received and approved. Geotextile tubes shall be labeled, shipped, stored, and handled in accordance with ASTM D 4873 and as specified herein. Each roll shall be wrapped in an opaque and waterproof layer of plastic during shipment and storage. The plastic wrapping shall be placed around the Geotextile tube roll in the manufacturing facility and shall not be removed until installation. Each roll shall be labeled with the manufacturer's name, Geotextile tube type, lot number, roll number, and roll dimensions, including length, width, or gross weight. Geotextile tube or plastic wrapping damaged as a result of delivery, storage, or handling shall be repaired or replaced, as directed, at no additional cost to the OWNER

1.5.2 Handling

No hooks, tongs, or other sharp instruments shall be used for handling the Geotextile tubes. Geotextile tubes shall not be dragged along the ground. The surface upon which it may be installed shall be smooth and free of burrs or protrusions that can snag and tear the fabric.

1.5.3 Storage

Geotextile tubes shall be stored in areas where water cannot accumulate, elevated off the ground, and protected from conditions that will affect the properties or performance of the Geotextile tube. Geotextile tube shall not be exposed to temperatures in excess of 140 degrees F or less if recommended by the manufacturer. Outdoor storage shall not be for periods which exceed the manufacturer's recommendations or 6 months, whichever is less. Prior to installation Geotextile tube shall not be exposed to direct sunlight for more than 14 days.

PART 2 - PRODUCTS

2.1 MATERIALS.

2.1.1 Fill Materials

Sediment for filling geotextile tubes shall consist of dredged materials.

2.2 MATERIALS AND MANUFACTURING REQUIREMENTS.

2.2.1 Geotextile tubes

The Geotextile tube shall be a woven monofilament or multi-filament pervious sheet of polymeric yarn. The Geotextile tube may be constructed to meet the Geotextile tube properties in Table 1. Fibers used in the manufacture of the Geotexile tubes shall consist of long-chain synthetic polymers composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. Stabilizers and inhibitors shall be added to the base polymer of the Geotextile tubes if necessary to make the filaments resistant to deterioration by ultraviolet light and heat exposure. Reclaimed or recycled fibers or polymer shall not be added to the formulation. Geotextile tubes shall be formed into a network so that the filaments or yarns retain dimensional stability relative to each other. The Geotextile tube physical properties shall equal or exceed the Minimum Average Roll Values (MARV) listed in TABLE 1, as determined by the standard test methods listed in the Paragraph: REFERENCES above. Acceptance of Geotextile tubes shall be in accordance with ASTM D 4759.

TABLE 1 - GEOTEXTILE TUBE PHYSICAL PROPERTIES
MINIMUM TEST

PROPERTY	TEST METHOD	UNIT	VALUE
Apparent Opening Size (U.S. Sieve)	ASTM D 4751	U.S.Sieve (mm)	#40 (0.425)
Flow Rate	ASTM D 4491	$gal/min/ft^2$ $(l/min/m^2)$	20 (813)
Permeability	ASTM D 4491	cm/sec	0.040
Permittivity	ASTM D 4491	sec^{-1}	0.26
Puncture	ASTM D 4833	lbs (kN)	280 (1.25)
Wide Width Tensile	ASTM D 4595		
Ultimate Tensile Strength Machine Direction(MD)		lbs/ft (kN/m)	4800 (70)
Ultimate Tensile Strength Cross Direction(CD)		lbs/ft (kN/m)	6600 (96.3)
Wide Width Tensile	ASTM 4595		
Elongation MD		%	18
Elongation CD		%	6
Mullen Strength	ASTM D 3786	psi (kPa)	1200 (8259)
Trapezoidal Tear	ASTM D 4533		
Machine Direction,		lbs (kN)	180 (0.80)
Cross Direction, lbs		 (kN)	275 (1.22)
Ultraviolet Degradation (percent Strength retained 500 hours)	ASTM D 4355		70% strength Retained for all classes
Seam Strength Wide Width Tests In the MD and CD	ASTM D 4884	lbs/ft (kN/m)	3600 (52.5)
Percent Open Area	Specification Paragraph:	%	4

2.2.2 Fabrication

2.2.2.1 Geotextile tube

The Geotextile tube shall be fabricated by sewing together sheets of high strength woven Geotextile tube material to form a tubular shape. The tubes shall have the circumference as shown in the Design Drawings. Geotextile tube lengths are shown on the Design Drawings. The Geotextile tube shall be delivered with tube filling ports spaced at intervals not to exceed 50 feet or other approved interval, along the crest of the tube. Each fill port shall consist of a sleeve having a length of at least 3 feet and circumference slightly greater than that of the dredge discharge pipe (minimum 8-inch diameter). In addition, a pressure relief port, consisting of a 5-foot long sleeve, shall be located not more than 5 feet from each end of each tube. The port sleeves shall be fabricated of the same material as the geotextile tubes and have a “drawstring” closure system to assure a secure closure after the completion of filling. Loops or straps shall be incorporated along the sides of the tube every 20 feet to facilitate deployment. The loops or straps shall have the same tensile strength as the Geotextile tube. Seams shall be overlapped and folded. Geotextile tube seams shall be factory sewn.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS.

2.3.1 Manufacturing, Sampling, and Testing

Geotextile tubes and factory seams shall meet the requirements specified in TABLE 1 above. Conformance testing shall be performed on random samples by the Manufacturer in accordance with approved Quality Control practices.

PART 3 – EXECUTION

3.1 MOBILIZATION AND DEMOBILIZATION

The CONTRACTOR shall mobilize sufficient personnel and equipment at the work site to begin required operations at the site. Upon successful completion of the work required as specified herein, the CONTRACTOR shall remove all construction equipment, materials, and supplies from the site.

3.2 SURFACE PREPARATION

The underlying surface to receive the geotextile tube shall be constructed in accordance with the Design Drawings and prepared to a relatively smooth condition free of ruts, erosion rills, obstructions, depressions, or debris greater than 6 inches in height. Cracks will be sealed and new asphalt laid. Perimeter berms will also be installed.

3.3 INSTALLATION

Installation of the geotextile tubes will be in accordance with the Design Drawings. The CONTRACTOR shall visually inspect the Geotextile tubes, prior to installation, for damage and imperfections. Defective Geotextile tubes shall be marked and repaired. Trimming shall be performed using only an upward cutting hook blade. The Geotextile tube shall be placed at the locations shown on the Design Drawings.

3.3.1 Geotextile tube Placement

The Geotextile tube shall be so placed on the pad as to produce a smooth plane surface in continuous contact with the surface.

3.3.2 Geotextile tube

Before and during filling, the Geotextile tube shall be prevented from rolling or shifting from the alignment shown in the Design Drawings. The Geotextile tubes shall be filled and excess water allowed to drain. The inlet sleeve shall be secured to the injection pipe prior to pumping fill material. The tubes shall be monitored for settlement and deterioration for 2 weeks after initial filling is complete. Failed seams or ruptures in the tubes shall be repaired and tubes filled to the required elevation. The filling ports shall remain open during filling and shall be folded in accordance with the manufacturer's recommendations upon completion of filling the Geotextile tube.

3.4 PROTECTION

The Geotextile tube shall be protected during installation from blinding, clogging, penetrations, tears, or other damage. Damaged Geotextile tubes shall be repaired or replaced.

3.5 REPAIRS

Damaged or defective Geotextile tubes shall be replaced or repaired. Repair shall be made by placing a patch of the same type of material which extends a minimum of 18 inches beyond the edge of the damage or defect. Patches shall be continuously fastened using a sewn seam or other approved methods recommended by the manufacturer. The machine direction of the patch shall be aligned with the machine direction of the Geotextile tube being repaired. Geotextile which cannot be repaired shall be replaced.

3.6 SAFETY REQUIREMENTS

The proposed Geotextile tube foundation must be leveled in the cross direction prior to filling because the mostly water filled Geotextile tube has a tendency to roll down very shallow slopes of one to two percent during initial filling. During initial filling of the Geotextile tubes personnel should be warned to stay up hill from the Geotextile tube to prevent entrapment under the Geotextile tube if it happens to become unstable and roll.

-- END OF SECTION --

PHASE II
DIVISION 02 – SITE WORK

SECTION 02090
HIGH DENSITY POLYETHYLENE PRESSURE (HDPE) PIPE AND FITTINGS

TABLE OF CONTENTS

PART 1 GENERAL

1.1 SUMMARY

Section Includes

- Pressure pipe and fittings for water distribution supplied by Owner.

1.2 SUBMITTALS

1.2.1 Product Data

- Provide product data on pipe and fittings including dimensions.

1.2.2 Quality Assurance/Control Submittals

- Certification that the tests required by this specification section were performed and meet the stated minimum requirements.
- Evidence that the personnel completing joints is qualified to perform the thermal butt fusion.
- Manufacturer's instructions and procedures for joining the pipe and pipe fittings.

1.3 QUALITY ASSURANCE

- Pipe shall be available for inspection.
- Personnel completing the joints shall be as being qualified to perform the thermal butt fusion.

1.4 DELIVERY, STORAGE AND HANDLING

- Upon delivery inspect pipe and fittings for damage, cracks, holes, or foreign inclusions.

- Check date of production to verify the pipe will be installed within six (6) months of date of production.

- Store pipe and accessories on flat level ground with no rocks or other objects under the pipe.

PART 2 PRODUCT

2.1 MATERIALS

2.1.1 Pipe Sizes 4-inch and Larger

- Pipe and fittings shall be high density polyethylene (HDPE) meeting AWWA C906 standards.

- Materials used for the manufacture of the HDPE pipe and fittings shall be made from a PE 3408 resin compound meeting the minimum cell classification of PE 345434C in accordance with ASTM D3350 and the hydrostatic design basis of 1,600 psi determined in accordance with ASTM D2837.

- Provide pipe with a dimension ratio (DR) of 17, pressure class 160 unless stated otherwise on the Drawings.

- Pipe shall be installed within 6 months of the production date.

2.2 FITTINGS

Fittings shall meet the requirements of AWWA C901 or AWWA C906 whichever applies.

2.2.1 Fittings for Pipe Greater than 3 inches Diameter

Fittings for pipe greater than 3 inches diameter shall be HDPE molded fittings and HDPE fabricated fittings of the same dimension ratio, pressure rating and outside diameter as the connecting pipe.

- The pipe manufacturer shall mold or fabricate and supply all HDPE molded fittings, fabricated fittings, accessories and adapters required to perform the Work. No Contractor fabricated fittings shall be used.

- Molded fittings shall be manufactured with thermal butt-fused joints meeting the requirements of ASTM D3261.

- Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings.

2.3 JOINTS

2.3.1 HDPE Pipe and Pipe Fittings Greater than 3 inches Diameter

- Pipe and pipe fittings shall be designed for joining by thermal butt fusion.

- Joining method shall be capable of conveying water at the pressure designated by the pressure class.

- Joints shall be pipe end to pipe end and pipe end to fitting.

PART 3 EXECUTION

3.1 POLYETHYLENE PIPE INSTALLATION

In addition to the applicable sections for installing piping, conform to the following:

- Thermal butt fuse all joints as per ASTM D2657.
- Utilize qualified personnel for jointing operation.

PART 4 REFERENCES

4.1 REFERENCES

i) American Society for Testing and Materials (ASTM)

(1)	ASTM D638	Standard Test Method for Tensile Properties of Plastics
(2)	ASTM D1238	Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
(3)	ASTM D1505	Standard Test Method for Density of Plastics by the Density-Gradient Technique
(4)	ASTM D1598	Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
(5)	ASTM D1599	Standard Test Method for Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings
(6)	ASTM D2122	Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
(7)	ASTM D2290	Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method
(8)	ASTM D2837	Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
(9)	ASTM D3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Pipe and Tubing
(10)	AST`M D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

(11) American Water Works Association (AWWA)

(12)	AWWA C901	Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½ in.(13 mm) Through 3 in. (76 mm) for Water Service
(13)	AWWA C906	Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) Through 63 in. (1,575 mm), for Water Distribution and Transmission

ii) National Sanitation Foundation

(1)	NSF No. 14	Plastics Piping Components and Related Materials

- END OF SECTION -

PHASE II
DIVISION 02 – SITE WORK

SECTION 02301
GENERAL EARTHWORK

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications.

PART 1 GENERAL

1.1 SUMMARY

Excavation and Grading to shape site entrance, roadways, berms, construction roads and dewatering pad.

1.2 RELATED SECTIONS

Not used.

PART 2 PRODUCTS

2.1 GENERAL EARTH FILL

The general earth fill will be free of organic material. The general earth fill can consist of soil fill or rock fill. Any earth fill used from an off-site borrow source will be sampled to assure that contaminants are not present.

2.2 STRUCTURAL FILL

The structural fill shall be free of organic material. The structural fill can consist of soil fill or rock fill.

2.3 COARSE AGGREGATE

Clean sands or gravels or other permeable material generally classified according to Unified Soil Classification System as SW, SP, GW or GP. The selected material should have rounded to sub-rounded grains.

2.4 GRANULAR MATERIAL

Clean sands or gravels or other permeable material generally classified according to Unified Soil Classification System as SW, SP, GW or GP. The selected material should have rounded to sub-rounded grains. The maximum particle size of the selected material is 3/8-inches.

2.5 COHESIVE BARRIER LAYER

Not used.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Survey Markers

SUPERVISING CONTRACTOR will Identify required lines, levels, contours, and datum. Protect bench marks and survey layout stakes from excavation equipment and vehicular traffic.

3.2 FIELD QUALITY CONTROL

3.2.1 Construction Testing and Documentation

During construction, the CONTRACTOR shall observe and document the items outlined in the CQA/CQC Plan.

3.3 GRADING

Uniformly grade areas to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent grades and new grades. Cut out soft spots, fill low spots and trim high spots to achieve a firm surface.

3.4 PROTECTION

Repair and reestablish grades where completed or partially completed surfaces become eroded, rutted, settled or where they loose compaction due to subsequent construction operations or weather conditions.

--- END OF SECTION ---

PHASE II
DIVISION 02 - SITE WORK

SECTION 02325
DREDGING

TABLE OF CONTENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The most recent version of the reference applies.

CODE OF FEDERAL REGULATIONS (CFR)

33 CFR 84	Annex I: Positioning and Technical Details of Lights and Shapes
33 CFR 85	Annex II: Additional Signal for Fishing Vessels in Close Proximity
33 CFR 86	Annex III: Technical Details of Sound Signal Appliances
33 CFR 89	Inland Navigation Rules: Implementing Rules
	U.S. COAST GUARD (USCG)
M16672.2	(1999) Navigation Rules Instruction Manual

1.2 SCOPE OF WORK

The Scope of work includes: furnishing all labor, material, equipment, and supervision to dredge and dewater sediments as specified herein and in accordance with the Contract Documents. Pursuant to the URSOW and the direction of the owner, sediment removal will be accomplished in this order by dredging each targeted deposit area until any of the following criteria are met:

- Sediment removal to hardpan or to consolidated material.
- Less than 3-4 inches, on average, of residual sediment remains in the deposit as determined by probing, or after three passes with conventional dredging equipment (or an equivalent level of effort with alternative dredging equipment), whichever goal is achieved first.
- If conventional excavation methods are used, one pass (e.g., downward movement of backhoe) would allow excavation of sediment such that 3-4-inches or less of residual sediment remains.
- USEPA determines that achieving these goals in a particular soft sediment deposit or set of deposits is impracticable or undesirable; USEPA may deem sediment removal complete when more than 3-4 inches of residual material or more remains in the deposit or fewer than three dredge passes have occurred.
- In consultation with USEPA, the Owner elects to conduct more than three dredging passes in an attempt to achieve a residual sediment level of less than 3-4 inches, subject to USEPA approval.

OWNER will provide equipment and material as specified in Section 01600.

1.3 SUBMITTALS

The contractor shall provide all submittals in accordance with Section 01300 – *Submittals*, and as further specified below:

1.3.1 ***Dredging Work Plan*** -- consisting of:

1.3.1.1 Methodology for mobilizing the dredge in the river.
1.3.1.2 Methodology of the dredging operation;
1.3.1.3 Dredging Accuracy and Control;
1.3.1.4 Method of transporting dredge slurry to the dewatering area;
1.3.1.5 Method of controlling and minimizing sediment resuspension;
1.3.1.6 Method of transporting the dredge between sediment deposit locations; and
1.3.1.7 Method of Sediment Dewatering and Management.

1.3.2 ***Decontamination Plan*** – procedure to decommission and decontaminate all dredge equipment, transfer piping, pumps, etc. associated with the dredging operation.

1.3.3 ***Contractor Daily Activity Reports*** – reports as defined in Section 3.1.3.

1.3.4 ***Contractor Quality Control Data*** – data as defined in Section 3.1.1.

1.4 MATERIAL TO BE REMOVED

The Contractor shall remove the soft sediment deposits to hard bottom. The soft sediment deposits are identified on the Design Drawings to the required depth. If sediment material is encountered that cannot be removed with normal dredging equipment, the Contractor shall promptly notify the Project Manager, and a determination shall be made as to its disposition with an alternative method provided. Dredging sediment with concentrations of total PCB's greater than 50 mg/lg (ppm) are designated at TSCA sediment. TSCA sediment locations are as shown on the drawings, or as defined by the site manager. All TSCA sediments shall be discharged into a separate geotube, as defined by the Project Manager.

Debris may be present (such as rock, boulders, vegetation, stumps, etc) and shall be removed or relocated, as appropriate, to an area outside the work area or for larger debris worked around as approved by the Project Manager. Owner will designate at least one access point upstream of the Waelderhaus Dam (Point B) and the Riverbend Dam (Point A). Alternative access points may be obtained from landowners upon request and would be used primarily for debris removal, personnel access to the river, and fueling.

1.5 QUANTITY OF MATERIAL

The total estimated amount of in-place material to be removed from within the specified limits, including side slopes, is approximately 35,000 cubic yards.

1.6 DEPTH DREDGING

The final dredge elevation shall be at or below the required residual sediment thickness (<3-4 inches). If post-dredge poling indicates that dredging operations failed to achieve the required residual depth or removal of the required soft sediment, the Contractor shall re-dredge the area until no recovery is obtained. After three passes are performed with the removal equipment consultation with the Owner and Regulatory Agencies will occur to determine the need for additional removal attempts.

1.7 NEAR STREAM BANK

Dredging near streambanks with slopes greater than 2 to 1 or where apparent trees warrant a safety concern will have a set back of a 1 foot from the cutterhead to the bank.

1.8 NEAR EXISTING DAM DREDGING

Dredging will not be allowed within 10 feet of an existing dam in order to protect existing structures and ensure proper safety.

1.9 ENVIRONMENTAL PROTECTION REQUIREMENTS

The Contractor shall provide and maintain during the life of the Contract, environmental protective measures in accordance with Section 01355 GENERAL ENVIRONMENTAL PROTECTION. These measures shall include, but are not limited to, erosion control, spill response, and water quality monitoring.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 QUALITY CONTROL

3.1.1 Work Quality

The Contractor shall inspect the Work, keep records of work performed, and ensure that gages, targets, ranges, and other markers are in place and usable for the intended purpose. The Contractor shall provide boats, boatmen, laborers, and materials necessary for inspecting, supervising, and surveying the Work. When required, the Contractor shall provide transportation for the Project Manager and inspectors to and from the dredging plant and adjacent points on shore.

3.1.2 Polling

Pre- and Post- Dredge poling will be conducted by or overseen by the Project Manager in the manner described in Verification Sampling Plan. The Project Manager will provide Contractor with Pre-Dredge Drawings, which will be the basis for Dredging Locations and Volume.

3.1.3 Contractor Daily Activity Report

The Contactor shall prepare and maintain a daily report of operations and furnish a copy to the Project Manager at the start of the work on the day after the first working date. At a minimum, information to be included in the report will be the date; period covered by the report; equipment used; description of activity as identified by the dredge area; RMUs dredged that day and to date based on the Design Documents; dredge movement; downtime and delays to the operation; cause of downtime and delays; health and safety performance; and other relevant comments concerning the conduct of the operation. The report shall include the results of all inspections and monitoring activities and shall be signed by Contractor’s dredging superintendent or quality control manager.

3.2 DREDGING

3.2.1 Order of Work

The Contractor shall conduct the Work starting at the removal area closest to the former Tecumseh Products Company Property and working downstream to each successive sediment deposition, unless otherwise approved by the Project Manager.

3.2.2 General

Dredging equipment for this project shall be agreed to by Contractor, Project Manager and Owner prior to commencement of dredging. Dredging equipment and methods proposed for use by the Contractor shall be designed to minimize the dispersion of resuspended sediments during dredging. The Contractor’s dredging operations shall conform to the requirements for water quality monitoring in accordance with Section 01355 GENERAL ENVIRONMENTAL PROTECTION. The Contractor shall maintain the plant, scows, coamings, barges, and associated equipment to meet the requirements of the Work.

Dredge methods shall be modified if turbidity monitoring indicates applicable trigger level (35 ppm) being exceeded. Dredge methods shall be stopped if turbidity monitoring indicates applicable action level (70 ppm) being exceeded. Dredging shall recommence once dredging techniques or methods are changed to minimize resuspension. Based on the results of the turbidity monitoring, the Project Manager may direct the Contractor to re-dredge certain areas.

The Contractor shall dredge sediment in accordance with performance criteria as defined in the Consent Decree (CD), Upper River Statement of Work (URSOW) and Upper River Remedial Design Work Plan.

3.2.3 Best Management Practices

The following BMPs will be implemented to minimize impacts to the aquatic environment during dredging operations:

a. The Contractor shall ensure that no fuel, garbage, or debris enters the waterway from the dredge, or other vessels associated with the project.
b. Wherever possible, dredging will be conducted using equipment that minimizes the release and redistribution of dredged material to the water column during dredging.
c. Dredging will be conducted using procedures that will minimize impacts to water quality and sediment quality to the extent practicable. These procedures include the following:
    - "Sweeping" the post dredge surface to smooth contours will not be allowed.
    - Stockpiling material on the bottom will not be allowed.
d. After project completion all equipment will be properly decontaminated to prevent potential spreading of contaminated sediment from the project area.

3.2.4 Lights

If dredging activities are performed during periods of restricted visibility, provide lights for floating pumps and pipelines.

3.2.5 Navigation Warnings

Furnish and maintain appropriate navigation warning signs along the pipeline and floating pumps in accordance to the US Coast Guard and/or other applicable federal, state, and/or local regulations. In addition, temporary warning signs will be posted for general public boating down river.

3.2.7 Method of Communication

Provide a system of communication between the dredge crew, the crew at the disposal area (if applicable) and points between. A portable two-way radio or cell phone is acceptable.

3.3 DEWATERING & WATER TREATMENT

3.3.1 General

Dewatering applies to the sediment slurry that is transferred upland for landfill disposal. The contractor shall minimize the water added to sediment during dredging to maximize free draining of water from recovered sediment.

Water Treatment applies to the treatment of PCB-impacted water resulting from the dredging operation and the dredged material dewatering or draining. Water treatment will be in accordance to the 11355 "Water Treatment System" specification.

3.4 TRANSFERRING SEDIMENT UPLAND

3.4.1 General

The discharge of sediment or drainage water outside of project boundaries is strictly prohibited. Sediment recovered from remediation areas shall be transferred upland to the dewatering pad using hydraulic methods unless otherwise agreed to by the Project Manager prior to commencement of the Work. Debris shall be transferred to an approved off-site disposal facility. In the event of failure of the geotextile tube during dredge operations, dredging shall be halted until a replacement geotube is available.

Dredging sediment with concentrations of total PCB's greater than 50 mg/kg (ppm) are designated at TSCA sediment. TSCA sediment locations are as shown on the drawings, or as defined by the site manager. All TSCA sediments shall be discharged into a separate geotube, as defined by the site MANAGER,

3.5 FINAL EXAMINATION AND ACCEPTANCE

3.5.1 Examination and Acceptance of Dredged Areas

Project Manager will conduct post-dredging sediment removal verification as described in the Work Plan. Contractor will be available to re-dredge areas that do not meet the required dredge depth (no recovery). The Project Manager shall accommodate the collection of sediment verification samples by coordinating dredging and sampling efforts and schedules with the Contractor.

3.5.2 Final Acceptance

When the dredge area is found to be complete and in satisfactory condition, with regard to dredge depth (no recovery) and cleanup criteria, it will be accepted.

--END OF SECTION--

PHASE II
DIVISION 02 – SITEWORK

SECTION 02740
ASPHALT PAVEMENT

TABLE OF CONTENTS

PART 1 GENERAL

1.1 SUMMARY

Section Includes;

- Sampling and Testing Requirements
- Surface Preparation
- Asphalt Paving

1.2 DELIVERY, STORAGE AND HANDLING

- Store asphalt in tanks free of foreign substances and caked asphalt.
- Storage period for hot mix shall not exceed 2 hours.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to WisDOT Standard Specifications for Highway and Structures Construction Sections 450, 455, and 460.

2.2 EQUIPMENT

All equipment shall conform to WisDOT Standard Specifications for Highway and Structure Construction Section 450.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

- Remove loose concrete and protruding joint material.
- Clean surface and joints of foreign material, e.g. dust, dirt, water, vegetation, etc.
- Seal cracks.
- Tack coat on existing asphalt or concrete pavements at minimum rate of 0.025 gallon per square yard.
- Fill potholes and depressions with a leveling course of asphalt mix compacted to required density of surface course.

3.2 ASPHALT INSTALLATION

3.2.1 Conditions
Do not place asphalt pavement when following conditions exist:
- Unstable or frozen base.
- During rain or snow.
- When air temperature is less than 35°F (1.5°C).

3.2.2 Thickness
Place to thickness, grade, section and location shown on the Design Drawings.
- When thickness is not shown, pavement thickness shall be 2 inches compacted.
- Finished surface shall be a true plane of 1/8 inch in 10 feet.

Establish course thickness by placing in layers in accordance with WisDOT Std. Spec. 460.3.2.

3.2.3 Spreading
- Permitted only in areas inaccessible to finishing machines.
- Place by means of a shovel, and shape with rake or lute.
- Do not rake over machine spread surfaces.

3.2.4 Compaction
- Roll as soon as mixture will support roller without displacing or hair line cracking:
  - Initial pass shall be with drive roller toward paver.
  - Start at center and continue toward either edge.
  - Overlap successive trips.
- Subsequent strips laid shall start adjacent to previous laid strip and continue to opposite edge.
- Roll until:
  - Roller marks are eliminated.
  - Surface is of uniform density.
  - Required density is obtained.

3.2.5 Bonding Joints
- Clean all joints.
- When joining new asphalt pavement to existing asphalt pavement, saw cut joints and tack coat.
- When joining new asphalt pavement to new asphalt pavement, saw cut end joints and tack coat cold joints.

PART 4 REFERENCES

4.1 REFERENCES

State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the items: method of measurement and basis of payment shall not apply.

- END OF SECTION -

PHASE II
DIVISION 02 – SITE WORK

SECTION 02931
LANDSCAPING, TURF AND VEGETATIVE COVER RESTORATION

TABLE OF CONTENTS

INTRODUCTION

This guide specification was created specifically for the set of specifications used during restoration of Armored Areas. With regards to Floodplain restoration, consultation with landowner (Kohler) will be performed and an amended Restoration Specification developed.

PART 1 GENERAL

1.1 SUMMARY

Section Includes:

a. Preparing ground surface.
b. Sod or Seed.
c. Plants.
d. Fertilizing.
e. Maintenance.

1.2 REFERENCES

ANSI Z60.1-90 - American Standard for Nursery Stock.

1.3 SUBMITTALS

Not used.

1.4 QUALITY ASSURANCE

1.4.1 Ability to Deliver

Investigate sources of supply and satisfy they can supply plants mentioned on plant list in sizes, variety, and quality noted. Failure to take this precaution shall not relieve responsibility for furnishing and installing plant material in accordance with Contract requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Preparation for Delivery

Balled and Burlapped (B&B) Plants: Dig and prepare for shipment in manner that will not damage roots, branches, shape, and future development of plant. B&B Plants: Originate from soil which will hold good ball and be wrapped with burlap or similar approved material, bound with twine or cord so as to hold balls firm and intact. Ball Sizes: Not less than standard established by AAN for B&B stock.

Potted or Container Plants: Container to hold ball shape protecting root mass during delivery and handling.

1.5.2 Delivery

Deliver fertilizer to site in original, unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law. Deliver plants with legible identification labels. Label trees, evergreens, shrubs, and ground cover with waterproof labels remaining legible for at least 60 days. Label with correct plant name and size as indicated in plant list. Protect plants during delivery to prevent damage to roots or desiccation of leaves. Tag sod with name of each grass species.

1.5.3 Storage

Store plants in ground or other acceptable media if not to be planted within 4 hrs. Protect roots of plant material from drying or other possible injury. Water plants as necessary until planted. Protect sod root system from exposure to sun and wind.

1.5.4 Handling

Do not drop plants. Do not pick up container or B&B plants by stems or trunks. Do not tear, stretch or drop sod.

1.6 PROJECT SITE/CONDITIONS

Intent is existing trees within grading and seeding limits, not disturbed by building operations be saved and protected, unless specified to be removed. Clear trees required to be removed. Wherever landscape work takes place executed in conjunction with other Work, schedule procedures permitting execution of landscape work as specified.

1.7 WARRANTY

Warranty new plant material through one full growing season after plants are installed. Replace plant material and warranty plants replaced for one full growing season from date of replacement. Repair damage to plants or lawns during plant replacement. Warranty lawn areas for duration of 1 yr after seeding to be alive and in satisfactory growth at end of warranty period. For purpose of establishing acceptable standard, scattered bare spots, none larger than 1 sq ft will be allowed up to maximum of 3% of lawn area.

PART 2 PRODUCTS

2.1 SEED

2.1.1 General

Fresh, clean, and new crop seed included in specified varieties and proportioned by weight. Tests are for minimum percentages of germination indicated. Weeds shall not exceed 0.25%.

2.1.2 General Turf

Name	% by Weight	Germination
Kentucky Bluegrass	45	80%
Perennial Ryecross	5	90%
Creeping Red Fescue	35	80%
White Clover	15	90%

2.2 PLANT MATERIALS

Quality and Size: Equal or exceed sizes and measurements. Follow standards currently recommended in American Standard for Nursery Stock. Well formed and shaped, true to type, and free from disease, insects, and defects such as knots, sun scald, wind burn, injuries, abrasions or disfigurement.

2.3 FERTILIZER

Commercial type, uniform in composition, free flowing, conforming to state and federal laws, and suitable for application with equipment designed for that purpose. Fertilizer shall contain minimum basis percentage by weight of following.

a. Prior to Seeding or Sodding: 6-24-24.

1. 6% nitrogen.
2. 24% phosphorous.
3. 24% potash.

b. After Seeding or Sodding: 18-5-9.

1. 18% nitrogen.
2. 5% phosphorous.
3. 24% potash.

c. For Plant Material: 6-24-24.

1. 6% nitrogen.
2. 24% phosphorous.
3. 24% potash.

1/4 of nitrogen shall be in form of nitrates, 1/4 in form of ammonia salts, and 1/2 in form of organic nitrogen. Available phosphoric acid shall be derived from super phosphate having minimum analysis of 20% available phosphate. Potash shall be in form of sulfate or potash. Balance of fertilizer specified above shall be materials usually present in such products, free from dust, sticks, sand, stone, and other debris. Coordinate N-P-K requirements with those recommended by soils test report.

2.4 MULCH FOR LAWN AREAS

Straw or hay in air-dry condition or wood excelsior fiber, wood chips or other suitable material of similar nature substantially free of noxious weed seeds and objectionable foreign matter.

2.5 EROSION CONTROL BLANKET

Combination of knitted synthetic netting interwoven with curled wood excelsior fiber, with consistent thickness and fiber evenly distributed over entire area of blanket. Roll type, mesh size approximately 1 in. sq, nominal weight of 1.0 lb/sq yd. Staples for anchoring blanket made of wire, 0.091-in. dia. or more, U-shaped with legs 6 in. in length and 1 in. crown.

PART 3 EXECUTION

3.1 EXAMINATION

Is not contemplated planting be done where depth of soil over underground construction, obstruction or rock insufficient to accommodate roots or where pockets in rock or impervious soil requires drainage. Where such conditions are encountered in excavation or planting areas and where stone, boulders or other obstruction cannot be broken or removed by hand methods and where trees to be planted are located under overhead wires, alternate locations for planting may be designated. Remove rock or other underground construction and provide for drainage for planting areas. Do not damage underground utilities while removing existing trees or digging pits for new planting. Verify location of underground wires and pipes with utility companies.

3.2 PLANTING SEASONS

Perform actual planting only when weather and soil conditions suitable in accordance with locally accepted practice.

3.2.1 Recommended Spring Planting Season

From time soil can be satisfactorily worked until following dates at end of planting season.

a. Evergreens: June 30.
b. Trees and Shrubs: June 30.
c. Lawns (Seed): June 1.

3.2.2 Recommended Fall Planting Season

Commence and terminate at time listed below.

a. Evergreens: August 15 to October 15.
b. Trees and Shrubs: August 15 to November 1.
c. Lawns (Seed): August 15 to October 1.

3.3 PREPARATION

3.3.1 Topsoil

Do not commence placing topsoil or finish grading prior to completion of rough grading. Place or work no topsoil in frozen or muddy condition.

3.3.2 Seeding

Scarify areas where topsoil is not removed being careful of tree roots, adding topsoil to eliminate depressions and hollows, and cutting high points to create smooth uniform surface. Remove sticks, stones, and debris and legally dispose off-site. Do not seed prior to completion of finish grading. Do not seed on saturated or frozen soil.

3.4 LAWN

3.4.1 Topsoil/Finish Grading:

Finish grade is established final grade as shown on Drawings. Grades not otherwise indicated are uniform levels or slopes between points where elevations given or between such points and existing finished grades. If existing topsoil to required depth is undisturbed and of equal or better quality than are specified, existing topsoil may be left in-place and use only enough new topsoil to bring these areas up to grade.

3.4.2 Spreading Fertilizer:

Before seeding or sodding, distribute 6-24-24 commercial fertilizer uniformly at rate of 20 lbs/1,000 sq ft over area to be seeded or sodded using mechanical spreader. Make 2 passes at right angle to each other and incorporate fertilizer into soil to depth of at least 2 in. by disking or harrowing. After completion of required interim mowings, apply 18-5-9 commercial fertilizer at rate of 15 lbs/1,000 sq ft to turf areas using mechanical spreader. Make 2 passes at right angles to each other.

3.4.3 Seeding

Areas not required to be developed otherwise shall be planted to grass. Seeding method shall establish smooth, uniform turf composed of specified grasses. Do not seed following rain or if surface has been compacted by rain. Do not seed when wind velocity exceeds 6 mph.

3.4.4 Erosion Control Blanket

Install erosion control blanket in accordance with the manufacturer's installation instructions.

3.4.5 Mulching

Mulch lawn areas within 3 days after seeding have been completed. Place mulch loose or open enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade ground, conserve soil moisture, and prevent or reduce erosion. Do not mulch during periods of excessively high winds which would preclude proper placing of mulch.

3.5 PLANTINGS

3.5.1 Layout

Locate where shown on Drawings except where obstructions, below ground or overhead, are encountered or where changes were made in construction. Stake out locations for plants and outline of planting beds. Contractor to confirm locations with Project Manager.

3.5.2 Planting Pits

Dig pits and prepare soil prior to moving plants to ensure plants will not be exposed to drying elements or physical damage. Excavate circular pits with vertical sides. Diameter of Pits for Trees and B&B Shrubs: Minimum 1 ft-0 in. greater than diameter of ball or spread of roots. Depth of Pits for Trees and Shrubs: Minimum 6 in. greater than ball or roots when plant set to finished grade. Loosen soil at bottom of pit to minimum depth of 4 in.

3.5.3 Setting Plants

Plant in pits, centered, and set on 6 in. of compacted soil to depth of finished grade level at plant, after settlement, will be same as at which plant was grown. Plant upright and faced to give best appearance or relationship to adjacent structures or land features. Do not pull burlap from under balls of B&B plants. Remove platforms, wire, and surplus binding from top and sides of balls. Remove potted or container grown plants from pot or container at time of planting. Cleanly cut off broken or frayed roots. Place and compact soil carefully to avoid injury to roots and to fill voids. When hole is nearly filled, add water and allow to soak away. Fill hole to finished grade and form shallow saucer around edge of each pit. After ground settles, fill in additional soil to level of finished grade.

3.5.4 Staking and Anchoring

Support trees immediately after planting. Use approved staking methods standard to trade, protecting bark with rubber hose if guy wires used, being careful not to damage roots or balls with stakes.

3.5.5 Pruning

Prune new trees and shrubs at time of or upon completion of planting operation. Limit pruning to minimum, necessary to remove dead or injured twigs, branches, and to compensate for root loss resulting from transplanting. Perform pruning in manner retaining natural plant shape or habit. Make cuts flush, leaving no stubs. Treat cuts over 3/4 in. in dia. with tree paint. Trace back to living tissue and remove bruises and scars with injured cambium. Shape and smooth wounds so as not to retain water and treat with tree paint. Prune flowering trees only to remove dead or broken branches. Do not remove central leaders. Shrub pruning shall result in loose outline conforming to general shape of specified material shrub type. Do not use hedge shears.

3.6 WATERING

Provide water and furnish hose, equipment, attachments, and accessories for irrigation of lawns and planted areas. Water during the course of working day. Leave job thoroughly soaked at close of each working day.

3.7 PROTECTION

Protect seeded and planted areas against damage by trespass and other Work. Replace, repair, restake or replant damaged seeding or planting. If planting done after lawn preparation, protect lawn areas and repair damage resulting from planting operations. Protect slopes and embankments against erosion until Work is accepted. Repair eroded portions of seeded or sodded areas by refilling, resodding, remulching, and reseeding as required by condition. Protection may be by installation of sod strips or other methods.

3.8 FIELD QUALITY CONTROL

Not used.

3.9 CLEANING

Remove soil or similar material brought onto paved areas, keeping these areas broom clean. Upon completion of planting, remove excess soil, stones, and debris not previously cleaned up and legally dispose of off-site. Prepare lawns and planting areas for final inspection.

3.10 MAINTENANCE

For purposes of establishing standard, scattered bare spots, none larger than 1 sq ft, will be allowed up to maximum of 3% of lawn area. Maintain new plantings by watering, weeding, cultivating, mulching, tightening, and repairing of guys, removal of planting saucer, and other necessary operations. Top dress and resod excessive cracks appearing upon shrinkage. No mowing will be required in restored Armored Areas or Floodplains.

3.11 REPLACEMENT

Remove plants that are dead or not in satisfactory growth from site. Replace these and any plants missing due to CONTRACTOR'S negligence as soon as conditions permit, but during normal planting season. Provide same kind and size as specified.

--- END OF SECTION ---

PHASE II
DIVISION 11 - EQUIPMENT

SECTION 11355
WATER TREATMENT SYSTEM

TABLE OF CONTENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

a. ASTM D 4397 (1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
b. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
c. 29 CFR 1910.145 Accident Prevention Signs and Tags
d. 29 CFR 1910.1000 Air Contaminants
e. 40 CFR 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
f. 49 CFR 171 General Information, Regulations, and Definitions
g. 49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations

1.2 DEFINITIONS

1.2.1 PCB and PCBs (Polychlorinated Biphenyls)

40 CFR 761. PCB and PCBs means any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance.

1.2.2 PCB Contaminated Water

Surface water containing greater than 0.5 ppb.

1.2.4 Permissible Exposure Limits (PEL)

PEL for PCBs is 3.10 E-08 pound per cubic feet on an 8-hour time weighted average basis.

1.3 DESCRIPTION OF WORK

The work includes the dewatering of dredged and excavated sediment, and treatment of this water to meet the requirements of WPDES, to discharge back into the Sheboygan River.

1.4 QUALITY ASSURANCE

1.4.1 Training

Instruct employees on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.

1.4.2 Regulation Documents

Maintain at the job site one readily available copy each of 29 CFR 1910.1000, 40 CFR 761, and all CONTRACTOR prepared plans required under "Submittals" paragraphs.

1.4.3 PCB Contaminated Water Management Plan

Prepare and submit plan detailing methods and techniques for collection and treatment as needed of PCB contaminated water. CONTRACTOR to incorporate additional management and testing requirements as provided in the “Water Management Plan” prepared by PROJECT MANAGER.

1.4.4 Sampling and Testing Plan

Water to be sampled and tested as provided in the Water Management Plan and meet the requirements of the WPDES at a minimum rate of once every day.

1.4.5 Closeout Report

Prepare closeout report containing following items: test results including readings and locations, chain of custody forms, and description of the work completed.

1.5 SUBMITTALS

Submit a plan which addresses the following:

a. PCB Contaminated Water Management Plan

b. Closeout Report

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF WORKERS AND THE ENVIRONMENT

Protect workers and the environment from PCB hazards in accordance with the PCB protection plan and, as a minimum, as specified herein.

3.1.1 Worker Safety

Provide portable decontamination facilities. Workers shall wear and use PPE upon entering a PCB control area. If PPE is not required, specify this in the PCB removal work plan. Keep work footwear inside work area until completion of the job. Do not carry out PCB handling operations in confined spaces. Do not delay aid to a seriously injured worker for reasons of decontamination.

3.1.2 PCB Control Area

Establish a PCB control area to prevent unauthorized entry of personnel. Rope off area and provide 29 CFR 1910.145 signs at approaches and around perimeter. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Allow only personnel briefed on the elements and trained as specified herein into the area. Do not permit food, drink, or smoking materials in the control area. Smoking is not permitted within 50 feet of the PCB control area. Provide "No Smoking" signs as directed by the PROJECT MANAGER.

3.1.3 Special Hazards

Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not heat PCBs to temperatures of 135 degrees F or higher without PROJECT MANAGER's concurrence.

3.2 PCB SPILL PREVENTION

Use appropriate operating practices to prevent spillage or leakage of contaminated water from occurring during operations. Immediately report any spills to the PROJECT MANAGER and provide cleanup in accordance with 40 CFR 761, Subpart G.

3.3 CONTAMINATED WATER

Collect washwater. Collect surface, and rain water contaminated by operations including water collected in the dewatering of sediment. Containerize, sample, and analyze PCB absorbed material and treat of as specified in Water Management Plan.

3.4 COLLECTION, TREATMENT, AND DISCHARGE OF PCB-CONTAMINATED WATER

Furnish labor, materials to install owner-supplied equipment necessary for collecting, sampling, treating, and discharging of PCB-contaminated water.

3.4.1 Treatment System Requirements

The PROJECT MANAGER shall be responsible for all aspects of operating and maintaining owner-supplied treatment facilities as required to discharge treated waters within the treatment limits required (WPDES). Piping shall be tested for leaks prior to start-up pursuant to Section 01451.

3.4.2 Treatment System Operations

Monitor, test, and adjust the treatment system in accordance with the Water Management Plan, or as otherwise modified by special regulatory requirements. If there is a conflict between requirements, the more stringent requirement shall prevail.

3.4.3 Discharge of Treated Water

Discharge or properly dispose treated water in accordance with the requirements outlined in the Water Management Plan. Provide erosion control at outlet of piping to minimize erosion.

3.5 CLEANUP

Maintain surfaces of the PCB control area free of accumulations of PCB contaminated water. Do not remove the PCB control area and warning signs prior to the PROJECT MANAGER's approval. Re-clean areas visually showing residual PCB contaminated water.

3.5.1 Cleaning

Clean contaminated tools, containers, etc., after use by rinsing three times with Alconox or equivalent. cleaning agents will be containerized, labeled, and disposed at an appropriate off-site facility (i.e. Onyx).

3.6 REPORTS

Prepare and submit a closeout report at the completion of the work.

-- END OF SECTION --

PHASE II
DIVISION 13 - SPECIAL CONSTRUCTION (TSCA)

SECTION 13285
REMOVAL OF PCB CONTAMINATED ARMORED AREA SEDIMENTS AND NEAR-SHORE SEDIMENTS AND DISPOSAL OF EXCAVATED AND DREDGED PCB CONTAMINATED SEDIMENTS

TABLE OF CONTENTS

INTRODUCTION

This guide specification has been modified from the original Corps of Engineer specification entitled "Section 13285N – REMOVAL AND DISPOSAL OF PCB CONTAMINATED SOILS".

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

a. ASTM D 4397 (1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
b. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
c. 29 CFR 1910.145 Accident Prevention Signs and Tags
d. 29 CFR 1910.1000 Air Contaminants
e. 40 CFR 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
f. 40 CFR 761.75 Chemical Waste Landfills
g. 49 CFR 171 General Information, Regulations, and Definitions
h. 49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
i. 49 CFR 173 Shipments and Packagings
j. 49 CFR 174 Carriage by Rail
k. 49 CFR 176 Carriage by Vessel
l. 49 CFR 177 Carriage by Public Highway
m. 49 CFR 178 Shipping Container Specification
n. 49 CFR 179 Tank Cars
o. EPA 530/F-93/004 (1986) Evaluating Solid Waste (Physical/Chemical Methods)
p. EPA 560/5-86-017 (1986) Grid Sampling of PCB Spill Sites to Verify Cleanup

1.2 DEFINITIONS

1.2.1 PCB and PCBs (Polychlorinated Biphenyls)

40 CFR 761. PCB and PCBs means any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance.

1.2.2 PCB Contaminated Sediments

Sediments exceeding project specific action levels are designated for removal.

1.2.3 Dredging

Dredging refers to the removal of sediments using a hydraulic dredge or conventional excavation equipment. See Dredging Specification 02325 for requirements.

1.3 DESCRIPTION OF WORK

The work includes removal and disposal of PCB contaminated sediments. Perform work in accordance with 40 CFR 761, 29 CFR 1910.120, and the requirements specified herein. Excavate to the horizontal and vertical limits of the identified contaminated sediment as indicated on the Design Drawings and as determined by verification poling. After removing contaminated sediments as indicated, sample and test as specified by the PROJECT MANAGER.

1.3.1 Existing Conditions

PCB contaminant levels range from "not detected" to 840 ppm.

1.4 QUALITY ASSURANCE

1.4.1 Training

Instruct employees on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.

1.4.2 Regulation Documents

Maintain at the job site one readily available copy each of 29 CFR 1910.1000, 40 CFR 761, and all CONTRACTOR prepared plans required under "Submittals" paragraphs.

1.4.3 PCB Contaminated Excavation Plan

PCB-contaminated sediments are present in nine (9) Armored Areas, and in Near-Shore Sediments adjacent to the Plant Site. The following requirements shall be incorporated into the Contractor's work plan:

1. Armored Areas and Near-Shore Sediments will be excavated to the limits in accordance with the Contract Documents. Overburden material on the Armored Areas will be sampled prior to removal to determine the appropriate disposal procedures greater than the detection limit and disposed of at an approved off-site facility, or less than the detection limit and re-used for stabilization purposes.
2. CONTRACTOR equipment used to haul PCB contaminated materials offsite shall be free of defects which may result in the spilling of PCB contaminated materials and will be inspected prior to leaving the site for evidence of PCB-impacted sediment.
3. Vehicles will be decontaminated in accordance to Standard Operating Procedure (SOP #P101) as/when necessary.

Prepare and submit, a minimum of 15 calendar days prior to initiating work, a plan describing methods, techniques, and phases of dealing with the contaminated sediment, including: a schedule to be employed in the excavation, a sequence of operations, the method of excavation, hauling, and handling of the contaminated sediment, and the proposed equipment. Define the CONTRACTOR's staging area requirements. Ensure that work operations or processes involving PCB-contaminated materials are conducted in accordance with 40 CFR 761 and the applicable requirements of this section, including but not limited to:

a. Obtaining advance approval of PCB storage sites.
b. Notifying PROJECT MANAGER prior to commencing the operation.
c. Reporting leaks and spills to the PROJECT MANAGER.
d. Cleaning up spills.
e. Maintaining an access log of employees working in a PCB control area and providing a copy to the PROJECT MANAGER upon completion of the operation.
f. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the PROJECT MANAGER.
g. Maintaining a spill kit
h. Maintaining inspection, inventory, and spill records.

1.4.4 Sampling and Testing Plan

Sampling and testing will be performed in accordance with the FSP, VSP and QAPP. The FSP outlines procedures for decontamination during site activities.

1.4.5 PCB Disposal

PCB sediment disposal must comply with applicable requirements of Federal, State, and local PCB waste regulations and address:

a. Identification of PCB wastes associated with the work.
b. Estimated quantities of wastes to be generated and disposed of.
c. Names and qualifications of each CONTRACTOR that will be transporting, storing, and disposing of the wastes. Include the facility location and a 24-hour point of contact.
d. Sediments containing less than 50 mg/kg PCB concentrations will be disposed of in an appropriate special waste landfill.
e. Sediments containing 50 mg/kg PCB concentrations or greater will be disposed of in an appropriate landfill licensed to receive TSCA material.

1.4.6 Closeout Report

Prepare closeout report containing following items: test results including readings and locations, a diagram of the limits of the excavated area with sample locations indicated, chain of custody forms, manifests, and description of the work completed.

1.5 SUBMITTALS

Submit a plan which addresses the following:

a. Management of excavated PCB Contaminated Sediment
b. Training certification
c. PCB Transportation and Disposal
d. Shipping documentation
e. Vehicle decontamination
f. Closeout Report

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF WORKERS AND THE ENVIRONMENT

Protect workers and the environment from PCB hazards as specified herein.

3.1.1 Worker Safety

Provide portable decontamination facilities. Workers shall wear and use PPE upon entering a PCB control area. If PPE is not required, specify this in the PCB removal work plan. Keep work footwear inside work area until completion of the job. Do not carry out PCB handling operations in confined spaces. Do not delay aid to a seriously injured worker for reasons of decontamination.

3.1.2 PCB Control Area

Establish a PCB control area to prevent unauthorized entry of personnel. Rope off area and provide 29 CFR 1910.145 signs at approaches and around perimeter. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Allow only personnel briefed on the elements and trained as specified herein into the area. Do not permit food, drink, or smoking materials in the control area. Smoking is not permitted within 50 feet of the PCB control area. Provide "No Smoking" signs as directed by the PROJECT MANAGER.

3.1.3 Special Hazards

Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not heat PCBs to temperatures of 135 degrees F or higher without PROJECT MANAGER's concurrence.

3.2 PCB SPILL PREVENTION

Use appropriate vehicles and operating practices to prevent spillage or leakage of contaminated materials from occurring during operations. Inspect vehicles leaving the site to ensure that no contaminated sediment adheres to the wheels or undercarriage. Immediately report any spills to the PROJECT MANAGER and provide cleanup in accordance with 40 CFR 761, Subpart G.

3.3 EXCAVATION PROCEDURES

Use methods and equipment that result in minimal disturbance beyond the excavation limits. Remove and dispose of any material that becomes contaminated as a result of the CONTRACTOR's operation at no additional cost to the PROJECT MANAGER. Stage operations to minimize the time the contaminated sediment is exposed to the weather. Provide protection measures around the area of contaminated sediments to divert runoff of water from within the excavation boundaries.

3.3.1 Underground Utilities

The existence of underground utilities is not expected due to the location of the Armored Areas and Near-Shore Sediments and depth of excavations. However, it remains the CONTRACTOR’S responsibility to verify prior to excavation.

3.3.2 Dust Control

Maintain strict dust control at all times to prevent dust particles with PCB attached from becoming airborne. Sprinkle or treat the sediment at the site and other areas disturbed by operations with dust suppressants or water.

3.3.3 Excavation Limits

Remove contaminated sediments to the horizontal and vertical limits as indicated in the Design Documents. Verify the limits of clean sediments by poling (no recovery). Handle and dispose of material within this area as PCB contaminated. If groundwater is encountered prior to reaching the vertical limits, notify the PROJECT MANAGER.

3.3.3.2 Verification Sampling and Testing

Verification Sampling and Testing shall be in accordance with the Verification Sampling Plan (VSP).

3.3.4 Additional Excavations

If poling results indicate that PCB contaminated sediments remain (recovery), continue using excavation as required.

3.3.5 Stockpiled Material

If stockpiled, place sediment removed from the excavations in the staging area. Divert water from the area. Place excavated sediment on the impervious barrier and cover with 6 mil polyethylene sheeting (if necessary). Provide berm around the outer limits of the area. Cover excavated contaminated sediment when not being worked. Maintain sheeting and replace when worn or ripped. As an option, sediment may be stockpiled in trucks suitable for carrying PCB contaminated sediments as specified herein. Dredged material will be placed directly into geotextile tubes for dewatering located on a impervious barrier.

3.3.5.1 PCB Testing of Stockpiled Sediment by Others

Collect composite samples from stockpiled material prior to removing from site. Analyze a minimum of one composite sample for every 250 cubic yards or fraction thereof of sediment to be disposed of from any one site. To develop a composite sample of the size necessary to run the required tests, take several samples (a minimum of 5 grab samples) from different areas along the surface and in the center of the stockpile. Combine these samples and thoroughly mix to develop the composite sample.

3.3.5.2 PCB Testing of Dredged Sediment by Others

Take composite samples from stockpiled material prior to removing from site. Analyze a minimum of one composite sample per geotextile tube (approximately 1000 cubic yards). To develop a composite sample of the size necessary to run the required tests, take several samples (a minimum of 5 grab samples) from different areas along geotextile tube along the surface and center. Combine these samples and thoroughly mix to develop the composite sample.

3.3.5.3 Moisture Test by Others

Dredged dewatered material will be subject to moisture testing for free liquids in either the lab or the field. The test will be conducted according to SW-846 Method 9095A. As part of the dewatering process, materials may be blended with the dredged material to aid in dewatering.

3.4 TRANSPORTATION AND DISPOSAL

Furnish labor, materials, and equipment necessary to store, transport, and dispose of PCB contaminated material in accordance with Federal, State, and local requirements. Prepare and maintain waste shipment records and manifests required by the Resource Conservation and Recovery Act (RCRA), U.S. Federal Department of Transportation (DOT), and State transportation department.

3.4.1 Transportation

Transport PCB contaminated sediments in vehicles designed to carry PCB contaminated sediments in accordance with Federal and State requirements. Transport PCB contaminated solid material, articles, or equipment in containers with removable heads. In addition to those requirements:

a. Inspect vehicles and containers for proper operation and covering. Repair or replace damaged containers.
b. Inspect vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.
c. Perform decontamination procedures prior to leaving the worksite and again before leaving the disposal site.

3.4.1.1 Weight Certification

Weigh vehicles transporting PCB contaminated materials at a State-certified weigh scale.

3.4.1.2 Shipping Documentation

Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB. Return a signed copy before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities and EPA identification numbers. Within 30 days from shipment date, the transporter shall provide a copy of the manifest signed and dated by the disposer.

3.4.2 Disposal

Dispose of PCB contaminated sediments in accordance with 40 CFR 761. The disposer shall forward a copy of the manifest to the PROJECT MANAGER within 30 days of receipt of PCBs. PCB impacted sediments must meet the requirements of the Moisture testing and any other specific requirements of the receiving landfill.

3.5 CLEANUP

Maintain surfaces of the PCB control area free of accumulations of PCBs. Restrict the spread of dust and debris; keep waste from being distributed over work area. Do not remove the PCB control area and warning signs prior to the PROJECT MANAGER's approval. Re-clean areas visually showing residual PCBs.

3.5.1 Solvent Cleaning

Clean contaminated tools, containers, etc., after use by rinsing three times with an appropriate solvent or by wiping down three times with a solvent wetted rag. Suggested solvents are Stoddard solvent or hexane.

3.6 REPORTS

Prepare and submit a closeout report at the completion of the work.

-- END OF SECTION --

Pollution Risk Services

Foth & Van Dyke

Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Specifications

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Specifications

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

SHEBOYGAN RIVER AND SUPERFUND SITE
TABLE OF CONTENTS

Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Mitigation Plan to Restore Habitats

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Mitigation Plan to Restore Habitats

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

Mitigation Plan to Restore Habitats

Contents

1 Introduction

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County (Drawing No. 1). The Site includes the former Tecumseh Manufacturing site, the lower fourteen miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner Harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the Remedial Investigations (RI), the river was segmented in separate sections based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four miles to the Waelderhaus Dam in Kohler. The Middle River extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. The Lower River extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work which included plant site soils, groundwater, and river bank soils was completed in 2004. Phase II remedial action work includes Upper River Near-Shore Sediments, Armored Areas, and Soft Sediment deposits and is scheduled for 2006 implementation. Remedial construction methods for the Floodplains are deferred pending the outcome of additional discussions between United States Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), Pollution Risk Services, LLC (PRS), and property owners of potentially impacted Floodplains.

This RD document has been generated to be consistent with the *Record of Decision (ROD)*, (May 2000), *Consent Decree (CD)*, (May 2004), and *Upper River Statement of Work (URSOW)*, (Jan. 2003). This Mitigation Plan to Restore Habitats identifies maintenance associated with the Upper River Remedial Action and has been developed in accordance to the requirements of the WDNR, *Chapter NR-724.13, Remedial and Interim Action Design, Implementation, Operation, Maintenance and Monitoring Requirements* (Oct. 1999).

