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## **APPENDIX A**

### **DREDGING AND MATERIALS HANDLING DESIGN SUPPORT DOCUMENTATION**

#### **Including**

Attachment A-1 Remedial Action Area Delineation

Attachment A-2 In-Water Structure Transition Area Design "Ground Rules"

Attachment A-3 Shoreline Design Refinement "Ground Rules"

Attachment A-4 Dredged Cut Slope Stability Memo

Attachment A-5 Mass Balance Spreadsheet

Attachment A-6 Effluent Discharge Design for Ammonia

Attachment A-7 Geotechnical Data for 2009 Dredge Areas

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**ATTACHMENT A-1**  
**REMEDIAL ACTION AREA DELINEATION**

The following is a summary of the steps used to delineate the lateral extents of RA areas during the development of the dredge, cap, and cover plans.

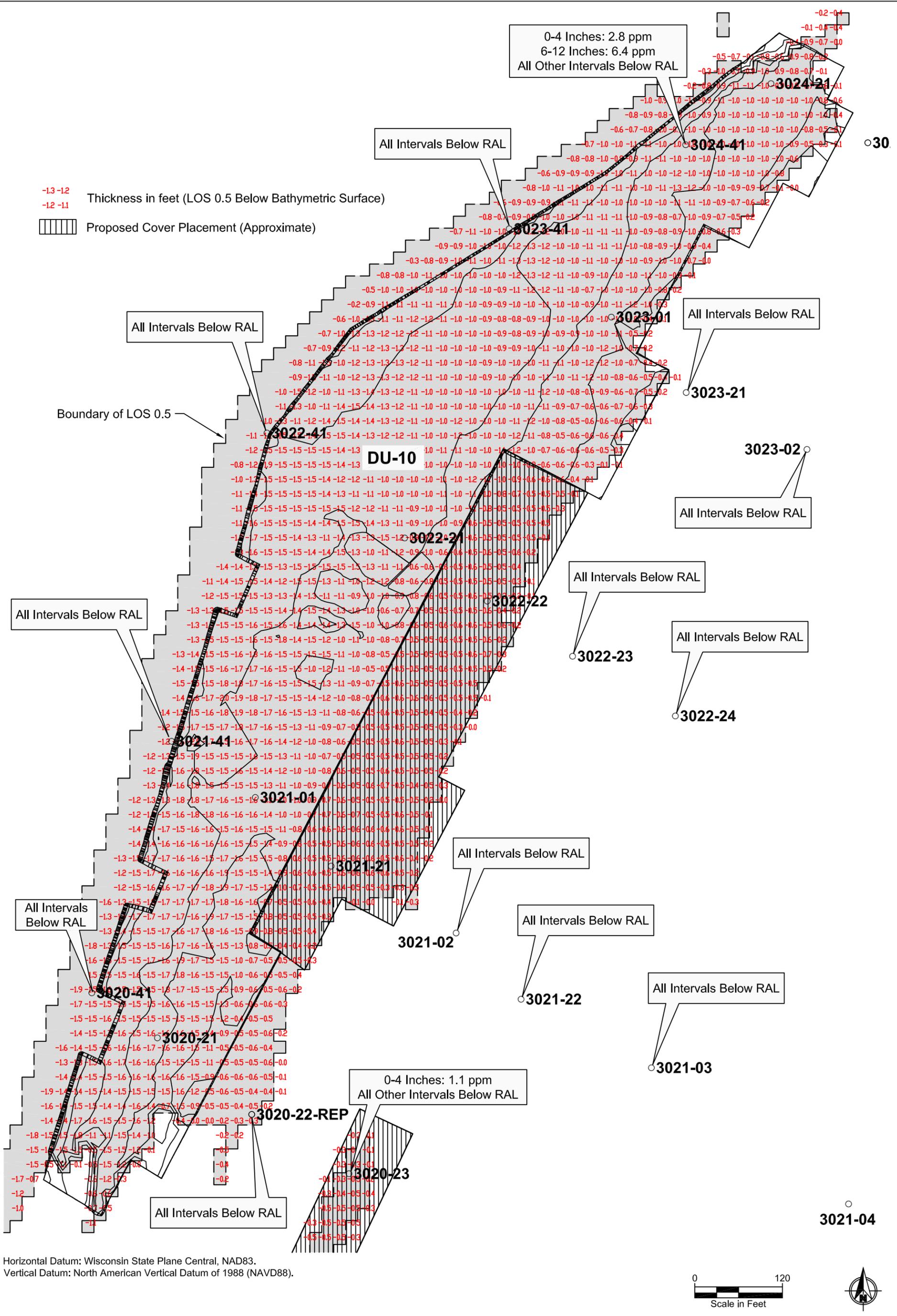
Steps to evaluate lateral extents:

1. RA areas were initially delineated based on a core-by-core analysis using a Thiessen polygon approach during the BODR phase. Each polygon represented a single RD sampling location and preliminary RAs were assigned to each polygon based on the PCB data from the RD sampling (see additional details in Section 4.4.1.1).
2. A geostatistical model, using full indicator kriging (FIK; see Section 2.4 of Volume 2) with RD data collected in 2004 and 2005 provided a three-dimensional surface representing the elevation of contamination above the RAL at various levels of significance (LOS). As discussed in the BODR and 30 Percent Design, the technical workgroups concluded that the LOS of 0.5 provides the optimum combination of maximum percent correct predictions and minimum overall bias and was therefore selected as the basis for delineating sediment with PCB concentrations exceeding the RAL.
3. The delineation of RA areas were refined from the Thiessen polygons developed in the BOD during the 30 Percent Design phase based on the FIK performed using the 2004 and 2005 RD sampling data. Geostatistical delineation of PCB contamination, discrete RD sampling data, and engineering judgment were used to refine the dredge prisms, as explained below:
  - a. Cross-sections were generated every 100 to 200 feet along the alignment of the river and at various locations where additional detail was warranted (e.g., areas where the channel alignment and shoreline are not parallel).
  - b. Each cross-section was analyzed individually and the lateral extents of remediation (dredging, capping, and sand cover) were delineated based on consideration of the following:
    - RA areas were delineated to address areas where the DOC was predicted to be in excess of approximately 2 to 4 inches (0.2 to 0.3 feet) by the FIK geostatistical model.

- PCB data from discrete core locations within and adjacent to the area were reviewed along with the FIK geostatistical model results. In some instances, the geostatistical model predicted the DOC upwards of 6 inches where the discrete core indicated all samples below the RAL. In these cases, the results of the discrete core samples were considered more accurate and RA areas were delineated accordingly.
  - Engineering judgment was used to achieve a more efficient and constructable design. This involved creating minimum width and constant width “lanes” parallel to the channel centerline, bathymetry, or shoreline.
- c. Plan view maps of the RA areas were reviewed along with predicted DOC from the geostatistical model shown on a regular grid spacing. Additional refinements were made to the lateral extents of the RA areas based on this review to ensure that the RA boundaries appropriately addressed areas where at least 2 to 4 inches of sediment above the RAL exist.

Figure 1 provides an example area that demonstrates the results of these steps.

May 29, 2008 10:45am evonckx C:\Documents and Settings\evonckx\Desktop\OU3 60% Dredge Plan WSPC USFT NAVD88 USFT - DH.dwg EXAMPLE



**Figure 1**  
Thickness of Sediment (in Feet) Between Bathymetric Surface and LOS 0.5  
Fox River



**ATTACHMENT A-2**

**IN-WATER STRUCTURE TRANSITION AREA  
DESIGN “GROUND RULES”**



TETRA TECH EC, INC.

## Remedial Design Technical Memorandum

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**To:** Shoreline and Cap Design Sub-Group Coordinators: Tim Harrington (Hard Hat) and Rich Weber (NRT)

**From:** Matt Henderson, Paul LaRosa, Ram Mohan, and Clay Patmont (Anchor)  
Gary Braun and Steve McGee (Tetra Tech)

**cc:** Jim Hahnenberg (U.S. Environmental Protection Agency), Greg Hill (Wisconsin Department of Natural Resources), and George Berken (Boldt)

**Date:** June 13, 2008

**Re:** 60 Percent Design – In-Water Structure Transition Area Design “Ground Rules”

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This remedial design (RD) technical memorandum establishes the “ground rules” for the design process that will be used for transition areas between the proposed remedies (dredging and capping) and bridge crossings and utilities in Operable Units (OUs) 2 to 5 of the Lower Fox River (the River). This approach was discussed and agreed upon with the Agency/Oversight Team (A/OT) during the Workgroup 2 conference calls held on April 11, 2008, and April 18, 2008. The “ground rules” described below will be incorporated into the 60 Percent Design submittal and subsequently used to design the site-specific remedy for each bridge and utility crossing in the River with the final remedy for each area to be presented in the annual Remedial Action (RA) Work Plans. The example bridge and utility crossings discussed with the A/OT are also included in this memorandum for reference. This technical memorandum will be included as an appendix to the 60 Percent Remedial Design Report.

**Bridge Crossings:** Several logistical and safety concerns are associated with remedial construction in close proximity to in-water or nearshore structures such as a bridge piers including the potential to damage or compromise the integrity of a structure (due to settlement or loss of bearing support) and ultimately cause damage to the bridge (in the short or longer term) Therefore, to minimize this liability, the following ground rules were established through collaboration within Workgroup 2:

1. Dredging shall typically be conducted to within 25 feet of a bridge pier, dolphin, or fender, except as modified by site-specific conditions (i.e., a larger or smaller offset) during preparation of annual remedial action work plans..

2. The placement of a sand cover within 25 feet of a bridge pier may be performed if technically feasible and RD sampling results indicate elevated polychlorinated biphenyl (PCB) concentrations and environmental risk warranting special consideration.
3. The placement of capping materials around and under the bridge will be evaluated on a case-by-case basis depending on the vertical clearance under the bridge deck as well as horizontal distances between the piers and structures.

In addition, sand cover placement is currently being evaluated by J.F. Brennan during implementation of the remedy in OU 1. The results of this work will assist in the selection of the site-specific remedies for each bridge during the development of each of the annual RA Work Plans. The proposed remedy will be discussed and coordinated with the owner of each structure during the year prior to the planned RA in the vicinity of that bridge structure. For the purposes of the 60 Percent Design submittal, a 25-foot offset from the edge of bridge piers will be shown on the engineering plans as a general case.

*Mason Street Bridge Crossing Example:* Attachment A presents an example transition design for the Mason Street bridge crossing in OU 4B that was discussed with the A/OT during the April 11 and 18, 2008, Workgroup 2 meetings. Sheets E-1 and E-2 present the plan and cross-section for the Mason Street bridge, which is supported by concrete piers with a dolphin and fender system protecting the main piers from damage around the navigation channel. The remedy proposed in this area in the 30 Percent Design consists of both dredging and capping. As described above, a 25-foot offset is shown from the edge of the piers and fenders system within which no dredging or engineering capping would be performed. Instead, a 6-inch sand cover may be placed in these areas (as described above) subject to site specific logistical and safety considerations. In addition to the presence of the bridge piers in this area, a 16-inch water main extends across the river parallel to and south of the bridge. A 50-foot offset around this crossing is shown (consistent with the ground rules described below for utility crossings).

**Utility Crossings:** The primary concern in dredging or capping near buried utilities is that the utility could be damaged during (or following) the implementation of the remedy, potentially resulting in significant worker/public safety issues, environmental damage, as well as disruption of public service. Similar to the ground rules developed for bridge crossings, an

offset from the utility is planned to minimize the chance of damaging the utility during remedial construction. The width of the offset is based on several factors, including:

- The nature of the utility (water, electric, sewer, communication, petroleum, or natural gas, other)
- The availability (and reliability) of design drawings or construction (i.e., as-built) data
- PCB concentrations in the sediment surrounding the utility

In order to minimize the potential for environmental damage or safety concerns, the following ground rules were established through collaboration within Workgroup 2:

1. Dredging and/or capping shall be conducted to within 50 feet of each known or reported river utility crossing.
2. Dredging and/or capping may be conducted using a closer offset distance of 25 feet, if both of the following conditions are met:
  - a. If the horizontal and vertical position of the utility or utilities is known with an accuracy of  $\pm 6$  inches vertically and  $\pm 5$  feet horizontally along the entire utility length as verified by physical surveys (e.g., manual probing)
  - b. If RD sampling results indicate elevated PCB concentrations and environmental risk warranting special consideration
  - c. If dredging and/or capping will not pose an adverse stability condition to the submerged utility crossing caused by undue stresses or excessive settlements

The proposed remedy and identification of the utility prior to construction will be discussed with the owner of each utility during the year prior to the planned RA in the vicinity of that utility and the design will be documented in the annual RA Work Plans. For the purposes of the 60 Percent Design, a 50-foot offset from the centerline of utility crossings will be shown on the engineering plans within which no dredging or engineering capping will be performed.

*Reid Street and Scheuring Road Water Main Crossing Example:* Attachment B presents example transition designs for two utility crossings (City of DePere water main crossings) in OU 3 that were discussed with the A/OT during the April 11 and 18, 2008, Workgroup 2 meetings. Sheets E-3 through E-6 present the plan and cross-sections for these two crossings. The Reid Street water main crossing consists of a 12-inch cast iron (C.I.) water main that extends across the River. The Scheuring Road crossing consists of a 16-inch C.I. water main that is supported by

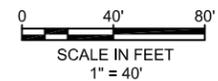
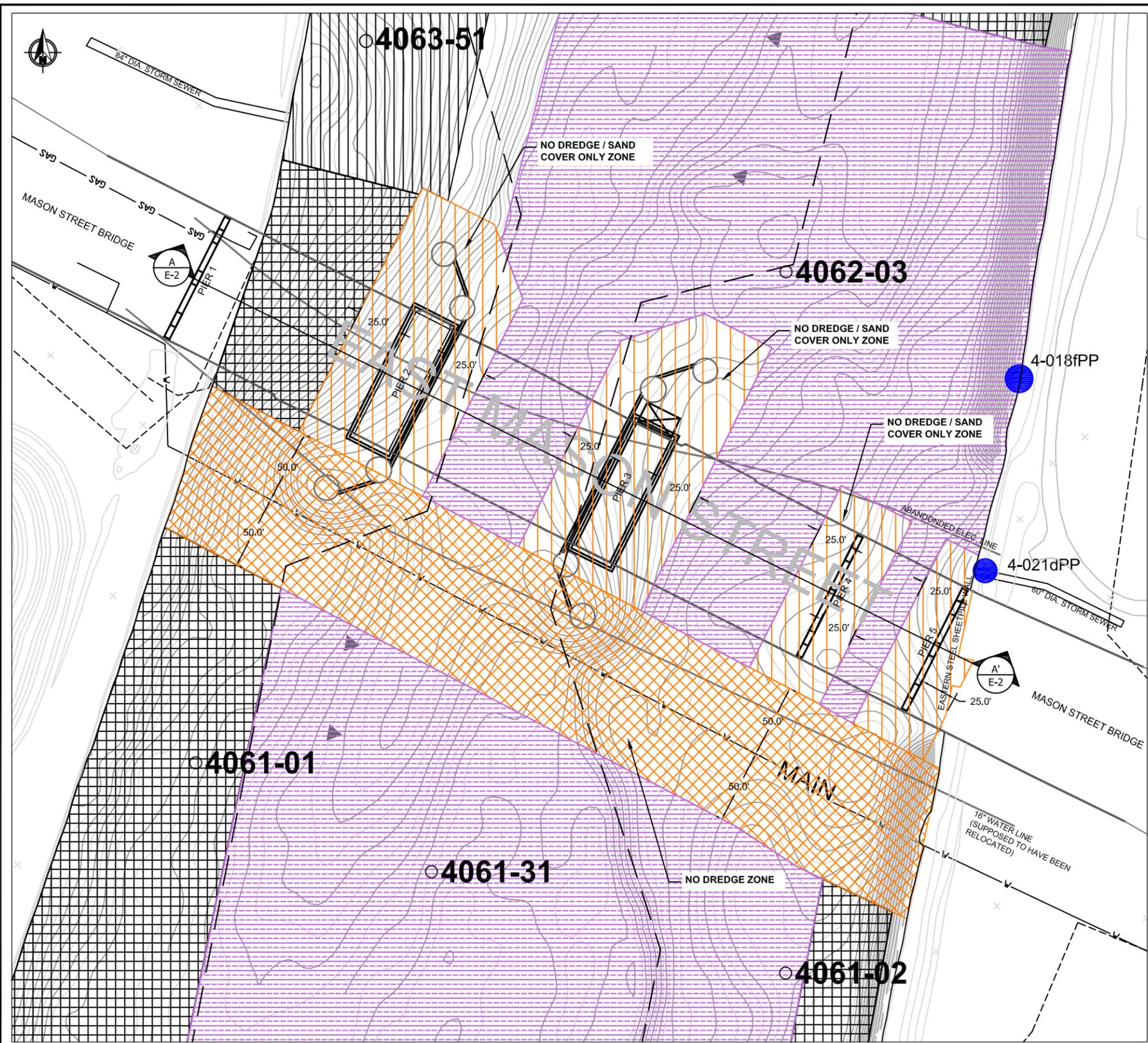
wooden piles and concrete anchor blocks. To stabilize exposed portions of both water mains in 1997, the City of DePere covered approximately 680 linear feet of the Reid Street water main and 700 linear feet of the Scheuring Road water main with ¾-inch bedding stone, a geotextile fabric, and 2- to 5-inch cover stone. The cover stone features can be readily seen as a ridge (or mound) on the 2004 bathymetry maps (Sheets E-3 and E-5). It is important to note that for the Scheuring Road crossing, the cover stone mound observable on the 2004 bathymetry is approximately 100 feet south of the location of utility as documented in project basemaps developed in 2004 by RETEC. This underscores the uncertainty associated with working in the vicinity of buried utilities as well as the need to field locate these utilities (both horizontally and vertically) prior to actual construction work.

A 50-foot offset is shown on the example drawings in Attachment B from the centerline of each utility crossing. As can be seen on these examples, this 50-foot offset (where no dredging or capping will be performed) is intended to provide sufficient offset to prevent damage to the bedding and cover stone placed by the City of DePere.

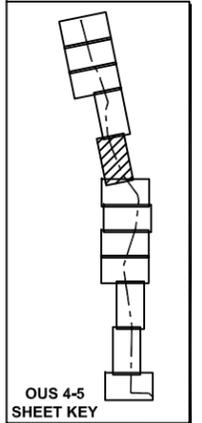
**ATTACHMENT A**

**MASON STREET BRIDGE CROSSING EXAMPLE**

C:\Documents and Settings\jgiblin\My Documents\08020503-Fox River (GMB)\EXAMPLE DRAWINGS\WSPC USFT NAV/D88 USFT NAV/D88 BRIDGE EXAMPLE WSPC USFT NAV/D88 USFT NAV/D88 BRIDGE 1



STATION	Compaction Corrected Interval		Total PCB (mg/kg)
	Top of Core Interval (feet)	Bottom of Core Interval (feet)	
4061-01	0.00	0.54	0.72
4061-01	0.54	1.07	3.10
4061-01	1.07	1.61	2.00
4061-01	1.61	2.14	2.50
4061-01	2.14	2.68	0.44
4061-01	2.68	3.22	0.06
4061-02	0.00	0.67	0.56
4061-02	0.67	1.33	9.10
4061-02	1.33	2.00	10.05
4061-02	2.00	2.67	11.00
4061-02	2.67	3.33	14.00
4061-02	3.33	4.00	17.00
4061-02	4.00	4.67	1.20
4061-02	4.67	5.33	0.08
4061-02	5.33	6.00	0.03
4061-02	6.00	6.67	0.03
4061-02	6.67	7.33	0.03
4061-02	7.33	8.00	0.03
4061-31	0.00	0.52	2.00
4061-31	0.52	1.04	2.90
4061-31	1.04	1.56	2.50
4061-31	1.56	2.08	2.95
4061-31	2.08	2.60	3.10
4061-31	2.60	3.13	3.30
4061-31	3.13	3.65	0.85
4061-31	3.65	4.17	0.03
4061-31	4.17	4.69	0.03
4061-31	4.69	5.21	0.04
4061-31	5.21	5.73	0.03
4061-31	5.73	6.25	0.03
4063-51	0.00	1.43	0.67
4063-51	1.43	3.00	0.77



- 4089-10 SAMPLE LOCATION
- 4-003fPP OUTFALL LOCATION
- NO DREDGE / SAND COVER ONLY ZONES
- ▨ NO DREDGE / NO CAPPING ZONES
- ▤ COVER - 6" MIN. SAND CAP
- ▥ CAP A - 7"-9" MIN. THICK GRAVEL AND SAND CAP
- ▧ CAP C - 9" MIN THICK GRAVEL AND SAND CAP WITH 12" THICK ARMOR LAYER
- ⊕ TRANSECT LOCATION FOR EXAMPLE DRAWINGS
- NAVIGATIONAL CHANNEL LINE
- ▨ NEATLINE DREDGING AREA

SAMPLE NOTES:  
 1. SAMPLE 4062-03 WAS NOT ANALYZED FOR PCB.

NOTES:  
 1. THIS DOCUMENT IS IN PREPARATION FOR REVIEW BY USEPA AND ITS FEDERAL AND STATE PARTNERS AND IS SUBJECT TO CHANGE.  
 2. ALL NOTES ON EXISTING CONDITIONS SHEETS APPLY.  
 3. ALL STRUCTURES, LOCATIONS, AND ALIGNMENTS NEED TO BE FIELD VERIFIED AND SHOULD BE CONSIDERED APPROXIMATE.  
 4. DREDGING SHALL TYPICALLY BE CONDUCTED TO WITHIN 25 FEET OF A BRIDGE PIER, DOLPHIN, OR FENDER, EXCEPT AS MODIFIED BY SITE-SPECIFIC CONDITIONS (I.E., A LARGER OR SMALLER OFFSET) DURING PREPARATION OF ANNUAL REMEDIAL ACTION WORK PLANS.  
 5. AN OFFSET OF LESS THAN 25-FEET MAY BE USED BASED ON THE FIELD VERIFICATION OF THE LOCATION OF THE BRIDGE PIERS AND FENDER SYSTEM, THE POTENTIAL FOR DAMAGING THE STRUCTURE AND/OR DREDGE EQUIPMENT, AND DISCUSSIONS WITH THE STRUCTURE'S OWNER (THE WISCONSIN DEPARTMENT OF TRANSPORTATION).

SOURCE:  
 1. SURVEY AND MAPPING WORK PERFORMED FOR THE WDNR BY THE RETEC GROUP CIRCA 2004.  
 2. HORIZONTAL DATUM: WISCONSIN STATE PLANE CENTRAL ZONE - NAD83, U.S. SURVEY FEET.  
 3. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAV/D88).  
 4. MASON STREET BRIDGE PLAN AND SECTION VIEWS DIGITIZED FROM DESIGN DRAWINGS BY THE STATE OF WISCONSIN DEPT. OF TRANSPORTATION, DIVISION OF HIGHWAYS ENTITLED "S.T.H. OVER FOX RIVER - STRUCTURE B-5-134, UNIT 13", SHEETS 1-13, DATED DEC. 1970. PLEASE NOTE THAT THESE ARE NOT AS-BUILT DRAWINGS.



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REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: D. BINKNEY/M. HENDERSON  
 DRAWN BY: D. BINKNEY/G. BOLIN  
 CHECKED BY: R. MOHAN/P. LAROSA  
 APPROVED BY: XX  
 FILE: AS SHOWN  
 DATE: MAY 2008

**LOWER FOX RIVER REMEDIAL DESIGN  
 PRELIMINARY 60 PERCENT DESIGN - VOLUME 1**

**EXAMPLE TRANSITION AREA DRAWINGS  
 BRIDGE EXAMPLES - PLAN VIEW**



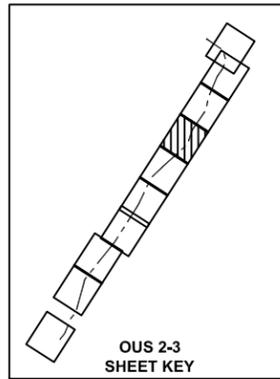
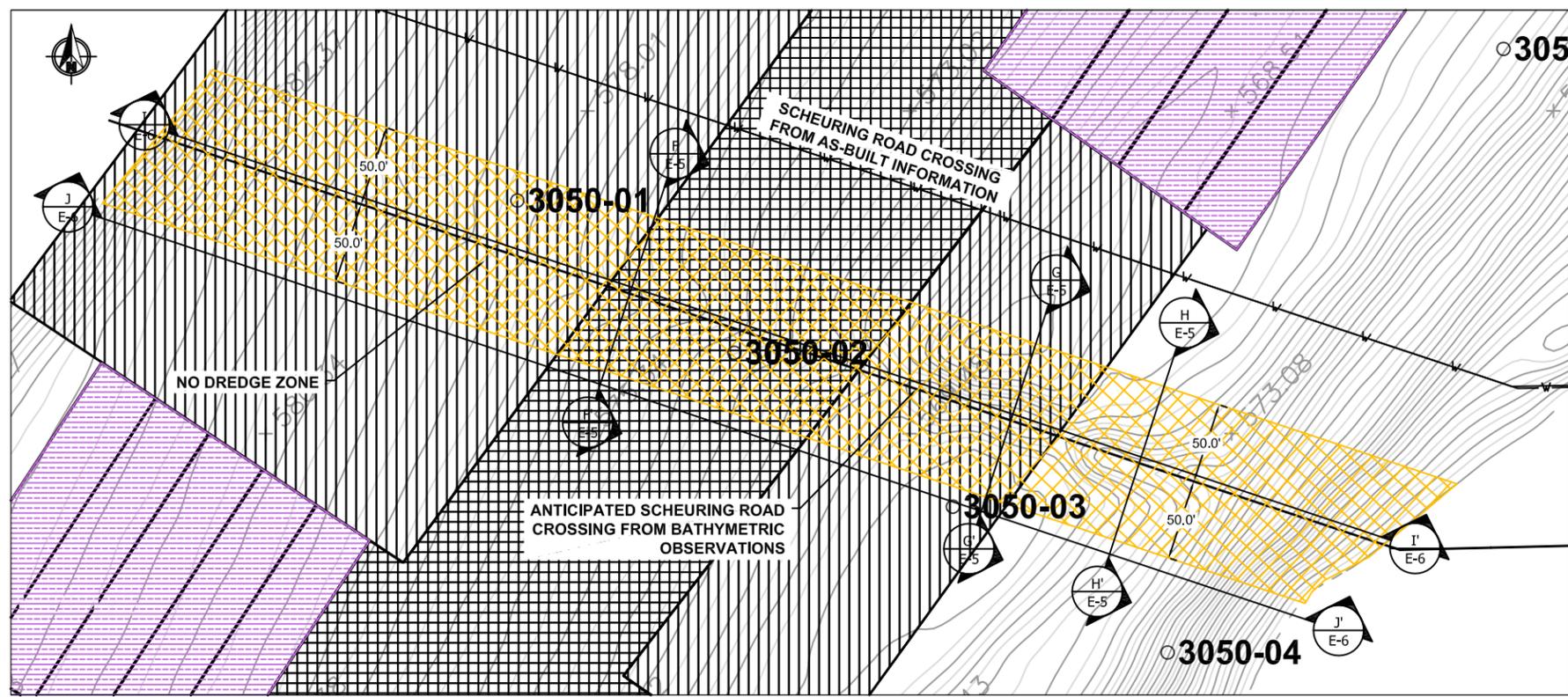
**ATTACHMENT B**

**REID STREET AND SCHEURING ROAD WATER MAIN CROSSING EXAMPLE**



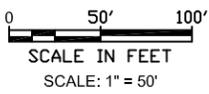


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STATION	Compaction Corrected Interval		Total PCB (mg/kg)
	Top of Core Interval (feet)	Bottom of Core Interval (feet)	
3050-01	0.00	0.59	1.50
3050-01	0.59	1.18	0.82
3050-01	1.18	1.76	0.25
3050-02	0.00	0.65	7.50
3050-02	0.65	1.30	0.76
3050-03	0.00	0.55	1.50
3050-03	0.55	1.10	0.99
3050-03	1.10	1.65	0.34
3050-03	1.65	2.21	0.06
3050-03	2.21	2.76	0.03
3050-04	0.00	0.56	0.03
3050-04	0.56	1.13	0.03
3051-01	0.00	0.51	0.78
3051-01	0.51	1.02	0.37
3051-01	1.02	1.53	0.08
3051-02	0.00	0.58	5.90
3051-02	0.58	1.16	0.90
3051-02	1.16	1.73	1.10
3051-02	1.73	2.31	0.35
3051-02	2.31	2.89	0.06
3051-02	2.89	3.47	0.03
3051-03	0.00	0.63	18.00
3051-03	0.63	1.25	0.87
3051-03	1.25	1.88	0.46
3051-04	0.00	0.54	0.13
3051-04	0.54	1.07	0.03
3051-04	1.07	1.61	0.03
3051-05	0.00	0.56	0.18
3051-05	0.56	1.11	0.33
3051-05	1.11	1.67	0.03

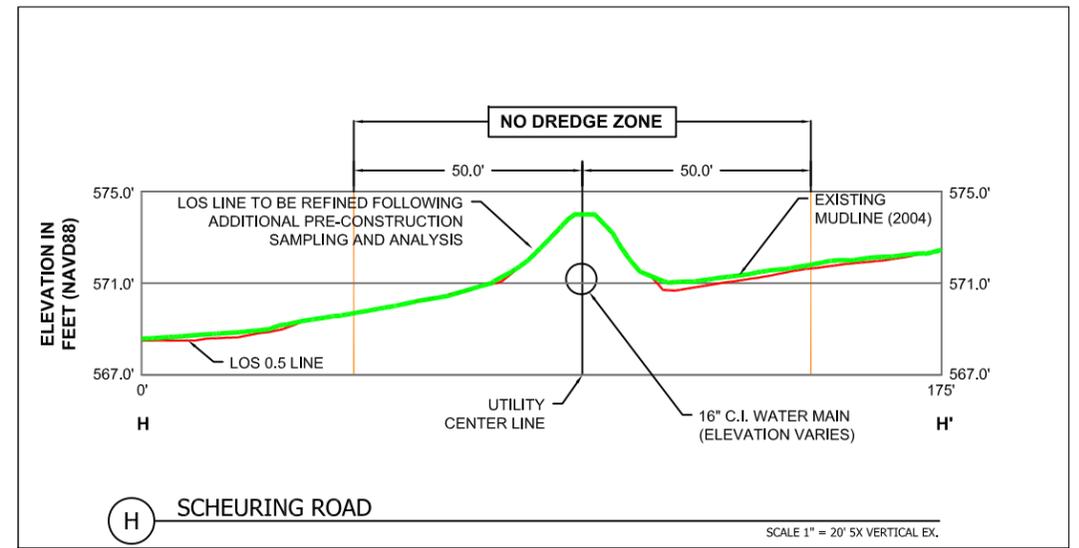
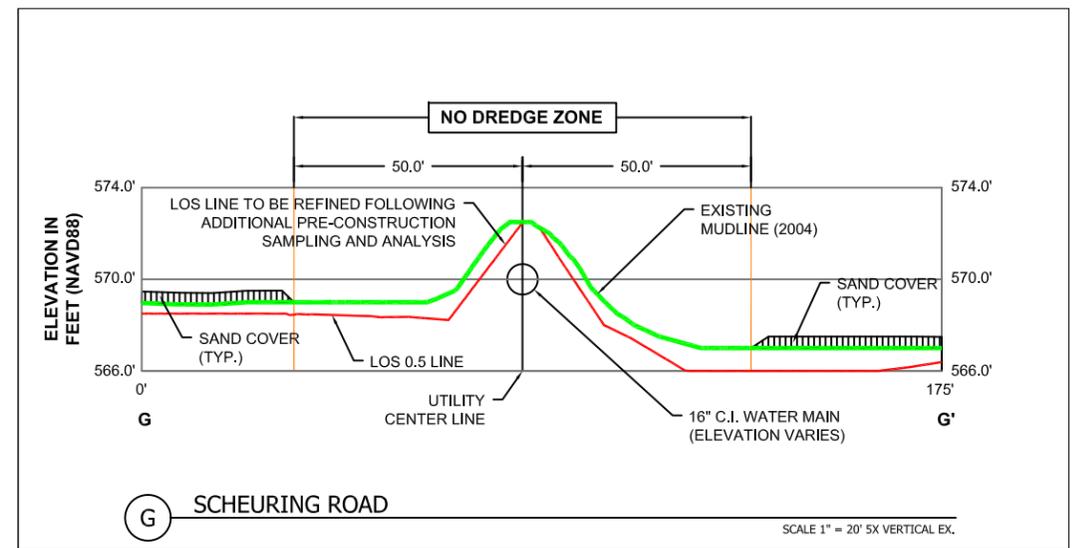
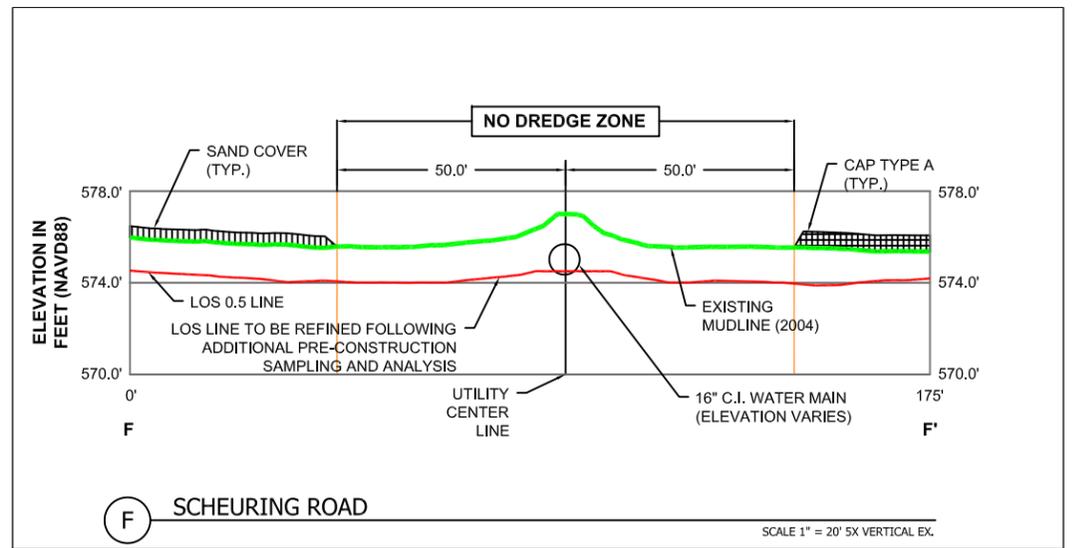
**SAMPLE NOTES:**  
 1. SAMPLE 3051-01 LOCATED OUT OF THE PLAN VIEWPORT, APPROXIMATELY 424.8 FT NORTH EAST (DOWNSTREAM) OF SAMPLE 3050-01.  
 2. SAMPLE 3051-02 LOCATED OUT OF THE PLAN VIEWPORT, APPROXIMATELY 426.7 FT NORTH EAST (DOWNSTREAM) OF SAMPLE 3050-02.  
 3. SAMPLE 3051-03 LOCATED OUT OF THE PLAN VIEWPORT, APPROXIMATELY 428.2 FT NORTH EAST (DOWNSTREAM) OF SAMPLE 3050-03.  
 4. SAMPLE 3051-04 LOCATED OUT OF THE PLAN VIEWPORT, APPROXIMATELY 429.0 FT NORTH EAST (DOWNSTREAM) OF SAMPLE 3050-04.  
 5. SAMPLE 3051-05 LOCATED OUT OF THE PLAN VIEWPORT, APPROXIMATELY 443.6 FT EAST-NORTH EAST (DOWNSTREAM) OF SAMPLE 3050-04.