Consultation with the owner(s) of any property affected by possible Sheboygan River Remedial Action work and subsequent mitigation will be a necessary and important task prior to completion and implementation of the Mitigation Plan to Restore Habitats.

2 Habitats On or Near the Sheboygan River Site

This Mitigation Plan covers the Upper River portion of the Sheboygan River. The Sheboygan River contains habitat for various species of fish and aquatic invertebrates. The river banks serve as habitat for birds, mammals, and insects that depend on the resources of the river. The goals of the mitigation efforts proposed herein are to protect the existing aquatic and terrestrial resources and to restore the resources affected by PCB remediation to the extent practicable.

The proposed remedial action in the Upper River includes the removal and disposal of PCB contaminated sediments from within the river. The areas that require remediation that are considered for possible mitigation include the following:

- Near-Shore Sediments,
- Armored Areas, and
- Soft Sediment deposits.

This Mitigation Plan proposes methods to restore the aquatic and terrestrial resources and environments that might be disturbed by the remedial action activities. The sections which follow outline the methods and materials that are proposed for use in the mitigation efforts.

3 Protection of Habitat During Remediation Activities

Project specifications for Phase II Remedial Action (RA) work include environmental protection measures that will be implemented during the remediation activities to mitigate potential damage to the Sheboygan River. Protection and mitigation measures include the following project Specification sections listed below:

- *Section 01355 - Environmental Protection* (Vol. II, Appendix F) lists the methods and materials needed to minimize damage that may occur as a result of construction operations.

- *Section 01356 - Stormwater Pollution Prevention Measures* (Vol. II, Appendix F) describes the methods and materials required to provide temporary and permanent structural practices to minimize erosion and sediment runoff.

- *Section 02931- Landscaping, Turf, and Vegetative Cover Restoration* (Vol. II, Appendix F) describes delivery procedures, preparation procedures, seeding and planting installation procedures for topsoil, fertilizers, erosion control blankets, grasses, and plantings to be used during site restoration.

Protective measures will be implemented prior to, during, and after remedial action activities are completed as a means to protect the Sheboygan River environment.

4 Restoration Habitats

Phase II RA work will occur at the Near-Shore Sediments, Armored Areas, and Soft Sediments Final remedy decisions on the Floodplains have not yet occurred and will be made in conjunction with USEPA, WDNR, PRS, and property owners of potentially impacted Floodplains.

The mitigation measures and materials that are proposed to restore the habitats, if necessary, in project areas are discussed below.

4.1 Near-Shore Sediments

As noted in Section 4.3, a mitigation plan will not be required for the removal of Near-Shore Sediments within the river.

4.2 Armored Areas

4.2.1 Description

The Armored Areas includes nine separate locations designated as Area 1, Area 2, Area 3, Area 4, Area 5A, Area 7, Area 8, Area 10, and Area 11. These areas were capped and armored during previous remediation activities on the Upper River with the following materials listed from top of the armoring/cap to the bottom:

- 12-inch thick layer of cobbles and cobble filled gabions around the river and bank side of the cobbles layer,
- Geotextile fabric (100 micron),
- 12 inches of run of bank material,
- Geotextile fabric (100 micron), and
- PCB contaminated sediment.

Remediation work will include removal of the armoring/cap materials and the PCB contaminated sediments. The PCB sediments will be removed and disposed of while the cap and armoring components could possibly be reused in the mitigation efforts if materials testing show non-detect PCB results.

4.2.2 Mitigation

The Mitigation Plan to restore and protect the river banks following removal of contaminated sediments from the Armored Areas includes the following:

- Salvaging of the cobbles to the extent practicable. (Note: cobbles are <u>not</u> in direct contact with contaminated sediment).
- Salvaging of the run of bank materials to the extent practicable. (Note: run of bank materials are separated from contaminated sediments by a geotextile and are therefore not expected to be contaminated.) Soils and riprap which contain less than detection limits will be re-used as bank materials.
- Re-depositing run of bank soil salvaged to create a bank slope that is as flat as practicable.

- Determine the nature of the sediments and/or soils in the stream bank and measure the post-dredge slopes of the bank;
  - For sandy soil stream banks with slopes of 3:1 (horizontal to vertical) (H to V) or greater, install a geotextile and place the salvaged cobbles in the portion of the slope below and one to two feet above the normal water level.
  - For clay soil stream banks with post-dredge slopes of 2:1 H to V provide the same mitigation as described above.
- The areas above the riprap placed below the water line will be mitigated as follows:
  - Install an erosion control matting such as a coconut husk, excelsior fiber or straw blanket bound together with jute twine or biodegradable plastic netting,
  - Seed the disturbed area with natural grasses, sedges and forbes capable of rooting into the bank and stabilizing the soil against erosion. Examples of species to seed include: fescue, ryegrass, little bluestem, side oats grama, Canadian wild rye, birdsfoot trefoil and others, and
  - Stake the erosion control blanket per the manufactures recommendations, including using live stakes of cuttings of willow (Salex spp) over area covered by the erosion blanket.
- For steeper slopes and areas subject to undercut provide geotextile and heavier riprap to stabilize the toe slope. Bioengineered techniques will be used where appropriate.

The re-deposited cobbles will be used at the toe of the slopes to help protect banks from the erosive nature of the river. Some larger stone material may be needed in order to hold the riverbank in place and protect the toe from erosion. If practicable, the banks of the Armored Areas shall be restored using an approximate 4:1 slope maximum.

Trees will be placed at the existing density unless it provides too much shade as determined by the vegetative inventory. Species will be selected by availability in the nursery industry and species that will thrive in the habitat in which they are placed. Weedy species such as Acer negundo (Box Elder) and Populus deltoides (Cottonwood) will not be re-planted in the mitigation phase of the project. Due to the possible future infestation of the Emerald Ash Borer to Wisconsin, new Faxinus Pennsylvanica (Green Ash) will not be planted in the area.

4.3 Soft Sediment Deposits

The *URSOW* requires a Mitigation Plan to restore habitats that have been physically impacted by sediment removal or soil excavation. Soft Sediment deposits mitigation, i.e. replacement of dredged material with clean fill, is not required. As part of the soft sediment removal plan the shore of the river will be protected by establishment of a shoreline setback zone approximately one foot away from the toe of slope of the bank.

5 References

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River (CD).* May 2004.

United States Environmental Protection Agency. *EPA Superfund Record of Decision (ROD).* May 2000.

United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site (URSOW).* January 2003 (revised).

Wisconsin Department of Natural Resources. *Remedial and Interim Action Design, Implementation, Operation, Maintenance and Monitoring Requirements, Chapter NR-724.13*. October 1999

Pollution Risk Services, LLC and Foth & Van Dyke. *Specifications*. Vol. II, Appendix F of *Sediment Removal Design*.. March 2006.

Pollution Risk Services

Foth & Van Dyke

Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Field Sampling Plan (FSP)

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Field Sampling Plan (FSP)

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

Field Sampling Plan (FSP)

Contents

Tables

Appendices

Drawings

1 Introduction

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County (Drawing No.1). The Site includes the former Tecumseh manufacturing facility and the lower fourteen miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner Harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the Remedial Investigations (RI), the river was segmented into separate sections based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four miles to the Waelderhaus Dam in Kohler. The Middle River extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. The Lower River extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls. In addition to PCB-contaminated sediment in the river and harbor, some Floodplain soils are also impacted with PCBs. This document has been prepared to address the remediation associated with the Upper River.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work which included plant site soils, groundwater, and riverbank soils was completed in 2004. Phase II remedial action work includes Upper River Near-Shore Sediments, Armored Areas, and Soft Sediment deposits and is scheduled for 2006 implementation. Remedial construction methods for the Floodplains are deferred pending the outcome of additional discussions between United States Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), Pollution Risk Services, LLC (PRS), and property owners of potentially impacted Floodplains.

This RD document has been generated to be consistent with the *Record of Decision (ROD),* (May 2000), *Consent Decree (CD),* (May 2004), and *Upper River Statement of Work (URSOW)*, (Jan. 2003). This Field Sampling Plan (FSP) presents the field sampling methods to support the *Verification Sampling Plan (VSP),* (Vol. II, Appendix E) and is submitted to detail post-dredge sediment procedures. Adjustments made to the FSP will be documented in the Remedial Action Work Plan (RAWP).

2 Objectives

This Field Sampling Plan (FSP) provides data collection procedures associated with the sampling program for Phase II of the Upper River work. Phase II addresses Near-Shore Sediments, Armored Areas, and Soft Sediments in the Upper River. Post-dredging objectives and procedures are provided in the *Verification Sampling Plan (VSP)*, (Vol. II, Appendix E).

Monitoring of groundwater is being performed in accordance with the approved Phase I *Final Field Sampling Plan* (Aug 2004). Monitoring of soft sediments and fish, if not meeting Performance Criteria (88% Removal and Surface Weighted Average Concentration (SWAC) less than or equal to 0.5 ppm) is included with the Phase II, *Operation and Maintenance Plan (O&M)* (Vol. II, Appendix K).

This FSP will provide specific Standard Operating Procedures (SOPs) for the following tasks:

- Completion of Field Logbook
- Field Measurement of Turbidity
- Surface Water Sampling,
- Dredge Dewatered Material (DDM) Disposal Sampling
- Air Monitoring
- Discharge Water Sampling
- Decontamination of Sampling Equipment
- Decontamination of Heavy Equipment
- Locating and measuring sediment thickness in a river
- Sediment Sample Collection Procedure
- Sample Identification
- Chain-of-custody, labeling, packaging, and shipping
- Management of investigation derived waste (IDW)

The following sections present the methods and protocols that will be utilized.

3 Sample Types and Sampling Methodology

The following sections describe the types of samples to be collected, the approach that will be used for sample collection, a summary of the general locations, number of samples, sample matrices, and analytical parameters for each general sample type before and during remedial activities.

3.1 Sample Types

The following sample types will be collected during Phase II of the Upper River investigation and remediation:

Turbidity – Turbidity monitoring will be performed during dredging activities to assess whether dredging activities are significantly contributing solids to the river. Turbidity will be measured in Nephelometric Turbidity Units (NTUs). Turbidity monitoring will be conducted at two or more locations, one upstream and one or more downstream. The exact upstream and downstream locations will be mobile as determined by PRS in the field. Monitoring stations will be located to measure potential impacts due to sediment removal activities. Samples will be collected in accordance with sampling protocols presented in Appendix A, SOP #P220-1.

A trigger and action level of turbidity will be used to inform the remediation contractor when turbidity due to sediment removal operations is above acceptance criteria. The trigger level for turbidity will be when the Total Suspended Solids (TSS) measured approximately 500 feet downstream of dredging activities is 35 parts per million greater than the background TSS concentration measured approximately 150 feet upstream of the dredging activities. The action level for turbidity will be when the TSS measure approximately 500 feet downstream of dredging activities is 70 parts per million greater than the background TSS concentration measured 150 feet upstream.

TSS will be correlated to NTUs during a bench test conducted prior to the mobilization of the 2006 Remedial Action Work. Water samples (10) from the river will be collected and analyzed for NTUs using the field turbidity meter. These samples will then be analyzed for TSS and a correlation curve generated. The results of the TSS/Turbidity correlation will be presented in the RAWP.

Readings upstream and downstream of the dredging activities will be made using the turbidity meter. The concentrations of TSS will be determined using the correlation curve. Specific locations for collection of the samples will be determined in the field during each day of dredging depending on the location of the dredge and downstream dispersion of the sediment. The downstream sample will be collected at the point that appears to have the highest levels of turbidity. The upstream sample will be collected at a point that appears to have the highest levels of turbidity. In the event that there is no noticeable increase in turbidity at the downstream point, the downstream and upstream samples will be collected at a point corresponding to the same distance from the shore where dredging is occurring. The samples will be collected from the river approximately at the midpoint of the water column.

Samples exceeding the TSS trigger level of 35 ppm above background will prompt dredging contractor to implements BMP's. Samples exceeding the TSS action level of 70 ppm above background will prompt shutdown of dredging operations to evaluate corrective measures for restarting the process.

Surface Water - As described in the previous section, if the turbidity action level is exceeded, the cause of the exceedance will be addressed. Corrective actions and/or additional sampling requirements will be made on a case-by-case basis by agreement between PRS, USEPA On-Site Coordinator (OSC), and the WDNR. Water sampling for PCBs may be conducted, if trigger level corrective actions are not sufficient to limit turbidity/sediment re-suspension. Samples will be collected as grab samples in accordance with sampling protocols presented in Appendix A, SOP #P221-01, at locations where turbidity monitoring was performed.

Discharge Water - Carriage water from sediment dewatering and equipment/personnel decontamination operations will be collected and treated on-site as required to meet effluent discharge limitations. Effluent will be analyzed for the parameters designated in the WPDES requirements. As required, samples will be collected in accordance with sampling protocols presented in Appendix A, SOP #P51-1.

Dredged Dewatered Material (DDM)/Excavated Sediment (Near-Shore Sediments and Armored Areas) - Composite samples will be collected from the geotextile tubes and stockpiles for PCB analysis and any other analytical parameters as required by the WDNR for the Onyx disposal facility. WDNR requirements for this facility will be finalized and presented in the RAWP. Hand tools will be used for collection of samples. Samples will be collected in accordance with sampling protocols presented in Appendix A, SOP #P50-1.

Air Sampling - Prior to loading out DDM from the site, baseline air monitoring will be performed at selected points (two) near the staging area to establish background PCB levels. During load out operations, air monitoring within the staging area will occur for a limited amount of time, e.g. one week to assess air levels of PCBs. Samples will be collected in accordance with sampling protocols presented in Appendix A, SOP #P52-1.

Operations and Maintenance - Monitoring of the concentrations of PCBs in soft sediments and fish will be performed as described in the *Operation & Maintenance Plan (O&M)*, (Vol. II, Appendix K) if the Performance Standards of the Consent Decree are not achieved, i.e. 88% Mass Removal and SWAC of less than or equal to 0.5 ppm.

Field Quality Control (QC) - Blanks and duplicate samples will be collected in accordance with the project *Quality Assurance Project Plan (QAPP),* (Vol. II, Appendix D). Rinsate blanks, field blanks and duplicate samples (field and MS/MSDs) will be collected as outlined in Table 1.

3.2 Sample Location, Frequency, and Analytical Parameters

The following sections present a summary of the Phase II sampling locations, frequency and analytical parameters that will be conducted before and during remedial activities. Additional details regarding post dredge verification sampling are presented in the *Verification Sampling Plan (VSP),* (Vol. II, Appendix E). Table 2 provides a summary of the sample location, frequency, and analytical parameters.

Near-Shore Sediments - Area delineation will be conducted by poling. If poling indicates that no sediments are present, then no removal action will be required.

Armored Areas Overburden - Overburden material is described as gabions, rocks, cobbles and re-deposited sediment overlaying the Armored Areas. Overburden material in direct contact with the contaminated sediments will be sampled to determined PCB concentrations per Armored Area location. Overburden material with concentration less than the detection limit may be used for bank stabilization. Overburden material with concentrations greater than the detection limit will be disposed at an approved off-site facility. Overburden material not in direct contact with contaminated sediment will not be sampled and may be used for bank stabilization.

Turbidity - Turbidity monitoring will be conducted at two or more locations, one upstream and one or more downstream at least every four hours during active dredging operations.

Surface Water - Specific sampling locations and the need for additional surface water samples will be determined based on the results of turbidity measurements and discussions with the agencies.

Discharge Water - Grab samples of treatment effluent will be collected daily. Samples will be collected at a frequency determined by the requirements of the Wisconsin Pollution Discharge Elimination System (WPDES) permit. The sample parameters will also be determined by the requirements of the WPDES permit.

DDM/Excavated Sediment (Near-Shore and Armored Areas) - DDM will be analyzed for PCBs to determine the landfill disposal location (TSCA vs. non-TSCA). DDM will be placed in geotextile tubes of approximately 1,000 cubic yards (cy) or less. Excavated sediments (Near-Shore and Armored Areas) will be stockpiled and sampled per location or at a minimum of approximately every 250 cubic yards (cy). If the PCB concentration of a pile is ≥50 ppm (i.e., TSCA material), the pile will be disposed at an approved out-of-state TSCA waste landfill or Wisconsin landfill licensed to receive TSCA waste. If the PCB concentration of a pile is less than 50 ppm (i.e., non-TSCA material), then the pile will be disposed of at an approved in-state or out-of-state landfill.

In addition, all DDM will be field tested for the following parameters at a minimum frequency of one sample every 500 cubic yards for the first 10,000 cubic yards and then at a rate of one sample every 3,000 cubic yards:

- Percent solids/moisture content (ASTM D2216 or 2974)
- Undrained shear strength (ASTM D2573 or D4648) if the sediment is cohesive
- Laboratory testing for grain size distribution (ASTM D4222) and undrained shear strength (ASTM D2850 or D4767) will be performed at a frequency of one analysis per 10,000 cubic yards. In addition, laboratory consolidation tests (ASTM D2455) will be performed at a frequency of one per 30,000 cubic yards

Air Sampling - Monitoring of the air within the staging area will be for a limited period of time to assess airborne PCB concentration. Two baseline samples will be collected prior to the staging of DDM and two samples will be collected daily during first week of DDM load-out.

3.3 Sampling Equipment and Procedures

The sampling equipment and procedures (including decontamination procedures) to be employed have been selected to meet the Project Data Quality Objectives (DQOs) and are detailed in Appendix A. DQOs are described in detail in the *QAPP* (Vol. II, Appendix D).

Appendix A contains the following procedural descriptions:

- Completion of Field Logbook,
- Field Measurement of Turbidity,
- Surface Water Sampling,
- Dredge Dewatered Material (DDM) Disposal Sampling,
- Air Monitoring,
- Discharge Water Sampling
- Decontamination of Sampling Equipment,
- Decontamination of Heavy Equipment,
- Locating & Measuring Sediment Thickness in a River,
- Sediment Sample Collection Procedure,
- Sample Identification,
- Chain-of-Custody, Labeling, Packaging and Shipping, and
- Management of Investigation Derived Wastes.

3.4 Field Instrumentation

Field equipment will be maintained in accordance with the manufacturer's requirements. Specific field preventive maintenance procedures are presented in Table 3.

Only qualified personnel will service instruments and equipment. Repairs, adjustments, and calibrations are documented in the appropriate equipment/instrument logbook or data sheet.

Instruments and equipment used to generate or measure environmental data will be calibrated in accordance with the manufacturer's specifications. Instrument and equipment calibration will be documented in the appropriate field logs and will be retained in the project file. Field measurement devices will be calibrated upon first use for this project and will be calibrated each day according to manufacturer's specifications.. Maintenance and procedural requirements from the manufacturer will be followed to ensure that the field equipment is operating properly.

Equipment to be used during field sampling will be examined to certify that it is in operating condition. This includes following recommendations of the manufacturer's operating manual to ensure that all maintenance requirements are observed. Calibration of field instruments will be performed at intervals specified by the manufacturer or more frequently as conditions dictate. Field instruments will include a Nephelometer (or turbidity meter), pH Meter, Hydro Lab, GPS, air monitoring equipment, and undrained shear strength equipment. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures it will be returned to the manufacturer for servicing.

Calibration of field instruments is governed by specific SOPs for applicable field methods, and such procedures take precedence over the following general discussions.

- pH Calibration - The pH Meter will be calibrated with standard buffer solutions as specified by the manufacturer.

- Nephelometer (Turbidity Meter) Calibration - The instrument chosen will be calibrated per the manufacturer's specifications.

- Hydro Lab (or equivalent) - The instrument chosen will be calibrated per the manufacturer's specifications.

- Global Positioning System (GPS) - A GPS will be used to identify the position of the additional sample collection points for Upper River soft sediments. The GPS system (e.g., Leica GS50, or equivalent) will be operated by competent personnel. Specifications for the accuracy and precision of the X (latitude), and Y (longitude) coordinates are contained within the operating instruction manual. The tolerance for the GPS unit will be within 5 feet of actual.

- Air Monitoring – The instrument chosen will be calibrated per the manufacturer's specification.

- Undrained Shear Strength – The instrument chosen will be calibrated per the manufacturer's specification.

4 Quality Control

Quality Control is presented in detail in the *QAPP* (Vol. II, Appendix D) and is presented as a separate document under the Remedial Design Work Plan (RAWP). A summary of quality control analyses for the sampling that will be conducted during the Upper River Investigations and remedial activities for Phase II is summarized in Table 1. Both laboratory and field quality control samples are indicated.

5 Sample Designation

Media to be sampled will consist of soils, surface water, sediment, water discharge effluent, air, and dredged de-watered materials. A detailed description of the sample designation and identification nomenclature for samples to be collected during the work is provided in Appendix A, SOP #P200SP. A summary of sample designation and identification is provided in Table 4.

6 Sampling Handling and Analysis

Each sample collected will be containerized, preserved, and shipped for analysis in accordance with the requirements listed in Table 5.

Examples of the paperwork that will be used to track sample shipments and other relevant forms are included in Appendix B.

7 Investigative Derived Waste (IDW)

The field sampling procedures necessary for the Phase II activities will generate solid and liquid Investigative Derived Waste (IDW). IDW is generally defined as any solid waste (solid waste includes liquids) including contaminated media (soil, rock, groundwater) generated as a result of typical investigative activities, including but not limited to decontamination fluids, tests, excess sample materials and personnel protective equipment that is intended to be disposed of.

Any excess soil, sediment, and groundwater collected but not submitted for laboratory analyses will be minimized, to the extent practicable, and will be managed as a remedial waste. All IDW will be appropriately managed in accordance with the WDNR, *General Interim Guidance for the Management of Investigation Waste (Publication RR556)*. A copy of *Publication RR556* is included in Appendix A. The specific sections of the WDNR, *Publication RR556* that should be reviewed are:

- Section III. *General Management Principles*
- Appendix B – *Guide to Management of Investigation Derived Waste*.
- Attachment 3 – *Long Term On-Site Storage of Investigation Derived Wastes*.

In general, IDW management methods should be protective of human health and the environment and comply, to the extent practicable, with applicable laws and regulations including wastewater, solid waste, and hazardous waste.

8 References

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River (CD).* May 2004.

United States Environmental Protection Agency. *EPA Superfund Record of Decision (ROD).* May 2000.

United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site (URSOW).* January 2003 (revised).

Pollution Risk Services, LLC and Foth & Van Dyke. *Verification Sampling Plan (VSP).* Vol. II, Appendix E of *Sediment Removal Design.* March 2006

Pollution Risk Services, LLC. *Phase I Final Field Sampling Plan (FSP).* Aug 2004.

Pollution Risk Services, LLC and Foth & Van Dyke. *Operation and Maintenance Plan (O&M*). Vol. II. Appendix K of *Sediment Removal Design..* March 2006

Pollution Risk Services, LLC. *Quality Assurance Project Plan (QAPP).* Vol. II of *Sediment Removal Design.* March 2006.

Wisconsin Department of Natural Resources. *General Interim Guidance for the Management of Investigation Waste (Publication RR556).* April 2002

Tables

Table 1
Environmental and Quality Analyses
Field Sampling Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Parameters	Approx No. of samples[1]	Field Analyses						Laboratory Sample						Estimated Total
		Rinse Blanks		Field Blanks		Field Dup		Matrix Spike		Matrix Spike Dup		Lab Blank		
		Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	
Groundwater/Surface Water/Turbidity/Air/Discharge Water[3]														
PCBs – (Aroclor) Groundwater	22	1/20	2	1/20	2	1/10	2	1/20	2	1/20	2	1/20	2	12
Surface Water	10	1/20	1	1/20	1	1/10	2	1/20	1	1/20	1	1/20/	1	7
Turbidity	240	NA	-	NA	-	NA	1	NA	-	NA	-	NA	-	1
PCBs – (Aroclor) Air	20	NA		NA		1/10	2	1/20	NA	1/20	NA	1/20	2	4
PCBs - (Aroclor) Discharge Water	120	1/20	6	1/20	6	1/10	12	1/20	6	1/20	6	1/20	6	42
TSS Discharge Water	120	NA	-	1/20	6	1/10	12	NA	-	NA	-	1/20	6	24
Soil/Sediment/DDM/Overburden (Armored Areas)														
PCBs (Aroclor) Soils/Sediment	1150	1/20	58	1/20	58	1/10	116	1/20	58	1/20	58	1/20	58	406
Percent Solids Soils/Sediment	1150	1/20	58	1/20	58	1/10	116	1/20	58	1/20	58	1/20	58	406
PCBs (Aroclor) DDM	40	NA[2]	-	1/20	2	1/10	4	1/20	2	1/20	2	1/20	2	12
Percent Solids, Undrained shear strength, grain size distribution, laboratory consolidation Soils/Sediment/ DDM	30	NA	-	NA	-	1/10	3	NA	-	NA	-	NA	-	3
PCBs (Aroclor) Overburden	9	1/20	1	1/20	1	1/10	1	1/20	1	1/20	1	1/20	1	6

[1] The actual number of samples collected and analyzed may be modified during project implementation.
[2] Rinse blanks not applicable to DDM (disposal)
[3] If possible, two 1- Liter bottles will be collected for each sampling location in case re-analysis is required. Additional sample volume will be required for field duplicate and MS/MSD samples.

NA = Not analyzed.
TSS = Total suspended solids

Table 2
Sample Location, Frequency and Analytical Parameters
Field Sampling Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

	Armored Areas	**Surface Water**	**Discharge Water**	**Air Monitoring**	**Turbidity**	**Dredged Dewatered Materials (DDM)/Excavated Sediment**
Sample Location	Overburden Material	Midpoint of water column downstream of dredging operations.	Effluent of Waste Water Treatment System	Selected areas around staging area	Upstream and downstream of dredging operation	Geotubes or stockpiles
Type and Estimated Number of Laboratory/Field Samples	Overburden, 9	Water samples, 20	Water samples, 120	Air samples, 20	Turbidity, 240	DDM/Excavated sediment samples, 40
Analytical Parameters	PCBs	PCBs	Discharge parameters determined in consultation with WDNR.	PCBs	NA	PCBs, Percent solids, Undrained shear strength, Grain size distribution, and Laboratory consolidation
Field Parameters	NA	NA	Flow	Weather Conditions	Nephelometric units correlated to TSS	Percent solids Undrained shear strength

NA – Not applicable
RAWP – Remedial Action Work Plan
NOTE: SAMPLE LOCATION, FREQUENCY, AND PARAMATERS ARE FOR FSP ONLY. VERIFICATION SAMPLE LOCATION, FREQUENCY, AND PARAMETERS CAN BE FOUND IN VERIFICATION SAMPLING PLAN (VSP).

Table 3
Field Equipment Preventative Maintenance
Field Sampling Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

MAINTENANCE	FREQUENCY
pH Meter	
Store in protective casing	Daily
Inspect equipment after use	Daily
Clean probe	Daily
Update equipment logbook	Daily
Replace probe	At operator’s discretion
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator’s discretion
Nephelometer (turbidity)	
Store in protective casing	Daily
Inspect equipment after use	Daily
Check and recharge batteries	Daily
Clean sample cells	Daily
Clean lens	Monthly, or at operator’s discretion
Update instrument logbook	Daily
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator’s discretion
ISCO Type Sampler	
Inspect equipment after use	Daily
Check and recharge batteries	Daily
Clean sample cells	Daily
Calibrate	Daily and/or according to manufacturers specifications
Verify temperature of sampler	Daily
Hydrolab (or equivalent)	
Store in protective casing	Daily
Inspect equipment after use	Daily
Clean probes	Daily
Update equipment logbook	Daily
Replace probes	At operator’s discretion
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator’s discretion

MAINTENANCE	FREQUENCY
Air Sampling	
Store in protective casing	Daily
Inspect equipment after use	Daily
Update equipment logbook	Daily
Check and replace batteries	Daily
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator’s discretion
Undrained Shear Strength	
Store in protective casing	Daily
Inspect equipment after use	Daily
Clean probes	Daily
Update equipment logbook	Daily
Replace probes	At operator’s discretion
Calibrate	Daily and/or according to manufacturers specifications
Return to manufacturer for service	At operator’s discretion

Table 4
Example Sample Designation and Identification Summary
Field Sampling Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Area of Investigation -Phase II	Sample Designation Example
Dredged De-Watered Material	PII-DWM, 6/6/06, 13:00, TUBE #1
Water Treatment Effluent Discharge	PII-DWE, 6/6/06
Surface Water	PII-SW,6/6/06
Air Monitoring	PII-AIR, 6/6/06,1

Table 5
Analytical Methods, Sample Containers, Preservation, and Handling Procedures
Field Sampling Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Analytical Parameter	Analytical Method	Container[2]	Preservation, Handling, and Holding Time[1]	Maximum Holding Times[1]
Groundwater/Surface Water				
PCB – Aroclors	8082	Two 1–L amber glass bottles with Teflon-lined lid[3]	Cool (4° C), 14 days to extract and 40 days to analyze	7 days – extraction 40 days - analysis
pH, Turbidity				pH – immediately Turbidity – 48 h
Total Suspended Solids	160.2	500-mL HDPE bottle	Cool (4° C), analyze as soon as possible	7 days
Soft Sediment/DDM/Overburden Material (Armored Areas)				
PCB – Aroclors	8082	250-mL glass jar with Teflon-lined lid	Cool (4° C), 14 days to extract and 40 days to analyze	7 days – extraction 40 days - analysis
Paint Filter	9095A	4 oz glass jar	Cool (4° C) analyze as soon as possible	
Percent Solids	D2216	NCS	NCS	Analyze as soon as practical
Undrained Shear Strength	ASTM D2850 or D4767	4 oz glass jar	Cool (4° C) analyze as soon as possible	
Grain size distribution	ASTM D4222	4 oz glass jar	Cool (4° C) analyze as soon as possible	NCS
Laboratory consolidation	ASTM D2435	4 oz glass jar	Cool (4° C) analyze as soon as possible	
Air				
PCB – Aroclors	NIOSH	Florisil sorbent tube	Cool (4° C) analyze as soon as possible	60 days

Notes:
NA = Not Applicable
NCS = No container, preservation etc. specified
[1] Unless otherwise specified, all holding times are measured from date of collection.
[2] Double sample containers required when MS/MSD or duplicates are being analyzed.
[3] When adequate volume is available two 1-L amber glass bottles will be collected at each sampling location.

Appendix A

Sampling Procedures

Sediment Sample Collection Procedure

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements for procedures to collect sediment samples. The general procedures to be utilized in obtaining samples from the river are outlined below.

Sediment samples will be collected at a rate of four grab samples per 2700 square feet in residual sediment of the remedial management units (RMUs) and composited into a single sample. Drawing No. 2 of the Verification Sampling Plan (VSP) shows a typical plan view of sediment sampling. Sampling will be collected from those locations determined to have sediment present after probing. If a sample is not obtained from a potential location, attempts will be made at other locations where sediment is known to be present. If hardpan (consolidated material) is determined after probing, a value of the detection limit (0.017 ppm) will be assigned to this location and used in the Surface Weighted Average Concentration (SWAC) calculations as it relates to the percentage of area within that RMU. Soft sediment or unconsolidated material that cannot be collected after 2 unsuccessful attempts with a Petite Ponar dredge will be assigned a value of 0.5 ppm as determined from the *RMU Verification Sampling & Calculation of SWAC – Sheboygan River Superfund (Upper River), Wisconsin Department of Natural Resources (WDNR), 1/24/2006* and used in the SWAC calculation as it relates to the percentage of area within that RMU. If a sample can be collected anywhere in the RMU not from no more than four locations, that PCB concentration would be used to represent all residual sediment in that RMU.

Equipment:

The Ponar dredge is ideal for sediments. A rope and trigger mechanism or “messenger” are used when collecting sediment samples with this dredge. This dredge can take a deeper bite in the sediment. Additionally, weights can be added if necessary.

Health and Safety:

- The jaws can come together with force.
- Refer to manufacturer’s recommendations and Health & Safety Plan.
- Gloves and waders (or PPE) should be worn while collecting and processing samples.

Cautions:

- The dredge occasionally becomes jammed by gravel becoming lodged between the end plate and the closing jaw.
- Possible disturbance of surface film of the substrate; can be overcome by lowering gently through the last 1-2 feet.
- The Ponar dredge is heavy.
- Potential loss of very fine grained surface deposits while sample is being retrieved from sampling area.
- Somewhat difficult to decontaminate.

Personnel Qualifications:

- Personnel may need to be certified under OSHA regulations.
- Individuals should be familiar with the use of sampling equipment.

Apparatus and Materials:

- Ponar Dredge
- Gloves
- Personal Protective Equipment
- Cooler and ice
- Pole or rope
- SS Mixing pan
- Chest waders
- Sample tags and/or labels
- Sample containers
- Chain-of-Custody forms
- Paper towels
- Water Proof Marker
- Logbook

Sampling Procedure:

1. Attach the necessary length of rope (a bowline knot is best) to the Petite Ponar dredge.

2. Set the trip mechanism on the dredge. Be careful not to place fingers or hands on or into any pinch points.

3. Lower dredge through the water column to the sediment, causing minimal disturbance to the final 1-2 feet of water. Trip the dredge by allowing the line to slacken. The jaws should clamp shut when the rope is retrieved, grabbing a sediment sample.

4. The dredge should be slowly raised through the water column, excess water poured off, and placed in a stainless steel bowl or pan for processing. Try not to pour off the sediment.

5. Deposit the sediment into the stainless steel mixing bowl to create a composite sample. Additional samples shall be added from the pre-determined location, as determined from probing.

6. Record sediment characteristics in the field log book.

7. Repeat the above procedures until all samples are collected for the composite sample.

8. Mix the sediment with a clean spoon thoroughly or until visually homogeneous. During this operation, remove any obviously “non-sediment” objects from the sample; bottle caps, broken glass, sticks, large rocks, etc. (Buckets and spoons are pre-cleaned according to decontamination protocols.)

9. Label all sample containers and record all appropriate information in the field notebook.

10. Handle, pack and ship the samples in accordance with the procedures in QAPP and SOP #P1-1.

Field Duplicates and Blanks:

Field duplicates will be collected for sediment cores by replicating subsamples of a composited sample from the mixing bowl.

Rinsate blanks will be collected by rinsing distilled water into and over all decontaminated equipment collecting the rinse water in appropriate sample containers.

Sample Identification

**SAMPLE IDENTIFICATION FOR
SHEBOYGAN RIVER PROJECT**

Nomenclature Procedures:

Remedial Activity Sample Designations and Identifications

During remedial activities, various samples will be collected including: verifications samples , effluent from de-watering, dredged materials undergoing de-watering, overburden material, and surface water. Sample nomenclature for these samples is discussed in this section. Retest samples are discussed in the following section.

Post Dredging Verification Sample

Samples collected to verify concentrations following dredging will be denoted with the prefix "PD" which intuitively denotes the designation of post dredging sediments followed by the deposit location and then by a numeric character sequence (i.e., 1, 2, 3, etc.) which uniquely identifies the Soft Sediment sample collected representing the 2700 square feet remedial management unit (RMU) area.

Post dredging surface sample 1 collected from Soft Sediment Deposit 5, Near-Shore, and Armored Area 1 would be identified as depicted below:

PII-PD-DEP5-1
PII-PD-AA1-1
PII-PD-NS1

Overburden Material

"Overburden" material is described as rocks, cobbles and re-deposited material overlaying sediment deposits in the Armored Areas. "Overburden" material in direct contact with the contaminated sediments will be samples to determine PCB concentration. A sample designator "O" will be used to define "Overburden Material".

An example identification of an "Overburden" sample collected from Armored Area 1 would be as follows:

PII-O, AA1

Dredged De-Watering Materials (DDM)

During the sediment dewatering period, measurement of moisture content in the DDM will be made on a daily basis. Grab samples will be collected from 5 locations and composited. For disposal purposes, DDM are typically sampled at a frequency of approximately one composite sample per geotextile tube (approximately 1000 cubic yards) or as required by the landfill for disposal. In addition, geotechnical data (percent solids & undrained shear strength) will be collected in the field at a rate of one sample every 500 cubic yards for the first 10,000 cubic yards and then at a rate of 3,000 cubic yards thereafter. Laboratory testing for grain size distribution and undrained shear strength will also be performed at a frequency of one sample every 10,000 cubic yards. Finally, a laboratory consolidation test will be performed at a rate of one sample per 30,000 cubic yards. Excavated sediment from the Armored Areas and Near-Shore Sediments will be stockpiled and sampled per location or at a minimum frequency of one composite (5 grab locations) sample per 250 cubic yards. An example identification of a dredge dewatered material sample collected on 6/6/06 at 1 p.m. from Geotube #1 would be as follows:

PII-DWM, 6/6/06, 13:00, TUBE 1

Water Treatment Effluent Discharge

Samples will be collected at a frequency determined by the requirements of the Wisconsin Pollution Discharge Elimination System (WPDES) permit. The sample parameters will also be determined by the requirements of the WPDES permit

An example identification of an effluent sample colleted form the Water Treatment System on 6/6/06 would be as follows:

PII-DWE, 6/6/06

Surface Water

If the action level (70 ppm) for downstream turbidity is exceeded, corrective actions and/or additional sampling requirements will be made on case-by-case basis by agreement between PRS, the USEPA OSC, and the WDNR. Water sampling for PCBs may be conducted, if trigger level corrective actions are not sufficient to limit turbidity/sediment re-suspension.

An example identification of a surface water sample collected on 6/6/06 would be as follows:

PII-SW, 6/6/06

Air Sampling

Prior to loading out DDM from the site, baseline air monitoring/sampling will be performed at selected points (two) near the staging area to establish background PCB levels in the air. If visible dust emissions are noticed, action will be taken to wet the surface of the material. In addition, monitoring/sampling of the air within the staging area will occur daily during the first week of load-out of the DDM to assure that there are no PCBs that may pose a health hazard to workers in the area

An example identification of an air sample collected on 6/6/06 at location 1 would be as follows:

PII-F-FP6-A3 and
PII-N-FP6-A3

QA/QC

Standard sample designations for QA/QC will be used as needed during the Phase II sampling efforts. The QA/QC letter suffixes that will be appended to the second part of the two-part designation and naming convention will be taken from the following list:

- Sample Duplicate – "DUP"
- Field Blank – "FB"
- Matrix Soike/Matrix Spike Duplicate – "MS/MSD"
- Trip Blank – "TB"

For example, a duplicate sample collected for QA/QC purposes may be designated and identified as follows:

PII-PD-DEP5-1 DUP

MISCELLANEOUS

Miscellaneous sample designations and identifications will be used as needed throughout the Phase II sampling effort. Letter suffixes will be appended to the second part of the two-part designation and naming convention. An example of a miscellaneous sample designation may be as follows:

- Sample Composite – "COMP"
- Sample Retest – "RETEST"

Where "retest" designates a sample collected from the same location as a previously collected sample, for example, after additional dredging passes. In this case, an example identifier would be:

PII-PD-DEP5-1 RETEST

FISH TISSUE

The fish tissue sampling plan will generally be consistent with the Operation and Maintenance Plan. Given the need for consistency in collection methods and analytical work, in order to identify trends, the Operation and Maintenance Plan will define the basis for this sampling effort as modified to fit the Remedial Action work.

Locating and Measuring Sediment Thickness in a River

LOCATING & MEASURING SEDIMENT THICKNESS IN A RIVER

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements for locating and measuring sediment thickness in a river after dredging activities. The general procedures to be utilized in the conduct of sediment probing in the river are described below. Sediment probing is performed to locate and measure the thickness of soft sediment within a particular area or location of the river. Sediment probing will be conducted by advancing a sediment probe through the soft sediment materials of the river unit refusal.

Equipment:

- Personal protective equipment (as required by the Site Health and Safety Plan);
- Cleaning equipment;
- Boat and/or chest waders;
- Calibrated sediment probing instrument(s);
- Duct tape;
- Field forms and field drawings for recording and plotting poling and probing measurements;
- Field book

Procedure (Locating Near-Shore Sediments):

The following list describes the procedures to be used when locating sediment in the river. Probing transects will be established across the RMU perpendicular to the shoreline spaced approximately every 120 feet depending on the size (area) of the RMU. RMU residual sediment thicknesses will be measured and recorded approximately every 30 feet along each transect using the following procedures:

1. Don personal protective equipment as required by the project Health and Safety Plan. If a boat is used, review the project Health and Safety Plan for health and safety requirements.

2. Record the proposed probing location in the field notebook along with other appropriate information collected.

3. Position boat (if used) over the sampling location using a minimum of two points to secure the boat.

4. Advance the probe into the sediment.

Procedure (Locating & Measuring Thickness Verification):

The following list describes the procedures to be used when conducting sediment poling and probing measurements. Probing transects will be established across the RMU perpendicular to the shoreline spaced approximately every 12.5 feet depending on the size (area) of the RMU. RMU residual sediment thicknesses will be measured and recorded approximately every 12.5 feet along each transect using the following procedures:

1. Don personal protective equipment as required by the project Health and Safety Plan. If a boat is used, review the project Health and Safety Plan for health and safety requirements.

2. Record the proposed probing location in the field notebook along with other appropriate information collected. Follow the typical example shown in Drawing No. 2 of the Verification Sampling Plan (VSP).

3. Position boat (if used) over the sampling location using a minimum of two points to secure the boat.

4. Measure the top of sediment using a metered pole with a disk attached on bottom.

6. Advance an approximately 5 cm diameter metered sediment probe into the deposit until refusal (i.e. hardpan or unconsolidated material).

7. Sediment thickness is determined by taking the difference between the sediment probe depth and the sediment disk depth.

8. Proceed to next probing location

9. Map the residual sediment thickness for the RMU as shown in Drawing No. 2 of the VSP.

10. Calculate the average thickness for the RMU by summing all recorded thickness and dividing by the total. Hardpan measurements will use a value of 0 feet.

GENERAL INTERIM GUIDANCE FOR THE MANAGEMENT OF INVESTIGATIVE WASTES

Wisconsin DNR Remediation and Redevelopment Program
Publication RR-556

General Interim Guidelines for the Management of Investigative Waste

1. Addendum to General Interim Guidelines for the Management of Investigative Wastes (April 1, 2002)
2. Jan 14, 1993 Memo: General Interim Guidelines for the Management of Investigative Wastes
3. Attachment 1: Regulatory Requirements and Policies Affecting Investigative Waste (IW) management
4. Appendix A to Attachment 1: Excerpts from Omega Hills Approval
5. Appendix B to Attachment 1: EPA Publication 9345.3-03FS Facsimile: Guide to Management of Investigation-Derived Wastes
6. Attachment 2: Sampling and Testing of Investigative Wastes
7. Attachment 3: Long-Term On-Site Storage of Investigative Wastes (IW)

(this page intentionally blank)

Addendum to Publication RR-556
General Interim Guidelines for the Management of Investigative Waste
April, 2002

Chapter NR 718

Chapter NR 718, Wis. Adm. Code, has been promulgated since the development of this guidance. The provisions of that chapter may be applied to investigative waste soils.

Attachment 1 Statutory and Rule Cites

Some of the statutory and rule citations in attachment 1 to the guidance have changed since the guidance was issued. They're outlined below.

Solid Waste Statutes:

The solid waste statutes previously found in ch. 144, Wis. Stats. (ss. 144.43 to 144.47) are now found in ch. 289, Wis. Stats.

The definition of "solid waste" that was previously found in s. 144.01 (15), Wis. Stats., is now found in s. 289.01 (33), Wis. Stats.

Hazardous Waste Statutes:

The hazardous waste statutes previously found in ch. 144, Wis. Stats., (ss. 144.60 to 144.74) are now found in ch. 291, Wis. Stats.

Air Management Statutes:

The state statutes that provide the legal basis for the Air management program are now found in ch. 285, Wis. Stats.

Solid Waste, Hazardous Waste and Air Management Administrative Rules:

Solid waste program rules are found in the NR 500 rule series (chs. NR 500 to 590), hazardous waste program rules are found in the NR 600 rule series (chs. NR 600 to 690), and air management rules are found in the NR 400 rule series.

CORRESPONDENCE/MEMORANDUM

DATE: January 14, 1993 FILE REF:

TO: District Solid and Hazardous Waste Program Supervisors and Bureau Section Chiefs (SW, HW & ERR)

FROM: Paul Didier - SW/3

SUBJECT: General Interim Guidelines for the Management of Investigative Waste

Contents

I. Purpose

The purpose of this memo is to provide you with general interim guidelines for making decisions regarding the management of investigative waste (IW), produced at sites regulated by our various program authorities. The ERR program formed an investigative waste committee earlier, and some of the recommendations and materials they developed are considered in these guidelines and the attachments. It is my understanding that Mark Giesfeldt, Barb Zellmer and Lakshmi Sridharan will form a second workgroup, including District staff, to develop more specific guidance on this topic, as needed. I would like the Districts to try to implement the guidelines for a 1 year period and then provide comments to this second workgroup. If you would like to provide comments before the workgroup is formed, please send them to Gary Edelstein - SW/3.

II. Investigative Waste - Definition

For the purposes of these guidelines, IW (or investigation-derived waste) is defined to include any solid waste, including any contaminated media (soil, rock or ground water) generated as a result of typical investigative activities. This includes, but is not limited to: drill cuttings from boring or monitoring well installations, decontamination fluids from cleaning investigative equipment (i.e., drill rigs, backhoes, sampling equipment such as bailers and pumps), spoils from backhoe pits, development water, purge water, water from pump tests, excess samples and dirty personal protective equipment and clothing intended to be thrown away. For purposes of these guidelines, IW does not include any wastes from activities generated as a result of remediation activities. Remediation wastes include wastes from petroleum tank/piping excavations, petroleum tank bottoms/sludges and other wastes that are picked up, treated and returned to the site. Also, the term does not include wastes used for treatability studies, including off-site bench scale tests and on-site pilot tests. We expect to develop separate guidelines in the future addressing the management of wastes generated as a result of remedial action, treatability and pilot test activities. Some of the principles outline in these guidelines may be found to be appropriate for those wastes.

III. General Management Principles

Whenever making decisions regarding the management of IW, the following general principles should be followed:

A. **General** - IW management methods should be protective of human health and the environment and comply, to the extent practicable, with all applicable laws and rules, including wastewater, solid waste and hazardous waste laws and rules. As a general rule, it will be necessary to use best professional judgement, in light of the site specific conditions, to determine if a management option is protective of human health and the environment. In some instances, a variance, waiver or exemption may be available to allow certain on-site management methods, including redisposal of IW back on the site, that normally would not be allowed under the solid or hazardous waste laws and rules. In other instances, managers may make enforcement discretion decisions. This is discussed in more detail under the next section - Complying with Requirements and Obtaining Approvals.

B. **Minimization** - The amount of IW produced should be minimized as much as possible. Work plans for investigations should outline drilling and sampling techniques that minimize the generation of IW. Non-intrusive investigation methods may be used, when such methods are considered appropriate for the site. The potential problems of managing IW should be a factor in choosing investigative methods. For additional specific suggestions for IW minimization methods, please refer to page 5 of the attached (appendix B) U.S. EPA Superfund fact sheet, under the title "IDW Minimization".

C. **In-State/On-Site Policy** - Management of hazardous IW should be in accordance with our "Interim Policy for Promoting the In-State and On-Site Management of Hazardous Waste in Wisconsin", dated March 14, 1991.

D. **Liquid IW** - Contaminated liquids should generally not be disposed of on the ground or back onto waste at a site. Aqueous wastes may be collected, properly characterized for possible treatment or incorporation into on-site remediation, such as for ground water or leachate, or collected for management at a permitted waste water treatment plant willing to accept these wastes, and having the appropriate approvals to do so. The preferred method for managing contaminated pump test discharges or other large volumes of aqueous wastes with low levels of contamination is to provide any necessary treatment to meet Waste Water program requirements and discharge them to surface wasters in accordance with those program requirements. It may be necessary to provide a temporary treatment unit for such discharges. Liquids generated from areas known to be free of contamination need not be handled as IW, but should not be disposed of over areas known to be contaminated or over waste, to avoid the leaching of additional contaminants into the environment.

E. **Management as Part of Remedial Action** - For sites where it is known that some sort of remedial action will be conducted in the future, secure on-site storage (see the long-term storage guidelines, attachment 3) and subsequent management of the IW through incorporation into the remedial action is preferred to off-site management, where possible. This will avoid the need for separate treatment and/or disposal arrangements. IW (with the exception of non-indigenous IW) generated during the course of an investigation can be considered part of the site and managed with other wastes from the site, consistent with a final remedy.

F. **Field Screening** - Where appropriate, field screening methods may be used to help determine if IW contains contaminants of concern, in lieu of laboratory testing. Staff project managers should decide if field screening is an appropriate method for making this determination on a site specific basis. In many instances, field screening might be used to help reduce the number of samples requiring laboratory analysis.

IV. Complying with Requirements and Obtaining Approvals

A. **Description of Requirements** - Attachment 1 describes the solid waste, hazardous waste, wastewater and air management requirements that may apply to IW. Whenever IW is produced, appropriate steps need to be taken to characterize the waste to determine whether it should be handled as a hazardous waste, and to determine the options available for both the short term and long term management of that IW.

B. **Variances, Waivers and Enforcement Discretion** - For activities requiring a hazardous waste license, it may be possible to obtain a variance from that licensing requirement. In addition, in an emergency situation a waiver from any of the hazardous waste requirements may be possible (limited to 90 days in duration). For activities requiring a solid waste license, a written exemption may be possible. **In other situations, a decision may be made to use discretion and not enforce certain solid and/or hazardous waste program requirements.** Each situation must be reviewed and considered individually regarding the appropriate course of action. The following criteria should be considered when making such decisions:

1. The contaminants, their concentrations, and total volume of IW;

2. Media potentially affected (e.g., groundwater, soil) under management options;

3. Location of nearest population(s) and the likelihood and/or degree of site access;

4. Potential exposure to workers; and

5. Potential for environmental impacts.

C. **Responsibilities** - If a project manager is assigned to and is actively overseeing a project, then that person is responsible for assuring that steps are taken to properly characterize the IW, that a plan is in place for the management of those wastes, and that appropriate approvals are obtained. In all cases I expect the District Program Supervisor to be responsible for determinations on whether, for example, a license is required for a specific waste management activity, along with the other applicable requirements, and whether a variance, waiver or exemption from that licensing requirement is appropriate and possible, or whether discretion is proposed to be used to not enforce certain requirements. In cases where hazardous investigative wastes or large volumes of solid investigative wastes are to be managed or unusual or unique management principles are involved, the determination should be made in writing along with the basis for the determination.

V. Specific Management Principles

A. **Decontamination** - Equipment decontamination should occur on a pad that is lined and designed to prevent surface water from running on to the pad and to prevent contaminated liquids from running off. Generally, these pads are sloped to drain to a sump that can be pumped out into a storage tank. Often, the pads are constructed of concrete with sealed joints or with a geomembrane covered with a geotextile and gravel. At many sites, it may be necessary to construct such a pad before the investigation begins. It may be necessary to decontaminate and/or manage as waste any contaminated material from the pad once it is decommissioned.

B. **Sampling, Testing and Short-Term Storage** - Guidelines for sampling, testing and short-term storage of IW are outlined in attachment 2. Where appropriate, field screening methods may be used to help determine if IW contains contaminants of concern, in lieu of laboratory testing. ERR staff project managers should decide if field screening is an appropriate method for making this determination on a site-specific basis.

C. **Long-term Storage** - Guidelines for long-term storage are outlined in attachment 3. For hazardous IW, a storage facility license may be required for long-term storage.

D. **Test Pits** - Test pit spoils returned to the same excavation immediately (generally on the same day), where returning the spoils does not pose an increased threat to human health or the environment has been allowed in the past without meeting all approval/licensing requirements using enforcement discretion, and this should be allowed to continue.

VI. Working Group

I expect that the working group formed to develop the specific guidance on this issue will provide direction for which circumstances it is appropriate to use the various authorities to approve the management of investigative waste, and that guidance will provide the direction staff need to assure that we are being consistent state wide on this issue. I also anticipate that this group will develop the specific procedures to use in making decisions regarding the management of investigative waste.

I hope that the working group can be formed and develop the specific guidance on this topic in the next several months. In the mean time please use the general guidelines I have laid out in this memo, as you and your staff address IW management issues.

Attachs.

GAE:BJZ:MFG

cc: Solid & Hazardous Waste Program Unit Leaders, District & Central Office
Darsi Foss - SW/3
Linda Meyer, Patti Hanz, Deb Johnson, & Pete Flaherty - LC/5

ATTACHMENT 1

REGULATORY REQUIREMENTS AND POLICIES AFFECTING INVESTIGATIVE WASTE (IW) MANAGEMENT

Solid Waste Program, Ch. 144, Stats. and Chs. NR 500-520, Wis. Adm. Code

The Solid Waste Program has no regulations or guidance aimed specifically at IW. Under that program's rules and statutes, any material or media from an investigation, even if it is uncontaminated, that is generated and is to be discarded is a solid waste, because the statutory definition of solid waste (s. 144.01(15), Stats.) is very broad. The definition of disposal is also very broad and includes the replacement of solid waste in a closed landfill or other site under investigation. Chapters NR 500-520, Wis. Adm. Code, require persons to obtain a license and meet operating and design standards in order to dispose of solid waste. However, there are exemptions in the rule for the disposal of clean media in s. NR 500.08, Wis. Adm. Code, and wastewater facilities for liquid wastes are also exempt from the rule. Therefore, under the statute and rules, any on-site management of IW consisting of contaminated media or any other material must be in a licensed solid waste facility that meets all operating and design standards or, for liquid wastes, in an exempt wastewater facility. Therefore, re-disposal of such wastes in a closed landfill or disposal area is not allowed without meeting standards and obtaining a license. However, the engineering unit leaders in the program have indicated that there is no site they're aware of where excavated waste from a solid (non-hazardous) waste landfill wasn't allowed to be redisposed of. The program does have a policy (no specific policy memo, although letters and plan approvals may have mentioned it) concerning the re-disposal of solid waste at closed, covered sites. The program will generally allow waste within the site to be moved around on the site, within licensed acreage, for the purposes of grading for site drainage or cover improvement, provided the total waste volume (called design capacity) is not exceeded. Written exemptions from any program requirement, including licensing, may be granted if a written application is submitted and the applicant can show the activity will not cause environmental pollution.

State Hazardous Waste Program, S. 144.60-144.64, Stats. and Chs. NR 600-685, Wis. Adm. Code

The Hazardous Waste Program has no regulations aimed specifically at IW. The only policy memo relating to them is a 4/28/89 memo from Barb Zellmer to the District SW Coordinators specifying who makes determinations on whether a remedial action waste is hazardous. Again, there is a policy on the re-disposal of waste. This policy was documented in the September 29, 1989 closure and long-term plan approval for the Omega Hills North Landfill (appendix A). In summary, the policy generally prohibits the re-disposal of hazardous waste in closed facilities, however, the Program can review such re-disposal proposals on case-by-case basis for each remedial action or investigation proposal, accounting for the latest U. S. EPA guidance (see Superfund, below for the U. S. EPA guidance and regulations discussion).

Although not specifically aimed at IW, the Program has some important requirements that affect its management:

-The definitions of hazardous waste (HW) and solid waste. The IW must be a solid waste to be a HW. The definition of solid waste comes from the solid waste program statutes (s. 144.01(15), Stats.), so any material from an investigation is a solid waste. How a solid waste is identified as hazardous is complicated, but there is considerable guidance available on the subject from both the Program and U. S. EPA. For quick reference, one of the better guidelines is the Superfund Program's land disposal restriction (LDR) fact sheet #5. This discusses how a HW determination is made for waste managed in sites before the HW regulations took effect. There are some exceptions, but for the most part, the state HW rules identify HW the same way the federal rules do. The most notable exceptions are the state F027 and F500 waste listings and the federal TCLP rule, discussed in the next section. The F027 listing is broader than U. S. EPA's, the F500 listing only exists in the state rules and the state rules do not yet have the TCLP test.

-Generator requirements apply to IW that is hazardous. An EPA ID number must be obtained, the manifest system used and the waste must be managed at an approved HW facility. Licensed HW transporters must haul any waste if taken off-site. On-site temporary tank and container storage standards apply to waste as it is generated. Generators who fall under small quantity generator categories must comply with rules less extensive than large quantity generators (it is expected that at most remedial action sites, the amount of IW waste generated would exceed the small quantity generator amounts of 100 and 1000 kg. generated per month).

-Licensing and facility operating and design standards apply to units where HW is treated, stored or disposed of. Large quantity generators must utilize a licensed storage facility for wastes held for more than 90 days. Under a strict interpretation of the rules, any on-site management of hazardous IW (if the quantity is over 100 kg. per month) must be in a licensed HW facility that meets all operating and design standards (under certain circumstances, wastes from generators who produce <100 kg. per month may also be disposed of at a solid waste landfill approved for such disposal by the Department). Therefore, under this interpretation, re-disposal of such wastes in a closed landfill or disposal area is not allowed. Exemptions from the facility design and operating standards (but not licensing) are allowed if the applicant can show equivalent protection. Variances from licensing are allowed for up to 5 years if a hardship to any person exists, and an application is submitted showing how the facility design and operating standards will be met. The variance section has been revised, as part of the NR 600 renumbering revisions, to allow certain types of land disposal. Waivers from any requirement may be granted if an emergency condition exists. As part of the recent revisions, the waiver provision is being expanded to allow waivers for HW management as part of an immediate response to a discharge.

Federal Hazardous Waste Program

Wisconsin is authorized to implement the HW program in lieu of U. S. EPA. However, there are 2 aspects of the federal program that affect IW management that are not yet part of Wisconsin's program. These are the LDR's and the TCLP characteristic.

The LDR's apply to HW that is land disposed. Usually, the waste must be treated before disposal occurs. The requirements are complex, but guidance is available. For quick reference, the Superfund LDR fact sheet series is recommended. Again, under a strict interpretation, re-disposal of IW on-site would trigger the LDR restrictions. There is no LDR guidance that specifically addresses IW. U. S. EPA may grant several types of variances from the LDR's. For Superfund soil and debris, a treatability variance will be normally be granted if a remedy is selected that will not meet LDR treatment levels. However, even under the variance, a certain level of treatment would still be required.

The recently promulgated TCLP test brings many more solid wastes into the HW program. The leach procedure allows wastes that contain certain organics to become characteristic HW, based on the amount of organics that leach out of the waste under the test. Certain contaminated media from the federal underground storage tank program are temporarily excluded. Many IW's that would not be listed HW under the rules are now hazardous under TCLP. There is no TCLP guidance that specifically addresses IW.

Federal Superfund Program

The Superfund Program has no regulations specifically addressing the procedures for managing IW. However, this program has developed general policies on the issue. There is discussion in the proposed (53 FR 51442, 12/21/88) and final (55 FR 8755, 3/8/90) National Contingency NCP preambles on the program's policies for IW. There is a statement that all state and federal standards (applicable or relevant and appropriate requirements - ARARs) should be met for IW management, but for on-site management, "best management practices" are the rule, and compliance is only required to "the extent practicable". U. S. EPA's position is that all investigations (apparently including preremedial site inspections) are conducted pursuant to the CERCLA removal authority, and strict compliance with all standards is not required for a removal (It is important to note that Wisconsin has no equivalent authority under any of the response programs.). Under the federal policy, if IW is managed off-site, however, the facility must be approved for the waste, and in compliance with the Superfund off-site facility policy.

IW managed as part of a Superfund remedial action entirely on-site fall under the on-site permit exemption in §121(e) of CERCLA. Such actions must comply with the substantive technical requirements that are applicable or relevant and appropriate to a management method, but no federal, state or local approvals, permits or licenses are required for the on-site action.

The proposed NCP discussion gives only 2 extreme examples of how to manage IW. The first is that if the IW is from an area with significant dioxin contamination, it will be containerized, tested and managed in accordance with all ARARs. It then mentions that it is standard practice to leave IW on-site until the remedial action commences. The second example is offered as a contrast to the first, stating that the routine testing and containerization of large volumes of drilling muds and purge waters not suspected to contain hazardous substances may be unnecessary.

In January, 1992, the Superfund Program issued a quick reference fact sheet that apparently only applies to the remedial program (copy attached).

The federal preremedial program has developed a more extensive draft guidance manual addressing IW management. The draft manual has information on regulatory requirements, identification of the specific types of IW, and specific guidelines on how to manage the waste in specific situations. It is generally written to allow flexibility for investigators, consistent with the NCP preamble policies discussed above. Most importantly, it states that:

-Non-hazardous IW, including liquids, may be re-disposed of on-site, regardless of its hazard or the concentration of hazardous constituents in the waste.

-Hazardous IW may be re-disposed of on-site if it poses no immediate threat to human health and the environment, considering the potential for community relations problems with residents in the area. Hazardous organic decontamination fluids may be evaporated (small amounts), or should be disposed of off-site.

Wastewater Program

Liquid IW that is to be discharged to a surface water or sewage treatment plant (POTW) must meet this program's requirements. It should be noted that such discharges are, for the most part, exempt from regulation under the solid or hazardous waste programs.

For surface water discharges, the Wastewater program normally requires a WPDES permit be obtained and specific discharge standards be met, including standards for toxics. It is possible, following future revisions to the Department's general permit that fluids containing very low concentrations of regulated substances may be discharged without treatment or a specific permit. If the concentrations of these substances are above levels of concern, treatment will be required under the general permit, or under a specific permit for more long-term or high volume discharges, such as certain pump tests. However, a short form application for discharge is required. Any person may be issued a general permit if its requirements are met. The program has allowed "on-site" wastewater discharges that are part of a federal Superfund site remedial action to only meet the substantive requirements of a permit, and has not required specific permits for those discharges.

For POTW discharge, the state requirements are usually minimal for these types of wastes. Ch. NR 211, Wis. Adm. Code, prohibits discharges that interfere with or pass through a POTW as well as discharges that exhibit certain characteristics, i. e., explosive, corrosive, fire hazard or could cause a sewer blockage. However, the local authority that operates the facility must give permission for the discharge, and will impose pretreatment requirements, which can vary, depending on the local pretreatment ordinance, and the potential for the discharge to interfere with the

POTW's operation. The local pretreatment requirements can include specific numeric limits for specific contaminants.

Air Management Program

Very briefly, this program regulates air emissions above certain amounts. In some cases it may be advantageous to evaporate certain IW's, such as organic decontamination liquids. This may be done without controls if the emissions do not exceed certain amounts.

Appendix A
Excerpts from Omega Hills Approval

September 29, 1989

IN REPLY REFER TO: 4430

Mr. Kevin O'Toole
District Manager
Waste Management of Wisconsin, Inc.
Two Park Plaza
10850 West Park Place, Suite 1200
Milwaukee, WI 53224

SUBJECT: Conditional Approval (Modification) of the
Chapter NR 181 Closure and Long-Term Care Plan
Omega Hills North Landfill
EPA ID# WID000808568

REVIEW COMMENTS

Management of Newly Generated Waste after Covering and Facility Decontamination

Since the landfill is defined as one unit, and there are no effective barriers we are aware of to prevent hazardous constituent migration, any waste, removed from the landfill as a result of any construction, remediation or investigation must be managed as a listed hazardous waste at an on or off-site facility that is licensed, permitted or approved to accept such hazardous wastes. This is because such waste or material is a mixture of solid and hazardous waste and/or is derived from the previous disposal of listed hazardous waste (see s. NR 181.12(l)(b)2. and 4., Wis. Adm. Code). Therefore, there are no "documented non-hazardous waste areas" which would contain non-hazardous wastes we are aware of.

In view of the above discussion, any remedial or other construction work at this site will likely contaminate the equipment used for construction with hazardous constituents. Therefore, all such equipment must be subject to an approved decontamination procedure that must be developed now. The closure plan indicates such a procedure will only be developed if needed at a later date. Therefore, the determination contains a condition requiring WMI to develop and submit that procedure for approval within 30 days.

RESPONSE TO COMMENTS

On September 13, 1989, WMI submitted, through its attorneys, comments on the Departments August 14, 1989 draft determination, along with other legal documents that requested various actions by the Department. The legal documents will be responded to under separate cover. A meeting was held on September 14, 1989 to discuss certain technical issues related to the draft determination.WMI submitted additional comments related to the statistical test used for groundwater monitoring on September 14, 1989, through its attorneys. WMI submitted additional comments on the final use plan issue and a copy of an August 13, 1976 soil documentation report prepared by STS Engineers, Inc. on September 19, 1989. WMI submitted information on a site in Pennsylvania on September 26, 1989. Department staff had additional conversations with WMI staff regarding statistical analysis issues on September 28, 1989. The Departments response to all the comments, submittals (except the legal documents) and the meeting are outlined below.

Condition No. 4

This condition sets out the requirements relating to the re-disposal of wastes in the landfill that are generated from on-site remedial actions and investigations, herein referred to as the "re-disposal issue." This issue involves both Department and U. S. EPA regulations and policies. U. S. EPA's policies relating to this issue are still evolving To give a clear response to the comments, it is helpful to briefly describe both the Department's and U.S. EPA's regulations and policies.

Under s. NR 181.44(1), Wis. Adm. Code, a landfill may not operate (i. e. accept hazardous waste for disposal) without having an operating or interim license or waiver issued under ch. NR 181, Wis. Adm. Code (variances aren't available to landfills under s. NR 181.55(10), Wis. Adm. Code). In accordance with the Chapter, hazardous waste can be generated from on-site remedial or investigative activities at the landfill. Under the "derived-from" and "mixture" rules, s. NR 181.12(1)(b)4. and 2., Wis. Adm. Code, material removed from the landfill, once removed for management, are hazardous wastes if they are contaminated by hazardous constituents from the past disposal of listed hazardous wastes. A closed landfill which doesn't have an operating or interim license may not accept such material for disposal, even if the material originated there, without violating the rule. The Department has, as a matter of policy, allowed closing landfills that formerly accepted hazardous waste (the Department may allow a closing hazardous waste landfill to continue to operate and accept solid waste under s. NR 181.44(12)(a), Wis. Adm. Code) and still have open hazardous waste units to continue to accept remedial waste generated on-site without a license or waiver, but only until the open hazardous waste unit closes.

U.S. EPA's regulations are similar and require a landfill to have a permit or interim status to continue to accept hazardous waste, and also require a landfill to close within 180 days after ceasing to accept hazardous waste (U.S. EPA is proposing regulations that would allow disposal facilities to continue to accept non-hazardous solid wastes without closing). It's regulations also include the "derived-from" and "mixture" rules. In addition, U. S. EPA has developed a "contained In" policy for non-solid waste media, such as soil or groundwater that is contaminated by hazardous wastes. Such contaminated media must be managed as a hazardous waste until all the contamination is removed, if contaminated by listed waste, or until the contaminated media no longer displays a characteristic, if contaminated by characteristic waste. U. S. EPA has been petitioned to develop a "deminimus" rule setting specific concentration levels for hazardous constituents in media below which it would no longer be regulated as a hazardous waste. Until such a rule is promulgated, U. S. EPA and the states may look at each situation involving potentially contaminated media an a case by case basis.

U. S. EPA has developed additional policy and guidance related to the application of the HSWA land disposal restrictions for on-site actions at sites remediated under a federal Superfund project. The Department understands that U. S. EPA intends that this policy apply to RCRA hazardous waste facilities. WMI's comments referred to some of this guidance, as related to Superfund sites. In summary, this guidance describes how to determine when a RCRA waste is being managed and when a disposal activity takes place on-site that triggers the land disposal restrictions. A new term, "placement", was developed to help determine when disposal occurs that cause the land disposal restrictions to apply. This term does not appear in the federal regulations. However, the Department understands that U. S. EPA plans to codify the policy in the future. In short, "placement", and hence disposal, takes place if waste is managed in a different unit than it came from, or in the same unit it came from if it is first managed in an intervening treatment or storage unit. If the waste is moved around or consolidated in the same unit or "area of contamination", consolidated without being managed in an intervening unit, then "placement" does not occur.

The Department has not yet incorporated the land disposal prohibitions into ch. NR 181, Wis. Adm. Code, but intends to do so in the future. Once those rules are adopted, the Department will consider adopting the U. S. EPA policies and guidance related to them. In the meantime, the Department can consider, on a case by case basis, U. S. EPA's policies when formulating its own policies on the re-disposal issue.

WMI has requested that the Department regulate wastes removed from the landfill differently. Specifically, WMI has requested that:

1. Material removed from the landfill that has "clearly been significantly contaminated by demonstrable mixing and are removed for placement at a different management unit..." would be the only material managed as a hazardous waste in accordance with the condition.

2. The Department grant a treatability variance for soil and debris from the landfill and allow removed waste to replaced In the existing fill or disposed of at Parkview Landfill.

3. That leachate from the landfill be assigned the hazardous waste number for all the hazardous wastes known to be accepted at the landfill.

In response to request 1, limiting the requirements to material that has "clearly been significantly contaminated by demonstrable mixing" would not meet the intent of the "derived-from" and "mixture" rules under ch. NR 181, Wis. Adm. Code. In addition, such a limit would be contrary to U. S. EPA's regulations; we are not aware of any federal policy that limits these two rules as this proposed language would. Finally, it is not clear who would make such a demonstration. Any material from the landfill that has the potential to be contaminated by hazardous constituents must be managed as a hazardous waste. However, in response to the submitted comments and the

September 14 meeting discussion, the Department can further refine the condition to more clearly indicate that if soil, including cover soil, and groundwater is demonstrated by WMI to not be contaminated, then it would not be regulated as a hazardous waste in accordance with the condition. This was the condition's original intent. Until a "deminimus" rule is in place, the Department has latitude in judging if a demonstration method is adequate. Generally, the Department's policy is to require testing of the material, and field screening methods can be considered, depending on the hazardous constituents of concern (i. e., if VOC's are of concern, an Hnu or OVA screening method may be appropriate). Also, Department field staff may determine, on a case by case basis, that certain materials are not considered contaminated based on field observations.

Request 1 also has language further limiting the requirements only to material "removed for placement in a different management unit". This limitation would defeat the purpose of the condition and would generally allow re-disposal on site without limits. This would be in clear violation of ch. NR 181, Wis. Adm. Code, as outlined in the second paragraph of the response to the Condition No. 4 comments, above. We also note this would be in conflict with the Closure and Long-Term Care plan, page 2-10. The Department does not intend to grant a "blanket" approval to the re-disposal of waste in the landfill during the entire long-term care period. Therefore, the condition will not be revised to conform with this request. However, in light of U. S. EPA's policies, as discussed above, the Department is willing to consider, on a case by case basis, requests for re-disposal of wastes associated with remedial actions and investigations, with each separate remedial action or investigation proposal. That will allow the Department to take into account any changes in U. S. EPA guidance or policy, the kinds of wastes being generated, any testing requirements, and the portion of the landfill the wastes are being re-disposed of in. The Department will not approve such proposals unless they conform with any U. S. EPA guidance, policy or regulations in effect at the time.

Request 2 refers to a variance authority under the HSWA land disposal prohibitions, which are not contained in ch. NR 181, Wis. Adm. Code at this time. Therefore, the Department does not have the authority to consider such a variance, so the condition can't be changed in response. In addition, it is not clear that U. S. EPA will grant this variance authority to a state as part of the authorization process.

Request 3 refers to a letter regarding a leachate pretreatment pilot facility that has since closed at the landfill. The Department has no objection to the suggested waste code designation. The proper procedure to formally notify the Department and U. S. EPA of a waste code designation is through specific correspondence and a revised notification form. However, it should be noted that if such material (or any other material from the site covered by this condition) is manifested, a specific waste code or code(s) will be needed on the manifest form. Questions on this issue should be directed to the Department's Southeast district hazardous waste staff. No revision to the determination appears to be necessary to respond to the request.

BEFORE THE
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

CONDITIONAL CLOSURE AND
LONG-TERM CARE PLAN APPROVAL (MODIFICATION)
OMEGA HILLS NORTH LANDFILL
EPA ID# WID000808568

CONDITIONAL CLOSURE AND LONG-TERM CARE PLAN
APPROVAL (MODIFICATION)

The Department hereby approves the Closure and Long-Term Care Plan for the landfill, subject to the following conditions which hereby modify the plan:

4. All wastes, liquids, contaminated groundwater, contaminated soils or other materials removed from the landfill as a result of any construction, remediation or investigation shall be managed as a hazardous waste at a facility licensed, permitted or approved to accept such wastes, in accordance with s. NR 181.21(4), Wis. Adm. Code, regardless of where the material originates. The Department shall consider specific requests by WMI, on a case by case basis, on whether soil or groundwater to be removed from the landfill is contaminated and therefore subject to this condition. The Department shall consider specific requests by WMI, on a case by case basis, on whether material removed as part of a particular remedial action or investigation may be managed in an different fashion than set out in this condition, but only when such requests accompany the particular remedial action or investigation proposal.

Appendix B. **NOTE: This is a WDNR scanned version of this USEPA Quick Reference Fact Sheet. The WDNR believes it is an accurate facsimile of the Fact Sheet, but the reader should obtain a copy of the original if there is any question of accuracy.**

EPA-	Publication: 9345.3-O3FS April 1992 United States Environmental Protection Agency, Office of Solid Waste and Emergency Response **Office of Emergency and Remedial Response Hazardous Site Control Division OS-220W Quick Reference Fact Sheet**

Guide to Management of investigation—Derived Wastes

CERCLA field investigation activities (e.g., remedial investigation/feasibility studies and remedial designs) may result in the generation of waste materials that may pose a risk to human health and the environment These investigation-derived wastes (IDW) may include drilling muds, cuttings, and purge water from test pit and well installation; purge water, soil, and other materials from collection of samples; residues (e.g., ash, spent carbon, well development purge water) from testing of treatment technologies and pump and treat systems; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment. The management of IDW must ensure protection of human health and the environment and comply with (or waive) regulatory requirements that are applicable or relevant and appropriate requirements (ARAR). **This fact sheet presents an overview of possible IDW management options, discusses the protectiveness requirements and ARARs associated with these options, and outlines general objectives established for IDW management under Superfund.**

The general options for managing IDW (see Highlight 1) are collection and either (1) immediate disposal or (2) some type of interim management. Interim management may include storage or other temporary measures. As discussed below, the specific option selected will depend on the type of waste produced, its relative threat to human health and the environment, and other site-specific conditions.

IDW MANAGEMENT REQUIREMENTS

When managing IDW, site managers are required to choose an option that: (1) is protective of human health and the environment and (2) complies with (or waives) ARARs, as described below.

Protectiveness

In determining if a particular management/disposal option is protective, site managers should consider the following:

- The contaminants, their concentrations, and total volume of IDW;
- Media potentially affected (e.g., ground water, soil) under management options;
- Location of the nearest population(s) and the likelihood and/or degree of site access;
- Potential exposures to workers; and
- Potential for environmental impacts.

---

[1] Management of treatability study and treatment pilot wastes is discussed in Guide for Conducting Treatability Studies Under CERCLA, Interim Final, December 1989, EPA/540/2-89/058. Information on management of IDW generated during Preliminary Assessments and Site Investigations is provided in Management of Investigation-Derived Waste During Site Investigations, May 1990, EPA/540/G-91/009.

As a general rule, it will be necessary to use best professional judgment, in light of the site-specific conditions, to determine whether an option is protective of human health and the environment. For example, a site manager may determine that storing IDW temporarily until the final action or returning IDW to its source is protective, based on knowledge that the material **poses** low risk and/or that the final action will address any risks posed by the wastes and there will be no unacceptable risks in the interim.

Alternatively, if the site includes or is near residential areas, the site is unsecured, and/or contaminants appear to be present at unacceptable levels, it may not be protective to return excavated soil to the source. Storing IDW in containers in an on-site, secure location, or sending it off site immediately may be more appropriate.

Site managers also need to consider the potential effects of IDW management-related activities on environmental media. For example, pouring contaminated purge water on the ground around a well may not be prudent, because such an action could mobilize any hazardous constituents present in the soil or introduce contaminants into clean soil.

Compliance with ARARs

Remedial Investigation/Feasibility Study (RI/FS) and Remedial Design (RD) actions must comply with ARARs "to the extent practicable, considering the exigencies of the situation" (NCP, 55 FR 8756, emphasis added); therefore, it generally will not be necessary to obtain a waiver if an ARAR cannot be attained during these actions. If a site manager determines that, based on site-

Highlight 1: IDW Management Options

Type of IDW	**Generation Processes**	**Management Options**
Soil	• Well/test pit installation • Borehole drilling • Soil sampling	• Return to boring, pit, or source immediately after generation • Spread around boring pit, or source within the AOC+ • Consolidate in a pit (within the AOC) • Send to on-site TDU+ • Send to TDU off site immediately • Store for future treatment and/or disposal
Sludges/sediment	• Sludge pit/sediment sampling	• Return to boring pit, or source immediately after generation • Send to on-site TDU • Send to TDU off site immediately • Store for future treatment and/or disposal
Aqueous liquids (ground water, surface water, drilling fluids, other wastewaters)	• Well installation/development • Well purging during sampling • Ground water discharge during pump tests • Surface water sampling	• Discharge to surface water • Pour onto ground close to well (non-hazardous waste) • Send to on-site TDU • Send to off-site commercial treatment unit • Send to POTW+ • Store for future treatment and/or disposal
Decontamination fluids	• Decontamination of PPE+ and equipment	• Send to on-site TDU • Evaporate (for small amounts of low contamination organic fluids) • Send to TDU off site immediately • Store for future treatment and/or disposal
Disposable PPE	• Sampling procedures or other on-site activities	• Send to on-site TDU • Place in on-site industrial dumpster • Send to TDU off site immediately • Store for future treatment and/or disposal

*The generation processes listed here are provided as examples. IDW may also be produced as a result of activities not listed here. +AOC: Area of Contamination (AOCs at a site may not yet have been identified at the time of the RI/FS); TDU: Treatment/disposal Unit; POTW: Publicly Owned Treatment Works; PPE Personal Protective Equipment specific factors, compliance with an ARAR is practicable but an ARAR waiver is warranted for an RI/FS or RD action, an interim action waiver may be available if the final remedy will attain the ARAR. An action memorandum should be prepared for the waiver, the state given an opportunity to comment, and the decision document placed in the administrative record.

Potential ARARs for IDW at CERCLA sites include regulations under the Resource Conservation and Recovery Act (RCRA) (including both Federal and State underground injection control (UIC) regulations), the Clean Water Act (CWA), the Clean Air Act (CAA), the Toxic Substances Control Act (TSCA), and other State environmental laws. How these various requirements may direct or influence IDW management decisions is described below.

Resource Conservation and Recovery Act (RCRA). Certain sections of the RCRA Subtitle C hazardous waste regulations (e.g., land disposal restrictions and storage restrictions) may be ARARs for IDW should RCRA hazardous waste be identified at a site. (Note that RCRA may be relevant and appropriate even if the IDW is not a RCRA hazardous waste.) A waste is hazardous under RCRA if it is <u>listed</u> as such in 40 CFR 261.31 - 261.33 or if it exhibits one of four <u>characteristics</u>: ignitability, corrosivity, reactivity, or toxicity.

Site managers should not assume that a waste considered to pose a potential risk at a CERCLA site is a listed or characteristic RCRA hazardous waste. Until there Is positive evidence (records, test results, other knowledge of waste properties) that the IDW Is a RCRA hazardous waste, site managers should manage it in a protective manner (but not necessarily In accordance with Subtitle C requirements). Business records or facility processes should be examined to determine whether RCRA listed wastes were generated and are present in the IDW. For characteristic wastes, site managers should rely on testing results or on knowledge of the material's properties. If best professional judgment and available information indicate that, for protectiveness reasons (or because RCRA requirements are relevant and appropriate), IDW is best managed as a "hazardous waste," management in accordance with Subtitle C requirements is prudent, regardless of whether it is known to be a RCRA waste.

If aqueous liquid IDW is considered a RCRA hazardous waste, the site manager should determine whether the Domestic Sewage Exclusion (DSE) applies to the discharge of that IDW to a POTW. The RCRA DSE exempts domestic sewage and any mixture of domestic sewage and other wastes that passes through a sewer system to a POTW for treatment from classification as a solid waste and, therefore, as a RCRA hazardous waste (40 CFR 261.4).

- <u>Land Disposal Restrictions</u>

If IDW is determined to be a RCRA hazardous waste and subject to the land disposal restrictions (LDRs), "land disposal" of the IDW will be prohibited unless specified treatment standards are met (see Superfund LDR Guides #5 and #7, <u>Determining When LDRs Are Applicable to CERCLA Response Actions</u> and <u>Determining When LDRs Are Relevant and Appropriate to CERCLA Response Actions</u> OSWER Directive 93473.05FS and 9347.3-08FS, June 1989 and December 1989 and the NCP, 55 FR 8759, March 8, 1990). "Land disposal" occurs when wastes from different AOCs are consolidated into one AOC; when wastes are moved outside an AOC (for treatment or storage) and returned to the same or a different AOC; or when wastes are excavated, placed in a separate hazardous waste management unit such as an incinerator or tank within the AOC, and then redeposited into the AOC.

Storing IDW In a container ("a portable device In which a material Is stored, transported, treated, disposed of, or otherwise handled" (40 CFR 260.10)) within the AOC and then returning it to Its source, however, Is allowable without meeting the specified LDR treatment standards. Under the definition of "hazardous waste management unit" (40 CFR 260.10), EPA states that "a container alone does not constitute a unit; the unit includes the containers and the land or pad upon which they are placed." Therefore, returning IDW that has been stored in containers (not tanks or other RCRA-regulated units) within the AOC to its source does not constitute land disposal, as long as containers are not managed in such a manner as to constitute a RCRA storage unit as defined in 40 CFR 260.10. In addition, sampling and direct replacement of wastes within an AOC do <u>not</u> constitute land disposal.

- <u>Storage</u>

Subtitle C outlines the storage requirements for RCRA hazardous wastes. Under RCRA, "storage" is defined as "the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere" (40 CFR 260.10).

On-site Superfund actions are only required to comply with the substantive standards of other laws (see 40 CFR 300.5, definitions of applicable or relevant and appropriate requirements). Superfund sites are also exempt from permit requirements under CERCLA §121(e). Therefore, site managers are not required to comply with administrative requirements triggered by RCRA storage deadlines (e.g., contingency planning, inspections, recordkeeping). Generally equivalent administrative activities are undertaken at Superfund sites, however, under existing Superfund management practices.

Site managers storing known RCRA hazardous waste must comply with the substantive, technical requirements of 40 CFR Parts 264 and 265 Subparts I (containers), J (tanks), and L (waste piles), to the extent practicable. (See Highlight 2 for a summary of these technical requirements for each type of unit). In addition, the ground-water monitoring requirements of 40 CFR Parts 264 and 265 Subpart F are potential ARARs, and to the extent they are determined to be ARARs at a site, they should be attained to the extent practicable (or waived). (In many cases, ground-water monitoring conducted during the RI/FS will provide protection equivalent to the Subpart F requirements.)

[NOTE: Under the LDRs, restricted RCRA hazardous waste may not be stored at a site unless the storage is solely for the purpose of accumulating sufficient quantities of the waste to facilitate proper disposal, treatment, or recovery (see 40 CFR 268.50). Generally, storing IDW until a final disposal option is selected in a Record of Decision (ROD) and Implemented during the remedial action is allowable storage under the RCRA LDR storage prohibition.]

- Recordkeeping and Manifesting

If hazardous wastes are sent off site, the site manager must comply with both administrative and substantive elements of the RCRA generator requirements of 40 CFR Pan 262 and LDR notification and certification requirements of Part 268. (For example, a site manager must prepare an LDR notification and certification when restricted wastes are sent off site to a land disposal facility.) These standards include requirements such as manifests for shipping waste that list all hazardous waste listing and characteristics applicable to the waste (see 40 CFR 262.11), packaging and transport requirements, and recordkeeping requirements.

If the LDRs are applicable, the following information should be collected and available before the removal of wastes to an off-site disposal facility: EPA hazardous waste number, LDR treatment standards, manifest number for the waste shipment, and waste analysis data.

Highlight 2:

Examples of RCRA Technical Storage Requirements

RCRA storage requirements, applicable to both less-than-90-days generators and permitted or interim status storage facilities, may include the following substantive requirements:

Containers 40 CFR 264 Subpart I and 265 Subpart I
- Containers must be in good condition
- Wastes must be compatible with containers
- Container must be closed during storage
- Container storage areas must have a containment system that can contain 10 percent of the volume of containers or of the largest container
- Spilled or leaked waste must be removed from the collection area as necessary to prevent overflow

Tanks 40 CFR 264 Subpart J and 265 Subpart J
- Tanks must have a secondary containment system that includes a liner, a vault, a double-walled tank, or an equivalent device (applies only to certain tanks)

Waste Piles 40 CFR 264 Subpart L and 265 Subpart L
- Waste piles must have a liner and a leachate collection and removal system
- Owners/operators must have a run-on control system to prevent flow on to the active portion of the pile during peak discharge from at least 25 year storm
- Owners/operators must have a run-off management system to collect and control at least the water volume resulting from a 24-hour, 25-year storm

- This is a partial list of substantive requirements. For more detail, see 40 CFR Part 264 and 265.

- Underground Injection Control (UIC) Program

Under the UIC regulations, RCRA hazardous wastes may be injected into Class I permitted wells. In some cases, hazardous liquids, such as extracted ground water from pump and treat operations, may be injected into a Class IV

UIC well. For example, ground water contaminated with RCRA hazardous wastes may be injected into Class IV permitted wells if it is part of a CERCLA response action or a RCRA corrective action and if it has been treated to 'substantially reduce hazardous constituents prior to such injection..." (RCRA § 3020(b)). (See Applicability of Land Disposal Restrictions to RCRA and CERCLA Ground Water Treatment Reinjection OSWER Directive #9234,1-06, December 1989.)

- Non-RCRA Hazardous Wastes

Some non-RCRA hazardous waste may be subject to management requirements under Subtitle D of RCRA as solid wastes. Subtitle D regulates disposal of solid waste in facilities such as municipal landfills. Therefore, non-RCRA hazardous IDW, such as decontaminated PPE or equipment, may need to be disposed of in a Subtitle D facility (depending on State requirements).

Clean Water Act (CWA). Discharges of aqueous IDW to surface water and publicly owned treatment works (POTWs) may be required to comply with CWA Federal, State, and local requirements. Requirements to be met may include water quality criteria, pre-treatment standards, State water quality standards, and NPDES permit conditions. Direct discharges to on-site waters are subject only to substantive requirements, while discharges to POTWs and other off-site discharges must comply with both a substantive and administrative CWA requirements (including Permitting requirements). (See Guide to Discharging CERCLA Aqueous Wastes to POTWs. June 1991 and CERCLA Compliance with the CWA and SDWA, #9234.2-06FS, January 1991.)

Toxic Substances Control Act (TSCA). If IDW contains PCBs, TSCA treatment and/or disposal requirements may apply during its management TSCA requirements regulate the disposal of material contaminated with PCBs at concentrations of 50 ppm or greater as found on site (i.e., based on sample analysis and not the PCB concentration of the source material {e.g., transformer fluid}). (See PCB Guidance Manual, EPA/540/G-90/007, August 1990.) In addition, TSCA storage requirements may apply that limit the time that PCBs may be stored to one year. Furthermore, if PCB materials are mixed with a RCRA hazardous waste, they may be regulated by the LDR California list prohibitions. (See RCRA sections 3004(d)(2)(D) and (E).)

Department of Transportation (DOT) requirements. Where IDW will be disposed of off site or transported on public roads to a site, DOT requirements for containerizing, labeling, and transporting hazardous materials and substances may apply.

State requirements. Promulgated State regulations that are legally enforceable, timely identified, and more stringent than Federal regulations may be potential ARARs for IDW managed on site. Substantive requirements of State law that may be ARARs for IDW management include State water quality standards, direct discharge limits and RCRA requirements (including underground injection control regulations) promulgated m a State with an authorized RCRA hazardous waste management program (as well as programs authorized by State laws). Off-site, substantive and administrative requirements of State law may apply.

Off-Site Policy. In addition to complying with requirements of Federal and State laws all off-site disposal of wastes must comply with CERCLA section 121(d)(3) and the CERCLA Off-Site Policy (OSWER Directive No.9834.11 (November 13, 1987)). The Off-Site Policy establishes criteria for selecting an appropriate treatment, storage, or disposal facility (TSDF), including release criteria for all facilities that receive wastes from CERCL A authorized or funded response actions. In addition, receiving facilities must be in compliance with all "applicable laws."

Before shipping wastes off site, approval should be obtained for the proposed disposal facility from EPA's Regional Off-Site Policy Coordinator. In addition, EPA has adopted a policy for Superfund wastes shipped out of State that written notification should be provided to receiving States (OSWER Directive 9330.2-07, September 14, 1989).

GENERAL OBJECTIVES FOR IDW MANAGEMENT

In addition to the two requirements of protectiveness and compliance with ARARs to the extent practicable (on site) or compliance with applicable law (off site), EPA has identified two general objectives that Superfund site managers should consider when managing IDW: (1) minimization of IDW generation; and (2) management of IDW consistent with the final remedy for the site. The extent to which these objectives can be achieved is highly dependent on site-specific circumstances.

IDW Minimization

Site managers should strive to minimize the generation of IDW to reduce the need for special storage or disposal requirements that may result in substantial additional costs yet provide little or no reduction in site risks relative to the final remedial action. Generation of IDW can be minimized through proper planning of all remedial activities that may generate IDW, as well as through use of screening information from the site inspection. The potential problems of managing IDW should be a factor in choosing an investigative method. Site managers may wish to consider techniques such as replacing solvent-based cleaners with aqueous based cleaners for decontamination of equipment, reuse of equipment (where it can be decontaminated), limitation of traffic between clean and hot zones and drilling methods and sampling techniques that generate little waste. Examples of such techniques include using gridding techniques to minimize the number of test pits or using soil boring instead of test pits. Alternative drilling and subsurface sampling methods may include the use of small diameter boreholes, as well as borehole testing methods such as a core penetrometer instead of coring. Site managers should also be careful to keep hazardous wastes separate from nonhazardous wastes.

Management Consistent with Final Remedy

Most IDW (with the exception of non-indigenous IDW) generated during the course of an investigation are intrinsic elements of the site. If possible, IDW should be considered part of the site and should be managed with other wastes from the site, consistent with the final remedy. This will avoid the need for separate treatment and/or disposal arrangements.

Because early planning for IDW management can prevent unnecessary costs and the use of treatment or disposal capacity, IDW management should be considered as early as possible during the remedial process. A key decision to be made is whether the waste will best be treated/disposed of immediately or addressed with the final remedy. If addressed with the final remedy, IDW volumes should be considered in the FS. In addition, when IDW is stored on site, it should be managed as part of the first remedial action/operable unit that addresses the affected media.

SELECTION OF IDW DISPOSAL OPTIONS

The following sections present the Agency's presumptions for IDW management that have been established based on the above considerations. The actual option selected should be based upon best professional judgment and should take into account the following factors:

- The type and quantity of IDW generated (sludge/soil, aqueous liquid, non-indigenous IDW);
- Risk posed by managing the IDW on site (e.g., based on site access controls, contaminant concentrations);
- Compliance with ARARs, to the extent practicable (on site);
- IDW minimization; and
- Whether the final remedy is anticipated to be an off-site or on-site remedy (or this information is unknown) and whether IDW can be managed consistent with the final remedy.

Off-site Final Remedies

If a site manager believes that the final remedy will involve off-site disposal of wastes, EPA's presumption is to manage the IDW as part of the remedial action addressing the waste/medium. Thus, until the final action, the IDW may be stored (e.g., drummed, covered waste pile) or returned to its source. However, the management option selected should also take into account any protectiveness concerns, ARARs, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

There are several potential reasons why it may be advisable to store IDW until the final action. First, because wastes at the site will be shipped off site eventually, returning IDW (especially sludges and soil) to its source would require that it be excavated again. Thus, site managers may consider it practical to containerize IDW as soon as it is generated. Second, storing IDW in containers may be more protective than returning it to its source. Third, because off-site actions may trigger such requirements as the LDRs, temporary storage will eliminate the need to meet these additional requirements until the final remedy.

In some cases, circumstances may lead site managers to choose to return the IDW to its source. This may be appropriate if it is determined that returning IDW to the source is protective and that storage at the site is not possible or practicable (i.e., given State or community concerns). In other cases, long-term storage may not be protective, and immediate off-site disposal may be a better option.

> Example: A site involves volatile organic RCRA hazardous wastes that will likely be sent off site for final treatment and disposal. Site conditions are such that temporary storage of IDW is considered protective until the remedial action begins. Because off-site disposal will trigger RCRA disposal requirements such as the LDRs and immediate containerization would be more protective than redepositing into the source area at the time of sampling, the site manager decides to containerize the IDW (and comply with RCRA substantive technical tank and container standards) until the final action is initiated.

On-site Final Remedies (or Final Management in an Unknown Location)

When final management of wastes is likely to occur on site, the management presumptions vary depending on the type of IDW produced.

Sludge/soil

Generally, the Agency expects sludge or soil IDW will be returned to its source if short-term protectiveness is not an issue. The reason behind this presumption is that IDW that may pose a risk to human health and the environment in the long term will be addressed by the final action. Storage of RCRA hazardous IDW in container-s within the AOC prior to returning It to the source will not trigger the LDRs as long as the containers are not managed In such a way as to constitute a RCRA storage unit as defined in 40 CFR 260.10. Therefore, it may be possible to store IDW temporarily before redisposing of it. However, EPA believes that, in many cases, returning sludges and soils to their source immediately will be protective and will avoid potentially increased costs and requirements associated with storage. Site-specific decisions on how to manage sludge and soil IDW may ultimately vary from the presumption based on protectiveness, ARARs, and/or community concerns.

<u>Example 1</u>: The soil at a site contains wastes that are expected to be stabilized on site during the final remedial action. The site manager determines that sending soil IDW off site is not cost-effective, because off-site disposal would involve testing and transport costs for a relatively small amount of waste. Instead, knowing that the site is secure and that redisposing the waste at the source will not increase site risk or violate ARARs, the site manager decides to return soil IDW to the source area from which it originated.

<u>Example 2</u>: A site manager determines that returning highly contaminated PCB wastes to the ground at a site is not protective because of the potential risks associated with the material; instead, the site manager chooses to drum the waste and send it off site (in compliance with TSCA). (Off-site disposal may occur immediately or at a later date.)

<u>Example 3</u>: Soil IDW contaminated with a RCRA hazardous waste is generated from a soil boring. The site manager decides to put the IDW back into the borehole immediately after generation, but ensures that site risks will not be increased (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate "clean" areas) and that the contamination will be addressed in the final remedy.

Aqueous liquids

EPA has not established a presumption for the management of aqueous liquid IDW (e.g., ground water). Site managers should determine the most appropriate disposal option for aqueous liquids on a site-specific basis. Parameters to consider, especially in making the protectiveness decision, include the volume of IDW, the contaminants present in the ground water, the presence of contaminants in the soil at the site, whether the ground or surface water is a drinking water supply, and whether the ground-water plume is contained or moving. Special disposal/handling may be needed for drilling fluids because they may contain significant solid components. Examples of aqueous liquid management decisions considering these factors are presented in the following box.

Example 1: A site manager has large volumes of ground water IDW and does not know if it is contaminated. Pouring this IDW on the ground would not be protective, because it may contaminate previously uncontaminated soil or may mobilize contaminants that are present in the soil. Therefore, the site manager stores the water in a mobile tank until a determination is made as to whether the water and soil are contaminated or until the final action.

Example 2: IDW is generated from the sampling of background, upgradient wells. Because there are no community concerns or evidence of any soil contamination from other sources, the site manager decides to pour this presumably uncontaminated IDW on the pound around the well.

Example 3: Purge water from a deep aquifer is known to be contaminated with a RCRA hazardous waste. At this site, if this water were poured on the pound, it could contaminate a previously uncontaminated shallow aquifer that is a potential drinking water source and would have to comply with the LDRs. The site manager decides to containerize the water within the AOC and store it until the final remedy.

Non-indigenous IDW

Non-indigenous IDW (e.g., sampling materials, disposable PPE, decontamination fluids) should be stored until the final remedy or disposed of immediately. If contaminated, such waste may not be disposed of onto the ground because such an action would add contamination that was not present when activities began at the site (e.g., solvents used for decontamination). If non-indigenous IDW is contaminated with RCRA hazardous waste, it must be managed in accordance with RCRA Subtitle C requirements. Otherwise, site managers may generally dispose of it in an on-site dumpster (for PPE).

Example 1: Disposable PPE (e.g, gloves, shoe covers) becomes contaminated with RCRA hazardous waste during the field investigation. The site manager containerizes and disposes of this IDW in compliance with RCRA Subtitle C requirements.

Example 2: Disposable equipment becomes contaminated during a field investigation. The site manager decontaminates them and sends them to a Subtitle D facility.

COMMUNITY CONCERNS

Residents of communities near a CERCLA site, local governments or States may have concerns about certain disposal methods or long-term storage of IDW at the site. As with all CERCLA activities, site managers should evaluate community concerns regarding disposal of IDW in deciding what action to take. For example, if a community is concerned about the direct discharge of IDW water to surface water on site, site managers may want to consider sending the water to a POTW, if one is located nearby. In some instances, it may be appropriate to prepare fact sheets include options in other community relations documents or explain IDW management decisions at public meeting prior to actions.

NOTICE: The policies set out in this memorandum are not final agency action, but are intended solely a guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this memorandum, or to act at variance with the guidance, based on an analysis of specific site circumstances. The Agency also reserves the right to change this guidance any time without public notice.

ATTACHMENT 2

SAMPLING AND TESTING OF INVESTIGATIVE WASTES

During the installation of monitoring wells and soil borings the amount of waste material generated in the form of drilling fluids and soil cuttings should be minimized. Waste materials generated from these activities will require containerization and sampling in order to determine proper disposal or treatment options. The following is a discussion of ways to not only minimize the amount of materials accumulated and thereby minimize the number of samples which have to be collected and analyzed, but also how to sample these wastes in order to best obtain representative results.

An attempt should be made to identify the exact depth within the formation where the soil cuttings originated or, in the case of drilling fluids, were in contact with the formation, if possible. When borings are extended into or below the water table it is advisable to segregate materials from a point approximately 10 feet above the top of the water table from those collected below the water table. In that way you can potentially minimize the amount of materials which may need to be sampled and characterized because they were in contact with contaminated groundwater.

When drilling off-site, or away from the area where a release occurred, an assumption can be made that soils above the water table do not contain contaminants, and therefore do not need to be containerized or sampled. This may not be true in those situations where soil gas migration may have carried contaminants off-site to adjacent properties. Field screening equipment, such as an OVM or PID, can be used to help isolate contaminated materials from `clean' soils and cuttings for the contaminants in question, when appropriate.

Materials collected as the result of drilling or soil boring activities which require containerization should be collected and stored in 55 gallon drums, roll-off containers, or similar containers which can be closed or covered watertight and are compatible with the wastes being stored in them. These drums or containers should be marked such that they can be clearly identified as to the exact location and depths the materials came from. These drums or containers should also be stored in a secured location, if possible, and labeled as special waste materials until an exact determination can be made.

If soil samples are being analyzed from a soil boring or well location, the results from those analyses must be directly tied back to the material collected and the container it was placed in. In certain cases, you may be analyzing specific samples based upon elevated readings from field screening devices. This is why very precise labeling and identification of containers is necessary. Should the samples be too widely distributed or should you be unable to field screen for elevated readings, such as with pesticide contamination, all samples will need to be analyzed for the contaminants of concern.

Samples should be taken such that they are representative of the waste material to be analyzed. For material stored in 55 gallon drums, if field readings do not detect a hot spot or area from the boring, a representative sample should be collected for every 5-55 gallon drums or portion thereof. This sample should be a discrete sample taken from approximately the middle of one of the 5 drums. If the drum contains both liquid and solid fractions, these should be sampled and analyzed separately. This assumes that soil formations for the material collected in the 5 drums are consistent in their unified soil classification system (USCS) rating and there was no visual or other indications of contamination present. Where visual observations or field readings detect elevated readings, the sample should be collected from that depth or from the container where those specific materials were placed. Standard sampling methods and procedures should be followed to ensure that the results are representative of the materials in question.

If materials are being stored in a large container, such as a covered rolloff, a minimum of two samples should be collected from opposite ends of the soil pile. Two additional samples should be collected for every additional 100 cubic yards of material being collected and stored. These should be discrete samples and should be taken from at least 18 inches below the surface of the soil pile. An attempt should be made to identify those areas of a soil pile which may contain elevated concentrations or hot spots and these areas should be segregated out and sampled individually.

Liquids collected as part of well installation or development should be segregated from soils as much as possible. If the area is served by a sanitary sewerage system, permission should be obtained from it's operator as well as the local District wastewater engineer for permission to directly discharge these liquids into that system. In most cases an analysis of the liquids will be required by the sewage treatment plant if information is not available on what contaminants are present.

All analyses should be performed using a method listed in EPA SW-846 designed to detect the target compounds. The method chosen should be one which gives an acceptable detection limit and will allow for characterization of the materials as hazardous or non-hazardous waste. Based upon these results, a determination will need to be made as to proper disposal or treatment options.

ATTACHMENT 3

LONG-TERM ON-SITE STORAGE OF INVESTIGATIVE WASTES (IW)

General

Storage of IW should be in above ground tanks or containers. Examples of tanks include large metal or fiberglass tanks and trailer tanks for hauling liquids on roads. Examples of containers are 55-gallon drums, rolloff boxes (also called "luggers") and U. S. DOT approved boxes for solids. Storage should not be in underground tanks, in-ground pits, surface impoundments, trenches or lagoons. The tanks or containers should be water tight and compatible with the IW being stored. Permanent labels that indicate the source of the wastes and their descriptions should be attached to all containers.

Containers or tanks should be stored in area with limited access, such as a fenced area or a building. If vandalism is a potential concern, consideration should be given to storing the IW in a building. Temporary buildings can be constructed for this purpose. For liquids, and especially highly contaminated liquids, consideration should be given to providing secondary containment for spills and leaks in accordance with the hazardous waste regulations (see below). For outdoor secondary containment, precipitation run on and run off control should be provided in accordance with those regulations.

Stored IW should be periodically inspected, with records kept. Deteriorating containers or tanks should be immediately replaced. Deteriorating 55-gallon drums can be overpacked. If a container label has deteriorated, it should also be replaced.

Hazardous IW Storage

Storage of hazardous IW should be in accordance with the Hazardous Waste Program regulation technical standards. The standards for containers are outlined in ss. NR 640.08 - 640.15. The standards for tanks are outlined in ss. NR 645.08 - 645.15.

Field Measurement of Turbidity

FIELD MEASUREMENT OF TURBIDITY

Scope: The following SOP outlines the technique required for the accurate field measurement of turbidity using the LaMotte 2020 Turbidity meter (or comparable unit).

Equipment:
LaMotte 2020 turbidity meter (or comparable unit)
Turbidity Standards
Distilled or Deionized Water
Field Logbook and Sample Field Parameter Data Sheet

Important Note: Instrument should be thoroughly checked for proper operation prior to use. This should include checking and adjusting all internal calibrations.

Procedure:

Standardization of the meter for turbidity measurements should be done prior to taking the instrument into the field. Meter should be calibrated daily prior to use in accordance with the manufacturers specifications. Details of all calibration checks should be logged in the field logbook.

Water samples collected from approximately the midpoint of the water column will be placed into the vial provided with the meter (the vial will be rinsed with distilled water between samples). See SOP #P221-1 for water sampling procedures. The vial will then be placed in the turbidity meter and a measurement will be collected once the reading on the meter has stabilized.

Resulting TSS values will be determined from a correlation chart (Turbidity vs. TSS) established prior to commencement of dredging activities. The TSS and turbidity values will be recorded in the Field Log Book and any required action by dredging contractor as result will be noted.

Note: An internal meter calibration must be performed whenever the check standards meter readings vary by more than 10 percent of their stated values.

Accuracy:

The accuracy of the field measurement and calibration will be checked using commercially available, certified check standards. The turbidity measurement should be within 10 percent of the check standard. If the measured value is outside of this range, the instrument will be checked for proper operations and calibration followed by re-analyses of the check standard. If the measured value is still outside the acceptable limits, the instrument will be replaced with a duplicate or comparable instrument.

Dredge Dewatered Material (DDM) Disposal Sampling

DDM DISPOSAL SAMPLING PROTOCOLS

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements for procedures to collect dredged dewatered material disposal samples. The general procedures to be utilized in obtaining samples from the river are outlined below.

Grab samples will be collected with a Hand Corer at five locations (sample ports) within a Geotube (approximately 1000 cubic yards) and composited to provide a single result.

Health and Safety:

- Refer to Health & Safety Plan.
- Gloves and (or PPE) should be worn while collecting and processing samples.

Personnel Qualifications:

- Personnel may need to be certified under OSHA regulations.
- Individuals should be familiar with the use of sampling equipment.

Apparatus and Materials:

- Hand Corer
- Gloves
- Personal Protective Equipment
- Cooler and ice
- Stainless Steel Mixing pan
- Chest waders
- Stainless Stell spoons
- Sample tags and/or labels
- Sample containers
- Chain-of-Custody forms
- Paper towels
- Water Proof Marker
- Logbook

Sampling Procedure:

1. Identify the proposed sample location in the field notebook along with other appropriate information.

2. Don personal protective equipment as required by the Site Health and Safety Plan.

3. Decontaminate the non-dedicated cores and all sampling utensils following the procedures addressed in Equipment Decontamination SOP.

4. Drive the sampling equipment into each of the 5 determined locations (sample ports) along the Geotube. Push the core/tube into the dewatered sediment until tube has reached the bottom of tube.

5. Slowly pull the core from the sediment.

6. Deposit the core into the stainless steel mixing bowl to create a composite sample.

8. Record sediment characteristics in the field log book.

8. Repeat the above procedures until all core samples are collected for the composite sample.

9. Mix the sediment with a clean spoon thoroughly or until visually homogeneous. During this operation, remove any obviously "non-sediment" objects from the sample; bottle caps, broken glass, sticks, large rocks, etc. (Buckets and spoons are pre-cleaned according to decontamination protocols.)

10. Label all sample containers and record all appropriate information in the field notebook.

12. Handle, pack and ship the samples in accordance with the procedures in QAPP and SOP #P1-1.

Discharge Water Sampling

DISCHARGE WATER SAMPLING PROTOCOLS

Scope: The following sections present surface water sampling protocols.

Equipment:

The following shall be considered prior to surface water sampling:

1) Review the work program, project documents, and the health and safety requirements.

2) Assemble all equipment (ISCD sampler) and supplies.

3) Contact the laboratory and arrange for the following:

   - glassware;
   - coolers;
   - shipping details; and
   - starting date

4) Inform the appropriate regulatory groups, Client personnel, landowner, PRS personnel, and laboratory of the pending sample events.

Procedure:

Once the prior planning and preparation activities are completed, discharge water sampling can proceed at the outfall of the Waste Water Treatment Plant (WWTP). Quality Control samples will be collected in accordance with the QAPP. Discharge water samples will be collected per the requirements of the WPDES permit.

Samples will be collected at the outfall of the water treatment system with an ISCD sampler at a frequency determined by the requirements of the WPDES permit.

1) Sample Collection Analysis Parameters

   PCBs, TSS, and any other requirements of the WPDES determined by the WDNR.

2) Sample Acquisition and Transfer

   Samples collected for other parameters will be collected in the jars prescribed in the QAPP.

   All samples must be labeled in accordance with the Chain-of-Custody and Labeling SOP as well with the Sample Identification for the Sheboygan River Project SOP.

3) Handle, pack, and ship samples in accordance with the QAPP and SOP #P1-1.

Follow-up activities:

The following shall be performed once field activities are complete.

1) Double check Work Plan to ensure all samples have been collected.
2) Equipment shall be cleaned and returned to the office or vendor.
3) Notify the contract laboratory as to when to expect the samples. The chain-of-custody indicating the parameters and number of samples shall be enclosed in the sample cooler.

Decontamination of Sampling Equipment

DECONTAMINATION OF SAMPLING EQUIPMENT

Scope: The following standard operating procedure details the method of decontaminating non-dedicated sampling equipment used to collect/composite soil and/or sediment samples, surface water samples, and discharge water samples. It should be noted that this SOP is a minimal operating procedure. Certain sampling projects may require additional procedures; however these projects are atypical and shall be addressed in a project specific manner. Should non-dedicated sample equipment be covered with oily materials, they will placed in an appropriate storage container (e.g. 55-gallon drum) pending characterization and disposal.

Equipment:
Three stainless steel bowls
Scrubbing brushes
Alconox or other detergent
Distilled water
Spray bottles
Nitrile Gloves
Clean water source (if available)

Procedure:

1. Don a pair of clean disposable nitrile gloves.
2. Scrape or rub off any excessive material from the equipment.
3. Scrub equipment in stainless steel bowl containing potable water or distilled water.
4. Scrub equipment in stainless steel bowl containing soapy (Alconox) potable or distilled water.
5. Rinse in stainless steel bowl containing potable or distilled water.
6. Spray with distilled water.
7. Allow to air dry as permittable.

The water source shall either be tested "clean" or from a potable water source. Upon completion of decontamination activities place all decontamination fluids into the sump of the water treatment system for processing.

Decontamination of Heavy Equipment

DECONTAMINATION OF HEAVY EQUIPMENT

Procedure:

The following cleaning procedures are applicable to most programs requiring heavy equipment decontamination:

1) Prior to initiating any excavation or other soil/sediment handling activities, identify area where decontamination will take place. If the work area is likely to contain elevated concentrations of contaminants, the cleaning water will need to be contained pending appropriate treatment. Containment methods shall be site specific, but shall be designed in order to assure that potential contaminants do not adversely affect the site.

2) Remove by hand (i.e., shovel, bar, scraper) excess visible dirt and debris from the equipment paying particular attention to track, cleats, tires, and other irregular surfaces.

3) Clean the equipment using power washer or steam generator capable of producing sufficient water pressure to remove materials from the equipment.

4) If necessary, clean/scrub the equipment with water and natural soap (biodegradable-phosphate free, i.e., Alconox or equivalent) solution.

5) If necessary, final rinse of equipment with power washer or steam generator.

6) If necessary, collect wash and rinse water pending appropriate treatment.

Completion of Field Logbook

COMPLETION OF FIELD LOGBOOK

Scope: The following SOP is to be used as a guideline when recording activities on any jobsite. The primary purpose of recording data in the field logbook is to create a record by which anyone can reconstruct the field activity without reliance on the recorder's memory. The field logbook will become part of the final evidence file. The field logbook will be bound and will contain pre-numbered pages.

Equipment: Field Logbook for Site Activity
Calculator
Waterproof Ink Pen
Watch (for time of day)

Procedure:

1. All information pertinent to the field activity or sampling event must be recorded in a bound field logbook using the waterproof ink pen. If the ink pen does not function at the time of entry, note the malfunction as reason for using some other method (i.e., pencil, etc.). The title page of the logbook will include the following (at a minimum):

   a) Person to whom the logbook is assigned
   b) Logbook number.
   c) Project name.
   d) Project start date.
   e) Project end date.

At the beginning of each entry, the date, start time, weather, names of all project personnel present, and the level of personal protective equipment (PPE) being used will be documented. In addition, the entries in the logbook must include the following (at a minimum):

   a) Time of each entry (24-hour clock).
   b) Project personnel on jobsite.
   c) Objective/purpose for activity.
   d) Name, address and telephone number of field contact.
   e) References, such as maps or photographs of the study site.
   f) Field observations.
   g) Description of any field methods to be used for the site activities.
   h) Personnel and equipment decontamination procedures.
   i) Signatures of personnel responsible for observations.
   j) Name of visitors and reason for visit.

2. In addition to the items listed above, the following information will be included in the field notes portion of the logbook.

a) Type, volume and number of samples collected (include information on the depth of samples collected).
b) Sample location and identification number.
c) Sampling method, (note deviations from the work plan or the SOPs).
d) Sample handling, packaging, labeling and shipping information, including destination.
e) Diagrams of RMU to identify poling thickness and sampling locations as shown in the Verification Sampling Plan.

3. The field notes portion of the logbook should be completed in a sequential, chronological order. No blank pages should be found within the daily notes section of the logbook. Data changes or errors within the field logbook should be corrected by placing a single line through the data, followed by the recorders initials, followed by the correction.

4. The field logbook should be kept in a secure place during the field activities (i.e., in hand, within visual site, locked in field vehicle, etc.). Upon completion of the activity, the field logbook should be checked for completeness and a copy of the completed logbook will be made. The copy of the logbook will be stored as part of the project files. The original field logbook will become part of the final evidence file.

Chain-of-Custody, Labeling, Packaging and Sampling

CHAIN-OF-CUSTODY, LABELING, PACKAGING AND SHIPPING

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements that provide the ability to trace possession and handling of samples from time of collection through transportation to the laboratory for analysis and final disposition of the data.

Equipment:
Sample Labels
Chain-of-Custody Record
Waterproof Ink Pen
Sample Containers
Packaging tape
Packaging materials (e.g. bubble wrap)
Ice

Definition:

Samples are considered to be in a person's custody if they are:

1. In a person's physical possession.
2. In view of a person after taking possession.
3. Secured by that person so that no one can tamper with it, or secured by that person in an area that is restricted to authorized personnel.

Procedure:

1. Sample labels are necessary to prevent misidentification of samples. Sample labels must include the following information:

    a) Project name.
    b) Date of collection.
    c) Time of collection.
    d) Sample identification: as specified in the Sample Identification SOP
    e) Location.
    f) Analysis.
    g) Sampler's initials.

    Labels should be securely affixed to sample containers prior to or at the time of collection.