**LEGEND**

- 4089-10 SAMPLE LOCATION
- 4-003bPP OUTFALL LOCATION
- NO DREDGE / NO CAPPING ZONES
- HORIZONTAL:VERTICAL SLOPE IN DIRECTION OF ARROW
- COVER - 6" MIN. SAND CAP
- CAP A - 7"-9" MIN. THICK GRAVEL AND SAND CAP
- TRANSECT LOCATION FOR EXAMPLE DRAWINGS
- NEATLINE DREDGING AREA

- NOTES:**
- SURVEY AND MAPPING WORK PERFORMED FOR THE WDNR BY THE RETEC GROUP CIRCA 2004.
  - HORIZONTAL DATUM: WISCONSIN TRANSVERSE MERCATOR (WTM), U.S. SURVEY FEET.
  - VERTICAL DATUM: INTERNATIONAL GREAT LAKES DATUM, 1985 (IGLD85), U.S. SURVEY FEET.
  - ALL STRUCTURES, LOCATIONS, AND ALIGNMENTS NEED TO BE FIELD VERIFIED AND SHOULD BE CONSIDERED APPROXIMATE.
  - UTILITY CROSSING PLAN AND SECTION VIEWS DEVELOPED FROM INFORMATION OBTAINED FROM DOCUMENT ENTITLED "CITY OF DE PERE WATER CROSSING STABILIZATION - FOX RIVER WATERMAIN CROSSINGS AT REID STREET AND SCHEURING ROAD, BROWN COUNTY, WISC.", BY COASTAL PLANNING AND DESIGN, INC. DATED JULY, 1997. ADDITIONAL INFORMATION TAKEN FROM PIPE INSPECTION REPORT BY SEAVIEW DIVING CONTRACTORS, INC. DATED MAY, 1997. NOTE THAT THESE ARE NOT AS-BUILT DRAWINGS.
  - DREDGING SHALL BE CONDUCTED TO WITHIN 50 FEET OF EACH KNOWN OR REPORTED RIVER UTILITY CROSSING. DREDGING MAY BE CONDUCTED USING A CLOSER OFFSET DISTANCE OF 25 FEET, IF THE FOLLOWING CONDITIONS ARE MET: (a) IF THE HORIZONTAL AND VERTICAL POSITION OF THE UTILITY OR UTILITIES IS KNOWN WITH AN ACCURACY OF WITHIN 6 INCHES VERTICALLY AND 5 FEET HORIZONTALLY ALONG ITS ENTIRE LENGTH [AS VERIFIED BY PHYSICAL SURVEYS (E.G. MANUAL PROBING)]; AND (b) IF PCB SAMPLING RESULTS WARRANT SPECIAL CONSIDERATION. THE RECOMMENDED OFFSET WILL BE PRESENTED FOR EACH UTILITY CROSSING IN THE ANNUAL REMEDIAL ACTION WORKPLANS.
  - UTILITY LOCATIONS ARE APPROXIMATE BASED ON BEST AVAILABLE DATA. ALL UTILITIES WILL BE FIELD VERIFIED PRIOR TO CONSTRUCTION.



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DESIGNED BY: D. BINKNEY/M. HENDERSON  
 DRAWN BY: D. BINKNEY/G. BOLIN  
 CHECKED BY: R. MOHANP. LAROSA  
 APPROVED BY: XX  
 FILE: AS SHOWN  
 DATE: MAY 2008

**LOWER FOX RIVER REMEDIAL DESIGN  
 PRELIMINARY 60 PERCENT DESIGN - VOLUME 1**

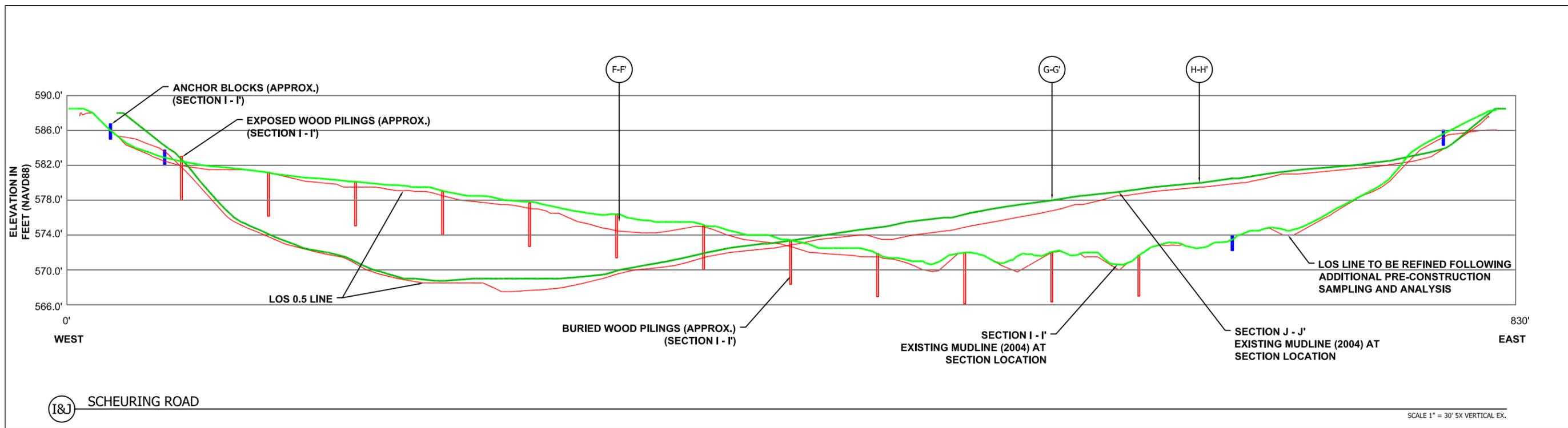
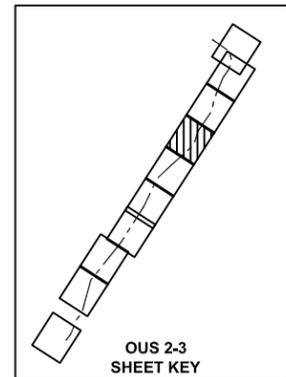
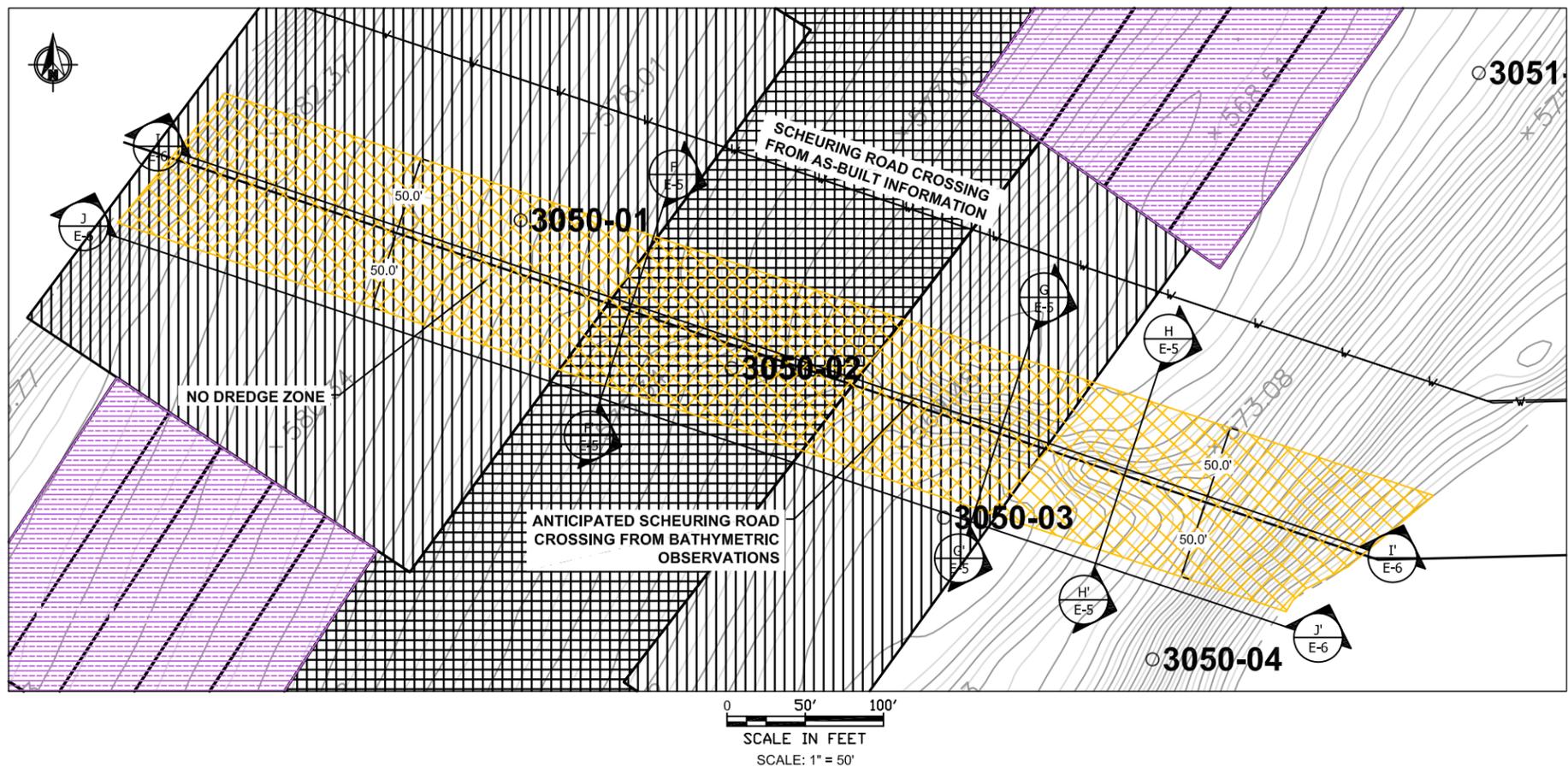
**UTILITY CROSSING EXAMPLES  
 SCHEURING ROAD SECTIONS**

**E-5**

SHEET NO. **5** OF **6**

Jun 12, 2008 9:56am gbolin

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Jun 12, 2008 9:58am gpolin



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DRAWN BY: D. BINKNEY/G. BOLIN  
CHECKED BY: R. MOHANP. LAROSA  
APPROVED BY: XX  
FILE: AS SHOWN  
DATE: MAY 2008

**LOWER FOX RIVER REMEDIAL DESIGN  
PRELIMINARY 60 PERCENT DESIGN - VOLUME 1**

**UTILITY CROSSING EXAMPLES  
SCHEURING ROAD SECTIONS**

**E-6**

SHEET NO. **6** OF **6**

**ATTACHMENT A-3**

**SHORELINE DESIGN REFINEMENT “GROUND RULES”**



## Remedial Design Technical Memorandum

---

**To:** Shoreline and Cap Design Sub-Group Coordinators: Tim Harrington (Hard Hat) and Rich Weber (NRT)

**From:** Matt Henderson, Paul LaRosa, Ram Mohan, and Clay Patmont (Anchor)  
Steve McGee (Tetra Tech)

**cc:** Jim Hahnenberg (U.S. Environmental Protection Agency), Greg Hill (Wisconsin Department of Natural Resources), and George Berken (Boldt)

**Date:** June 6, 2008

**Re:** 60 Percent Design – Shoreline Design Refinement “Ground Rules”

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This remedial design (RD) technical memorandum establishes the basis for design (or “ground rules”) for developing appropriate transitions from offshore remedies into adjacent shoreline areas. The approach for local shoreline design refinements was discussed with the Agency/Oversight Team (A/OT) during the Workgroup 2 conference call held on April 28, 2008. The ground rules described herein will be incorporated into the 60 Percent Design submittal and subsequently used for the site-specific shoreline design in localized areas in the Fox River. Application of these ground rules will be performed as remedial action (RA) work progresses within the river, such that site-specific remedies are designed in the year prior to construction in that area and the final remedy for each area documented in the annual RA Work Plans.

As part of the 30 Percent Design (Appendix B, Attachment B-6), a 2-foot threshold was proposed as a minimum depth of contamination that would require detailed review and potential shoreline capping. Areas with less than 2 feet of contamination could be dredged without significant impact to the adjacent upland property; however, areas with predicted depth of contamination in excess of 2 feet would warrant additional engineering analysis. Additional site-specific engineering analysis involves consideration of existing slope angle and soil types/conditions, potentially supplemented by additional shoreline sampling/characterization. This RD technical memorandum builds upon the initial assessment and presents three design approaches for transitioning offshore remedies into adjacent shoreline areas. The approaches were developed in recognition of the following three sets of

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conditions representing the general range of conditions anticipated throughout Operable Units (OUs) 2 to 5:

- 1) Transitioning from an offshore dredge area where the depth of contamination (DOC) (represented by the level of significance [LOS] of 0.5 surface) or site-specific shoreline samples indicate that sediments exceeding the 1.0 part per million (ppm) polychlorinated biphenyl (PCB) remedial action level (RAL) extend to a depth greater than 2 feet below the mudline and preliminary RA delineation included dredging
- 2) Transitioning from an offshore dredge area where the DOC (represented by the LOS 0.5 surface) or site-specific shoreline samples indicate that sediments exceeding the 1.0 ppm RAL extend to a depth less than 2 feet below the mudline and preliminary RA delineation included dredging
- 3) Transitioning from an offshore dredge and cap (or offshore cap) area into the shoreline where preliminary RA delineation included capping

These three design alternatives were discussed with the A/OT and are included in this memorandum for reference. This memorandum will be included as an appendix to the 60 Percent Remedial Design Report.

*Shoreline Transition Case 1:* This example case, illustrated in Attachment S-1, represents an area where the DOC (represented by the LOS 0.5 surface) or site-specific shoreline samples indicate that sediments exceeding the 1.0 ppm RAL extend to a depth greater than 2 feet below the mudline and the nearshore remedy delineated during preliminary RD involved dredging to remove all sediment exceeding the 1.0 ppm RAL. However, initial engineering analyses presented in the 30 Percent Design (Appendix B, Attachment B-6) indicate that dredging more than 2 feet immediately adjacent to the shoreline could destabilize the bank. Therefore, the dredge cut will be designed to daylight at the edge of the shoreline and slope down towards the river to the required dredge elevation at a 5 horizontal to 1 vertical (5H:1V) slope (maximum slope based on shoreline slope stability analysis). Flatter slopes will be considered on a case-by-case basis using site-specific physical/geotechnical and chemical information. The "edge of the shoreline", as it pertains to delineating the extent of in-water RA addressed by this RD, is defined as the shoreline identified during the November 2003 photogrammetric aerial survey performed by Jenkins Survey and Design, Inc. as part of the site survey work contracted by Wisconsin Department of Natural Resources (WDNR). Additional sampling, either as part of

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annual infill sampling or following initial dredging, may be performed along shorelines to confirm the need for a shoreline cap. Sediments with PCB concentrations above the 1.0 ppm RAL that are left in place immediately adjacent to the shoreline will be capped following the dredging. Shoreline cap construction will be generally sequenced to follow shortly after dredging (typically within the same construction season). If site-specific conditions indicate a high potential for erosion (e.g., from wind waves, vessel wakes, propwash, or ice scour), shoreline cap construction may be sequenced immediately following dredging (e.g., within 1 to 3 months), to the extent practical. Evaluation of potential for post-dredge erosion will be a site-specific analysis considering fetch distance relative to potential for wind wave attack, vessel wake potential (e.g., OU 4B navigation channel versus OU 4A bench areas), etc. These site-specific evaluations will be included in the annual RA Work Plans.

Where shoreline capping is deemed necessary, appropriate armor stone sizes and thicknesses will be designed based on the results of wind wave, ice scour, propwash, and vessel wake analyses. Based on these analyses, vessel wakes are expected to be the dominant erosive force in most shoreline areas. Shoreline caps within OU 4B are expected to require larger armor stone (up to 1-foot median stone diameter) than those in OUs 4A and 3. Preliminary wave run-up calculations performed for the maximum predicted vessel wake and a 5H:1V slope using the Automated Coastal Engineering System (ACES) software indicate that shoreline caps should extend approximately 2 feet above the top of shoreline cap elevation to protect against scour during extreme wave events (Attachment S-1). The appropriate top of shoreline cap elevation will be determined based on the results of the hydrodynamic model generated by Sea Engineering for the RD, which incorporated a 100+ year flow event and a maximum seiche event. As the flood flow and seiche elevation will vary depending on the location within OU 4, this elevation will be site-specific. For the purpose of these examples, a top of cap elevation of approximately 581.6 feet North American Vertical Datum (NAVD) is shown, corresponding to a high water elevation including river stage, seiche, and wave run-up (subject to site-specific review and refinement as part of the annual RA Work Plans. The details of the wave run-up calculations will be included in the 60 Percent Design Report. The base of the shoreline slope cap will be designed with a toe berm (as necessary) to facilitate construction of the cap on the slope as well as provide long-term support by preventing undercutting. An example toe berm is depicted in Attachment S-1; further details of the toe berm configuration and associated design analysis will be presented in the 60 Percent Design Report.

*Shoreline Transition Case 2:* This design approach, illustrated in Attachment S-2, will apply to areas where the geostatistical modeling (LOS 0.5 surface) or site-specific shoreline samples indicate that sediments exceeding the 1.0 ppm RAL extend less than 2 feet below the existing mudline and the nearshore remedy delineated during preliminary RD involved dredging to remove all sediment exceeding the 1.0 ppm RAL. In addition, this case applies to shoreline areas where settlement-sensitive structures (e.g., docks, bulkhead walls, slope protection, etc.) are not positioned within approximately 10 feet of the slope. Based on initial engineering analyses presented in the 30 Percent Design (Appendix B, Attachment B-6), it is expected that essentially all of the sediment above the RAL under these conditions could be removed without destabilizing the bank. As in Case 1, the dredge cut will be designed to daylight at the edge of the shoreline and slope down towards the river to the required dredge elevation at a 5H:1V slope. Flatter slopes will be considered on a case-by-case basis using site-specific physical/geotechnical and chemical information. The "edge of the shoreline", as it pertains to delineating the extent of in-water RA addressed by this RD, is defined as the shoreline identified during the November 2003 photogrammetric aerial survey performed by Jenkins Survey and Design, Inc. as part of the site survey work contracted by WDNR. Since essentially all of the targeted sediment will be removed, a shoreline cap will not be placed in these areas.

*Shoreline Transition Case 3:* This example case, illustrated in Attachment S-3, represents an area where the nearshore remedy delineated during preliminary RD involved capping (alone or more typically following initial dredging) to contain sediment exceeding the 1.0 ppm RAL at current depths in excess of 2 feet below the mudline. This design approach provides general design criteria for appropriate transition(s) between the nearshore cap (or dredge-and-cap) remedy and planned offshore remedy (dredge-only, dredge-and-cap, or cap). As with Cases 1 and 2, the dredge cut will be designed to daylight at the edge of the shoreline and slope down towards the river to the required dredge elevation at a 5H:1V slope. Sediments with PCB concentrations above the 1.0 ppm RAL left in place at the shoreline will be capped following dredging. Flatter slopes will be considered on a case-by-case basis using site-specific physical/geotechnical and chemical information. The "edge of the shoreline", as it pertains to delineating the extent of in-water RA addressed by this RD, is defined as the shoreline identified during the November 2003 photogrammetric aerial survey performed by Jenkins Survey and Design, Inc. as part of the site survey work contracted by WDNR. As with Case 1,

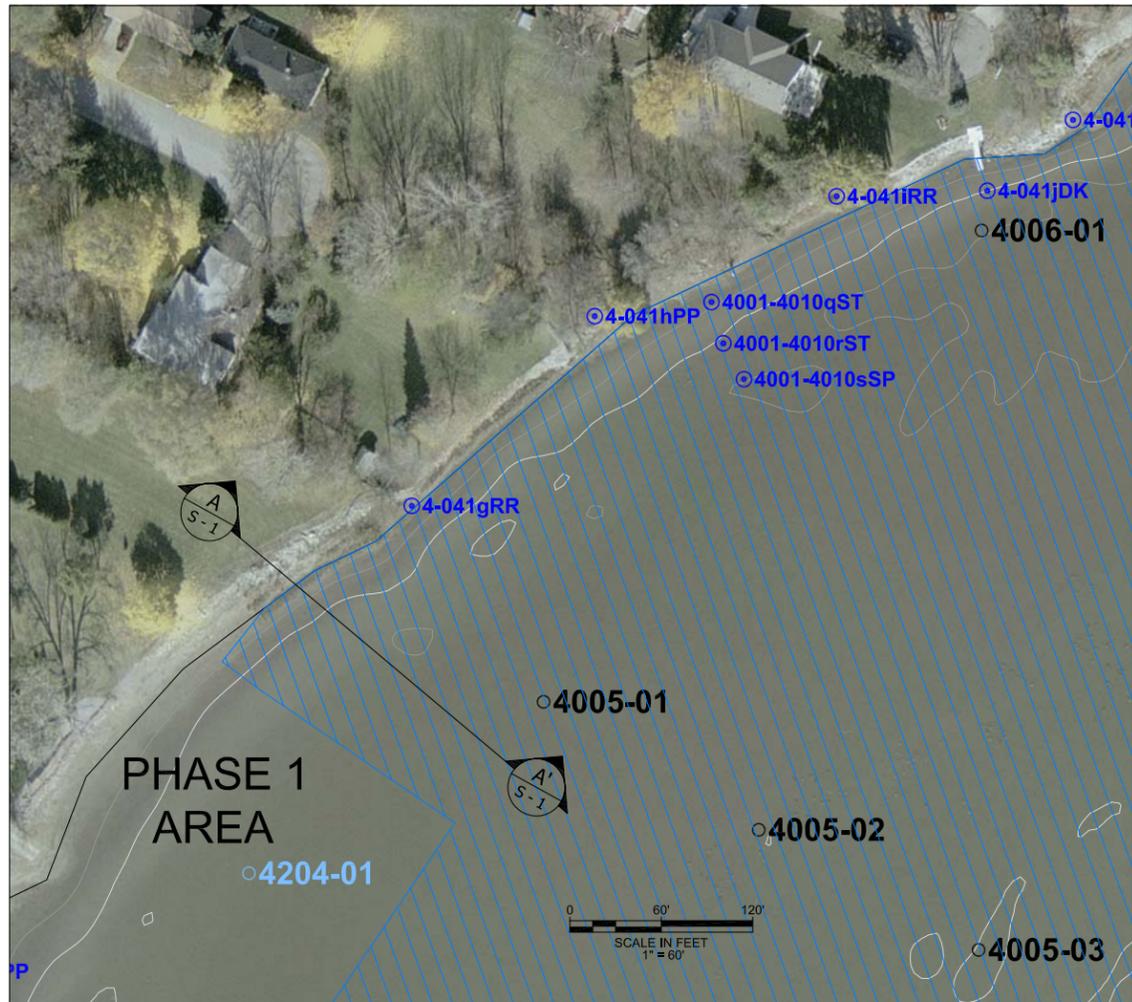
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shoreline cap construction will be generally sequenced to follow shortly after dredging (typically within the same construction season). If site-specific conditions indicate a high potential for erosion (e.g., from wind waves, vessel wakes, propwash, or ice scour), shoreline cap construction may be sequenced immediately following dredging (e.g., within 1 to 3 months), to the extent practical. Evaluation of potential for post-dredge erosion will be a site-specific analysis considering fetch distance relative to potential for wind wave attack, vessel wake potential (e.g., OU 4B navigation channel versus OU 4A bench areas), etc. These site-specific evaluations will be included in the annual RA Work Plans.

Where shoreline capping is deemed necessary, appropriate armor stone sizes and thicknesses will be designed based on the results of wind wave, ice scour, propwash, and vessel wake analyses. Based on these analyses, vessel wakes are expected to be the dominant erosive force in most shoreline areas. Shoreline caps within OU 4B are expected to require larger armor stone (up to 1-foot median stone diameter) than those in OUs 4A and 3. Preliminary wave run-up calculations performed for the maximum predicted vessel wake and a 5H:1V slope using the ACES software indicate that shoreline caps should extend approximately 2 feet above the top of shoreline cap elevation to protect against scour during extreme wave events (Attachment S-3). The appropriate top of shoreline cap elevation will be determined based on the results of the hydrodynamic model generated by Sea Engineering, which incorporated a 100+ year flow event and a maximum seiche event. As the flood flow and seiche elevation will vary depending on the location within OU 4, this elevation will be site-specific. For the purpose of these examples, a top of cap elevation of approximately 581.6 feet NAVD is shown, corresponding to a high water elevation including river stage, seiche, and wave run-up (subject to site-specific review and refinement as part of the annual RA Work Plans. The details of the wave run-up calculations will be included in the 60 Percent Design Report. The base of the shoreline slope cap will be designed with a toe berm (as necessary) to facilitate construction of the cap on the slope as well as provide long-term support by preventing undercutting. An example toe berm is depicted in Attachment S-3; further details of the toe berm configuration and associated design analysis will be presented in the 60 Percent Design Report.

**ATTACHMENT S-1**

**SHORELINE TRANSITION – EXAMPLE CASE 1**



Chemistry			
location	top (ft)	bott (ft)	[PCB]ppm
4005-01	0.0	0.6	5.4
	0.6	1.1	8.6
	1.1	1.7	18.8
	1.7	2.3	29.0
	2.3	2.9	19.0
	2.9	3.4	2.5
4005-02	0.0	0.6	4.5
	0.6	1.1	31.0
	1.1	1.7	16.4
	1.7	2.3	1.7
	2.3	2.8	1.4
	2.8	3.4	0.4
4005-03	0.0	0.5	4.0
	0.5	1.1	25.5
	1.1	1.6	21.0
	1.6	2.2	13.0
	2.2	2.7	0.8
	2.7	3.2	0.6
4006-01	0.0	0.5	4.5
	0.5	1.1	0.1
	1.1	1.6	0.0
	1.6	2.2	0.0
	2.2	2.7	0.0
	2.7	3.2	0.0



Taken from further offshore of point 4204-01, just outside Phase 1 area, facing north.



SECTION LOCATION



At point 4-041gRR (south edge of riprap embankment) facing northeast

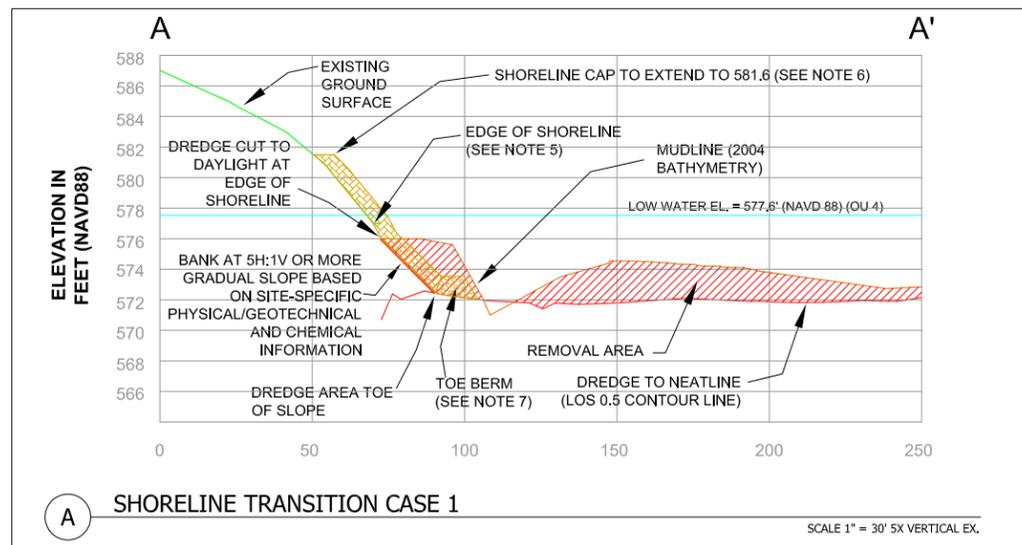


At point 4001-4010qST, facing west.

- NEATLINE DREDGE AREA
- MUDLINE (2004 BATHYMETRY)
- SHORELINE CAP
- TOE BERM
- TRANSECT LOCATIONS
- 4005-01 SAMPLING POINT
- 4-041gRR SHORELINE SURVEY POINT

Visual observations from 2006 and 2007 shoreline surveys (Vertical Datum: NAVD88, U.S. survey feet)

Point Name	General Note	Specific feature	Water depth(ft)	Mudline elev.
4-041gRR	residential shoreline, riprap, and docks	riprap embankment at west; thin layer of gravel along riprap residential areas - soft underneath	0	578.6
4-041hPP	residential shoreline, riprap, and docks	N. edge of maintained embankment at outfall; thin layer of gravel along riprap residential areas - soft underneath	0	578.6
4-041iRR	residential shoreline, riprap, and docks	S. edge of residential riprap embankment; thin layer of gravel along riprap residential areas - soft underneath	0	578.6
4-041jDK	residential shoreline, riprap, and docks	east end of private dock	2	576.6
4001-4010qST	residential shoreline upstream of county fairgrounds	transition from hard sand to 6" of softer sand over hard sand	0.50	576.9
4001-4010rST	residential shoreline upstream of county fairgrounds	transition from 6" of soft sediment with hard bottom below to very soft deep sediment offshore	1.0	576.4
4001-4010sSP	residential shoreline upstream of county fairgrounds	6' of soft sediment above hard bottom, and very soft further offshore from this point.	1.5	575.9



- NOTES:
1. SURVEY AND MAPPING WORK PERFORMED FOR THE WDNR BY THE RETEC GROUP CIRCA 2004.
  2. HORIZONTAL DATUM: WISCONSIN STATE PLANE CENTRAL, U.S. SURVEY FEET.
  3. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88), U.S. SURVEY FEET.
  4. ALL STRUCTURES, LOCATIONS, AND ALIGNMENTS NEED TO BE FIELD VERIFIED AND SHOULD BE CONSIDERED APPROXIMATE.
  5. "EDGE OF SHORELINE" IS DEFINED AS THE ADMINISTRATIVE BOUNDARY OF THE OUs 2 TO 5 SITE AS DEFINED BY THE RETEC SURVEY COMPLETED IN 2004.
  6. WAVE RUNUP ANALYSIS SHOWED A POTENTIAL FOR A 2-FOOT RUNUP WITH A 5:1 SLOPE; THEREFORE, THE SHORELINE CAP WILL EXTEND TO 581.6 FT (NAVD 88) TO ACCOUNT FOR A 2-FOOT SEICHE AND 2-FOOT RUNUP. THE TOP OF SHORELINE CAP ELEVATION WILL BE FURTHER REFINED BASED ON A SITE-SPECIFIC ANALYSIS OF THE RESULTS OF THE HYDRODYNAMIC MODEL GENERATED BY SEA ENGINEERING, WHICH INCORPORATED A 100+ YEAR FLOW EVENT AND A MAXIMUM SEICHE EVENT.
  7. DETAILS ON THE TOE BERM DESIGN WILL BE INCLUDED IN THE 60% DESIGN DRAWINGS.

**DRAFT**



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SUBJECT TO CHANGE IN WHOLE OR IN PART.

REVISIONS				
REV	DATE	BY	APPD	DESCRIPTION

DESIGNED BY: LIZ VONCKX  
DRAWN BY: LIZ VONCKX  
CHECKED BY: MATT HENDERSON  
APPROVED BY: \_\_\_\_\_  
FILE: AS SHOWN  
DATE: APRIL 2008

LOWER FOX RIVER OPERABLE UNIT 2 - 5

EXAMPLE CAP REFINEMENT DRAWINGS  
SHORELINE TRANSITION - CASE 1  
PLAN AND SECTION VIEWS

S - 1

SHEET NO. 1 OF 3

**ATTACHMENT S-2**

**SHORELINE TRANSITION – EXAMPLE CASE 2**

C:\Documents and Settings\gibolin\My Documents\Fox River Temp Files\CAD files transferred from FUI\09029503 EXAMPLES CAP REFINEMENTS RECOVERED.dwg SHORELINE CASE 2



Just inside mouth of inlet, facing SW toward south shore



At mouth of inlet, facing NW



SECTION LOCATION



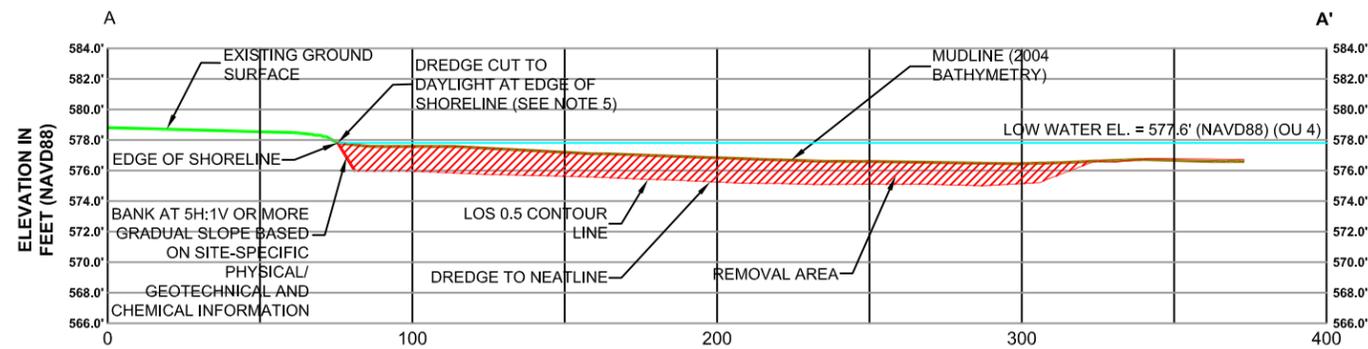
Just inside mouth of inlet facing directly south.



Taken near core location 4020-08, facing west.

Chemistry

location	top (ft)	bott (ft)	[PCB]ppm
4020-07	0.00	0.53	0.72
	0.53	1.06	0.37
	1.06	1.59	0.03
	1.59	2.12	0.03
	2.12	2.65	0.03
4020-08	2.65	3.18	0.03
	3.18	3.71	0.03
	0.00	0.57	0.51
	0.57	1.13	1.50
	1.13	1.70	3.20
4020-09	1.70	2.27	0.06
	2.27	2.83	0.03
	2.83	3.40	0.03
	0.00	0.51	4.40
	0.51	1.03	2.60
4021-21	1.03	1.54	0.03
	1.54	2.05	0.03
	2.05	2.56	0.03
	0.00	0.55	0.08
	0.55	1.10	0.03
4019-21	1.10	1.65	0.03
	1.65	2.20	0.03
	2.20	2.75	0.03
	0.00	0.56	0.17
	0.56	1.11	0.03
4104-01	1.11	1.67	0.03
	1.67	2.22	0.03



A SHORELINE TRANSITION CASE 2

SCALE 1" = 30' 5X VERTICAL EX.

- NEATLINE DREDGING
- MUDLINE (2004 BATHYMETRY)
- COVER
- TRANSECT LOCATIONS
- 4104-01 SAMPLING POINT

- NOTES:
- SURVEY AND MAPPING WORK PERFORMED FOR THE WDNR BY THE RETEC GROUP CIRCA 2004.
  - HORIZONTAL DATUM: WISCONSIN STATE PLANE CENTRAL, U.S. SURVEY FEET.
  - VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM, 1988 (NAVD88), U.S. SURVEY FEET.
  - ALL STRUCTURES, LOCATIONS, AND ALIGNMENTS NEED TO BE FIELD VERIFIED AND SHOULD BE CONSIDERED APPROXIMATE.
  - "EDGE OF SHORELINE" IS DEFINED AS THE ADMINISTRATIVE BOUNDARY OF THE OUs 2 TO 5 SITE AS DEFINED BY THE RETEC SURVEY COMPLETED IN 2004.