2. Pertinent sampling activities will be recorded in the field notebook. In the sequential portion of the notebook, the following information will be recorded:

    a) Sample identification, location and number.
    b) Type and number of samples.
    c) Reference to the particular sample location.

d) Date and Time of sampling.

3. Upon completion of sample collection, a chain-of-custody record will be completed and will accompany the sample-shipment container to the laboratory. If more than one sample-shipment container is used, a separate chain-of-custody form should be completed for each container. An example of a completed chain-of-custody form is included in Appendix B of the QAPP.

4. The chain-of-custody record will include the following information:

   a) Project name.
   b) Sampler's signature.
   c) Unique sample identification.
   d) Date and time of collection.
   e) Composite or grab sample designation.
   f) Sample location or description.
   g) Number of containers.
   h) Indication of analytical parameters to be performed (including analytical method and preservation if any).
   i) Remarks, if necessary.
   j) Signature of persons involved in the chain of possession.

5. Upon completion of a Chain-of-Custody Record, it will be placed in a re-sealable plastic bag and placed inside the sample-shipment container (cooler).

6. Using bubble packing or styrofoam sheets, securely wrap samples and arrange in the shipping cooler in such a way as to minimize the chance for breakage during shipment. Place a layer of ice over the samples and wrap cooler securely with strapping tape for shipment by common carrier.

7. A chain-of-custody seal will be placed on each cooler. Each seal will be marked with the shipping date and samplers initials and will be placed such that it will be separated upon opening of the cooler. A piece of clear tape will be placed over the custody to ensure it remains in place during transport.

8. Samples should be delivered to the laboratory for analysis as soon as possible. The samples must be delivered to the person in the laboratory authorized to receive samples.

9. There are three routes through which samples reach the laboratory, including:

   a) Personnel who collected samples deliver them to the laboratory directly.
   b) Personnel who collected samples deliver them to the PRS site office and a laboratory representative will come to the PRS office to pick them up.

c) Personnel delivers samples to a common carrier; i.e., UPS, Federal Express, etc. to be shipped to the laboratory. In this case, the Bill of Lading number becomes part of the chain-of-custody documentation.

The actual chain-of-custody document contains three separate copies. These will be distributed as follows:

Yellow Copy	retained by lab for their records.
Pink Copy	kept by sampling personnel and retained in the project file.
White Copy	returned to PRS project personnel with the analysis data package and retained in the project file.

Air Monitoring for PCBs

AIR MONITORING FOR PCBS

Scope: The following procedures are applicable to monitoring the air during activities that may generate high levels of potentially PCB impacted dust.

Location: Air monitoring for PCBs will occur in the load-out area for the dewatered dredge material. This is the only area where media is present that is sufficiently dry to become airborne. Initially, baseline air samples will be collected at two locations near this area to establish background levels. The samples would be collected prior to media being brought to the area. When load-out begins, samples will be collected at two locations in the immediate vicinity of the work.

Samples will be collected within the breathing zone by the typical worker in the area. If that worker will be in a cab of a truck, loader, or other equipment, the sample should be collected at that height. Otherwise, the sample should be collected at a height of five feet above ground surface.

Frequency: Two baseline PCB air samples will be collected in the load-out area prior to load-out of the dewatered dredge material. The samples should be collected on separate days. Two air samples will be collected the first week of load-out activities. If load-out activities occur from more than one location, each location will be similarly monitored. SAMPLING SHOULD NOT BE CONDUCTED DURING A RAINFALL EVENT.

Procedure:

1) Obtain the following supplies: one (1) air personal air sampling pump, one (1) low-flow tube holder, flexible Tygon tubing (supplied with pump), one (1) air flow calibrator, one (1) tube breaker, and two (2)filters (13-mm glass fiber with florisil). The laboratory will supply these materials

2) Calibrate the flow meter according to manufacturer's instructions. Using the tube breaker, break off both ends of one tube to provide an opening of at least one-half the internal diameter. Connect the filter tube to the low flow holder which in turn is connected to the pump using the Tygon tubing. The filter tube should be mounted in the direction indicated on the tube. Connect the sampling train to the calibrator, turn on the pump, and adjust the low flow holder until the calibration flowmeter reads the flow desired. For sampling during a normal work day, select a flow of approximately 100 ml/min. Record the results in the log book. Discard the sampling tube.

3) Using the tube breaker, break off both ends of the second filter tube to provide an opening of at least one-half the internal diameter. Place the filter tube on the pump, mount the pump/tube assembly in the appropriate location, and turn on the pump. Record the beginning time in the log book. Note the weather conditions in the log book.

4) At the end of the day (pump should run a minimum of 6 hours), turn off the pump, and remove the filter tube. Place provided caps, if any, on each tube and the place in glass vial (if provided). Please note, some laboratories use caps only while others use glass vials. Record the time sampling ended in the log-book and the daily weather conditions. Provide a summary of the flow rates, beginning time and end time to the <u>Field Team Leader who should ensure the Health and Safety Officer receives the data.</u>

5) Ship the sample to the laboratory under proper chain-of-custody documentation.

Surface Water Sampling

SURFACE WATER SAMPLING PROTOCOLS

Scope:

The following sections present surface water sampling protocols.

Equipment:

The following shall be considered prior to surface water sampling:

1) Review the work program, project documents, and the health and safety requirements.

2) Assemble all equipment and supplies.

3) Contact the laboratory and arrange for the following:

   - glassware;
   - coolers;
   - shipping details; and
   - starting date

4) Inform the appropriate regulatory groups, Client personnel, landowner, PRS personnel, and laboratory of the pending sample events.

Procedure:

Once the prior planning and preparation activities are completed, surface water sampling can proceed at the respective location(s). Quality Control samples will be collected in accordance with the QAPP. Surface water samples will be collected as grab samples and may be collected by reaching into the water, wading into the water, or from a boat. Initially, a grab sample will be collected and measured in the field for turbidity (see the Field Measurement of Turbidity SOP).

Grab samples will be collected by placing jars with lid on into the stream at approximately the midpoint of the water column, removing lid to allow jar to fill, and placing lid back on when full.

Note: Sampling should progress in an upstream direction should multiple samples be collected. Samples should be collected upstream from where the sampler is standing in order to avoid any potential sediment disturbance caused by the sampler.

1) Sample Collection Analysis Parameters

   - PCBs

2) Sample Acquisition and Transfer

   Samples collected for other parameters will be collected in the jars prescribed in the QAPP. Samples will be handled, pack, and shipped in accordance with the QAPP and SOP #P1-1.

   All samples must be labeled in accordance with the Chain-of-Custody and Labeling SOP as well with the Sample Identification for the Sheboygan River Project SOP.

Follow-up activities:

The following shall be performed once field activities are complete.

1) Double check Work Plan to ensure all samples have been collected.
2) Equipment shall be cleaned and returned to the office or vendor.
3) Notify the contract laboratory as to when to expect the samples. The chain-of-custody indicating the parameters and number of samples shall be enclosed in the sample cooler.

Appendix B

Field Forms

State of Wisconsin
Department of Natural Resources

CHAIN OF CUSTODY RECORD

Form 4100-145 7-87

Sample Collector(s)	Title/Work Station	Telephone No. (include area code)
Property Owner	Property Address	Telephone No. (include area code)

Split Samples: Offered? ☐ Yes ☐ No (Check One)
Accepted? ☐ Yes ☐ No (Check One) Accepted By: ______________________
Signature

Field ID No.	Date	Time	Sample Type Comp	Sample Type Grab	Station Location Sample Description	Lab ID Number	No. of Containers	Comments

I hereby certify that I received, properly handled, and disposed of these samples as noted below:

Relinquished By (Signature)	Date/Time	Received by: (Signature)
Relinquished By (Signature)	Date/Time	Received by: (Signature)
Relinquished By (Signature)	Date/Time	Received for Laboratory By: (Signature)

Disposition of Unused Portion of Sample:

Dispose ________ Retain for ________ days

Return ________ Other ________

Company Name		20000197
Sample ID		
Project	Sample Date	Sample Time
Bottle Desc. Plastic 1000mL Oblong, HDPE		
Preservatives: HNO3		Filtered ___ Unfiltered X
Analysis Requested Comments Metals		

STL

SEVERN TRENT

489814

Custody Seal

DATE

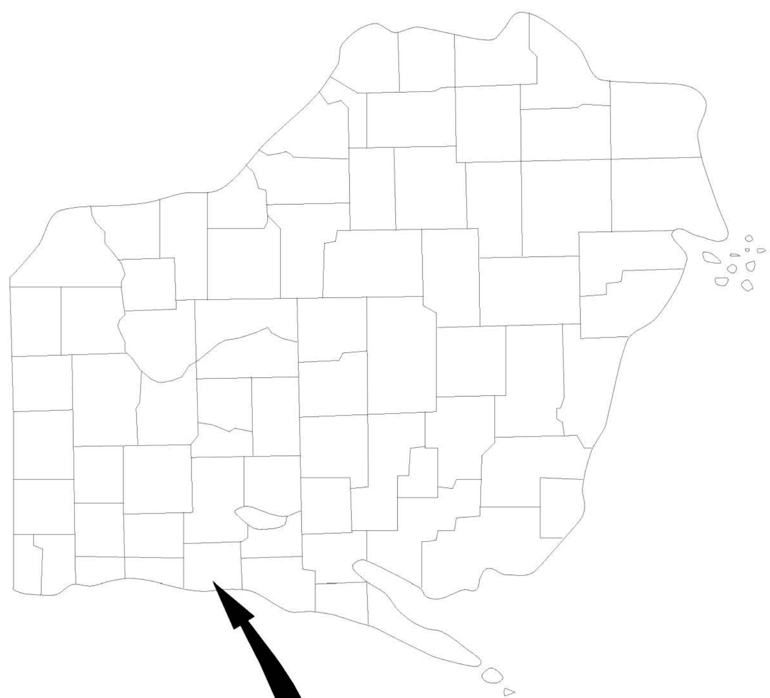
SIGNATURE

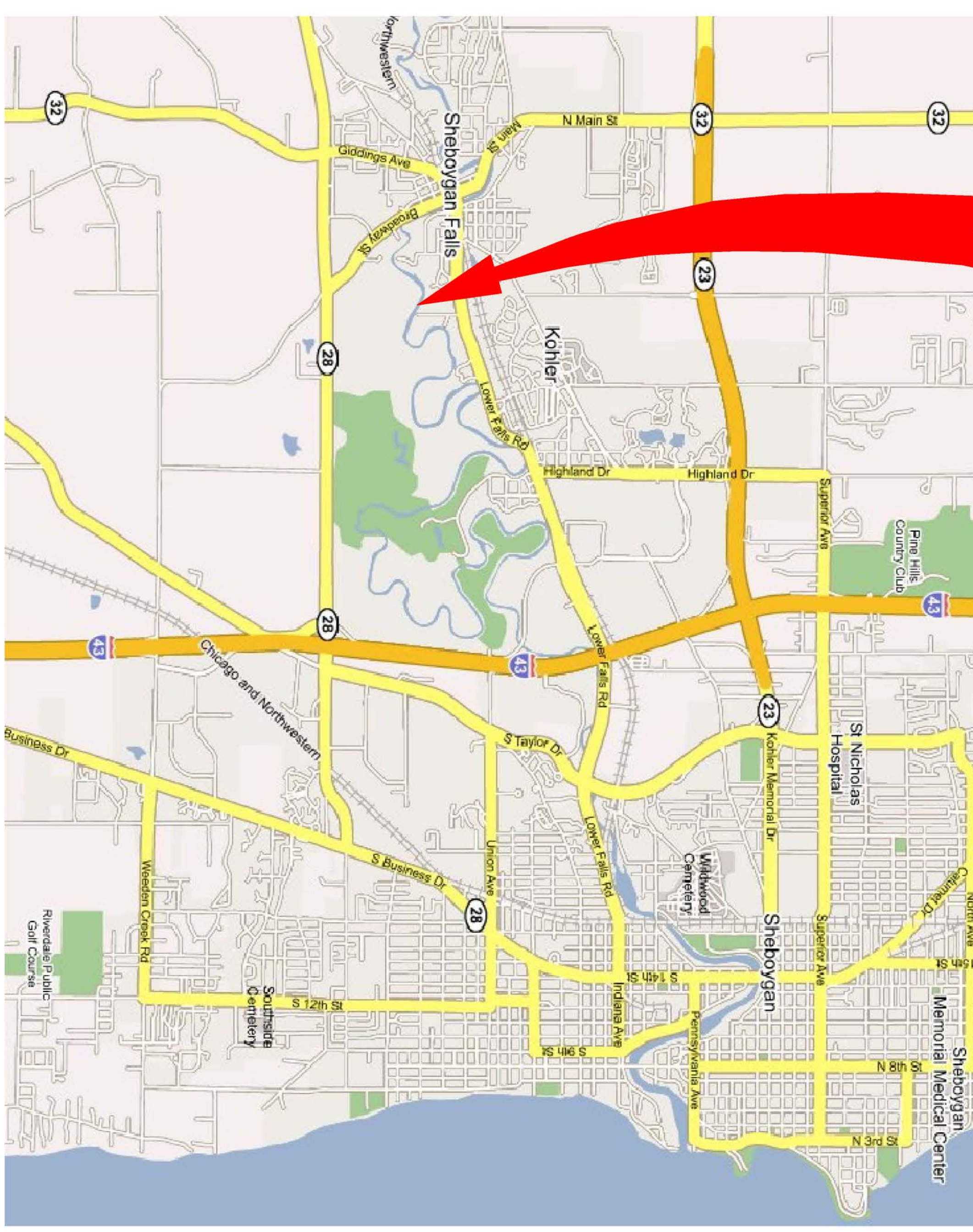
SEVERN TRENT

489814

STL

STL-4145





DRAWING NO.	SCOPE ID	SCALE	
1	05P031	NOT TO SCALE	

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
100% DESIGN – PHASE II – UPPER RIVER
ARMORED, NEAR-SHORE &
SOFT SEDIMENTS REMEDIATION
SHEBOYGAN FALLS, WISCONSIN

SITE LOCATION

PRS Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
			APPROVED	
			REVIEWED	
			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDSBY_______ DATE_______

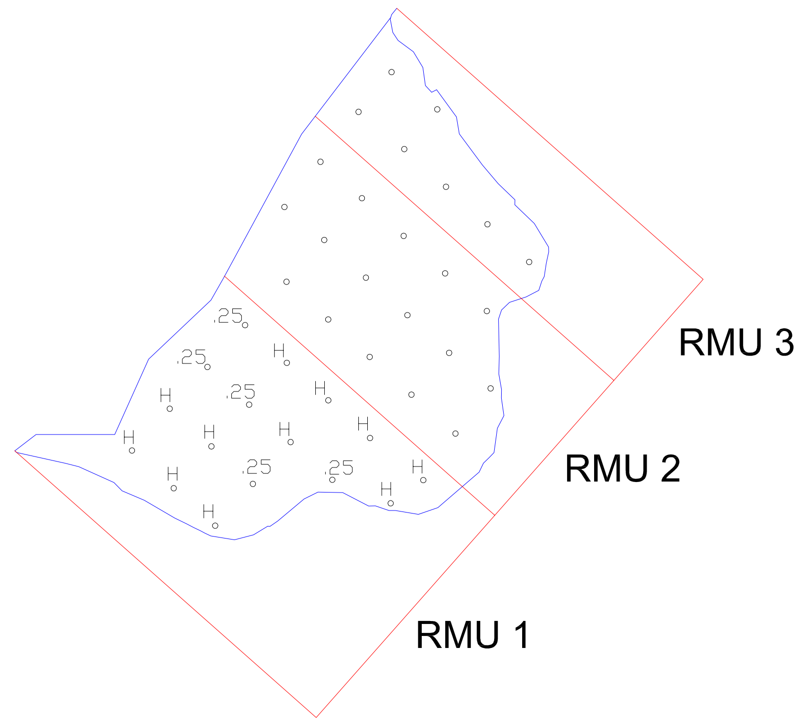
FILE NAME: $$$$DGNSPEC$$$$$$$$$$$$$$$$$$$

DRAWN BY: JRB2 DATE: MAY 2005

Foth & Van Dyke

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

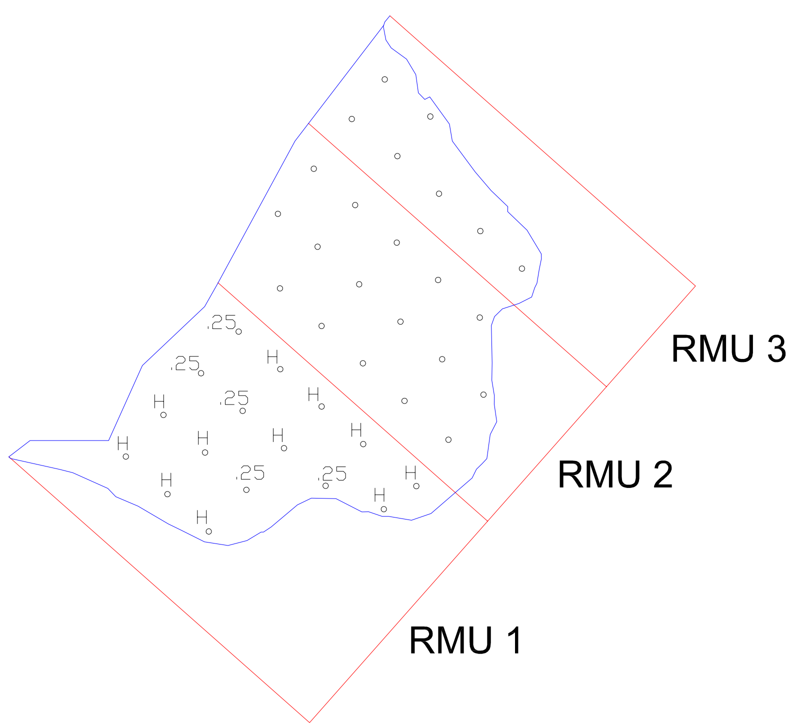
PCM MASS DETERMINATION



- Probing Locations within RMU, Spaced Approx. 12.5'
- H Desingated Hardpan = Thickness of 0 feet
- .25 Value of thickness in feet

Average thickness = Sum (thickness)/Total
= 1.25/16
= 0.078 feet

SWAC DETERMINATION



- Probing Locations within RMU
- H Desingated Hardpan = 0.017 mg/kg
- .25 Sample Location = 0.5 mg/kg for No sample collected or Value (Asuume 1 mg/kg) from lab

SWAC = Sum of Conc./Total Conc.
= [0.017 (11/16*2700) + 0.5 (4/16*2700) + 1.0 (1/16*2700)]/2700
= [0.017(1856) + 0.5(675) + 1.0(169)]/2700
= 0.199 mg/kg

DRAWN BY: JRB2 DATE: MAY 2005
Foth & Van Dyke
REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.
REVISIONS | SIGNATURES: APPROVED, REVIEWED, DESIGNED
RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS BY ____ DATE ____

Pollution Risk Services
100 E-Business Way, Suite 210
Cincinnati, Ohio 45241
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
100% DESIGN – PHASE II – UPPER RIVER
ARMORED, NEAR-SHORE & SOFT SEDIMENTS REMEDIATION
SHEBOYGAN FALLS, WISCONSIN

TYPICAL PROBING AND SAMPLING FOR AN RMU

SCALE: NOT TO SCALE
SCOPE ID: 05P031
DRAWING NO. 2

Air Monitoring for PCBs

AIR MONITORING FOR PCBS

Scope: The following procedures are applicable to monitoring the air during activities that may generate high levels of potentially PCB impacted dust.

Location: Air monitoring for PCBs will occur in the load-out area for the dewatered dredge material. This is the only area where media is present that is sufficiently dry to become airborne. Initially, baseline air samples will be collected at two locations near this area to establish background levels. The samples would be collected prior to media being brought to the area. When load-out begins, samples will be collected at two locations in the immediate vicinity of the work.

Samples will be collected within the breathing zone by the typical worker in the area. If that worker will be in a cab of a truck, loader, or other equipment, the sample should be collected at that height. Otherwise, the sample should be collected at a height of five feet above ground surface.

Frequency: Two baseline PCB air samples will be collected in the load-out area prior to load-out of the dewatered dredge material. The samples should be collected on separate days. Two air samples will be collected the first week of load-out activities. If load-out activities occur from more than one location, each location will be similarly monitored. SAMPLING SHOULD NOT BE CONDUCTED DURING A RAINFALL EVENT.

Procedure:

1) Obtain the following supplies: one (1) air personal air sampling pump, one (1) low-flow tube holder, flexible Tygon tubing (supplied with pump), one (1) air flow calibrator, one (1) tube breaker, and two (2)filters (13-mm glass fiber with florisil). The laboratory will supply these materials

2) Calibrate the flow meter according to manufacturer’s instructions. Using the tube breaker, break off both ends of one tube to provide an opening of at least one-half the internal diameter. Connect the filter tube to the low flow holder which in turn is connected to the pump using the Tygon tubing. The filter tube should be mounted in the direction indicated on the tube. Connect the sampling train to the calibrator, turn on the pump, and adjust the low flow holder until the calibration flowmeter reads the flow desired. For sampling during a normal work day, select a flow of approximately 100 ml/min. Record the results in the log book. Discard the sampling tube.

3) Using the tube breaker, break off both ends of the second filter tube to provide an opening of at least one-half the internal diameter. Place the filter tube on the pump, mount the pump/tube assembly in the appropriate location, and turn on the pump. Record the beginning time in the log book. Note the weather conditions in the log book.

4) At the end of the day (pump should run a minimum of 6 hours), turn off the pump, and remove the filter tube. Place provided caps, if any, on each tube and the place in glass vial (if provided). Please note, some laboratories use caps only while others use glass vials. Record the time sampling ended in the log-book and the daily weather conditions. Provide a summary of the flow rates, beginning time and end time to the Field Team Leader who should ensure the Health and Safety Officer receives the data.

5) Ship the sample to the laboratory under proper chain-of-custody documentation.

Chain-of-Custody, Labeling, Packaging and Sampling

CHAIN-OF-CUSTODY, LABELING, PACKAGING AND SHIPPING

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements that provide the ability to trace possession and handling of samples from time of collection through transportation to the laboratory for analysis and final disposition of the data.

Equipment:

Sample Labels
Chain-of-Custody Record
Waterproof Ink Pen
Sample Containers
Packaging tape
Packaging materials (e.g. bubble wrap)
Ice

Definition:

Samples are considered to be in a person's custody if they are:

1. In a person's physical possession.
2. In view of a person after taking possession.
3. Secured by that person so that no one can tamper with it, or secured by that person in an area that is restricted to authorized personnel.

Procedure:

1. Sample labels are necessary to prevent misidentification of samples. Sample labels must include the following information:

   a) Project name.
   b) Date of collection.
   c) Time of collection.
   d) Sample identification: as specified in the Sample Identification SOP
   e) Location.
   f) Analysis.
   g) Sampler's initials.

   Labels should be securely affixed to sample containers prior to or at the time of collection.

2. Pertinent sampling activities will be recorded in the field notebook. In the sequential portion of the notebook, the following information will be recorded:

   a) Sample identification, location and number.
   b) Type and number of samples.
   c) Reference to the particular sample location.

d) Date and Time of sampling.

3. Upon completion of sample collection, a chain-of-custody record will be completed and will accompany the sample-shipment container to the laboratory. If more than one sample-shipment container is used, a separate chain-of-custody form should be completed for each container. An example of a completed chain-of-custody form is included in Appendix B of the QAPP.

4. The chain-of-custody record will include the following information:

   a) Project name.
   b) Sampler's signature.
   c) Unique sample identification.
   d) Date and time of collection.
   e) Composite or grab sample designation.
   f) Sample location or description.
   g) Number of containers.
   h) Indication of analytical parameters to be performed (including analytical method and preservation if any).
   i) Remarks, if necessary.
   j) Signature of persons involved in the chain of possession.

5. Upon completion of a Chain-of-Custody Record, it will be placed in a re-sealable plastic bag and placed inside the sample-shipment container (cooler).

6. Using bubble packing or styrofoam sheets, securely wrap samples and arrange in the shipping cooler in such a way as to minimize the chance for breakage during shipment. Place a layer of ice over the samples and wrap cooler securely with strapping tape for shipment by common carrier.

7. A chain-of-custody seal will be placed on each cooler. Each seal will be marked with the shipping date and samplers initials and will be placed such that it will be separated upon opening of the cooler. A piece of clear tape will be placed over the custody to ensure it remains in place during transport.

8. Samples should be delivered to the laboratory for analysis as soon as possible. The samples must be delivered to the person in the laboratory authorized to receive samples.

9. There are three routes through which samples reach the laboratory, including:

   a) Personnel who collected samples deliver them to the laboratory directly.
   b) Personnel who collected samples deliver them to the PRS site office and a laboratory representative will come to the PRS office to pick them up.

c) Personnel delivers samples to a common carrier; i.e., UPS, Federal Express, etc. to be shipped to the laboratory. In this case, the Bill of Lading number becomes part of the chain-of-custody documentation.

The actual chain-of-custody document contains three separate copies. These will be distributed as follows:

Yellow Copy	retained by lab for their records.
Pink Copy	kept by sampling personnel and retained in the project file.
White Copy	returned to PRS project personnel with the analysis data package and retained in the project file.

Completion of Field Logbook

COMPLETION OF FIELD LOGBOOK

Scope: The following SOP is to be used as a guideline when recording activities on any jobsite. The primary purpose of recording data in the field logbook is to create a record by which anyone can reconstruct the field activity without reliance on the recorder's memory. The field logbook will become part of the final evidence file. The field logbook will be bound and will contain pre-numbered pages.

Equipment: Field Logbook for Site Activity
Calculator
Waterproof Ink Pen
Watch (for time of day)

Procedure:

1. All information pertinent to the field activity or sampling event must be recorded in a bound field logbook using the waterproof ink pen. If the ink pen does not function at the time of entry, note the malfunction as reason for using some other method (i.e., pencil, etc.). The title page of the logbook will include the following (at a minimum):

    a) Person to whom the logbook is assigned
    b) Logbook number.
    c) Project name.
    d) Project start date.
    e) Project end date.

At the beginning of each entry, the date, start time, weather, names of all project personnel present, and the level of personal protective equipment (PPE) being used will be documented. In addition, the entries in the logbook must include the following (at a minimum):

a) Time of each entry (24-hour clock).
b) Project personnel on jobsite.
c) Objective/purpose for activity.
d) Name, address and telephone number of field contact.
e) References, such as maps or photographs of the study site.
f) Field observations.
g) Description of any field methods to be used for the site activities.
h) Personnel and equipment decontamination procedures.
i) Signatures of personnel responsible for observations.
j) Name of visitors and reason for visit.

2. In addition to the items listed above, the following information will be included in the field notes portion of the logbook.

a) Type, volume and number of samples collected (include information on the depth of samples collected).
b) Sample location and identification number.
c) Sampling method, (note deviations from the work plan or the SOPs).
d) Sample handling, packaging, labeling and shipping information, including destination.
e) Diagrams of RMU to identify poling thickness and sampling locations as shown in the Verification Sampling Plan.

3. The field notes portion of the logbook should be completed in a sequential, chronological order. No blank pages should be found within the daily notes section of the logbook. Data changes or errors within the field logbook should be corrected by placing a single line through the data, followed by the recorders initials, followed by the correction.

4. The field logbook should be kept in a secure place during the field activities (i.e., in hand, within visual site, locked in field vehicle, etc.). Upon completion of the activity, the field logbook should be checked for completeness and a copy of the completed logbook will be made. The copy of the logbook will be stored as part of the project files. The original field logbook will become part of the final evidence file.

Decontamination of Heavy Equipment

DECONTAMINATION OF HEAVY EQUIPMENT

Procedure:

The following cleaning procedures are applicable to most programs requiring heavy equipment decontamination:

1) Prior to initiating any excavation or other soil/sediment handling activities, identify area where decontamination will take place. If the work area is likely to contain elevated concentrations of contaminants, the cleaning water will need to be contained pending appropriate treatment. Containment methods shall be site specific, but shall be designed in order to assure that potential contaminants do not adversely affect the site.

2) Remove by hand (i.e., shovel, bar, scraper) excess visible dirt and debris from the equipment paying particular attention to track, cleats, tires, and other irregular surfaces.

3) Clean the equipment using power washer or steam generator capable of producing sufficient water pressure to remove materials from the equipment.

4) If necessary, clean/scrub the equipment with water and natural soap (biodegradable-phosphate free, i.e., Alconox or equivalent) solution.

5) If necessary, final rinse of equipment with power washer or steam generator.

6) If necessary, collect wash and rinse water pending appropriate treatment.

Decontamination of Sampling Equipment

DECONTAMINATION OF SAMPLING EQUIPMENT

Scope: The following standard operating procedure details the method of decontaminating non-dedicated sampling equipment used to collect/composite soil and/or sediment samples, surface water samples, and discharge water samples. It should be noted that this SOP is a minimal operating procedure. Certain sampling projects may require additional procedures; however these projects are atypical and shall be addressed in a project specific manner. Should non-dedicated sample equipment be covered with oily materials, they will placed in an appropriate storage container (e.g. 55-gallon drum) pending characterization and disposal.

Equipment:
Three stainless steel bowls
Scrubbing brushes
Alconox or other detergent
Distilled water
Spray bottles
Nitrile Gloves
Clean water source (if available)

Procedure:

1. Don a pair of clean disposable nitrile gloves.
2. Scrape or rub off any excessive material from the equipment.
3. Scrub equipment in stainless steel bowl containing potable water or distilled water.
4. Scrub equipment in stainless steel bowl containing soapy (Alconox) potable or distilled water.
5. Rinse in stainless steel bowl containing potable or distilled water.
6. Spray with distilled water.
7. Allow to air dry as permittable.

The water source shall either be tested “clean” or from a potable water source. Upon completion of decontamination activities place all decontamination fluids into the sump of the water treatment system for processing.

Discharge Water Sampling

DISCHARGE WATER SAMPLING PROTOCOLS

Scope: The following sections present surface water sampling protocols.

Equipment:

The following shall be considered prior to surface water sampling:

1) Review the work program, project documents, and the health and safety requirements.

2) Assemble all equipment (ISCD sampler) and supplies.

3) Contact the laboratory and arrange for the following:

   - glassware;
   - coolers;
   - shipping details; and
   - starting date

4) Inform the appropriate regulatory groups, Client personnel, landowner, PRS personnel, and laboratory of the pending sample events.

Procedure:

Once the prior planning and preparation activities are completed, discharge water sampling can proceed at the outfall of the Waste Water Treatment Plant (WWTP). Quality Control samples will be collected in accordance with the QAPP. Discharge water samples will be collected per the requirements of the WPDES permit.

Samples will be collected at the outfall of the water treatment system with an ISCD sampler at a frequency determined by the requirements of the WPDES permit.

1) Sample Collection Analysis Parameters

   PCBs, TSS, and any other requirements of the WPDES determined by the WDNR.

2) Sample Acquisition and Transfer

   Samples collected for other parameters will be collected in the jars prescribed in the QAPP.

   All samples must be labeled in accordance with the Chain-of-Custody and Labeling SOP as well with the Sample Identification for the Sheboygan River Project SOP.

3) Handle, pack, and ship samples in accordance with the QAPP and SOP #P1-1.

Follow-up activities:

The following shall be performed once field activities are complete.

1) Double check Work Plan to ensure all samples have been collected.
2) Equipment shall be cleaned and returned to the office or vendor.
3) Notify the contract laboratory as to when to expect the samples. The chain-of-custody indicating the parameters and number of samples shall be enclosed in the sample cooler.

Dredge Dewatered Material (DDM) Disposal Sampling

DDM DISPOSAL SAMPLING PROTOCOLS

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements for procedures to collect dredged dewatered material disposal samples. The general procedures to be utilized in obtaining samples from the river are outlined below.

Grab samples will be collected with a Hand Corer at five locations (sample ports) within a Geotube (approximately 1000 cubic yards) and composited to provide a single result.

Health and Safety:

- Refer to Health & Safety Plan.
- Gloves and (or PPE) should be worn while collecting and processing samples.

Personnel Qualifications:

- Personnel may need to be certified under OSHA regulations.
- Individuals should be familiar with the use of sampling equipment.

Apparatus and Materials:

- Hand Corer
- Gloves
- Personal Protective Equipment
- Cooler and ice
- Stainless Steel Mixing pan
- Chest waders
- Stainless Stell spoons
- Sample tags and/or labels
- Sample containers
- Chain-of-Custody forms
- Paper towels
- Water Proof Marker
- Logbook

Sampling Procedure:

1. Identify the proposed sample location in the field notebook along with other appropriate information.

2. Don personal protective equipment as required by the Site Health and Safety Plan.

3. Decontaminate the non-dedicated cores and all sampling utensils following the procedures addressed in Equipment Decontamination SOP.

4. Drive the sampling equipment into each of the 5 determined locations (sample ports) along the Geotube. Push the core/tube into the dewatered sediment until tube has reached the bottom of tube.

5. Slowly pull the core from the sediment.

6. Deposit the core into the stainless steel mixing bowl to create a composite sample.

8. Record sediment characteristics in the field log book.

8. Repeat the above procedures until all core samples are collected for the composite sample.

9. Mix the sediment with a clean spoon thoroughly or until visually homogeneous. During this operation, remove any obviously "non-sediment" objects from the sample; bottle caps, broken glass, sticks, large rocks, etc. (Buckets and spoons are pre-cleaned according to decontamination protocols.)

10. Label all sample containers and record all appropriate information in the field notebook.

12. Handle, pack and ship the samples in accordance with the procedures in QAPP and SOP #P1-1.

Field Measurement of Turbidity

FIELD MEASUREMENT OF TURBIDITY

Scope: The following SOP outlines the technique required for the accurate field measurement of turbidity using the LaMotte 2020 Turbidity meter (or comparable unit).

Equipment:
LaMotte 2020 turbidity meter (or comparable unit)
Turbidity Standards
Distilled or Deionized Water
Field Logbook and Sample Field Parameter Data Sheet

Important Note: Instrument should be thoroughly checked for proper operation prior to use. This should include checking and adjusting all internal calibrations.

Procedure:

Standardization of the meter for turbidity measurements should be done prior to taking the instrument into the field. Meter should be calibrated daily prior to use in accordance with the manufacturers specifications. Details of all calibration checks should be logged in the field logbook.

Water samples collected from approximately the midpoint of the water column will be placed into the vial provided with the meter (the vial will be rinsed with distilled water between samples). See SOP #P221-1 for water sampling procedures. The vial will then be placed in the turbidity meter and a measurement will be collected once the reading on the meter has stabilized.

Resulting TSS values will be determined from a correlation chart (Turbidity vs. TSS) established prior to commencement of dredging activities. The TSS and turbidity values will be recorded in the Field Log Book and any required action by dredging contractor as result will be noted.

Note: An internal meter calibration must be performed whenever the check standards meter readings vary by more than 10 percent of their stated values.

Accuracy:

The accuracy of the field measurement and calibration will be checked using commercially available, certified check standards. The turbidity measurement should be within 10 percent of the check standard. If the measured value is outside of this range, the instrument will be checked for proper operations and calibration followed by re-analyses of the check standard. If the measured value is still outside the acceptable limits, the instrument will be replaced with a duplicate or comparable instrument.

GENERAL INTERIM GUIDANCE FOR THE MANAGEMENT OF INVESTIGATIVE WASTES

Wisconsin DNR Remediation and Redevelopment Program
Publication RR-556

General Interim Guidelines for the Management of Investigative Waste

1. Addendum to General Interim Guidelines for the Management of Investigative Wastes (April 1, 2002)
2. Jan 14, 1993 Memo: General Interim Guidelines for the Management of Investigative Wastes
3. Attachment 1: Regulatory Requirements and Policies Affecting Investigative Waste (IW) management
4. Appendix A to Attachment 1: Excerpts from Omega Hills Approval
5. Appendix B to Attachment 1: EPA Publication 9345.3-03FS Facsimile: Guide to Management of Investigation-Derived Wastes
6. Attachment 2: Sampling and Testing of Investigative Wastes
7. Attachment 3: Long-Term On-Site Storage of Investigative Wastes (IW)

(this page intentionally blank)

Addendum to Publication RR-556
General Interim Guidelines for the Management of Investigative Waste
April, 2002

Chapter NR 718

Chapter NR 718, Wis. Adm. Code, has been promulgated since the development of this guidance. The provisions of that chapter may be applied to investigative waste soils.

Attachment 1 Statutory and Rule Cites

Some of the statutory and rule citations in attachment 1 to the guidance have changed since the guidance was issued. They're outlined below.

Solid Waste Statutes:

The solid waste statutes previously found in ch. 144, Wis. Stats. (ss. 144.43 to 144.47) are now found in ch. 289, Wis. Stats.

The definition of "solid waste" that was previously found in s. 144.01 (15), Wis. Stats., is now found in s. 289.01 (33), Wis. Stats.

Hazardous Waste Statutes:

The hazardous waste statutes previously found in ch. 144, Wis. Stats., (ss. 144.60 to 144.74) are now found in ch. 291, Wis. Stats.

Air Management Statutes:

The state statutes that provide the legal basis for the Air management program are now found in ch. 285, Wis. Stats.

Solid Waste, Hazardous Waste and Air Management Administrative Rules:

Solid waste program rules are found in the NR 500 rule series (chs. NR 500 to 590), hazardous waste program rules are found in the NR 600 rule series (chs. NR 600 to 690), and air management rules are found in the NR 400 rule series.

CORRESPONDENCE/MEMORANDUM

DATE: January 14, 1993 FILE REF:

TO: District Solid and Hazardous Waste Program Supervisors and Bureau Section Chiefs (SW, HW & ERR)

FROM: Paul Didier - SW/3

SUBJECT: General Interim Guidelines for the Management of Investigative Waste

Contents

I. Purpose

The purpose of this memo is to provide you with general interim guidelines for making decisions regarding the management of investigative waste (IW), produced at sites regulated by our various program authorities. The ERR program formed an investigative waste committee earlier, and some of the recommendations and materials they developed are considered in these guidelines and the attachments. It is my understanding that Mark Giesfeldt, Barb Zellmer and Lakshmi Sridharan will form a second workgroup, including District staff, to develop more specific guidance on this topic, as needed. I would like the Districts to try to implement the guidelines for a 1 year period and then provide comments to this second workgroup. If you would like to provide comments before the workgroup is formed, please send them to Gary Edelstein - SW/3.

II. Investigative Waste - Definition

For the purposes of these guidelines, IW (or investigation-derived waste) is defined to include any solid waste, including any contaminated media (soil, rock or ground water) generated as a result of typical investigative activities. This includes, but is not limited to: drill cuttings from boring or monitoring well installations, decontamination fluids from cleaning investigative equipment (i.e., drill rigs, backhoes, sampling equipment such as bailers and pumps), spoils from backhoe pits, development water, purge water, water from pump tests, excess samples and dirty personal protective equipment and clothing intended to be thrown away. For purposes of these guidelines, IW does not include any wastes from activities generated as a result of remediation activities. Remediation wastes include wastes from petroleum tank/piping excavations, petroleum tank bottoms/sludges and other wastes that are picked up, treated and returned to the site. Also, the term does not include wastes used for treatability studies, including off-site bench scale tests and on-site pilot tests. We expect to develop separate guidelines in the future addressing the management of wastes generated as a result of remedial action, treatability and pilot test activities. Some of the principles outline in these guidelines may be found to be appropriate for those wastes.

III. General Management Principles

Whenever making decisions regarding the management of IW, the following general principles should be followed:

A. **General** - IW management methods should be protective of human health and the environment and comply, to the extent practicable, with all applicable laws and rules, including wastewater, solid waste and hazardous waste laws and rules. As a general rule, it will be necessary to use best professional judgement, in light of the site specific conditions, to determine if a management option is protective of human health and the environment. In some instances, a variance, waiver or exemption may be available to allow certain on-site management methods, including redisposal of IW back on the site, that normally would not be allowed under the solid or hazardous waste laws and rules. In other instances, managers may make enforcement discretion decisions. This is discussed in more detail under the next section - Complying with Requirements and Obtaining Approvals.

B. **Minimization** - The amount of IW produced should be minimized as much as possible. Work plans for investigations should outline drilling and sampling techniques that minimize the generation of IW. Non-intrusive investigation methods may be used, when such methods are considered appropriate for the site. The potential problems of managing IW should be a factor in choosing investigative methods. For additional specific suggestions for IW minimization methods, please refer to page 5 of the attached (appendix B) U.S. EPA Superfund fact sheet, under the title "IDW Minimization".

C. **In-State/On-Site Policy** - Management of hazardous IW should be in accordance with our "Interim Policy for Promoting the In-State and On-Site Management of Hazardous Waste in Wisconsin", dated March 14, 1991.

D. **Liquid IW** - Contaminated liquids should generally not be disposed of on the ground or back onto waste at a site. Aqueous wastes may be collected, properly characterized for possible treatment or incorporation into on-site remediation, such as for ground water or leachate, or collected for management at a permitted waste water treatment plant willing to accept these wastes, and having the appropriate approvals to do so. The preferred method for managing contaminated pump test discharges or other large volumes of aqueous wastes with low levels of contamination is to provide any necessary treatment to meet Waste Water program requirements and discharge them to surface wasters in accordance with those program requirements. It may be necessary to provide a temporary treatment unit for such discharges. Liquids generated from areas known to be free of contamination need not be handled as IW, but should not be disposed of over areas known to be contaminated or over waste, to avoid the leaching of additional contaminants into the environment.

E. **Management as Part of Remedial Action** - For sites where it is known that some sort of remedial action will be conducted in the future, secure on-site storage (see the long-term storage guidelines, attachment 3) and subsequent management of the IW through incorporation into the remedial action is preferred to off-site management, where possible. This will avoid the need for separate treatment and/or disposal arrangements. IW (with the exception of non-indigenous IW) generated during the course of an investigation can be considered part of the site and managed with other wastes from the site, consistent with a final remedy.

F. **Field Screening** - Where appropriate, field screening methods may be used to help determine if IW contains contaminants of concern, in lieu of laboratory testing. Staff project managers should decide if field screening is an appropriate method for making this determination on a site specific basis. In many instances, field screening might be used to help reduce the number of samples requiring laboratory analysis.

IV. Complying with Requirements and Obtaining Approvals

A. **Description of Requirements** - Attachment 1 describes the solid waste, hazardous waste, wastewater and air management requirements that may apply to IW. Whenever IW is produced, appropriate steps need to be taken to characterize the waste to determine whether it should be handled as a hazardous waste, and to determine the options available for both the short term and long term management of that IW.

B. **Variances, Waivers and Enforcement Discretion** - For activities requiring a hazardous waste license, it may be possible to obtain a variance from that licensing requirement. In addition, in an emergency situation a waiver from any of the hazardous waste requirements may be possible (limited to 90 days in duration). For activities requiring a solid waste license, a written exemption may be possible. **In other situations, a decision may be made to use discretion and not enforce certain solid and/or hazardous waste program requirements.** Each situation must be reviewed and considered individually regarding the appropriate course of action. The following criteria should be considered when making such decisions:

1. The contaminants, their concentrations, and total volume of IW;

2. Media potentially affected (e.g., groundwater, soil) under management options;

3. Location of nearest population(s) and the likelihood and/or degree of site access;

4. Potential exposure to workers; and

5. Potential for environmental impacts.

C. **Responsibilities** - If a project manager is assigned to and is actively overseeing a project, then that person is responsible for assuring that steps are taken to properly characterize the IW, that a plan is in place for the management of those wastes, and that appropriate approvals are obtained. In all cases I expect the District Program Supervisor to be responsible for determinations on whether, for example, a license is required for a specific waste management activity, along with the other applicable requirements, and whether a variance, waiver or exemption from that licensing requirement is appropriate and possible, or whether discretion is proposed to be used to not enforce certain requirements. In cases where hazardous investigative wastes or large volumes of solid investigative wastes are to be managed or unusual or unique management principles are involved, the determination should be made in writing along with the basis for the determination.

V. Specific Management Principles

A. **Decontamination** - Equipment decontamination should occur on a pad that is lined and designed to prevent surface water from running on to the pad and to prevent contaminated liquids from running off. Generally, these pads are sloped to drain to a sump that can be pumped out into a storage tank. Often, the pads are constructed of concrete with sealed joints or with a geomembrane covered with a geotextile and gravel. At many sites, it may be necessary to construct such a pad before the investigation begins. It may be necessary to decontaminate and/or manage as waste any contaminated material from the pad once it is decommissioned.

B. **Sampling, Testing and Short-Term Storage** - Guidelines for sampling, testing and short-term storage of IW are outlined in attachment 2. Where appropriate, field screening methods may be used to help determine if IW contains contaminants of concern, in lieu of laboratory testing. ERR staff project managers should decide if field screening is an appropriate method for making this determination on a site-specific basis.

C. **Long-term Storage** - Guidelines for long-term storage are outlined in attachment 3. For hazardous IW, a storage facility license may be required for long-term storage.

D. **Test Pits** - Test pit spoils returned to the same excavation immediately (generally on the same day), where returning the spoils does not pose an increased threat to human health or the environment has been allowed in the past without meeting all approval/licensing requirements using enforcement discretion, and this should be allowed to continue.

VI. Working Group

I expect that the working group formed to develop the specific guidance on this issue will provide direction for which circumstances it is appropriate to use the various authorities to approve the management of investigative waste, and that guidance will provide the direction staff need to assure that we are being consistent state wide on this issue. I also anticipate that this group will develop the specific procedures to use in making decisions regarding the management of investigative waste.

I hope that the working group can be formed and develop the specific guidance on this topic in the next several months. In the mean time please use the general guidelines I have laid out in this memo, as you and your staff address IW management issues.

Attachs.

GAE:BJZ:MFG

cc: Solid & Hazardous Waste Program Unit Leaders, District & Central Office
Darsi Foss - SW/3
Linda Meyer, Patti Hanz, Deb Johnson, & Pete Flaherty - LC/5

ATTACHMENT 1

REGULATORY REQUIREMENTS AND POLICIES AFFECTING
INVESTIGATIVE WASTE (IW) MANAGEMENT

Solid Waste Program, Ch. 144, Stats. and Chs. NR 500-520, Wis. Adm. Code

The Solid Waste Program has no regulations or guidance aimed specifically at IW. Under that program's rules and statutes, any material or media from an investigation, even if it is uncontaminated, that is generated and is to be discarded is a solid waste, because the statutory definition of solid waste (s. 144.01(15), Stats.) is very broad. The definition of disposal is also very broad and includes the replacement of solid waste in a closed landfill or other site under investigation. Chapters NR 500-520, Wis. Adm. Code, require persons to obtain a license and meet operating and design standards in order to dispose of solid waste. However, there are exemptions in the rule for the disposal of clean media in s. NR 500.08, Wis. Adm. Code, and wastewater facilities for liquid wastes are also exempt from the rule. Therefore, under the statute and rules, any on-site management of IW consisting of contaminated media or any other material must be in a licensed solid waste facility that meets all operating and design standards or, for liquid wastes, in an exempt wastewater facility. Therefore, re-disposal of such wastes in a closed landfill or disposal area is not allowed without meeting standards and obtaining a license. However, the engineering unit leaders in the program have indicated that there is no site they're aware of where excavated waste from a solid (non-hazardous) waste landfill wasn't allowed to be redisposed of. The program does have a policy (no specific policy memo, although letters and plan approvals may have mentioned it) concerning the re-disposal of solid waste at closed, covered sites. The program will generally allow waste within the site to be moved around on the site, within licensed acreage, for the purposes of grading for site drainage or cover improvement, provided the total waste volume (called design capacity) is not exceeded. Written exemptions from any program requirement, including licensing, may be granted if a written application is submitted and the applicant can show the activity will not cause environmental pollution.

State Hazardous Waste Program, S. 144.60-144.64, Stats. and Chs. NR 600-685, Wis. Adm. Code

The Hazardous Waste Program has no regulations aimed specifically at IW. The only policy memo relating to them is a 4/28/89 memo from Barb Zellmer to the District SW Coordinators specifying who makes determinations on whether a remedial action waste is hazardous. Again, there is a policy on the re-disposal of waste. This policy was documented in the September 29, 1989 closure and long-term plan approval for the Omega Hills North Landfill (appendix A). In summary, the policy generally prohibits the re-disposal of hazardous waste in closed facilities, however, the Program can review such re-disposal proposals on case-by-case basis for each remedial action or investigation proposal, accounting for the latest U. S. EPA guidance (see Superfund, below for the U. S. EPA guidance and regulations discussion).

Although not specifically aimed at IW, the Program has some important requirements that affect its management:

-The definitions of hazardous waste (HW) and solid waste. The IW must be a solid waste to be a HW. The definition of solid waste comes from the solid waste program statutes (s. 144.01(15), Stats.), so any material from an investigation is a solid waste. How a solid waste is identified as hazardous is complicated, but there is considerable guidance available on the subject from both the Program and U. S. EPA. For quick reference, one of the better guidelines is the Superfund Program's land disposal restriction (LDR) fact sheet #5. This discusses how a HW determination is made for waste managed in sites before the HW regulations took effect. There are some exceptions, but for the most part, the state HW rules identify HW the same way the federal rules do. The most notable exceptions are the state F027 and F500 waste listings and the federal TCLP rule, discussed in the next section. The F027 listing is broader than U. S. EPA's, the F500 listing only exists in the state rules and the state rules do not yet have the TCLP test.

-Generator requirements apply to IW that is hazardous. An EPA ID number must be obtained, the manifest system used and the waste must be managed at an approved HW facility. Licensed HW transporters must haul any waste if taken off-site. On-site temporary tank and container storage standards apply to waste as it is generated. Generators who fall under small quantity generator categories must comply with rules less extensive than large quantity generators (it is expected that at most remedial action sites, the amount of IW waste generated would exceed the small quantity generator amounts of 100 and 1000 kg. generated per month).

-Licensing and facility operating and design standards apply to units where HW is treated, stored or disposed of. Large quantity generators must utilize a licensed storage facility for wastes held for more than 90 days. Under a strict interpretation of the rules, any on-site management of hazardous IW (if the quantity is over 100 kg. per month) must be in a licensed HW facility that meets all operating and design standards (under certain circumstances, wastes from generators who produce <100 kg. per month may also be disposed of at a solid waste landfill approved for such disposal by the Department). Therefore, under this interpretation, re-disposal of such wastes in a closed landfill or disposal area is not allowed. Exemptions from the facility design and operating standards (but not licensing) are allowed if the applicant can show equivalent protection. Variances from licensing are allowed for up to 5 years if a hardship to any person exists, and an application is submitted showing how the facility design and operating standards will be met. The variance section has been revised, as part of the NR 600 renumbering revisions, to allow certain types of land disposal. Waivers from any requirement may be granted if an emergency condition exists. As part of the recent revisions, the waiver provision is being expanded to allow waivers for HW management as part of an immediate response to a discharge.

Federal Hazardous Waste Program

Wisconsin is authorized to implement the HW program in lieu of U. S. EPA. However, there are 2 aspects of the federal program that affect IW management that are not yet part of Wisconsin's program. These are the LDR's and the TCLP characteristic.

The LDR's apply to HW that is land disposed. Usually, the waste must be treated before disposal occurs. The requirements are complex, but guidance is available. For quick reference, the Superfund LDR fact sheet series is recommended. Again, under a strict interpretation, re-disposal of IW on-site would trigger the LDR restrictions. There is no LDR guidance that specifically addresses IW. U. S. EPA may grant several types of variances from the LDR's. For Superfund soil and debris, a treatability variance will be normally be granted if a remedy is selected that will not meet LDR treatment levels. However, even under the variance, a certain level of treatment would still be required.

The recently promulgated TCLP test brings many more solid wastes into the HW program. The leach procedure allows wastes that contain certain organics to become characteristic HW, based on the amount of organics that leach out of the waste under the test. Certain contaminated media from the federal underground storage tank program are temporarily excluded. Many IW's that would not be listed HW under the rules are now hazardous under TCLP. There is no TCLP guidance that specifically addresses IW.

Federal Superfund Program

The Superfund Program has no regulations specifically addressing the procedures for managing IW. However, this program has developed general policies on the issue. There is discussion in the proposed (53 FR 51442, 12/21/88) and final (55 FR 8755, 3/8/90) National Contingency NCP preambles on the program's policies for IW. There is a statement that all state and federal standards (applicable or relevant and appropriate requirements - ARARs) should be met for IW management, but for on-site management, "best management practices" are the rule, and compliance is only required to "the extent practicable". U. S. EPA's position is that all investigations (apparently including preremedial site inspections) are conducted pursuant to the CERCLA removal authority, and strict compliance with all standards is not required for a removal (It is important to note that Wisconsin has no equivalent authority under any of the response programs.). Under the federal policy, if IW is managed off-site, however, the facility must be approved for the waste, and in compliance with the Superfund off-site facility policy.

IW managed as part of a Superfund remedial action entirely on-site fall under the on-site permit exemption in §121(e) of CERCLA. Such actions must comply with the substantive technical requirements that are applicable or relevant and appropriate to a management method, but no federal, state or local approvals, permits or licenses are required for the on-site action.

The proposed NCP discussion gives only 2 extreme examples of how to manage IW. The first is that if the IW is from an area with significant dioxin contamination, it will be containerized, tested and managed in accordance with all ARARs. It then mentions that it is standard practice to leave IW on-site until the remedial action commences. The second example is offered as a contrast to the first, stating that the routine testing and containerization of large volumes of drilling muds and purge waters not suspected to contain hazardous substances may be unnecessary.

In January, 1992, the Superfund Program issued a quick reference fact sheet that apparently only applies to the remedial program (copy attached).

The federal preremedial program has developed a more extensive draft guidance manual addressing IW management. The draft manual has information on regulatory requirements, identification of the specific types of IW, and specific guidelines on how to manage the waste in specific situations. It is generally written to allow flexibility for investigators, consistent with the NCP preamble policies discussed above. Most importantly, it states that:

-Non-hazardous IW, including liquids, may be re-disposed of on-site, regardless of its hazard or the concentration of hazardous constituents in the waste.

-Hazardous IW may be re-disposed of on-site if it poses no immediate threat to human health and the environment, considering the potential for community relations problems with residents in the area. Hazardous organic decontamination fluids may be evaporated (small amounts), or should be disposed of off-site.

Wastewater Program

Liquid IW that is to be discharged to a surface water or sewage treatment plant (POTW) must meet this program's requirements. It should be noted that such discharges are, for the most part, exempt from regulation under the solid or hazardous waste programs.

For surface water discharges, the Wastewater program normally requires a WPDES permit be obtained and specific discharge standards be met, including standards for toxics. It is possible, following future revisions to the Department's general permit that fluids containing very low concentrations of regulated substances may be discharged without treatment or a specific permit. If the concentrations of these substances are above levels of concern, treatment will be required under the general permit, or under a specific permit for more long-term or high volume discharges, such as certain pump tests. However, a short form application for discharge is required. Any person may be issued a general permit if its requirements are met. The program has allowed "on-site" wastewater discharges that are part of a federal Superfund site remedial action to only meet the substantive requirements of a permit, and has not required specific permits for those discharges.

For POTW discharge, the state requirements are usually minimal for these types of wastes. Ch. NR 211, Wis. Adm. Code, prohibits discharges that interfere with or pass through a POTW as well as discharges that exhibit certain characteristics, i. e., explosive, corrosive, fire hazard or could cause a sewer blockage. However, the local authority that operates the facility must give permission for the discharge, and will impose pretreatment requirements, which can vary, depending on the local pretreatment ordinance, and the potential for the discharge to interfere with the

POTW's operation. The local pretreatment requirements can include specific numeric limits for specific contaminants.

Air Management Program

Very briefly, this program regulates air emissions above certain amounts. In some cases it may be advantageous to evaporate certain IW's, such as organic decontamination liquids. This may be done without controls if the emissions do not exceed certain amounts.

Appendix A
Excerpts from Omega Hills Approval

September 29, 1989

IN REPLY REFER TO: 4430

Mr. Kevin O'Toole
District Manager
Waste Management of Wisconsin, Inc.
Two Park Plaza
10850 West Park Place, Suite 1200
Milwaukee, WI 53224

SUBJECT: Conditional Approval (Modification) of the
Chapter NR 181 Closure and Long-Term Care Plan
Omega Hills North Landfill
EPA ID# WID000808568

REVIEW COMMENTS

Management of Newly Generated Waste after Covering and Facility Decontamination

Since the landfill is defined as one unit, and there are no effective barriers we are aware of to prevent hazardous constituent migration, any waste, removed from the landfill as a result of any construction, remediation or investigation must be managed as a listed hazardous waste at an on or off-site facility that is licensed, permitted or approved to accept such hazardous wastes. This is because such waste or material is a mixture of solid and hazardous waste and/or is derived from the previous disposal of listed hazardous waste (see s. NR 181.12(l)(b)2. and 4., Wis. Adm. Code). Therefore, there are no "documented non-hazardous waste areas" which would contain non-hazardous wastes we are aware of.