**DRAFT**



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REVISIONS				
REV	DATE	BY	APPD	DESCRIPTION

DESIGNED BY: GABE BOLIN  
DRAWN BY: GABE BOLIN  
CHECKED BY: MATT HENDERSON  
APPROVED BY: \_\_\_\_\_  
FILE: AS SHOWN  
DATE: APRIL 2008

LOWER FOX RIVER OPERABLE UNIT 2 - 5

EXAMPLE CAP REFINEMENT DRAWINGS  
SHORELINE TRANSITION - CASE 2  
PLAN AND SECTION VIEWS

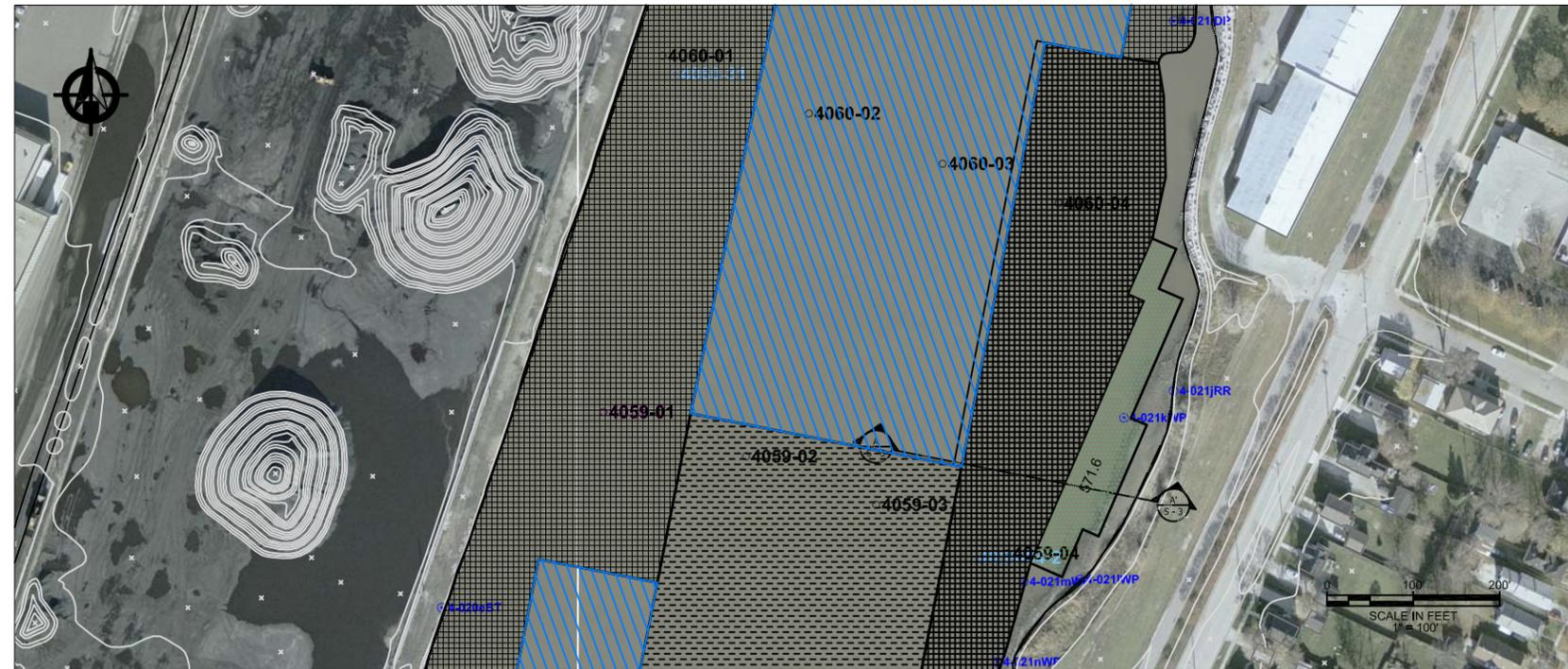
S - 2

SHEET NO. 2 OF 3

**ATTACHMENT S-3**

**SHORELINE TRANSITION – EXAMPLE CASE 3**

C:\Documents and Settings\gibolin\My Documents\Fox River Temp Files\CAD files transferred from FUL00029503 EXAMPLES CAP REFINEMENTS RECOVERED.dwg SHORELINE CASE 3 Jun 06, 2008 10:54am gibolin

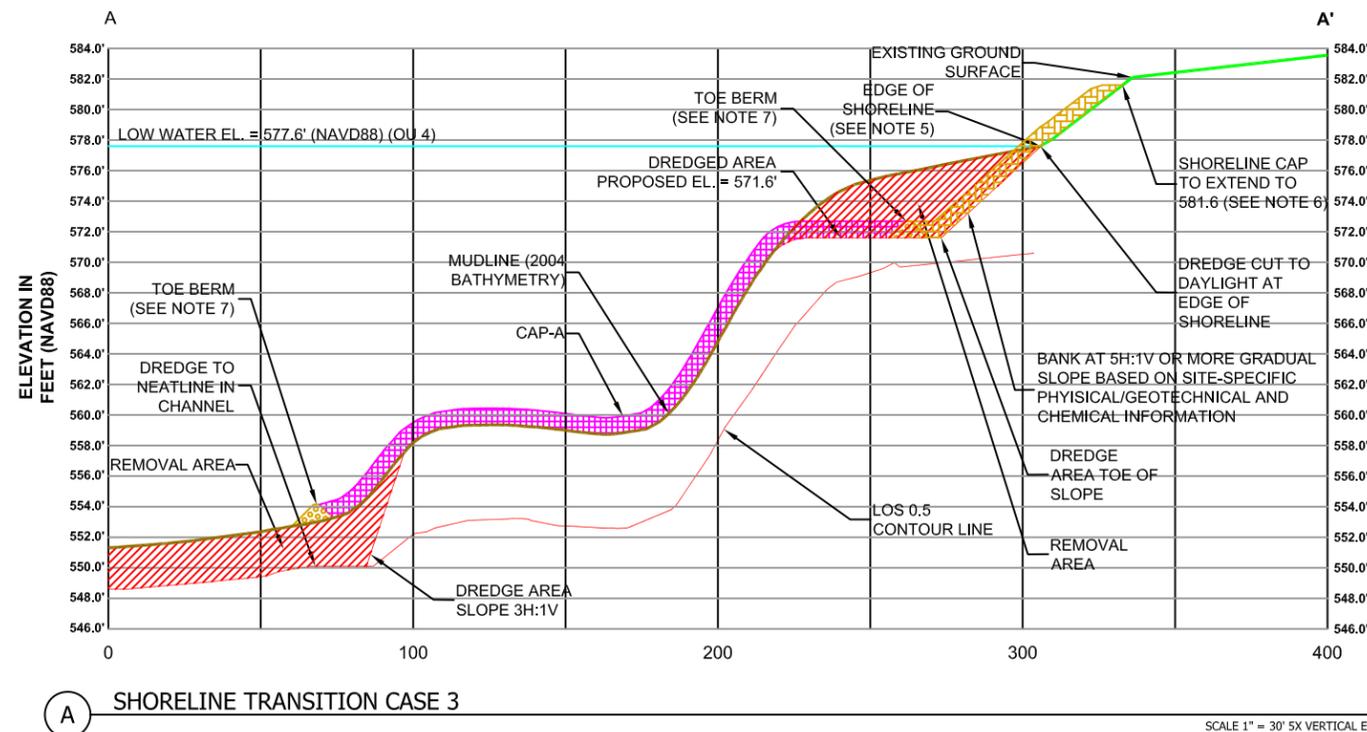


**Chemistry**

Location	top (ft)	bott (ft)	[PCB]ppm
4059-03	0.0	0.5	2.2
	0.5	1.1	2.3
	1.1	1.6	2.4
	1.6	2.1	2.5
	2.1	2.6	0.0
4059R-04	2.6	3.2	0.0
	3.2	3.7	0.0
	3.7	4.2	0.0
	4.2	4.8	0.0
	0.0	0.7	2.1
	0.7	1.4	2.1
	1.4	2.1	2.1
	2.1	2.8	2.3
	2.8	3.4	2.3
	3.4	4.1	2.0
	4.1	4.8	1.7
	4.8	5.5	2.4
	5.5	6.2	1.5



SECTION LOCATION



Visual observations from shoreline survey, June 14, 2006  
(Vertical Datum: NAVD88, U.S. Survey Feet)

Point Name	Specific feature	Water depth(ft)	Mudline elev.
4-021jRR	south end of riprap	0.5	577.8
4-021kWP	north end of abandoned piles	3	575.3
4-021lWP	south end of piles	0.7	577.7
4-021mWP	north end of abandoned pile group	5.0	573.3
4-021nWP	south end of piles	1.5	576.8

- NEATLINE DREDGING
- MUDLINE (2004 BATHYMETRY)
- DREDGE AND CAP
- CAP A
- CAP C
- SHORELINE CAP
- TOE BERM
- TRANSECT LOCATIONS
- 4059-02 SAMPLING POINT
- 4-021jRR SHORELINE SURVEY POINT

- NOTES:
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  - HORIZONTAL DATUM: WISCONSIN STATE PLANE CENTRAL, U.S. SURVEY FEET.
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  - WAVE RUNUP ANALYSIS SHOWED A POTENTIAL FOR A 2-FOOT RUNUP WITH A 5:1 SLOPE; THEREFORE, THE SHORELINE CAP WILL EXTEND TO 581.6 FT (NAVD 88) TO ACCOUNT FOR A 2-FOOT SEICHE AND 2-FOOT RUNUP. THE TOP OF SHORELINE CAP ELEVATION WILL BE FURTHER REFINED BASED ON A SITE-SPECIFIC ANALYSIS OF THE RESULTS OF THE HYDRODYNAMIC MODEL GENERATED BY SEA ENGINEERING, WHICH INCORPORATED A 100+ YEAR FLOW EVENT AND A MAXIMUM SEICHE EVENT.
  - DETAILS ON THE TOE BERM DESIGN WILL BE INCLUDED IN THE 60% DESIGN DRAWINGS.



Taken near sample location 4060-04, facing southeast

**DRAFT**



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REVISIONS				
REV	DATE	BY	APPD	DESCRIPTION

DESIGNED BY: GABE BOLIN  
DRAWN BY: GABE BOLIN  
CHECKED BY: MATT HENDERSON  
APPROVED BY: \_\_\_\_\_  
FILE: AS SHOWN  
DATE: APRIL 2008

LOWER FOX RIVER OPERABLE UNIT 2 - 5

EXAMPLE CAP REFINEMENT DRAWINGS  
SHORELINE TRANSITION - CASE 3  
PLAN AND SECTION VIEWS

S - 3

SHEET NO. 3 OF 3

**ATTACHMENT A-4**  
**DREDGED CUT SLOPE STABILITY MEMO**



## Memorandum

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**To:** 60 Percent Design Report File  
**From:** Wes MacDonald, John Laplante, Paul LaRosa, and John Verduin  
**cc:**  
**Date:** June 13, 2006  
**Re:** Dredged Cut Slope Stability

---

This memorandum provides details and background on the dredge cut slope stability analysis performed during development of the 60 Percent Design for the Fox River.

Details of the slope stability analyses performed for the design of dredge cut slopes are provided below using data generated during the 2004 and 2005 Remedial Design (RD) geotechnical investigation program (Shaw/Anchor 2004 and 2005). Three (3) horizontal to 1 vertical (3H:1V) slopes were selected for the dredge prism design based on review of vane shear and triaxial strength data collected as part of the RD and previous investigations. These data indicate that a 3H:1V slope will have a factor of safety of at least 1.3 for the vast majority of the data reviewed. Slopes cut at 3H:1V are expected to remain stable throughout construction.

Moreover, under the ROD Remedy (and areas handled in a similar fashion under the Optimized Remedy), any long-term sloughing of adjacent slopes is expected to involve clean material (less than 1 ppm PCBs). This is because the dredge prism in these areas was designed to remove the deepest contamination between adjacent cuts. Slight adjustment of the slopes could occur in some areas over time due to the dynamic nature of hydrodynamic conditions. However, such adjustments in these dredge slopes would not expose contaminated sediments in the future.

### **STABILITY OF DREDGE CUT SLOPES**

For purposes of the Basis of Design Report (BODR), the stability of cut slopes was evaluated for a range of slope angles and a range of cut depths. For purely cohesive sediments, the stability of the cut is a function of the height of the cut. For sediments with appreciable sand, the stability is also a function of the slope angle.

Lambe and Whitman (1969) present methods to evaluate the stability of slopes using infinite slope theory, for both cohesive and granular materials. These methods were used to compute the factor of safety for slopes based on the existing site strength data, which includes the following:

- Vane Shear Test (VST) data collected in 2004 and 2005
- Laboratory Unconsolidated Undrained (UU) shear strength test data collected by the Johnson Company as well as the Shaw/Anchor team during the RD
- Laboratory Consolidated Undrained (CU) shear strength test data collected by the Shaw/Anchor team during the RD

Using the methods presented by Lambe and Whitman, a graph was prepared to show the required sediment shear strength for a given slope, and a given depth of cut, at a selected factor of safety. Figure 1 presents these curves, which are linear plots of cut depth vs. required shear strength, for slopes of 3H:1V, 4H:1V, 5H:1V and 10H:1V, assuming a factor of safety of 1.3 for these slopes.

Also plotted on Figure 1 are the available laboratory UU and CU shear strength data from the sources listed above. The UU data are plotted as discrete shear strengths for each undisturbed sample, at the depth from which the sample was collected. The CU data are plotted as strength versus depth, using the cohesion and friction angle measured during the laboratory CU test on each sample.

Evaluations made using the VST shear strength data (corrected based on plasticity index after Bjerrum, 1972) indicate that more than 95 percent of the time, a factor of safety of 1.3 or better is achieved using a 3H:1V cut slope. Most importantly, the CU data, which are among the highest quality of the tests, all show adequate strength to achieve the target factor of safety.

The limit equilibrium slope stability analyses demonstrate that the Lambe and Whitman methods provide a conservative estimate of the strength required to achieve the target factor of safety. More detailed computer modeling limit equilibrium analyses will be performed during the stability of capped slopes design.

Based on this evaluation, the 3H:1V cut slope was selected for design. This represents the slope that the Contractor will be required to achieve, and will likely be the basis for measurement of pay volumes during construction.

## REFERENCES

Bjerrum, L., Clausen, C.J.F. and Duncan, J.M. 1972 "Earth Pressures on Flexible Structures: A State-of-the Art Report," Proc. 5<sup>th</sup> European Conf. soil Mech. and Found. Engrg., Madrid, Vol. II, pp.169-196.

Lambe, T. W. and R. V. Whitman, 1969. Soil Mechanics, John Wiley & Sons Publishing, New York.

Shaw and Anchor, 2004. Lower Fox River Operable Units 2-5 Pre-design Sampling Plan. Prepared for Fort James Operating Company, Inc. and NCR Corporation by Shaw Environmental and Infrastructure, Inc. and Anchor Environmental, LLC. June 7, 2004.

Shaw and Anchor, 2005. Lower Fox River Operable Units 2-5 Pre-design Sampling Plan, Addendum #2. Prepared for Fort James Operating Company, Inc. and NCR Corporation by Shaw Environmental and Infrastructure, Inc. and Anchor Environmental, LLC. April 2005.

### Target FOS 1.3

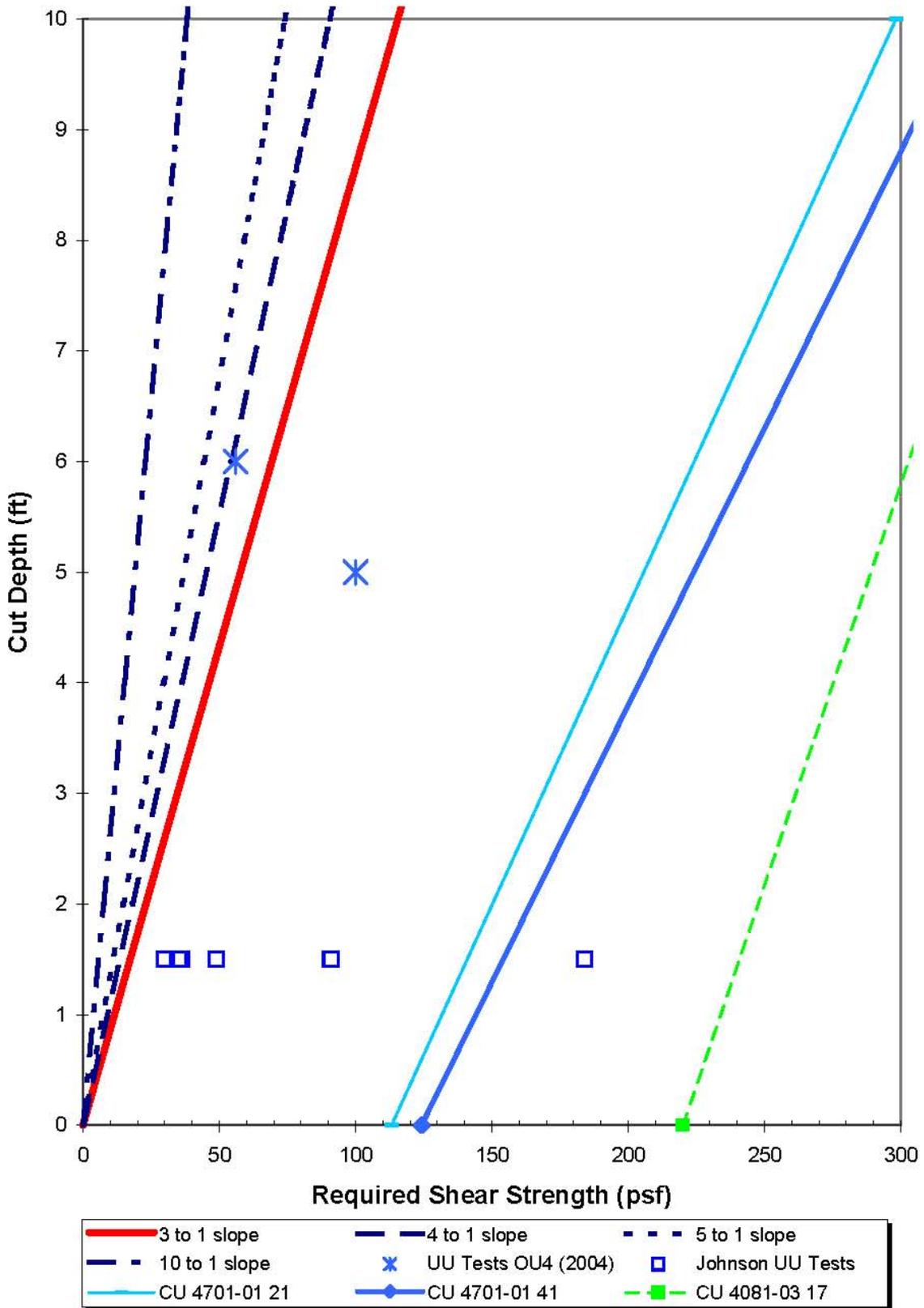


Figure 1  
Selection of Cut Slope Angle  
Fox River

**ATTACHMENT A-5**  
**MASS BALANCE SPREADSHEET**

**Preliminary Mass Balance Calculations for OUs 2 to 5**

<b>Boskalis Dolman COMPOSITE NUMBER</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>Total</b>
Total estimated volume per composite in m3 situ sediment	106,000	70,000	500,000	430,000	1,150,000	317,000	2,573,000
<b>In situ Material Characteristics</b>							
Dry solids, %, in situ	45.7%	31.9%	57.1%	59.9%	40.8%	69.0%	
Organics, % of dry solids, in situ	9.8%	15.7%	9.1%	6.2%	12.8%	5.7%	
Specific Gravity, mtons/m3	2.52	2.45	2.53	2.57	2.48	2.58	
Density, mtons/m3 in situ	1.37	1.22	1.51	1.56	1.31	1.71	
Particle size distribution conform BRAUN 2007							
Total Sand (+63 micron)	58.6%	31.4%	66.1%	81.8%	42.6%	89.6%	
Coarse Sand (+150 micron)	30.8%	18.6%	27.8%	51.5%	11.6%	52.7%	
Fine Sand (+63 - 150 micron)	27.8%	12.8%	38.3%	30.3%	31.0%	36.9%	
<b>Process Design Characteristics Dredging and Desanding</b>							
Design capacity, cyard/hr in situ	250	250	250	250	250	250	
Design capacity, m3/hr in situ	191	191	191	191	191	191	
Total Volume Input in gpm	6,000	6,000	6,000	6,000	6,000	6,000	
Total Volume Input in m3 per hour	1368	1368	1368	1368	1368	1368	
<b>Process Input Characteristics</b>							
Input solids per hour in mtds/hr	119	74	165	179	102	226	
Input organics in mtds/hr	12	12	15	11	13	13	
Input minerals in mtds/hr	108	63	150	168	89	213	
Total Sand Load (+63 micron) in mtds/hr	63	20	99	137	38	191	
Coarse Sand Load (+150 micron) in mtds/hr	33	12	42	86	10	112	
Fine Sand Load (+63 - 150 micron) in mtds/hr	30	8	57	51	28	78	
Fine minerals Load in mtds/hr	45	43	51	31	51	22	
Organics in mtds/hr	12	12	15	11	13	13	
Total Residue Load (Fine + Organics) in mtds/hr	56	55	66	42	64	35	
<b>Total Process Volumes (maximized)</b>							
Total Flow in m3/hr	1368	1368	1368	1368	1368	1368	
Total Flow Solids in mtds/hr	119	74	165	179	102	226	
Total Flow Solids Volume in m3/hr	47	30	65	70	41	88	
Total Flow Water Volume in m3/hr	1,321	1,338	1,303	1,298	1,327	1,280	
Total Flow Mixture Density in mton/m3	1.053	1.032	1.073	1.080	1.045	1.101	
<b>Simplified Process calculations Desanding</b>							
Load De-sander Coarse Sand, mtds/hr	119	74	165	179	102	226	
Load De-sander Coarse Sand, m3/hr	1,321	1,338	1,303	1,298	1,327	1,280	
Coarse Sand Removal, mtds/hr	33	12	42	86	10	112	
Gravity drained solids	82.5%	82.5%	82.5%	82.5%	82.5%	82.5%	
Coarse Sand Removal, wet mtons/hr	40	14	50	105	12	136	
Process Water addition, estimated, m3/hr	100	100	100	100	100	100	
Load De-sander Fine Sand, mtds/hr	86	63	123	92	92	113	
Load De-sander Fine Sand, m3/hr	1,334	1,407	1,295	1,174	1,400	1,089	
Fine Sand Removal, mtds/hr	30	8	57	51	28	78	
Gravity drained solids	82.5%	82.5%	82.5%	82.5%	82.5%	82.5%	
Fine Sand Removal, wet mtons/hr	36	10	69	62	33	95	
Process Water addition, estimated, m3/hr	100	100	100	100	100	100	
<b>Simplified Process calculations Dewatering</b>							
Dewatering Load Total Residue, mtds/hr	56	55	66	42	64	35	
Dewatering Load Total Residue, m3/hr	1,356	1,486	1,245	1,142	1,428	985	
Total Residue Removal in mtds/hr	56	55	66	42	64	35	
Filter cake dry solids after pressing	52.5%	52.5%	52.5%	52.5%	52.5%	52.5%	
Filter Cake Removal, wet mtons/hr	107	104	125	79	122	67	
Process Water addition, estimated, m3/hr	250	250	250	250	250	250	
<b>Simplified Water Balance</b>							
Water Flow to Process Water Tank, m3/hr	1,420	1,555	1,279	1,255	1,466	1,120	
Process Water to Desanding and dewatering, m3/hr	450	450	450	450	450	450	
Total Excess Water at maximized productions, m3/hr	970	1,105	829	805	1,016	670	
Extra water addition for cleaning works etc, m3/hr (?)	100	100	100	100	100	100	
Uptime Factor	75%	75%	75%	75%	75%	75%	
Daily Excess Water to Water Treatment, m3	19,265	21,685	16,714	16,284	20,088	13,853	
Average hourly Excess Water to Water Treatment, m3/hr	803	904	696	678	837	577	
Average hourly Excess Water to Water Treatment, GPM	3,521	3,963	3,055	2,976	3,671	2,532	
<b>Filter press sizing</b>							
<b>Process Design Characteristics Filter Presses</b>							
Design capacity, cyard/hr in situ	180	180	180	180	180	180	
Design capacity, m3/hr in situ	138	138	138	138	138	138	
<b>Filter Press Inputs</b>							
Filter cake dry solids, %	52.5%	52.5%	52.5%	52.5%	52.5%	52.5%	
Cake density, mtons/m3	1.417	1.417	1.417	1.417	1.417	1.417	
Dewatering Load Total Residue, mtds/hr	41	39	47	30	46	25	
Dewatering Load Total Residue, mtons/hr	77	75	90	57	88	48	
Dewatering Load Total Residue, m3/hr	54	53	64	40	62	34	
Cycle time, minutes	75	75	75	75	75	75	
Press size, m3	17.7	17.7	17.7	17.7	17.7	17.7	
Compression factor membrane press	1.3	1.3	1.3	1.3	1.3	1.3	
Capacity per press in m3 per drop	13.6	13.6	13.6	13.6	13.6	13.6	
Nr of Drops per press per hour	0.8	0.8	0.8	0.8	0.8	0.8	
Capacity per press in m3 per hour	10.9	10.9	10.9	10.9	10.9	10.9	
Uptime factor	75%	75%	75%	75%	75%	75%	
Nett Capacity per press in m3 per hour	8.2	8.2	8.2	8.2	8.2	8.2	
Number of Presses needed	6.7	6.5	7.8	4.9	7.6	4.1	

**ATTACHMENT A-6**

**EFFLUENT DISCHARGE DESIGN FOR AMMONIA**

## Appendix A - Attachment A-6 Effluent Discharge Design for Ammonia

**AMMONIA (as N) LIMITS  
CLASSIFICATION:**

enter data in yellow cells

**WARMWATER SPORTFISH, WARMWATER FORAGE FISH COMMUNITY**

EFFLUENT FLOW (mgd):	8.6
EFFLUENT FLOW (cfs):	13.306
MAX. EFFLUENT pH (s.u.):	8.00
f (withdrawal factor)	1.00

**BACKGROUND INFORMATION:**

	June- Sept. <i>summer</i>	Oct. - Dec. <i>winter</i>	April & May <i>spring</i>			
4Q3 (cfs)	0					
7Q10 (cfs)	660	660	660			
30Q5 (cfs)	1260	1260	1260			
7Q2 (cfs)						
Ammonia (mg/L)	0.03	0.16	0.07			
Temperature (deg C)	26	7	14			
pH (std. units)	8.6	8.37	8.26			
% of river flow used:	100	25	50			
Reference weekly flow:	660	165	330			
Reference monthly flow:	1260	315	630			

<b>CRITERIA (in mg/L):</b>					
Acute (@ effl. pH):		8.41	8.41	8.41	
4-day Chronic (@ backgrd. pH):					
early life stages present		1.10	3.39	4.07	
early life stages absent		1.10	5.51	4.21	
30-day Chronic (@ backgrd. pH)					
early life stages present		0.44	1.36	1.63	
early life stages absent		0.44	2.20	1.68	
<b>EFFLUENT LIMITS (in mg/L):</b>					
<b>Daily maximum</b> (also see below)		16.82	16.82	16.82	
<b>Weekly average</b>					
early life stages present		52.95		99.23	
early life stages absent			66.46		
<b>Monthly average</b>					
early life stages present		38.74		73.81	
early life stages absent			48.51		
		<i>summer</i>	<i>winter</i>	<i>spring</i>	

Daily maximum table:	pH	Criterion	Limit
	6	54.99	109.98
	6.2	53.17	106.34
	6.4	50.53	101.06
	6.6	46.84	93.69
	6.8	42.00	83.99
	7	36.09	72.19
	7.2	29.54	59.08
	7.4	22.97	45.94
	7.6	17.03	34.06
	7.8	12.14	24.28
	8	8.41	16.82
	8.2	5.73	11.45
	8.4	3.88	7.77
	8.6	2.65	5.30
	8.8	1.84	3.69
	9	1.32	2.65

**ATTACHMENT A-7**  
**GEOTECHNICAL DATA FOR 2009 DREDGE AREAS**



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**APPENDIX B**  
**ENGINEERED PLAN DRAWINGS**

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**(SEE ATTACHED FOLDER)**

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**APPENDIX C**

**SPECIFICATIONS/CONSTRUCTION WORK PLANS  
FOR KEY DESIGN ELEMENTS**

**Including**

Attachment C-0 Project Plan and Sheets P-101 through P-107

Attachment C-1 Site Prep SOW

Attachment C-2 Shell Site Prep

Attachment C-3 Little Rapids Site Prep

Attachment C-4 Building Foundation WP

Attachment C-5 Building Erection WP

Attachment C-6 Dredging Equipment Documents

Attachment C-7 DWP Equipment Documents

Attachment C-8 Water Treatment Plant Equipment

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**APPENDIX C-0**

**PROJECT PLAN**

**LOWER FOX RIVER REMEDIAL DESIGN  
60 PERCENT DESIGN REPORT**

**Prepared for:**

Appleton Papers Inc.  
Georgia-Pacific Consumer Products, LP  
NCR Corporation

**For Submittal to:**

Wisconsin Department of Natural Resources  
U.S. Environmental Protection Agency

**Prepared by:**

Anchor Environmental, L.L.C.  
Tetra Tech EC, Inc.

**June 2008**

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## List of Acronyms and Abbreviations

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ACM	asbestos-containing material
BRM	beneficial reuse material
CCU	cap certification unit
CD	Consent Decree
CFR	Code of Federal Regulations
cm	centimeter
CMU	cap management unit
CQAPP	Construction Quality and Assurance Project Plan
cy	cubic yards
DCU	dredge certification unit
DMU	dredge management unit
DOT	Department of Transportation
DWP	Dewatering Plant
GPS	Global Positioning System
gpm	gallons per minute
HASP	Health and Safety Plan
HDPE	high-density polyethylene
mg/L	milligrams per liter
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
NTU	nephelometric turbidity units
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCB	polychlorinated biphenyl
PCP	Project Control Point
PPE	personal protective equipment
ppm	parts per million
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RA	remedial action
RAL	remedial action level
RAO	remedial action objective
RD	Remedial Design
ROD	Record of Decision
RTK	Real Time Kinematic
SAP	Sampling and Analysis Plan

## List of Acronyms and Abbreviations

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SLAMM	Source Loading and Management Model Modeling
SOW	Statement of Work
SWAC	surface weighted average concentration
SWPPP	Stormwater Pollution Prevention Plan
Tetra Tech	Tetra Tech EC, Inc.
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
TSS	total suspended solids
µg	microgram (or micron)
UMR-IWW	Upper Mississippi River-Illinois Waterway
USDOT	United States Department of Transportation
USEPA	U.S. Environmental Protection Agency
VMW	vehicle maintenance waste
WDNR	Wisconsin Department of Natural Resources
WTP	wastewater treatment plant

## **BACKGROUND INFORMATION**

With the award of the remediation for the Lower Fox River Operable Units (OUs) 2 through 5 to the Tetra Tech Team, under a design-build scenario, the need or format for some of the specifications described in the 30% Design Report has changed in some cases. Following is the entire specification list from the 30% Design Report:

- Summary of Work
- Measurement and Payment
- Project Management and Coordination
- Construction Progress Documentation
- Project Schedule
- Submittal Procedures
- Health, Safety, and Emergency Response Procedures for Contaminated Sites
- Quality Control
- Temporary Construction Facilities and Controls
- Temporary Erosion, Sediment and Pollution Control
- Environmental Protection
- Examination and Preparation
- Mobilization and Demobilization
- Cleaning and Waste Management
- Closeout Procedures
- Closeout Submittals
- Maintenance of Existing Conditions
- Surveying and Grade Control
- Existing Conditions Assessment
- Site Demolition
- Water Treatment
- Transportation and Disposal of Hazardous Materials
- Earthwork
- Clearing and Grubbing
- Metal Sheet Piling
- Signaling and Control Equipment for Waterways
- Dredging and Dewatering
- Capping and Sand Cover Placement

Under design-build performed by the Tetra Tech Team, the Measurement and Payment specification is no longer needed. In addition, the following specification sections are described as noted in this Design Report (in whole or as part of other plans) based on the Tetra Tech Team's design-build role:

- Project Schedule – See Section 7 of Volume 1, or Section 9 of Volume 2
- Health, Safety and Emergency Response Procedures for Contaminated Sites – See the Appendix containing the Health and Safety Plan (HASp) and Contingency Plan.

- Quality Control – See the Construction Quality Assurance Project Plan (CQAPP) with Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) attachments
- Temporary Construction Facilities and Controls – The requirements for this specification are described in the Building Erection Work Plan and the Site Preparation Work Plans included in the Design Report appendices.
- Temporary Erosion, Sediment and Pollution Control – The requirements for this specification are addressed as part of the Tetra Tech Team’s submittal of the Storm Water Pollution Prevention Plan (SWPPP) documentation to the City of Green Bay and the Wisconsin Department of Natural Resources (WDNR).
- Water Treatment – The requirements for this specification is described in Section 5 of the Design Report and the Wastewater Treatment Plant (WTP) design drawings included in the Technical Specifications at the end of this Project Plan.
- Signaling and Control Equipment for Waterways – The requirements for this specification are addressed as part of the Tetra Tech Team’s coordination of the waterway marker requirements with the U.S. Coast Guard.
- Cleaning and Waste Management – This information is included in Section 35 20 23 and Section 01 57 20.
- The requirements for Project Management and Controls, Existing Conditions Assessment, Maintenance of Existing Conditions and Construction Progress Documentation have been addressed within the text of the Design Report and are thus not included as separate specifications within this Project Plan.

The following general requirements specifications are included in this Project Plan, which presents an overview of the project under design-build:

- 01 11 00 Summary of Work
- 01 33 00 Submittal Procedures
- 01 57 20 Environmental Protection
- 01 71 00 Examination and Preparation
- 01 71 13 Mobilization and Demobilization
- 01 78 00 Closeout Submittals

The following technical specifications have been included in this Project Plan for performance of the project:

- 02 21 00 Surveying and Grade Control
- 02 41 13 Site Demolition
- 02 81 00 Transportation and Disposal of Hazardous Materials
- 31 00 00 Earthwork and Road Construction
- 31 11 00 Clearing and Grubbing
- 31 41 16 Metal Sheet Piling
- 35 20 23 Dredging and Dewatering
- 35 43 00 Capping and Sand Cover Placement

## **SECTION 01 11 00 - SUMMARY OF WORK**

### **PART 1 GENERAL**

#### **1.1 DESCRIPTION OF WORK**

##### **A. Project Description and Location**

The Lower Fox River and Green Bay Site includes approximately 39 miles of the Lower Fox River, as well as the bay of Green Bay. The Fox River portion of the site extends from the outlet of Lake Winnebago and continues downstream to the mouth of the Fox River at the City of Green Bay. The Bay portion of the site extends from the mouth of the Fox River at the City of Green Bay to the point where the Green Bay enters Lake Michigan. The site has been divided into five geographically-defined Operable Units (OU) – 1, 2, 3, 4, and 5 – for the remediation of polychlorinated biphenyls (PCBs) that have been released into the river.

Remedial design sampling indicated elevated concentrations of PCBs in sediments along the west bank of the river, just downstream of the De Pere Dam. Decisions by the U.S. Environmental Protection Agency (USEPA) and WDNR (collectively known as the “Response Agencies”), concluded that the accelerated removal of PCBs in this area would have significant benefits to the environment and public health. Therefore, it was determined that the remedial actions for OUs 2 through 5 should be conducted in two phases with Phase 1 implemented to address sediments just downstream of the De Pere Dam and all remaining elements of the remedial action in OUs 2 through 5 implemented in Phase 2. Phase 1 of the remedial action is currently being conducted under a Consent Decree (CD) between the Response Agencies, and NCR Corporation and Sunoco–U. S. Mills, Inc. All remaining elements of the remedial action in OUs 2 through 5 will be implemented in Phase 2.

The overall remediation program to be implemented for the removal of PCBs in OUs 2 through 5 is set forth in a Record of Decision (ROD) and the 2007 ROD Amendment (USEPA and WDNR 2002, 2003, and 2007). The 2007 Administrative Order for Remedial Action (RA) directed respondents to implement the remedial action for OUs 2 through 5. The following parties are collectively referred to as the “Respondents to the 2007 Administrative Order for RA” or “RA Order Respondents”: Appleton Papers Inc., CBC Coating, Inc. (formerly known as Riverside Paper Corporation), Georgia-Pacific Consumer Products, LP (formerly known as Fort James Operating Company, Inc.), Menasha Corporation, NCR Corporation, P.H. Glatfelter Company, U.S. Paper Mills Corp., and WTMI Company (formerly known as Wisconsin Tissue Mills, Inc.). To adhere to the project schedule, Phase 2 of the OU 2-5 remedial action will be subdivided into stages, Phase 2A and 2B. Certain of the 2007 RA Order Respondents (collectively, the “Phase 2A Respondents”) are required to conduct the Phase 2A work; these are Appleton Papers Inc., CBC Coating, Inc., Georgia-Pacific Consumer Products, LP, NCR Corporation, and U.S. Paper Mills Corp. As set forth in the 2007 Administrative Order for RA and associated Statement of Work (SOW) for completion of Phase 2A work elements, certain RA tasks will be expedited and completed in 2008 in order to commence full-scale sediment remediation in OUs 2 through 5 at the start of the 2009 construction season

and/or as necessary to allow for continuation of full-scale actions in subsequent years. Phase 2B work will start at the beginning of the 2009 construction season and continue with full scale sediment remediation within OUs 2 through 5 during the subsequent years.

B. Summary of Work – Phase 2A

Phase 2A for the remediation of OUs 2 through 5 consists of work to be performed before the start of the 2009 construction season in preparation for the commencement and continuation of full-scale sediment remediation within OUs 2 through 5 which is to start at the beginning of the 2009 construction season. Phase 2A work will include:

1. Taking the necessary steps to procure equipment in order to ensure that such equipment will be available as needed at the start of the 2009 construction season
2. Taking the necessary steps to procure equipment that will be required for continuation of full-scale sediment remediation throughout the 2009 construction season and throughout the subsequent years
3. Securing on-shore staging areas and performing staging site preparation work and associated infrastructure construction that will be needed for full-scale sediment remediation at the start of the 2009 construction season and through out subsequent years
4. Developing agreements with landfill disposal facilities for disposal of sediments to be dredged during the 2009 construction season and the subsequent years
5. Completion of site surveys, including in-water and upland archaeological surveys, upland geodetic control network and construction layout survey

C. Summary of Work – Phase 2B

Phase 2B work will start at the beginning of the 2009 construction season and continue with full scale sediment remediation, processing and disposal within OUs 2 through 5 and continue through the end of the 2017 construction season.

Remedial work activities will include:

1. Mobilization of dredging equipment
2. Removal of Toxic Substances Control Act (TSCA) sediments
3. Removal of non-TSCA sediments
4. Sediment de-sanding using hydrocyclones
5. Sediment dewatering using membrane presses
6. Sediment transportation and disposal of both TSCA and non-TSCA sediments to approved landfill facilities
7. Treatment of process water with a 3-unit operation, sand filtration, bag filters, and carbon canisters with polishing accomplished using cartridge filters. A diffuser will be located in the river channel for discharge.

8. Confirmation sampling conducted after dredging is complete to verify the 1.0 ppm remedial action level (RAL) has been achieved.
9. Post-dredge residual management
10. Sediment capping using sand covers and engineered caps
11. Institutional controls that may include access restrictions, land use or water use restrictions, dredging moratoriums, fish consumption advisories, and domestic water use restrictions
12. Demobilization and site restoration

Requirements for materials and construction, as well as performance, for the various project elements are provided in these specifications and the associated Work Plans developed for specific operations.

## **SECTION 01 33 00 - SUBMITTAL PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION OF WORK**

This section addresses the documents that must be submitted throughout the duration of the contract. The following documents shall be submitted to the Respondents and Response Agencies as summarized in this section. A draft of each document shall be prepared for review by Respondents and Response Agencies. Suggested changes made by the Respondents and Response Agencies will be considered and required changes will be incorporated to prepare a final version of each document. Submittals shall bear the contract name and number, date of submission, reference to what the submittal applies, and the preparer's or responsible person's signature.

#### **1.2 PRE-MOBILIZATION SUBMITTALS**

Prior to mobilization, a full set of detailed, site-specific, pre-mobilization submittals will be submitted for review and any required changes will be incorporated prior to commencing any in-water construction activities. When applicable, work will not commence until approval has been received. These submittals will include but not be limited to the following:

- A. Preliminary Schedule
- B. Draft Schedule of Values
- C. Construction Quality Assurance Plan
- D. Construction Health and Safety Plan
- E. Community Health and Safety Plan
- F. Contingency Plan
- G. Annual RD/RA Work Plan (including Dredging and Capping Design Plans, as applicable)
- H. Stormwater Pollution Prevention Plan
- I. Adaptive Management Plan
- J. Operations, Maintenance and Monitoring Plan

#### **1.3 CONSTRUCTION SUBMITTALS**

The following table presents the schedule for documentation that will be submitted during construction activities. Besides the documents listed in the table, others may be submitted.

### Documentation Schedule During Construction

Daily Construction Report to include daily dredging, dewatering, transportation and disposal information, daily cap and cover installation performed, and materials received on site	Submitted prior to 10 a.m. on the following work day
Daily QA / QC Report	Submitted prior to 10 a.m. on the following work day
Daily Health and Safety Report	Submitted prior to 10 a.m. on the following work day
Weekly Progress Reports and Two-Week Look-Ahead	Submitted at each weekly progress meeting, distributed on Friday during design
Monthly Progress Reports	On or before the fifth day of each month
Confirmation Sediment Sampling	Included in the Daily Construction Report
Acceptance Surveys	Included in the Daily Construction Report, rolls up into Dredge Certification Unit (DCU) and Cap Certification Unit (CCU) Reports
Borrow Source Characterization Report	Prior to any and all imported material arriving on site
Cap and Cover Acceptance Survey	Included in the Daily Construction Report.
Summary of Acceptance Surveys, and Confirmation Sample results	At the end of each construction season for the dredge management unit (DMU) completed that season
Record Documents	Within 60 days following completion of the work, or upon request
Pre-final and Final Inspection	At completion of construction of material processing building and wastewater treatment plant

All submittals and reports shall be submitted in electronic format with the exception of the Project Schedule, which may be prepared in other suitable format but submitted in Portable Document Format (PDF).

#### 1.4 SUBMITTAL DESCRIPTION

##### A. Daily Construction Report

A Daily Construction Report shall be submitted in electronic format, for each day of construction by 10 a.m. on the following work day. If multiple shifts are used, a Daily Construction Report shall be submitted for each shift.

The Daily Construction Report shall consist of a summary of all activities worked on each day, including photo documentation as necessary. Work activities shall be categorized by trade and employer.

The dredging subcontractor shall provide a report to Tetra Tech detailing all dredging, capping, and sand cover placement activities performed each day so that this information can be included with the Daily Construction Report. It will include shipping receipts and material volumes for shipments of imported materials, daily volumes of material placed, area of cap placed, hours of cap placement operations, and survey measurements of material placed.

B. Daily QA / QC Report

At a minimum, information in the Daily QA/QC Report will include the date, period covered by the report, equipment used, description of activity as identified by stationing and offset, quantity of materials placed and/or excavated that day and to date, downtime and delays to the operation, health and safety status, and other relevant information concerning conduct of the operation. The report shall include the results of all inspections, surveys, and monitoring activities and shall be signed by the QA/QC Manager.

C. Daily Health and Safety Report

The Daily Health and Safety Report will contain all relevant monitoring and incidents that occur on site.

D. Weekly Progress Report and Two-Week Look-Ahead

The Weekly Progress Report will include a narrative describing the work accomplished the preceding week, identify the completion of major milestones and activities, and describe any problems encountered during the week and their subsequent resolution. The Two-Week Look-Ahead is an annotated version of the Monthly Update Schedule, which reflects work tasks to be completed in the next 2-week period and that were completed in the preceding 1-week period.

E. Monthly Progress Report

The Monthly Progress Report shall include the activities that have been performed during the previous month and includes a summary of all results of sampling and testing performed in the previous month. It will include all actions, including but not limited to, data collection and implementation of work plans that are scheduled for the next month and will provide other information relating to the progress of construction. The Monthly Progress report will also include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule, and a description of efforts made to mitigate those delays or anticipated delays.

F. Acceptance Surveys

Acceptance surveys will be performed as follows:

1. Upon completion of all dredging in a DMU, as established through verification sampling

2. Upon completion of cap or sand cover placement in a cap management unit (CMU)

G. Record Documents

An accurate record of the Work completed, including record drawings. At a minimum, record documentation submitted at the following stages of the Work:

1. After completion of dredging of each DCU: This record documentation will include the acceptance survey performed for each DMU and will confirm that specified dredge depths and extents have been achieved.
2. After completion of each layer of cap material within each CCU: These record drawings will include the acceptance survey performed for each CMU and will be used to confirm that specified cap layer thicknesses and extents have been achieved, and to verify the volume of capping materials placed.
3. Progress surveys shall be completed as needed to track work progress and shall be submitted upon request.

H. Pre-Final and Final Inspection

Pre-Final Inspections will be performed at the completion of construction of the sediment dewatering plant and wastewater treatment plant. Final Inspection will be performed by the Tetra Tech Team to verify that all deficiencies have been corrected. Final inspections and correction of deficiencies must be accomplished within the time stated for completion of the work.

- END OF SECTION -

## **SECTION 01 57 20 - ENVIRONMENTAL PROTECTION**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. This section includes requirements for managing materials and remediation waste generated during dewatering activities at the former Shell site. Management includes activities such as storage (i.e., containerization and/or stockpiling), labeling, processing, transporting and disposing of remediation wastes.

#### **1.2 DEFINITIONS**

- A. Approved recycling facility: An off-site facility that receives demolition or remediation-generated material from the Lower Fox River project for approved re-use or recycling, and that is approved to accept the material.
- B. Container: A competent unit used to store and transport remediation waste that includes, but is not limited to, bags, wrappings, drums, overpack drums, rolloffs, tankers, trucks, frac/Baker-type tanks or other type of Contractor-approved competent containment unit.
- C. Disposal facility: The final off-site destination for remediation and other wastes.
- D. DOT: The U.S. Department of Transportation, which regulates the commercial transport of hazardous materials on public highways.
- E. EPA: U.S. Environmental Protection Agency.
- F. Incidental remediation waste: Wastestreams generated during implementation of remedial activities. Incidental wastes will be classified for disposal using existing documentation, material safety data sheets, or analytical results (if sampling must be performed to identify a waste).
- G. Nonroutine remediation waste: Wastestreams that may be generated during project implementation that were not specifically identified when the ROD was developed and were not identified during project planning. Nonroutine wastes may include unknown liquids, sludges or solids, containers of chemicals, and/or other wastes encountered during the Work.
- H. Recycling: On-site or off-site recycling of demolition/remediation waste, including, but not limited to, structural steel, used oil, and other materials.
- I. Routine waste: ROD-identified waste and incidental waste.
- J. Secondary wastes: Wastes generated during decontamination/cleaning processes.
- K. Storage: Includes both containerization and stockpiling of remediation waste.
- L. Processing: Includes, but is not limited to, dewatering of sediment utilizing membrane presses and/or solidification of sediment where excess moisture is present or where the waste is not capable of passing the disposal facility acceptance criteria.

- M. Vehicle maintenance wastes (VMW): Includes wastes generated by subcontractors during vehicle maintenance activities, including but not limited to, oils, filters, tires, batteries and antifreeze.

### **1.3 GENERAL OBJECTIVES**

- A. Ensure remediation waste is properly managed from the point of origination at the project to the appropriate on-site disposal facility.
- B. Prevent cross-contamination of environmental media.
- C. Minimize generation of secondary wastes.

### **1.4 INSPECTIONS/NOTIFICATIONS**

- A. Perform and document inspections of storage and stockpile areas.
- B. Notify the Construction Manager immediately upon discovery of nonroutine remediation waste. Segregate this waste from other remediation waste in an area designated by the Construction Manager.
- C. Notify Construction Manager immediately of spills, releases, or leaks.

### **1.5 TRAINING**

Subcontractor employees working on the former Shell site shall complete required health and safety training prior to initiation of field work.

## **PART 2 PRODUCTS**

### **2.1 EQUIPMENT**

- A. Provide incidentals and accessories (including containers and appropriate secondary containment and storage tanks) as required for the proper management of remediation waste.
- B. Provide containers for the temporary on-site storage and transportation of remediation wastes and off-site recycling of VMWs.
- C. Provide spill response kits in requisite numbers and locations.
- D. Provide materials and equipment necessary to implement dust, odor, and stormwater erosion control on remediation waste stockpiles.

### **2.2 MATERIALS**

- A. Provide materials necessary for management of remediation waste such as, but not limited to, the following:
  - 1. Impervious liner material (20 mil [minimum]) to be used for the lining of container storage areas
  - 2. DOT labels and placards for off-site transportation of VMWs
  - 3. Bags for the storage of personal protective equipment (PPE) and trash
  - 4. Signs, rope/tape, and posts as appropriate for demarcation of storage areas

5. Labels for specialty wastes (e.g., PCBs and asbestos) and vehicle maintenance wastes
  6. Absorbent (if used)
  7. Spill response kits in requisite numbers and locations
- B. Provide the following:
1. Transport and disposal services for wastes prohibited from on-site treatment and/or from disposal at TSCA and non-TSCA facilities planned for use by the project. Examples include mercury, lead-acid batteries, chemical solvents, oily wastes, and wastewaters not treatable by the site’s wastewater treatment system.
  2. “Remediation Waste” labels
  3. Bins for recycling office waste (paper, aluminum cans, glass, and newspaper)

## **PART 3 EXECUTION**

### **3.1 GENERAL STORAGE REQUIREMENTS**

- A. Implement best management practices to minimize contaminant dispersion including, but not limited to, the following:
1. Clearly demarcate the storage area limits using legible signs, markings, barricades, fences, or other appropriate means
  2. Post signs with information such as project name, company name, phone number, contents, and disposal destination
  3. Locate storage areas away from high-traffic areas and drainage flow paths such as ditches, streams, and stormwater culverts
  4. Maintain good drainage within the storage area to prevent standing water
- B. Close storage areas by removing remediation waste and isolation material (e.g., liner).

### **3.2 CONTAINERS**

- A. Implement best management practices for containers including, but not limited to, the following:
1. Consolidate storage of containers, as practicable
  2. Ensure that containers are in good condition and compatible and impervious to the waste
  3. Keep containers closed or covered except when adding or removing wastes
  4. Store containerized liquid waste (excluding decontamination water) in a secondary containment area that is lined and bermed
  5. Close container storage areas by removing remediation waste and isolation material (e.g., liner)

- B. Label containers/items (including bags of PPE) with project name, company name/contact name and phone number, contents, and disposal destination. Describe waste contents on label.
- C. Maintain a Container/Drum Storage Log when accumulating drums.
- D. Poly, steel, or fiber containers may also be used for temporary storage of wastes.

### **3.3 STOCKPILING AND STAGING**

- A. Filter cake from sediment processing shall be stockpiled only in the designated area within the processing building.
- B. Other remediation wastes may be staged separately from the filter cake, but only for immediate load-out.
- C. Remediation wastes placed on-site shall be fully covered at all times. The cover used shall be secured so as not to be removed by weather or nearby work on the site.

### **3.4 SPILLS AND RELEASES**

- A. Immediately report spills/releases/leaks to the Construction Manager.
- B. Immediately contain and clean up spills/releases/leaks.
- C. Containerize spill material including spill-contaminated soil/gravel, sorbents and PPE. Recovered oil-spill materials shall be disposed of in accordance with the waste management guidance in this Section, based on the characterization of the original material spilled.
- D. Repair damage to area resulting from cleanup. Return area to approximately original grade and revegetate or resurface, as required.

### **3.5 WASTE TRACKING**

- A. Notify the Construction Manager in advance of loading operations and types of waste to ensure that the waste tracking system is updated.
- B. Complete a Waste Profile Form, if required by the disposal facility, prior to transporting waste off site for disposal.

### **3.6 WASTES DESIGNATED FOR OFF-SITE DISPOSAL**

- A. Transport filter cake generated from dewatering of sediments dredged from TSCA and non-TSCA areas for off-site disposal in accordance with Section 02 81 00. Debris from these areas shall be managed in accordance with Section 02 81 00.
- B. Containerize non-routine remediation wastes for off-site disposal in accordance with Subpart 3.2.
- C. Store wastes awaiting off-site disposal in accordance with requirements identified in Subpart 3.1.

-END OF SECTION-

## **SECTION 01 71 00 - EXAMINATION AND PREPARATION**

### **PART 1 GENERAL**

#### **1.1 DESCRIPTION OF WORK**

The work includes examination and preparation for site work, including the following:

- A. Clearing and grubbing of the upland work area as necessary
- B. Construction of temporary access roads necessary to complete the work
- C. Placing impermeable surfaces to prevent loss of sediment or effluent to the ground
- D. Establishing construction layout controls
- E. Establishing upland erosion and sediment controls
- F. Removing or temporarily relocating existing facilities
- G. Providing security fencing and performing any other upland work necessary to support the in-water work as shown in the Site Preparation Work Plan

#### **1.2 RELATED WORK DESCRIBED ELSEWHERE**

This section specifies requirements and procedures for examining existing conditions and preparation of upland processing and staging areas. Additional information can be found in the Site Preparation Work Plan.

#### **1.3 SUBMITTALS**

- A. A Site Development Plan and SWPPP have been prepared and submitted that present the procedures which shall maintain environmental protection during preparation of the upland site, including plans for controlling erosion and water turbidity as a result of upland staging area activities. A HASP and Community HASP have been prepared and are included in the Design Report appendices that describe air monitoring plans and measures to be taken to control fugitive dust in compliance with applicable local, state, and federal laws and regulations.
- B. An Operations, Maintenance, and Monitoring Plan shall be submitted. At a minimum, this plan will contain the following information:
  - 1. Description of the planned operations including sequencing of work, hours of operation, and coordination of activities of subcontractors
  - 2. Description of regularly scheduled maintenance of equipment and facilities, including planned shutdown periods

#### **1.4 REFERENCES**

Site Preparation Work Plan, Appendix C-2 of the 60 Percent Design Report, Vol. 1.

#### **1.5 DEFINITIONS**

- A. Processing facility: The facility to be constructed on the upland site that will be used to offload, stockpile, rehandle, dewater, and transfer onto trucks, contaminated sediments or debris that have been dredged from the project area.

- B. TSCA sediments: Dredged material with a PCB concentration of 50 ppm or greater, removed from above the required dredge elevation, which will require removal and off-site disposal at an approved TSCA landfill facility.
- C. Non-TSCA sediments: Dredged material with a PCB concentration less than 50 ppm that is removed from above the required dredge elevation and which will require removal and off-site disposal at an approved upland landfill facility.

## **PART 2 PRODUCTS**

Not used.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

#### **A. Existing Conditions**

The Shell Property is a former petroleum storage facility location encompassing approximately 22 acres. In 1999 and 2000 the site was used as a staging area for dredged material processing. For this prior operation, the west side of the site near State Street was paved with asphalt and used as a storage and dewatering area. Upon completion of this work, the site was allowed to return to its natural state and currently has numerous trees, brush, and vegetation extending to the Fox River bank.

#### **B. Utility Location**

Complete utility locate will be performed prior to any intrusive activities, including but not limited to, excavation, boring, auguring, sample collection, and hand digging. See the Site Preparation Work Plan (Appendix C-2 of 60 Percent Design Report) for additional information.

#### **C. Acceptance of Conditions**

The Shell property is available for the purpose of staging boats and other equipment or material that must be delivered to the project area by water. Use of this property shall include de-watering and de-sanding of dredged material, water treatment, and staging of materials.

### **3.2 PREPARATION OF SITE**

- A. The site shall be cleared and grubbed of all trees and woody vegetation, as needed, within the areas necessary to complete the work by cutting, breaking, uprooting, and other means. Clearing and grubbing shall be performed in accordance with Section 31 11 00 of the Technical Specifications.

#### **B. Existing Utility Information**

Prior to using the Shell Property, coordination with the local utility companies will be required to make necessary provision for temporary utilities such as electricity, lighting, heating, ventilation, telephone service, water, and sanitary. Currently an energized power line extends east and west on the southern portion of the site. There is also a series of light poles around the western perimeter of the site.

C. Surveying

Before the work begins, an accurate method of survey control shall be established. A geodetic control network will be established at the site for this project. Control points locations will facilitate Global Positioning System (GPS) base station control. All survey and control will be performed by a Licensed Land Surveyor registered in the State of Wisconsin.

D. Field Measurements

See Appendix C-2 of the 60 Percent Design, Site Preparation Work Plan for additional information.

E. Space Requirements

The staging and processing area shall be constructed within the working limits of the site. The size, configuration, and material of construction for the staging and processing area shall conform to the project design drawings.

F. Review of Contract Documents and Field Conditions

See Appendix C-2 of the 60 Percent Design, Site Preparation Work Plan for additional information.

### **3.3 CONSTRUCTION LAYOUT**

A. Care shall be exercised when conducting operations so as not to damage, undermine, or otherwise disturb other facilities. Loss of sediment, stabilizing additives, or other material that could damage or coat existing structures, shorelines, and/or facilities shall be prevented. This includes preventing loss of material through windborne means.

B. Building Lines and Levels

See Appendix C-2 of the 60 Percent Design, Site Preparation Work Plan for additional information.

C. Record Log

Characterization of any and all imported material shall be submitted prior to any on-site placement. The characterization shall include an analysis of the material source sample, site inspection, and site characterization.

### **3.4 SAMPLE TESTING, REPORTING AND CERTIFICATION TESTS**

A. Field Engineering and Surveying

Geotechnical data will be obtained in the building and equipment area foundation footprint. Based on these data, building and equipment foundations will be designed. Elevation and related information will be per the building construction specifications and design, along with the building erection plans.

- END OF SECTION -

## **SECTION 01 71 13 - MOBILIZATION AND DEMOBILIZATION**

### **PART 1 GENERAL**

#### **1.1 DESCRIPTION OF WORK**

Mobilization includes the procurement, preparation and transport to the site of all personnel, equipment, and materials necessary to execute the full-scale remediation in accordance with the approved Project Plan, Work Plans, and design drawings; and other contractual requirements. Mobilization activities will be coordinated with the Respondents. Mobilization activities will occur on an as-needed basis, and will be dependent on the work activities scheduled.

#### **1.2 PROCUREMENT**

Procurement of long lead items will be performed to ensure that the full-scale remediation will begin in 2009. These items include, but are not limited to, the following:

- A. Membrane presses
- B. Dredging equipment and peripherals
- C. Process equipment
- D. Water treatment system
- E. The purchase of steel for the completion of the process plant building
- F. The steel required for the sheet pile wall for Shell site buildout
- G. Temporary support facilities to support the 2008 operations facility at the Shell property

#### **1.3 PERSONNEL**

##### **A. Professional Staff**

Professional staff (Project Managers, Line Managers and Technicians, Project Engineers, etc.) required to support the construction and remedial activities will be on site prior to the commencement of activities, if required, so as to avoid work delays. Professional staff will be qualified to perform their specific duties.

Site-specific training required by such personnel will be completed and documented as required prior to their participation in work activities. Other required training that is not site specific (i.e., HAZWOPER 40-hour) will be documented and kept in project files.

Professional staff will be mobilized to the site annually and as required, determined by need and based on project activities.

##### **B. Craft Personnel**

Craft personnel (i.e., operators and laborers) required to support the construction and remedial activities will be on site prior to the beginning of activities and as required to avoid work delays. Craft personnel will be hired through local unions unless on-

site staff are or will be members of such unions. Personnel will be qualified to perform their specific duties.

Site-specific training required by such personnel will be completed and documented as required prior to their participating in work activities. Other required training not site specific (i.e., HAZWOPER 40-hour) will be documented and kept in project files.

Craft personnel will be mobilized to the site annually and as project activities dictate.

#### 1.4 EQUIPMENT

Equipment required for construction activities will be mobilized to the site so as to not delay the activities in which they are required. This will include, but not be limited to the following:

- A. Dredge equipment
  - 1. Dredges
  - 2. Booster pumps
  - 3. High-density polyethylene (HDPE) pipe required for the dredge line
  - 4. Excavators
  - 5. Open-top containers
  - 6. GPS equipment
- B. Process equipment
  - 1. Desanding equipment and accessories
  - 2. Dewatering equipment and accessories
  - 3. Membrane presses and accessories
  - 4. Water treatment equipment and accessories
- C. Capping equipment
  - 1. Barges
  - 2. Slurry plants
  - 3. Broadcast spreaders
  - 4. Excavators
  - 5. Cranes
  - 6. Tugboats
- D. Upland support equipment
  - 1. Wheeled loaders
  - 2. Cranes
  - 3. Excavators

## 1.5 MATERIALS

Materials needed for the completion of the remedial action will be mobilized to the site on an as-needed basis. Such items will include:

- A. Backfill as needed for the Shell site grading
- B. Concrete for the foundation of the process facility
- C. Sand for cover and engineered cap installation
- D. Aggregate for engineered cap installation

## 2.0 DEMOBILIZATION

Demobilization activities will occur annually as required and upon project completion. Demobilization activities will include demobilization of personnel, equipment, and transportation from the site. Demobilization activities will be coordinated with the respondents to ensure completion of all required activities prior to the removal from the site.

### 2.1 PERSONNEL

#### A. Professional Staff

Professional staff will demobilize from the site on an annual basis upon completion of work for each construction season. The end of the season will be dictated by either completion of scheduled work activities or the on-set of conditions (i.e., ice on the river, snow on the roads and upland facilities) that limits the ability to complete the scheduled activities for the season.

As work activities are completed and certain professional staff are no longer required, those personnel will be released from duty. In such event, the appropriate notifications will be made.

Upon project completion, professional staff will demobilize from the site upon acceptance by the respondents and agencies of the remedial action.

#### B. Craft Personnel

Craft personnel will demobilize from the site on an annual basis upon completion of work for each construction season. The end of the season will be dictated by either completion of scheduled work activities or the on-set of conditions (i.e., ice on the river, snow on the roads and upland facilities) that limit the ability to complete the scheduled activities for the season.

As work activities are completed and certain craft personnel are no longer needed, those personnel will be released from duty. In this event, the appropriate notifications will be made. In such cases, proper procedures with the unions will be followed.

Upon project completion, professional staff will demobilize from the site upon completion and acceptance by the respondents and agencies of the remedial action.

## **2.2 EQUIPMENT**

Demobilization of equipment will occur annually and as required. Demobilization will include the removal of equipment (i.e., tugboats, barges, and booster pumps) from the Fox River as required. In addition, demobilization and transportation of any equipment that may be rented or returned to the home bases of operations will be performed as required to perform maintenance and repair activities.

Equipment will also be demobilized and transported off site when no longer required based on scheduled work or upon completion of activities.

Upon completion and acceptance of the remedial action by the respondents and agencies, all project equipment, both rented and owned, used for the project will be permanently removed from the site and transported back to home bases of operation or to new projects.

## **2.3 MATERIALS**

Any materials remaining at the completion of the project will be removed from the site during the demobilization process.

-END OF SECTION-

## **SECTION 01 78 00 - CLOSEOUT SUBMITTALS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

Requirements for closeout submittals for each DCU and CCU documenting the completion of remedial activities for the Lower Fox River Remedial Action OUs 2 through 5.

#### **1.2 SUMMARY OF WORK**

- A. Provide documentation that remedial activities have been completed within each DCU and CCU and that the work performed meets the requirements of the approved Work Plans, Project Design Drawings, Project Plan, and other applicable documents describing the work.
- B. Submit documentation for each DCU and CCU on an annual basis which will collectively make up the complete Final Remedial Action Closure Report.

#### **1.3 RELATED WORK**

- A. Other related Work activities include, but are not limited to, the following:
  - 1. Section 01 33 00: Submittal Procedures
  - 2. Section 03 20 23: Dredging and Dewatering, including procedures for the Dredge Certification Report and approval
  - 3. Section 03 43 00: Capping and Sand Cover Placement, including procedures for the Cap/Cover Certification Report and approval

### **PART 2 PRODUCTS**

Not used.

### **PART 3 EXECUTION**

#### **3.1 ANNUAL CLOSE-OUT REPORTS**

- A. Provide an annual report describing the remedial activities that occurred during the construction season for each DCU and CCU completed.
- B. Relevant documentation will be compiled, including:
  - 1. Work Schedule
  - 2. Plans (and/or Revisions to Plans)
  - 3. Record Drawings
  - 4. QA/QC Reports
  - 5. Monthly Progress Reports
  - 6. Pre-dredge surveys
  - 7. Dredge Certification Reports

8. Cap/Cover Certification Reports

**3.2 FINAL CLOSURE REPORT**

- A. Each annual report that is submitted will constitute a volume of the final closure report.
- B. Upon final completion of the project, submittal of the final annual report will complete the submittal requirements for the project.

-END OF SECTION-

**TECHNICAL SPECIFICATIONS**

## **SECTION 02 21 00 - SITE SURVEYING AND GRADE CONTROL**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Requirements for topographic and hydrographic surveying.
- B. Controlling the work as needed to construct the project according to the Design Drawings and Specifications.
- C. Survey datum information.

#### **1.2 RELATED WORK**

- A. Appendix B-1: Dredging Drawings
- B. Appendix B-2: DWP Drawings
- C. Appendix B-3: WTP Drawings
- D. Appendix C-1: Site Preparation Statement of Work
- E. Appendix C-2: Site Preparation Work Plan – Shell Property
- F. Appendix C-3: Site Preparation – Little Rapids Dam Area
- G. Appendix C-4: Foundation Work Plan for Building
- H. Section 31 00 00 Earthwork
- I. Section 31 11 00 Clearing and Grubbing
- J. Section 31 41 16 Metal Sheet Piling
- K. Section 35 20 23 Dredging and Dewatering
- L. Section 35 43 00 Capping and Sand Cover Placement

#### **1.3 SURVEYOR QUALIFICATIONS**

- A. All record surveys will be performed and stamped by a Licensed Land Surveyor registered in the State of Wisconsin.
- B. Survey work shall be performed using surveying techniques that meet or exceed the requirements set forth herein.

#### **1.4 GENERAL REQUIREMENTS AND INFORMATION**

- A. Perform surveying and grade checking as required to control the Work.
- B. Use baseline survey performed by STS Consultants for the former Shell site, if appropriate.
- C. For topographic surveys, furnish digital terrain model drawings and topographic maps, with 1-foot contour intervals, of the Work with prescribed grade control points. The survey grid width shall be 100-foot intervals at a minimum.

- D. A survey control network shall be installed by the Subcontractor. This network shall consist of no fewer than three points and shall be referred to herein as Project Control Points (PCPs). These PCPs shall be maintained as permanent points on the site by the Subcontractor. In addition, these PCPs shall be tied to into any located existing survey benchmarks located on the site. It shall be the responsibility of the Subcontractor to provide additional PCPs as needed.
- E. The Subcontractor shall maintain and protect the PCPs throughout the length of the project and make the PCPs available for use by others. This established network shall be used for the construction of all features shown on the project drawings.
- F. QA Surveys shall be performed by the Licensed Land Surveyor on all submitted Subcontractor survey data to ensure that the required accuracies are met.
- G. Vertical datum for the upland sites (former Shell site and Little River Dam site) shall be North American Vertical Datum 1988 (NAVD 88). Horizontal datum for the site shall be Brown County (Wisconsin) Coordinates. PCPs shall be tied into and presented using these two datums. The vertical control benchmark and corresponding elevation are shown on the project drawings.
- H. Horizontal datum for the Fox River shall be Wisconsin State Plane – Central Zone NAD83, U.S. Survey feet. Vertical datum for the Fox River shall be North American Vertical Datum 1988 (NAVD88), U.S. Survey feet.
- I. All survey points shall include northing, easting, and elevation coordinates. Base each land survey on the same ground control established for the subject site.
- J. Each survey event shall be tied to a minimum of two PCPs horizontally and one PCP vertically. Document with submittals along with any temporary benchmarks established by the Licensed Land Surveyor. When Real Time Kinematic (RTK) GPS technique is used, the vertical PCP shall be occupied at the beginning of the survey event, near midway if event is longer than 7 hours and at the end of the event.
- K. All surveying shall meet the accuracies set forth in this specification. The accuracy governing each survey shall be clearly shown on the submitted documents.
- L. Subcontractor shall collect survey data digitally (unless Tetra Tech approves otherwise) and at prescribed locations to support digital terrain modeling database. Provide all coordinates, acronyms, and descriptions necessary to clarify items shown on survey.

## 1.5 SUBMITTALS

Furnish each of the following in accordance with Specification Section 01300 – Submittal Procedures:

- A. Survey Plan, as part of the work specified in the Work Plan pertaining to a particular activity (such as development of the former Shell site), for acceptance prior to initiating Work, to include the following:

1. Equipment list, calibration and control system, and manner to achieve required accuracies
  2. Computer software to be used for volume calculations and drawing preparation
  3. Methods for surveying and grade checking earthwork
  4. Sequence of surveying operations
  5. Proposed data management consistent with the requirements set forth in this specification and proposed schedule of data transfer to the Subcontractor
  6. A list of all acronyms and definitions used in record survey documentation tables and field staking
  7. Copy of the responsible Land Surveyor's License
- B. For topographic surveys, survey grid, prior to initiating work, that includes the following:
1. An accurate topographic description of the work site
  2. Include project boundaries, work area boundaries, a uniform grid, control points provided on the project drawings, and grade breaks on distinguishable surface features
  3. Boundary point spacing shall not exceed 100 feet
  4. Grid spacing shall not exceed 100 feet
- C. One set of stamped Drawings for PCPs and benchmarks required for survey control in each Work Area, prior to beginning earthwork in the respective Work Area. Include a signed copy of computations by the responsible Licensed Land Surveyor.
- D. Survey data in electronic format.

## **PART 2 PRODUCTS**

### **2.1 EQUIPMENT**

- A. Provide the equipment needed to perform land-based topographic surveying.
- B. Provide the equipment and vessels needed to perform hydrographic surveys in designated areas of the Fox River.
- C. Provide cylindrical, flat-bottomed "Topo Shoes" for collection of data with GPS or Total Stations.
- D. Provide pin flags with fiberglass or other nonmetallic material shafts for land-based marking.
- E. Provide anchored buoy markers for marking off areas in the Fox River.

## **PART 3 EXECUTION**

### **3.1 SURVEY CONTROL AND ACCURACY**

- A. Use the Subcontractor-provided PCPs as the basis for all surveys. Added project control points may be installed as needed by the Surveyor, coordinates of which shall be provided to the Subcontractor for verification prior to use.
- B. Order of accuracy of ground control shall conform to the standards of the Federal Geodetic Control Committee of the U.S. Department of Commerce for triangulation, traverse, and leveling surveys as noted below:
  - 1. Horizontal and vertical surveys to establish local project control shall conform to Second Order, Class II Standards.
  - 2. For general construction layout, verification, and obtaining topography, accuracy shall be +/- 0.06 ft.

### **3.2 PERFORMANCE OF SURVEYS**

- A. Perform surveys as required to control the work and to comply with documentation requirements.
- B. The Surveyor's presence on site shall not impact the project schedule in any manner.
- C. Perform pre-excavation and pre-placement surveys in accordance with the survey grid to record site conditions prior to the initiation of work and for use in survey reports of the excavation and placement areas.
- D. Perform post-excavation and post-placement surveys to verify the achievement of design elevations within the required tolerances and to prepare survey reports of the excavation and placement areas. Survey grid points within 0.25 feet (laterally) of the previously established points. Work that does not meet the specification will require correction by the Subcontractor, at no cost to Tetra Tech.
- E. When stakes are placed, identify installer of survey points by providing name of the survey company on stakes, pin flags, or other physical survey point markers.
- F. Stake locations and spacing shall be at the discretion of the Subcontractor.

### **3.3 REQUIRED SURVEYS**

- A. Pre-construction and post-construction topographic surveys
  - 1. Perform as required by site development plans and in accordance with requirements of Parts 3.1 and 3.2 above.
  - 2. Submit detailed survey information in accordance with Part 1.5 of this Section.
- B. Pre-dredge and post-dredge bathymetric surveys
- C. Pre-capping/sand cover and post-cover/sand cover surveys

- D. Progress surveys will be performed to control the work and to accompany payment requests. These interim surveys will not be used for any other purpose.
- E. Final acceptance surveys shall be performed to confirm that the work conforms to the lines and grades shown on the design drawings. Baseline control and soundings for the final acceptance survey will be consistent with the pre-construction and progress surveys. A certification of compliance will be provided by the Subcontractor and will be signed and sealed by the Licensed Land Surveyor. The certification of compliance will certify that the work as constructed conforms to the lines and grades shown on the design drawings.

-END OF SECTION-

**SECTION 02 41 13 - DEMOLITION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

Requirements for demolition or removal of structures, below-grade foundations and footers, electric poles, asphalt and concrete blocks, as needed, to prepare the former Shell site and the Little Rapids Dam site for construction of process-related buildings and/or staging areas.

**1.2 SUMMARY OF WORK**

- A. Demolish, size, transport, and dispose of structures located within the work area of each site, including below-grade foundations and footers, and transport to an appropriate off-site disposal facility, unless the material can be recycled. Structures may include, but are not limited to, the following:
  - 1. Building structures and slabs (Little Rapids Dam site)
  - 2. Below-grade piping and conduits
  - 3. Roads and parking/paved areas
  - 4. Tank saddles, equipment pedestals
  - 5. Stockpiled equipment and debris
  - 6. Culverts and headwalls
  - 7. Fencing
  - 8. Utility poles
  - 9. Miscellaneous debris
- B. Other related Work activities include, but are not limited to, the following:
  - 1. Capping or plugging of below-grade utilities at the edge of excavations, unless otherwise noted
  - 2. Miscellaneous debris encountered on the sites shall be picked up and hauled to associated disposal facility.
  - 3. Removal and disposal of liquids and sediment in sumps, vaults, tanks, pits, and basements, if present
  - 4. Removal and disposal of isolated stored drums and containers, if present
  - 5. Removal of hazardous materials (if present)
- C. Refer to Drawings for existing structures, debris piles, and foundations to be demolished and removed.

- D. Prior to performing the work, complete the following:
  - 1. *Hazardous Materials Survey* that identifies the locations of, but is not limited to, the following items that may be present in each structure:
    - i. Floor drains and conduits to the environment
    - ii. Confirmed and/or suspected PCB-contaminated equipment
    - iii. Mercury switches
    - iv. Friable and nonfriable asbestos
    - v. Animal droppings

### **1.3 SCHEDULING / SEQUENCING / HOLD POINTS**

- A. Do not commence hazardous materials abatement or demolition activities until all stormwater and erosion control structures have been constructed in accordance with the project drawings.

## **PART 2 PRODUCTS**

### **2.1 EQUIPMENT**

- A. Provide incidentals and accessories as required for the proper execution of the work.
- B. Provide containers for the storage, transportation, and disposal of materials.
- C. Provide spill control equipment.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Survey the site, and the structures to be demolished, for structural integrity and overall work area safety. Prepare and submit an Occupational Safety and Health Administration (OSHA) Engineering Survey in accordance with OSHA 29 CFR Subpart T, Demolition, latest revision. Engineering survey shall be prepared by a competent person knowledgeable in demolition techniques and experienced in demolition.
- B. Perform a Hazardous Materials Survey of structures to identify potentially hazardous and toxic materials.
  - 1. Identify locations of other hazardous or suspected hazardous materials.

### **3.2 PREPARATION**

- A. Perform and/or verify and document facility de-energization prior to commencing work in or around structures.
- B. Construct sediment and erosion control measures, prior to work, in accordance with SWPPP.

### 3.3 DRAINS AND UTILITIES

- A. Seal floor drains and other conduits to the environment on all structure floors with nonshrink grout (Masterflow 928, or Contractor-approved equal) placed in a stiff consistency.
- B. Small, horizontal conduits may be sealed with waterproof nonshrink spray foam as approved by the Contractor.

### 3.4 WATER REMOVAL

Remove standing water from sumps, pits, vaults, tanks, and basements, including standing water from floor slabs, prior to hazardous material abatement and/or demolition.