In view of the above discussion, any remedial or other construction work at this site will likely contaminate the equipment used for construction with hazardous constituents. Therefore, all such equipment must be subject to an approved decontamination procedure that must be developed now. The closure plan indicates such a procedure will only be developed if needed at a later date. Therefore, the determination contains a condition requiring WMI to develop and submit that procedure for approval within 30 days.

RESPONSE TO COMMENTS

On September 13, 1989, WMI submitted, through its attorneys, comments on the Departments August 14, 1989 draft determination, along with other legal documents that requested various actions by the Department. The legal documents will be responded to under separate cover. A meeting was held on September 14, 1989 to discuss certain technical issues related to the draft determination.WMI submitted additional comments related to the statistical test used for groundwater monitoring on September 14, 1989, through its attorneys. WMI submitted additional comments on the final use plan issue and a copy of an August 13, 1976 soil documentation report prepared by STS Engineers, Inc. on September 19, 1989. WMI submitted information on a site in Pennsylvania on September 26, 1989. Department staff had additional conversations with WMI staff regarding statistical analysis issues on September 28, 1989. The Departments response to all the comments, submittals (except the legal documents) and the meeting are outlined below.

Condition No. 4

This condition sets out the requirements relating to the re-disposal of wastes in the landfill that are generated from on-site remedial actions and investigations, herein referred to as the "re-disposal issue." This issue involves both Department and U. S. EPA regulations and policies. U. S. EPA's policies relating to this issue are still evolving To give a clear response to the comments, it is helpful to briefly describe both the Department's and U.S. EPA's regulations and policies.

Under s. NR 181.44(1), Wis. Adm. Code, a landfill may not operate (i. e. accept hazardous waste for disposal) without having an operating or interim license or waiver issued under ch. NR 181, Wis. Adm. Code (variances aren't available to landfills under s. NR 181.55(10), Wis. Adm. Code). In accordance with the Chapter, hazardous waste can be generated from on-site remedial or investigative activities at the landfill. Under the "derived-from" and "mixture" rules, s. NR 181.12(1)(b)4. and 2., Wis. Adm. Code, material removed from the landfill, once removed for management, are hazardous wastes if they are contaminated by hazardous constituents from the past disposal of listed hazardous wastes. A closed landfill which doesn't have an operating or interim license may not accept such material for disposal, even if the material originated there, without violating the rule. The Department has, as a matter of policy, allowed closing landfills that formerly accepted hazardous waste (the Department may allow a closing hazardous waste landfill to continue to operate and accept solid waste under s. NR 181.44(12)(a), Wis. Adm. Code) and still have open hazardous waste units to continue to accept remedial waste generated on-site without a license or waiver, but only until the open hazardous waste unit closes.

U.S. EPA's regulations are similar and require a landfill to have a permit or interim status to continue to accept hazardous waste, and also require a landfill to close within 180 days after ceasing to accept hazardous waste (U.S. EPA is proposing regulations that would allow disposal facilities to continue to accept non-hazardous solid wastes without closing). It's regulations also include the "derived-from" and "mixture" rules. In addition, U. S. EPA has developed a "contained In" policy for non-solid waste media, such as soil or groundwater that is contaminated by hazardous wastes. Such contaminated media must be managed as a hazardous waste until all the contamination is removed, if contaminated by listed waste, or until the contaminated media no longer displays a characteristic, if contaminated by characteristic waste. U. S. EPA has been petitioned to develop a "deminimus" rule setting specific concentration levels for hazardous constituents in media below which it would no longer be regulated as a hazardous waste. Until such a rule is promulgated, U. S. EPA and the states may look at each situation involving potentially contaminated media an a case by case basis.

U. S. EPA has developed additional policy and guidance related to the application of the HSWA land disposal restrictions for on-site actions at sites remediated under a federal Superfund project. The Department understands that U. S. EPA intends that this policy apply to RCRA hazardous waste facilities. WMI's comments referred to some of this guidance, as related to Superfund sites. In summary, this guidance describes how to determine when a RCRA waste is being managed and when a disposal activity takes place on-site that triggers the land disposal restrictions. A new term, "placement", was developed to help determine when disposal occurs that cause the land disposal restrictions to apply. This term does not appear in the federal regulations. However, the Department understands that U. S. EPA plans to codify the policy in the future. In short, "placement", and hence disposal, takes place if waste is managed in a different unit than it came from, or in the same unit it came from if it is first managed in an intervening treatment or storage unit. If the waste is moved around or consolidated in the same unit or "area of contamination", consolidated without being managed in an intervening unit, then "placement" does not occur.

The Department has not yet incorporated the land disposal prohibitions into ch. NR 181, Wis. Adm. Code, but intends to do so in the future. Once those rules are adopted, the Department will consider adopting the U. S. EPA policies and guidance related to them. In the meantime, the Department can consider, on a case by case basis, U. S. EPA's policies when formulating its own policies on the re-disposal issue.

WMI has requested that the Department regulate wastes removed from the landfill differently. Specifically, WMI has requested that:

1. Material removed from the landfill that has "clearly been significantly contaminated by demonstrable mixing and are removed for placement at a different management unit..." would be the only material managed as a hazardous waste in accordance with the condition.

2. The Department grant a treatability variance for soil and debris from the landfill and allow removed waste to replaced In the existing fill or disposed of at Parkview Landfill.

3. That leachate from the landfill be assigned the hazardous waste number for all the hazardous wastes known to be accepted at the landfill.

In response to request 1, limiting the requirements to material that has "clearly been significantly contaminated by demonstrable mixing" would not meet the intent of the "derived-from" and "mixture" rules under ch. NR 181, Wis. Adm. Code. In addition, such a limit would be contrary to U. S. EPA's regulations; we are not aware of any federal policy that limits these two rules as this proposed language would. Finally, it is not clear who would make such a demonstration. Any material from the landfill that has the potential to be contaminated by hazardous constituents must be managed as a hazardous waste. However, in response to the submitted comments and the

September 14 meeting discussion, the Department can further refine the condition to more clearly indicate that if soil, including cover soil, and groundwater is demonstrated by WMI to not be contaminated, then it would not be regulated as a hazardous waste in accordance with the condition. This was the condition's original intent. Until a "deminimus" rule is in place, the Department has latitude in judging if a demonstration method is adequate. Generally, the Department's policy is to require testing of the material, and field screening methods can be considered, depending on the hazardous constituents of concern (i. e., if VOC's are of concern, an Hnu or OVA screening method may be appropriate). Also, Department field staff may determine, on a case by case basis, that certain materials are not considered contaminated based on field observations.

Request 1 also has language further limiting the requirements only to material "removed for placement in a different management unit". This limitation would defeat the purpose of the condition and would generally allow re-disposal on site without limits. This would be in clear violation of ch. NR 181, Wis. Adm. Code, as outlined in the second paragraph of the response to the Condition No. 4 comments, above. We also note this would be in conflict with the Closure and Long-Term Care plan, page 2-10. The Department does not intend to grant a "blanket" approval to the re-disposal of waste in the landfill during the entire long-term care period. Therefore, the condition will not be revised to conform with this request. However, in light of U. S. EPA's policies, as discussed above, the Department is willing to consider, on a case by case basis, requests for re-disposal of wastes associated with remedial actions and investigations, with each separate remedial action or investigation proposal. That will allow the Department to take into account any changes in U. S. EPA guidance or policy, the kinds of wastes being generated, any testing requirements, and the portion of the landfill the wastes are being re-disposed of in. The Department will not approve such proposals unless they conform with any U. S. EPA guidance, policy or regulations in effect at the time.

Request 2 refers to a variance authority under the HSWA land disposal prohibitions, which are not contained in ch. NR 181, Wis. Adm. Code at this time. Therefore, the Department does not have the authority to consider such a variance, so the condition can't be changed in response. In addition, it is not clear that U. S. EPA will grant this variance authority to a state as part of the authorization process.

Request 3 refers to a letter regarding a leachate pretreatment pilot facility that has since closed at the landfill. The Department has no objection to the suggested waste code designation. The proper procedure to formally notify the Department and U. S. EPA of a waste code designation is through specific correspondence and a revised notification form. However, it should be noted that if such material (or any other material from the site covered by this condition) is manifested, a specific waste code or code(s) will be needed on the manifest form. Questions on this issue should be directed to the Department's Southeast district hazardous waste staff. No revision to the determination appears to be necessary to respond to the request.

BEFORE THE
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

CONDITIONAL CLOSURE AND
LONG-TERM CARE PLAN APPROVAL (MODIFICATION)
OMEGA HILLS NORTH LANDFILL
EPA ID# WID000808568

CONDITIONAL CLOSURE AND LONG-TERM CARE PLAN
APPROVAL (MODIFICATION)

The Department hereby approves the Closure and Long-Term Care Plan for the landfill, subject to the following conditions which hereby modify the plan:

4. All wastes, liquids, contaminated groundwater, contaminated soils or other materials removed from the landfill as a result of any construction, remediation or investigation shall be managed as a hazardous waste at a facility licensed, permitted or approved to accept such wastes, in accordance with s. NR 181.21(4), Wis. Adm. Code, regardless of where the material originates. The Department shall consider specific requests by WMI, on a case by case basis, on whether soil or groundwater to be removed from the landfill is contaminated and therefore subject to this condition. The Department shall consider specific requests by WMI, on a case by case basis, on whether material removed as part of a particular remedial action or investigation may be managed in an different fashion than set out in this condition, but only when such requests accompany the particular remedial action or investigation proposal.

Appendix B. **NOTE: This is a WDNR scanned version of this USEPA Quick Reference Fact Sheet. The WDNR believes it is an accurate facsimile of the Fact Sheet, but the reader should obtain a copy of the original if there is any question of accuracy.**

EPA-	Publication: 9345.3-O3FS April 1992 United States Environmental Protection Agency, Office of Solid Waste and Emergency Response **Office of Emergency and Remedial Response Hazardous Site Control Division OS-220W Quick Reference Fact Sheet**

Guide to Management of investigation—Derived Wastes

CERCLA field investigation activities (e.g., remedial investigation/feasibility studies and remedial designs) may result in the generation of waste materials that may pose a risk to human health and the environment These investigation-derived wastes (IDW) may include drilling muds, cuttings, and purge water from test pit and well installation; purge water, soil, and other materials from collection of samples; residues (e.g., ash, spent carbon, well development purge water) from testing of treatment technologies and pump and treat systems; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment. The management of IDW must ensure protection of human health and the environment and comply with (or waive) regulatory requirements that are applicable or relevant and appropriate requirements (ARAR). **This fact sheet presents an overview of possible IDW management options, discusses the protectiveness requirements and ARARs associated with these options, and outlines general objectives established for IDW management under Superfund.**

The general options for managing IDW (see Highlight 1) are collection and either (1) immediate disposal or (2) some type of interim management. Interim management may include storage or other temporary measures. As discussed below, the specific option selected will depend on the type of waste produced, its relative threat to human health and the environment, and other site-specific conditions.

IDW MANAGEMENT REQUIREMENTS

When managing IDW, site managers are required to choose an option that: (1) is protective of human health and the environment and (2) complies with (or waives) ARARs, as described below.

Protectiveness

In determining if a particular management/disposal option is protective, site managers should consider the following:

- The contaminants, their concentrations, and total volume of IDW;
- Media potentially affected (e.g., ground water, soil) under management options;
- Location of the nearest population(s) and the likelihood and/or degree of site access;
- Potential exposures to workers; and
- Potential for environmental impacts.

---

[1] Management of treatability study and treatment pilot wastes is discussed in Guide for Conducting Treatability Studies Under CERCLA, Interim Final, December 1989, EPA/540/2-89/058. Information on management of IDW generated during Preliminary Assessments and Site Investigations is provided in Management of Investigation-Derived Waste During Site Investigations, May 1990, EPA/540/G-91/009.

As a general rule, it will be necessary to use best professional judgment, in light of the site-specific conditions, to determine whether an option is protective of human health and the environment. For example, a site manager may determine that storing IDW temporarily until the final action or returning IDW to its source is protective, based on knowledge that the material **poses** low risk and/or that the final action will address any risks posed by the wastes and there will be no unacceptable risks in the interim.

Alternatively, if the site includes or is near residential areas, the site is unsecured, and/or contaminants appear to be present at unacceptable levels, it may not be protective to return excavated soil to the source. Storing IDW in containers in an on-site, secure location, or sending it off site immediately may be more appropriate.

Site managers also need to consider the potential effects of IDW management-related activities on environmental media. For example, pouring contaminated purge water on the ground around a well may not be prudent, because such an action could mobilize any hazardous constituents present in the soil or introduce contaminants into clean soil.

Compliance with ARARs

Remedial Investigation/Feasibility Study (RI/FS) and Remedial Design (RD) actions must comply with ARARs "to the extent practicable, considering the exigencies of the situation" (NCP, 55 FR 8756, emphasis added); therefore, it generally will not be necessary to obtain a waiver if an ARAR cannot be attained during these actions. If a site manager determines that, based on site-

Highlight 1: IDW Management Options

Type of IDW	**Generation Processes**	**Management Options**
Soil	• Well/test pit installation • Borehole drilling • Soil sampling	• Return to boring, pit, or source immediately after generation • Spread around boring pit, or source within the AOC+ • Consolidate in a pit (within the AOC) • Send to on-site TDU+ • Send to TDU off site immediately • Store for future treatment and/or disposal
Sludges/sediment	• Sludge pit/sediment sampling	• Return to boring pit, or source immediately after generation • Send to on-site TDU • Send to TDU off site immediately • Store for future treatment and/or disposal
Aqueous liquids (ground water, surface water, drilling fluids, other wastewaters)	• Well installation/development • Well purging during sampling • Ground water discharge during pump tests • Surface water sampling	• Discharge to surface water • Pour onto ground close to well (non-hazardous waste) • Send to on-site TDU • Send to off-site commercial treatment unit • Send to POTW+ • Store for future treatment and/or disposal
Decontamination fluids	• Decontamination of PPE+ and equipment	• Send to on-site TDU • Evaporate (for small amounts of low contamination organic fluids) • Send to TDU off site immediately • Store for future treatment and/or disposal
Disposable PPE	• Sampling procedures or other on-site activities	• Send to on-site TDU • Place in on-site industrial dumpster • Send to TDU off site immediately • Store for future treatment and/or disposal

*The generation processes listed here are provided as examples. IDW may also be produced as a result of activities not listed here. +AOC: Area of Contamination (AOCs at a site may not yet have been identified at the time of the RI/FS); TDU: Treatment/disposal Unit; POTW: Publicly Owned Treatment Works; PPE Personal Protective Equipment specific factors, compliance with an ARAR is practicable but an ARAR waiver is warranted for an RI/FS or RD action, an interim action waiver may be available if the final remedy will attain the ARAR. An action memorandum should be prepared for the waiver, the state given an opportunity to comment, and the decision document placed in the administrative record.

Potential ARARs for IDW at CERCLA sites include regulations under the Resource Conservation and Recovery Act (RCRA) (including both Federal and State underground injection control (UIC) regulations), the Clean Water Act (CWA), the Clean Air Act (CAA), the Toxic Substances Control Act (TSCA), and other State environmental laws. How these various requirements may direct or influence IDW management decisions is described below.

Resource Conservation and Recovery Act (RCRA). Certain sections of the RCRA Subtitle C hazardous waste regulations (e.g., land disposal restrictions and storage restrictions) may be ARARs for IDW should RCRA hazardous waste be identified at a site. (Note that RCRA may be relevant and appropriate even if the IDW is not a RCRA hazardous waste.) A waste is hazardous under RCRA if it is <u>listed</u> as such in 40 CFR 261.31 - 261.33 or if it exhibits one of four <u>characteristics</u>: ignitability, corrosivity, reactivity, or toxicity.

Site managers should not assume that a waste considered to pose a potential risk at a CERCLA site is a listed or characteristic RCRA hazardous waste. Until there Is positive evidence (records, test results, other knowledge of waste properties) that the IDW Is a RCRA hazardous waste, site managers should manage it in a protective manner (but not necessarily In accordance with Subtitle C requirements). Business records or facility processes should be examined to determine whether RCRA listed wastes were generated and are present in the IDW. For characteristic wastes, site managers should rely on testing results or on knowledge of the material's properties. If best professional judgment and available information indicate that, for protectiveness reasons (or because RCRA requirements are relevant and appropriate), IDW is best managed as a "hazardous waste," management in accordance with Subtitle C requirements is prudent, regardless of whether it is known to be a RCRA waste.

If aqueous liquid IDW is considered a RCRA hazardous waste, the site manager should determine whether the Domestic Sewage Exclusion (DSE) applies to the discharge of that IDW to a POTW. The RCRA DSE exempts domestic sewage and any mixture of domestic sewage and other wastes that passes through a sewer system to a POTW for treatment from classification as a solid waste and, therefore, as a RCRA hazardous waste (40 CFR 261.4).

- <u>Land Disposal Restrictions</u>

If IDW is determined to be a RCRA hazardous waste and subject to the land disposal restrictions (LDRs), "land disposal" of the IDW will be prohibited unless specified treatment standards are met (see Superfund LDR Guides #5 and #7, <u>Determining When LDRs Are Applicable to CERCLA Response Actions</u> and <u>Determining When LDRs Are Relevant and Appropriate to CERCLA Response Actions</u> OSWER Directive 93473.05FS and 9347.3-08FS, June 1989 and December 1989 and the NCP, 55 FR 8759, March 8, 1990). "Land disposal" occurs when wastes from different AOCs are consolidated into one AOC; when wastes are moved outside an AOC (for treatment or storage) and returned to the same or a different AOC; or when wastes are excavated, placed in a separate hazardous waste management unit such as an incinerator or tank within the AOC, and then redeposited into the AOC.

Storing IDW In a container ("a portable device In which a material Is stored, transported, treated, disposed of, or otherwise handled" (40 CFR 260.10)) within the AOC and then returning it to Its source, however, Is allowable without meeting the specified LDR treatment standards. Under the definition of "hazardous waste management unit" (40 CFR 260.10), EPA states that "a container alone does not constitute a unit; the unit includes the containers and the land or pad upon which they are placed." Therefore, returning IDW that has been stored in containers (not tanks or other RCRA-regulated units) within the AOC to its source does not constitute land disposal, as long as containers are not managed in such a manner as to constitute a RCRA storage unit as defined in 40 CFR 260.10. In addition, sampling and direct replacement of wastes within an AOC do <u>not</u> constitute land disposal.

- <u>Storage</u>

Subtitle C outlines the storage requirements for RCRA hazardous wastes. Under RCRA, "storage" is defined as "the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere" (40 CFR 260.10).

On-site Superfund actions are only required to comply with the substantive standards of other laws (see 40 CFR 300.5, definitions of applicable or relevant and appropriate requirements). Superfund sites are also exempt from permit requirements under CERCLA §121(e). Therefore, site managers are not required to comply with administrative requirements triggered by RCRA storage deadlines (e.g., contingency planning, inspections, recordkeeping). Generally equivalent administrative activities are undertaken at Superfund sites, however, under existing Superfund management practices.

Site managers storing known RCRA hazardous waste must comply with the substantive, technical requirements of 40 CFR Parts 264 and 265 Subparts I (containers), J (tanks), and L (waste piles), to the extent practicable. (See Highlight 2 for a summary of these technical requirements for each type of unit). In addition, the ground-water monitoring requirements of 40 CFR Parts 264 and 265 Subpart F are potential ARARs, and to the extent they are determined to be ARARs at a site, they should be attained to the extent practicable (or waived). (In many cases, ground-water monitoring conducted during the RI/FS will provide protection equivalent to the Subpart F requirements.)

[NOTE: Under the LDRs, restricted RCRA hazardous waste may not be stored at a site unless the storage is solely for the purpose of accumulating sufficient quantities of the waste to facilitate proper disposal, treatment, or recovery (see 40 CFR 268.50). Generally, storing IDW until a final disposal option is selected in a Record of Decision (ROD) and Implemented during the remedial action is allowable storage under the RCRA LDR storage prohibition.]

- <u>Recordkeeping and Manifesting</u>

If hazardous wastes are sent off site, the site manager must comply with both administrative and substantive elements of the RCRA generator requirements of 40 CFR Pan 262 and LDR notification and certification requirements of Part 268. (For example, a site manager must prepare an LDR notification and certification when restricted wastes are sent off site to a land disposal facility.) These standards include requirements such as manifests for shipping waste that list <u>all</u> hazardous waste listing and characteristics applicable to the waste (see 40 CFR 262.11), packaging and transport requirements, and recordkeeping requirements.

If the LDRs are applicable, the following information should be collected and available before the removal of wastes to an off-site disposal facility: EPA hazardous waste number, LDR treatment standards, manifest number for the waste shipment, and waste analysis data.

Highlight 2:

Examples of RCRA Technical Storage Requirements

RCRA storage requirements, applicable to both less-than-90-days generators and permitted or interim status storage facilities, may include the following substantive requirements:

<u>Containers</u> 40 CFR 264 Subpart I and 265 Subpart I

- Containers must be in good condition
- Wastes must be compatible with containers
- Container must be closed during storage
- Container storage areas must have a containment system that can contain 10 percent of the volume of containers or of the largest container
- Spilled or leaked waste must be removed from the collection area as necessary to prevent overflow

<u>Tanks</u> 40 CFR 264 Subpart J and 265 Subpart J

- Tanks must have a secondary containment system that includes a liner, a vault, a double-walled tank, or an equivalent device (applies only to certain tanks)

<u>Waste Piles</u> 40 CFR 264 Subpart L and 265 Subpart L

- Waste piles must have a liner and a leachate collection and removal system
- Owners/operators must have a run-on control system to prevent flow on to the active portion of the pile during peak discharge from at least 25 year storm
- Owners/operators must have a run-off management system to collect and control at least the water volume resulting from a 24-hour, 25-year storm

- This is a partial list of substantive requirements. For more detail, see 40 CFR Part 264 and 265.

- <u>Underground Injection Control (UIC) Program</u>

Under the UIC regulations, RCRA hazardous wastes may be injected into Class I permitted wells. In some cases, hazardous liquids, such as extracted ground water from pump and treat operations, may be injected into a Class IV

UIC well. For example, ground water contaminated with RCRA hazardous wastes may be injected into Class IV permitted wells if it is part of a CERCLA response action or a RCRA corrective action and if it has been treated to 'substantially reduce hazardous constituents prior to such injection..." (RCRA § 3020(b)). (See Applicability of Land Disposal Restrictions to RCRA and CERCLA Ground Water Treatment Reinjection OSWER Directive #9234,1-06, December 1989.)

- Non-RCRA Hazardous Wastes

Some non-RCRA hazardous waste may be subject to management requirements under Subtitle D of RCRA as solid wastes. Subtitle D regulates disposal of solid waste in facilities such as municipal landfills. Therefore, non-RCRA hazardous IDW, such as decontaminated PPE or equipment, may need to be disposed of in a Subtitle D facility (depending on State requirements).

Clean Water Act (CWA). Discharges of aqueous IDW to surface water and publicly owned treatment works (POTWs) may be required to comply with CWA Federal, State, and local requirements. Requirements to be met may include water quality criteria, pre-treatment standards, State water quality standards, and NPDES permit conditions. Direct discharges to on-site waters are subject only to substantive requirements, while discharges to POTWs and other off-site discharges must comply with both a substantive and administrative CWA requirements (including Permitting requirements). (See Guide to Discharging CERCLA Aqueous Wastes to POTWs. June 1991 and CERCLA Compliance with the CWA and SDWA, #9234.2-06FS, January 1991.)

Toxic Substances Control Act (TSCA). If IDW contains PCBs, TSCA treatment and/or disposal requirements may apply during its management TSCA requirements regulate the disposal of material contaminated with PCBs at concentrations of 50 ppm or greater as found on site (i.e., based on sample analysis and not the PCB concentration of the source material {e.g., transformer fluid}). (See PCB Guidance Manual, EPA/540/G-90/007, August 1990.) In addition, TSCA storage requirements may apply that limit the time that PCBs may be stored to one year. Furthermore, if PCB materials are mixed with a RCRA hazardous waste, they may be regulated by the LDR California list prohibitions. (See RCRA sections 3004(d)(2)(D) and (E).)

Department of Transportation (DOT) requirements. Where IDW will be disposed of off site or transported on public roads to a site, DOT requirements for containerizing, labeling, and transporting hazardous materials and substances may apply.

State requirements. Promulgated State regulations that are legally enforceable, timely identified, and more stringent than Federal regulations may be potential ARARs for IDW managed on site. Substantive requirements of State law that may be ARARs for IDW management include State water quality standards, direct discharge limits and RCRA requirements (including underground injection control regulations) promulgated m a State with an authorized RCRA hazardous waste management program (as well as programs authorized by State laws). Off-site, substantive and administrative requirements of State law may apply.

Off-Site Policy. In addition to complying with requirements of Federal and State laws all off-site disposal of wastes must comply with CERCLA section 121(d)(3) and the CERCLA Off-Site Policy (OSWER Directive No.9834.11 (November 13, 1987)). The Off-Site Policy establishes criteria for selecting an appropriate treatment, storage, or disposal facility (TSDF), including release criteria for all facilities that receive wastes from CERCL A authorized or funded response actions. In addition, receiving facilities must be in compliance with all "applicable laws."

Before shipping wastes off site, approval should be obtained for the proposed disposal facility from EPA's Regional Off-Site Policy Coordinator. In addition, EPA has adopted a policy for Superfund wastes shipped out of State that written notification should be provided to receiving States (OSWER Directive 9330.2-07, September 14, 1989).

GENERAL OBJECTIVES FOR IDW MANAGEMENT

In addition to the two requirements of protectiveness and compliance with ARARs to the extent practicable (on site) or compliance with applicable law (off site), EPA has identified two general objectives that Superfund site managers should consider when managing IDW: (1) minimization of IDW generation; and (2) management of IDW consistent with the final remedy for the site. The extent to which these objectives can be achieved is highly dependent on site-specific circumstances.

IDW Minimization

Site managers should strive to minimize the generation of IDW to reduce the need for special storage or disposal requirements that may result in substantial additional costs yet provide little or no reduction in site risks relative to the final remedial action. Generation of IDW can be minimized through proper planning of all remedial activities that may generate IDW, as well as through use of screening information from the site inspection. The potential problems of managing IDW should be a factor in choosing an investigative method. Site managers may wish to consider techniques such as replacing solvent-based cleaners with aqueous based cleaners for decontamination of equipment, reuse of equipment (where it can be decontaminated), limitation of traffic between clean and hot zones and drilling methods and sampling techniques that generate little waste. Examples of such techniques include using gridding techniques to minimize the number of test pits or using soil boring instead of test pits. Alternative drilling and subsurface sampling methods may include the use of small diameter boreholes, as well as borehole testing methods such as a core penetrometer instead of coring. Site managers should also be careful to keep hazardous wastes separate from nonhazardous wastes.

Management Consistent with Final Remedy

Most IDW (with the exception of non-indigenous IDW) generated during the course of an investigation are intrinsic elements of the site. If possible, IDW should be considered part of the site and should be managed with other wastes from the site, consistent with the final remedy. This will avoid the need for separate treatment and/or disposal arrangements.

Because early planning for IDW management can prevent unnecessary costs and the use of treatment or disposal capacity, IDW management should be considered as early as possible during the remedial process. A key decision to be made is whether the waste will best be treated/disposed of immediately or addressed with the final remedy. If addressed with the final remedy, IDW volumes should be considered in the FS. In addition, when IDW is stored on site, it should be managed as part of the first remedial action/operable unit that addresses the affected media.

SELECTION OF IDW DISPOSAL OPTIONS

The following sections present the Agency's presumptions for IDW management that have been established based on the above considerations. The actual option selected should be based upon best professional judgment and should take into account the following factors:

- The type and quantity of IDW generated (sludge/soil, aqueous liquid, non-indigenous IDW);
- Risk posed by managing the IDW on site (e.g., based on site access controls, contaminant concentrations);
- Compliance with ARARs, to the extent practicable (on site);
- IDW minimization; and
- Whether the final remedy is anticipated to be an off-site or on-site remedy (or this information is unknown) and whether IDW can be managed consistent with the final remedy.

Off-site Final Remedies

If a site manager believes that the final remedy will involve off-site disposal of wastes, EPA's presumption is to manage the IDW as part of the remedial action addressing the waste/medium. Thus, until the final action, the IDW may be stored (e.g., drummed, covered waste pile) or returned to its source. However, the management option selected should also take into account any protectiveness concerns, ARARs, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

There are several potential reasons why it may be advisable to store IDW until the final action. First, because wastes at the site will be shipped off site eventually, returning IDW (especially sludges and soil) to its source would require that it be excavated again. Thus, site managers may consider it practical to containerize IDW as soon as it is generated. Second, storing IDW in containers may be more protective than returning it to its source. Third, because off-site actions may trigger such requirements as the LDRs, temporary storage will eliminate the need to meet these additional requirements until the final remedy.

In some cases, circumstances may lead site managers to choose to return the IDW to its source. This may be appropriate if it is determined that returning IDW to the source is protective and that storage at the site is not possible or practicable (i.e., given State or community concerns). In other cases, long-term storage may not be protective, and immediate off-site disposal may be a better option.

<u>Example</u>: A site involves volatile organic RCRA hazardous wastes that will likely be sent off site for final treatment and disposal. Site conditions are such that temporary storage of IDW is considered protective until the remedial action begins. Because off-site disposal will trigger RCRA disposal requirements such as the LDRs and immediate containerization would be more protective than redepositing into the source area at the time of sampling, the site manager decides to containerize the IDW (and comply with RCRA substantive technical tank and container standards) until the final action is initiated.

<u>On-site Final Remedies (or Final Management in an Unknown Location)</u>

When final management of wastes is likely to occur on site, the management presumptions vary depending on the type of IDW produced.

Sludge/soil

Generally, the Agency expects sludge or soil IDW will be returned to its source if short-term protectiveness is not an issue. The reason behind this presumption is that IDW that may pose a risk to human health and the environment in the long term will be addressed by the final action. Storage of RCRA hazardous IDW in container-s within the AOC prior to returning It to the source will not trigger the LDRs as long as the containers are not managed In such a way as to constitute a RCRA storage unit as defined in 40 CFR 260.10. Therefore, it may be possible to store IDW temporarily before redisposing of it. However, EPA believes that, in many cases, returning sludges and soils to their source immediately will be protective and will avoid potentially increased costs and requirements associated with storage. Site-specific decisions on how to manage sludge and soil IDW may ultimately vary from the presumption based on protectiveness, ARARs, and/or community concerns.

<u>Example 1</u>: The soil at a site contains wastes that are expected to be stabilized on site during the final remedial action. The site manager determines that sending soil IDW off site is not cost-effective, because off-site disposal would involve testing and transport costs for a relatively small amount of waste. Instead, knowing that the site is secure and that redisposing the waste at the source will not increase site risk or violate ARARs, the site manager decides to return soil IDW to the source area from which it originated.

<u>Example 2</u>: A site manager determines that returning highly contaminated PCB wastes to the ground at a site is not protective because of the potential risks associated with the material; instead, the site manager chooses to drum the waste and send it off site (in compliance with TSCA). (Off-site disposal may occur immediately or at a later date.)

<u>Example 3</u>: Soil IDW contaminated with a RCRA hazardous waste is generated from a soil boring. The site manager decides to put the IDW back into the borehole immediately after generation, but ensures that site risks will not be increased (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate “clean” areas) and that the contamination will be addressed in the final remedy.

Aqueous liquids

EPA has not established a presumption for the management of aqueous liquid IDW (e.g., ground water). Site managers should determine the most appropriate disposal option for aqueous liquids on a site-specific basis. Parameters to consider, especially in making the protectiveness decision, include the volume of IDW, the contaminants present in the ground water, the presence of contaminants in the soil at the site, whether the ground or surface water is a drinking water supply, and whether the ground-water plume is contained or moving. Special disposal/handling may be needed for drilling fluids because they may contain significant solid components. Examples of aqueous liquid management decisions considering these factors are presented in the following box.

Example 1: A site manager has large volumes of ground water IDW and does not know if it is contaminated. Pouring this IDW on the ground would not be protective, because it may contaminate previously uncontaminated soil or may mobilize contaminants that are present in the soil. Therefore, the site manager stores the water in a mobile tank until a determination is made as to whether the water and soil are contaminated or until the final action.

Example 2: IDW is generated from the sampling of background, upgradient wells. Because there are no community concerns or evidence of any soil contamination from other sources, the site manager decides to pour this presumably uncontaminated IDW on the pound around the well.

Example 3: Purge water from a deep aquifer is known to be contaminated with a RCRA hazardous waste. At this site, if this water were poured on the pound, it could contaminate a previously uncontaminated shallow aquifer that is a potential drinking water source and would have to comply with the LDRs. The site manager decides to containerize the water within the AOC and store it until the final remedy.

Non-indigenous IDW

Non-indigenous IDW (e.g., sampling materials, disposable PPE, decontamination fluids) should be stored until the final remedy or disposed of immediately. If contaminated, such waste may not be disposed of onto the ground because such an action would add contamination that was not present when activities began at the site (e.g., solvents used for decontamination). If non-indigenous IDW is contaminated with RCRA hazardous waste, it must be managed in accordance with RCRA Subtitle C requirements. Otherwise, site managers may generally dispose of it in an on-site dumpster (for PPE).

Example 1: Disposable PPE (e.g, gloves, shoe covers) becomes contaminated with RCRA hazardous waste during the field investigation. The site manager containerizes and disposes of this IDW in compliance with RCRA Subtitle C requirements.

Example 2: Disposable equipment becomes contaminated during a field investigation. The site manager decontaminates them and sends them to a Subtitle D facility.

COMMUNITY CONCERNS

Residents of communities near a CERCLA site, local governments or States may have concerns about certain disposal methods or long-term storage of IDW at the site. As with all CERCLA activities, site managers should evaluate community concerns regarding disposal of IDW in deciding what action to take. For example, if a community is concerned about the direct discharge of IDW water to surface water on site, site managers may want to consider sending the water to a POTW, if one is located nearby. In some instances, it may be appropriate to prepare fact sheets include options in other community relations documents or explain IDW management decisions at public meeting prior to actions.

NOTICE: The policies set out in this memorandum are not final agency action, but are intended solely a guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this memorandum, or to act at variance with the guidance, based on an analysis of specific site circumstances. The Agency also reserves the right to change this guidance any time without public notice.

ATTACHMENT 2

SAMPLING AND TESTING OF INVESTIGATIVE WASTES

During the installation of monitoring wells and soil borings the amount of waste material generated in the form of drilling fluids and soil cuttings should be minimized. Waste materials generated from these activities will require containerization and sampling in order to determine proper disposal or treatment options. The following is a discussion of ways to not only minimize the amount of materials accumulated and thereby minimize the number of samples which have to be collected and analyzed, but also how to sample these wastes in order to best obtain representative results.

An attempt should be made to identify the exact depth within the formation where the soil cuttings originated or, in the case of drilling fluids, were in contact with the formation, if possible. When borings are extended into or below the water table it is advisable to segregate materials from a point approximately 10 feet above the top of the water table from those collected below the water table. In that way you can potentially minimize the amount of materials which may need to be sampled and characterized because they were in contact with contaminated groundwater.

When drilling off-site, or away from the area where a release occurred, an assumption can be made that soils above the water table do not contain contaminants, and therefore do not need to be containerized or sampled. This may not be true in those situations where soil gas migration may have carried contaminants off-site to adjacent properties. Field screening equipment, such as an OVM or PID, can be used to help isolate contaminated materials from `clean' soils and cuttings for the contaminants in question, when appropriate.

Materials collected as the result of drilling or soil boring activities which require containerization should be collected and stored in 55 gallon drums, roll-off containers, or similar containers which can be closed or covered watertight and are compatible with the wastes being stored in them. These drums or containers should be marked such that they can be clearly identified as to the exact location and depths the materials came from. These drums or containers should also be stored in a secured location, if possible, and labeled as special waste materials until an exact determination can be made.

If soil samples are being analyzed from a soil boring or well location, the results from those analyses must be directly tied back to the material collected and the container it was placed in. In certain cases, you may be analyzing specific samples based upon elevated readings from field screening devices. This is why very precise labeling and identification of containers is necessary. Should the samples be too widely distributed or should you be unable to field screen for elevated readings, such as with pesticide contamination, all samples will need to be analyzed for the contaminants of concern.

Samples should be taken such that they are representative of the waste material to be analyzed. For material stored in 55 gallon drums, if field readings do not detect a hot spot or area from the boring, a representative sample should be collected for every 5-55 gallon drums or portion thereof. This sample should be a discrete sample taken from approximately the middle of one of the 5 drums. If the drum contains both liquid and solid fractions, these should be sampled and analyzed separately. This assumes that soil formations for the material collected in the 5 drums are consistent in their unified soil classification system (USCS) rating and there was no visual or other indications of contamination present. Where visual observations or field readings detect elevated readings, the sample should be collected from that depth or from the container where those specific materials were placed. Standard sampling methods and procedures should be followed to ensure that the results are representative of the materials in question.

If materials are being stored in a large container, such as a covered rolloff, a minimum of two samples should be collected from opposite ends of the soil pile. Two additional samples should be collected for every additional 100 cubic yards of material being collected and stored. These should be discrete samples and should be taken from at least 18 inches below the surface of the soil pile. An attempt should be made to identify those areas of a soil pile which may contain elevated concentrations or hot spots and these areas should be segregated out and sampled individually.

Liquids collected as part of well installation or development should be segregated from soils as much as possible. If the area is served by a sanitary sewerage system, permission should be obtained from it's operator as well as the local District wastewater engineer for permission to directly discharge these liquids into that system. In most cases an analysis of the liquids will be required by the sewage treatment plant if information is not available on what contaminants are present.

All analyses should be performed using a method listed in EPA SW-846 designed to detect the target compounds. The method chosen should be one which gives an acceptable detection limit and will allow for characterization of the materials as hazardous or non-hazardous waste. Based upon these results, a determination will need to be made as to proper disposal or treatment options.

ATTACHMENT 3

LONG-TERM ON-SITE STORAGE OF INVESTIGATIVE WASTES (IW)

General

Storage of IW should be in above ground tanks or containers. Examples of tanks include large metal or fiberglass tanks and trailer tanks for hauling liquids on roads. Examples of containers are 55-gallon drums, rolloff boxes (also called "luggers") and U. S. DOT approved boxes for solids. Storage should not be in underground tanks, in-ground pits, surface impoundments, trenches or lagoons. The tanks or containers should be water tight and compatible with the IW being stored. Permanent labels that indicate the source of the wastes and their descriptions should be attached to all containers.

Containers or tanks should be stored in area with limited access, such as a fenced area or a building. If vandalism is a potential concern, consideration should be given to storing the IW in a building. Temporary buildings can be constructed for this purpose. For liquids, and especially highly contaminated liquids, consideration should be given to providing secondary containment for spills and leaks in accordance with the hazardous waste regulations (see below). For outdoor secondary containment, precipitation run on and run off control should be provided in accordance with those regulations.

Stored IW should be periodically inspected, with records kept. Deteriorating containers or tanks should be immediately replaced. Deteriorating 55-gallon drums can be overpacked. If a container label has deteriorated, it should also be replaced.

Hazardous IW Storage

Storage of hazardous IW should be in accordance with the Hazardous Waste Program regulation technical standards. The standards for containers are outlined in ss. NR 640.08 - 640.15. The standards for tanks are outlined in ss. NR 645.08 - 645.15.

Locating and Measuring Sediment Thickness in a River

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements for locating and measuring sediment thickness in a river after dredging activities. The general procedures to be utilized in the conduct of sediment probing in the river are described below. Sediment probing is performed to locate and measure the thickness of soft sediment within a particular area or location of the river. Sediment probing will be conducted by advancing a sediment probe through the soft sediment materials of the river unit refusal.

Equipment:

- Personal protective equipment (as required by the Site Health and Safety Plan);
- Cleaning equipment;
- Boat and/or chest waders;
- Calibrated sediment probing instrument(s);
- Duct tape;
- Field forms and field drawings for recording and plotting poling and probing measurements;
- Field book

Procedure (Locating Near-Shore Sediments):

The following list describes the procedures to be used when locating sediment in the river. Probing transects will be established across the RMU perpendicular to the shoreline spaced approximately every 120 feet depending on the size (area) of the RMU. RMU residual sediment thicknesses will be measured and recorded approximately every 30 feet along each transect using the following procedures:

1. Don personal protective equipment as required by the project Health and Safety Plan. If a boat is used, review the project Health and Safety Plan for health and safety requirements.

2. Record the proposed probing location in the field notebook along with other appropriate information collected.

3. Position boat (if used) over the sampling location using a minimum of two points to secure the boat.

4. Advance the probe into the sediment.

Procedure (Locating & Measuring Thickness Verification):

The following list describes the procedures to be used when conducting sediment poling and probing measurements. Probing transects will be established across the RMU perpendicular to the shoreline spaced approximately every 12.5 feet depending on the size (area) of the RMU. RMU residual sediment thicknesses will be measured and recorded approximately every 12.5 feet along each transect using the following procedures:

1. Don personal protective equipment as required by the project Health and Safety Plan. If a boat is used, review the project Health and Safety Plan for health and safety requirements.

2. Record the proposed probing location in the field notebook along with other appropriate information collected. Follow the typical example shown in Drawing No. 2 of the Verification Sampling Plan (VSP).

3. Position boat (if used) over the sampling location using a minimum of two points to secure the boat.

4. Measure the top of sediment using a metered pole with a disk attached on bottom.

6. Advance an approximately 5 cm diameter metered sediment probe into the deposit until refusal (i.e. hardpan or unconsolidated material).

7. Sediment thickness is determined by taking the difference between the sediment probe depth and the sediment disk depth.

8. Proceed to next probing location

9. Map the residual sediment thickness for the RMU as shown in Drawing No. 2 of the VSP.

10. Calculate the average thickness for the RMU by summing all recorded thickness and dividing by the total. Hardpan measurements will use a value of 0 feet.

Sample Identification

SAMPLE IDENTIFICATION FOR SHEBOYGAN RIVER PROJECT

Nomenclature Procedures:

Remedial Activity Sample Designations and Identifications

During remedial activities, various samples will be collected including: verifications samples , effluent from de-watering, dredged materials undergoing de-watering, overburden material, and surface water. Sample nomenclature for these samples is discussed in this section. Retest samples are discussed in the following section.

Post Dredging Verification Sample

Samples collected to verify concentrations following dredging will be denoted with the prefix "PD" which intuitively denotes the designation of post dredging sediments followed by the deposit location and then by a numeric character sequence (i.e., 1, 2, 3, etc.) which uniquely identifies the Soft Sediment sample collected representing the 2700 square feet remedial management unit (RMU) area.

Post dredging surface sample 1 collected from Soft Sediment Deposit 5, Near-Shore, and Armored Area 1 would be identified as depicted below:

PII-PD-DEP5-1
PII-PD-AA1-1
PII-PD-NS1

Overburden Material

"Overburden" material is described as rocks, cobbles and re-deposited material overlaying sediment deposits in the Armored Areas. "Overburden" material in direct contact with the contaminated sediments will be samples to determine PCB concentration. A sample designator "O" will be used to define "Overburden Material".

An example identification of an "Overburden" sample collected from Armored Area 1 would be as follows:

PII-O, AA1

Dredged De-Watering Materials (DDM)

During the sediment dewatering period, measurement of moisture content in the DDM will be made on a daily basis. Grab samples will be collected from 5 locations and composited. For disposal purposes, DDM are typically sampled at a frequency of approximately one composite sample per geotextile tube (approximately 1000 cubic yards) or as required by the landfill for disposal. In addition, geotechnical data (percent solids & undrained shear strength) will be collected in the field at a rate of one sample every 500 cubic yards for the first 10,000 cubic yards and then at a rate of 3,000 cubic yards thereafter. Laboratory testing for grain size distribution and undrained shear strength will also be performed at a frequency of one sample every 10,000 cubic yards. Finally, a laboratory consolidation test will be performed at a rate of one sample per 30,000 cubic yards. Excavated sediment from the Armored Areas and Near-Shore Sediments will be stockpiled and sampled per location or at a minimum frequency of one composite (5 grab locations) sample per 250 cubic yards. An example identification of a dredge dewatered material sample collected on 6/6/06 at 1 p.m. from Geotube #1 would be as follows:

PII-DWM, 6/6/06, 13:00, TUBE 1

Water Treatment Effluent Discharge

Samples will be collected at a frequency determined by the requirements of the Wisconsin Pollution Discharge Elimination System (WPDES) permit. The sample parameters will also be determined by the requirements of the WPDES permit

An example identification of an effluent sample colleted form the Water Treatment System on 6/6/06 would be as follows:

PII-DWE, 6/6/06

Surface Water

If the action level (70 ppm) for downstream turbidity is exceeded, corrective actions and/or additional sampling requirements will be made on case-by-case basis by agreement between PRS, the USEPA OSC, and the WDNR. Water sampling for PCBs may be conducted, if trigger level corrective actions are not sufficient to limit turbidity/sediment re-suspension.

An example identification of a surface water sample collected on 6/6/06 would be as follows:

PII-SW, 6/6/06

Air Sampling

Prior to loading out DDM from the site, baseline air monitoring/sampling will be performed at selected points (two) near the staging area to establish background PCB levels in the air. If visible dust emissions are noticed, action will be taken to wet the surface of the material. In addition, monitoring/sampling of the air within the staging area will occur daily during the first week of load-out of the DDM to assure that there are no PCBs that may pose a health hazard to workers in the area

An example identification of an air sample collected on 6/6/06 at location 1 would be as follows:

PII-F-FP6-A3 and
PII-N-FP6-A3

QA/QC

Standard sample designations for QA/QC will be used as needed during the Phase II sampling efforts. The QA/QC letter suffixes that will be appended to the second part of the two-part designation and naming convention will be taken from the following list:

- Sample Duplicate – “DUP”
- Field Blank – “FB”
- Matrix Soike/Matrix Spike Duplicate – “MS/MSD”
- Trip Blank – “TB”

For example, a duplicate sample collected for QA/QC purposes may be designated and identified as follows:

PII-PD-DEP5-1 DUP

MISCELLANEOUS

Miscellaneous sample designations and identifications will be used as needed throughout the Phase II sampling effort. Letter suffixes will be appended to the second part of the two-part designation and naming convention. An example of a miscellaneous sample designation may be as follows:

- Sample Composite – “COMP”
- Sample Retest – “RETEST”

Where “retest” designates a sample collected from the same location as a previously collected sample, for example, after additional dredging passes. In this case, an example identifier would be:

PII-PD-DEP5-1 RETEST

FISH TISSUE

The fish tissue sampling plan will generally be consistent with the Operation and Maintenance Plan. Given the need for consistency in collection methods and analytical work, in order to identify trends, the Operation and Maintenance Plan will define the basis for this sampling effort as modified to fit the Remedial Action work.

Sediment Sample Collection Procedure

SEDIMENT SAMPLE COLLECTION PROCEDURE

Scope: The following Standard Operating Procedure (SOP) is to be used to outline the requirements for procedures to collect sediment samples. The general procedures to be utilized in obtaining samples from the river are outlined below.

Sediment samples will be collected at a rate of four grab samples per 2700 square feet in residual sediment of the remedial management units (RMUs) and composited into a single sample. Drawing No. 2 of the Verification Sampling Plan (VSP) shows a typical plan view of sediment sampling. Sampling will be collected from those locations determined to have sediment present after probing. If a sample is not obtained from a potential location, attempts will be made at other locations where sediment is known to be present. If hardpan (consolidated material) is determined after probing, a value of the detection limit (0.017 ppm) will be assigned to this location and used in the Surface Weighted Average Concentration (SWAC) calculations as it relates to the percentage of area within that RMU. Soft sediment or unconsolidated material that cannot be collected after 2 unsuccessful attempts with a Petite Ponar dredge will be assigned a value of 0.5 ppm as determined from the *RMU Verification Sampling & Calculation of SWAC – Sheboygan River Superfund (Upper River), Wisconsin Department of Natural Resources (WDNR), 1/24/2006* and used in the SWAC calculation as it relates to the percentage of area within that RMU. If a sample can be collected anywhere in the RMU not from no more than four locations, that PCB concentration would be used to represent all residual sediment in that RMU.

Equipment:

The Ponar dredge is ideal for sediments. A rope and trigger mechanism or "messenger" are used when collecting sediment samples with this dredge. This dredge can take a deeper bite in the sediment. Additionally, weights can be added if necessary.

Health and Safety:

- The jaws can come together with force.
- Refer to manufacturer's recommendations and Health & Safety Plan.
- Gloves and waders (or PPE) should be worn while collecting and processing samples.

Cautions:

- The dredge occasionally becomes jammed by gravel becoming lodged between the end plate and the closing jaw.
- Possible disturbance of surface film of the substrate; can be overcome by lowering gently through the last 1-2 feet.
- The Ponar dredge is heavy.
- Potential loss of very fine grained surface deposits while sample is being retrieved from sampling area.
- Somewhat difficult to decontaminate.

Personnel Qualifications:

- Personnel may need to be certified under OSHA regulations.
- Individuals should be familiar with the use of sampling equipment.

Apparatus and Materials:

- Ponar Dredge
- Gloves
- Personal Protective Equipment
- Cooler and ice
- Pole or rope
- SS Mixing pan
- Chest waders
- Sample tags and/or labels
- Sample containers
- Chain-of-Custody forms
- Paper towels
- Water Proof Marker
- Logbook

Sampling Procedure:

1. Attach the necessary length of rope (a bowline knot is best) to the Petite Ponar dredge.

2. Set the trip mechanism on the dredge. Be careful not to place fingers or hands on or into any pinch points.

3. Lower dredge through the water column to the sediment, causing minimal disturbance to the final 1-2 feet of water. Trip the dredge by allowing the line to slacken. The jaws should clamp shut when the rope is retrieved, grabbing a sediment sample.

4. The dredge should be slowly raised through the water column, excess water poured off, and placed in a stainless steel bowl or pan for processing. Try not to pour off the sediment.

5. Deposit the sediment into the stainless steel mixing bowl to create a composite sample. Additional samples shall be added from the pre-determined location, as determined from probing.

6. Record sediment characteristics in the field log book.

7. Repeat the above procedures until all samples are collected for the composite sample.

8. Mix the sediment with a clean spoon thoroughly or until visually homogeneous. During this operation, remove any obviously "non-sediment" objects from the sample; bottle caps, broken glass, sticks, large rocks, etc. (Buckets and spoons are pre-cleaned according to decontamination protocols.)

9. Label all sample containers and record all appropriate information in the field notebook.

10. Handle, pack and ship the samples in accordance with the procedures in QAPP and SOP #P1-1.

Field Duplicates and Blanks:

Field duplicates will be collected for sediment cores by replicating subsamples of a composited sample from the mixing bowl.

Rinsate blanks will be collected by rinsing distilled water into and over all decontaminated equipment collecting the rinse water in appropriate sample containers.

Surface Water Sampling

SURFACE WATER SAMPLING PROTOCOLS

Scope:

The following sections present surface water sampling protocols.

Equipment:

The following shall be considered prior to surface water sampling:

1) Review the work program, project documents, and the health and safety requirements.

2) Assemble all equipment and supplies.

3) Contact the laboratory and arrange for the following:

   - glassware;
   - coolers;
   - shipping details; and
   - starting date

4) Inform the appropriate regulatory groups, Client personnel, landowner, PRS personnel, and laboratory of the pending sample events.

Procedure:

Once the prior planning and preparation activities are completed, surface water sampling can proceed at the respective location(s). Quality Control samples will be collected in accordance with the QAPP. Surface water samples will be collected as grab samples and may be collected by reaching into the water, wading into the water, or from a boat. Initially, a grab sample will be collected and measured in the field for turbidity (see the Field Measurement of Turbidity SOP).

Grab samples will be collected by placing jars with lid on into the stream at approximately the midpoint of the water column, removing lid to allow jar to fill, and placing lid back on when full.

Note: Sampling should progress in an upstream direction should multiple samples be collected. Samples should be collected upstream from where the sampler is standing in order to avoid any potential sediment disturbance caused by the sampler.

1) Sample Collection Analysis Parameters

   - PCBs

2) Sample Acquisition and Transfer

   Samples collected for other parameters will be collected in the jars prescribed in the QAPP. Samples will be handled, pack, and shipped in accordance with the QAPP and SOP #P1-1.

   All samples must be labeled in accordance with the Chain-of-Custody and Labeling SOP as well with the Sample Identification for the Sheboygan River Project SOP.

Follow-up activities:

The following shall be performed once field activities are complete.

1) Double check Work Plan to ensure all samples have been collected.
2) Equipment shall be cleaned and returned to the office or vendor.
3) Notify the contract laboratory as to when to expect the samples. The chain-of-custody indicating the parameters and number of samples shall be enclosed in the sample cooler.

State of Wisconsin
Department of Natural Resources

CHAIN OF CUSTODY RECORD
Form 4100-145 7-87

Sample Collector(s)	Title/Work Station	Telephone No. (include area code)
Property Owner	Property Address	Telephone No. (include area code)

Split Samples: Offered? ☐ Yes ☐ No (Check One)
Accepted? ☐ Yes ☐ No (Check One) Accepted By: ______________________
Signature

Field ID No.	Date	Time	Sample Type Comp	Sample Type Grab	Station Location Sample Description	Lab ID Number	No. of Containers	Comments

I hereby certify that I received, properly handled, and disposed of these samples as noted below:

Relinquished By (Signature)	Date/Time	Received by: (Signature)
Relinquished By (Signature)	Date/Time	Received by: (Signature)
Relinquished By (Signature)	Date/Time	Received for Laboratory By: (Signature)

Disposition of Unused Portion of Sample:

Dispose __________ Retain for __________ days

Return __________ Other __________

Company Name		20000197
Sample ID		
Project	Sample Date	Sample Time
Bottle Desc. Plastic 1000mL Oblong, HDPE		
Preservatives: HNO3		Filtered ___ Unfiltered X
Analysis Requested Comments		
Metals		

STL
SEVERN TRENT
489814

Custody Seal

DATE

SIGNATURE

SEVERN TRENT
489814
STL

STL-4145

Density Tests of Compacted Fill

Contractor: ______________________

Compaction Equipment: ______________________

____

Weather: ______________________

Method of Test:

☐ Nuclear Meter *(ASTM: D2922)*

☐ Sand Cone *(ASTM: D1556)*

Area/Location Tested: ______________________

____

____

Report Number: ______________________

Test No.	Test Location	Depth of Probe	Elevation	Proctor Used	Wet Density *(pcf)*	Moisture Content *(%)*	Dry Density *(pcf)*	Percent Compaction	Remarks

Proctor No.	Soil Classification	Max. Dry Density *(pcf)*	Moisture Content *(%)*	Compaction Spec. *(%)*

General Note:
Density test results are valid only at the locations and elevations tested.

Nuclear Meter Used: ______________________

Model: __________ Serial No.: __________

Standard Counts: ______________________

Density: __________ Moisture: __________

Foth & Van Dyke

Client: ______________________ Scope I.D.: __________

Project: ______________________ Page: __________

Prepared by: ______________________ Date: __________

Checked by: ______________________ Date: __________

FORM CES011 (Rev. 10/97)

Foth & Van Dyke

Client: ______________________ Scope ID: ________

Project: ______________________ Page: ________

Prepared By: ______________________ Date: ________

Construction Observation Report

Location ____

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Site Conditions (describe)	
	Low	High	Clear Pt. Cldy Cloudy	None	Rain	Snow	Dry	Muddy

Contractors on site *(include no. of personnel per contractor)*

____

____

____

____

____

Other personnel on site ______________________ *Purpose* ______________________

____

Work observation report, comments: ____

____

For additional comments, use back of form.

Foth & Van Dyke

Client: ______ Scope ID: ______

Project: ______ Page: ______

Prepared By: ______ Date: ______

Construction Observation Report

Work observation report, comments (continued): ______

Sheboygan River: Upper River - Phase I & II
Sheboygan County, Wisconsin

Soil Sample Tracking Log

Sample ID #	Source	Date Sampled	Sampler	Date Shipped	Test Methods Requested	Test Results	Notes

Request for Clarification/Information #_____

Date Issued:	Date Response Required:
Engineer: Foth & Van Dyke	Attention:
Organization: Foth & Van Dyke	Project Name: Sheboygan River – Upper Phase I & II
Originator:	Subject:
Concern:	
Engineer's Signature:	Date:

Pollution Risk Services

Foth & Van Dyke

Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Draft Construction Quality Assurance Plan

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Draft Construction Quality Assurance Plan

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

Draft Construction Quality Assurance Plan

Contents

Tables

Figures

Appendices

1 Introduction

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five (55) miles north of Milwaukee, Wisconsin, in Sheboygan County (Drawing No. 1). The Site includes the former Tecumseh Manufacturing site, the lower fourteen (14) miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner Harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the Remedial Investigations (RI), the river was segmented in separate sections based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four (4) miles to the Waelderhaus Dam in Kohler. The Middle River extends seven (7) miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. The Lower River extends three (3) miles from the C&NW railroad bridge to the Pennsylvania Avenue bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work which included plant site soils, groundwater, and river bank soils was completed in 2004. Phase II remedial action work includes Upper River Near-Shore Sediments, Armored Areas, and Soft Sediment deposits and is scheduled for 2006 implementation. Remedial construction methods for the Floodplains are deferred pending the outcome of additional discussions between United States Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), Pollution Risk Services, LLC. (PRS), and property owners of potentially impacted Floodplains.