### 3.5 HAZARDOUS AND TOXIC MATERIALS ABATEMENT AND DISPOSAL

- A. Remove hazardous and toxic material in accordance with federal, state, and local regulations. Hazardous and toxic materials that may be present include, but are not limited to, the following:
  - 1. Friable asbestos-containing material (ACM)
  - 2. Nonfriable ACM (including Transite and asbestos)
  - 3. PCB-containing/-contaminated materials and components, including, but not limited to, those items identified below:
    - i. Oil stains sampled and confirmed to contain  $\geq 50$  ppm of PCB
    - ii. Equipment “confirmed” or “representative” to be contaminated with  $\geq 50$  ppm of PCB
    - iii. PCB fluorescent light ballasts
    - iv. Other equipment with tags or markings indicating PCB contamination or potential PCB contamination
    - v. Other locations and equipment identified during the structure walk-through
  - 4. Mercury switches and instruments
  - 5. Animal feces – Animal feces require abatement (i.e., bleach spray or equivalent) when personnel will be performing work in the area. Dry removal will not be permitted. If manual work will not be performed in the area, the droppings may be left in place during structure demolition, provided that sufficient wetting is applied during the demolition process.
  - 6. Lighting – fluorescent, mercury vapor, and sodium vapor
  - 7. Containers and drums stored in structures
  - 8. Sludges in tanks

- B. Remove chlorofluorocarbons (CFCs), if encountered or suspected, in accordance with federal, state, and local regulations. Removal shall be performed by licensed personnel or licensed lower-tier subcontractor.
- C. Stage, transport, and dispose of hazardous and toxic material in accordance with Section 02 81 00.
- D. Notify the Construction Manager immediately if chemical, hazardous, or toxic materials not previously identified are suspected or encountered.
- E. Allow one working day for the confirmation of hazardous and toxic material abatement by the Contractor.

### 3.6 DEMOLITION

Demolition includes complete removal of foundations and other below-grade features.

- A. Completely remove any structures, foundations, footers, basements, and vaults for the structures identified on the sites that are slated for removal.
- B. Completely remove any tank saddles, concrete pads, and other equipment pedestals, including foundations.
- C. Remove approach roads, parking areas, and areas in the immediate surroundings of the structures unless these areas have been identified for re-use as part of the Site Development Plan.
- D. Minimize cross-contamination of recyclable materials during structure demolition. Decontaminate materials that come in contact with potentially-contaminated material.
- E. Segregate, size, and transport materials/debris.
- F. Protect and leave in place fire hydrants (if present).
- G. Install fencing/barricades around any open structure basements and pits after structure demolition. Maintain fencing in good order until disturbed area has been backfilled and area is no longer a hazard. NO EXCEPTIONS.
  - 1. Protect openings 4 feet deep or greater with 4-foot-high square wire fencing with T-posts.
  - 2. Steel road plate, ¾-inch thick, may be placed over openings in lieu of fencing for protection, where it can be properly installed.

### 3.7 BELOW-GRADE UTILITIES

**HOLD POINT:** Prior to backfilling excavations, plug utilities at the perimeter of the excavation.

### **3.8 ENVIRONMENTAL COMPLIANCE**

- A. Manage materials and remediation waste generated as a result of work activities in accordance with Section 02 81 00.
- B. Notify the Construction Manager immediately in the event of any spill. Contain and clean up all spills immediately and manage spill cleanup in accordance with the Spill Prevention, Control and Countermeasures Plan.
- C. Do not discharge any liquids into sanitary water system, storm drain systems, drainage ditches, or onto the ground, except as approved by local authorities.
- D. Do not allow trash, debris, and other materials to enter sanitary water system, storm drain systems, or drainage ditches. Clean up worksite at the end of each work shift. Manage trash, garbage, sanitary waste, debris, and other materials in accordance with Section 01 74 00.
- E. Control fugitive dust emissions during demolition and material sizing/handling.
- F. Notify the Construction Manager immediately if nonroutine waste(s) are suspected or encountered.

### **3.9 RECYCLING**

Recycle useable materials from demolition activities if possible and if absence of contamination can be confirmed.

### **3.10 DECONTAMINATION/CLEANING**

- A. Perform decontamination activities in accordance with Section 01 74 00, Cleaning and Waste Management.
- B. Manage decontamination water in accordance with Section 02 72 00, Water Treatment.

### **3.11 WORKING AND STAGING AREAS**

Manage material and material storage areas in accordance with Specification Section 01 50 00, Temporary Construction Facilities and Controls.

### **3.12 FINAL INSPECTION AND ACCEPTANCE**

- A. Perform a final inspection to ensure that the completed project satisfies contractual requirements. Prepare a written punch list of those items or conditions not approved. Subcontractor acknowledges that completion of all punch list items shall be performed within the established Subcontract Period of Performance. In the event that Subcontractor fails to complete punch list items within the stipulated Period of Performance, as stated in the Subcontract, the Subcontractor shall be liable for all damages to Contractor, including Contractor's other Subcontractors, due to such delay.

- B. Upon completion and acceptance of the work, the Subcontractor shall promptly remove all equipment, excess materials, and supplies from the work area. Contractor and Subcontractor shall jointly inspect the Construction Activity Boundary to ensure removal of Subcontractor equipment, materials, and supplies. Further, the parties shall inspect the areas surrounding the Construction Activity Boundary to identify any damage to the ecosystem, pursuant to the Article entitled "Protection of Property" set forth in the General Terms and Conditions of the Subcontract. Finally, all Contractor-provided equipment shall be returned to the Contractor as a condition for release of final payment.
- C. The final site configuration following demolition activities is shown on project drawings. If the Subcontractor is uncertain about the disposition of a site item, Subcontractor shall contact the Contractor for guidance/direction.

-END OF SECTION-

## **SECTION 02 81 00 - TRANSPORTATION AND DISPOSAL**

### **PART 1 GENERAL**

#### **1.1 SUMMARY OF WORK**

Dredging operations in the Lower Fox River will generate various materials (both TSCA- and non-TSCA-regulated PCB waste) that will require eventual off-site disposal. Dredging is scheduled to begin in April or May 2009. This specification focuses on the off-site transportation and disposal of the waste streams generated as a result of sediment dredging and associated activities. These waste streams will include:

- A. TSCA-regulated and Non-TSCA River Debris,
- B. TSCA-regulated and Non-TSCA Sand and Sediments, and
- C. Other Waste Materials (i.e., construction debris and trash).

The following sections provide a general description of the materials as well as the procedures Tetra Tech will follow to prepare the material for transport.

#### **1.2 DEBRIS REMOVAL, DECONTAMINATION AND DISPOSAL**

Debris in the river within the dredging management units and capping management units that may interfere with the dredging and or capping process will be removed using a barge and excavator. Contaminated debris removed from the Fox River will be segregated by waste type (i.e., TSCA or non-TSCA), reduced in size to meet the disposal facility standard, and placed in open-top containers.

- A. Non-porous debris (TSCA or non-TSCA) may be decontaminated in accordance with TSCA regulations for decontamination of bulk remediation waste.
  - 1. TSCA debris that is decontaminated to a surface concentration of less than 100  $\mu\text{g}/100 \text{ cm}^2$  of surface area may be disposed of at a non-TSCA landfill.
  - 2. TSCA and/or non-TSCA debris that is decontamination to a surface concentration of less than 10  $\mu\text{g}/100 \text{ cm}^2$  of surface area may be recycled without restriction. However, re-use of decontaminated TSCA debris will not occur without WDNR approval.
- B. Porous TSCA debris, such as logs and vegetation will be sized to fit in containers acceptable to the TSCA disposal facility and disposed of off site along with the TSCA filter cake materials.
- C. Porous non-TSCA debris will be sized to be no larger than 1 cubic yard and placed in an open-top container designated for disposal at a non-TSCA disposal facility.
- D. Debris removal and off-loading locations will be specific to material characteristics. All contaminated debris, which includes debris encased in sediment that cannot be

removed, and debris with cellular structures, i.e., trees and logs, will be moved to the Shell site for final off-loading.

- E. Decontamination of non-porous debris shall be performed in accordance with the double-wash-rinse procedure specified in 40 CFR 761.123. Wastewater generated from the decontamination process shall be treated in the WTP prior to discharge. Surface wipe testing to verify decontamination levels shall be performed in accordance with 40 CFR 761.130.

### 1.3 SEDIMENTS

- A. During the course of dredging, most of the material will be removed using hydraulic dredging. All sediment removed from the Fox River OUs 2 through 5 will be moved to the Shell site for sediment separation, dewatering, and final load-out for disposal. Dewatered sediments will include filter cake material and screened materials (i.e., separated coarse and fine sands). The dredging and subsequent process treatment is expected to generate the amounts of material shown in the following table.

**Estimated Daily Sediment Dewatering Production**

Material Produced	Production Based on Average Sediment Composition	Truck Loads Per Day (20 tons per load)
Average Sand and Gravel	60 tons/hr or 1,440 tons/day	72 loads per day
Average Filter Cake	70 tons/hr or 1,680 tons/day	84 loads per day
Peak Sand and Gravel	115 tons/hr or 2,760 tons/day	138 loads per day
Peak Filter Cake	130 tons/hr or 3,120 tons/day	156 loads per day
Total Average Output	3,300 tons/day	165 loads per day
Total Peak Output	6,000 tons/day	300 loads per day

### 1.4 OTHER WASTE MATERIALS

- A. Site preparation at the Little Rapids Staging Area will generate broken concrete, brick, trees, and brush debris. This material will be recycled or disposed of as non-TSCA waste at a local landfill. No other wastes are expected.
- B. During the clearing and grubbing activities at the former Shell site all materials will be separated and sized reduced to meet disposal facility requirements. These materials will be transported and disposed of at an approved facility. All remaining

construction debris and trash will be collected in roll-off containers and handled through a local waste collection service.

### **1.5 RELATED WORK DESCRIBED ELSEWHERE**

- A. Appendix B (G-01 Proposed Building and Stockpile Layout) of the Work Plan, Volumes 1 and 2.

### **1.6 REGULATIONS, CODES, AND STANDARDS**

- A. Subcontractor services furnished shall be in accordance with all applicable state, federal, and local codes and standards. Services furnished will be in accordance with but not limited to, the codes and standards listed below.
  - 1. Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions [40 CFR 268].
  - 2. Non-Hazardous (Sanitary) Landfill Requirements [40 CFR 257/258] and Wisconsin state equivalents.
  - 3. Transportation Requirements for Hazardous Waste [40 CFR 263].
  - 4. Hazardous Waste Treatment, Storage and Disposal Facility Standards [40 CFR 264/265].
  - 5. OSHA Recordkeeping, Reporting and Related Regulations [29 CFR 1904].
  - 6. OSHA Hazardous Waste Operations and Emergency Response [29 CFR 1910.120].
  - 7. RCRA Hazardous Waste Identification Requirements [40 CFR 261].
  - 8. Contingency Plan and Emergency Procedures.
  - 9. USDOT Transportation Requirements for Hazardous Materials [49 CFR 100 through 180].
  - 10. All applicable requirements for transportation and disposal of hazardous and non-hazardous waste of the state of Wisconsin.
  - 11. All applicable laws/regulations related to recycling.
  - 12. All applicable permit requirements of the hazardous waste treatment, storage, and disposal (TSD) facility and non-hazardous facility.

### **1.7 SUBMITTALS**

- A. The Subcontractor shall schedule and prepare all submittals and deliverables in accordance with this specification, including but not limited to the following items. The Subcontractor shall submit to Tetra Tech:
  - 1. Site-specific DOT Hazardous Materials Security Plan and Emergency Response Plan for waste transportation activities; (Note: The security plan

shall address security issues associated with transportation of hazardous materials over roads.)

2. Draft waste profiles, Land Disposal Restriction Notification forms, waste manifests, and Bills of Lading for review and approval by Tetra Tech
3. A copy of the manifest signed by the disposal facility
4. A copy of the shipping papers used for non-hazardous waste (e.g., bills of lading) signed by the waste disposal/recycling facility
5. Facility's documentation of quantity of waste received **within 30 calendar days of receipt of waste. This can include weight tickets, if appropriate.**
6. Waste disposal certifications, if available, **within 25 calendar days after the date of disposal**

## 1.8 QUALIFICATIONS

- A. The Subcontractor, or a second-tier subcontractor, must be a licensed hazardous waste transporter in good standing for hazardous waste and solid waste shipments in the state of Wisconsin and must possess all necessary federal and state permits and insurance for shipping and disposal of waste to a licensed TSD facility, whether in Wisconsin or another state.
- B. Training and Certifications
  1. The vehicle drivers shall have the required USDOT training under 49 CFR 172 Subpart H applicable to transporting contaminated material and/or hazardous materials.
  2. A copy of each driver's current DOT training and DOT license, along with the DOT Physician's Statement, shall be provided to Tetra Tech.

## PART 2 PRODUCTS

The Subcontractor shall provide copies of all manifests, Bills of Lading, weight tickets, and any other documentation required for disposal of these materials.

## PART 3 EXECUTION

### 1.1 TRANSPORTATION AND DISPOSAL OF NON-TSCA DREDGED MATERIAL FOR DISPOSAL

- A. The dredged materials will be treated, and excess moisture removed and disposed of, either at a non-TSCA landfill or for beneficial reuse. The following assumptions are used: Process operations are 5 days a week, 24 hours a day for approximately 8 months a year (April 1 through Nov 15). Trucks are assumed to carry 20 tons per load in accordance with Wisconsin DOT regulations.

- B. A total of at least 1,500,000 tons of non-TSCA filter cake will require disposal. The material will be loaded onto the trucks with a wheeled loader or other conveyance mechanism. PPE waste is allowed to be disposed of with the filter cake, provided it does not constitute more than 10 percent of the load volume.

## **1.2 TRANSPORTATION AND DISPOSAL OF TSCA DREDGED MATERIAL FOR DISPOSAL**

- A. TSCA wastes (equal to or greater than 50 ppm PCBs) are expected to be generated and will require disposal. While on the Shell site, these materials will be stored in accordance with TSCA PCB waste storage regulations within the process building. After leaving the presses, the filter cake will be conveyed to stockpiles within the process building to await loading onto disposal trucks.
- B. Currently it is estimated that 170,000 tons of filter cake will be TSCA regulated and require disposal in a TSCA-permitted landfill. The distance from the work site to the landfill will likely require temporary on-site storage of TSCA PCB wastes on the Shell site; however, this is not anticipated to exceed 30 days, and trucking will continue after dredging and processing have been completed until all wastes have been removed for the construction season.
- C. It is currently estimated, based on sediment sampling, that 8,500 trucks (at 20 tons per truck) of TSCA filter cake PCB wastes will require disposal over the life of the project (7 years).

## **1.3 DISPOSAL SERVICES**

- A. The Subcontractor shall be responsible for the proper disposal of the waste streams according to all applicable federal, state, and local regulations and requirements.
- B. Non-TSCA PCB wastes, including filter cake and river debris generated (i.e., with less than 50 ppm of PCBs) will require disposal. Much of the sand is expected to be suitable for beneficial reuse. Sand that is not suitable, along with gravel and other minor debris, will be disposed of in a landfill permitted for bulk low-level PCB wastes.
- C. TSCA wastes with PCBs at 50 ppm or greater will be generated and will be disposed of at a landfill permitted for disposal of TSCA waste.
- D. Tetra Tech will designate the disposal facilities to be used for both TSCA and non-TSCA materials. Substitutions or additions shall not be permitted without prior written approval from Tetra Tech, and if approved, shall be at no extra cost to Tetra Tech.
- E. No changes, including additions or deletions, can be made to the disposal/recycling facility(ies) on the shipping papers without direct authorization from Tetra Tech.

#### 1.4 TRANSPORTATION SERVICES

- A. The Subcontractor will provide open-top containers for debris removed from the Fox River site and rolloffs for construction debris at the former Shell site. In addition, the Subcontractor will provide appropriately permitted/certified, lined trucks (for TSCA-regulated sediments) and non-lined trucks (for non-TSCA sediments) to be loaded at the former Shell site Staging Area. The Subcontractor shall provide appropriate DOT- and state-permitted transport vehicles with appropriately licensed and permitted drivers. The Subcontractor shall utilize drivers who are DOT-trained for transportation of contaminated material and/or hazardous materials.
- B. **The Subcontractor shall utilize the transporter(s) that have been approved in advance by Tetra Tech.** These transporters shall be one of the approved transporters identified by Tetra Tech in the Subcontract. **Transporter(s) used for TSCA regulated PCB waste must have submitted the “TSCA PCB Waste Notification” form to the USEPA and must submit a copy of the form to Tetra Tech.** Substitutions or additions shall not be permitted without prior written approval from Tetra Tech, and if approved, shall be at no extra cost to Tetra Tech.
- C. Tetra Tech retains the right to inspect the vehicle for safety requirements and DOT Emergency Response information, which shall remain the responsibility of the Subcontractor. The Subcontractor shall retain ultimate responsibility for ensuring that the vehicle can be released from the site onto the public roadways.
- D. If for any reason the waste is rejected from the designated disposal/recycling facility, the transporter shall immediately notify Tetra Tech upon rejection of the waste. Tetra Tech will immediately notify Tetra Tech’s client of the situation to obtain direction on the handling of the waste. The transporter shall not leave the waste or turn over custody of the waste to anyone without prior direction and approval from the generator and Tetra Tech.
- E. For all materials, the Subcontractor shall obtain and submit to Tetra Tech loaded weights by using the truck scales at the waste receiving facility. The Subcontractor shall comply with all state and USDOT vehicle weight limits.
- F. The Subcontractor is responsible for meeting all applicable federal, state, and local regulations and requirements governing the transport of contaminated material and hazardous materials including 49 CFR 100-179. This includes, but is not limited to, labeling, manifesting, placarding, licensing, weight and route restrictions, and proper covering of any bulk loads. All transportation shall be by licensed, insured, and permitted carriers. The Subcontractor shall comply with all Federal Motor Carriers Safety Regulations and shall have current permits and licenses, as required by federal, state, and local authorities. The transporter shall have a current MC Safety Rating of "Satisfactory" or have Tetra Tech’s and the U.S. Army Corps of Engineers approval of their safety record.

- G. The Subcontractor shall maintain an Emergency Response telephone number (manned 24 hours), or shall subscribe to a reputable outside service (e.g., Chemtrec or Infotrac) that provides emergency response information and meets all DOT requirements for the Emergency Contact. The Subcontractor shall allow use of this phone number or service to complete Section 3 of the EPA Uniform Waste Manifest and to serve as the DOT Emergency Contact, on behalf of the generator. Tetra Tech will verify that this telephone number is appropriate prior to shipment of wastes off-site.
- H. The Subcontractor shall utilize drivers who are DOT-trained for transportation of hazardous or TSCA-regulated materials.
- I. Transport vehicles may be inspected by Tetra Tech for compliance, including:
  - 1. Safety requirements (back-up alarm, fire extinguisher, first-aid kit, etc.)
  - 2. Placarding
  - 3. Emergency Response information (Emergency Response Plan, DOT Guidebook)
  - 4. Current state and federal DOT inspection documentation
- J. The transporter(s) of PCB waste shall have a written DOT Hazardous Materials Security Plan, in accordance with 49 CFR 172.800.

#### **1.5 GENERAL TRAFFIC CONTROLS**

- A. All trucking will be in accordance with Wisconsin and DOT regulations. Drivers and trucks hauling hazardous materials will be in compliance with the additional requirements related to hauling those materials. Trucks hauling materials in or away from the site will abide by restrictions for truck traffic and will travel on approved truck routes. The trucking subcontractors will be evaluated for safety and past DOT compliance. Equipment will be required to be new or like new. Tetra Tech will oversee subcontractor activities and equipment as well as perform truck inspections.
- B. Certified Scales  
Truck scales will be available at the Shell site for weighing trucks for operational safety and for manifesting purposes.

#### **1.6 DOCUMENTATION**

- A. Waste Manifests  
All TSCA PCB waste shipments (and all TSCA and non-TSCA-regulated shipments containing  $\geq 1$  pound reportable quantity of PCBs) will be manifested in accordance with DOT requirements. All non-TSCA PCB waste shipments will be weighed and provided a bill of lading for tracking and accounting purposes. Prior to shipping of

- any TSCA PCB wastes, Tetra Tech will notify the appropriate state and USEPA officials.
- B. The documentation requirements for disposal shall include the following:
1. Provide all necessary labor, supervision, insurance, equipment, and material to properly package, label, mark, and placard the materials for transport.
  2. Provide drafts and finals of all waste documentation, including waste profiles, manifests/shipping papers, and RCRA Land Disposal Restrictions Notification forms (if required), including any required documentation under the Universal Treatment Standards regulations, to Tetra Tech's Technical Representative (identified in the Subcontract) for review and approval by Tetra Tech.
  3. Provide Tetra Tech's Site Superintendent with a legible copy of the material weight tickets, bills of lading, or hazardous waste manifests signed by the disposal facility's representative.
  4. Provide Tetra Tech's Site Superintendent with a legible copy of Certificates of Disposal for the TSCA PCB wastes (and other wastes, if available).

– END OF SECTION –

## **SECTION 31 00 00 - EARTHWORK AND ROAD CONSTRUCTION**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Requirements for construction of the soil components on site. This includes all excavation, cutting and filling of soils, movement of soil, construction of roadways, and general earthwork/grading required for drainage controls.
- B. Publications listed below form a part of this specification section to the extent referenced. Publications are referenced in the text by basic designation only. The latest published version of the referenced publication shall apply. In the event of contradiction, the more stringent requirement shall apply.

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates
- ASTM D 422 Particle-Size Analysis of Soils
- ASTM D1557 Laboratory Compaction Characteristics of Soils Using Modified Effort
- ASTM D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils

#### AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

#### **1.2 DEFINITIONS**

- A. Degree of Compaction: Where specified as such, shall be expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D 1557 (Modified Proctor). All moisture-density (Proctor) curves shall be developed using 5 points
- B. Frozen material: Soil with a temperature less than 32°F (+/- the accuracy of the thermometer), or containing visible ice crystals or clods of frozen soil larger than 4 inches in any dimension
- C. The following defines materials that shall be used under this specification:
  - Aggregate: A composite mixture of hard, durable mineral materials that have been mechanically processed
  - Virgin materials: Mineral materials in a native or raw form, not previously used

Gravel: Naturally occurring rounded particles of rock that will be retained on a No. 10 (2.0-mm) sieve

Sand: Granular material having at least 90 percent passing the No. 4 (4.75-mm) sieve and predominantly retained on the No. 200 (75- $\mu$ m) sieve.

Crushed stone: Crushed angular particles of rock

Fractured face: An angular, rough, or broken particle surface with sharp edges

Reprocessed material: Waste material for which a commercially demonstrated process uses the material as a raw material

Reclaimed asphaltic material: Crushed or processed asphaltic pavement or surfacing recovered from a Construction Manager-designated source

Salvaged asphaltic material: Crushed or processed asphaltic pavement or surfacing recovered from a department-designated source

Select crushed material: Crushed and screened aggregate with particles predominately larger than 1 1/2 inches

Beneficial reuse material: Sand derived from the hydrocyclone separation process used to separate sand from TSCA and non-TSCA sediment

### **1.3 RELATED WORK**

- A. Appendix C-1: Statement of Work for Construction of Staging Area and Access Roads
- B. Appendix C-2: Site Preparation Work Plan – Former Shell Site CY 2008-09
- C. Appendix C-3: Site Preparation Work Plan – Little Rapids Dam Area
- D. Appendix C-4: Concrete Foundation Work Plan

### **1.4 SUBMITTALS**

Submit the following in accordance with Section 01 33 00, Submittal Procedures:

- A. Record surveys and drawings
- B. Field Density Test Reports
- C. Certified test reports and analysis certifying that materials from off-site sources (if used) proposed for use at the project site conform to the specified requirements and are free from chemical contamination

## **PART 2 PRODUCTS**

### **2.1 BORROW MATERIAL**

- A. Obtain soil materials required for fills from designated on-site stockpiles. Obtain rock and gravel materials from off-site sources, which meet the requirements herein.
- B. Obtain documentation or chemical analyses from borrow source certifying that the material is not contaminated.

### **2.2 GRANULAR BACKFILL**

- A. Furnish natural sand or a mixture of sand with gravel, crushed gravel, crushed stone, or other broken or fragmented material.
- B. Do not use materials with a liquid limit greater than 25 and a plasticity index greater than 6 as defined by ASTM D4318.

### **2.3 STRUCTURAL BACKFILL**

- A. Furnish and use sand, a mixture of sand and gravel, crushed gravel, crushed stone, crushed concrete, or other fragmented mineral material.

### **2.4 UTILITY TRENCH BACKFILL**

- A. Material for the pipe bedding and initial backfill in utility trenches shall consist of well-graded sand, gravel, crushed gravel, crushed stone, or crushed slag composed of hard, tough, and durable particles to the dimensions shown on the drawings.
- B. Backfill shall contain material less than  $\frac{3}{4}$  inch in any dimension, or the maximum size recommended by the pipe manufacturer, whichever is smaller. This material shall extend to approximately 6 inches above the crown of the pipe. From 6 inches above the crown of the pipe, the trench shall be filled with general fill material.
- C. Material shall classify according to ASTM D 2487 as coarse-grained (cohesionless) soil, classifying as GW, GW-GM, GW-GC, GP, GP-GM, GP-GC, SW, SW-SM, SW-SC, SP, SP-SM, or SP-SC.

### **2.5 GENERAL FILL**

- A. General fill is material that has been generated on site and can be used for the general backfill. This material will be free of debris and will meet any compaction requirements where used.

### **2.6 BENEFICIAL REUSE MATERIAL (BRM) FILL**

- A. BRM fill shall be sand separated from the sediment during processing, containing < 12 percent passing the No. 200 sieve, and having a PCB concentration of 1.0 ppm or less, unless otherwise approved by WDNR.

## **2.7 ROAD BASE**

### **A. Description**

This section describes constructing a granular base on the prepared roadbed.

- ### **B. Base course materials shall conform to Section 2.2 for granular backfill. Road areas around the processing building and parking lots shall be hard surfaced with asphalt or concrete.**

## **PART 3 EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. Perform grading and placement for all materials, regardless of material encountered, within the grading limits of the project to the lines and grades indicated on the design drawings.**
- B. Transport suitable material; place directly as fill materials, or stockpile (as required) in areas within the limits of the work, as shown on the drawings or as designated by the Construction Manager.**
- C. Construction haul roads or temporary access roads may be needed to permit truck access to sections of the site. The extent and location of temporary access roads are subject to approval by the Construction Manager.**

### **3.2 PLACEMENT OF ROAD BASE**

#### **A. Preparing Subgrade**

- 1. Clear road footprint of vegetation, roots, and debris. Excavate and backfill areas of soft, yielding, or spongy subgrade or otherwise treat unstable areas. Remove upper 6 inches of topsoil in road footprint and stockpile.**
- 2. Scarify the subgrade and recompact subgrade to 90 percent of the maximum dry density based on a Modified Proctor (ASTM D 1557) to form a firm base.**
- 3. If firmness of subgrade is inadequate as determined by load and/or volume of truck traffic anticipated, install an appropriate geotextile layer for road reinforcement, or increase thickness of aggregate used on roads. Consult Project Engineer for identification of appropriate geotextile.**

#### **B. Placing and Compacting Road Base Material**

- 1. Deposit, spread, and level the road base material in layers generally no thicker than 8 inches before compaction.**
- 2. Compact the base until there is no appreciable displacement, either laterally or longitudinally, under the compaction equipment. Compact each layer of the road base until the compaction equipment achieves no further significant consolidation (90 percent of Modified Proctor maximum dry density). The**

required compaction for each layer will be achieved before placing any material for a succeeding layer.

3. Controlling Dust

Apply water or other approved dust control materials to control dust during construction and maintenance of the roads.

### **3.3 EXCAVATION FOR UTILITIES**

- A. Unless otherwise indicated, perform excavation by open cut methods, except where sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Construction Manager, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.
- B. Stockpile material acceptable for backfilling during excavation in an orderly manner at a distance from the banks of the trench equal to 1/2 the depth of the excavation, but in no instance closer than 12 inches, or as governed by OSHA requirements.
- C. Place excavated material not required or not acceptable for backfill in the general fill stockpile provided the excavated materials meet the requirements for general fill in these specifications, or dispose of at a location designated by the Construction Manager.
- D. Perform grading as necessary to prevent surface water from flowing into the excavation, and remove any water that accumulates therein to maintain stability of the bottom and sides of excavations.
- E. Shore or otherwise cut back to achieve a stable slope all trench walls more than 3 feet high, or provide equivalent means of protection for employees who may be exposed to moving ground or cave-in.
- F. Give special attention to slopes that may be adversely affected by weather or moisture content.
- G. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter, and shall not exceed 36 inches plus pipe O.D. for pipes larger than 24 inches inside diameter.
- H. Over-excavate trench bottoms to allow installation of bedding material as shown on the drawings.
- I. Where material is encountered that is unacceptable or too wet to properly support pipe or appurtenant structures, remove such material and replace with suitable material.

### **3.4 EXCAVATION OF APPURTENANCES**

- A. Excavation for catch basins, inlets, manholes, or similar structures shall be sufficient to leave at least 24 inches clear between the outer structure surfaces and the face of the excavation or support members.
- B. Clean rock of loose debris and cut to a firm surface level, stepped, or serrated, as shown, or as directed by the Construction Manager. Remove loose disintegrated rock and thin strata.

- C. Do not disturb the excavation bottom when concrete or masonry is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is placed.

### **3.5 EXCAVATION OF DRAINAGE DITCHES**

- A. Cut drainage ditches accurately to the cross sections and grades indicated on the drawings.
- B. Backfill excessive excavation to grade with suitable material and compact as directed by the Construction Manager.
- C. Remove roots, stumps, rock, or foreign matter in the sides and bottom of drainage ditches to a minimum depth of 6 inches below final ditch subgrade elevation.
- D. Backfill material due to excessive excavation or removal of roots, stumps, rock, or foreign material shall consist of general fill material.
- E. Maintain all drainage ditches excavated under this section until final acceptance of the work. Place material excavated from drainage ditches and suitable for other uses as fill or in stockpiles as appropriate and as approved by the Construction Manager.
- F. Place excess excavated material in the general fill stockpile, provided that the materials meet the requirements for general fill in these specifications, or dispose of at a location designated by the Construction Manager.

### **3.6 STORMWATER CONTROLS**

- A. Maintain excavations in a dry condition, as practicable, during subgrade preparation and continually thereafter until installation has been completed.
- B. Divert or otherwise prevent surface water from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property.
- C. Manage stormwater that accumulates within the excavation during construction in accordance with the SWPPP.
- D. Leave all pipe and conduits clean and free of sediment.

### **3.7 USE OF EXCAVATED MATERIAL**

- A. Acceptable material removed from required excavation under this section and any excess material from building excavation may be used in the formation of embankments, subgrades, shoulders, slopes, bedding, backfill for culverts and other structures, and for such other purposes as directed by the Construction Manager.
- B. Material that is determined to be not suitable for general fill by the Construction Manager will be stockpiled separately from suitable general fill material in a manner directed by the Construction Manager, which does not obstruct flow characteristics of any stream or impair the efficiency of any structure. This material may be used as

directed by the Construction Manager. This material may be disposed of only at the discretion and direction of the Construction Manager.

- C. Do not deposit or dispose of any excavated materials at any time in a manner that may endanger a partly finished structure by direct pressure or by overloading banks adjacent to the operation, or that may in any other way be detrimental to the completed work.

### **3.8 BACKFILL AND COMPACTION FOR GENERAL FILL, UTILITIES, AND STRUCTURES**

#### **A. General Requirements**

1. Strip or otherwise remove all vegetation to include roots, brush, heavy sods, heavy growth of grass, and all decayed vegetable matter, rubbish, and other unacceptable material within the area upon which fill is to be placed before the fill is started. In no case shall unsuitable material remain in or under the fill area.
2. Excavate and remove stumps, logs, and roots more than 1/2 inch in diameter to a depth not less than 18 inches below the original ground surface.
3. Scarify sloped ground surfaces steeper than 4H:1V on which fill is to be placed so that fill material will bond with the existing surface.
4. Add water or dry prepared surfaces on which compacted fill is to be placed as required to obtain the specified moisture content and density.
5. Do not place material in overly wet or frozen areas.
6. Provide compaction by the means specified and to the required moisture and density for various parts of the work.
7. Degree of compaction shall be 90 percent of Modified Proctor maximum dry density.

#### **B. Adjacent to and Beneath Structures and Appurtenances**

1. Backfill adjacent to and beneath structures and appurtenances shall consist of general fill.
2. Do not place backfill on surfaces that are muddy or frozen. Remove unacceptable material in surfaces to receive fill or in excavated areas and replace with acceptable materials. Scarify the surface prior to fill placement.
3. Plow, step, bench, or otherwise break up fill material on sloped surfaces steeper than 4H:1V so that fill material will bond with existing material.
4. When subgrades are less than the specified fill density, process the subgrade soils to a minimum depth of 6 inches and compact to the specified fill density.

5. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inches and compact as specified for the adjacent fill.
  6. Place fill in layers not exceeding 8 inches in loose thickness, or 6 inches when hand-operated machine compactors are used.
  7. Place backfill carefully around pipes, manholes, or tanks to avoid damage to coatings, wrappings, or tanks.
  8. During backfilling operations and in the formation of embankments, do not use equipment that will overload the structure in passing over and compacting fills.
  9. Compact general fill materials to 90 percent Modified Proctor maximum dry density at a moisture content to facilitate compaction without bulking.
- C. Utility Trenches
1. Initial and final backfill, and backfill for utility appurtenances, shall consist of general fill.
  2. Place pipe bedding materials as indicated on the drawings. Partially backfill utility trenches prior to performing pressure tests, where required. Prior to pressure testing, compact the fill materials under the pipe to provide adequate support. Take care to ensure thorough compaction of fill under pipe haunches. Refer to the details on the drawings.
  3. Do not completely backfill the trench until all specified tests are performed. Backfill trenches after all required tests are performed and approved to final grades indicated.
  4. Backfill evenly on both sides of the pipe for the full length of the pipe. Place remaining backfill material in loose lifts not to exceed 12 inches and compact to a minimum of 90 percent of Modified Proctor maximum dry density. Material shall not exceed 6 inches in any dimension and shall meet the requirements for general fill.
  5. Compact cohesive soils at a moisture content from -2 percentage points below to + 2 percentage points above Modified Proctor optimum moisture.
  6. Compact cohesionless soils at a moisture content as required to facilitate compaction without bulking.

### **3.9 FIELD TESTING AND CONTROL**

- A. The Quality Control Manager, or his designee, will perform all QA and QC sampling and testing in accordance with the CQAPP.
- B. Should test results indicate lack of compliance, rock or soil materials shall be added to the noncomplying material, and the material reworked until material complies with the project specifications.

- C. Retesting will be performed to verify compliance.

### **3.10 PROTECTION AND REPAIRS**

- A. Where ruts occur, the surface shall be brought to grade and reshaped prior to placing additional fill.
- B. Repair and regrade any areas where settlement or erosion results and reestablish the required elevations and slopes.
- C. Protect existing service lines and utility structures as follows:
  - 1. All utility lines to be retained, including existing utility lines, utility lines whose locations are made known prior to excavation, and new utility lines constructed, shall be protected from damage. (Note: Utility locates shall be conducted by the Subcontractor(s) prior to construction and as part of the permitting process.)
  - 2. Subcontractor(s) will not proceed until an Intrusive Work Permit is obtained and a copy furnished to the Construction Manager.
  - 3. Any damaged utility lines that fall within the above categories shall be repaired.

-END OF SECTION-

## **SECTION 31 11 00 - CLEARING AND GRUBBING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Clear and grub all areas necessary to complete the work required. Limits for clearing and grubbing shall be marked in the field and approved by the Construction Manager before the work commences.

#### **1.2 RELATED WORK**

- A. Related work and/or equipment that is specified in other sections of the Project Plan includes, but is not limited to, the following:

Appendix C-1: Site Preparation Statement of Work

Appendix C-2: Site Preparation Work Plan – Shell Property

Appendix C-3: Site Preparation – Little Rapids Dam Area

Section 31 00 00 Earthwork and Road Construction

Section 31 41 16 Metal Sheet Piling

#### **1.3 SOIL EROSION AND SEDIMENT CONTROL**

- A. No land disturbance, which is defined as the excavation and disturbance of erodible soils, shall be performed until all erosion and sediment control measures have been implemented in accordance with the SWPPP developed for the site.

#### **1.4 OTHER REQUIREMENTS**

- A. Conform to applicable local, state, and federal codes for transportation, recycling, and disposal of debris.
- B. Coordinate any tree-clearing work that involves overhead wires with utility company(s) as appropriate.

### **PART 2 PRODUCTS**

#### **2.1 MATERIALS**

Not used.

#### **2.2 EQUIPMENT**

- A. Provide all equipment needed to clear and grub areas of trees, stumps, root, vegetation, debris, and other deleterious material.

## **PART 3 EXECUTION**

### **3.1 PROTECTION OF UTILITY LINES**

- A. Notify the Construction Manager immediately if damage to a known or an unknown utility line occurs. The Subcontractor shall be responsible for completing the repairs to any utility lines that are damaged. The Subcontractor shall provide ample notification, to the utility companies, for utilities that require removal or relocation, so that interruption of service shall be at a minimum.

### **3.2 CLEARING AND GRUBBING**

- A. Clearing and grubbing shall consist of the removal and satisfactory disposal of vegetation designated for removal, including trees, stumps, logs, shrubs, snags, and brush occurring within the site boundaries as defined by the design drawings. The surface of the ground within these areas shall be cleared and grubbed as required for the installation of facilities, utilities, and improvements. Clearing operations shall be conducted in a manner that prevents damage to existing structures and installations and those under construction, and that provides for the safety of employees and others. The Subcontractor shall clear and grub on an as-needed basis as its work progresses, or as otherwise directed by the Construction Manager.
- B. The Subcontractor shall remove any rubbish, rubble piles, debris, and all other objectionable obstructions resting on or protruding through the surface of the ground that would otherwise adversely impact the construction activities.
- C. The Subcontractor shall not clear and grub any area beyond the Subcontractor's working area, unless otherwise directed by the Construction Manager. No stumps, tree limbs, or brush shall be buried in any fills or embankments. Damage of any nature shall not be inflicted upon adjoining properties by unwarranted entry on such land.
- D. The Subcontractor shall chip for mulch all cleared and grubbed materials that are less than 3 inches in diameter.

### **3.3 DISPOSAL OF CLEARING AND GRUBBING MATERIAL**

- A. If deemed necessary by the Construction Manager, cleared and grubbed material may be disposed of off site. All excavated soil will be used to re-grade the site.

- END OF SECTION -

## **SECTION 31 41 16 - STEEL SHEET PILING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

Requirements for sheet pile to be installed as part of site staging area development at the former Shell site.

Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by designation only. The latest published version of the referenced publication shall apply. In the case of contradiction the most stringent requirement shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A328 Grade 50 - Standard Specification for Steel Sheet Piling

ASTM A572 Grade 50 - Standard Specification for High-Strength Low-Alloy  
Columbium-Vanadium Structural Steel

STEEL STRUCTURES PAINTING COUNCIL (SSPC) SSPC-10 Near White Blast Metal  
Cleaning

#### **1.2 SUMMARY OF WORK**

- A. Provide all labor, equipment, and material and perform all operations in connection with installation of the open cell steel sheet pile bulkhead and associated backfill to the lines and grades shown on the drawings provided by PND Engineers, Inc.

#### **1.3 RELATED WORK**

- A. Other related Work activities include, but are not limited to, the following:
  - 1. Clearing, grubbing, and removal of debris
  - 2. Removal of hazardous and nonhazardous materials (if present), including mechanical removal of contaminated sediment that may be present within the area to be developed into the Open Cell® Bulkhead and staging area.
- B. Refer to drawings for existing site conditions and site grading plan.

#### **1.4 SCHEDULING / SEQUENCING / HOLD POINTS**

- A. Do not commence sheet pile installation or backfilling activities until removal of contaminated sediment has been completed and confirmed with verification sampling.

## **1.5 QUALITY ASSURANCE**

### **A. Field Monitoring**

1. The Contractor (Tetra Tech) shall be granted access to observe and/or test all steel sheet piles prior to installation. Observations and/or testing shall include:
  - i. Checking sheet piles for general straightness: Piles with kinks in local areas along the interlock or that have excessive bowing or camber shall be rejected and replaced at no additional cost to Contractor.
  - ii. Gauging all pile interlocks: Thumbs of interlocks shall be of the proper size to fit into the corresponding interlock openings. Piles whose interlocks are not within acceptable tolerance shall be rejected and replaced at no additional cost to the Contractor.
  - iii. Checking piles for lamination flaws or gas pockets: Piles showing evidence of lamination flaws shall be rejected and replaced at no additional cost to contractor.
  - iv. Testing of coated steel sheet piles with holiday detectors, field adhesion test, or a combination of both.

## **1.6 SUBMITTALS**

- A. Provide the following listed submittal requirements in accordance with Section 01300 of these specifications.
  1. Driving plan and schedule for installation of the steel sheet pile bulkhead.
  2. Method of installation of steel sheet piling including size and type of pile hammer, and temporary support systems.
  3. Templates and false work to be used for support and layout of sheet piles during driving.
  4. Certify that materials are new and meet or exceed specification requirements by submitting a notarized copy of chemical and physical test results.
  5. Coating manufacturer's product literature and recommended preparation and application instructions.

## **1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. All materials necessary for the installation of the steel sheet pile shall be delivered in a timely manner to ensure the continuity of pile driving.
- B. Sheet piles shall be handled, transported, and stacked so as to prevent damage.
- C. Materials shall be stored on site or on barges as designated by the Contractor.

## 1.8 LINES AND GRADES

- A. The Subcontractor shall establish sheet pile locations and all elevations required. Vertical and horizontal benchmarks located on the site will be provided by the Contractor. The Subcontractor shall be responsible for maintenance and protection of all pile location markers.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Steel sheet pile shall meet the following requirements:
  - 1. PS 27.5 flat sheets with SWC 120 degree extruded wye piles and SWC extruded anchor piles (unless otherwise notified) in dimensions shown on the Open Cell<sup>®</sup> Bulkhead Design drawings provided by PND Engineers, Inc.
  - 2. All steel sheet piling shall be sections meeting either ASTM A328 Grade 50 or ASTM A572 Grade 50.
- B. Steel Sheet Pile Coating
  - 1. Steel sheet pile coating shall be Carboline Bitumastic 300 M, manufactured by Carboline of St. Louis, MO, or an approved equal.
  - 2. All coating shall be applied by brush or spray using commercially available spray equipment. The coatings shall exhibit reasonable leveling without excessive sagging when applied at the required film thickness.
  - 3. Thinning: Whenever possible the material shall be applied without thinning. Where thinning must be done, it shall be as recommended by the coating manufacturer.
  - 4. The finished coating shall be generally smooth and free of sharp protuberances which could be removed by abrasion. A minor amount of sags, dimpling, or curtaining that does not exceed 2 to 3 percent of the surface will not be considered cause for rejection unless they present sharp edges that might be removed by abrasion. Sharp protuberances shall be cut off using a sharp wood chisel laid flat against the surface. The area from which material has been removed shall be recoated to smooth the surface.
  - 5. Steel sheeting shall be coated on both sides.
  - 6. Coating shall be applied according to manufacturer's recommendations to a dry film thickness of 16 mil. Coating shall be applied in one coat.
  - 7. Prior to coating steel shall be prepared by grit blasting to a near white equivalent as defined by SSPC certification SSPC-10.
  - 8. Any damaged coating shall be touched up in the field using Carboline Bitumastic 300 M or approved equal. Damaged area of coating and sheet shall be prepared and touch up coating applied according to coating manufacturer's recommendations.

- B. Sand backfill for the Open Cell<sup>®</sup> Bulkhead will be provided by the Contractor, and will meet the following requirements:
  - 1. Contain a PCB concentration no greater than 1.0 mg/kg using analysis based on SW-846 Method 8080 or using the Fox River Method, unless otherwise approved by WDNR
  - 2. Contain less than 12 percent of material passing the number 200 sieve
- C. Provide incidental materials, such as bracing, bolts, and sealants, necessary for installation of the sheet pile and cellular fill.

## **2.2 EQUIPMENT**

- A. Provide two marine plants, each with spud barge, material barge, crew boats, crane, pile driving hammers (diesel and vibratory), manlift, crew shelter, timber mats, navigation lights, and any other tools needed for proper execution of the work.
- B. Provide land-based crane(s), excavator(s), loader(s), and any other equipment needed for transfer of materials and equipment to the marine plants.
- C. Provide containers for the storage, transportation, and disposal of debris and materials.
- D. Provide equipment needed to transport materials to the site from rail off-loading area and to off load at the site, if needed.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine area where sheet pile will be installed to identify obstructions. Review hydrographic surveys and utility maps to assist in identification of potential utilities and other obstructions that may be present.

### **3.2 PREPARATION**

- A. Install sediment and erosion control measures, prior to work, in accordance with SWPPP.
- B. Survey and clearly mark sheet pile alignment for the Open Cell<sup>®</sup> Bulkhead construction.
- C. Survey and clearly mark any utility or pipeline obstructions that can not be removed. Remove all debris within the Open Cell<sup>®</sup> Bulkhead footprint that may interfere with sediment dredging operations and place in designated debris storage areas on the former Shell site.

- D. Dredge sediment within the Open Cell<sup>®</sup> Bulkhead footprint to elevation 562, prior to backfill placement. Perform sediment sampling, if required, to verify sediment removal is complete to approved RAL of 1.0 ppm.
- E. Perform post-dredge survey within the Open Cell<sup>®</sup> Bulkhead footprint area to document sediment removal.

### **3.3 INSTALLATION OF SHEET PILE**

- A. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.
- B. Steel sheet piling shall be installed at the locations as shown on the drawings provided by PND Engineers, Inc.
- C. Sheet piles shall be driven plumb and true to line. Tail wall sheets may be shifted to avoid visible obstructions. Face sheet maximum deviation from the intended wall line shall be 6 in. per 100 ft. but shall not exceed 6 in. over the entire length.
- D. Sheet piles shall be driven to elevations specified on the drawings provided by PND Engineers, Inc.
- E. No pile splices shall be permitted.
- F. Obstructions encountered during the driving process

- 1. General

Subcontractor shall be responsible for the removal of all obstructions encountered during the installation of the steel sheet pile. If obstructions are found in known TSCA-contaminated area, these obstructions and any associated sediment shall be removed and handled according to established project procedures defined under Specification Sections 35 20 23 and/or Section 02 81 00.

- 2. Tail Wall Sheet Installation

The tail wall sheet may be shifted in order to avoid surface or sub-surface obstructions. The tail wall shall be shifted in a gradual manner so as not to overstress the interlocks of the affected sheets. Subcontractor shall check with sheet manufacturer for allowable rotation of sheet at each interlock and shall not exceed this value.

- 3. Face Sheet Installation

Face sheets shall be installed in location shown on drawing to all extents practicable. Sheet line shall not be shifted in an amount greater than stated in Section 3.3 C of this specification.

### **3.4 PLACEMENT OF SAND BACKFILL**

- A. Sand backfill shall be placed in lifts within completed cells and within the general bulkhead footprint area, commencing in the deepest portion of the dredged area at approximate elevation 562.
- B. Sand will be dropped through the water column from a marine plant or material barge, or dropped from a conveyor operating from land. Sand will be placed in lifts to maintain relatively equal elevation as the area is filled. However, the bulkhead may be subdivided into areas that are backfilled in stages, in which case one area may be completely backfilled prior to other area(s).
- C. When the sand backfill reaches approximately elevation 574 feet, placement of sand backfill may be performed from land by spreading sand out over the area using low ground pressure equipment. When the sand base firmness allows, additional compaction may be performed on the sand lifts using standard compaction and/or construction equipment.
- D. Placement of sand backfill will continue in lifts until the sand reaches the final elevation of 592 feet.
- E. At no time shall the elevation differential of the sand on either side of a single tail wall be greater than 5 feet.

### **3.5 INSTALLATION RECORDS**

- A. Provide as-built survey of installed sheet pile and Open Cell<sup>®</sup> Bulkhead area when complete. Sheet pile alignment shall be surveyed prior to and following sand backfill placement. Final elevations of the entire Open Cell<sup>®</sup> Bulkhead area shall be provided on the as-built survey.

-END OF SECTION-

## **SECTION 35 20 23 - DREDGING AND DEWATERING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

Requirements for dredging and dewatering of PCB-impacted sediments

#### **1.2 SUMMARY OF WORK**

- A. Install equipment and supply materials needed to dredge, transport, and process sediment from OUs 2 through 5 of the Fox River. Processing of sediment includes sand separation, dewatering, and treatment of water from the process.
- B. Perform dredging of approximately 520,000 cubic yards (may be as much as 580,000 cubic yards) of sediments in designated areas of OUs 2 and 3 and downstream of the DePere Dam in OU 4 of the Fox River in 2009, and approximately 3.35 million cubic yards of impacted sediments in OU 4 and OU 5 from 2010 to 2017 (approximately). Dredge areas of TSCA sediments (approximately 70,000 cubic yards) and non-TSCA sediments (approximately 470,000 cubic yards) separately and keep material segregated.
- C. Transport dredged material to the material staging area located at the former Shell site,
- D. Dewater sediment to meet landfill disposal facility requirements for acceptance of waste (e.g., filter cake).
- E. Installation of appropriate channel crossing buoys, warning buoys, and pipeline delineator buoys to mark river work areas and pipeline routes, and to provide warnings to vessels and boaters.

#### **1.3 RELATED WORK**

- A. Other related Work activities include, but are not limited to, the following:
  - 1. Clearing, grubbing, and removal of debris
  - 2. Removal of hazardous and nonhazardous materials (if present), including mechanical removal of contaminated sediment that may be present within the area to be developed into the Open Cell® Bulkhead and staging area
  - 3. Work described in the Site Preparation Work Plan – Shell Property
  - 4. Work described in the Site Preparation Work Plan – Little Rapids Dam Area
- B. Refer to drawings for existing site conditions and site grading plan.
- C. Refer to Appendices C-6, Dredging Equipment Documents; C-7, DWP Equipment Documents; and C-8, WTP Equipment Documents

- D. Section 02 21 00, Surveying and Grade Control — includes bathymetric surveying, side-scan sonar surveying, sub-bottom profiling, and marine magnetometer surveys to provide elevation data and locate obstructions and/or debris.
- E. Section 01 57 20, Environmental Protection

## **1.4 DEFINITIONS**

- A. Required dredging: Removal of sediment to the dredge template elevation indicated on the dredging drawings.
- B. Overdredge dredging: An assumed additional thickness of sediment removed to ensure that dredging to the neatline is accomplished
- C. Dredging tolerances: Equipment-specific degree of accuracy that is achievable during dredging

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Provide polymer for sediment dewatering.
- B. Provide solidification reagent, such as fly ash or kiln dust, if needed, for solidification of sediment that may be dredged prior to installation of the dewatering facility at the former Shell site.
- C. Provide 8-inch and 12-inch SDR 17 HDPE piping as required to install sediment transfer pipelines shown on the project design drawings.
- D. Provide materials required for construction of sediment dewatering and wastewater treatment plant, which are described in detail in Appendix C-1, Site Preparation Statement of Work; C-2, Shell Site Preparation Work Plan – Shell Property; C-4, Foundation Work Plan for Building; and C-5, Building Erection Work Plan. Materials, equipment, and methods for performing the work described in these documents will not be described further here. This work must be completed prior to production dredging.
- E. Provide silt curtains and/or turbidity barriers, as needed, to control migration of solids during dredging activities.

### **2.2 EQUIPMENT**

- A. Provide debris removal plants consisting of barges with cranes and/or a backhoe with suitable rake, orange-peel, or grapple-type attachments to remove debris. Provide separate containers on the barge for placement of debris from TSCA and non-TSCA areas.
- B. Provide hydraulic and mechanical dredging equipment, as needed, to complete removal of impacted sediments within OUs 2 through 5 of the Fox River. This effort is expected to require the use of two 8-inch-diameter hydraulic dredges and one

12-inch-diameter hydraulic dredge, at a minimum. A mechanical dredge plant shall be provided for removal of heavier sediment and debris in shoreline and other select areas.

- C. Provide booster pump stations, as needed, in OUs 2, 3, and 4 along the HDPE pipeline route to facilitate transfer of dredged material over a long distance.
- D. Provide dewatering equipment sized to process/dewater the sediment at the rates shown in the mass balance presented in Exhibit A.
- E. Provide flow meters, gages, and testing equipment needed to monitor operation of the dewatering plant and associated equipment (such as the wastewater treatment plant).
- F. Provide equipment needed to construct storage areas required for storage of filter cake and sand.

### **PART 3 EXECUTION**

#### **3.1 SURVEY/DELINEATION OF OBSTRUCTIONS**

- A. Review hydrographic surveys and utility maps to assist in identification of potential utilities and other obstructions that may be present. Clearly mark all utility and pipeline structures present within the areas to be dredged and/or where pipelines will be installed for transfer of sediment.

#### **3.2 SURVEY AND DELINEATION OF HDPE PIPELINE ROUTE(S)**

- A. Survey and clearly mark pipeline route for HDPE dredge slurry pipeline(s) from sediment removal areas to the former Shell site.

#### **3.3 DREDGE MANAGEMENT UNITS**

- A. Survey and clearly mark limits of designated DMUs prior to performing dredging activities in an area.

#### **3.4 PREPARATION**

- A. Install sediment and erosion control measures, prior to work, in accordance with SWPPP.
- B. Install one background turbidity monitoring station 500 feet upstream, where the predominant flow passes through the river, and one turbidity monitor a distance of 500 feet downstream of dredging operations in the flow path extending from the DMU being dredged.
- C. Conduct pre-dredge survey prior to initiating dredging in a DMU.

### 3.5 DREDGING AND TRANSPORT OF SEDIMENT

- A. Perform all dredging in an upstream-to-downstream direction.
- B. Remove impacted sediments in shallow water using 8-inch dredges; with possible final pass clean-up using the Vic-Vac™.
- C. Use mechanical excavator or derrick for shallow water environments with insufficient draft for hydraulic removal.
- D. Use 12-inch hydraulic dredge for initial bulk removal of sediment from thicker deposits in OU 4, with clean-up passes by the 8-inch hydraulic dredge for greater precision. Remove TSCA-level sediments in OU 4 and keep segregated from non-TSCA sediment.
- E. Use 12-inch hydraulic dredge for the mouth of the Fox River and for Green Bay dredging.
- F. Perform multiple passes using the hydraulic dredges where thicker sediment deposits exist.
- G. Remove sediment to the dredge template elevations provided in the sediment removal design drawings. Following removal of sediments to the neatline elevations, the DMU will be sampled to verify compliance with the performance standards specified in Part 3.6 of this Section.
- H. Near utilities and infrastructure, use the following guidelines to protect these structures:
  - 1. For residential docks – Dredging and capping will be performed within 25 feet of a pile.
  - 2. For bridge crossings – No dredging will be conducted within 25 feet of a bridge pier, dolphin, or fender, which may be increased if site-specific conditions warrant a larger off-set.
  - 3. For submerged utilities/pipelines – Dredging will not be conducted within 50 feet of a known or reported river utility crossing. However, dredging may be conducted to an offset distance of 25 feet if the horizontal and vertical position of the utility is known within an accuracy of  $\pm 6$  inches vertically and  $\pm 5$  feet horizontally along the entire length of the utility as verified by physical surveys; and if RD sampling results indicate elevated PCB concentrations and environmental risk warrant.
- I. Monitor the dredge pipeline to ensure operation is in compliance with design, and to document that no damage has been incurred and no leakage is occurring.

### **3.6 DREDGING PERFORMANCE STANDARDS**

- A. Sediment exceeding the RAL of 1.0 ppm PCBs goal in OUs 2 through 5, excluding exceptional areas, is required to be addressed either through removal, capping, or sand cover.
- B. If the RAL is not achieved in an OU, the remedy may be considered complete if the surface weighted average concentrations (SWAC) goal is met and the residuals are managed as follows:
  - 1. In 2009, generated residuals exceeding 10.0 ppm PCB will be re-dredged to meet the RAL or identified for capping in 2010 or beyond.
  - 2. In 2009, generated residual exceeding 1.0 ppm PCB but < 10.0 ppm PCB will be identified for covering with at least 6 inches of sand in 2010 and beyond, provided this placement is necessary to meet the SWAC goal for the OU. The SWAC goal for OU 3 is 0.28 ppm PCB, and the SWAC goal for OU 4 is 0.25 ppm PCB.
  - 3. Engineered caps will be installed in designated areas of the site – see design drawings for details.
  - 4. Sand covers comprised of at least 6 inches of sand will be installed in certain undredged areas and in areas not meeting the RAL. This work is described in Section 35 43 00.

### **3.7 TURBIDITY MONITORING DURING DREDGING**

- A. Perform monitoring for turbidity during dredging operations in accordance with Section 10.1 of the CQAPP.

### **3.8 POST-DREDGE SAMPLING**

- A. Perform post-dredge sampling in accordance with the sediment removal verification plan in the CQAPP.

### **3.9 SURVEYS**

- A. Perform survey checks in areas requiring multiple dredge passes to monitor removal.
- B. Perform post-dredge multi-beam survey to document that final removal elevations have been achieved. This survey will be used as the record document to verify achievement of design grades.

### **3.10 SEGREGATION OF SAND FROM SEDIMENT**

- A. Segregate coarse and fine fraction of sand from dredged sediment using hydrocyclones installed at the sediment processing plant on the former Shell site.
- B. Perform sampling and analysis of sand to measure effectiveness of separation, and relationship between organic matter and PCB concentration.

- C. If sand separation does not yield sand meeting the requirements for beneficial re-use, consistent with WDNR’s *Guidance for the Reuse of Sand Separated from the Fox River PCB Sediment*, dated April 18, 2008, additional measures such as scrubbing or treatment to removal residual contamination may be considered. Sand containing < 1.0 ppm PCB is potentially available for reuse, but if the concentration exceeds 0.25 ppm PCBs the sand must be covered with a low-permeability material. Sand with a PCB concentration > 1.0 ppm may be considered for reuse on a case-by-case basis, pending WDNR approval. Re-use of sand separated from TSCA sediment may be performed only if approved by WDNR.
- D. The sand must be free of other contaminants of potential concern, which must be verified by analyses.
- E. Testing frequencies for sand to determine reuse suitability are as follows:

**Additional Analyses to Determine Reuse Suitability**

Beneficial Reuse Criteria/Guidance	Test Method	Test Frequency	Acceptable Range		
<b>Chemical Parameters</b>					
Total 2,3,7,8 TCDD		1 sample/1,000 cubic yards (cy) for the first 10,000 cy then 1 sample/10,000 cy for 10,000 to 50,000 cy then 1 sample/50,000 cy thereafter.	To be determined for all parameters (*)		
Total 2,3,7,8 TCDF					
DDT					
Arsenic	EPA 6000/7000				
Barium					
Cadmium	EPA 6000/7000				
Chromium	EPA 6000/7000				
Copper	EPA 6000/7000				
Cyanide					
Iron					
Lead	EPA 6000/7000				
Manganese					
Mercury	EPA 6000/7000				
Nickel	EPA 6000/7000				
Selenium					
Zinc	EPA 6000/7000				
<b>Physical Parameters</b>					
Grain-Size	SOP-Appendix D/Sieve and Hydrometer				
Percent Solids					
Total Organic Carbon	Walkley-Black/EPA 415-1				
Moisture Content	SOP-Appendix D				
Settleability	SOP-Appendix D and E				

DDT = Dichloro-Diphenyl-Trichloroethane  
 EPA = U.S. Environmental Protection Agency  
 SOP = standard operating procedure  
 TCDD = tetrachlorodibenzo-p-dioxin  
 TCDF = tetrachlorodibzofuran

<sup>1/</sup> Determined by uses approved by WDNR.

### **3.11 DEWATERING**

- A. Perform pre-thickening of sediment slurry following sand separation process and prior to routing to the membrane presses.
- B. Feed pre-thickened sediment into membrane presses at flow rates consistent with the mass balance design and with planned sediment removal rates. The process shall be sized to handle a maximum rate of approximately 3,000 tons per day of sediment (based on expected filter cake production) in a slurry with approximately 5 to 6 percent solids without interruption.
- C. Adequate capacity and redundancy shall be provided for all processes to allow system components to go off-line for routine maintenance and cleaning while maintaining operation of the system at the design flow rates.
- D. Polymer addition shall be monitored and adjusted, as needed, and membrane presses shall be operated to provide dewatering of the sediment to meet the requirements specified for filter cake disposal. These properties are as follows:
  - 1. Undrained shear strength of 800 psf, or
  - 2. Frictional strength of 25 degrees, or
  - 3. A combined frictional and cohesive strength that provides filter cake of sufficient strength to achieve a comparable factor of safety (as the strength in (1) or (2)) for slope stability, as determined by a geotechnical engineer.
- E. In addition to the above properties, a firm filter cake with nominally 50 percent solids or greater is desired. Although failure to meet this requirement may not impact landfill disposal, adjustments to the dewatering system should be made if the percent solids in the filter cake begins to decline below 50 percent and process adjustments may improve this property.
- F. In addition to the above tests, grain size analyses will be performed on filter cake samples during the initial startup period to monitor the effectiveness of the sand separation process.

### **3.12 REMEDIAL ACTION COMPLETION CERTIFICATION PROCEDURE**

- A. Upon completion of a DCU (3 - 1 Acre DMUs) a Dredge Certification Report, stamped by a Wisconsin-certified Professional Engineer, will be submitted to the agencies for approval. The package will identify the DCU to be certified, identify the DMUs that are included in the DCU and will include record drawing information and confirmation sample information for each DMU that is included in the DCU.
- B. The Agencies will review the documentation to verify that the dredging in the DCU has been completed and has met the RA requirements set forth in the contract documents.

- C. Agencies will approve the Dredge Certification Report, confirming that the DCU is complete.
- D. All Dredge Certification Reports will be compiled and submitted as part of the final closure report annual volume.

-END OF SECTION-

## **SECTION 35 43 00 - CAPPING AND SAND COVER PLACEMENT**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

Requirements for materials and installation of engineered caps and sand covers in OUs 2 through 5 of the Fox River.

#### **1.2 SUMMARY OF WORK**

- A. Provide equipment and materials needed to construct engineered caps and sand covers for OUs 2 through 5 of the Fox River, as delineated on the design drawings and/or determined following post-dredge surveys.
- B. Provide silt curtains or turbidity barriers for turbidity control.

#### **1.3 RELATED WORK**

- A. Other related Work activities include, but are not limited to, the following:
  - 1. Section 02 21 00, Surveying and Grade Control, includes bathymetric surveying, side-scan sonar surveying, sub-bottom profiling, and marine magnetometer surveys to provide elevation data and locate obstructions and/or debris.
  - 2. Section 01 57 20, Environmental Protection

#### **1.4 DEFINITIONS**

- A. Engineered cap: A soil cover installed over sediments that includes a sand layer and an armor layer. Caps with large armor also include a filter layer of finer aggregate material. Thickness of the sand and armor layers varies by location.
- B. Sand cover: A minimum 6-inch thickness of sand placed over residual contamination. Areas to receive sand cover will be based on residual PCB concentrations in the sediment as determined by post-dredge sampling and analysis described in the CQAPP.
- C. Engineered cap design and designations: Cap designs have been designated according to thickness and materials used, which was based on PCB concentration remaining in undredged sediment and other considerations. The designated cap designs are as follows:

**Designated Cap Designs**

<b>Cap Description</b>	<b>PCB Concentration range (in 0 to 6-inch Interval)</b>	<b>Comments</b>
Cap A - Minimum 13-inch Sand Cap with Gravel Armor	< 10 ppm	Used in low concentration areas where mixing zone of clean sand provides necessary chemical isolation.
Cap B - Minimum 16-inch Sand Cap with Gravel Armor	10-50 ppm	Used in areas where 3 inches of uncompromised chemical isolation layer is necessary for protection.
Cap C - 33-inch Sand/Quarry Spall Cap	10-100 ppm	Used only in OU 4 navigation channel and/or where PCB concentrations exceed 50 ppm at any depth.
Shoreline Caps – Minimum 44-inch Sand/Gravel/Quarry Spall Cap	varies	Used in areas near shorelines where water depth will exceed 3 feet after cap installation.

**1.5 SITE CONDITIONS**

- A. Sediments in OUs 2 to 4 are characterized as soft, silty, clayey sand, with trace gravel. Limited areas of stiff clayey soils exist immediately under the soft sediments.
- B. Pre-capping bathymetry in a DMU will be provided by the post-dredge survey.

**PART 2 PRODUCTS****2.1 MATERIALS**

- A. Sand - provide sand for cap and sand cover construction. Sand shall meet the following specifications:
  - 1. < 12% passing the No. 200 sieve
  - 2. Classification by the Unified Soil Classification System as SP, SW, or SW-SM
- B. Gravel - provide gravel for armor and filter layers meeting the following specifications:
  - 1. for armoring - up to D50 of 1.5 inches
  - 2. for filter layer in OU 4 - D50 of 3 inches
- C. Quarry spall – provide for armoring in OU 4 (Federal Navigation Channel) - D50 = 6 to 9 inches

- D. Provide silt curtains or turbidity barriers, as needed, to maintain turbidity to less than actionable levels.

## **2.2 EQUIPMENT**

- A. Provide material transfer barges, a marine capping plant, a mechanical capping plant and associated equipment needed to load, transport, and spread and/or place cover materials at designated locations in OUs 2 through 5.
- B. Provide equipment and devices for monitoring/surveying of material placement thicknesses.

## **PART 3 EXECUTION**

### **3.1 PRE-CAP AND POST-CAP SURVEYS**

- A. Perform pre-cap delineation of each CMU to define and clearly mark the area to be capped prior to commencing capping or sand placement activities.
- B. Perform pre-cap (or in dredged areas, post-dredge) and post-cap bathymetric surveys in the CMU to document cap and/or sand cover thicknesses.
- C. Review hydrographic surveys and utility maps to assist in identification of potential utilities and other obstructions that may be present. Clearly mark all utility and pipeline structures present within the areas to be capped or covered.

### **3.2 MATERIAL STAGING**

- A. Capping and sand cover materials will be staged and loaded from the Little Rapids Dam staging area for capping/sand cover areas located south of the De Pere Dam and from the former Shell site staging area for capping/sand cover areas located north of the De Pere Dam. This material will be staged from clean areas and kept segregated from potentially contaminated material being processed at the former Shell site.
- B. Load materials into material barges for transport to the CMU. Monitor material inventories and placement schedules to ensure sufficient volume of material is available for scheduled capping/covering activities.

### **3.3 SEQUENCE OF CAPPING AND SAND COVER PLACEMENT**

- A. Sand covering will be conducted from 2010 through 2017 in areas designated for covering of residuals.
- B. Capping of residuals and/or sediment left in place will be conducted from 2010 through 2017 in areas designated for placement of Cap A, B, or C.
- C. Capping and sand cover placement shall be conducted in an upstream-to-downstream direction, as soon as possible following dredging (if applicable) and verification of residual levels.

### **3.4 PREPARATION**

- A. Implement sediment and erosion control measures, prior to work, in accordance with the SWPPP.
- B. Install one background turbidity monitoring station 500 feet upstream, where the predominant flow passes through the river, and one turbidity monitor a distance of 500 feet downstream of dredging operations in the flow path extending from the DMU being dredged.
- C. Conduct pre-dredge survey prior to initiating dredging in a DMU.

### **3.5 PLACEMENT OF SAND COVER AND CAPPING MATERIALS**

- A. A barge will be used to transfer granular sand cover and capping materials to the slurry barge associated with the marine capping plant or mechanical capping plant.
- B. Sand cover shall be placed in designated areas using a broadcast spreading technique to place relatively uniform thin lifts of sand gradually over the area.
- C. Transfer cap/cover material to a conveyor that feeds a metered hopper, followed by a slurry hopper. Inject water into the slurry hopper to create a slurry. Transfer slurry from the hopper via pipeline to the broadcast spreading barge.
- D. After the slurried cap material enters the broadcast spreading barge, the material passes across a vibrating dewatering screen.
- E. The granular cap material will roll off the dewatering screen and into a hopper that conveys material to the broadcast spreader. Excess water returns to the river.
- F. Particles spread out into the water and fall through the water column under the spreader pool, an area of open water enclosed by floating barriers measuring approximately 35 feet by 12 feet.
- G. Maintain material placement rates of 40 to 60 cubic yards per hour, per broadcast spreading plant.
- H. Near utilities and infrastructure, use the following guidelines to protect these structures:
  - 1. For residential docks – Capping will be not be performed within 25 feet of a pile, unless otherwise directed by the Construction Manager.
  - 2. For bridge crossings – No capping will be conducted within 25 feet of a bridge pier, dolphin, or fender, which may be increased if site-specific conditions warrant a larger off-set.
  - 3. For submerged utilities/pipelines – Capping will not be conducted within 50 feet of a known or reported river utility crossing. However, capping may be conducted to an offset distance of 25 feet if the horizontal and vertical position of the utility is known within an accuracy of + 6 inches vertically and + 5 feet

horizontally along the entire length of the utility as verified by physical surveys; and if RD sampling results indicate elevated PCB concentrations and environmental risk warrant.

- I. Monitor the volume of material placed based on volumes measured by the metered conveyor(s) and hoppers to compare with pre- and post-cap/cover survey volumes.

### **3.6 DREDGING PERFORMANCE STANDARDS FOR CAP/COVER DETERMINATION**

- A. Sediment exceeding the RAL of 1.0 ppm PCBs goal in OUs 2 through 5, excluding exceptional areas, is required to be addressed either through removal, capping, or sand cover.
- B. If the RAL is not achieved in an OU, the remedy may be considered complete if the SWAC goal is met and the residuals are managed as follows:
  1. In 2009, generated residuals exceeding 10.0 ppm PCB will be re-dredged to meet the RAL or identified for capping in 2010 or beyond.
  2. In 2009, generated residuals exceeding 1.0 ppm PCB but < 10.0 ppm PCB will be identified for covering with at least 6 inches of sand in 2010 and beyond, provided this placement is necessary to meet the SWAC goal for the OU. The SWAC goal for OU 3 is 0.28 ppm PCB, and the SWAC goal for OU 4 is 0.25 ppm PCB.
  3. Engineered caps will be installed in designated areas of the site – see design drawings for details.
  4. Sand covers comprised of at least 6 inches of sand will be installed in certain undredged areas and in areas not meeting the RAL. This work is described in Section 35 43 00.

### **3.7 TURBIDITY MONITORING DURING SAND COVERING AND CAPPING**

- A. Commence monitoring of upstream nephelometer prior to commencing sand and/or cap placement in the downstream CMU. Hourly readings shall be logged at each location during capping/sand covering activities.
- B. Obtain discrete turbidity measurements at the monitoring stations 3 times per week during capping/sand covering activities for comparison to nephelometer reading and calibrate accordingly.
- C. Correlate logged turbidity data to total suspended solids (TSS) using data from Phase I project. If data correlate poorly, perform additional sampling for TSS and develop correlations for turbidity specific to this site.
- D. Compare measured turbidity levels downstream to the upstream turbidity and notify the Construction Manager immediately if the background level is more than 40 nephelometric turbidity units (NTUs) above the background level for four

- consecutive readings (i.e., over 4 hours). The Construction Manager will notify the material barge operator, who will evaluate best management practices and/or modify material placement methods to reduce turbidity.
- E. If the background level is more than 80 NTUs above the background level for four consecutive readings (i.e., over 4 hours), the Construction Manager will notify the barge operator, who will immediately suspend capping/sand cover placement operations to reduce turbidity.
  - F. In the event capping/sand cover placement operations are suspended due to turbidity, capping/sand cover placement will not resume until four consecutive readings below 80 NTUs have been achieved.

-END OF SECTION-

**Wastewater Treatment Plant Design Drawings**















## **APPENDIX C-1**

### **Lower Fox River Remedial Design 60 Percent Design Report**

#### **Statement of Work for Construction of Staging Area and Access Roads**

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## **Acronyms and Abbreviations**

ASTM	American Society for Testing and Materials
HASP	Health and Safety Plan
OU	Operable Unit
PCB	polychlorinated biphenyl
PPE	personal protective equipment
SHSO	Site Health and Safety Officer
SWPPP	Stormwater Pollution Prevention Plan
Tetra Tech EC, Inc.	Tetra Tech
TPHs	total petroleum hydrocarbons

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## 1.0 GENERAL DESCRIPTION

### 1.1 PROJECT DESCRIPTION

Tetra Tech EC, Inc. (Tetra Tech) is the General Contractor for remediation of polychlorinated biphenyls (PCBs) in Operable Units (OUs) 2, 3, 4, and 5 of the Lower Fox River and Green Bay site. The site extends 39 miles from the outlet of Lake Winnebago to the mouth of the river where it discharges into the bay of Green Bay.

The project involves construction of an upland staging area for desanding, dewatering, and water treatment operations. The former Shell Oil Property adjacent to the Georgia-Pacific West Mill in OU 4 was identified as the staging area. The proposed staging area will cover about 27 acres of upland space following buildout of the shore line.

The site includes several locations where residual total petroleum hydrocarbons (TPHs) are present at low concentrations, associated with the former Shell Oil Tank Farm. The Tetra Tech Team understands, however, that TPH concentrations in this material are such that it does not pose a hazard to workers performing intrusive on-site activities. Work will be initiated in Level D personal protective equipment (PPE). Upgrades in levels of protection may need to be initiated as directed by the Tetra Tech Site Health and Safety Officer (SHSO).

### 1.2 SCOPE OF WORK

This statement of work defines the technical and construction requirements for site preparation activities for the upland staging area. The seven tasks required to perform this work are as follows:

**Task 1: Mobilization/Demobilization.** This task includes the work associated with moving equipment and supplies to the site vicinity prior to beginning work and moving off site after the job has been completed. This task is to be performed in accordance with the requirements of technical specification Section 01 71 13. This task also includes ensuring that all construction equipment delivered to the site is clean and free of foreign matter, cleaning around construction sites after field activities are completed, decontaminating all the equipment prior to demobilization, and conformance of subcontractor personnel with specified health and safety requirements.

**Task 2: Site Clearing and Grubbing.** This task includes removal of vegetation, debris, and other undesirable materials such as rock and obstructions from the staging area, building footprint(s), and the areas where the entrance/exit roads are to be constructed. Material that cannot be beneficially reused may be stockpiled on site prior to disposal. Disposal will be at an approved off-site location. This work is to be performed in accordance with the requirements of technical specification Section 31 11 00.