This RD document has been generated to be consistent with the *Record of Decision (ROD),* (May 2000), *Consent Decree (CD),* (May 2004), and *Upper River Statement of Work (URSOW),* (Jan. 2003). This Draft Construction Quality Assurance Plan (CQAP) addresses quality assurance and quality control for the construction portion of the Upper River Phase II - Soft Sediments. In accordance, with the *CD* the final CQAP will be submitted with the Remedial Action Work Plan (RAWP).

1.1 Definitions

Construction Quality Assurance (CQA) procedures refer to the means and actions employed and/or overseen by Foth & Van Dyke acting as Supervising Contractor, on behalf of the Owner to assure conformity of the final construction activities with the approved *Consent Decree* and RD/RA documents.

Construction Quality Control (CQC) refers to those actions taken by Contractor(s), manufacturers, fabricators, installers, and Subcontractors to ensure that the materials and workmanship meet the requirements of the approval plans. All quality control information will be reviewed by Foth & Van Dyke as a standard quality assurance function. Reviews will be made of Contractor(s) submittals during the pre-construction phase and continues throughout construction.

This CQAP describes the processes and components necessary to implement and document the Construction Quality Assurance (CQA) and Quality Control (QC) process to assure that the materials and workmanship meet the project requirements. This CQAP applies to manufacturing, shipping, handling, installing and design guidelines in conjunction with the approved Contract Drawings, Specifications, and Work Plans.

2 Project Organization

The parties discussed in this Section are associated with the ownership, design, manufacture, supply, transportation, installation and quality assurance for the construction associated with the remedial action. Figure 1 shows the organizational chart for the Phase II RA work.

2.1 USEPA Project Coordinator

2.1.1 Responsibility and Authority

The USEPA Project Coordinator will track overall progress of PRS in meeting the conditions of the *URSOW* and the *CD*. In addition, the USEPA will be responsible for approval of project design and subsequent changes.

2.2 WDNR Project Manager

2.2.1 Responsibility and Authority

The WDNR Project Manager will provide approval for overall project activities, monitor progress, and communicate with other WDNR project personnel.

2.3 Project Coordinator/Settling Defendant

Pollution Risk Services, LLC (PRS) is the Project Coordinator/Settling Defendant for the Upper River Remedial Action. PRS will have a Site Manager assigned to the Upper Remedial Action who will function as the Project Coordinator for all on-site activities.

2.3.1 Responsibility and Authority

PRS will have the final responsibility to ensure the construction is in general accordance with the approved Contract Drawings and Specifications. PRS also has primary responsibility for submitting required information to the appropriate regulatory agencies. Submittals will include:

1. Contract Drawings, Specifications and this CQAP,
2. Record Drawings, and
3. Construction Documentation Report (CDR).

2.4 Supervising Contractor, Foth & Van Dyke

Foth & Van Dyke is the Supervising Contractor for Upper River Phase II activities of the project.

2.4.1 Responsibility and Authority

The Supervising Contractor will be responsible for coordination of the Construction Quality Assurance (CQA) activities and the organization and implementation of this CQAP. Other responsibilities will include selection and approval of Contractor(s), Subcontractors, and manufacturers in consultation with the Project Coordinator; and design and submittal review. The Supervising Contractor is authorized to approve design changes in the field on behalf of PRS.

The Supervising Contractor shall serve as communication coordinator for the project. As communication coordinator, Foth & Van Dyke shall act as liaison between all parties involved in the field implementation of the project to maintain communications and shall also be responsible for the resolution of any quality assurance issues which may arise during construction.

2.5 Engineering & Design Manager

2.5.1 Responsibility and Authority

The Design Engineer will be responsible for the engineering design and Contract Drawings and Specifications for the final Remedial Action (RA). The Design Engineer will be responsible for approving all design and specification changes and making design clarifications, which may be required during construction. The Contract Drawings, Specifications, CQAP, and CDR shall be approved by PRS. Foth & Van Dyke and PRS will share Design Engineer responsibilities.

2.6 Health & Safety Manager

2.6.1 Responsibility and Authority

The Health and Safety Manager will be responsible for coordination and communication with the Project Coordinator, the Supervising Contractor, and Subcontractors regarding all health and safety issues. The Health and Safety Manager will implement the requirements of the *Site Specific Health and Safety Plan* (HASP), (Vol. II, Appendix J) for the duration of field activities.

2.7 Construction Quality Assurance Official and Staff

Foth & Van Dyke (FVD) will provide the Construction Quality Assurance Staff (CQA Staff), including a CQA/CQC Site Engineer and CQA Technicians (as necessary). Jim Hutchison, P.E. was selected jointly by PRS and Supervising Contractor to oversee CQA/CQC and act as the Quality Assurance Official. A copy of Mr. Hutchison's resume is included in Appendix B.

2.7.1 Responsibility and Authority

The CQA Official and Staff are responsible for:

1. Observation and documentation of construction activities requiring certification,
2. Reviewing the calibration certificates of testing equipment,
3. Reviewing the results of laboratory testing to ensure the materials meet or exceed project specifications,
4. Verifying that installation requirements are met and submittals are received,
5. Maintaining field and central filing systems and providing copies,
6. Implementing the field sampling and testing components of this CQAP,
7. Generating photographic documentation of project activities for the CDR,
8. Maintaining daily reports of construction and Quality Control (QC) activities as outlined in this CQAP,
9. Summarizing construction reports and documenting problems and resolutions, and
10. Preparing a monthly summary of construction activities.

The Site Engineer and CQA Staff shall be experienced in the procedures of Quality Assurance field inspection and documentation including quality assurance forms, reports and Record Drawings.

2.8 Remediation Contractor

The Remediation and Construction Contractor(s) will perform the remediation and implement the requirements of Contract Drawings, Specifications, and Work Plans.

2.8.1 Responsibility and Authority

The Remediation and Construction Contractor(s) responsibilities include, but are not limited to: constructing the dewatering pad, load-out facilities and decontamination pad; removing targeted Near-Shore Sediment, Armored Area material and Soft Sediment; treatment and discharge of carriage water and site water, management and site restoration in accordance with the Design Drawings and Specifications. The Remediation Contactor will provide a Construction Superintendent to manage the project.

2.9 Independent Quality Assurance Laboratories

2.9.1 Responsibility and Authority

The independent Quality Assurance Laboratories (QAL) is responsible for conducting the appropriate laboratory tests as directed by PRS and/or the Supervising Contractor. The test procedures shall be performed in accordance with the required test methods consistent with the QAL Quality Assurance Plan.

The QAL shall submit written test results in a timely manner to the Site CQA officer. Test results shall be provided by facsimile as soon as possible after test completion. Written test results shall include references to the standard test methods used, material tested, date tested, and signature of approving laboratory manager.

The QAL shall have appropriate testing equipment that is properly maintained and calibrated. The QAL will forward maintenance and calibration documentation to PRS and Foth & Van Dyke. The laboratory personnel shall be familiar with American Society for Testing and Materials (ASTM) and other applicable test standards. Personnel with appropriate experience and training shall perform laboratory testing. The QAL shall be capable of providing test results meeting test method specifications to PRS and Foth & Van Dyke in a timely manner. Non-compliance results shall be immediately reported to the CQA official and the Supervising Contractor. The QAL shall maintain project files that include sampling and testing procedures used during the project and test results. Test results shall be provided both in hard copy and electronic formats. A list of construction material testing requirements is in Table 1.

2.10 Independent Data Validator

The independent Data Validator will review raw data and associated validation packets pursuant to the project *Quality Assurance Project Plan* (QAPP), (Vol. II, Appendix D).

3 Special Training and Certifications

3.1 Site Work

Personnel working on-site who may potentially come in contact with hazardous waste are required to have 40-hour Hazardous Waste Site (Hazwoper) worker training in accordance with *29 CFR 1910.120*. Personnel are also required to be current with their annual 8-hour Hazwoper refresher training in accordance with *29 CFR 1910.120*. The Health and Safety Manager, or designee, is responsible for ensuring that all personnel working on site have the required training. Any individual who has the potential to encounter or handle hazardous materials must have Hazard Communication training in accordance with *29 CFR 1910.1200*. Copies of the certificates for required training must be filed on-site for each individual working at the Site.

At least one person on each team will be certified in First Aid.

3.2 Shipping and Material Handling

Individuals involved in the shipment of hazardous materials are required to have Department of Transportation (DOT) Hazardous Materials (Hazmat) shipper training in accordance with *40 CFR 172 subpart H.*

4 Meetings and Communication

Clear and open channels of communication are essential between all parties involved to maintain a high degree of quality during installation and development of a final product that meets the plans and specifications. This Section discusses appropriate lines of communication and describes meetings that will be necessary to achieve project goals.

4.1 Pre-Construction Meeting

A Pre-Construction Meeting shall be held prior to the start of construction work on this project. The Pre-Construction Meeting must be attended by all Contractor(s) and Subcontractors who will be working on-site during the remedial activities. This CQAP and the *Site Specific Health and Safety Plan (HASP),* (Vol. II, Appendix J) shall be reviewed by each party. The meeting shall be documented and minutes shall be transmitted to all participants in a timely manner.

4.2 Daily Tailgate Safety Meetings

Daily Tailgate Safety Meetings will be held by the Health and Safety Officer (HSO) prior to commencing work each day. Each employee working on the job site will be required to attend the Daily Tailgate Safety Meetings. These meetings shall address progress, planned activities for the day, health and safety concerns or any other issues deemed necessary. If any matter remains unresolved at the end of the meetings, the Site Manager, CQA Staff, and/or HSO shall be responsible for the resolution of the matter and communication of the decision to the appropriate parties.

4.3 Progress Meetings

Progress meetings will be held on a weekly basis to review Site activities and schedule. PRS, Foth & Van Dyke, Site Manager, HSO, CQA Staff, USEPA, and WDNR representatives, Contractor(s), Subcontractors, suppliers, and other parties concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. An agenda for the upcoming meeting will be provided at least 2 days prior to the meeting date for all attendees. The meeting shall be documented and minutes shall be transmitted to all participants in a timely manner. The Master Construction Schedule shall be revised after each progress meeting, if necessary, where revisions to the schedule have been made or recognized. The revised schedule will be transmitted concurrently with the minutes of each meeting as part of the monthly project report.

4.4 Construction Foreman's Meetings

A Construction Foreman's meeting will be held daily at the Site and will be attended by the Site Manager and Construction Foreman. The topics to be discussed include daily progress, scheduling changes/updates, upcoming work, and field observations.

4.5 Post-Construction Meeting

Upon completion of all outstanding construction items of each Phase of the project, a final meeting shall be held at the Site. PRS and Foth & Van Dyke Project Managers, Site Manager, CQA Staff, Contractor(s), and Subcontractors must attend the final meeting. The meeting shall consist of a walk-through of the Site to verify that the project was completed in accordance with Design Documents.

5 Documentation and Reporting Requirements

The effective implementation of this CQAP will be verified through the documentation of quality assurance activities. Laboratory results, field test results, data sheets, checklists, logs and other documentation will be used to show that activities have been carried out and the Design Documents have been met or exceeded.

5.1 Request for Clarification/Information

The selected Contractor(s) and Subcontractors shall address substitution requests and areas of the Design Documents that need clarification prior to beginning work. However, if a situation arises during work that requires clarification or further information/review from the Design Engineer the Subcontractor shall notify the Site Manager and document the situation on the Request for Clarification/Information form, included in Appendix A. The Site Manager will transmit the request to the Design Engineer and CQA Staff and coordinate work activities with Subcontractors such that the Design Engineer may address the request without delay of work. Work activities that are outside the scope or deviate from the Design Documents will not be allowed without prior approval from the Design Engineer and the CQA Staff. The Contractor(s) or Subcontractor performing the work will be responsible for any further work to correct the situation if work that is outside the scope of or deviates from the Design Documents proceeds without approval by the Engineer and CQA Staff. The Supervising Contractor' Site Engineer is authorized to approve design changes and respond to request for information on behalf of PRS.

5.2 Field Reports

5.2.1 Daily Field Reports

The CQA Staff shall complete a Daily Field Report and/or logs outlining monitoring activities for that day. The Daily Field Report shall consist of field notes, soils/sediments laboratory or field test results, construction problems and solutions. An example of the format for the Daily Field Report is included in Appendix A.

The Design Engineer shall be made aware of any nonconformance with Design Documents and shall recommend the appropriate action. These results shall be documented and the certifying engineer must approve any revisions impacting the scope of work.

5.2.2 Stormwater Pollution Prevention Inspection Reports

The CQA Staff shall perform a Site inspection and complete an inspection report once every seven (7) days or within 24 hours of the end of any precipitation event producing at least 0.5 inches of rainfall. The inspector shall check disturbed areas and areas of material storage for evidence of pollutants entering the drainage system, confirm proper operation of erosion and sediment control measures, and observe Site exit areas for evidence of offsite sediment tracking.

The report will include the inspector's name, date, scope of the inspection, major observations, maintenance performed, and actions taken. The report will be added to the daily CQC report.

The daily CQC report will also include dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the Site, and when stabilization practices are initiated (if necessary).

5.3 Test Reports

5.3.1 Soils/Sediments Testing Reports

Soil/sediment test records for the soil components of the project shall be maintained on-site and in a central file. A summary log of laboratory and field test results shall be prepared and submitted by the CQA Staff with the monthly reports. An example of the Soil/Sediment Sample Tracking Log is included in Appendix A.

5.4 Record Drawings

Record Drawings prepared by the CQA Staff will be submitted to the Site Manager and included with the Construction Documentation Report (CDR). Record Drawings from Subcontractors shall be submitted to the Site Manager in accordance with Design Documents.

5.5 Construction Documentation Report (CDR)

Upon substantial completion of each phase of the Work, a Construction Documentation Report (CDR) shall be prepared by Foth & Van Dyke and other pending Supervising Contractor and submitted to PRS. The CDR shall document that the work was performed in compliance with the Approved Plans and Design Documents. The CDR shall include the following:

1. Scope of Work,
2. Parties involved with the project,
3. Summary of construction activities,
4. Monthly reports,
5. Observation and Testing Data Sheets, including sampling locations,
6. Analytical test results (laboratory and field),
7. Construction problems and corrective actions,
8. Photographic documentation, and
9. Changes in Contract Drawings and Specifications.

5.6 Final Storage of Records

Final record documentation of construction shall be maintained by PRS. PRS shall submit final record documentation to the USEPA and WDNR. PRS and Foth & Van Dyke will retain copies of reports and other submittals.

As indicated in the *Consent Decree*, all project documents and records, including those of PRS and PRS' Contractors and agents, must be maintained for a period of ten years following receipt of Certification of Completion of the Upper River work. These documents will include all deliverables, agreements, correspondence, memos, notes, and data.

6 CQC/CQA of Soil Materials

The references to specifications for each material of interest are listed in Table 1.

6.1 Backfill – Native and Borrow

6.1.1 Material Evaluation

The backfill materials will be free of organic or other foreign matter. Native materials must be relatively free of mud, peat, or unsuitable material. Analytical testing will be performed on soils brought in from off-site borrow sources. The borrow source for restoration of the Near-Shore Sediment and Armored Areas will be clean topsoil like soil. Testing will include 8 RCRA metals, total PCBs, and pesticides to verify the appropriate use of this material (see Table 2). The CQA Staff shall certify that installation of the subgrade soil components has proceeded in accordance with the Design Documents with any deviations noted. This certification shall be provided in the Construction Documentation Report (CDR). Construction material testing requirements are included in Table 2.

6.1.2 Placement and Compaction

Soil fill placement for Phase II Upper River will only involve placement of soil following removal of contaminated soil/sediments from Near-Shore and Armored areas. This fill material will be placed in loose lifts without additional compaction to support vegetation.

6.1.3 Inspection

One sieve analysis will be performed for each source of backfill material. Additional analysis may be done as determined by the CQA Staff to verify gradation in granular fills. Density tests are not planned to be performed during Phase II activities. Observation and quality control requirements of subgrade placement include:

1. Photographic record of the placement of fill materials used for subgrade,
2. Laboratory soil testing to establish/verify material properties as indicated in Table 2, and
3. A written record of the quantities involved for subgrade preparation.

6.2 Riprap

6.2.1 Material Evaluation

Riprap shall consist of sound, hard, dense, field or quarry stone resistant to action of air and water and free from seams, cracks or other structural defects and meet project specifications. Material shall be free of objectionable amounts of clay lumps, dirt coatings, and other foreign material. Weight loss shall not be more than 12% after 5 cycles when tested by sodium sulfate test methods, KM-64-610-02.

6.2.2 Placement

Areas where riprap are to be placed should be graded and dressed to lines and grades as shown in the Design Drawings or as required by the Supervising Contractor. Stone should be placed to produce a reasonably well graded mass of stone with minimum practicable percentage of voids. Avoid segregation of various sizes of stones. Larger stones shall be well distributed throughout the mass and finished protection shall be free from pockets of small stones and clusters of large stones. Adhere to gradation and thickness requirements as listed in the Design Documents.

6.2.3 Inspection

Riprap areas shall be visually inspected to document proper distribution and gradation.

6.3 Vegetative Cover Soil

6.3.1 Material Evaluation

The topsoil shall be clean soil capable to support the growth of the required vegetative cover and meet project specifications. The existing surface soil stripped from the areas under construction shall be disposed of off-site if it exceeds project specific action levels. Debris and stones over a minimum of 3 inches in any dimension shall be removed from the surface. Construction material testing requirements are included in Table 2.

6.3.2 Placement

The topsoil shall be replaced and graded evenly over the backfilled and compacted surfaces where appropriate. The topsoil shall remain uncompacted to promote rooting and areas with the prepared surfaces shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion. The prepared surface shall be a maximum of 1-inch below adjoining grades of any surfaced area. New surface areas shall be blended into existing surface areas. The CQA Staff will verify the actual thickness of the vegetative soil cover with survey data.

6.3.3 Inspection

Topsoil placement shall be visually inspected to document proper grading and removal of unacceptable materials.

7 CQC/CQA of Construction Materials

A description of construction materials is provided in the following subsections. The reference specification sections for each material type are listed in Table 1.

7.1 Piping

7.1.1 Material Evaluation

Piping materials (dredged slurry piping, force mains, and inverted siphons) shall be as described in the Design Documents. Pipe, fittings and accessories, and pipe coatings shall not be damaged during delivery, handling, and storage.

7.1.2 Installation

Piping shall be installed per the Design Documents following best industry practice. Heat fusion joints shall comply with manufacturer's instructions. Collection piping shall begin from lowest point in the proposed line and be laid uniformly to line and grade.

7.1.3 Inspection

Inspection of gravity pipelines and perforated pipe installations shall be by visual observation only. Forcemain sections shall be pressure tested (city water) and certified as compliant with design requirements upon completion of a successful test.

7.2 Geotextile

7.2.1 Material Evaluation

The supplier will provide written certifications for the geotextile indicating that the material meets the required physical requirements outlined in the Design Documents. The geotextile will be evaluated based on the certifications alone.

7.2.2 Installation

CQA Staff will be present during all geotextile placements to document that subgrades are prepared in accordance with project requirements, the geotextile component is properly sewn and the materials remain clean and unplugged as necessary. Separation/filtration geotextile panels shall overlap a minimum of 12-inches if not sewn. Silt fence geotextile shall overlap a minimum of 6-inches. Seam locations will be field located by Supervising Contractor and documented to be included in the as-built drawings.

7.2.3 Inspection

The CQA Staff will examine rolls upon delivery to the Site, any deviation from the requirements will be reported to Supervising Contractor. Upon delivery to the Site, samples of the material will be collected at a frequency of one per 100,000 square feet. Samples will be identified with a waterproof marker by manufacturer's name, product identification, lot number, roll number and machine direction. Samples will be tested to verify that the geotextile meets the requirements of the Design Documents. The CQA Staff will verify that the geotextile rolls are free of dirt and dust prior to installation. The CQA Staff will report the outcome of this verification to Supervising Contractor. Only undamaged materials will be included in the work.

7.3 Bituminous Concrete (Asphalt)

7.3.1 Material Evaluation

The aggregate supplier and asphaltic concrete design mix will be part of the project specifications shown in Table 1.

7.3.2 Placement

Existing cracks, holes and irregularities in the existing concrete and bituminous concrete within the dewatering pad footprint will be addressed (filled in and/or patched) prior to placement of bituminous concrete. The bituminous concrete shall be placed such that drainage towards the dewatering pad sump and pump system is maintained. The thickness of asphaltic concrete will vary from ½ to 3 inches. Placement of the bituminous concrete will meet project specifications shown in Table 1.

7.3.3 Inspection

The properly prepared and patched existing pavement will be observed and conditions documented with photographs prior to placement of the bituminous concrete. After placement of the bituminous concrete, other site observations will occur and will be documented with photographs. Any areas of obvious distress (wide cracks or alligatory cracks) will be properly addressed prior to acceptance.

7.4 Seeding

7.4.1 Material Evaluation

Seed used for revegetation shall be state-approved seed of the latest season's crop and shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of purity, germination, and mixture. Seed species and mixtures shall be proportioned as outlined in the Design Documents. Prior to delivery, certificates of compliance attesting that the materials meet the specified requirements shall be submitted to the CQA Staff.

7.4.2 Placement

Application and rates of the vegetation material shall be verified prior to placement by the landscaping Subcontractor. Removal of the temporary erosion and sedimentation control features will be done upon establishment of adequate vegetation to minimize soil erosion. The landscaping Subcontractor will submit seed and fertilizer certifications and/or bag tags from products utilized and coordinate Site activities with the Supervising Contractor. The standard for successful revegetation will be at least 98% of groundcover.

7.4.3 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet or moldy shall be rejected. Other materials shall be inspected for compliance with specified requirements. Prior to acceptance of final revegetation, the CQA Staff shall visually evaluate the groundcover and verify that it meets the revegetation percentage requirements.

8 Site Work

8.1 Manufacturer's Instructions

Installation of equipment and materials shall comply with manufacturer's instructions. Such instructions will be provided to parties involved in installation, including two copies to the Supervising Contractor. One set of complete instructions will be maintained at the Site during installation and until completion of Work. Materials and equipment will be handled, stored, installed, connected, cleaned, conditioned, and adjusted in accordance with manufacturer's written instructions and in conformance with Specifications. If job conditions or specified requirements conflict with manufacturer's instructions, the Supervising Contractor shall be consulted for further instructions. Work will not proceed without written instructions.

8.2 Transportation and Handling

Contractor(s) shall arrange deliveries of materials and equipment in accordance with Construction Progress Schedule. Coordinate to avoid conflict with Work and conditions at Site. Deliver materials and equipment in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Immediately upon delivery, inspect shipments to ensure compliance with Design Documents and approved submittals and products have been protected and undamaged. Provide equipment and personnel to handle materials and equipment by methods recommended by manufacturer to prevent soiling or damage to materials, equipment or packaging.

8.3 Storage, Protection, and Maintenance

On-site temporary storage areas and buildings shall be provided by Contractor(s) as required.

8.3.1 Interior Storage

Materials and equipment shall be stored with seals and labels intact and legible. Materials and equipment subject to damage by elements shall be stored in weather-tight enclosures.

8.3.2 Exterior Storage

Fabricated materials and equipment shall be stored above ground, on blocking or skids to prevent soiling or staining. Materials and equipment subject to deterioration shall be covered with impervious sheet coverings. Ventilation shall be provided to minimize condensation. Materials shall be stored on pallets or racks, off the ground.

8.3.3 Inspection and Maintenance

Storage shall be arranged to provide easy access for inspection, maintenance, and inventory. Periodic inspections of stored materials and equipment shall be performed.

9 Process Measurements

Process measurements related to dredging, dewatering, and water treatment are described in the *Field Sampling Plan (FSP),* (Vol. II, Appendix H) and *Verification Sampling Plan (VSP)*, (Vol. II, Appendix E) and are not repeated in this CQA Plan. These include the following measurements:

- Dewatered sediment and soil sampling (FSP)
- Carriage water sampling (FSP)
- Pre-dredge poling (VSP)
- Post-dredge poling (VSP)
- Post-dredge PCB sampling (VSP)

10 References

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River.* May 2004.

United States Environmental Protection Agency. *EPA Superfund Record of Decision.* May 2000.

United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site.* January 2003 (revised).

Pollution Risk Services, LLC and Foth & Van Dyke. *Site Specific Health and Safety Plan (HASP).* Vol. II, Appendix J of S*ediment Removal Design.* March 2006

Pollution Risk Services, LLC. *Quality Assurance Project Plan (QAPP*). Vol. II, Appendix D of *Sediment Removal Design.* March 2006.

Federal Code of Regulations, Occupational Safety and Health Administration. *Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910.120 and 1910.1200.*

Federal Code of Regulations, Department of Transportation. *Part 172-Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, And Training Requirements,* (Subpart H).

Tables

Table 1
Project Specification Reference
Construction Quality Assurance Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

ITEM	SPECIFICATION
Backfill	Section 02301, General Earthwork
Vegetative Cover	Section 02931 Landscaping Turf and Vegetative Cover Restoration
Piping	Section 01451
Riprap	Section 02050
Geotextile	Section 02073
Seeding	Section 02931 Landscaping Turf and Vegetative Cover Restoration
Dredge Slurry	Section 02325, Dredging
Dewatered Sediment/Soil	Section 02074, Geotextile Tubes (Dewatering)
Sitework (Storage)	Section 02074, Geotextile Tubes Section 02301, Covered Earthwork Section 02325, Dredging Section 02931, Landscaping, Turf and Vegetative Cover Restoration

Table 2
Construction Material Testing
Construction Quality Assurance Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Item	Specifications	Pre-Construction Manufacturer/Conformance Testing		Construction Testing/Certification	
	Material, Construction and Design Specifications	**Required Tests**	**Frequency**	**Required Tests**	**Frequency**
Backfill – Native and Borrow	Free of organic or other foreign matter			Visual Observation or TCLP	Daily
	Granular - Maximum particle size = ¾ inch	Grain size ASTM D422	1 per source	Grain size ASTM D422	1 per source
	Granular - Percent Passing No. 200 sieve not greater than 15%	Grain size ASTM D422	1 per source	Grain size ASTM D422	1 per source
	Cohesive – Maximum particle size = ¾ inch	Grain size ASTM D422	1 per source	Grain size ASTM D422	1 per source
	Cohesive - Percent Passing No. 200 sieve greater than 50%	Grain size ASTM D422	1 per source	Grain size ASTM D422	1 per source
	Cohesive – USCS = CL, CH, CL-ML	Grain size ASTM D422	1 per source	Grain size ASTM D422	1 per source
	Lift thickness			Field Measurement and Visual Observation	
Coarse Aggregate	USCS = SW, SP, GW, GP	Grain size ASTM D422	1 per source	Grain size ASTM D422	1 per source
	AASHTO No. 5 Sieve Size = 1-1/2 inches; % Passing = 100 Sieve Size = 1 inch; % Passing = 90 to 100 Sieve Size = 3/4 inches; % Passing = 20 to 55 Sieve Size = 1/2 inches; % Passing = 0 to 10 Sieve Size = 3/8 inches; % Passing = 0 to 5	Grain size ASTM D422	1 per source	Grain size ASTM D422	1 per source
Riprap	Sound, hard, dense field or quarry stone free from seams, cracks or other structural defects			Visual Observation	Daily
	Free of clay lumps, dirt coatings, other foreign material			Visual observation	Daily
	Weight loss not more than 12% after 5 cycles	Sodium Sulfate Test Methods,KM-64-610-88	1 per source		

Table 2
Construction Material Testing
Construction Quality Assurance Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Item	Specifications	Pre-Construction Manufacturer/Conformance Testing		Construction Testing/Certification	
	Material, Construction and Design Specifications	**Required Tests**	**Frequency**	**Required Tests**	**Frequency**
	Maximum shale content = 2%	Certification	1 per source	Visual Observation	Daily
Vegetative Cover Soil	Free of debris, foreign material, and/or deleterious material			Visual Observation	Daily
	Vegetative layer - 6 inch loose lift Soil Characteristics of silty or sandy clay, 3-inch maximum particle size Sufficient fertility to support dense vegetation			Final survey by P.S., tolerance 0 to +0.2 ft.	Entire surface
	≤ MEC, per Consensus – Based Sediment Quality Guidelines (WT-732, 2003) Tables 1 and 3	RCRA Metals, Total PCBs, and Pesticides	1 per source		
Stabilization Practices	Record when major grading activities occur.			Stabilization practices initiated no more than 14 days where no activity for 21 days	Daily
	Record when construction activities temporarily or permanently cease			Stabilization practices initiated no more than 14 days where no activity for 21 days	Daily
Force Main Piping	HDPE Pipe minimum pressure rating =100 psi at 73.4 degrees F	ASTM D 3350, ASTM D 3035	One per Manufacturer		
	Pressure test			City water pressure	A period of 1 hour
Geotextile – Silt Fence	Polymeric filaments in a stable network, composed of at least 85% by weight of ester, propylene, or amide	Certification from Manufacturer	One per Manufacturer		
	Grab Tensile = Min 100 lbs	ASTM D 4632	One per Manufacturer		
	Elongation (%) = Max 30%	ASTM D 4632	One per Manufacturer		
	Trapezoid Tear = Min 55 lbs	ASTM D 4533	One per Manufacturer		
	Permittivity = 0.2 sec –1	ASTM D 4491	One per Manufacturer		

Table 2
Construction Material Testing
Construction Quality Assurance Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Item	Specifications	Pre-Construction Manufacturer/Conformance Testing		Construction Testing/Certification	
	Material, Construction and Design Specifications	**Required Tests**	**Frequency**	**Required Tests**	**Frequency**
	AOS (U.S. Std. Sieve) 20-100	ASTM D 4751	One per Manufacturer		
	Wooden stakes min cross section = 2 inches by 2 inches (oak); 4 inches by 4 inches (pine)			Field Measurement and Visual Observation	One per Manufacturer
	Wooden or steel stakes/posts minimum length = 3 feet			Field Measurement and Visual Observation	One per Manufacturer
	Steel posts minimum weight = 1.33 lbs/LF	Certification from Manufacturer	One per Manufacturer		
	Identification, storage, handling			ASTM D 4873	
	Extend minimum 24 inches above the ground surface; not greater than 34 inches			Field Measurement and Visual Observation	100 foot intervals
	Minimum 6 inches overlap			Field Measurement and Visual Observation	100 foot intervals
Geotextile – Separation/ Filtration	Silt content of native soils <17% = non-woven Silt content of native soils >17% but <25% = woven Silt content of native soils >25% = woven as long as documentation provided by manufacturer indicates no clogging	Certification from Manufacturer	One per Manufacturer		
	Elongation at Break 20%< x > 50%	ASTM D 4632	ASTM D 4354, Procedure A	ASTM D 4632	1 / 100,000 SF
	Apparent Opening Size = [TBD]	ASTM D 4751	ASTM D 4354, Procedure A	ASTM D 4751	1 / 100,000 SF
	Permittivity, sec-1 = [TBD]	ASTM D 4491	ASTM D 4354, Procedure A	ASTM D 4491	1 / 100,000 SF
	Puncture 55 lbs < x > 90 lbs	ASTM D 4833	ASTM D 4354, Procedure A	ASTM D 4833	1 / 100,000 SF
	Grab Tensile 160 lbs < x > 250 lbs	ASTM D 4632	ASTM D 4354, Procedure A	ASTM D 4632	1 / 100,000 SF
	Trapezoidal Tear 55 lbs < x > 90	ASTM D 4533	ASTM D 4354, Procedure A	ASTM D 4533	1 / 100,000 SF
	Burst Strength 190 psi < x > 400 psi	ASTM D 3786	ASTM D 4354, Procedure A	ASTM D 3786	1 / 100,000 SF
	Ultraviolet Stability = 50	ASTM D 4355	ASTM D 4354, Procedure A	Not Applicable	

Table 2
Construction Material Testing
Construction Quality Assurance Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Item	Specifications	Pre-Construction Manufacturer/Conformance Testing		Construction Testing/Certification	
	Material, Construction and Design Specifications	**Required Tests**	**Frequency**	**Required Tests**	**Frequency**
	Unit Weight = 6 oz/sqyd	ASTM D 3776-84	ASTM D 4354, Procedure A	ASTM D 3776-84	1 / 100,000 SF
	Overlap panels = min. 12 inches			Field Measurement and Visual Observation	100 foot intervals
Straw Bales	Standard cross section = 14 inches by 18 inches			Field Measurement and Visual Observation	One per location
	Wooden stakes min cross section = 2 inches by 2 inches			Field Measurement and Visual Observation	One per location
	Wooden or steel stakes/posts minimum length = 3 feet			Field Measurement and Visual Observation	One per location
	Steel posts minimum weight = 1.33 lbs/LF	Certification from Manufacturer	One per Manufacturer		
Erosion Control Blanket	Excelsior - Not less than 35 inches wide	Certification from Manufacturer	One per Manufacturer	Field Measurement and Visual Observation	One per location
	Excelsior - Roll weight average 0.09 lbs/sqft +/- 10%	Certification from Manufacturer	One per Manufacturer		
	Excelsior - Steel staples at least 6 inches long	Certification from Manufacturer	One per Manufacturer	Field Measurement and Visual Observation	One per location
	Excelsior - Net backing mesh size not larger than 1-1/2 x 2 inches or smaller than 7/8 x 1 inch	Certification from Manufacturer	One per Manufacturer	Field Measurement and Visual Observation	One per location
	Jute Fabric – 41 weft yarns +/- 2 per linear yard of length	Certification from Manufacturer	One per Manufacturer		
	Jute Fabric – Full width 78 warp ends +/- 1	Certification from Manufacturer	One per Manufacturer	Field Measurement and Visual Observation	One per location

Table 2
Construction Material Testing
Construction Quality Assurance Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

Item	Specifications	Pre-Construction Manufacturer/Conformance Testing		Construction Testing/Certification	
	Material, Construction and Design Specifications	Required Tests	Frequency	Required Tests	Frequency
	Jute Fabric – Weight 92 lbs/100 SQYD +/- 10%	Certification from Manufacturer	One per Manufacturer		
	Jute Fabric – Width of strips 48 inches +/- one inch	Certification from Manufacturer	One per Manufacturer	Field Measurement and Visual Observation	One per location
Seeding	Mixture Amount Kentucky Bluegrass 45% (min. purity = 85%) Creeping Red Fescue 35% (min. purity = 97%) Perennial Ryegrass 5% (min. purity = 95%) White Clover 15% (min. purity = 95%)	Certification from Manufacturer	One per Bag		
	Broadcast/Hydroseed rate = 1.5 lbs/1000 SF			Field Measurement and Visual Observation	Per Acre
Benchmarks	Existing benchmarks			Certify & include in As-built Plans	Upon preparation of As-Builts
Asphaltic Concrete	Design mix source QC tests density testing	submitted prior to work submit prior to work		ASTMD2950	4 acre

Footnote:

Unless otherwise specified, the CQA Official shall determine the sample frequency based on material acceptance requirements, variations in actual material conditions, and field conditions encountered. The CQA Official may request additional tests of any construction component at any time. Field test location shall be chosen at random by the Field Technicians.

Appendix A

Standard Forms

Density Tests of Compacted Fill

Contractor: ______________________

Compaction Equipment: ______________________

____

Weather: ______________________

Method of Test:

☐ Nuclear Meter *(ASTM: D2922)*

☐ Sand Cone *(ASTM: D1556)*

Area/Location Tested: ______________________

____

____

Report Number: ______________________

Test No.	Test Location	Depth of Probe	Elevation	Proctor Used	Wet Density *(pcf)*	Moisture Content *(%)*	Dry Density *(pcf)*	Percent Compaction	Remarks

Proctor No.	Soil Classification	Max. Dry Density *(pcf)*	Moisture Content *(%)*	Compaction Spec. *(%)*

General Note:
Density test results are valid only at the locations and elevations tested.

Nuclear Meter Used: ______________________

Model: __________ Serial No.: __________

Standard Counts: ______________________

Density: __________ Moisture: __________

Foth & Van Dyke

Client: ______________________ Scope I.D.: __________

Project: ______________________ Page: __________

Prepared by: ______________________ Date: __________

Checked by: ______________________ Date: __________

Foth & Van Dyke

Client: ______________________ Scope ID: ________

Project: ______________________ Page: ________

Prepared By: ______________________ Date: ________

Construction Observation Report

Location ____

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Site Conditions (describe)	
	Low	High	Clear Pt. Cldy Cloudy	None	Rain	Snow	Dry	Muddy

Contractors on site *(include no. of personnel per contractor)*

____

____

____

____

____

Other personnel on site ______________________ *Purpose* ______________________

______________________ ______________________

Work observation report, comments: ____

____

For additional comments, use back of form.

Foth & Van Dyke

Client: ______ Scope ID: ______

Project: ______ Page: ______

Prepared By: ______ Date: ______

Construction Observation Report

Work observation report, comments (continued): ______

Soil Sample Tracking Log

Sheboygan River: Upper River - Phase I & II
Sheboygan County, Wisconsin

Sample ID #	Source	Date Sampled	Sampler	Date Shipped	Test Methods Requested	Test Results	Notes

Request for Clarification/Information #_____

Date Issued:	Date Response Required:
Engineer: Foth & Van Dyke	Attention:
Organization: Foth & Van Dyke	Project Name: Sheboygan River – Upper Phase I & II
Originator:	Subject:
Concern:	
Engineer's Signature:	Date:

Appendix B

Resume, CQA/CQC Site Engineer

James B. Hutchison, P.E.

Senior Technical Consultant

Education

M.S., Civil and Environmental Engineering, University of Wisconsin-Madison, 1986
B.S., Civil Engineering, University of Wisconsin-Platteville, 1979

Registrations/Certifications

Professional Engineer (Civil) - Wisconsin

Professional Affiliations & Organizations

American Society of Civil Engineers (ASCE)
International Erosion Control Association (IECA)

Specialization

Mr. Hutchison is a Senior Technical Consultant with over 24 years of experience in geotechnical and environmental projects, municipal utility design and construction, soils and groundwater remediation projects, and river dredging projects. He has done extensive subsurface soil exploration and made geotechnical recommendations regarding river sediment, soil, and groundwater remediation. Mr. Hutchison has provided construction quality assurance work on sediment removal and site reclamation projects costing up to tens of millions of dollars. Mr. Hutchison has developed several construction quality assurance (CQA) plans which list and detail project monitoring media, methods, and locations including adherence to Quality Assurance Project Plans (QAPPs) and Sampling and Analysis Plans (SAPs).

Key Project Experience

- **Dredging Specifications and Quality Assurance.** Managed the 2004 quality assurance activities for dredging, dewatering, and disposal of 17,000 cubic yards of PCB impacted sediments from Little Lake Butte des Morts, Lower Fox River OU1. Prepared technical specifications for 2005 bid documents for dredging of 100,000 cubic yards of PCB impacted sediments in Little Lake Butte des Morts, Lower Fox River OU1.

- **Hydraulic Dredging of PCB Contaminated Sediment.** Assisted with preparation of the technical specifications to dredge 50,000 cubic yards of PCB contaminated sediment during 2000 activities at Sediment Management Unit 56/57 on the Fox River, Green Bay, Wisconsin. Reviewed and managed the review of project submittals by the Project Contractor. Developed the project CQA Manual and managed the staff performing CQA documentation. Managed CQA monitoring including monitoring river water, dredged slurry, dewatered sediment, treated carriage water, post dredge-river sediment, river bottom (elevation), and sand cover.

- **Hydraulic Dredging of PCB Contaminated Sediment.** Prepared the technical construction specifications and CQA Manual for the Wisconsin Department of Natural Resources dredging project, Deposit N, on the Fox River in Wisconsin. The project was a pilot study in which 10,000 cubic yards of sediment was dredged, dewatered and transported to landfills. The project began in 1998 and was completed in 1999. Reviewed and managed the review of project submittals by the Project Contractor. Also worked on the pre-design treatability study and managed on-site staff that performed CQA documentation during dredging. Managed CQA monitoring including monitoring of dewatered sediment, treated carriage water, air, post dredge-river sediment, river bottom (elevation) and subsoil's at the on-shore management area.

- **Site Development and Restoration on Flambeau River.** Managed a multi-disciplinary, multimillion-dollar project development and restoration in western Wisconsin involving air, groundwater, surface water and wetlands monitoring, construction permitting and general adherence to WDNR permits. Developed pit backfilling CQA Manual for backfilling 5 million cubic yards of material into an open pit. Managed CQA monitoring including monitoring of backfilling equipment, limestone (addition) material and application rate, backfill material (including waste-rock, saprolite, sandstone and till) parameters, backfill density and moisture content, stockpile (waste-rock) paste parameters, backfill hydraulic conductivity, and backfill geo-chemical parameters.

- **Stream/Lake Separation Structure.** Lead geotechnical engineer for design and installation of a structure to separate an organically soil loaded stream from a lake in Manitowoc County, Wisconsin. Project included peat removal by displacement methods and installation of a lake outfall structure with fish barriers.

- **City of Brodhead Dam Rehabilitation.** The Brodhead dam was a $900,000 dam Rehabilitation project in Southern Wisconsin. The challenge was to make use of existing structures in such a way to take advantage of the economic benefit, while changing the appearance and potential use by the local public. Designed a cantilever sheet-pile spillway for the Brodhead rehabilitation dam project. The spillway was 70-feet long with sheet-piles approximately 30-feet in length. Designed an emergency spillway to redirect flow during periods of high flow. The design incorporated large sized riprap and filter fabric to optimize economic concerns. Also designed an erosion control mat where new design grades steepened the slope near existing structures. The mat design incorporated the use of mortar filled fabric-form material to bridge the gap between existing concrete structures and existing large riprap shoreline protection.

- **Mine permitting.** Managed a multi-disciplinary, multimillion-dollar mine permitting project in western Wisconsin involving air, groundwater, surface water and wetlands monitoring, construction permitting and general adherence to Wisconsin Department of Natural Resources permits. The project included providing geotechnical recommendations for site facility design and construction, which consisted of railway subgrade design and building foundation design. Also made recommendations for the preparation of subgrade for a flexible membrane liner and performed foundation analysis for stockpile construction. The project also included development of a 1-acre wetland test plot, management of topsoil and hydric soils, and construction of a 30-acre waste-rock storage area lined with a flexible membrane liner. Duties included compiling and submitting several reports to the Wisconsin Department of Natural Resources.

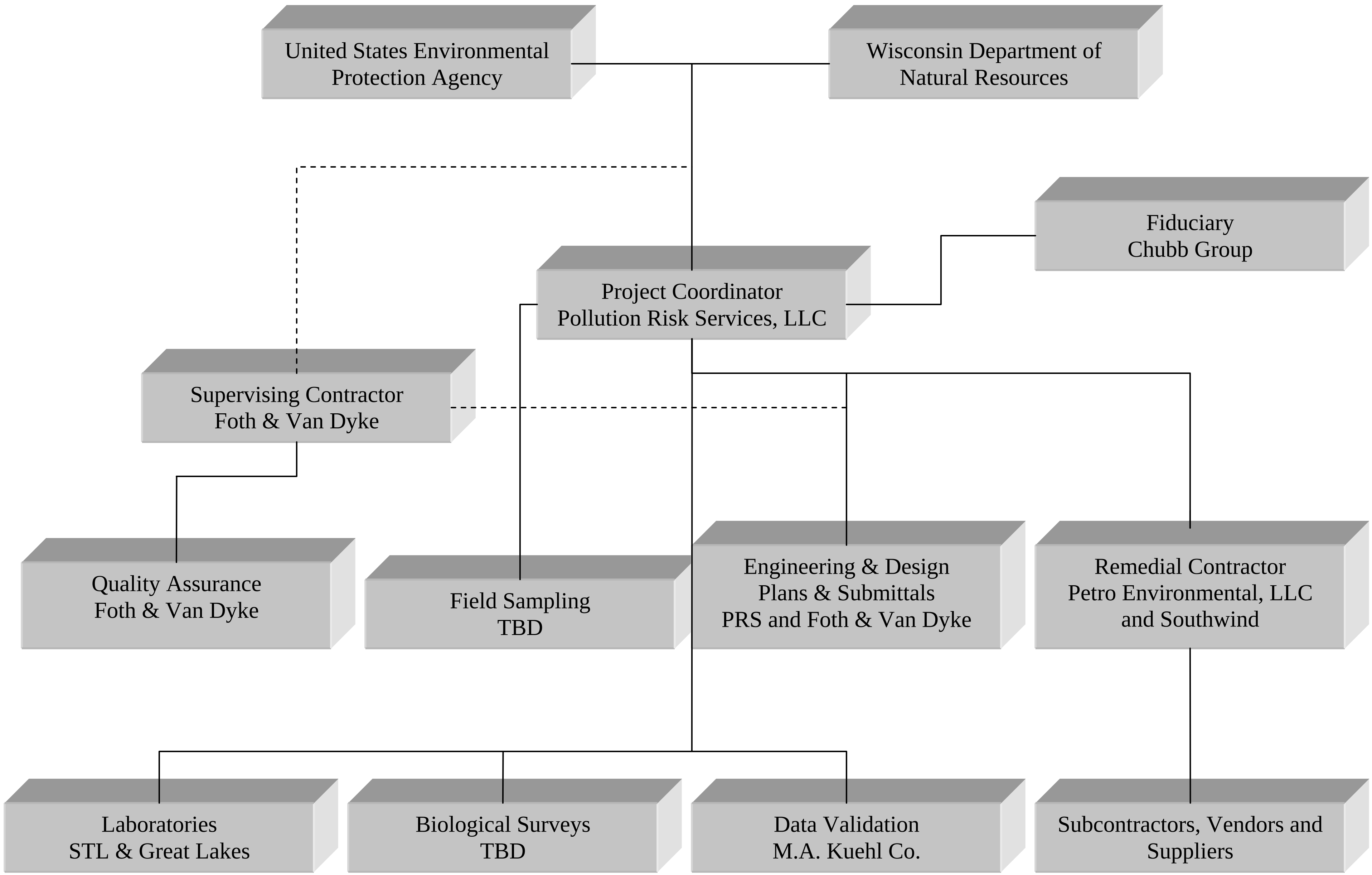
- **Landfill geotechnology.** Provided geotechnical support for various landfill projects. This support included slope stability analysis of proposed final grades of landfills, bearing capacity calculations of subsoils beneath proposed landfills, and settlement calculations of both refuse and subgrade soils due to proposed filling.

- **Vapor extraction, enhanced bioremediation and sparge system.** Designed and managed the specifications and bidding document development of a system to treat soil and groundwater contaminated with trichloroethylene (TCE). The remediation system includes a partial sheet piling containment wall, horizontal and vertical soil vapor wells, sparge/injection wells, water and air activated carbon units (backup), class one Division 2 (explosion proof) equipment building, and an isolated control panel.

- **Groundwater collection trench.** Designed a groundwater collection trench to collect groundwater impacted from leachate from an existing landfill. The trench conveys collected groundwater to a manhole which delivers the water to an aboveground storage tank. A truck load-out facility was also designed with spill collection equipment. The collection trench and load-out facility are currently in operation.

- **Hydraulic dredging of PCB contaminated sediment.** Assisted with preparation of the technical specifications to dredge 50,000 cubic yards of PCB contaminated sediment at sediment management unit 56/57 on the Fox River, Green Bay, Wisconsin. Managed staff performing quality control (QC) documentation and developed an internal QA/QC guidance document used during the project to identify monitoring duties and responsibilities of Owner, Contractor(s) and Engineer(s).

SHEBOYGAN RIVER, UPPER RIVER REMEDIATION
ORGANIZATIONAL CHART



Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Site Specific Health and Safety Plan

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Site Specific Health and Safety Plan

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

Site Specific Health and Safety Plan

Contents

Tables

Appendices

1 Introduction

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five (55) miles north of Milwaukee, Wisconsin, in Sheboygan County. The Site includes the former Tecumseh Manufacturing site, the lower fourteen (14) miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner Harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the Remedial Investigations (RI), the river was segmented in separate sections based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four (4) miles to the Waelderhaus Dam in Kohler. The Middle River extends seven (7) miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. The Lower River extends three (3) miles from the C&NW railroad bridge to the Pennsylvania Avenue bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work which included plant site soils, groundwater, and river bank soils was completed in 2004. Phase II remedial action work includes Upper River Near-Shore Sediments, Armored Areas, and Soft Sediment deposits and is scheduled for 2006 implementation. Remedial construction methods for the Floodplains are deferred pending the outcome of additional discussions between Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), Pollution Risk Services, LLC. (PRS), and property owners of potentially impacted Floodplains.

This RD document has been generated to be consistent with the *Record of Decision (ROD),* (May 2000), *Consent Decree (CD),* (May 2004), and *Upper River Statement of Work (URSOW),* (Jan. 2003). This Site Specific Heath and Safety Plan (HASP) addresses this specific project which involves Polychlorinated Biphenyls (PCBs) removal and associated activities in which personnel may come in contact with potentially hazardous materials. Major work items include the following activities:

- Excavation, transport, and disposal of PCB impacted soils and sediments,
- Soil, sediment and groundwater sampling,
- Installation and management of dewatering systems and sheet piling,
- Construction of temporary access roads, dikes, and embankments,
- Installation and maintenance of sedimentation and erosion controls,
- Clearing and grubbing,
- Backfill and regrading of excavated areas to re-establish grades, and
- Site clean up and demobilization.

The Site Specific Heath and Safety Plan (HASP) is designed to ensure:

- That personnel working on Site are not exposed to hazardous materials which could adversely affect their health and safety.
- That the health and safety of the general public and the environment is not compromised by on-site activities.
- Compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists [ACGIH]) regulations and guidelines.
- Compliance with the *Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926*.
- Transportation of contaminated material will be in compliance with all Department of Transportation (DOT) Regulations.

All Site operations will be conducted in accordance with the provisions of the HASP.

1.1 Basis

The *Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926)* will provide the basis for this HASP. The plan also reflects the position of the United States Environmental Protection Agency (USEPA) and National Institute for Occupational Safety and Health (NIOSH) regarding procedures required to ensure safe operations at sites containing hazardous or toxic materials.

1.2 Facility Description

The Site consists of multiple areas of PCB impacted soils and sediments at various depths which require characterization, removal, transport and disposal. A physical hazard analysis for construction activities is presented in Table 1.

1.3 Site Characteristics

The exposure potential is low and the potential waste is categorized as solid (sediment material and other excavated soils) and liquid (groundwater and water extracted from the dewatering process). Soil will be extracted from the locations in or adjacent to the Upper River. Dewatered sediment will be stockpiled in outside areas designated by the Project Manager (PM). Prevailing winds are from the west. Known, suspected or alleged contamination comes from groundwater, surface water, sewers and storm drains, soil and sediment. The waste is characterized as potentially toxic and persistent in nature. Potential hazardous conditions include worker exposure, worker injury, heat and cold temperatures, heavy equipment operations, trenching/excavation, boat and water hazards.

2 Personnel

Pollution Risk Services, LLC (PRS) will designate an individual to act as the Health and Safety Officer (HSO) and will be responsible for the health and safety of workers. The HSO will be responsible for decisions regarding when work will be stopped or started for health and safety considerations. The HSO will conduct daily safety briefings with all relevant site personnel (all briefings will be properly documented).

The responsibilities of the HSO are as follows:

- Responsible for implementation of the *Site Specific Health and Safety Plan* (HASP), (Vol. II, Appendix J) at the initiation of Site work,
- Conduct the initial briefing sessions for all on-site personnel with regard to the *HASP* and other safety requirements to be observed during field construction activities, including:
  - Potential hazards,
  - Personal hygiene principles,
  - Personal protective equipment, and
  - Emergency procedures dealing with fire and medical situations.
- Review and modify the *HASP* as more information becomes available concerning the hazards involved and review all monitoring reports,
- Supervise and enforce safety equipment usage,
- Supervise and inspect maintenance of safety equipment;,
- Personnel training in safety equipment usage and emergency procedures,
- Monitoring of the health and safety program by auditing for compliance with the *HASP*,
- Perform Site safety inspections and verify correction of identified deficiencies,
- Suspend work activity if unsafe working conditions develop,
- Inform workers of the nature of chemical exposure risk as required by the "Right-to-Know" Law (*29 CFR 1910.1200*),
- Coordination of emergency procedures,
- Maintain a sign in/out log at the Site office for personnel and visitors entering the Work Area, and
- Dust control in accordance with the *HASP*.

3 Medical Surveillance

In accordance with requirements detailed in *29 CFR 1910.120* and *29 CFR 1910.134* as Site personnel are expected to come into contact with PCBs greater than 1mg/m^3 for Aroclor 1242, medical surveillance by a licensed physician or physician's group is required.

Medical records for all on-site construction personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

Each employer will ensure that its personnel involved in on-site work will have all necessary medical examinations prior to commencing work that requires respiratory protection. Personnel not obtaining medical certification will not work on the Site.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to on-site activity or when accidental exposure to elevated concentrations of contaminants occurs. Periodic or special exams are administered only as needed and are not scheduled on a regular basis.

4 Training

Prior to commencing Site activities, a site-specific initiation session will be conducted. This session will be used to instruct the on-site personnel as to what the potential Site hazards are: level of PPE required, site-specific requirements, and the basis of the *HASP*. All personnel who attend this session will sign a Training Acknowledgment Form, an example of which is presented as Appendix B . Each employer will be required to verify that operators and helpers have been adequately trained for the equipment they will be using. Training documentation, respirator qualifications, and medical certifications will be made available for review on site.

All site personnel performing remediation and/or sampling activities shall be trained in accordance with *29 CFR 1910.120*. Non-remediation activities such as laydown area construction, surveying, water treatment installation, and seeding and mulching do not require Hazwoper training. HSO shall be responsible for determining training requirements for other activities.

5 Work Areas

PRS will clearly lay out and identify work areas in the field and will limit equipment, operations and personnel in these areas. These work areas may be established as temporary or permanent; depending on the work activity and the sequence in which it is performed.

PRS will maintain the following:

- An entry for personnel, materials, and equipment to the work area
- An exit area for personnel, materials and equipment from the work area
- The housing of Site special services
- A storage area for clean safety and work equipment and materials
- A Site support area including Site offices, toilet facilities and parking
- Decontamination/contaminant reduction zone

6 Personal Protective Equipment

Pollution Risk Services, LLC will require that all on-site personnel are equipped with Personal Protective Equipment (PPE) appropriate for the nature of work being completed. PRS will require that all safety equipment and protective clothing are kept clean, well maintained and that their integrity is intact.

Safety equipment and apparel as required for general work on-site where there is no respiratory hazard, but a potential for dermal contamination and ingestion, will be Level D. Level D protective equipment consists of the following:

- Leather work boots with safety toes in accordance with *ANSI F2413-05 standard*
- Hard hat
- Leather, latex and/or cotton gloves as necessary; if more than one pair of gloves are needed, chemical-resistant gloves shall be inside
- Safety glasses and/or goggles in accordance with *ANSI Z87.1 standard*
- Safety vests when working near heavy equipment

Modified Level C protective equipment will be used on-site should it be found necessary. Examples where increased PPE would be required include working with heavily impacted soils, where free-product may be present, as well as sediment and/or water samples. Modified Level C includes:

- Chemical-resistant disposable coveralls, tyvek (polyethylene) or saranex
- Latex and/or cotton inner gloves; if more than one pair of gloves are needed, chemical-resistant gloves shall be inside
- Nitrile outer gloves
- Leather work boots with safety toes in accordance with *ANSI F2413-05* standard
- Chemical-resistant overboots or booties, butyl rubber or neoprene
- Hard hat
- Safety glasses and/or chemical-resistant goggles in accordance with *ANSI Z87.1* standard
- Half-face or full-face NIOSH approved air-purifying respirators with appropriate cartridges for organic vapors and particulates

Additional protective equipment usage guidelines to be implemented include:

- Prescription eyeglasses in use on-site will be safety glasses in accordance with *ANSI Z87.1* standard
- Contact lenses will not be permitted
- All disposable or reusable nitrile, latex and/or cotton gloves worn on-site will be changed or discarded at the end of each day
- During periods of respirator usage, respirator cartridges, and filters will be changed daily or upon breakthrough, whichever occurs first
- On-site personnel who have not passed a respirator fit test will not be permitted to enter or work on potentially contaminated areas. Personnel will not be permitted to have beards, or long sideburns or mustaches as these interfere with a proper fit of the respirator
- Duct tape will be used to ensure that disposable coveralls and gloves are tightly secured when personnel are working within contaminated areas

The HSO or their designated representative will observe work areas for visible signs of hazardous chemical or waste. Should an apparent hazardous waste source be observed, work adjacent to the potential source will be halted immediately. The area in question will be cordoned off with yellow warning tape. Samples of the suspected hazardous waste will be taken and analyzed at a local laboratory. If the sample indicates the presence of dangerous levels of hazardous waste, employees working in the area will wear Level C protection.

7 Respirator Program

It is not anticipated that respirators will be required during investigation/construction activities. However, prior to arriving at the site, on-site personnel designated to work in contaminated soil/sediment areas will have received training in the use of, and have been fit tested and medically certified for, either half or full-facepiece respirators. All on-site personnel will be required to comply with their employer-specific written respiratory protection program developed in accordance with *OSHA 29 CFR 1910.134*, which will be attached to each employer's site-specific HASP. A copy of Pollution Risk Services Contractor's written Respiratory Protection Program is included in Appendix C.

8 Personal Hygiene

All personnel performing or supervising work within the work area will be required to comply with the personal hygiene-related provisions of this section.

On-site personnel found to be disregarding the personal hygiene-related provisions of this HASP will, at the direction of the HSO, be barred from the Site.

Each employer will be required to ensure that the following equipment/facilities are available for the personal hygiene of all their on-site personnel:

- Suitable disposable outerwear, gloves, and footwear on a daily basis for the use of on-site personnel
- Disposal containers for used disposable outerwear
- Potable water and a suitable sanitation facility
- Lunch area
- Smoke area

The following regulations for personnel actively participating in the work activities will be enforced:

- On-site personnel will wear appropriate PPE when in the work area
- Used disposable outerwear will not be reused if deemed to be unsuitable to provide the necessary protection, and when removed, will be placed inside disposal containers provided for that purpose
- On-site personnel will thoroughly cleanse their hands, face, neck area and other exposed areas before smoking, eating or drinking and before leaving the Site
- On-site personnel will not eat, drink or smoke in areas where these activities are prohibited

9 Dust Control

Prior to loading out DDM from the Site, baseline air monitoring will be performed at selected points (two) near the staging area to establish background PCB levels. During load out operations, air monitoring within the staging area will occur for a limited amount of time, e.g., one week to assess air levels of PCBs. If levels increase beyond the OSHA PEL of 1mg/m^3 for Aroclor 1242, proper PPE (respirator, half or full) will be used until levels drop below the action level.

10 Particulate Emission Control

During Remedial Activities, a dust control program will be implemented and enforced to minimize the generation and potential off-site migration of visual dust emissions.

All roadways, designated work areas, and other possible sources of dust generation will be controlled by application of water as required.

11 Equipment and Personnel Decontamination

During field investigation activities, procedures will be implemented to reduce the amount of contact of both personnel and equipment with the PCBs. These procedures include the following:

- Proper work practices that would lead to minimal direct contact with PCBs, and
- Use of disposable equipment and clothing as practicable.

All personnel will remove their protective clothing and wash their hands, face, neck area, and other exposed areas in the decontamination zone before entering the lunch and break areas to eat, drink or smoke.

Waste materials generated during field activities (used PPE, miscellaneous trash, etc.) will be secured in plastic bags on Site until such time as they can be transferred to the appropriate disposal facility.

To minimize vehicle tire contamination, vehicles used to transport sediment to the landfill will be segregated from the staging area and dewatered sediment will be pushed to the edge of the staging area for loading. If equipment and/or vehicles have visible material on tires they will be decontaminated prior to leaving site by entering the decontamination pad located at the Site (Drawing 2, Vol. I). Decontamination rinse water shall be properly contained and treated onsite and/or disposed at a licensed facility. Equipment and/or vehicles shall be decontaminated in accordance with SOP # P101 of the *Field Sampling Plan (FSP),* (Vol. II, Appendix H).

12 Contaminant Migration Control

All vehicles and equipment used within the work area and have come into contact with PCBs will be cleaned on-site at the decontamination pad (Drawing 2, Vol. I), as determined necessary by the HSO, prior to leaving the Site. Cleaning, when required, will consist of the thorough cleaning of those parts of the equipment which come in contact with refuse or muddy material as described in the SOP #P101 of the *Field Sampling Plan (FSP),* (Vol. II, Appendix H). The HSO or designee will inspect each piece of equipment and verify that it is clean (no visible dirt, mud, etc.) prior to removal from the Site. All wastewater generated as a result of equipment cleaning will be containerized pending appropriate disposal or will be contained and treated in the on-site water treatment system prior to discharge to the Sheboygan River.

13 Communications

Emergency numbers including police, fire, ambulance, and hospital are presented in Table 2 and will be prominently posted in each construction office.

A route map to the nearest emergency medical facility is presented in Appendix A of this document and will be posted in each construction office. Prior to initiating Site activities, the emergency medical facility will be notified of Site activities to ensure preparedness to respond to any Site-related injuries.

The HSO or designee shall monitor for severe weather. In the event of severe weather (severe thunderstorm) the HSO or designee shall notify personnel via radio and/or cell phone to suspend work and seek shelter in a building or vehicle. In the event of a tornado, personnel shall seek shelter in a basement. If a basement is not available seek shelter in the interior room of a building. If outdoors, seek shelter in a low lying ditch or culvert.

14 Emergency Contingency Plan

14.1 General Information

This plan is intended to provide immediate response to a serious Site occurrence such as injury, explosion or fire.

In the event of injury to on-site personnel, the following protocol will be followed. It should be noted that the below protocol is meant to be a guideline. Actual sequence of events and/or notifications will be event-specific and depend on the severity of the accident/injury.

- Administer appropriate first aid,
- Notify the project Health and Safety Officer (HSO),
- Notify the appropriate USEPA agency/personnel,
- Contact the designated hospital and describe the injury,
- Transport personnel to the medical facility along a pre-defined route, and
- In the event of a serious injury, an ambulance will be summoned.

A route map to the Sheboygan Memorial Medical Center is shown in Appendix A.

14.2 Drum Removal Compressed Gas Cylinder Work Plan

It is not anticipated that compressed gas cylinders or drums will be encountered during remediation operations. However, in the event that a compressed gas cylinder or drum is encountered during remediation activities at the Site, PRS will store it on-site. PRS will have readily available the following spill control and equipment: Absorbent pads, 55-gallon drums, barricade tape, spark resistant tools, and accident/incident reports.

If the release of a hazardous waste occurs from a drum, the situation will be contained as quickly as possible using the personnel and resources at hand. If it cannot be contained safely or remotely, evacuation of the zones will be necessary until an initial assessment of the situation can be made. If there is a potential threat to the surrounding community, notifications will be made. At a minimum, Level B protection will be worn by personnel investigating a leaking drum or compressed cylinder. Air monitoring will be conducted using an organic vapor detector (Hnu) and 4-gas meter to determine the presence of potentially hazardous constituents and oxygen levels. In the event of any hazardous material spills, the appropriate State and Federal emergency contacts listed in Table 2 will be notified. Prompt response to all on-site spills will minimize the risk that spilled material will migrate off-site. If necessary, berms, dikes or trenches will be constructed, under the direction of the Project Manager and HSO to prevent any spills from migrating into the stream.

If a liquid spill does occur, it will be contained immediately using a small earthen dike established by hand shoveling and all personnel will be wearing the appropriate level of personal protective equipment to be determined on a site specific basis. The contained liquid will then be cleaned up using a sorbent material. All materials used during cleanup activities will be drummed and include identification on the outside of the drum as to the contents and date of occurrence. All drums and cylinders discovered will be stored on-site for later disposal.

14.3 Incident Reporting

After an emergency event has occurred and has been resolved, the Project Manager will conduct a meeting with all concerned individuals and all personnel on-site at the time of the event. This meeting will be held as soon as possible after the event. This meeting will be for discussions of the following topics, at a minimum:

- What was the cause of the event?
- What parts of the Contingency Plan worked well?
- What parts of the Contingency Plan did not work well?
- What is being done to correct the results of the incident?
- What is being done to prevent similar events from happening again?

15 Emergency and First Aid Equipment

Emergency safety equipment will be available for use by Site personnel and will be located and maintained on-site. The safety equipment will include, but is not limited to, the following:

- Two 20-pound ABC type dry chemical fire extinguishers
- Approved first-aid kit for a minimum of 25 personnel
- Fire blanket
- Portable air horn
- Bloodborne pathogen kit

16 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. In particular, heat stress can be evident as:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

These hazards will be discussed during daily safety meetings before commencement of work activities, when relevant. Personnel must increase consumption of water and electrolyte-containing beverages, such as Gatorade ™, during warm and hot weather conditions.

At a minimum, workers will break approximately every two hours for 10 to 15 minute rest periods. In addition, workers will be encouraged to take rests whenever they feel any adverse effects that may be heat related. The frequency of breaks may need to be increased upon worker recommendation to the HSO.

A work/rest schedule will be calculated based on heat stress monitoring results. Monitoring will consist of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. The frequency of monitoring the radial pulse will be as follows:

Ambient Temp.	***Level D PPE***	***Modified Level C PPE***
90° F or above	After 45 min. of work	After 15 min. of work
87.5° F - 90° F	After 60 min. of work	After 30 min. of work
82.5° F - 87.5°F	After 90 min. of work	After 60 min. of work
77.5° F - 82.5° F	After 120 min. of work	After 90 min. of work
72.5° F - 77.5° F	After 150 min. of work	After 120 min. of work

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, the next work cycle will be shortened by 1/2 and the rest period will be kept the same. If the heat rate still exceeds 110 beats per minute at the next rest period, the following rest period will be increased by 1/3. The initial rest period will be at least five minutes.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70°F when wearing modified Level C, Level C or Level B PPE, or 80°F when wearing Level D PPE and humidity levels are above 50 percent. Initial rest period will be at least five minutes.

17 Cold Stress

With outdoor work in the winter months, the potential exists for hypothermia and frostbite. Prior to start of work the HSO shall discuss prevention of cold stress with employees. Discussion will include proper clothing, heated shelter, and reporting symptoms.

Protective clothing greatly reduces the possibility of hypothermia in workers. Personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees must also change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel must pay particular attention to hands, feet and any exposed skin when dressing. Personnel will be advised to obtain more clothing if they begin to experience loss of sensation due to cold exposure.

Employees will be encouraged to seek heated shelter at regular intervals, depending upon the severity of ambient temperatures. Symptoms of cold stress include: heavy shivering, excessive fatigue, drowsiness, irritability or euphoria. These symptoms will necessitate immediate return to the heated shelter.

HSO shall consult with employees at regular intervals to ensure they have proper clothing. HSO shall schedule regular breaks at heated shelter for employees based on US Army Wind Chill Index (Appendix D). If employees or HSO notice a worker(s) exhibiting symptoms of cold stress, HSO shall immediately direct worker(s) to heated shelter and ensure they have proper clothing.

18 Posted Regulations

Where appropriate, "No Smoking" signs will be posted at the work area entrance and on the perimeter of the work area in addition to signs which state "Work Area, Do No Enter Unless Authorized", or similar. In addition, a notice directing visitors to the office will be posted at the Site.

Safety regulations and safety reminders will be posted at conspicuous locations throughout the Site.

19 PCB Exposure

Three possible pathways of exposure to PCBs exist at the Site: 1) dermal contact, 2) ingestion of contaminated water or sediment, and 3) inhalation of either PCB impacted particulates or PCB vapors. PCB concentrations in media at the Site range from non-detect to 1800 ppm (*External Source Assessment*, Nov. 1999). The Minimal Risk Level for ingestion of PCBs is 0.03 ug/kg/day (*Toxicological Profile for PCBs*, 2000).

To minimize exposure to PCBs, level D PPE shall be worn by workers when handling PCB impacted soils or water.

Symptoms of PCB exposure include acne, rash, gastrointestinal discomfort, depression, or fatigue. If employees or HSO notice these symptoms, they shall be immediately reported and taken to the designated hospital for a blood test.

For more information on PCBs, refer to the Material Safety and Data Sheet (Appendix E).

20 References

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River.* May 2004.

United States Environmental Protection Agency. *EPA Superfund Record of Decision.* May 2000.

United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site.* January 2003 (revised).

Federal Code of Regulations, Occupational Safety and Health Administration. *Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910,1910.1200, 1910.120, 1910.134, and 1926. 29.*

American National Standards Institute. *Standards F2413-05 (Performance Requirements for Foot Protection) and Z87.1-2003 (Occupational and Educational Personal Eye and Face Protection Devices).* 2003 and 2005.

Pollution Risk Services, LLC and Foth & Van Dyke. *Field Sampling Plan (FSP).* Vol. II, Appendix H of *Sediment Removal Design.* March 2006

Blasland, Bouck, Lee, Inc. *External Source Assessment (ESA).* November 1999.

Agency of Toxic Substances and Disease Registry. *Toxicological Profile for PCBs.* 2000

Tables

Table 1
Physical/Chemical Hazard Summary
Site Specific Health and Safety Plan
Pollution Risk Services, LLC
Sheboygan River and Superfund Site

HAZARDS MAY BE PRESENT DURING THESE ACTIVITIES:	
Road Building	Clearing and Grubbing
Multimedia Sampling	Regrading
Trenching	Placing Final Cover
Dredging	Seeding and Mulching
Excavation	Working On or Near River
Powerwashing	Fuse Welding Pipe
Wastewater Treatment Setup & Operations	Construction of Temporary Dams

POTENTIAL HAZARD	**HAZARD PREVENTION**
slip/trip/fall	-Wear proper safety boots -Avoid muddy slippery areas -Avoid horseplay -Work carefully -Keep work area neat -Erect barriers around open excavation -HSO to inspect operations daily in accordance with 29 CFR 1926.650
excess dust	-Use dust suppressants, e.g. water -Perform real-time dust monitoring, -if concentrations exceed OSHA PEL of 1mg/m^3 for Aroclor 1242 evaluate and don respirator
sunburn	-Use proper sun block
poison ivy	-Wear long pants and long sleeve shirts -Wear gloves -Be alert for poison ivy
ticks/insects	-Wear full coveralls -Use hair net and/or hood tyvek -Use insect repellent -Inspect hair and body for ticks
noise	-Monitor noise levels with a noise or sound level meter in accordance with OSHA requirements -Wear proper hearing protection at levels of 85 dBA (29 CFR 1910.95)
snakes	-Avoid walking in brush -Be alert
cuts/scrapes	-Do not remove safety guards from equipment -Review daily the physical and chemical glove protection required -Wear proper PPE clothing -Wear gloves when handling sharp tools or materials -Do not place sharp object in pockets

POTENTIAL HAZARD	HAZARD PREVENTION
back strain	-Use proper lifting methods -Lift no more than 60 lbs -Provide material handling devices -Get help with heavy / awkward objects
Hand tools	-Inspect tools prior to use -Wear gloves as needed to protect hands
chain saws & other power tools	-Wear chaps (chain saws-only) -Wear gloves -Follow manufacturers operating instructions -Wear safety glasses and hard hat -Hearing protection
heavy equipment - Excavator - Loader - Dozer - Dump Truck - Dredge	-Use only personnel trained in heavy equipment operations -Develop rules of engagement -Give heavy equipment right-of-way -Exercise extreme caution -Wear reflecting vests -Do not walk under boom -Make eye contact with operator prior to approaching -Documented inspections daily for each piece of equipment (refer to individual equipment inspections sheet for inspection requirements)
electrical cables	-Check and mark buried cables -Avoid overhead lines (maintain a minimum clearance of 10-ft) -Follow 29 CFR 1910.180 -Hand dig near or around cables to verify position.
underground utilities	-Prior to any onsite subsurface work, coordinate, check and mark underground utilities using Digger's Hotline at 1.800.242.8511 -Follow 29 CFR 1910.180 -Hand dig near or around utilities to verify position
drowning	-Wear coast guard approved personal floatation device when working near water
boat accident	-Follow Coast Guard Navigation Rules and Regulations (Inland Navigation Rules Act of 1980) -Properly licensed land and marine vehicles shall be used -Properly licensed personnel shall maintain and operate marine vehicles
power washer/generator	-Avoid direct exposure of power washer to skin to prevent puncture injuries - Don appropriate PPE (safety glasses, face shields, ear plugs, hard hat, tyvek suit or rain suit)
cold stress	-Wear layered clothing -Heated shelter to be provided using job trailers. -HSO to schedule heated shelter breaks at regular intervals based on the US Army Wind Chill Index (Appendix D, HASP) -HSO to ensure employees have adequate clothing at regular intervals -Employees to stop and obtain clothes if wet or cold.

POTENTIAL HAZARD	**HAZARD PREVENTION**
heat stress	-Drink plenty of water throughout day -HSO to schedule adequate rest periods for cooling down -All breaks are taken in shaded areas -Know signs and symptoms of heat exhaustion -Educate employees on importance of rest, acclimatization and proper diet to prevent heat stress
extension cords	- check condition of cord, i.e., no exposed wire, broken prongs, etc. - when working near water insure that a GFCI is used
Geotube	- stay up-hill during initial filling to prevent entrapment from falling
PCB's/Polymers/other chemicals	- read MSDS for associated hazards - don PPE (i.e., gloves, safety glasses, face shield) before handling

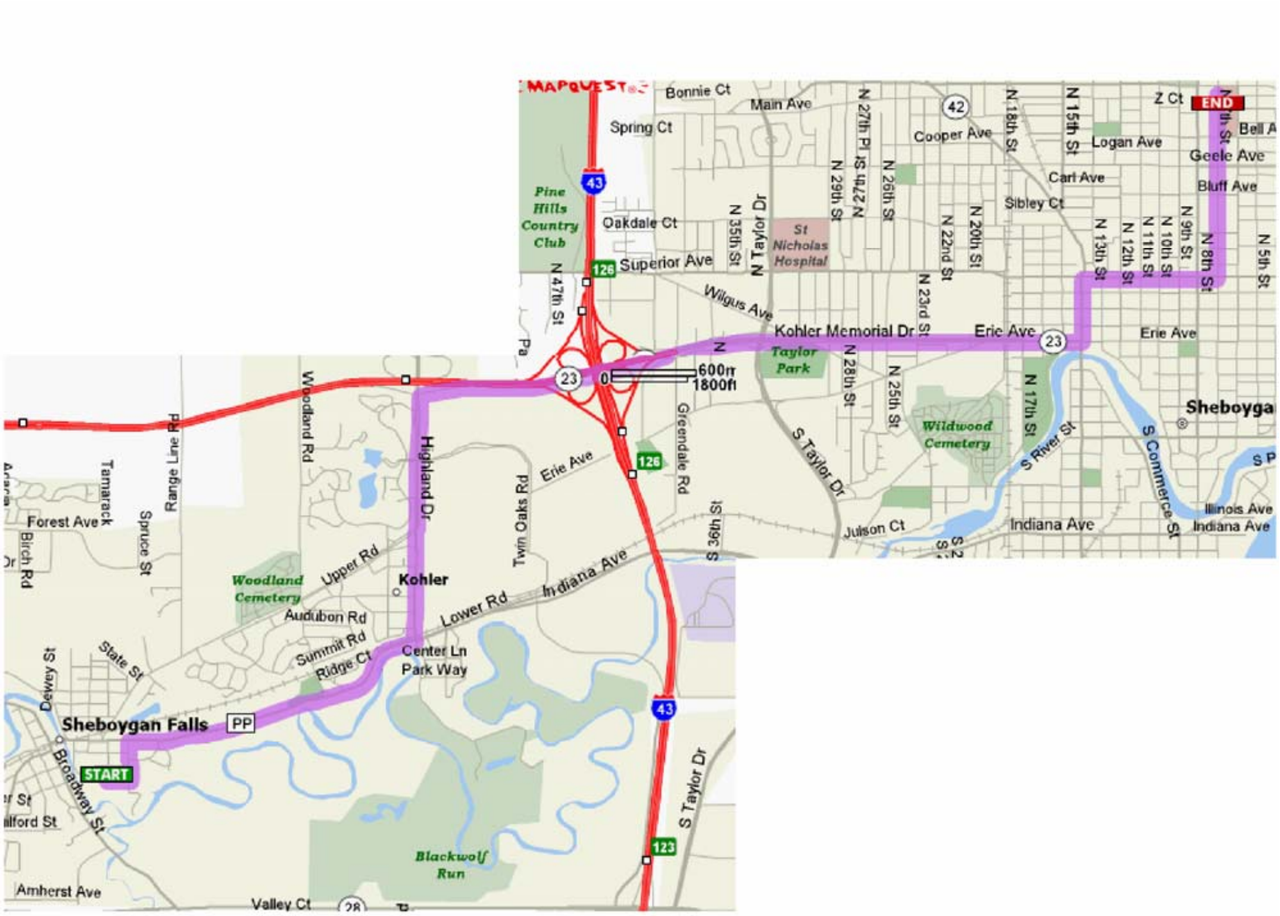
Table 2
Emergency Telephone Numbers
Sheboygan Falls, Wisconsin
Site Specific Health and Safety Plan
Pollution Risk Services, LLC
Sheboygan River and Superfund Site

General Emergency (Sheboygan Falls Sheriff's Dept.)	911
Ambulance (Sheboygan Falls)	911
Hospital (Sheboygan Memorial Medical Center)	(920) 451-5000
Wisconsin Department of Public Health	(608) 266-1865
Sheboygan County Health Department	(920) 459-0529
Wisconsin Department of Natural Resources (WDNR)	(414) 263-8500
Wisconsin Hazardous Material Spill Hotline	(800) 943-0003
WDNR Southeast Regional Spill Coordinator	(414) 263-8685
Sheboygan Poison Control Center	(800) 222-1212
USEPA Emergency Response & Removal Branch	(404) 562-8705
USEPA Emergency Response & Removal Branch – 24 Hour	(404) 562-8700
Wisconsin State Police	(920) 929-3700
Pollution Emergency Alert System (PEAS)	1-800-292-4706

APPENDIX A

EMERGENCY HOSPITAL ROUTE MAP

Emergency Hospital Route Map



Sheboygan Memorial Medical Center
2629 N 7th Street
Sheboygan, WI 53083

(920) 451-5000

APPENDIX B

TRAINING ACKNOWLEDGEMENT FORM

Fo

TRAINING ACKNOWLEDGMENT FORM

Please Print:

NAME:

ADDRESS:

SOCIAL SECURITY NUMBER:

EMPLOYER:

JOB SITE: Sheboygan River and Harbor Superfund Site

I have attended and understood the mandatory Site-specific initiation session for the above referenced job site where I read or was provided with an explanation of the Health and Safety Plan. This program referenced the following topics:

____
Signature

____
Date

APPENDIX C

RESPIRATORY PROTECTION PROGRAM

POLLUTION RISK SERVICES ENVIRONMENTAL'S
RESPIRATORY PROTECTION PROGRAM

1. Policy

Appropriate respiratory protection shall be worn as specified by a facility or department's procedures or a project's Health and Safety plan.

When working within a client's facility, the respiratory protection requirements of the client or Pollution Risk Services shall be complied with, whichever is more stringent.

Only employees who have been medically cleared to wear respirators shall do so.

The respiratory protection and practices identified below are required for all employees while on a work site (either facility or project). This includes visits to clients' facilities and job walks, as appropriate.

Only Pollution Risk Services authorized respirators shall be worn.

2. Scope

This policy applies to all Pollution Risk Services employees, visitors and contractors.

3. Provisions

A. Engineering Controls

1. Whenever practical, contaminant levels shall be reduced through engineering controls. These controls shall include ventilation, dust control and substitution of less toxic materials.

B. Selection

1. Selection of respirators shall be based on the hazards that might be encountered. Contaminant levels, toxicity and emergency conditions that might arise shall be considered in the selection of respiratory protection for a particular project or operation.

2. Unless otherwise approved by Pollution Risk Services Health and Safety Officers, at a minimum, full-face respirators with appropriate chemical cartridges and filters shall be worn whenever the presence of contaminants is suspected or has been detected and the possibility exists that they may become airborne.

C. Facial Hair

1. All employees who may be required to wear a respirator in the course of their duties must be clean-shaven where the respirator touches the face when they report to work.

D. Fit Testing

1) Positive/Negative

a) Respirators must be fit tested to the user's face with a positive/negative fit test prior to each use to ensure proper sealing.

2) Qualitative

a) A qualitative (irritant smoke) test shall be administered to all new employees prior to the use of a respirator and at least annually thereafter.

b) Tests shall also be administered whenever:

- Employees change makes, models or sizes of respirators;
- Employees experience any condition which alters the configuration of the face; e.g. weight gain or loss of more than ten pounds, broken nose, loss of teeth, facial surgery; and
- Employees perceive that their respirator does not seal properly.

c. The Pollution Risk Services Qualitative Respirator Fit Test Procedures shall be followed in administering the tests.

d. Qualitative fit tests shall be documented on a form such as the Respirator Fit Test Certificate.

E. Self-Contained Breathing Apparatus (SCBA, ALE)

1. Breathing air quality shall, at a minimum, shall meet the Compressed Gas Association's Grade D specification. A certification of air quality must be obtained from the supplier at the time of purchase. If a certification is not obtained, the air must be tested and certified by a qualified lab prior to use.
2. SCBAs and ALEs must be inspected prior to each use or at least monthly. Records of inspections must be maintained for a minimum of twelve months.

F. Cleaning/Maintenance/Storage

1. If a respirator is not individually assigned, it must be cleaned and disinfected after each use.
2. Individually assigned respirators shall be cleaned as frequently as necessary to insure that proper protection is provided.
3. Respirators shall be inspected; straps, valves, facepiece, fittings, hoses, etc., and repaired as necessary after each cleaning.
4. Respirators shall be stored in tightly sealed containers in a location where the mask is not distorted and temperatures do not exceed 130°F.

G. Training

1. Once each calendar year, employees who are required to wear respirators shall be trained in the use of respiratory protection equipment. At a minimum, training shall include:

   a. Proper Selection
   b. Use
   c. Fit Testing Procedures (positive/negative and qualitative)
   d. Cleaning
   e. Maintenance
   f. Storage
   g. Limitation of Use

H. Responsibilities

The responsibility for enforcement of the Pollution Risk Services Respiratory Protection Policy is as follows:

1. Employees - each employee is responsible for:
    a) Following the instructions received in training
    b) Selecting the proper respirator for a job
    c) Insuring that their respirator fits properly and is clean and maintained in a serviceable condition
2. Supervisor/Manager - the Supervisor/Manager is responsible for seeing that:
    a) Employees are properly fitted with the appropriate type of respirator
    b) Employees receive respirator clearance exams (pulmonary function tests)
    c) Employees are properly trained
    d) The use of respiratory equipment is enforced in situations/operations where such use is required
    e) That respiratory protection equipment is readily available and accessible
    f) That conditions are evaluated which will allow for proper selection of respiratory protection
3. Corporate Health and Safety Staff - the Corporate Health and Safety Staff will
    a) Assist in specifying the types of respirators needed
    b) Provide assistance in the training of Supervisors/Managers and employees
    c) Provide periodic, comprehensive audits of the respirator program. The Medical Monitoring ground will oversee respirator clearance exams

QUALITATIVE RESPIRATOR FIT TEST GUIDELINES

Introduction

In order to achieve the maximum protection possible from a respirator, it must be worn properly and seal tightly against the user's face. If a respirator is not sealed properly against the face, contaminated air may enter the face piece from around the edges of the mask during inhalation.

A respirator fit test determines the ability of a respirator wearer to obtain a satisfactory fit with a specific make, model and size of respirator. Briefly, the qualitative test consists of exposing a respirator wearer to an irritant smoke test agent. If the wearer is unable to detect penetration of the test agent into the respirator, the wearer has achieved a satisfactory fit.

The irritant smoke is produced by breaking the ends off a glass tube and connecting it to a squeeze bulb. As the bulb is squeezed and air is forced through the tube, moisture in the air reacts with the material in the tube (commonly stannic chloride or titanium tetrachloride) and produces hydrochloric acid which appears as smoke. The smoke is very irritating to the eyes and respiratory tract and must be used properly.

Frequency of Testing

Respirator fit tests shall be administered before initial assignment to jobs requiring the use of a respirator and at least annually thereafter.

Tests shall also be administered whenever:

1. Employees change makes, models or sizes of respirators;
2. Employees experience any activity which alters the configuration of the face; e.g. weight gain or loss of more than ten pounds, broken nose, loss of teeth, facial surgery; or
3. Employees perceive that their respirator does not seal properly.

Record Keeping

Respirator fit test records shall be kept for at least the duration of employment. The records shall include:

1. Employee name
2. Employee number
3. Job title
4. Specific make, model, size and approval number of each respirator tested
5. Test results
6. Name of person administering test
7. Date
8. Testing agent

Test Procedures

1. Explain the purpose of the test and the test procedures to the employee.
2. Allow the employee to smell a weak concentration of the irritant smoke.
3. Inspect the respirator which will be worn (either the employee's own respirator or the one which will be used for the test) to insure that the straps, valves, face piece, etc., are in satisfactory condition. Refer to the manufacturer's literature for proper inspection procedures if necessary. The respirator used in the test must be capable of filtering fumes in order to purify the test agent from inspired air. Make sure fume filters or cartridges are on the respirator before starting the test (regardless of which filters or cartridges an employee normally uses).
4. Have the individual put the respirator on and tighten the straps, position the facepiece etc. until the respirator is adjusted as he/she normally wears it.
5. Insure that the employee is clean shaven where the respirator touches the face. If facial hair does interfere with the seal of the respirator, discontinue the test until the employee is clean shaven.
6. If this is the first test for an employee, have the employee wear the respirator for at least ten minutes before starting the test.
7. If a half-mask respirator is being tested, insure that the employees wear goggles during the test so that his/her eyes are protected from the smoke.
8. Once the respirator is adjusted, have the employee perform a positive/negative fit test. If a seal cannot be obtained with a positive/negative fit test, have the employee change size or models until a good seal is obtained.
9. Have the employee stand in front of an exhaust hood or outdoors and instruct him/her to keep their eyes closed during the test even though goggles or a full face respirator are worn to avoid irritation of the eyes.
10. Keeping the smoke tube about two feet from the respirator, cautiously direct a minimal amount of smoke toward the center of the respirator while watching the wearer's reactions. If the wearer is able to detect the smoke, stop the test. Instruct the employee to readjust the respirator and begin the test again at Step 6. In some cases, it may be necessary to change to a different size or model of respirator.
11. If the user does not detect the test agent, move the smoke tube progressively closer to the respirator, and increase the density of the smoke, until the tube is within 4” to 5” of the facepiece. (Do *not* move the tube closer than 4” because this distance is required for the hydrochloric acid vapor to condense and form smoke.) Again, if smoke penetrates the facepiece, readjust the respirator, change sizes, etc. and return to Step 6.
12. If no leakage is detected direct the smoke at potential points of leakage in the seal of the respirator; under the chin, along the jaws, across the nose pieces of half-masks, from a distance of approximately 4” to 5”. Again if leakage occurs, stop the test and return to Step 6.
13. Next, while directing smoke at the potential leakage points, have the user perform a series of exercises designed to simulate movements which he makes during a normal work period. Each exercise shall be performed for one minute. These exercises include:
    a) Turn the head from side to side. Inhale on each side.
    b) Nodding the head up and down. Do not bump the respirator on the shoulders. Inhale in the up position.
    c) Repeat the Rainbow Passage or count backward from 100.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch, with its path high above and its two ends apparently beyond the horizon. There is according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Repeat the Rainbow Passage aloud.

d) Breathe deeply. Be sure breaths are deep and regular.
e) Any other movements which might be specific to the respirator user's job, which might affect the seal of the respirator; e.g. bending over and touching the toes, squatting.
f) Jog in place.

If leakage is detected at any point during this portion of the test, return to Step 6.

14. If the wearer is unable to detect the penetration of smoke into the respirator, then a satisfactory fit has been obtained and approval shall be given for use of that particular respirator.

Repeat the entire test for each respirator the employee uses.

APPENDIX D

US WIND CHILL INDEX

Wind Chill Temperature Table

Wind Speed (mph) ↓ / Air Temperature (°F)

Wind Speed (mph)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
0	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95

RISK OF FROSTBITE (see times on chart below)

GREEN LITTLE DANGER (frostbite occurs in >2 hours in dry, exposed skin)
YELLOW INCREASED DANGER (frostbite could occur in 45 minutes or less in dry, exposed skin)
RED GREAT DANGER (frostbite could occur in 5 minutes or less in dry, exposed skin)

Time to occurrence of frostbite in minutes or hours

(In the most susceptible 5% of personnel.)

Wind Speed (mph) ↓ / Air Temperature (°F)

Wind Speed (mph)	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
0	***>2h***	***>2h***	***>2h***	***>2h***	***>2h***	***>2h***	***40***	***22***	***20***	***13***	***11***	***9***
5	>2h	>2h	>2h	>2h	31	22	17	14	12	11	9	8
10	>2h	>2h	>2h	28	19	15	12	10	9	7	7	6
15	>2h	>2h	33	20	15	12	9	8	7	6	5	4
20	>2h	>2h	23	16	12	9	8	8	6	5	4	4
25	>2h	42	19	13	10	8	7	6	5	4	4	3
30	>2h	28	16	12	9	7	6	5	4	4	3	3
35	>2h	23	14	10	8	6	5	4	4	3	3	2
40	>2h	20	13	9	7	6	5	4	3	3	2	2
45	>2h	18	12	8	7	5	4	4	3	3	2	2
50	>2h	16	11	8	6	5	4	3	3	2	2	2

WET SKIN COULD SIGNIFICANTLY DECREASE THE TIME FOR FROSTBITE TO OCCUR.

*Source: USARIEM Technical Note "SUSTAINING HEALTH & PERFORMANCE IN COLD WEATHER OPERATIONS," October 2001

APPENDIX E

PCB MATERIAL SAFETY DATA SHEET

POLLUTION RISK SERVICES -- PCBS IN SOIL INDIVIDUAL STANDARDS
==
MSDS Safety Information
==
MSDS Date: 11/21/03
Product ID: PCBS IN SOIL INDIVIDUAL STANDARDS,
Company Name: POLLUTION RISK SERVICES
Address: 100 E-BUSINESS WAY
City: CINCINNATI, OH 45241
Info Phone Number: 513-489-2793
Emergency Phone Number: 513-489-2793
==
Site Summary
==
Name: TECUMSEH PRODUCTS COMPANY
Address: 415 CLEVELAND STREET
City: SHEBOYGAN FALLS, WI 53085
Phone:
==
Hazardous Substances
==
Name: POLYCHLORINATED BIPHENYLs
==
Health Hazards Data
==.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: YES
IARC: YES
OSHA: NO
Effects of Exposure: SEVERAL COMPONENTS ARE ANIMAL POSITIVE, HUMAN SUSPECTED
CARCINOGENS. PRIMARY IRRITANT. IRRITATES AND DAMAGES ALL TISSUES. MAY CAUSE
LIVER, KIDNEY AND LUNG DAMAGE. MAY CAUSE CARDIAC ARRYTHIMIA, MAY SEN SITIZE
THE HEART TO EPINEPHRINE. MAY CAUSE ALLERGIC DERMATITIS OR CHLORACNE. MAY
CAUSE CANCER OF THE (EFTS OF OVEREXP)
Explanation Of Carcinogenicity: AROCHLOR 1254:IARC MONOGRAPHS, SUPP, VOL 7, PG
322, 1987:GROUP 2A. AROCOLOR 1254 & 1260:NTP 7TH ANNUAL RPT ON (SUP DAT)
Signs And Symptoms Of Overexposure: HLTH HAZS: LIVER OR HEMATOPOIETIC SYSTEM.

SIGNS AND SYMPTOMS:RED, DRY, SCALY SKIN; CRACKING AND WEEPING SKIN; COUGH AND

WHEEZING. JAUNDICE; NAUSEA AND VOMITING; UREMIA. MAY CAUSE CHLORACNE.
Medical Cond Aggravated By Exposure: DERMATITIS. LIVER DISEASE, KIDNEY DISEASE, ANEMIAS AND LEUKOPENIAS.
First Aid: INHALATION:REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE O*2/ARTF RESP) (FP N). EYES:IN CASE OF CONTACT WITH MATERIAL, IMMEDIATELY FLUSH EYES WITH RUNNING WATER FOR AT LEAST 15 MINUTES. SKIN:WASH SKIN WITH SOAP AND WATER. REMOVE AND ISOLATECONTAMINATED CLOTHING AND SHOES AT THE SITE. INGESTION:GIVE SYRUP OF IPECAC 60 CC WITH 180 CC WATER IF SWALLOWED.

===

Handling and Disposal

===

Spill Release Procedures: VENTILATE AREA. DAMPEN WITH WATER SPRAY TO PREVENT DUST DISPERSION. CALL CLEANUP TEAM. DO NOT FLUSH TO DRAIN OR OPEN WATER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N). INCINERATE OR DISPOSE AS HAZARDOUS WASTE.
Handling And Storage Precautions: AVOID BREAKAGE. USE OR STORE ONLY IN AREAS WHERE SPILLS CAN BE CONTAINED.
Other Precautions: HANDLE WITH CARE! MATERIAL CONTAINS CARCINOGENS.

===

Fire and Explosion Hazard Information

===

Extinguishing Media: MEDIA SUITABLE FOR SURROUNDING FIRE (FP N). NOT APPLICABLE.
Fire Fighting Procedures: WEAR NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). NOT APPLICABLE.
Unusual Fire/Explosion Hazard: MAY FORM CARBON MONOXIDE, PHOSGENE, AND CARBONYL BROMIDE IN FIRE (SIGNIFICANT ONLY IF LARGE QUANTITY INVOLVED).

===

Control Measures

===

Respiratory Protection: NIOSH APPROVED PARTICULATE OR COMBINED VAPOR/PARTICULATE FULL FACE RESPIRATOR OR SELF CONTAINED/POSITIVE PRESSURE

FULL FACE UNIT.
Ventilation: LOCAL EXHAUST:USE IN HOOD. SPECIAL:VENTILATE SPILL.
Protective Gloves: VITON OR NEOPRENE GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).

Other Protective Equipment: ANSI APPROVED EMERGENCY EYE WASH AND DELUGE SHOWER
(FP N). CHEMICAL IMPERVIOUS CLOTHING IF LARGE AMOUNTS IN (SUPP DATA)
Work Hygienic Practices: USE CAREFUL LABORATORY TECHNIQUE. AVOID CONTACT.
Supplemental Safety and Health: EXPLAN OF CARCIN:CARCINOGENS, 1994:ANTICIPATED
TO BE CARCINOGEN. ANIMAL:LIVER. OTHER PROT EQUIP:USE. LABORATORY COAT,
IMPERVIOUS APRON WITH SLEEVES AND CLOSED SHOES.
==
Physical/Chemical Properties
==
Spec Gravity: 0.889 (H*2O=1)
Evaporation Rate & Reference: NOT KNOWN
Solubility in Water: INSOLUBLE
Appearance and Odor: CLEAR YELLOWISH LIQUID; ODORLESS.
==
Reactivity Data
==
Stability Indicator: YES
Stability Condition To Avoid: NONE.
Materials To Avoid: NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products: NONE SPECIFIED BY MANUFACTURER.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT
==
Toxicological Information
==
==
Ecological Information
==
==
MSDS Transport Information
==
==
Regulatory Information
==
==
Other Information
==

Product ID: PCBS IN SOIL INDIVIDUAL STANDARDS, PS-91 (1242 LOW)
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: WARNING
Respiratory Protection IND: YES
Health Hazard: Moderate

Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None
Hazard And Precautions: ACUTE:PRIMARY IRRITANT. IRRITATES AND DAMAGES ALL
TISSUES. MAY CAUSE LIVER, KIDNEY AND LUNG DAMAGE. MAY CAUSE CARDIAC
ARRYTHMIA, MAY SENSITIZE THE HEART TO EPINEPHRINE. MAY CAUSE
ALLERGIC
DERMATITIS O R CHLORACNE. SIGNS AND SYMPTOMS:RED, DRY SCALY SKIN;
CRACKING
AND WEEPNG SKIN; COUGH AND WHEEZING. JAUNDICE; NAUSEA AND VOMITING;
URENIA.
CHRONIC:CANCER HAZARD. CONTAINS ARCHLOR 1254 AND 1260 (PCB'S) WHICH
ARE
LISTED AS ANIMAL LIVER CARCINOGENS (FP N).
===

PRS Pollution Risk Services

Foth & Van Dyke

Sheboygan River and Harbor Superfund Site
Phase II – Upper River
Sediment Removal Design

Draft Operation and Maintenance Plan

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Draft Operation and Maintenance Plan

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

Draft Operations & Maintenance Plan

Contents

Tables

Appendices

1 Introduction

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County. The Site includes the former Tecumseh Manufacturing site and the lower fourteen miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner Harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the remedial investigations (RI), the river was segmented in separate sections based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four miles to the Waelderhaus Dam in Kohler. The Middle River extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. The Lower River extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work, which included plant site soils, groundwater and riverbank soils was completed in 2004. Phase II remedial action work includes Upper River Near-Shore Sediments, Armored Areas, and Soft Sediment deposits and is scheduled for 2006 implementation.

This RD document has been generated to be consistent with the *Record of Decision (ROD),* (May 2000), *Consent Decree (CD),* (May 2004), and *Upper River Statement of Work (URSOW)*, (Jan. 2003). This Draft Operations & Maintenance Plan (O&M) addresses the monitoring activities for Upper River and Harbor Upper River Phase II. Once remedial action performance standards as defined in "Sections 14b and 45b (22 b and 55b, Amended)" of the *Consent Decree*, are achieved, the monitoring activities described herein will cease. The Draft O & M Plan also addresses Floodplain monitoring and maintenance, fish monitoring and sediment monitoring.

2 Floodplain Monitoring and Maintenance

Floodplain monitoring and maintenance activities will be performed semi-annually for a period of two years following the completion of Phase II Upper River remedial actions. In the event that a one-time removal of soils from select locations in the Floodplains occurs and the absence of ongoing remedial activities no operations are associated with Floodplain monitoring and maintenance activities.

2.1 Monitoring and Maintenance

In accordance with the *URSOW*, remediated areas of the Floodplains will be inspected on a semiannual basis, for evidence of erosion, vegetative coverage, and growth for a period of two years following completion of the Upper River Remedial Action. Inspections will be documented on the form provided in Appendix A. If necessary, PRS will schedule repairs to address any deficiencies within two weeks of the inspection. All repairs will be documented.

Floodplain monitoring and maintenance will include the following activities:

- Inspect Floodplains for erosion and health planted vegetation
- Reseed/replant areas where deficiencies are identified in semi-annual inspections
- Maintain and repair temporary erosion controls (i.e. straw bales, silt fence) until vegetation is established
- Repairs are to be made, condition permitting, within two weeks of inspections
- Remove temporary erosion control measures once vegetation is established

2.2 Schedule Frequency of O&M Tasks

A schedule for Floodplain monitoring and maintenance activities is provided on Table 1.

3 Fish Monitoring

Fish monitoring will be performed annually after the completion Phase II Upper River Remedial Actions as described in this Plan.

3.1 Monitoring Tasks

3.1.1 Fish Monitoring

Polychlorinated Biphenyl (PCB) concentration in fish for the Upper River will be monitored in accordance with the *URSOW*. Species targeted for monitoring include adult smallmouth bass, walleye, trout, catfish, juvenile white suckers or carp. Fish will be collected from two locations of the river: Station 1 – Vicinity of Rochester Park (between Tecumseh site and River Bend dam); Station 2 – Between River Bend dam and Waelderhaus dam. Size of fish to be collected should vary by no more than 10% of that listed below. Sample sizes and size ranges are as follows:

- Smallmouth bass: 9 individuals/location; target fish size: greater than 10 inches
- Carp or white suckers: 25 individuals/location; target fish size: 3-8 inches
- Walleye: 9 individuals/location; target fish size: greater than 12 inches
- Trout: 9 individuals/location; target fish size: greater than 10 inches
- Catfish: 9 individual/location; target fish size: greater than 12 inches

The justification for type of fish collected is generally consistent in scope with the *Work Plan/Qapp Interim Monitoring Program* (Sept. 1996), the *ROD* for target levels, and the *URSOW*.

Prior to collection of any fish, a Scientific Collectors Permit will be obtained from the WDNR. Species will be collected from the Upper River using boat-mounted electro fishing equipment. Although this method has been effective in the past, if deemed ineffective in the future, alternative methods (e.g. seining, angling) may be employed. These methods are consistent with those used during the *Work Plan/Qapp Interim Monitoring Program* and WDNR's collection for fish advisories. Other methods (i.e. hoop nets, gill nets) were unsuccessful and are not discussed as alternatives. They would only be used as a last resort method and an addendum to this document would be required. In the event that certain species of fish are not collected, this will be documented in the Fish Monitoring Report. Collection methods, sample processing procedures, and analytical methods are described in subsequent sections.

PCB concentrations in fish will be monitored until fish consumption advisories for the upper river are lifted by the Wisconsin Department of Health, fish fillet concentrations of PCBs decrease to the target levels specified in the *ROD* listed below:

Sport Fish
1. Smallmouth Bass: 0.31 parts per million (ppm)
2. Walleye: 0.63 ppm
3. Trout: 0.09 ppm

Bottom Feeders
1. Carp/White Suckers: 2.58 ppm
2. Catfish: 2.53 ppm

or for 30 years, whichever comes first.

3.2 Monitoring Frequency

Fish monitoring will occur annually between the months of June and September to allow for appropriate collection of migrating species. The monitoring program may be adjusted if it is demonstrated that less frequent sampling still provides the information necessary to track trends or trends indicate that fish tissues will reach the targeted cleanup levels over time.

3.3 Sampling Procedures

Fish sampling will be performed in accordance with the procedures described below. Also discussed in this section will be procedures and requirements for sample processing, sample packaging and shipment, and equipment decontamination.

3.3.1 Fish

Fish sampling will be conducted in accordance with field procedures. These procedures will specify how the fish are collected and stored prior to field processing and shipment to the laboratory for analysis. Information regarding the fish collection activities (i.e. location, species, size, and sample size) is discussed in Section 3.1.

Fish will be collected using boat-mounted electro-fishing equipment and techniques. If this method is ineffective, alternative methods including seining and/or angling may be used.

3.3.1.1 Boat-Mounted Electro-fishing

The following describes the procedures to use for collection and short term storage of fish collected with a boat-mounted electro-fishing unit.

1. Personnel assigned to collect fish from a specific location will be provided the following:
    - Sample location;
    - WDNR Fisheries Division District Office number;
    - Species to be collected;
    - Number of each species to collect;
    - Length or size of species to collect;
    - Sampling permit; and
    - Special instrumentation (if needed)

2. During fish collection, the following equipment will be available:
    - Electro-fishing boat;
    - Electrodes;
    - Generator;
    - Control equipment to regulate voltage and current to electrode;
    - Wiring to provide safe transmission of current;
    - Switching, including a switch that keeps circuit open unless actively and continuously closed;
    - Live well;
    - Ice and coolers;

- Dip nets with handles of non-conductive material;
- Life preservers, footwear with non-conductive soles, and non-conducting gloves;
- Measuring board;
- Suspended-weight or top-loading spring balance;
- Top-loading electronic balance;
- Mesh bags, trays, or other containers to hold fish for weighing;
- Appropriate forms and/or field notebook

3. Field personnel will set up and test equipment per the unit(s) operating manual.

4. Procedures for operation of the electro-fishing boat require the following assignments:
   A. Field Crew
      a. Crew leader will be responsible for:
         i. Control of boat; and
         ii. Operation of control equipment and generator.
   B. Operation
      a. Select appropriate power setting employing pulsed DC to stun-fish.
      b. Apply current to water by closure of the switch while generator and control equipment are operative.
      c. Collect target species of appropriate size fish in dip nets when seen.
      d. Retain fish in live well or on ice in cooler until sampling is completed, or processing samples for shipment to laboratory.

3.3.1.2 Seining/Angling

In the event that electro-fishing is unsuccessful, either of the two alternative collection methods will be employed at the site, depending on in-stream collection conditions (i.e. width of channel, depth, current, obstructions, etc.)

1. Seining

The following describes procedures to be used for collection of fish:

A. Select a seine with dimensions and mesh size appropriate for the target fish group and collecting conditions.
B. Seine the sample location using one of the following two techniques:
   a. Shore Seining – Shore seining will be performed by maintaining the seine approximately perpendicular to a shoreline, with one end at or near the edge of the water and the other held out as far out from shore as practicable. The seine will be pulled along the shore with both ends moving at about the same rate. At the end of the seine haul, the outer end will be moved around to the shore, and the entire seine will be pulled out of the water while maintaining the leadline on the bottom as practicable. The seine will be pulled onto shore until the leadline is completely out of the water.
   b. Quarter-Arc Seining – Quarter-arc seining will be performed by holding one end of the seine in one place at or near the shoreline

and first pulling the other end of the seine out into the water perpendicular to the shore. The water-end of the seine will be moved down and back toward shore so that the outer end of the net moves approximately through a quarter of a circle. When the outer end of the net reaches shore, the entire seine will be pulled out of the water while maintaining the leadline on the bottom as practicable. The seine will be pulled onto shore until the leadline is completely out of the water.

2. Angling

If angling is used, the sampling personnel will adhere to the regulations defined by the general fishing licenses/laws and/or collecting permit. Angling will be performed with the use of bait or artificial lures. The nature of gear, the bait or lures, and the method of use will depend on the collecting conditions and targeted species.

3.3.1.3 Sample Processing, Packaging, and Shipping

1. Processing and Packaging

In preparation for shipment to the laboratory, all fish samples will be process and packaged in accordance with the procedures described in the WDNR's *Division of Environmental Standards Field Procedures Manual* (Sept. 1988). Procedures for field processing, wrapping, labeling, and shipping fish samples are listed below:

A. During and after collection, samples will be held in a live well or on ice in an insulated cooler.
B. All fish samples will remain whole and ungutted.
C. Each fish should be numbered and the following recorded in field log book:
   - Length
   - Species
   - Sex (optional)
   - Sample location
   - Other distinguishing features
   - Sampler(s)
D. Any unusual skin lesions, tumors, or other irregularities should also be noted.
E. Prior to wrapping, scales will be retained from each individual fish.
F. Fish will be wrapped in aluminum foil first, then in freezer paper, then taped securely so that the package does not open during shipment.
G. All samples should be frozen as soon as possible after collection.

2. Shipping

For shipment to the laboratory, all fish samples will be packaged in accordance with the following procedures:

A. Place fish packages in a Ziploc bag or industrial grade trash bag and then into a cooler lined with ice on the bottom of the cooler. Fill cooler with fish samples, leaving enough room for ice on top of samples. If needed, fill remaining space with additional ice.

B. Put chain-of-custody forms in a sealable plastic bag and tape to inside of cooler lid.
C. Close cooler and seal with shipping tape; place evidence tape across closure at front of cooler.
D. Affix air bill (if appropriate) with shipper's and consigners address at top.

3.3.1.4 Equipment Decontamination

Reusable equipment which comes into direct contact with fish tissues will be cleaned prior to use and between samples using the following procedures:

1. Potable water rinse, and wash with a detergent solution (i.e., Alconox)
2. Potable water rinse.

Solid materials (e.g. disposable gloves and other disposable equipment) from sampling activities will be placed in plastic bags. These bags will be transferred into larger containers and transported to a licensed disposal facility. Reusable personnel gear which comes in contact with sediments will be cleaned with a detergent, and the interior and exterior surfaces will be washed with potable water, as necessary.

3.4 Data Analysis and Interpretation

Analysis and interpretation of the fish monitoring data will be consistent with the previous studies performed by Tecumseh. In addition, information generated will be summarized in a Fish Monitoring Report that will be submitted to the USEPA and WDNR on an annual basis. The report will present data generated during that year's sampling, along with any additional relevant information for that year. If appropriate, the progress report will discuss the significance of that year's data relative to data from previous years.

The monitoring program will provide the following data for each fish sample: total weight PCB concentration, percent lipids, fish total length and weight, and general conditions (i.e., presence of external abnormalities). Data analysis will include calculation of arithmetic mean total PCB concentration and lipid-normalized PCB concentration for each sampling location. Differences among the two locations will use an appropriate multiple comparison procedure. Temporal trends at each location will be evaluated similarly.

3.5 Quality Assurance and Quality Control

3.5.1 QA Objectives

The overall objective is to develop and implement procedures for sample collection, chain-of-custody, laboratory analysis, and reporting. Specific procedures used for sample collection, chain-of-custody, calibration, laboratory analysis, reporting, internal quality control, and corrective actions are described in subsequent sections. This section defines the goals for accuracy, precision, and sensitivity of specific chemical analyses; and the completeness, representativeness, and comparability of analytical data. QA objectives for field measurements will also be discussed.

3.5.1.1 Analytical Objectives

The receiving laboratory will be provided with sample specimens that are whole and intact. Samples will be packed in ice. The analysis to be performed on fish include: total PCBs (Aroclor basis) and percent lipids.

QA/QC samples will consist of a matrix spike and matrix spike duplicate. A minimum of one matrix spike/matrix spike duplicate analysis will be performed with every batch of fish being analyzed for PCBs. Batch size will be limited to no more than 20 samples.

The required detection limit for 10-g tissue sample is 0.09 mg/kg. Laboratory QA procedures for PCBs in fish is discussed in a subsequent section.

For analysis of PCBs in tissues, the QA procedures in USEPA's *Statement of Work for Organic Analysis* (Feb 1988) will be used, including laboratory blanks consistent with required detection limits, and initial and continuing calibration to verify recoveries of 80 to 120 percent. The QA requirements for matrix spikes, and control samples are as follows: matrix spike recoveries will be within 70 to 130 percent; control sample recoveries will be within 80 to 120 percent. If a sample falls outside of these ranges, it will be noted in monitoring report.

3.5.1.2 Completeness, Representativeness, and Comparability

The laboratory will provide data meeting QC acceptance criteria for at least 90 percent of all samples tested. Field measurements should provide completely valid data, and reasons for any variances from 100 percent completeness will be noted.

The Operation & Maintenance Plan (O&M) was designed to provide data representative of site conditions. During development of the O&M, consideration was given to past sampling practices and existing analytical data. The comparability of previous data and the data collected during the O&M depends upon the similarity of sampling and analytical methods.

3.5.1.3 Field Measurements

Measurements will be taken during field activities that are incidental to collecting samples for analytical testing. Data collection activities include:

1. Document date, time, and weather conditions;
2. Measure weight and length of fish.

The general objective for such field measurements is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the intended use of the data through use of standardized procedures.

3.5.2 Sample and Document Custody Procedures

3.5.2.1 Sample Records

Field observations and other information concerning the collection of samples will be recorded in log books. The data recorded will include: date, time, personnel, location, sample number, weather conditions, and any other pertinent information.

3.5.2.2 Chain-of Custody Procedures

All samples will be collected and handled in accordance with the procedures summarized below:

1. Prior to relinquishing samples for packaging and shipment, record relevant information on Chain-of-Custody form.
2. Samples will be packaged for shipment as described in the section “Sample Packaging and Shipment”.
3. Temporarily stored samples will be kept cold and placed in secured storage area. Coolers will be sealed and custody seals will be affixed just prior to shipment.

All chain-of-custody paperwork will be kept in a separate file. Procedures followed by sampling personnel will be based on the guidance provided in USEPA guidance documents.

3.5.2.3 Document Custody Procedures

The laboratory will establish a file for all data generated from analysis performed during the O&M. This file will include raw data, chromatographs, sample preparation, etc. These will be maintained in a secure location. At the conclusion of their involvement with this project, the laboratory will transfer all file information to Pollution Risk Services (PRS). These files will be retained for the duration of the project and six years thereafter. The final file will consist of the following components:

1. Project Files
2. Analytical Laboratory Data
3. Field Records
4. Reports
5. Miscellaneous (maps, drawings, articles, etc.)

Analytical laboratory data will be filed in chronological order. Field records will consist of Chain-of-Custody forms, field notebooks, and associated paperwork.

3.5.3 Calibration Procedures and Frequency

The calibration procedures and frequency of calibration for analytical instrumentation are discussed in the analytical protocols described in a subsequent section. Equipment used in the field will be calibrated as follows:

- Field calibration of balances will be performed per manufacturer recommendations prior to processing fish samples or, at a minimum, once each day of sampling.

3.5.4 Laboratory Procedures

Sample preparation procedures for analysis of fish for PCBs and percent lipids are presented below. Fish samples collected for the O&M will be analyzed for PCBs and percent lipids in accordance with procedures established by the WDNR for PCB analysis in tissue (WDNR Procedure 1400). These procedures are presented in Section 3.5.4.2. All sample preparation and analytical procedures will be comparable to those employed during previous fish sampling events.