**Task 3: Subgrade Preparation.** This task includes following:

- A. Remove 6 inches (typical) of topsoil for the entire width of the entrance/exit roads and stockpile material at the designated area.
- B. Scarify the subgrade supporting the access road surfacing to a depth of 6 inches and recompact to 90 percent of Modified Proctor maximum dry density in

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accordance with American Society for Testing and Materials (ASTM) D1557, Standard Proctor.

- C. Following stripping, proof roll exposed subgrade of proposed staging areas with six passes of a dump truck loaded with 4 cubic yards of soil. Operate the truck in a systematic manner to ensure the number of passes over all areas and that speeds are between 2 ½ and 3 ½ mph. When proof rolling, half of the passes made with the dump truck will be in a direction perpendicular to the other passes. In areas where pumping or excessive subgrade movement occurs, scarify, aerate, and recompact existing material as directed by the Tetra Tech Field Engineer.
- D. Where subgrade soils are loose, remove to solid bearing and replace material in compacted lifts.
- E. Minimize traffic over prepared surface.
- F. Perform this work in accordance with the requirements of technical specification Section 31 00 00.

**Task 4: Grading.** This task includes grading the subgrade to meet lines, grades, and cross sections indicated on drawings. Remove unsuitable subgrade materials and fill with structural fill.

**Task 5: Stockpiling.**

- A. Stockpile material on site at the location(s) indicated on the site layout plan.
- B. The maximum height of soil stockpile(s) will not exceed 9.5 feet.
- C. Different material will be stockpiled at a minimum distance of 30 feet from each other to prevent intermixing and to allow access of equipment.
- D. Direct surface water away from all stockpile locations to prevent erosion or deterioration of materials.
- E. All stockpiles will have sediment controls such as silt fence or other engineered controls installed around the base, in accordance with the requirements of the Stormwater Pollution Prevention Plan (SWPPP), to prevent erosion.

**Task 6: Fill Placement.**

- A. Fill areas to meet designed lines and grades with structural fill. Use specified materials where indicated on drawings.
- B. Place and compact fill materials in continuous layers not exceeding 8 inches loose depth.
- C. Maintain optimum moisture content of fill materials, within Proctor tolerances to attain required compaction density.
- D. Do not fill over unsuitable subgrade conditions.

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- E. Do not place fill materials that are frozen or contain ice or snow.
  - F. Suspend placing fill when the climatic conditions will not allow specified placement and fill compaction requirements.

**Task 7: Compacting.**

- A. Compact backfill material using mechanical compactors, towed or self-propelled compactors, or hand-operated compactors.
- B. Place loose backfill material in maximum 8-inch lifts prior to compaction.
- C. Compact material to meet specification requirements.
- D. Fill under buildings and to a point 10 feet horizontal beyond the building perimeter will be to 90 percent per ASTM D1557, Modified Proctor.
- E. Perform this work in accordance with the requirements of technical specification Section 31 00 00.

**1.3 WORK PROVIDED BY SUBCONTRACTOR**

A list of the work that will be provided by the Subcontractor follows:

- A. Construction Activities: The Subcontractor will provide supervision, labor, materials, and equipment necessary to perform work.
- B. Site Housekeeping: The Subcontractor will remove from any portion of the site any material, debris, or rubbish that may interfere with the work or constitute a nuisance. All rubbish or debris derived from drilling activities will be removed daily from each drilling location at the completion of drilling operations. The Subcontractor will return the site to as nearly the original condition as is reasonably possible.
- C. Compliance Standard: The Subcontractor's activities must meet all applicable state and local regulations governing construction activities and specification requirements.
- D. Health and Safety: All of the Subcontractor's activities will be subject to the requirements of the Contractor's Site Health and Safety Plan (HASP). The Subcontractor personnel must meet the requirements of this HASP and follow the guidance, rules, and regulations of the HASP to protect personnel and/or the environment.
- E. Emergency/Contingency Procedures: Should it become necessary, the Subcontractor will follow and implement the Emergency/Contingency Procedures outlined in the HASP.
- F. Field Activities: All activities will be conducted in an efficient and professional manner, with the minimum practical damage to the site environment.

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- G. Cleaning: The Subcontractor is responsible for the disposal of surplus or unsuitable material to a site designated by Tetra Tech. Special material handling may be required and should be performed as detailed in the HASP provided by Tetra Tech.
  - H. Security: The Subcontractor will be responsible for securing the Subcontractor's equipment and materials at the site.
  - I. Required Documents: The Subcontractor will furnish the following documents for Tetra Tech's review and records prior to the commencement of the project:
    - 1. A Certificate of Compliance stating the following: "All work provided under the Contract complies with all requirements of the specification."
    - 2. All required federal, state, and/or local permits
    - 3. Documents identifying any deviations
    - 4. Schedule of Value
    - 5. Copies of health and safety training certificates, medical certificates, and any other documentation of Subcontractor's personnel required by the HASP
    - 6. All Terms and Conditions set forth in the subcontract
  - J. Protective Equipment and Clothing: It is assumed that the work will be conducted in Level D PPE. The Subcontractor will supply all of the necessary equipment and clothing for Level D. Additional pricing for possible upgrades from Level D to Modified Level D and Level C PPE should be included in the price form.
  - K. Designated Areas: Tetra Tech will designate parking, equipment storage, and personnel areas.

#### **1.4 WORK PROVIDED BY TETRA TECH**

The work to be provided by Tetra Tech includes the following:

- A. Site Access: Access to all locations will be arranged by Tetra Tech prior to commencement of work. Tetra Tech will also contact all utility owners at the site and clear the construction area through them. No Subcontractor personnel or equipment are to enter any location without first obtaining clearance from Tetra Tech.
- B. Work Direction: Tetra Tech will mark the construction limits. Locations of underground utilities (pipes, conduits, etc.) will be marked by utility locators before the Subcontractor begins work at these locations. The Subcontractor is responsible for verifying these locations and the performance of the locating activities before beginning work.
- C. Quality Control: Tetra Tech will inspect the work in progress and at completion to ensure compliance with the specification. Any documentation verifying that compliance to the specification has been met, such as testing or surveyor, will be submitted to Tetra Tech for confirmation.
- D. Health and Safety Monitoring: Tetra Tech provides management and oversight responsibilities over all health and safety activities. Tetra Tech's responsibilities include authorizing persons to enter or work at the site, establishing levels of

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protection for operating personnel, conducting environmental monitoring for health and safety purposes, and supervising the adequacy of field procedures. The Subcontractor is responsible for ensuring all health and safety requirements are met.

- E. Site Engineer: Tetra Tech will provide a Site Engineer to observe and to document daily activities. The Subcontractor will generate a Daily Activity Report to be given to the Site Engineer no later than the day following the occurrence of the activity.

## **1.5 SCHEDULE**

The dates proposed for the services are anticipated to begin in June 2008.

## **1.6 POINTS OF CONTACT**

- The Tetra Tech Project Manager for this Project is Ray Mangrum, who can be reached at (770) 825-7100, Cell: (713) 876-8528, or via email at ray.mangrum@tteci.com.
- The Tetra Tech Construction Manager for this Project is Michael Estess, who can be reached at (803) 646-0938, or via email at Michael.estess@tteci.com.
- The Tetra Tech Lead Civil Engineer for this Project is Josh Singer, who can be reached at (617) 457-8270, or via email at josh.singer@tteci.com.
- The Tetra Tech Procurement lead for this subcontract is Vanessa Paolini who can be reached at (262) 781-3992, or via email at Vanessa.paolini@tteci.com.

## **2.0 TECHNICAL SPECIFICATIONS**

### **2.1 CODES AND STANDARDS**

In addition to the codes and standards for the performance of the field effort specified in this document, the Subcontractor will comply with applicable state and local ordinances, laws, and regulations. Any modifications to the standards specified herein must be approved by Tetra Tech.

### **2.2 SITE ACCESS WORK AREA**

Access to the project site will be provided through Tetra Tech. The Subcontractor will be responsible for the storage and security of its own equipment. The Subcontractor will be responsible for containerizing any debris and wastes requiring isolation and for transporting wastes off site for disposal.

### **2.3 CONSTRUCTION**

The Subcontractor will supply construction crew and equipment; Tetra Tech will supply a Field Engineer and SHSO. The Tetra Tech Construction Manager will supervise construction operations.

## **APPENDIX C-2**

### **Lower Fox River Remedial Design 60 Percent Design Report**

#### **Site Preparation Work Plan Former Shell Site CY 2008-09**

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Figure G-01. Master Site Layout with Phase 1 Grading

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## **1.0 INTRODUCTION**

The purpose of this Work Plan is to provide a summarized narrative on the approach to the Site Preparation Work at the State Street Shell Site during the 2008 and early 2009 calendar years. Detailed requirements are contained in the project specifications, drawings, and schedules that will be finalized in the 100 percent designs.

Site preparation includes all the activities to clear the site of prior use materials and vegetation; filling, cutting, grading, and compacting soils and other fill materials; maintaining stormwater and runoff controls; installation of underground utilities; preparation of foundation areas; installation of site security fencing and lighting; and construction of road and storage areas.

## **2.0 SITE LOCATION**

This plan addresses the site preparation at the former Shell Oil facility, located at 1505 State Street, Green Bay, Wisconsin 54301. This is a former petroleum storage facility location consisting of approximately 22 acres. The site was operated from 1940 to 1980, with surface equipment removed in 1988 and 1989. In 1999 and 2000, the site was used as the staging area for a dredge process area for the SWMU 56/57 project. For this operation, the area near State Street was paved with asphalt and used as a storage and dewatering area, and two wastewater storage basins were constructed in-line to the east of the pad. Upon completion of this work, the site was left vacant and currently has numerous trees, brush, and vegetation going to the Fox River bank.

In preparation for the construction of the waste processing facilities and sand storage area, the site will be cleared, leveled, and prepared for use. The clearing, preparation, and construction at the Shell site will take place in 2008 and early 2009 to support the active removal of contaminants from the affected river areas. A drawing of the property showing the planned facilities over the existing features can be found as Figure G-01.

## **3.0 PERMITS, RELEASES, AND APPROVALS**

Prior to the start of site preparation, all required permits will be in place and project personnel made aware of the provisions and conditions. Permits required include:

- Building permits
- Stormwater Pollution Prevention Permit
- Curb Cut Permits

Any other permits required will be acquired as they are identified. Inspections by local and other officials will be coordinated to ensure that they are not overlooked or do not delay work.

## **4.0 GENERAL ACTIVITIES**

### **4.1 SITE SUPPORT FACILITIES**

A mobile office trailer will be placed on site during mobilization to allow project personnel to be at the site. As work progresses, additional permanent trailers will be added to support the work crew on site. The trailer(s) will be electrically powered. Portable restroom facilities will be placed on site and increased in number as the workforce grows. The temporary trailers are

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expected to remain on the site until the process facility offices are completed in early 2009, at which time the temporary trailer(s) may be demobilized and removed from the site.

Worker parking will be delineated on existing paved areas away from heavy equipment working during the site preparation and will be moved as necessary until the permanent parking is completed.

## **4.2 DEBRIS REMOVAL**

### **4.2.1 Land Areas**

The unpaved area of the site is currently littered with miscellaneous pipe, concrete, scrap soil piles, vegetation, and piling materials. Numerous trees, brush, and other materials have grown up. Along the river, the remains of an old dock (piling with caps, abandoned piling, and other debris) are in or near the river.

A boundary line access will be opened on the property line and silt fencing installed to prevent waterborne runoff from the site. Drainage areas will be benched; retained with silt fences, hay bales, and/or erosion control mats; and prepared to retain water and prevent silt runoff into the river. The trees and vegetation will be cut or pushed over and chipped. The chipped materials will be stockpiled for later use on ground cover and runoff control. Pipe and other miscellaneous debris will be gathered and stockpiled for scrap sale or disposal. Concrete foundations, rock, gravel, boulders, and the like will be removed and sized using conventional equipment and stockpiled for later use as backfill on site or properly disposed of at the appropriate facility. Clearing of the site will focus on the building area (property near State Street) first in order to allow the building construction to commence.

Efforts will be made to maintain ground cover in order to reduce the potential for dust or waterborne runoff. Areas may be mulched, receive temporary seeding, etc., as needed.

This work is to be performed in accordance with the requirements of technical specification Section 31 11 00.

### **4.2.2 Debris Removal – Shore and Fox River Areas**

On the riverfront area, debris, old piling and caps, and other debris will be removed from the shore and out in the Fox River in preparation for a sheet pile dock wall that will be installed. The removed materials will be collected and disposed of in a manner similar to that used for the land areas.

## **4.3 REMOVAL OF EXISTING UTILITIES**

Currently an energized power line extends east to west on the southern portion of the site from State Street. There are also a series of light poles around the perimeter on the State street side of the site.

The powerline will be deenergized and removed. The poles will be retained for possible reuse. The light poles will also be de-activated and removed; again, these will be retained for possible reuse.

A stormwater line extends onto the site from the asphalt paved area near State Street and is believed to end at the river with an intermediate line draining a low area at the river. This line was believed to have been closed off in the past but may have been reopened. This line will be

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disconnected and blocked (if not already so) before the portion at the river's edge. The remainder of the pipe will be either filled or removed.

An underground petroleum line runs along the edge of the site along State Street. This line is currently inactive. This line will be located and protected during the installation of other utilities. The depth will be confirmed but it is currently believed to be at a depth sufficient that truck traffic and other loadings will not affect it.

#### **4.4 EXISTING ASPHALT AND CONCRETE PAVING**

Asphalt and concrete paving exists on several areas of the site. The area of the existing asphalt pad that lies in the footprint of the process facility will be removed and stockpiled for later possible road construction. The stockpiles will be bermed or channeled to a retention area to prevent rainwater runoff sheens from moving off site. The concrete will be broken and sized for use as fill in other areas of the site. Concrete piers, miscellaneous slabs, and other structures will also be removed, sized, and stockpiled for later use.

#### **4.5 FILLING AND GRADING**

Detailed quantities of on-site fill required have not been finalized. It is currently believed that current on-site materials will not provide adequate volumes for filling and leveling the site, and additional clean fill material will have to be imported to meet final grades. The building area will be filled, leveled, and compacted first to expedite the building construction. Other areas of the site will be graded, filled, and compacted later to provide areas for storage areas, roadways, and laydown areas. Compaction and materials specifications are contained in the specifications.

The area between the new sheet pile dock wall and the existing river shoreline will be filled to provide equipment staging areas. The area will be filled with sand generated from the processing of dredge materials deemed sufficient for beneficial reuse, or excess inert materials from the remainder of the property. If additional materials are required for any area, clean fill will be imported from local suppliers.

Throughout the grading and filling, drainage runoff controls will be maintained to prevent stormwater from entering the Fox River. As larger areas are completed they will be mulched or seeded or finished with final surfaces.

This work is to be performed in accordance with the requirements of technical specification Section 31 00 00.

#### **4.6 WATER RUNOFF CONTROLS**

Stormwater runoff will be controlled in accordance with the Stormwater Pollution Prevention Plan and best management practices to prevent movement off site of sediment due to stormwater from disturbed soil areas. When unprotected soils are exposed during site preparation, stormwater runoff will be controlled by drainage into temporary retention areas for absorption and/or discharge at the 2-year 24-hour predevelopment rate and with silt fences and temporary seeding or mulching. Current plans for stormwater retention are being finalized. Stormwater from process areas and storage areas containing potentially contaminated materials will be collected and processed through the water treatment system for discharge to the Fox River. From areas that are clean, such as the gutters of the process plant building and other areas containing clean materials, stormwater will be collected and discharged to the City of Green Bay stormwater system. The retention systems will be sized and tentatively placed below other non-

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building areas and would be installed during the site preparation. Additionally silt fence will be installed as needed and maintained to control run-off and drainage during the life of the project.

#### **4.7 DRIVE SHEET PILING**

Sheet piling will be installed according to the project specifications and locations shown on the design drawings. Approximately 1,500 feet of sheet piling will be driven after removal of the shore and near-in debris. Fill for the area between the sheet pile and existing shoreline will include some excess site materials and sand generated from the processing of dredge material deemed acceptable by the regulatory agencies for beneficial reuse. Sheet pile design details and supporting information have been prepared and submitted separately for regulatory approval.

This work is to be performed in accordance with the requirements of technical specification Section 31 41 16.

#### **4.8 UTILITIES**

Utilities will be located, tapped, or connected and brought to the connect points by the responsible local utilities. Utilities will be kept underground whenever possible to avoid overhead hazards and to prevent damage to the utilities. During the site preparation these utility lines will be installed (or prepared for installation) with water, gas, electric, and sanitary sewer brought into the site and terminated at the building connect points. Utilities planned are:

- Locate electrical substation/transformers to tap in points
- Locate and run potable water to tap in
- Locate and run sanitary sewer to tap in
- Locate phone to tap in
- Natural gas to tap in
- Potable water and fire protection water supplies
- Yard area lighting (conduits)
- Sanitary sewer

Utility tie-in points will be identified on the detailed drawings for the site preparation and building areas.

#### **4.9 PROJECT OUTFALL AND DISCHARGE LINE**

The process will treat water to permit requirements and discharge this water to the Fox River via a discharge line and outfall. This discharge line will be installed after other site preparations are completed. The outfall and discharge line will be installed in accordance with the specifications and drawings. Approval for this discharge will be obtained from the Wisconsin Department of Natural Resources.

#### **4.10 RADIO TRANSMITTERS**

Due to the large area that personnel will be working during the project, provisions for radio communications will be needed including FM and Marine frequencies. It is anticipated that needed antennas can be mounted on the main building. If a separate antenna structure is needed, it will be installed according to design drawings and specifications, along with permit conditions.

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## **4.11 SECURITY**

Currently security fencing and gates exist on the project site facing State Street and along the property line to the north. These will be left in place during the early part of construction to provide interim site security. Later in the construction phase, the existing fencing will be removed in certain areas to allow for new gates to be installed. Existing fencing is a 6-foot chain-link fence enclosing three sides of the site and will remain in place (with the Fox River side left open). Four gates from State Street onto the site will be established, including two for heavy truck and other traffic entry and exit, with the two existing gates in the center of the fence line to be exclusively for worker vehicle parking. The gates will be closeable during off-work hours and controlled during work hours. The heavy vehicle exit will have an auto-opening gate to prevent traffic from entering, and the heavy vehicle entrance will be controlled from a portable structure security building. Conduits for powering the gates and security shed will be installed during the site preparation. Curb cuts, turn radius, and traffic controls will be included in the specifications and permits from the City of Green Bay.

Security lighting will be installed on the site. During the initial site work, several area lights will be installed near State Street around the construction trailer area. Later in the construction, permanent security and yard area lighting will be installed. Lighting will be focused for on-site lighting. Parking and yard lighting will be sufficient for general work, and reduced lighting will be used during non-working hours for security.

## **4.12 BUILDING FOOTPRINTS AREAS**

Geotechnical data have been obtained by drilling in the building area, and foundation designs are in process. Site preparation of the building area will be dependent on the selected foundation (spread footings, piling, etc.). The general area will be cleared of any surface and subsurface obstructions, graded and compacted in advance of the foundation work to provide a stable working area. Elevations and related information will be per the building construction specifications and design and the Building Foundation and Building Erection Plans.

### **4.12.1 Stockpile and Yard Areas**

Any storage areas that are planned to have, or could potentially have, Toxic Substances Control Act materials stored on them will have geosynthetic liners installed under them with upturned edges. The liners are impermeable and will prevent any spillage or releases from migrating downward. Liners will be covered with a sand layer and a marker material placed, then covered with additional gravel materials. The marker material will serve as a visual warning to operators and others that a liner is below to prevent damage. The stockpile areas will be surfaced with compact crushed base coarse material to provide a firm and uniform surface.

The stockpile storage areas will be constructed to reduce or prevent runoff and windblown dust. Stockpiles are expected to be constructed with low slopes with approximate 50-foot separations to allow for drainage and to prevent mixing. Alternatively, to increase capacity barriers or walls to form bunkers (sheet piling, ecology blocks, or precast concrete panels) may be installed. For materials that may be fine enough to become windblown, the piles will be treated with crusting agents applied with a water truck to lock down the particles.

Much of the material may be moved using conveyor belts, which will reduce traffic in the stockpile area and will also reduce the generation of dust.

The stockpile areas will have mild slopes for drainage and control of water.

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#### **4.13 FIRE PROTECTION DURING SITE PREPARATION**

Fire protection during the early site activities will include controls to prevent fires from starting and means to control or extinguish them if they should occur.

The greatest fire hazard on the project will be the existing dead vegetation that covers much of the site. Removal of this material will occur in the spring and early summer timeframe before the materials have had time to dry out. No open burning will be allowed on the site, and activities that could initiate a fire, such as welding or other hot work, will be limited to areas that are 50 feet or more from combustible materials.

Refueling of heavy equipment will take place away from vegetation areas. All heavy equipment, trucks, and light vehicles will be equipped with a fire extinguisher that can be used to control small fires.

If a fire should ignite on the project site, the local fire department will be called to respond. Emergency phone numbers along with 911 numbers are posted on the site. The site will also have a water truck available for wetting down areas for dust control as well as fire prevention. The water truck can also be used to assist the local fire department in extinguishing a fire.

#### **4.14 SITE ROADS**

During the initial stages of construction, on-site roads will be located for convenience and graded as needed. As the site preparation continues and underground work is completed, the permanent site roads will be constructed. Road subgrades will be constructed and tested in conformance with the design specifications and drawings. When required, road beds will be reinforced with geosynthetic fabrics and materials.

Dust control will be maintained during the early stages of construction using water trucks. Water additives will be used if needed to further lock dust particles and prevent them from becoming airborne.

Roads around the processing building and parking lots will be hard surfaced (asphalt or concrete). Roads in the yard and stockpile areas will be base course gravel surfaces. Recycled asphalt pavement may be placed on some of the yard roads to further reduce dust generation and mud tracking. The location and elevations of the roads will be defined in the final design documents and constructed as early as possible to support construction of the other facilities. Roads traveled by trucks and heavy equipment will be a minimum of two lanes wide, and will be one-way whenever possible for safety purposes.

The proposed layout of the roads is depicted on Figure G-01. Specifications are included in the Project Plan that is contained in the Design Report. This work is to be performed in accordance with the requirements of technical specification Section 31 00 00.

The Transportation Plan will address traffic controls both on site and off site for the safety of the project workers and the general public. During site preparation, Tetra Tech will be working with the city to enhance traffic control, including possible turn lanes into and out of the site.

#### **4.15 EQUIPMENT FUELING**

Heavy equipment on site during the site preparation and clearing will be refueled from light vehicle mounted transfer tanks, with fuel being procured from off site. Equipment services for

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lubrication will require that used oil be removed from the site for recycling and that filters and other materials be disposed of in accordance with local regulations.

Dependent on fuel needs during operations, a fueling area may be established towards the end of the site preparation. On-site fueling includes use of double-walled tanks, lined fueling pads, and appropriately rated grounding and pump systems in accordance with the Spill Prevention, Control and Countermeasures Plan.

#### **4.16 DOCK LIFT PAD FOUNDATION FOR CRANE**

Capability to lift barges and other equipment related to the dredging process into and out of the waterway will be required. A crane will be brought to the site and set up when these activities are required. The crane will require a stable and level site adjacent to the water from which to operate. The design of the crane pad will be finalized during the 100 percent design. Dependent on the design and location, the pad may require piling or large spread foundations.

#### **4.17 PUG MILL**

A pug mill may be used to blend sands and additives. There are no special provisions for preparation since foundations are relatively minor and the units are typically engine powered. Electrical power to operate the additives silo (carbon), supporting conveyor belts, and other equipment will be routed underground to the area.

#### **4.18 DECONTAMINATION**

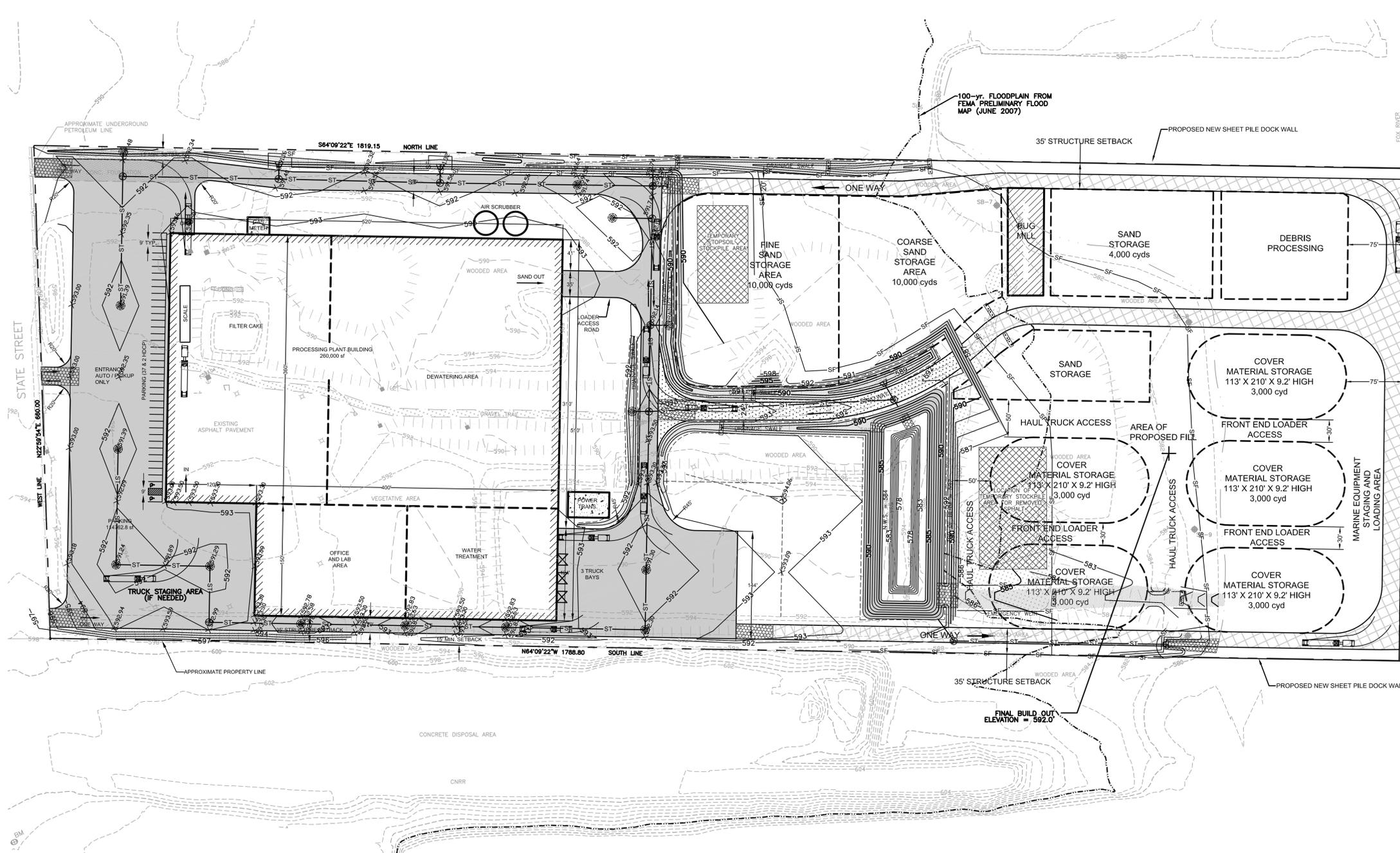
Equipment that has been in contact with polychlorinated biphenyls (PCBs) or with other contaminants or organisms will require decontamination and cleaning prior to release from the project. Heavy equipment and other mobile equipment will be decontaminated over an established decontamination area. For non-mobile equipment, such as barges, temporary decontamination liners will be put in place to collect all decontamination liquids and solids for treatment. Decontamination equipment will include high-pressure and steam cleaners as well as hand tools. Temporary enclosures will be available to place around equipment to protect from wind, low temperatures, or other inclement weather.

For water craft or equipment that has been in the water where viral hemorrhagic septicemia is a concern (either incoming or outgoing), after draining of all water (bilges, tanks, etc.) the decontamination will include a cleaning with a detergent followed by a disinfectant solution followed by drying.

Trucks hauling materials to disposal will go through an external wash prior to release from the site.

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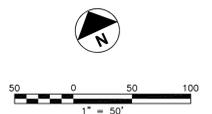
## Figures



**BENCHMARK**  
 BM-1 INTERSECTION OF LIBERTY STREET AND STATE STREET  
 NGS DISK ON THE TOP OF A COPPER COATED STEEL ROD AT GROUND LEVEL  
 ELEVATION = 598.21

EXISTING SITE INFORMATION DATA	
EXISTING SITE AREA = 1,188,498 SQ. FT. (27.284 ACRES)	
EXISTING PAVEMENTS AREA = 153,473 SQ. FT. (3.523 ACRES)	
EXISTING GRAVEL AREA = 32,397 SQ. FT. (744 ACRES)	
EXISTING WOODED AREA = 320,985 SQ. FT. (7.369 ACRES)	
EXISTING GREENSPACE = 489,203 SQ. FT. (11.231 ACRES)	

PROPOSED TOTAL SITE INFORMATION DATA	
TOTAL SITE AREA = 1,188,498 SQ. FT. (27.284 ACRES)	
PROPOSED PAVEMENTS AREA = 166,121 SQ. FT. (3.814 ACRES)	
PROPOSED ROOF AREA = 247,200 SQ. FT. (5.675 ACRES)	
PROPOSED GREENSPACE = 502,543 SQ. FT. (11.537 ACRES)	
PROPOSED POND AREA = 14,095 SQ. FT. (0.324 ACRES)	
TOTAL AREA OF DISTURBANCE = 762,300 SQ. FT. (17.5 ACRES)	



THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATIONS AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THEREOF.



**LEGEND**

---	APPROXIMATE SUBJECT PROPERTY LINE	●	SPOT ELEVATION
---	SECTION LINE	⊙	SANITARY MANHOLE
---	LOT LINE	⊙	STORM MANHOLE
---	EASEMENT LINE	⊙	ROUND CATCH BASIN
---	EDGE OF WATER	⊙	CURB INLET
---	2' CONTOUR	⊙	UNKNOWN MANHOLE
---	10' CONTOUR	⊙	FIRE HYDRANT
---	FENCE LINE	⊙	WATER VALVE UNDERGROUND
---	TREE LINE	⊙	LIGHT POLE
---	SANITARY SEWER LINE	⊙	POWER POLE
---	STORM SEWER LINE	⊙	POWER & LIGHT POLE
---	PHON	⊙	GUY WIRE
---	UNDERGROUND PHONE LINE	⊙	ELECTRIC MANHOLE
---	WATER LINE	⊙	TRAFFIC SIGNAL
---	UNDERGROUND GAS LINE	⊙	ELECTRIC BOX / PEDESTAL
---	UNDERGROUND ELECTRIC LINE	⊙	TRAFFIC SIGNAL BOX
---	OVERHEAD ELECTRIC LINE	⊙	TELEPHONE PEDESTAL
---	CONCRETE PAVEMENT	⊙	GAS METER
---	GRAVEL	⊙	SIGN
---	PROPOSED ASPHALT	⊙	BOLLARD
---	PROPOSED GRAVEL (PHASE 1)	⊙	WHEEL STOP
---	PROPOSED GRAVEL (PHASE 2)	⊙	FOUND IRON PIPE
---	PROPOSED BUILDING	⊙	SET IRON PIPE
		⊙	TREE & APPROXIMATE SIZE
		⊙	BUSH / SHRUB

CAD FILE: JRS\pipeline1-Figure G-01.dwg



**Figure G-01**  
 Master Site Layout with Phase 1 Grading  
 Lower Fox River-OUs 2 to 5

G:\06-3667-2008.02 Design-Fox River\STS UPDATES-MAY 29\STS Updates-Fox River\Figure G-01.dwg, 6/10/2008 10:40:48 AM, STS-PIPELINES-Adobe PDF.p3

## **APPENDIX C-3**

### **Lower Fox River Remedial Design 60 Percent Design Report**

#### **Site Preparation Work Plan**

#### **Little Rapids Dam Area**

**2008 and 2009**

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## **1.0 INTRODUCTION**

Year 2008 of the project will involve development of the project site and mobilization of dredge plant materials later in the year. In year 2009, access site work will include mobilization of dredging equipment, setting up the barge loading dock, and dredging in the Operable Unit (OU) 2 and OU 3 areas. Years 2010 through 2012 will require capping activities at upriver locations that are substantial distances from the Former Shell Property Staging Area, particularly for work in the upper OU 2 and OU 3 areas. In order to minimize the need to navigate the locks at the De Pere Dam and reduce capping material transportation time, a facility will be established upriver to receive, store, and transfer capping and cover materials as well as armored cap materials to the distribution barges. The facility would receive capping materials delivered by truck and deposited into various stockpiles. Barges would be docked and loaded by conveyor or other means with capping materials. No treatment or handling of contaminated wastes would occur at this site.

A site near the Little Rapids Dam area known as the Van Den Heuvel Property has been identified as an optimal location. At this time, several surveys related to the leasing agreements are underway (e.g., archaeological, historical, and land surveys). This document is written under the assumption that rights to use the Van Den Heuvel Property will be acquired.

## **2.0 SITE LOCATION**

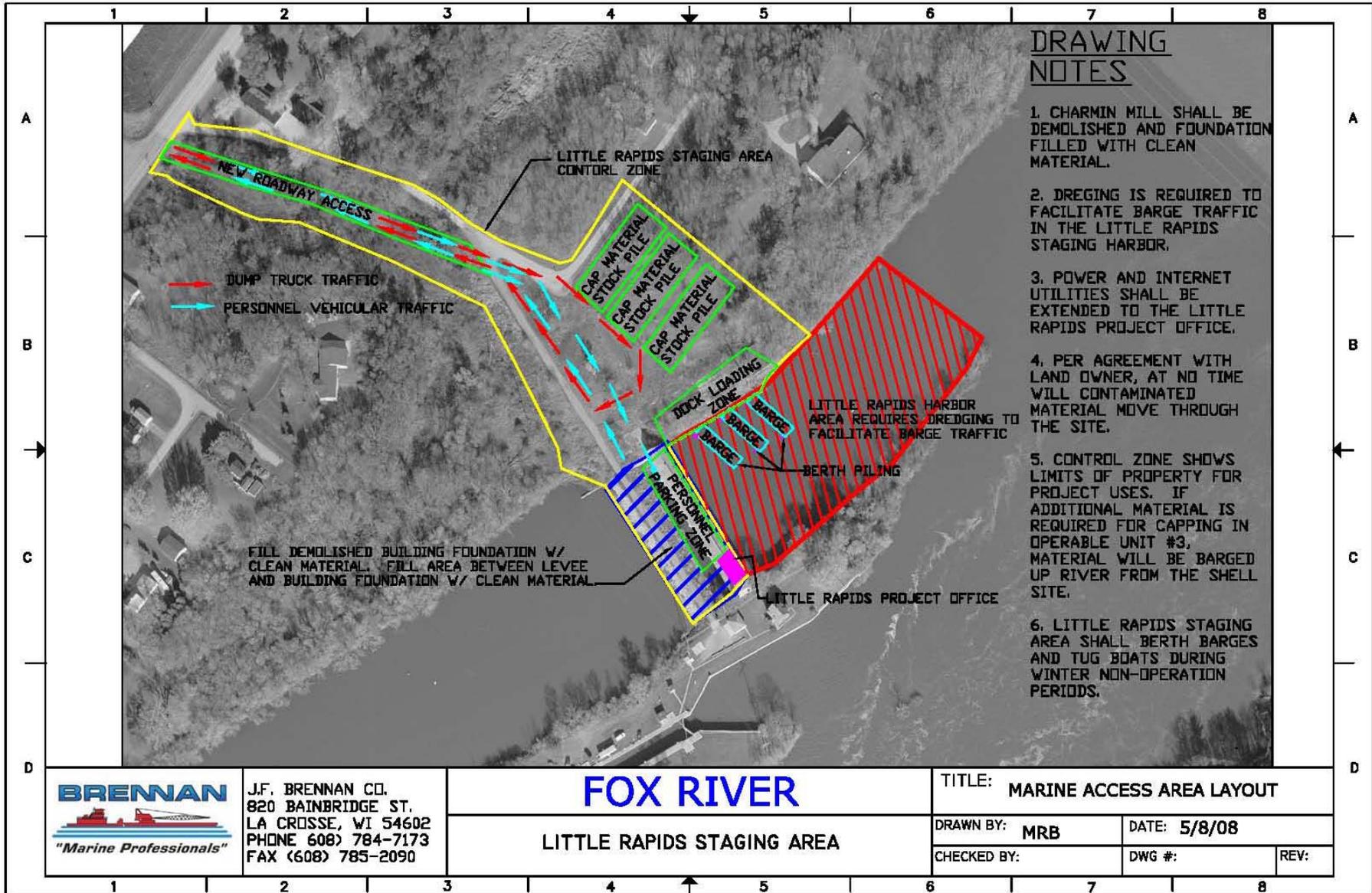
The Van Den Heuvel Property is also known as the Little Rapids Dam Area site. The property is located on the north side of the Little Rapids Dam and Lock area and accessed from Lost Dauphin Road. The total property includes a causeway across a dam, an older mill building below the dam, and a residence. Current plans are to lease part of the property to establish aggregate materials storage areas and barge loading. Figure 1 shows an aerial photo of the site before construction work, and Figure 2 is a photo with an overlay showing the project facilities.