3.5.4.1 Sample Preparation and Preservation

Upon receiving fish samples at the laboratory, the following sample preparation procedures apply:

1. Storage
   a. Fish should be stored by site on freezer shelves.
2. Preparing to grind
   a. Pull samples from freezer the day before grinding to thaw. Fish should be arranged by site, then species by increasing length.
   b. Prepare bottles – label year and sequence number on tape and wrap around each sample bottle. Consult sample tags for specific parameters to run.
3. Processing samples
   a. Weigh sample
   b. Filleting
      i. Following USEPA's *Pesticide Analytical Manual* (1977), prepare samples as follows:
         - Fillet: standard skin-on fillet

3.5.4.2 Analysis of PCBs in Fish

1. Application
   i. This method may be used for the analysis of PCB Aroclor mixtures in tissue samples. PCBs will be reported by Aroclor, with a detection limit of 0.1 mg/kg. This applies to each Aroclor.
2. Sample Preparation and Preservation – See Section 3.3.1.3
3. Reagents
   i. Methylene chloride, hexane, isooctane, acetone-pesticide grade, petroleum ether.
   ii. Anhydrous sodium sulfate, florisil gel (60 to 80 mesh).
   iii. PCB primary standards-graded purity (EPA or USDA graded by percent).
4. Standards
   i. All data pertinent to preparation will be recorded in a log book. Pertinent data will include date of preparation, origin of parent solution/primary standard, aliquot, and dilution information, all weighings and tares, purity, and name of preparer.
   ii. When fresh stock solutions are prepared from primary standards, a log book sheet will be used for noting origin, purity, date of preparation, and pertinent weighings and dilutions. Subsequent intermediate and working (or spiking) solutions prepared from the stock will also be documented.
   iii. Before introducing freshly prepared standards to routing analysis, they should be compared to current working standards where applicable and checked for impurities. Record response, retention, and all pertinent data and file chromatograms appropriately.
   iv. All standards are to be labeled with date of preparation, current concentration, parameter, and initials of preparer.

v. Procedure for standard preparation will be as follows:

1. Pre-tare a 50 ml beaker to nearest 0.1 mg. Introduce 10 to 50 mg of primary standard to the beaker and weigh the beaker plus standard to nearest 0.1 mg.
2. Determine total standard amount by the following formula:

   D = (B-A)C/100 , where
   A = beaker tare
   B = standard plus tare
   C = percent purity
   D = adjusted standard weight

3. Quantitatively transfer standard to a 100 ml volumetric flask and dilute with isooctane or hexane. Compute concentration as follows:

   Standard = adjusted standard weight/0.1
   This is concentrated stock
4. Working standards will be prepared by serial dilutions using standard volumetric glassware, i.e. pipettes.

5. Quality Control

i. Prepare Aroclor spiking solutions such that addition of this solution to 10 g of tissue yields an appropriate spiking level. Solutions will be prepared in acetone.

ii. Aliquots of spiking solution are introduced to tissue directly after tissue has been mixed with sodium sulfate prior to extraction. Mix thoroughly allowing solvent to evaporate before introducing the tissue/sodium sulfate mixture into extraction column.

6. Sample Extraction

i. Blend tissue with liquid nitrogen at high speed to produce a free-flowing powder. Let the liquid nitrogen evaporate in a freezer. Then, mix 10 g of frozen tissue powder with 60 g anhydrous sodium sulfate stirring frequently for approximately 30 minutes.

ii. Pour mixture into a 20 mm I.D. chromatographic column initially containing a 2 cm layer of sodium sulfate. Open the stopcock and add 250 ml of methylene chloride to the column reservoir. Adjust the elution rate through the column to about 5 ml/minute. Collect the eluate.

iii. After solvent has completely eluted, concentrate the extract on a steam bath to less than 5 ml. Add 5 ml of methylene chloride and quantitatively transfer to a 10 ml volumetric flask using methylene chloride and dilute to volume. Take a 1 ml aliquot and transfer to an aluminum weighing dish tared to the nearest 0.1 mg. Evaporate remaining solvent under a hood overnight and weigh the residue to the nearest 0.1 mg. Determine the fat content using this equation:

%fat = [mass of residue(g) x 10 ml/mass of extract(g)]x100

7. Sample Cleanup

i. Silica gel and/or magnesium silicate chromatography are used as a cleanup for PCB analysis. These may be repeated for samples which chromatograph poorly follow the first treatment.

ii. The sample extract will be at a volume of 5 ml in hexane.

iii. Place a plug of glass wool in the bottom of as many columns as will be used to clean up blanks, samples, and spikes.

iv. Add 20 g of Florisil to each column.

v. Top each Florisil column with 2 cm of sodium sulfate.
vi. Pre-rinse each column with 150 ml petroleum ether, taking the solvent down to the top of the sodium sulfate. Discard the eluent.
vii. Label each column and a 500 ml Erlenmeyer flask for each.
viii. Place a 500 ml Erlenmeyer flask under each of the Florisil columns.
ix. Add 5 ml of the sample extract (in hexane) to the top of the column.
x. Open the stopcock, allow the sample to go down to the top of the sodium sulfate, and close the stopcock.
xi. Add 250 ml of petroleum ether to the column, open the stopcock, and allow the solvent to elute at a rate of approximately 5 mL/minute.
xii. When all of the solvent has gone through the column, concentrate the sample extracts, exchange them to hexane, and dilute them to a needed volume.
xiii. Samples are ready for further cleanup or analysis, depending on the remaining matrix interferences.

8. Gas Chromatography
   i. PCBs are analyzed on a 1.8 M x .4 mm packed column containing 3% SP2100 or a mixed packing of 1.5% SP2250 column packing and 1.95% SP2401 using a electron captive detector. A DB-5, DB-608, or DB-1701 megabore column may also be used.
   ii. The first step in PCB quantification is to match the sample chromatogram as closely as possible with that of an Aroclor standard or combination of standards. Sample weathering (loss of some peaks) and the possible presence of co-eluting compounds must be considered. Experience should enable the analyst to identify and match standard Aroclor mixtures to environmental samples from a qualitative sample chromatogram. Complex Aroclor mixtures require careful attention and adjustment as to relative component strengths in order to obtain the best match of the sample.
   iii. Quantification of PCB mixtures is done by summing the peak heights of the PCB components present in the sample and comparing that to the sum of the same peaks in an Aroclor standard. Peaks in the sample representing an interfering pesticide should be avoided. Peaks used should be at least 10% of the full scale.

3.5.5 Data Reduction, Validation, and Reporting

3.5.5.1 Data Reduction

An external standard method will be used to quantify PCBs when analyzed by packed or wide-bore capillary column GC. The raw chromatographic signal will be transformed by electronic integration into peak area counts. Peak areas will be summed, converted to Aroclor concentration(s) and a total reported as ppm of Aroclor in the matrix (ug/g). Identification of Aroclor type(s) will be performed by visual comparison to standard Aroclor chromatograms under identical analytical conditions. Peaks which are unique to the different Aroclors will be used to determine if more that one Aroclor exists.

3.5.5.2 Data Validation

Data submitted by the laboratory will be validated by reviewing the complete package. The following items will be checked:

- Completeness

- Adherence to stated analytical protocols
- Reproducibility (duplicates)
- Recoveries (matrix spikes)
- Absence of interferents and/or contaminants (laboratory and field blanks)

3.5.5.3 Data Reporting

The laboratory performing the PCB analyses will submit the following reporting results:

1. Data Summary: A tabulated list of results showing sample number, sample location, date received, extraction date, and PCB concentration (total or by Aroclor) in mg/kg, dry weight.
2. PCB Chromatograms: The following chromatograms will be provided:
    a. Calibration standards
    b. Performance check standards (congener-specific analysis only)
    c. Laboratory blanks
    d. Field blanks (if applicable)
    e. Samples, including duplicates and matrix spikes

        Chromatograms will be labeled at a minimum with the following:
        - Sample number
        - Date and time of injection

        Additional information to include:
        - Instrument used
        - GC column and operating conditions
        - Injection volume
        - Case narrative, briefly describing sample preparation and analysis, problems encountered and corrective action taken.

4 Soft Sediment Monitoring

Surficial Soft Sediment samples will be collected and analyzed at least once every five years after completion of Upper River remediation to document changes in PCB SWAC. Soft Sediment deposit sampling density will be selected so that each sample analyzed represents an area of approximately 250 square meters. Where there are smaller deposits denser sampling will be performed with individual samples composited for analysis. After the first monitoring event, USEPA will determine if a representative subset of sediment deposits can be selected for future monitoring of soft sediment SWAC trends.

4.1 Sediment Sampling

Sediment grab samples will be collected in accordance with SOP #P41-1 of the *Field Sampling Plan* (Vol. II, Appendix H) and outlined below. Grab samples will be used to collect sediment from the soft sediment areas in order to monitor PCB SWAC.

A composite sediment sample will be collected at a rate of one per 250 square meters (2700 square feet) of sediment deposit. If deposits are < 250 square meters (2700 square feet), at least one composite sample will be collected. Each composite sample will be comprised of samples collected from four discrete locations by means of Core Tube or Petite Ponar Dredge (from the surface of the deposit to the base of the deposit). The same Core Tube or Petite Ponar Dredge will be used to collect each of the four samples which made one composite sample. Non-dedicated Core Tubes or Petite Ponar Dredge will be decontaminated between composite sample locations in accordance with the Decontamination SOP #P210-1 of the *Field Sampling Plan* (Vol. II, Appendix H). Grab samples will be collected in accordance with SOP #P41-1 of the *Field Sampling Plan* (Vol. II, Appendix H). The four samples will be composited by thoroughly mixing in a pre-cleaned stainless steel mixing bowl. Samples will then be packaged and submitted to the laboratory for analysis of PCBs.

Procedures

1. Review *Site Specific Health and Safety Plan* (Vol. II, Appendix J) prior to site work

2. Identify sample location in field book along with any other appropriate information.

3. Position over probing location. When boat is needed, used two points to secure.

4. Probe sediment thickness at each sample collection point and record water depth and poling depth in field book in accordance with SOP #P40-1 of the *Field Sampling Plan* (Vol. II, Appendix H). Subtract the water depth from the poling depth to determine the thickness of the sediment deposit.

5. Decontaminate sampling equipment and all sampling utensils in accordance with Decontamination SOP #P210-1 of the *Field Sampling Plan* (Vol. II, Appendix H).

6. Collect surface samples (0-4 inches) in accordance with SOP #P41-1 of the *Field Sampling Plan* (Vol. II, Appendix H) for the specific device chosen.

7. Deposit the four sediment samples into a stainless steel mixing bowl to create a composite sample.

8. Record any sediment characteristics in the field log book.

9. Mix the sediment with a clean spoon thoroughly or until visually homogeneous. Remove any obvious "non-sediment" objects from the sample; i.e. bottle caps, broken glass, sticks, large rocks, etc.

10. Label all samples containers.

11. Handle, pack, and ship samples to the designated laboratory.

4.1.1 Sample Identification

Sediment samples collected for compliance monitoring will be denoted with the prefix "CM", which intentionally denotes the designation of "compliance monitoring", followed by the deposit location (i.e., Dep 1, 2, 3, etc.), and finally by a numeric character in sequence (i.e., 1, 2) which uniquely identifies the Remedial Management Unit (RMU) collected representing the 250 square meters as depicted below;

CM-DEP1-1

4.1.2 QC Procedures

Field duplicates, field blanks, and duplicate measurements will collected in order to assess field sampling precision and bias. Collection of samples is discussed below at the frequency of 1 per 20 samples.

Field duplicates will be collected for sediment cores by replicating subsamples of a composite sample from the mixing bowl.

Rinsate blanks will be collected by rinsing distilled water into and over a decontaminated mixing bowl and spoon and collecting the rinse water in appropriate sample containers.

5 Safety Plan

All monitoring activities will be performed in accordance with the *Site Specific Health and Safety Plan* (Vol. II, Appendix J).

Personnel will not be required to posses a 40 hr Hazwoper certificate during Operations & Maintenance Plan (O&M) required tasks unless there is direct contact with hazardous material.

6 Records and Reporting

6.1 Records

Records of the inspections (See Appendix A of this document) and maintenance activities will be kept in a project file or log book.

6.2 Reporting

Monitoring reports for fish and sediment will be presented in tabulated, graphical, and/or drawing form. They will be submitted to the appropriate agencies on an annual basis.

7 References

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River*. May 2004.

United States Environmental Protection Agency. *EPA Superfund Record of Decision.* May 2000.

United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site.* January 2003 (revised).

Blasland, Bouck & Lee, Inc. *Work Plan/QAPP Interim Monitoring Program.* Sept. 1996.

Wisconsin Department of Natural Resources. *Division of Environmental Standards Field Procedures Manual*. Sept. 1988.

United States Environmental Protection Agency. *Statement of Work for Organic Analysis.* Feb. 1988.

Pollution Risk Services, LLC and Foth & Van Dyke. *Site Specific Health and Safety Plan (HASP)*. Vol. II, Appendix J of *Sediment Removal Design.* March 2006

United States Environmental Protection Agency. *Pesticide Analytical Manual*. 1977

Pollution Risk Services, LLC and Foth & Van Dyke. *Field Sampling Plan (FSP).* Vol. II, Appendix H of *Sediment Removal Design.* March 2006

Tables

Table 1
Schedule of O&M Tasks
Operations & Maintenance Plan
Pollution Risk Services, LLC
Sheboygan River and Superfund Site

O&M Task	Schedule Frequency
Sediment Monitoring	Every five years, minimum
Floodplain Monitoring/Vegetation Maintenance	Semiannual for two years
Fish Monitoring	Annually

Appendix A

O&M Inspection Form

SHEBOYGAN RIVER & HARBOR SUPERFUND SITE

O&M INSPECTION FORM

Note: Contractor is to perform inspections semi-annually for two years.

Name of Contractor's Inspector____

Date________________________________ Time: ______a.m. _______p.m.

Current Weather Conditions____

Current Soil Moisture Conditions (Check one): Dry____ Moist____ Wet

Inches of Rainfall in Last 24 hours: ________________________

OBSERVATIONS

Note any problems with the following O&M Vegetation:

Hay Bales____

____

Silt Fences____

____

Vegetation Erosion____

____

Tree and Brush Damage____

____

Other ____

____

Corrective Measures, if any.

Note: If vegetation is damaged or if none is present where it is apparent that erosion is occurring, then maintenance should be performed within two weeks or controls should be repaired or added, as needed, to minimize soil erosion.

What was done to correct any problems:____

Date of Corrective Measure:____

SHEBOYGAN RIVER & HARBOR SUPERFUND SITE

O&M INSPECTION FORM
(Continued)

Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

__________________________________ ________________

Contractor Inspector Date:

Sheboygan River and Harbor Superfund Site
Phase II Upper River
Sediment Removal Design

Contingency Plan

March 2006

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Phase II - Upper River
Sediment Removal Design

Contingency Plan

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC
Foth & Van Dyke

March 2006

Contingency Plan

Contents

Tables

Appendix

1 Introduction

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County (Drawing No. 1). The Site includes the former Tecumseh Manufacturing facility and the lower fourteen miles of the Sheboygan River from the Sheboygan Falls Dam downstream to, and including, the Inner harbor. This segment of the river flows west to east through the cities of Sheboygan Falls, Kohler, and Sheboygan before entering Lake Michigan.

During the Remedial Investigations (RI), the river was segmented in separate sections based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River extends from the Sheboygan Falls Dam downstream four miles to the Waelderhaus Dam in Kohler. The Middle River extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge. The Lower River extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan. The Inner Harbor includes the Sheboygan River from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break walls.

Remedial Design (RD) and Remedial Action (RA) work at the Site has been phased in order to achieve proper source control prior to beginning down river work. Phase I RA work which included plant site soils, groundwater, and riverbank soils was completed in 2004. Phase II remedial action work for Upper River Near-Shore Sediments, Armored Areas, and Soft Sediment deposits is scheduled for 2006 implementation. Remedial construction methods for the Floodplains are deferred pending the outcome of additional discussions between United States Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), Pollution Risk Services, LLC (PRS), and property owners of potentially impacted Floodplains.

This RD document has been generated to be consistent with the *Record of Decision (ROD), Consent Decree (CD)*, and *Upper River Statement of Work (URSOW)*. This Contingency Plan describes actions in response to emergencies or unplanned releases of contaminated or hazardous constituents.

1.1 Purpose and Scope

The purpose of this Contingency Plan is to protect the potentially affected local community in the unlikely event of a waste spill, accident or emergency that could occur in conjunction with sampling or remediation activities. The Contingency Plan describes the actions project personnel must take to respond to emergencies and unplanned releases of contaminated or hazardous constituents.

The scope of the plan includes the following:

- General project information,
- Entity responsible for responding in the event of an emergency incident,
- Plan for meeting with local, state and federal agencies,
- First aid and medical information,
- Spill control and countermeasures plan, and
- Emergency response organization.

1.1.1 General Project Information

Project Title/Location Sheboygan River and Harbor Superfund Site Sheboygan Falls, Wisconsin	Supervising Contractor Foth and Van Dyke 2737 South Ridge Road Green Bay, WI 54307
Project Coordinator/Settling Defendant: Pollution Risk Services ("PRS") 100 E-Business Way, Suite 210 Cincinnati, OH 45241	Remediation Contractor Southwind - Dredging

2 Proposed Remedial Activities

Phases II of the project involves PCB soil and sediment removal and associated activities in areas where contact with potentially hazardous materials may occur. Major work items include the following activities:

- Soil, sediment, air, and surface water sampling
- Construction of temporary access roads and embankments
- Installation and/or management of dewatering and water treatment systems
- Installation and maintenance of sedimentation and erosion controls
- Clearing and grubbing
- Temporary dam construction
- Excavation, dredging, and staging of PCB impacted soils and sediments
- Loading and transporting PCB impacted sediments
- Backfill and restoration of disturbed areas
- Site clean up and demobilization

3 General Preventative Measures

Throughout the remediation process efforts will be made to avoid releases of contaminated materials or treatment chemicals. However, there is a potential for releases to occur during the remediation and construction activities. In the unlikely event that a release occurs, immediate action to contain and clean up the release will occur, including coordination with outside agencies.

This Contingency Plan is designed to aide site personnel in responding quickly and effectively to the problems presented by accidental releases and emergency situations. Its primary goal is to limit the environmental damage from a release and to protect the health and safety of on-site personnel and the general public who could be affected. This Contingency Plan provides a summary of the various remediation processes from which a release could occur, the chain of command should a release occur, preventive measures to avoid/contain a release, and corrective actions for isolating, containing, and cleaning up a release. The plan, as well as the *Site Specific Health & Safety Plan (HASP)*, (Vol. II, Appendix J), contains a listing of the local, state and federal phone number contacts in the event of an accidental release or emergency situation. This phone listing will be posted in all construction offices.

3.1 Pre-Emergency Planning

Prior to engaging in investigations and/or construction/remediation activities at this Site, the selected Remediation Contractor (RC) will be responsible to meet the minimum requirements set forth herein and the applicable regulatory requirements.

The following situations would warrant implementation of the plan actions:

- Spill or release of hazardous materials,
- Natural disaster, and
- Medical emergency.

The following measures will be taken by the RC to assure the availability of adequate equipment and manpower resources:

- Establish lines of communication with offsite responders prior to commencing with activities.
- Sufficient equipment and materials will be kept on-site and dedicated for emergencies only. The inventory will be replenished after each use.
- On-site emergency responders will be current with regard to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.
- It will be the responsibility of the Remediation Contractor's, Emergency Coordinator (EC) to brief the on-site response team on anticipated hazards at the site. The EC will also be responsible for anticipating and requesting equipment that would be needed for response activities.
- Emergency response activities pertaining to releases of hazardous substances in excess of the Reportable Quantity (RQ) will be communicated to the Wisconsin Department of Natural Resources Spill Hotline (Table 1). Hazardous substances and reportable

quantities are defined in WDNR *Publication # RR-559; NR 706* and *40 CFR 117 & 302*. The applicable sections are contained in the ARARs (Vol. II., Appendix A)

A specific chain of command and specifications of overall responsibilities of supervisors/ employees will be completed. This chain of command with specific contacts, roles, responsibilities, and numbers will be detailed as part of the Remedial Action Work Plan (RAWP).

Primary communication will be accomplished in the event of an emergency using appropriate emergency numbers listed in Table 1. The RC will be required to provide a listing of their on-site responders, including the EC, primary responder(s), and alternates.

3.1.1 Emergency Response Equipment

The Remediation Contractor will be responsible for implementing the Contingency Plan and will be required to have emergency response equipment on-site. The equipment will be staged at a location easily accessible from the office trailer and at target locations at the Site, as needed, to provide for safety and first aid during emergency responses. The following equipment is typically provided for this type of remediation project:

- ABC-type fire extinguishers
- First-aid kit, industrial size
- Eyewash
- Emergency signal
- Protective clothing, gloves, boots, eye, and ear protection compatible with the project requirements

3.1.2 Emergency Services Agreements

3.1.2.1 Off-Site Emergency Contingency Plan

Prior to commencing work involving the handling or excavation of contaminated materials, the RC will be responsible to develop an off-site emergency contingency plan. This plan is intended to provide immediate response to a serious off-site incident, explosion, fire or a spill of a quantity of toxic or hazardous material from the site onto adjacent public areas.

A coordination meeting will be held with appropriate authorities that may include the city, fire, hospital, state and city police, State Department of Transportation, Health Department, and emergency officials. The meeting will identify the off-site response coordinator through whom all information and coordination will occur in the event of an incident. Plans will be developed, or existing plans incorporated as an appendix into this Contingency Plan, encompassing:

- Evacuation of adjacent areas
- Firefighting procedures
- Transport of injured personnel to medical facilities
- Priority evacuation routes
- Coordination and/or modification of highway operation

Techniques and recommended procedure for immediate first aid emergency response will be developed with local medical facilities.

This off-site emergency contingency plan will be updated to contain a description of the agreements made with local police departments, fire departments, rescue squads, hazardous waste cleanup contractor(s), and Wisconsin state and local emergency response teams. The selected RC will contract a qualified hazardous waste cleanup Contractor(s) who will be on call for the duration of the Site activities. The RC will work with local police, fire and rescue units to make arrangements for the needed emergency response services. The agreement(s) will be negotiated during or prior to the contracting of the remediation services and once finalized will be added as attachments to this Contingency Plan.

3.1.2.2 On-Site Emergency Contingency Plan

In the event of injury to on-site personnel the following protocol will be followed. It should be noted that this protocol is meant to be a guideline. Actual sequence of events and/or notifications will be event-specific and based upon severity of the accident/injury:

- Administer appropriate first aid,
- Notify the project Health and Safety Officer (HSO),
- Notify the appropriate USEPA agency/personnel,
- Contact the designated hospital and describe the injury,
- Transport personnel to the medical facility along a pre-defined route, and
- In the event of a serious injury, a rescue squad will be summoned.

3.1.3 Project Meetings

The designated Emergency Coordinator (EC) will hold Site meetings on a schedule to be determined during the course of the project. The purpose of these meetings is to enhance communication between the various organizations involved, including informing the local, state, and federal officials regarding the status of the remediation and discuss ongoing and upcoming investigation and/or remediation activities. Representatives of the local community (i.e., citizens committee) will be invited to participate in these meetings. As part of the agenda of each meeting, health and safety issues related to ongoing and upcoming work will be discussed. This Contingency Plan may be modified as the results of changes to the scope of work or procedures used to accomplish the remediation.

3.2 Emergency Recognition and Prevention

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the RC Site Superintendent, through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and activity hazard analyses), to recognize and identify hazards that are found at the Site. These may include but are not limited to:

Chemical Hazards	- Materials at the Site - Materials brought to the Site
Physical Hazards	- Fire/explosion - Slip/trip/fall - Electrocution

Once a potential hazard has been recognized, the Site Superintendent will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Removal of the hazard
- Daily safety meetings
- Task-specific training prior to commencement of activity
- Lock-out/tag-out
- Personal protective equipment (PPE) selection/use
- Following standard operating procedures for potentially hazardous environments
- Practice drills for fire, medical emergency, and hazardous substances spills

3.3 Housekeeping

In order to reduce the possibility of accidental spills and safety hazards, good housekeeping practices will be strictly followed and enforced. This may include prompt removal of small spills, regular maintenance of walking areas, regular removal of refuse, and/or staging of similar materials together.

3.4 Security

PRS or designee will be responsible for Site security for the project duration. A sign-in log will be located and maintained at the Site office. All project personnel and visitors will be required to sign in on a daily basis. Unauthorized personnel will not be permitted to enter the Site. Chain link fencing to restrict access is present at the Site.

3.5 Training

All Site personnel involved in remediation and/or construction activities (Remediation Contractor and the Supervising Contractor) will be trained in compliance with *29 CFR 1910.120*. Operators of equipment that is present and used for Site activities will also require proper training.

3.6 Spill Prevention, Control and Countermeasures (SPCC) Plan

A Spill Prevention Control and Countermeasures (SPCC) Plan will be developed and contain the following minimum information:

1. Spill prevention control
   - Spill prevention on-site
   - Spill prevention during transport
   - Material clean up requirements

2. Emergency Response and Countermeasures
   - Personnel roles, lines of authority and communication
   - Responsibilities
     - emergency coordinator duties
     - additional response contractors and equipment
   - Medical emergency contingency measures

Each contractor on-site will be responsible to submit a SPCC plan and work in accordance with *Specification 01355 - Environmental Protection* (Vol. II, Appendix F). In this plan, details regarding clean-up requirements, notification, etc. for on-site and off-site spills will be denoted. General contingencies for on-site and off-site spills are discussed in sections 3.11 and 3.12.

3.7 Directions to Hospital

Written directions to the hospital and a map will be posted in all on-site office trailers. Directions to the hospital are also located in the *Site Specific Health & Safety Plan (HASP),* (Vol. II, Appendix J).

3.8 First Aid and Medical Information

General first aid information is provided in *HASP*. Note: the Remediation Contractor will be responsible for health and safety for its employees during the remedial activities and will be responsible to provide personnel trained in first aid and CPR.

3.9 Fire Contingency Measures

Because flammable/combustible materials are present at this site, fire is an ever-present hazard. The Supervising Contractor, Remediation Contractor, and Subcontractors are not trained professional firefighters. If there is any doubt that a fire cannot be quickly contained and extinguished, notify the EC by radio and vacate the area. The EC will immediately notify the local Fire Department (911).

The following procedures will be implemented in the event of a fire:

- Anyone who sees a fire will notify their supervisor who will then contact the EC by radio. The EC will contact the local Fire Department (911),
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count, and
- If a small fire has been extinguished by a worker, the EC will be notified.

3.10 Hazardous Weather Contingency Measures

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy rains/snow
- High winds
- Tornado warnings
- High water/flood conditions in the Sheboygan River

The following procedures will be implemented in the event of hazardous weather conditions:

- All equipment will be shut down and secured to prevent damage, and
- Personnel will be moved to safe refuge (initially crew trailers). The EC will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

3.11 Contingency Plan for On-Site Spills

In the event of an on-site spill or other emergency, the RC's superintendent will follow these procedures:

- Notify the EC via two-way radio or cell phone,
- The EC will contact the HSO and the Site Superintendent, to initiate the cleanup procedures, and
- Notify the WDNR if over the Reportable Quantity (RQ).

The EC will gather the following information from the contractor and relay it to the HSO and WDNR:

- Name of the person reporting the incident
- Phone number (or radio channel) where person reporting can be reached
- Date, time, and location of the incident
- The extent of injuries, if any
- Modes of transportation and type of transport vehicles involved
- Classification, name, quality, and estimated quantity of any hazardous material wastes involved, if such information is available
- Type of incident and nature of the hazardous material/waste involvement and whether a continued danger exists at the scene
- For each waste product involved provide;
  - Name and USEPA number of the generator
  - Product shipping, hazardous class and UN or NA number
  - Estimated quantity of material spilled
  - If possible, the extent of contamination to land, water or air

Specific actions to be taken at the scene of the spill:

1. Containment. The critical problem is to prevent the escape of any spilled waste or liquids into the ground or into a storm or sanitary sewer. Containment will be dependent on wind and weather conditions. Using sand bags to contain the spilled wastes are effective means for the short term. Adjacent storm sewer/catch basins should be covered and/or protected with temporary berms or dams to prevent spilled wastes from entering into the storm water system.

2. Cleanup. With containment effected and the spillage source controlled, cleanup is the next step. If the spill is contained on an impervious paved surface, solid material should be collected and any contaminated liquid absorbed into a compatible material (e.g., sand, diatomaceous earth). Any of a number of commercial absorbent inert materials may be used, only if they are compatible with the waste and will not cause a reaction.

If any spilled waste has reached the ground, the contaminated spill will be removed and disposed at the appropriate disposal site. The extent of contamination will be determined by sampling the areas. The samples will be analyzed by a qualified laboratory. Sampling techniques, chain-of-custody requirements, and analytical methods will follow approved procedures. Any solids exhibiting contamination above the background level will be removed and disposed at an approved disposal site.

3.12 Contingency Plan for Off-Site Spills

3.12.1 Emergency Action

In the event of an on-the-road spill or other emergency, the driver will follow these procedures:

- Notify the EC via two-way radio or cell phone,
- The EC will contact the HSO, the Site Superintendent and the WDNR and the spill response contractor to initiate the cleanup procedures,
- Remain with the vehicle and warn all pedestrians and motorists to stay away from the spill area, and
- Call the local police if it is necessary to barricade the roadway.

The EC will gather the following information from the contractor and relay it to the HSO and WDNR:

- Name of the person reporting the incident
- Name, address, and USEPA number of the transporter
- Phone number (or radio channel) where person reporting can be reached
- Date, time, and location of the incident
- The extent of injuries, if any
- Modes of transportation and type of transport vehicles involved,
- Classification, name, quality, and estimated quantity of any hazardous material wastes involved, if such information is available
- Type of incident and nature of the hazardous material/waste involvement and whether a continued danger exists at the scene

- For each waste product involved provide;
  - Name and USEPA number of the generator
  - Product shipping, hazardous class, and UN or NA number
  - Estimated quantity of material spilled
  - If possible, the extent of contamination to land, water or air

Specific actions to be taken at the scene of the spill:

3. Containment. The critical problem is to prevent the escape of any spilled waste or liquids into the ground or into a storm or sanitary sewer. Containment will be dependent on wind and weather conditions. Using the tarpaulin to cover the spilled wastes and sand bags to contain the spilled wastes are effective means for the short term. Adjacent storm sewer/catch basins should be covered and/or protected with temporary berms or dams to prevent spilled wastes from entering into the storm water system.

4. Cleanup. With containment effected and the spillage source controlled, cleanup is the next step. If the spill is contained on an impervious paved surface, solid material should be collected and any contaminated liquid absorbed into a compatible material (e.g., sand, diatomaceous earth). Any of a number of commercial absorbent inert materials may be used, but make sure they are compatible with the waste and will not cause a reaction.

If any spilled waste has reached the ground, the contaminated spill will be removed and disposed at the appropriate disposal site. The extent of contamination will be determined by sampling the areas. The samples will be analyzed by a qualified laboratory. Sampling techniques, chain-of-custody requirements, and analytical methods will follow approved procedures. Any solids exhibiting contamination above the background level will be removed and disposed at an approved disposal site.

3.12.2 Emergency Equipment

Each truck will carry the emergency equipment which is required for the driver to perform the actions described in Section 3.12.1 if a spill occurs. A list of the emergency equipment will be supplied by the selected Remediation Contractor.

All equipment will be tested and maintained as necessary to allow its proper operation in the event of an emergency. After an emergency, all equipment will be decontaminated, cleaned, and fit for its intended use before normal operation resume.

4 References

United States Environmental Protection Agency. *Consent Decree for the Upper River Work on the Sheboygan River*. May 2004.

United States Environmental Protection Agency. *EPA Superfund Record of Decision.* May 2000.

United States Environmental Protection Agency. *Statement of Work for Remedial Design Action for the Upper River Sediment, Floodplain Soil and Tecumseh Products Company Plant Site at the Sheboygan River and Harbor Superfund Site.* January 2003 (revised).

Pollution Risk Services, LLC, and Foth & Van Dyke. *Site Specific Health and Safety Plan.* Vol. II, Appendix J of *Sediment Removal Design.*. March 2006

Pollution Risk Services, LLC, and Foth & Van Dyke. *Specifications.* Vol. II, Appendix F of *Sediment Removal Design.*. March 2006

Tables

Table 1
Emergency Telephone Numbers
Contingency Plan
Pollution Risk Services, LLC
Sheboygan River and Harbor Superfund Site

General Emergency -- Sheboygan Falls Sheriff's Dept	911
Ambulance – Sheboygan Falls	911
Hospital (Sheboygan Memorial Medical Center)	(920) 451-5000
Wisconsin Department of Public Health	(608) 266-1865
Sheboygan County Health Department	(920) 459-0529
Wisconsin Department of Natural Resources (WDNR)	(414) 263-8500
Wisconsin Hazardous Material Spill Hotline	(800) 943-0003
WDNR Southeast Regional Spill Coordinator	(414) 263-8685
Sheboygan Poison Control Center	(800) 222-1212
USEPA Emergency Response & Removal Branch	(404) 562-8705
USEPA Emergency Response & Removal Branch – 24 Hour	(404) 562-8700
Wisconsin State Police	(929) 929-3700
Pollution Emergency Alert System (PEAS)	(800) 292-4706

Appendix A

Wisconsin Spill Reporting Requirements

Publication # RR-559 January, 2002

DNR Staff Provide Spill Response and Support

No one plans a spill; they are typically caused by accidents of some sort, but when they do occur, there are statutory requirements people must comply with. The Wisconsin Statutes mandate that spills of hazardous substances be immediately reported and cleaned up to protect Wisconsin's citizens and resources. If and when a spill occurs, the DNR has staff in each of the Regional offices to help in a variety of ways.

Activating a DNR Response

When calls are made to the hotline during the day, the information comes directly to the DNR office in Madison, and is forwarded to the nearest available warden for follow-up. During the evening hours, the phone calls are directed to the State Patrol, who will forward the information to a DNR Duty Officer. That Duty Officer will make sure the local warden is alerted to the situation. Depending on the nature of the spill, local officials may also be activated to assist at the scene. These officials can be fire department staff, hazmat specialists, or local police or sheriff department staff.

The DNR encourages the public to report hazardous substance spills using the ***24-hour toll-free hotline: 1-800-943-0003***

DNR Field Response

DNR Wardens

The first responders to a hazardous substance spill for the DNR typically are the DNR wardens. Wardens are local - each county has at least one warden working within the county. They have training in response activities and can assist local law enforcement officials, help set up protective barriers for small spills, or assist the responsible party in managing the spill. Wardens also know the local resources, including other response agencies like the fire departments, as well as the natural resources for which they are stewards.

When a warden gets a call about a spill, their follow up may include additional phone calls to get more information about the nature of the spill, going to the site, requesting other DNR assistance (i.e. fish managers, water resources staff, spill coordinators), or when an emergency situation occurs and the responsible party is not available or willing to take action, calling in the DNR Zone Contractor to respond to the spill.

The DNR has contracted with emergency response companies to provide statewide emergency response services to discharges of hazadous substances when responsible parties are unable or unwilling to take necessary actions to respond to an emergency situation. These companies can provide a response within 2 hours of notification, and specialize in emergency response, spill containment and removal. They are able to assess a situation, take actions to prevent spilled materials from harming the public or the environment, sample substances to determine how to manage them, containerize the spilled materials in suitable containers, and remove those substances from the spill site to a secure facility until analyses are completed to determine their final placement. At the conclusion of the response, the department seeks cost recovery for the response costs from the responsible party.

Regional Spill Coordinators

Spill Coordinators are available in each of the Regional DNR offices who specialize in technical spill response issues. These staff are available before, during, and after spills occur.

Before spills occur...

The spill coordinators are part of local planning and response networks. They work with local emergency planning agencies, talk to the local fire departments about spill response issues, and work with the wardens to ensure a consistent DNR approach to spill response. In addition, the spill coordinators work with local industries who may handle hazardous substances as part of their business to provide them with technical support for spill prevention as well as spill response.

During a Spill...

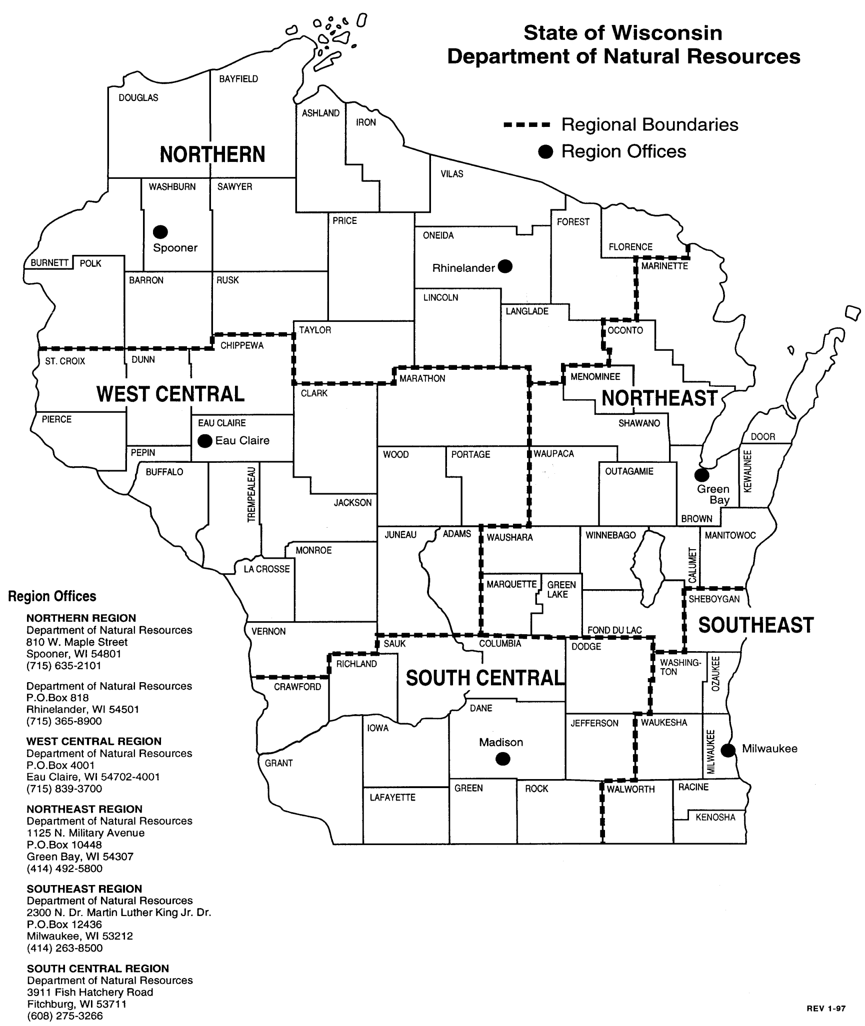
When a spill occurs, the wardens are typically the first responders. However, the spill coordinators can provide assistance in a variety of ways. Spill coordinators have developed packets of information that are provided to persons who are responsible for the spill. Included in these packets are information on DNR regulations, additional DNR contact persons, as well as listings of local contractors and waste management organizations who can assist the responsible party in management of the residual spilled material. The spill coordinator is often consulted by the responsible party for technical advice on spill containment and cleanup.

After a Spill...
The spill coordinators are part of the Remediation and Redevelopment technical staff, and are familiar with DNR regulations relating to site investigation and cleanup. Although smaller cleanups do not receive direct DNR oversight, the coordinators can answer questions and guide responsible parties through the process.

State Spill Response Team

The DNR manages the spills program through the State Spill Response Team. This team is comprised of a State Spill Coordinator, a State Emergency Management Coordinator, a federal Removal Coordinator, the 5 Regional Spill Coordinators, and legal counsel. Through the interactions of these staff persons, we identify and resolve issues to make the spill response program as effective as possible, in an ever changing response mode.

Northeast Regional Spill Coordinator: Roxanne Chronert (920) 492-5592
Northern Regional Spill Coordinator: Norm Dunbar (715) 365-8963
Southeast Regional Spill Coordinator: Scott Ferguson (414) 263-8685
South Central Regional Spill Coordinator: Ted Amman (608) 275-3332
West Central Regional Spill Coordinator: John Grump (715) 839-3775
State Spill Coordinator: Robin Schmidt (608) 267-7569
State Emergency Response Coordinator: David Woodbury (608) 266-2598
Federal Removal Coordinator: Amy Walden (608) 267-5063
Legal Counsel: Joe Renville (608) 266-9454



Wisconsin Spill Reporting Exemptions

Statutory Exemptions

The following exemptions to spill reporting are included in s. 292.11, Wis. Stats.:

- discharges within the limits authorized by a valid permit or program approved under Chs. 281, 285, or 289 - 299 (e.g. WPDES discharge permit);
- law enforcement agencies/fire departments using hazardous substances in protecting human health, safety, or welfare;
- applications of a registered pesticide according to label instructions, or application of a fertilizer at or below normal and beneficial agronomic rates

De Minimis Exemptions:

Besides the statutory exemptions identified above, Ch. NR 706, Wis. Adm. Code establishes exemptions for small quantity spills of agricultural and petroleum related compounds, as well as substances that have a federal reportable quantity established. These quantities are termed "de minimis" in that below these levels, under the following conditions, state notification of a discharge is not required. While reporting requirements may be exempted, cleanup requirements remain.

De Minimis Exemptions do not apply if the spill:

✔ has not evaporated or been cleaned up in accordance with NR 700 - 726;
✔ adversely impacts or threatens to adversely impact the air, lands, waters of the state as a single discharge, or when accumulated with past discharges;
✔ causes or threatens to cause chronic/acute human health impacts; or
✔ presents or threatens to present a fire or explosion or other safety hazard (including evacuations).

If you have a discharge that meets one of the following de-minimis exemptions, but has not been cleaned up, adversely impacts or threatens to adversely impact the environment, causes or threatens to cause human health impacts, or presents or threatens to present a fire or explosion hazard (including all evacuations), you still need to report your spill!

De Minimis Exemptions are as follows:

Discharges of Petroleum compounds if you spill:

- gasoline or another petroleum product is completely contained on an impervious surface.
- less than one gallon of gasoline on a pervious surface or runs off an impervious surface.
- less than five gallons of other petroleum products on a pervious surface or runs off an impervious surface.

Discharges of Agrichemical compounds if:

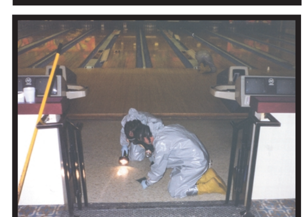
- the amount is less than 250 pounds of a dry fertilizer.
- the amount is less than 25 gallons of a liquid fertilizer.
- the amount discharged when diluted as indicated on the pesticide label would cover less than one acre of land if applied according to label instructions for pesticides registered for use in Wisconsin.

Federal reportable quantities:

- if the amount discharged is less than the federal reportable quantity.

For More Information

To order this and any other publications, or to find out more information about the Remediation and Redevelopment Program, please call our Information Line at 800-367-6076 (long distance in-state) or 608-264-6020 (local or out-of-state); or check out our web site at http://www.dnr.state.wi.us/org/aw/rr.



Chapter 292.11 – Wisconsin Spill Law

The spill law, Chapter 292.11, Wis. Stats., requires that a person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance shall notify the department immediately of any discharge not exempted by the statute. The Department has a 24-hour toll free number for reporting spills: 1-800-943-0003.

In order to determine whether you have a hazardous substance spill that requires immediate notification, you must ask yourself the following three questions: 1) Is the substance spilled a hazardous substance; 2) Has it been released to the environment; and 3) Are there statutory or rule exemptions that apply to this situation. The following text should help you answer those questions, and provides you with insights into unusual spills that did require notification.

WISCONSIN DEPT. OF NATURAL RESOURCES

PUB-RR-558 MARCH, 2003

Hazardous Substance Spills Reporting Requirements

Wisconsin Department of Natural Resources • PO Box 7921 • Madison, WO 53707

Hazardous Substance Definition

Chapter 292.01(5), Wis. Stats., defines a hazardous substance as "any substance or combination of substances including any waste of a solid, semisolid, liquid or gaseous form which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illnesses or which may pose a substantial present or potential hazard to human health or the environment because of its quantity, concentration or physical, chemical or infectious characteristics. This term includes, but is not limited to, substances which are toxic, corrosive, flammable, irritants, strong sensitizers or explosives as determined by the department."

This definition suggests that a hazardous substance can be anything, depending on the nature of the release. The question you really need to ask yourself is how much was released and into what environment. The rule of thumb used by many is if you have to think about whether it needs to be reported, it probably does. Remember, reporting spills never gets you into trouble, only failure to report does. Whether the spilled hazardous substance is heating oil or gasoline, or something unusual like corn, butter and/or manure that flows towards a stream, pickle juice spilled on the ground, or even mercury spilled in a classroom, DNR staff will tell you if your specific incident does not meet the criteria of a reportable spill at the time that you report it. To help clarify what spills are reportable, statutory exemptions as well as "de-minimis" exemptions have been established and are explained on the back page of this brochure.

The 24-hour Toll Free Hotline for Reporting Spills is: 1-800-943-0003

Environment Remediation and Redevelopment Program Cleanup Redevelopment Partnership

Knee High by the Fourth of July!

We don't think of corn as hazardous – fields of corn dominate the landscape in the summer. Sweet corn stands at the farmers' market and ground corn for cattle or hogs are the images that come to mind. However, a stream filled with dried shell corn from a derailed train is quite a different picture. As organic materials decompose in water, they increase the biological oxygen demand, or BOD, of the water. Their degradation reduces the amount of oxygen available to the organisms living in that water body, including fish. If the BOD gets too high, the water will not contain sufficient oxygen for organisms to survive – in this case, the corn created an anaerobic environment. The substance can be corn, milk, manure, or any other organic material. The quantity and size of the spill, the biological oxygen demand of the spilled material, and the size of the water body will determine whether the environment is at risk. The company associated with this spill did not report it to the department, and was subject to enforcement action.

If there's corn, there must be butter…

In May of 1991, a fire broke out in a refrigerated warehouse that stored 50 million pounds of food products, including butter, lard and cheese. This warehouse was in close proximity to a creek that flowed into Lake Monona, a large urban lake. The heat from the fire caused the food products to melt, which in turn, contributed to the intensity and duration of the fire. It took 8 days for the fire department to put out the fire. The warehouse buildings were destroyed, and the water from the fire suppression activities mixed with the melted food products and flowed toward the creek and nearby storm sewers – all leading to the lake. The fire department realized quickly that this was a reportable spill, and a potential environmental disaster and reported the release to the DNR. The department acted to prevent the mixture from reaching the waterbodies, and the total environmental cleanup costs to the warehouse company were over $1 million.

What's that smell?

Driving through the beautiful Wisconsin countryside with the windows open – fresh air filling your car – until you pass an area that has recently been spread with animal manure. Yes, you explain to your children, waste from animals can be used to fertilize the land, making it a recyclable product benefiting the environment. Until, however, that manure is applied too heavily or washed into a stream where the organic material removes the oxygen from the stream resulting in a major fish kill stretching for miles downstream. Again, manure is not often thought of as a hazardous substance – it's a natural by-product of animal husbandry – but it needs to be properly managed or hazardous conditions may result. For more information on agricultural spills, see DNR publication # RR-687 "Agricultural Spills and How to Handle Them".

In a pickle!

This truck driver was in quite a pickle after his truck carrying pickle juice was in a major collision. Pickle juice leaked from the truck bed, along with diesel fuel from the truck itself. This caused soil contamination due to the hazardous characteristics of the diesel fuel along with the high pH of the pickle juice. The trucking company hired a clean up company to excavate the contaminated soil and properly dispose of it. If left in place, this contamination could have migrated to the groundwater, causing impacts to nearby private drinking water wells.

"F" in Science Class…

Recently, a high school science teacher was using elemental mercury in his science class while talking about elements and compounds. Despite warnings about the hazards of mercury, it was simply too tempting for one student, who stole the small bottle containing approximately 4 ounces of mercury after class.

The student and friends began playing with the mercury, spreading it to various classrooms, stairwells, steps and sidewalks. Later in the morning, the student went bowling at a nearby bowling alley. On the bus to the bowling alley, the container of mercury was passed around, spilling on more students and the bus. At the bowling alley, students continued to play with the mercury, putting it in the finger holes of bowling balls and rolling them down the lanes. During lunch, the student took the mercury to a friend's house, transferring it to zip lock bags to be sold for $1 per bag. Before classes ended that day, the student was called out of her classroom, the mercury was confiscated and police, fire departments, and the DNR were notified.

After sampling, the high school, several students, one home, a school bus, the bowling alley, and a sidewalk tested positive for mercury contamination. A contractor was called into assist with the mercury cleanup. In order to gain control of the scene and begin to control the spread of the mercury students were locked in the building and put into separate rooms, depending on whether they were contaminated or not. Students that were exposed to the mercury were required to go to the school locker rooms, remove their clothes, shower, and dress in new clothes. Several students were taken to a local hospital for additional mercury testing. Total costs for the entire cleanup were more than $250,000.

When in doubt, call the number!

If you're not sure whether you have a spill that needs to be reported, call the 24-hour toll free hotline, 1-800-943-0003, and you will be provided with guidance on reporting. In many situations, spill report forms are not completed if the incident is not considered a hazardous substance spill to the environment. You will need to provide information such as

- ✔ your name, address, location of the discharge;
- ✔ physical state, quantity, chemical characteristics of the discharged substance;
- ✔ cause of the discharge;
- ✔ destination of the discharged substance;
- ✔ actions taken to stop the release/minimize the impact to the environment
- ✔ actual or potential impacts to human health or the environment

DNR Regional Spill Coordinators:

Northeast: Roxanne Chronert (920) 492-5592

Northern: Norm Dunbar (715) 365-8963

Southeast: Scott Ferguson (414) 263-8685

South Central: Ted Amman (608) 275-3332

West Central: John Grump (715) 839-3775

See the back page for further explanation of reporting exemptions.

Remember, reporting a spill is always in your best interest – it can minimize potential legal consequences, protect you from future false accusations, and establish a record on your follow-up activities cleaning up the spill. Not reporting spills is where problems start. If you have general questions about spill reporting, call your regional DNR office and ask for the spill coordinator. They can assist you in your spill-related questions.

Are these hazardous Spills?

Wisconsin Spill Reporting Requirements - *Condensed Version*

PUB-RR-560 August 2002

ALL discharges of hazardous substances that adversely impact, or threaten to adversely impact public health, welfare or the environment must be IMMEDIATELY reported to the DNR.

De Minimis Exemptions in Chapter NR 706, Wis. Adm. Code (effective 3/1/97):
***Only* apply when the discharged substance:**

√ **has evaporated or been cleaned up in accordance** with NR 700 - 726;
√ **does not adversely impact or threaten to adversely impact** the air, lands, waters of the state as a single discharge, or when accumulated with past discharges
√ **does not cause or threaten to cause** chronic/acute human health impacts
√ **does not present or threaten to present** a fire or explosion or other safety hazard

1. Petroleum compounds:
- gasoline or another petroleum product completely contained on an impervious surface.
- < 1 gallon of gasoline onto a pervious surface or runs off an impervious surface.
- < 5 gallons of other petroleum products onto a pervious surface or runs off an impervious surface.

- < 250 pounds dry fertilizer
- < 25 gallons of a liquid fertilizer
- pesticides that would cover < 1 acre of land if applied according to label instructions.

3. Federal reportable quantities:
- < the federal reportable quantity for a specific substance

2. Agrichemical compounds:

Statutory Exemptions - no reporting is required for:
- discharges within the limits authorized by a valid permit or program (Chs. 281, 285, or 289 - 299, Wis Stats)
- law enforcement /fire departments using hazardous substances to protect human health, safety, welfare;
- proper applications of a registered pesticide or a fertilizer

Call 24-hour Hotline 1-800-943-0003 to report a spill of a hazardous substance

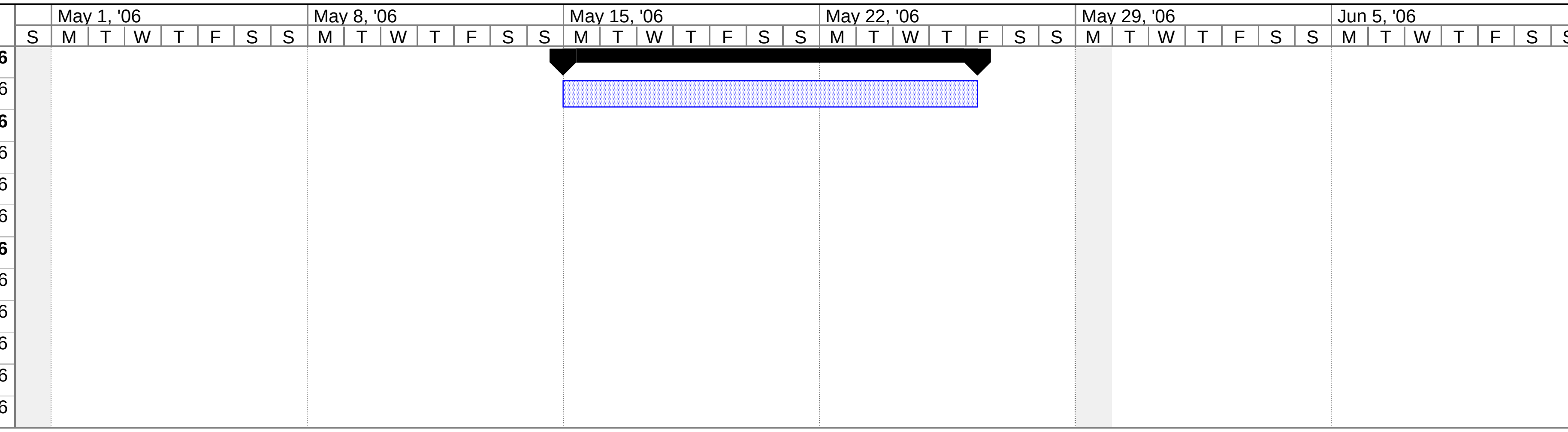
Notes:

For More Information

To order this and any other publications, or to find out more information about the Remediation and Redevelopment Program, please call our Information Line at 800-367-6076 (long distance in-state) or 608-264-6020 (local or out-of-state); or check out our web site at http://www.dnr.state.wi.us/org/aw/rr.

PHASE II CONSTRUCTION SCHEDULE -100% BASIS OF DESIGN

ID		Task Name	Duration	Start	Finish
1		**Mobilization**	**10 days**	**Mon 5/15/06**	**Fri 5/26/06**
2		Construct Staging Area	10 days	Mon 5/15/06	Fri 5/26/06
3		**Soft Sediment**	**90.6 days**	**Mon 6/12/06**	**Fri 9/22/06**
4		Removal - Dredging	73 days	Mon 6/12/06	Sat 9/2/06
5		Compliance Verification	75 days	Tue 6/13/06	Wed 9/6/06
6		T&D Sediment	60 days	Mon 7/17/06	Fri 9/22/06
7		**Armored Areas & Near-Shore Sediment**	**62.9 days**	**Mon 7/31/06**	**Mon 10/9/06**
8		Removal - Excavation	60 days	Mon 7/31/06	Fri 10/6/06
9		Restoration	60 days	Mon 7/31/06	Fri 10/6/06
10		Compliance Verification	62 days	Tue 8/1/06	Mon 10/9/06
11		T&D Sediment	10 days	Mon 9/25/06	Fri 10/6/06
12		**Complete Post-Dredging SWAC Report**	20 days	Mon 10/9/06	Tue 10/31/06



PH II CONSTRUCTION SCHEDULE
95% DESIGN
Date: Wed 3/15/06

Task		Progress		Summary		External Tasks		Deadline	
Split		Milestone		Project Summary		External Milestone			

COST ESTIMATE

PROJECT: **SHEBOYGAN RIVER & HARBOR SUPERFUND**
PROJECT NO: **02-010**
DESCRIPTION: **COST ESTIMATE**

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	MAT'L QUANTITY		ESTIMATE MARCH 2006
10-00000	**GENERAL PLANS & SUBMITTALS -- PHASE I & II**			1,637,182
10-01000	Engineering, Plans, Contracts, Project Management			1,258,559
10-02000	Technical and Legal Consultants			71,873
10-03000	Regulatory Design Oversight & Approvals			32,300
10-04000	Misc PRS Expenses			159,730
10-05000	PRS OH&P -- Fee			114,719
30-00000	**PHASE II -- UPPER RIVER SEDIMENT REMOVAL**	35,289	CY	6,119,960
30-01000	Delineation & Work Plans			50,000
30-02000	Mobilization/Demobilization			176,390
30-04000	Upper River Sediment Removal , Dewatering, and Water Treatment	35,289	CY	2,683,220
30-06000	Transport/Dispose Hazardous Material	2,367	TONS	340,065
30-07000	Transport/Dispose Non-Hazardous Material	48,202	TONS	1,621,991
30-08000	Compliance Verification			82,450
30-09000	Restoration of Site			40,000
30-10000	FVD & Regulatory Site Management			293,360
30-11000	PRS Site Management			214,200
30-12000	PRS OH&P -- Fee			618,284