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**Figure 1. Site Location before Construction**



Figure 2. Site Location after Construction



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### **3.0 PERMITS, RELEASES, AND APPROVALS**

Activities are currently underway to prepare for permit applications, survey, and reviews for:

- Historical site reviews
- Site development plan
- 401 water quality certification for dredging and filling, if applicable
- 404 submittal site activities (U.S. Army Corps of Engineers)
- Chapter 30 submittal site activities (Wisconsin Department of Natural Resources)
- Building demolition review
- Excavation permits
- Local county and township permitting as required
- Stormwater discharge Notice of Intent plan
- Access road construction and drainage plan
- Lead sampling of soils and building structure
- Additional wetland delineation review of access site

If additional permits are identified, they will be acquired before the controlled work is initiated.

### **4.0 GENERAL ACTIVITIES**

#### **4.1 SITE ACCESS**

The current access road is steep, narrow, and rough and will require improvement. An alternate route from the site would involve construction of a new access road that would provide a safer Lost Dauphin Road entrance and exit; however, the new access road would require filling across a lowland depression (possible wetlands).

Roads into the site will be approximately 25 feet wide (two-lane), crowned for drainage, and surfaced with gravel roadbase materials. Side ditches will be seeded to prevent silt runoff or erosion. The Transportation and Disposal Plan will address signage, turn lanes, etc., on Lost Dauphin Road.

Access to the dam area, causeway, and residence areas will be maintained. If the proposed new access road is developed, the existing road to the residence may be rerouted and separated from the site to avoid commingling of traffic.

This work is to be performed in accordance with the requirements of technical specification Section 31 00 00.

#### **4.2 CLEARING, GRUBBING, AND DEBRIS REMOVAL**

The site is currently covered with numerous trees and brush that will be cleared using construction equipment. Trees and other materials will either be chipped for later use or hauled offsite for disposal.

Concrete foundations, brick, and other former building debris will be removed and used for fill in lower areas, covered in place, or removed for offsite disposal.

This work is to be performed in accordance with the requirements of technical specification Section 31 11 00.

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### **4.3 GRADING AND LEVELING**

The proposed site has substantial elevation changes that will require cutting and filling to prepare the site for use as a storage area. Surveys are in progress, and the soil balance will be maintained to avoid the importing of additional fill materials.

The surface of the storage areas will be covered with a compacted base course material to prevent contamination of the stored materials with the native soils.

Silt fences will be installed prior to the start of clearing and earthwork and will be maintained throughout the use of the site. The site drainage will be controlled during the earthwork to prevent silt and stormwater runoff from entering the Fox River.

Barges will be loaded using conveyors or directly by loader. Current plans on the river shoreline will include cutting of trees and other brush to allow movement of the material barges and leaving the remainder of the shoreline undisturbed.

### **4.4 TEMPORARY FACILITIES**

The site will be unoccupied for significant periods and will have only limited personnel onsite during active use to receive materials and assist in barge loading operations. A small site trailer is anticipated, with portable restroom facilities for site personnel.

Parking areas will be near the trailer and outside the active work area.

### **4.5 UTILITIES**

Electric power is present on the site and will be used for the temporary trailer, security lighting, etc. No other utilities are anticipated.

### **4.6 TRAFFIC CONTROL – ONSITE ONLY**

Offsite traffic control will be included in the project Transportation and Disposal Plan.

Onsite traffic will be limited to the capping materials, delivery trucks, and a limited number of workers. Onsite traffic controls will be speed limits (to help control dust generation and to provide safe turnaround), dumping, and exit paths using one-way loops whenever possible. In addition, stop signs will be placed for all directions at all intersections.

### **4.7 STOCKPILE AREAS**

The stockpiles will be stacked using either stacker conveyors or loaders. Separation will be maintained between the stockpiles to minimize commingling of the materials. To optimize space, concrete barriers may be used in some areas. Silt fences will be installed in the drainage lines to filter any sheet drainage from the stockpile areas.

### **4.8 FUELING**

Only limited equipment will be onsite, and it is anticipated that this equipment will be fueled either by a fueling service or by use of light, vehicle-mounted fuel transfer tanks with fuel purchased locally.

### **4.9 SECURITY**

The site will not contain hazardous or high-value equipment or materials and is therefore a low security risk. Site security will include a pole or trailer area light and a gate or other closure at the Lost Dauphin Road entrance to the storage area.

## **APPENDIX C-4**

### **Lower Fox River Remedial Design 60 Percent Design Report**

#### **Concrete Foundation Work Plan**

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G-101 Dewatering and Water Treatment Facilities, General Building Layout

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## Acronyms and Abbreviations

ACI	American Concrete Institute
ASTM	American Society for Testing and Materials
ft	foot
in.	inch
OU	Operable Unit(s)
PCB	polychlorinated biphenyl
psi	pounds per square inch
Tetra Tech	Tetra Tech EC, Inc.
WP	Work Plan

---

## 1.0 INTRODUCTION

This document presents the plan for the design and construction of the Dewatering Plant Building foundation. This Work Plan (WP) addresses the pertinent elements of the design and construction of the concrete building foundation and other concrete pads to support the dewatering facility operations. Both the design and construction of the concrete foundation will be performed by others.

### 1.1 PROJECT BACKGROUND

Tetra Tech EC, Inc. (Tetra Tech) is the General Contractor for remediation of polychlorinated biphenyls (PCBs) in Operable Units (OUs) 2, 3, 4, and 5 of the Lower Fox River and Green Bay Site. The Lower Fox River Site extends 39 miles from the outlet of Lake Winnebago to the mouth of the river, where it discharges into Green Bay.

The project involves construction of an upland staging area for de-sanding, dewatering, and water treatment operations. The former Shell Oil Property adjacent to Georgia-Pacific West Mill in OU 4 was identified as the staging area. The proposed staging area covers about 16 acres of upland space. The dewatering plant is located on the west side of the site and will be used to dewater dredged material from the Fox River.

### 1.2 CONCRETE FOUNDATION DESCRIPTION

The concrete foundation for the dewatering plant is divided into four distinct areas, as shown on Figure G-101:

Dewatering Area—approximately 280 feet (ft) x 360 ft, divided into three 120-ft-wide bays and supporting a 67-ft-tall prefabricated metal building. Concrete pads and curbs will be provided for various tanks and other equipment, as necessary.

Filter Cake Storage Area—approximately 240 ft x 360 ft, divided into four separate bays and supporting a 31-ft-tall prefabricated metal building. Concrete pads and curbing will be provided to subdivide areas for storage of sludge filter cakes.

Water Treatment Facility—approximately 150 ft x 200 ft, divided into three areas and supporting a 31-foot-tall prefabricated metal building. Concrete pads and curbs will be provided for various tanks and other equipment, as necessary.

- Laboratory—approximately 150 ft x 200 ft, divided into three areas and supporting a 31-foot-tall prefabricated metal building. An exterior concrete pad, approximately 6 ft x 20 ft, will support gas lines.

The work shall entail the structural design and construction of all building foundations, footings, tank and equipment pads, curbing, and any other concrete items associated with the Dewatering Facility.

## 2.0 DESIGN REQUIREMENTS

The design of the concrete foundation will be in accordance with the latest edition of American Concrete Institute (ACI) 301, *Specification for Structural Concrete for Buildings*; ACI 318,

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*Building Code Requirements for Reinforced Concrete*; and the following American Society for Testing and Materials (ASTM) standards.

ASTM A185	Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C143	Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Specification for Sheet Materials for Curing Concrete
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C881	Standard Specification for Epoxy-Resin Base Bonding System for Concrete
ASTM C920	Standard Specification for Elastomeric Joint Sealants
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM D994	Preformed Expansion Joint Filler for Concrete (Bituminous Type)

The concrete shall have a 28-day compressive strength of 4,500 pounds per square inch (psi).

### **3.0 FIELD ACTIVITIES**

The WP activities for the construction of the concrete foundation include the following:

- Excavation and compaction, as necessary, for proper placement of the concrete foundation forms and slab, in accordance with Specification Section 31 00 00
- Mixing, placing, and curing of cast-in-place concrete to include, but not be limited to, slabs on grade, curbs, grade beams, footings, sumps, and equipment pads
- Installation of embedded items and inserts furnished under other specifications
- Form materials and related items, including installation and removal of formwork
- Application of treatments and finishes
- Curing of concrete
- Installation of joint seals and waterstops, as necessary
- Any miscellaneous items necessary for concrete placement

All concrete shall be placed in accordance with ACI 304, *Guide for Measuring, Mixing, Transporting and Placing Concrete*. Concrete will be batched, mixed, and transported in accordance with ASTM C94.

### **3.1 PREPARATION OF SURFACES**

Subgrade or surfaces of previously hardened concrete not treated with a bonding adhesive against which fresh concrete will be placed will be moistened with clean water prior to concrete

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placement. Such surfaces shall also be clean and free of frost, ice, mud, and standing water. In locations where new concrete is doweled to existing work, dowel holes will be drilled in the existing concrete and steel dowels will be installed with epoxy resin, in accordance with the manufacturer's recommendations.

Subgrade surfaces shall be adequately compacted and free of any organic matter prior to concrete placement. Any gravel subbase placed beneath a slab will be compacted to near maximum density in thin layers not to exceed 4 inches (in.) prior to compaction.

No concrete will be placed until all adjacent operations that might be detrimental to the proper setting and curing of concrete have been completed.

### **3.2 FORMWORK**

All formwork shall be constructed in accordance with ACI 347, *Recommended Practice for Concrete Formwork*. Forms will be fabricated and erected to accurately conform to the required lines, grades, and shapes indicated on the construction drawings. Forms will be sufficiently tied and braced to maintain proper position and dimensions during concrete placement. Forms and supports will be arranged so that they may be readily removed without hammering or prying against concrete. The Contractor's approval of the completed formwork will be obtained prior to placement of concrete.

Forms and shores for load-carrying concrete structures will not be removed until 7-day test cylinders have been broken and results provide a basis for predicting when concrete will attain sufficient strength to support expected loads. In general, the strength must be at least 70 percent of the required 28-day compressive strength.

Forms will be constructed of lumber, steel, plywood, or wood fiberboard, or a combination of these materials. All forms will be clean and properly coated prior to use, and free of surface defects that would affect the concrete finish. Formwork for exposed concrete will be designed to produce the required concrete finish.

All tolerances, preparation of forms surfaces, removal of forms, reshoring, and removal strength shall be in accordance with ACI 301.

### **3.3 REINFORCEMENT**

All reinforcement bars will meet the requirements of ACI 315, *Details and Detailing of Concrete Reinforcement*. Welded wire reinforcement will meet the requirements of ASTM A185. All reinforcement will be bent cold, unless prior Contractor approval is obtained.

Concrete reinforcement will be accurately placed and supported prior to concrete placement. All reinforcement will be secured against displacement during concrete placement.

### **3.4 JOINTS**

All construction joints will be placed as shown on the design drawings. Joints not shown on the drawings, but necessary for construction, will be located so as to least impair the strength of the structure and will be approved by the Contractor prior to being incorporated in the field. All joints will be perpendicular to the main reinforcing, and reinforcement will be continuous across all construction joints.

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Contraction joints will be installed at locations indicated on the design drawings, or at alternate locations with Contractor approval. Contraction joints will be saw cut as a continuous slot to a depth of one-fourth the slab thickness, and made within 12 hours of concrete placement. All such joints will be sealed with elastomeric joint sealant that complies with ASTM C920.

Expansion joints will be installed at the locations and in the manner shown on the design drawings. All expansion joints will be filled with expansion joint filler that complies with ASTM D994.

All embedded items will be placed accurately and supported against displacement prior to placement of concrete. All embedded items will be relatively clean and free of oil, loose scale / rust, or paint.

Waterstops will be located in concrete joints as indicated on the design drawings, and installed in accordance with the manufacturer's recommendations.

### **3.5 CONCRETE PLACEMENT**

All concrete will be placed in accordance with ACI 304 and ACI 318. The Contractor will be notified at least 24 hours prior to commencement of concrete placement. All formwork will have been completed and inspected by the Contractor. Underground pipe, conduits, and ducts in the pour area will be completely installed prior to placing concrete. The placement area will be free of debris.

Concrete will be placed continuously between predetermined expansion, control, and construction joints. New construction joints will be only at locations permitted by the Contractor. Concrete will be placed with chutes as close as possible to the final position.

Concrete will be consolidated with high-frequency, internal vibrators to work concrete around all reinforcement, embedments, and into corners to eliminate all air or stone pockets. The type and number of vibrators will be pre-approved by the Contractor. Only experienced personnel will operate the vibrators. Vibrators will be inserted and withdrawn in the vertical position at approximate 18-inch separation points. Vibrators will not be used to transport concrete within forms or in chutes.

Concrete placed in cold weather will be in accordance with ACI 306, *Cold Weather Concreting*, and that placed in hot weather will be in accordance with ACI 305, *Hot Weather Concreting*.

Records of concrete placement will be maintained at the site and include date of placement, location, quantity, air temperature, and test samples taken. Delivery tickets for each batch of ready-mixed concrete will be provided to the Contractor. Each delivery ticket will include, as a minimum, the following:

- Water/cement ratio and amount of water
- Type, brand, and amount of cement
- Type, brand, and amount of admixtures
- Maximum size of aggregate
- Weights of fine and coarse aggregate
- Indication that all ingredients are as previously certified or approved (approved mix number, etc.)

- 
- Date and time

### **3.6 CURING AND PROTECTION**

Immediately following placement, concrete will be protected from premature drying with water, waterproof sheeting, or approved curing compounds. Waterproof sheet material will comply with ASTM C171 and curing compounds with ASTM C309. Curing compounds, if approved by the Contractor, will not be applied to areas that will receive fresh cement, paint, or other coatings.

Freshly placed concrete will be protected from excessively hot or cold temperatures in accordance with ACI 305 or 306 (blankets, tents, fans, etc.).

Freshly placed concrete will be protected from mechanical injury and flowing water by the forms, sandbags, warning tape, or other means, as necessary.

### **3.7 SURFACE DEFECT REPAIRS**

All surface repairs, after removal of forms, will be in accordance with ACI 301. Excessive honeycomb or embedded debris will be cut out and repaired. All tie holes and spreaders will be cut back 1-1/2 in., and the resulting hole will be cleaned, moistened, and patched.

### **3.8 CONCRETE FINISHES**

All concrete surfaces not placed in contact with formwork will receive the following treatment before receiving the final surface finish: strike off top surface to the proper contour, grade, and elevation, and wood float to correct any unevenness. The final surface finish for unformed areas will be a "broom or belt finish" complying with ACI 301, Paragraph 5.3.4. Formed surfaces will comply with ACI 301, Paragraph 5.3.3, for "smooth-form finish."

### **3.9 CONCRETE STRENGTH SAMPLES**

A minimum of three concrete test cylinders will be prepared for each class of concrete placed per day. Additional sets of three cylinders will be made for each 50 cubic yards of concrete placed per day. These test cylinders will be prepared and cured, under standard moisture and temperature conditions, in accordance with ASTM C31.

One moisture-cured test cylinder will be tested at 7 days after the concrete is placed. The remaining two test cylinders will be tested at 28 days after the concrete is placed. An additional, or fourth, test cylinder may be prepared, as directed by the Contractor, to cure in the field for 28 days under the same conditions as the main concrete. This test cylinder will be held in reserve to test if another specimen develops a dubious test value.

All test cylinders will be tested for compressive strength at an independent laboratory in accordance with ASTM C39. The testing laboratory will provide two copies of all test reports to the Contractor, and one copy to the concrete Supplier.

## **4.0 REQUIRED SUBMITTALS**

The following documents will be submitted for Contractor review and approval:

- 
- Shop drawings of reinforcing steel, construction joint details and alternate locations, and embedded items, as required
  - Manufacturer's product data on admixtures, joint sealants, waterstops, and miscellaneous items
  - A concrete mix design for each concrete mix used in the work
  - Certifications from the Manufacturer(s) that materials supplied meet or exceed the specification requirements

## **5.0 HEALTH AND SAFETY REQUIREMENTS**

All construction work will be conducted in accordance with the approved task-specific Health and Safety Plan.

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## Figures

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B	50% DESIGN SUBMISSION					05/15/09
A	50% DESIGN SUBMISSION					05/15/08

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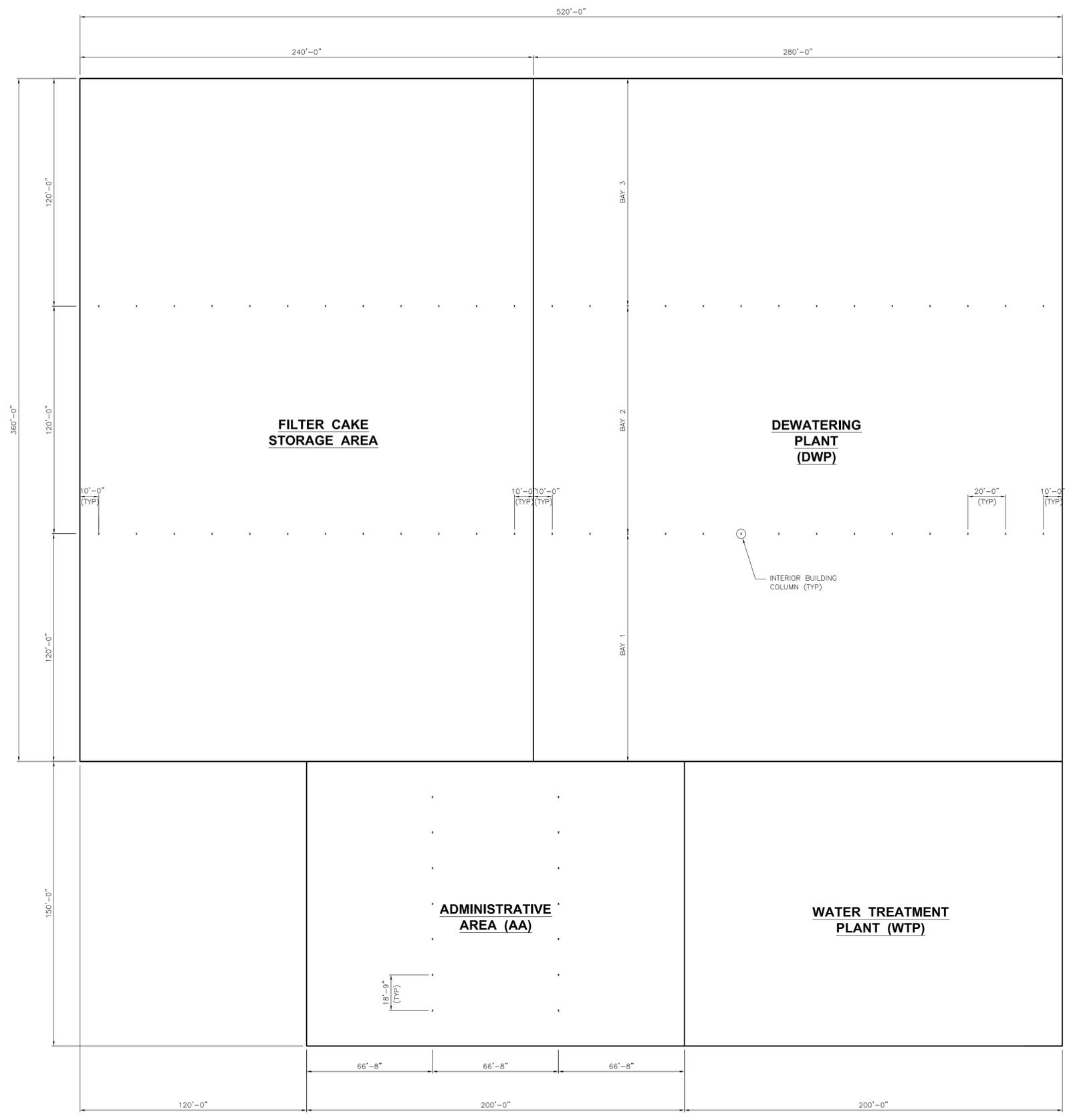
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**LOWER FOX RIVER PRP GROUP**  
GREEN BAY, WISCONSIN

**LOWER FOX RIVER SITE OPERABLE UNITS 2-5**  
GREEN BAY, WISCONSIN

WATER TREATMENT PLANT DESIGN  
**DEWATERING AND WATER TREATMENT FACILITIES**  
GENERAL BUILDING LAYOUT

CONTRACT NO.:  
SPEC. NO.:  
SCALE: AS SHOWN  
CAD FILE: 3667-G-101-REV B.DWG  
SHEET - OF -  
SIZE: D G-101



## **APPENDIX C-5**

### **Lower Fox River Remedial Design 60 Percent Design Report**

### **Metal Building Erection Work Plan**

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Preliminary Pre-Engineered Building Design Drawings

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## Acronyms and Abbreviations

AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWS	American Welding Society
ft	foot
MBMA	Metal Building Manufacturers Association
OU	Operable Unit(s)
PCB	Polychlorinated Biphenyl
QA	Quality Assurance
QC	Quality Control
SSPC	Society for Protective Coating
Tetra Tech	Tetra Tech EC, Inc.
WP	Work Plan

---

## 1.0 INTRODUCTION

This document presents the plan for the erection of the Dewatering Plant Metal Building. This Work Plan (WP) addresses the pertinent elements for the construction of the prefabricated metal building system to support the dewatering facility operations. Both the design and construction of the metal building system will be performed by others.

### 1.1 PROJECT BACKGROUND

Tetra Tech EC, Inc. (Tetra Tech) is the General Contractor for remediation of polychlorinated biphenyls (PCBs) in Operable Units (OUs) 2, 3, 4 and 5 of the Lower Fox River and Green Bay Site. The Lower Fox River Site extends 39 miles from the outlet of Lake Winnebago to the mouth of the river where it discharges into Green Bay.

The project involves construction of an upland staging area for desanding, dewatering, and water treatment operations. The former Shell Oil Property adjacent to Georgia-Pacific West Mill in OU 4 was identified as the staging area. The proposed staging area covers about 16 acres of upland space. The dewatering plant is located on the west side of the site and will be used to dewater dredged material from the Fox River.

### 1.2 METAL BUILDING DESCRIPTION

The metal building system for the dewatering plant is divided into four distinct areas, as shown on Figure G-101:

- Dewatering Plant – approximately 280 feet (ft) x 360 ft, divided into three 120-foot-wide bays with an eave height of 67 ft
- Filter Cake Storage Area – approximately 240 ft x 360 ft, divided into four separate bays and with an eave height of 31 ft
- Water Treatment Plant – approximately 150 ft x 200 ft, with an eave height of 31 ft
- Administrative Area – approximately 150 ft x 200 ft, divided into three areas and with an eave height of 14 ft

The work shall entail the erection of a pre-fabricated metal building and all ancillary items associated with the Dewatering Facility.

## 2.0 REFERENCES

The erection of the metal building system will be in accordance with the latest edition of MBMA, *Metal Building Systems Manual*, Specification 02500, the Building Site Layout Drawings (provided by Contractor), General Steel Building Plans, and the latest edition of the following Standards and Codes.

AISC S303	Code of Standard Practice for Steel Buildings and Bridges
AISC 348	Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts
ANSI/AISC 360	Specification for Structural Steel Buildings
AISC 325	Manual of Steel Construction 13 <sup>th</sup> Edition

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AISC 326                      Detailing for Steel Construction  
AISC 341                      Seismic Provisions for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-673                      Cold-Formed Steel Design Manual

WISCONSIN COMMERCIAL BUILDING CODE

WISCONSIN FIRE PREVENTION CODE

BROWN COUNTY (WISCONSIN) CODE OF ORDINANCES

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA-06                      Metal Building Systems Manual  
AMERICAN WELDING SOCIETY (AWS)

AWS D1.1                      Structural Welding Code – Steel (20<sup>th</sup> Edition)

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC-02                      Hand Tool Cleaning Preparation

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A123                      Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products  
ASTM A153                      Standard Specification for Zinc (Hot-Dip) on Iron and Steel Hardware  
ASTM C1107/WK13513                      Standard Specification for Packaged, Dry Hydraulic-Cement Grout (Non-Shrink)  
ASTM A325                      Standard Specification for Structural Bolts, Steel, Heat Treated, 120-105 ksi Minimum Tensile Strength  
ASTM A490                      Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength

### **3.0    FIELD ACTIVITIES**

The WP activities for the erection of the metal building system include the following elements.

#### **3.1    GENERAL**

Erection will be in accordance with the approved Manufacturer’s erection instructions and drawings and with applicable provision of AISC S303, 348, 360, 325, 326, and 341 as well as AISI SG-673 and MBMA-06. Assembly will follow all requirements of the Wisconsin Commercial Building Code, the Wisconsin Fire Prevention Code, and the Brown County (Wisconsin) Code of Ordinances. All welding of steel will be in accordance with AWS D1.1. High-strength bolting will conform to AISC 326 using ASTM A325 or ASTM A490 bolts.

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All required building permits will be prominently displayed at the building site. A utility locate (Dig Safe) organization will be contacted to mark all existing underground utilities prior to the start of field work.

Materials will be delivered to the site in a dry, undamaged condition, stored out of contact with the ground, and protected from the weather. Any delivered items that are damaged and cannot be restored to “like-new” conditions will be replaced. Stained or discolored items will be replaced, as directed by the Contractor.

### **3.2 FRAMING AND STRUCTURAL MEMBERS**

All field welding required for erection of the metal building will comply with AWS D1.1. A nonshrink grout will be used under base plates and sill members to provide a uniform bearing on the foundation. Temporary bracing will be provided to assure stability of the structure during construction. Field cutting or altering structural members will be done only with prior approval from the Contractor.

Base plate anchor bolts will be hot-dipped galvanized according to ASTM A123 or A153, as applicable.

Structural members will be accurately placed to ensure proper fitting of side and roof covering.

### **3.3 SIDING AND ROOF COVERING**

Wall coverings will be installed with the longitudinal configuration in the vertical direction and roof coverings with the longitudinal configuration in the direction of the roof slope. Closure strips will be installed to provide weathertight construction. All accessories will be installed to the framing members, except as noted on the drawings.

Concealed fastening clips will be used to fasten exterior panels to the framing members. Spacing of such clips will be in accordance with the manufacturer’s recommendations. Fasteners or anchor clips will not exceed 12 inches on center spacing unless otherwise approved. Fasteners will not puncture covering sheets except as approved for certain items (i.e., flashing, closures, or trim). All joints will be sealed per the manufacturer’s recommendations.

### **3.4 GUTTERS AND DOWNSPOUTS**

Rigid attachments will be used for attaching all gutters and downspouts to the building. Cleat spacing for gutters will be at 16 inches. Brackets and spacers for gutters will be spaced at 36 inches on center. Downspout supports will be per manufacturer’s recommendations.

### **3.5 INSULATION, WALL LINER/VAPOR RETARDER**

Insulation and wall liner/vapor retarder for the building exterior will be installed in accordance with the manufacturer’s instructions.

### **3.6 DOORS AND WINDOWS**

All doors and windows will be installed plumb and true, anchored to the supporting construction, and adjusted for proper operation. All joints at doors and windows will be sealed, per the manufacturer’s recommendations, to provide weathertight construction.

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### **3.7 LOUVERS AND VENTILATORS**

All louvers and ventilators will be installed, per the manufacturer's instructions, to assure weathertight construction.

### **3.8 OVERHEAD COILING DOORS**

All overhead coiling doors will be securely attached to the building structure, in accordance with the manufacturer's instructions. Once installed, such doors will be adjusted to allow door to operate freely and correctly.

### **3.9 FIELD PAINTING**

Any detected abrasions or corroded spots on shop-painted surfaces will be prepared in accordance with SSPC-02, prior to touch-up painting to match the shop coat. Factory color finishes will be touched up, as necessary, with the manufacturer's recommended touch-up paint.

### **3.10 CLEANUP**

The building site will be left in a neat and clean condition. Building debris will be cleaned up periodically during erection and at final completion.

## **4.0 REQUIRED SUBMITTALS**

Five copies of the following documents will be submitted for Contractor review and approval:

- Erection Plan - to include instructions and drawings that describe the preparation requirements, assembly sequence, temporary bracing, and shoring necessary for the metal building system erection
- Subcontractor qualifications for similar types of buildings for at least 5 years of experience
- A Site-Specific Quality Assurance Plan
- All building permits, as necessary

## **5.0 HEALTH AND SAFETY REQUIREMENTS**

All construction work will be conducted in accordance with the approved task-specific Health and Safety Plan.

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## Figures

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REV	DESCRIPTION	DRN	DES	CHK	APP	DATE
B	50% DESIGN SUBMISSION					05/15/09
A	50% DESIGN SUBMISSION					05/15/08

DESIGNED BY: J. SINGER  
DRAWN BY: F. MICHIELLI  
CHECKED BY: J. FRANCO  
APPROVED BY: R. FEENEY  
DATE: MAY 15, 2008

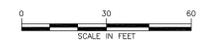
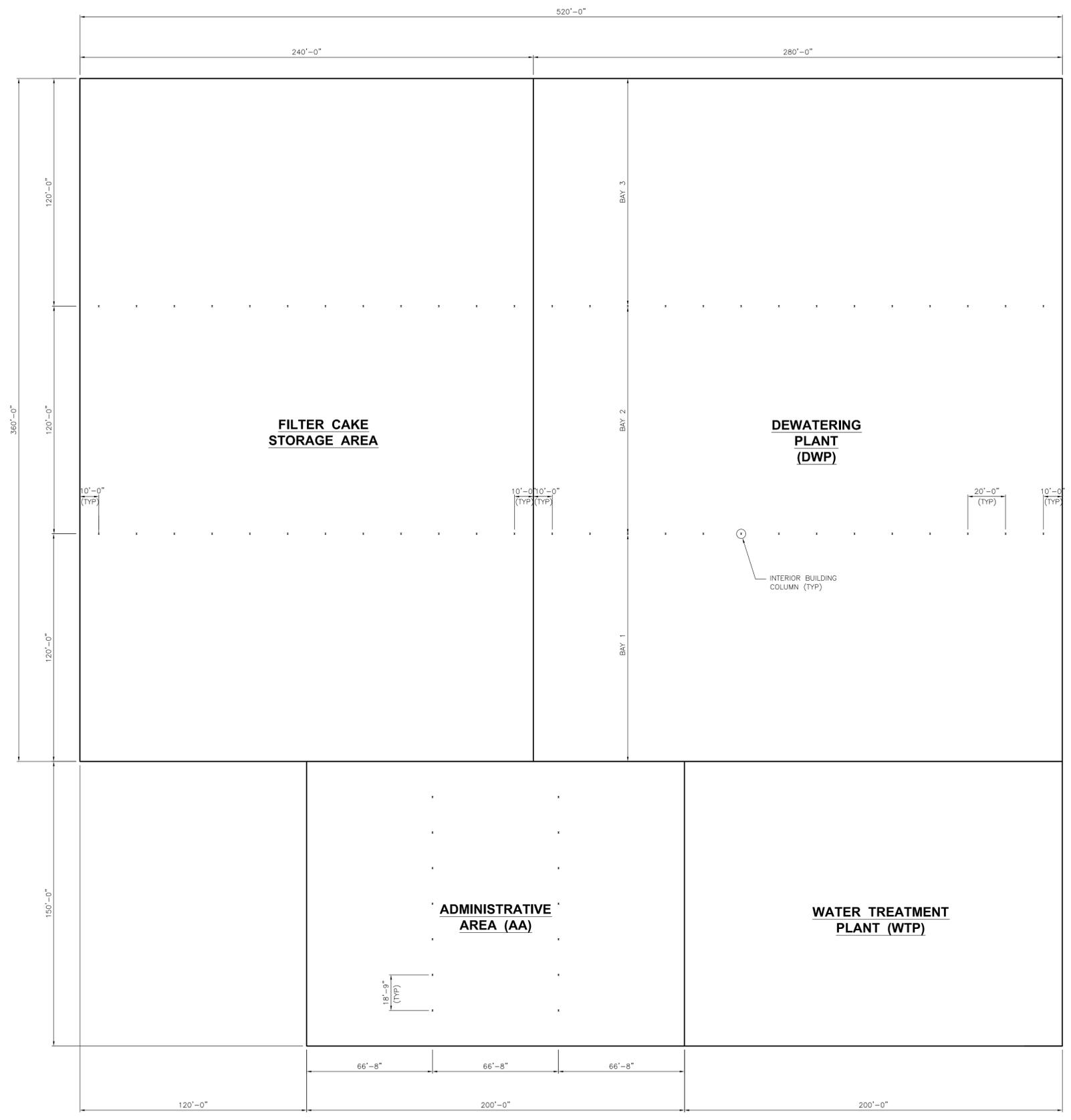
**TETRA TECH EC, INC.**  
133 FEDERAL STREET, 6TH FLOOR  
BOSTON, MA 02110  
TEL: (617) 457-8200 FAX: (617) 457-2488

**LOWER FOX RIVER PRP GROUP**  
GREEN BAY, WISCONSIN

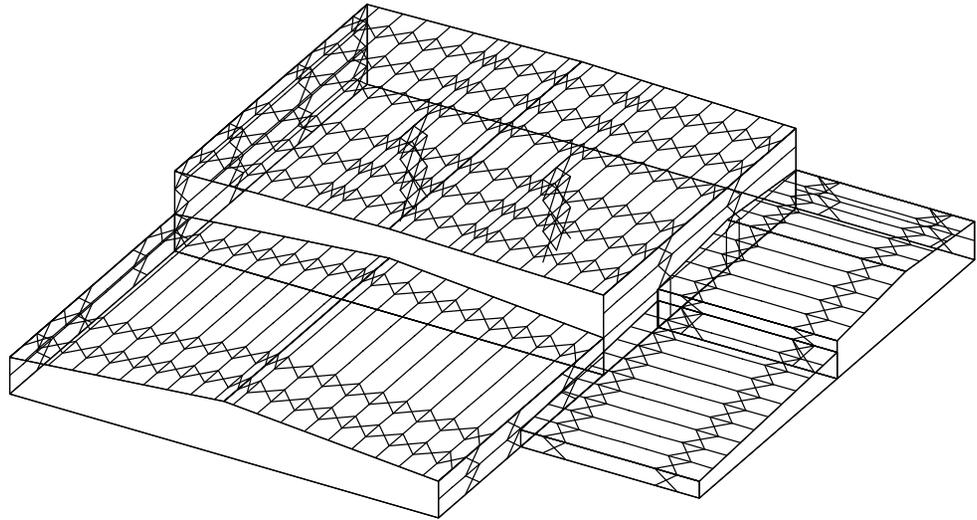
**LOWER FOX RIVER SITE OPERABLE UNITS 2-5**  
GREEN BAY, WISCONSIN

WATER TREATMENT PLANT DESIGN  
**DEWATERING AND WATER TREATMENT FACILITIES**  
GENERAL BUILDING LAYOUT

CONTRACT NO.:  
SPEC. NO.:  
SCALE: AS SHOWN  
CAD FILE: 3667-G-101-REV B.DWG  
SHEET - OF -  
SIZE: D G-101



DRAWING INDEX		DRAWING RELEASE HISTORY		
DRAWING TITLE	PAGES	TYPE	DATE	DESCRIPTION
Cover Sheet				
Notes				
Anchor Rod Plan				
Primary Structural				
Secondary Structural				
Covering				
Special Drawings				
Standard Erection Details				



### GENERAL NOTES

**MATERIALS**

3 PLATE WELDED SECTIONS	A529, A572, A1011, A1018	GRADE 55
COLD FORMED LIGHT GAGE SHAPES	A653, A1011	GRADE 55
GRADE RODS	A572	GRADE 65
HOT ROLLED MILL SHAPES	A36, A529, A572, A588, A709, A992	GRADE 36 KSI UNLESS NOTED
HOT ROLLED ANGLES	A529, A572, A588, A709, A992	GRADE 50
HOLLOW STRUCTURAL SECTION (HSS)	A500	GRADE B
CLADDING	A653, A792	GRADE 50 OR GRADE 80

**A325 & A490 BOLT TIGHTENING REQUIREMENTS**

IT IS THE RESPONSIBILITY OF THE ERECTOR TO INSURE PROPER BOLT TIGHTNESS IN ACCORDANCE WITH APPROPRIATE REGULATIONS. THE FOLLOWING CRITERIA IS IN COMPLIANCE WITH THE LATEST SPECIFICATIONS, HOWEVER THE ERECTOR IS RESPONSIBLE TO VERIFY LOCAL AUTHORITY REQUIREMENTS.

ALL CONNECTIONS MADE WITH A325 BOLTS MAY BE TIGHTENED TO THE "SNUG TIGHT" CONDITION AS PERMITTED BY THE SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS (2004 ED), UNLESS INDICATED AS "PRE-TENSIONED" ELSEWHERE IN THESE DRAWINGS, OR AS INDICATED BELOW.

PRE-TENSION BOLTS ON PRIMARY FRAMING, BOLTED BRACING, AND STRUT CONNECTIONS IF LOCATED IN IBC SEISMIC PERFORMANCE / DESIGN CATEGORY D, E OR F, USC ZONE 3 OR 4. SEE CODES AND LOADS NOTES BELOW FOR SEISMIC DESIGN CATEGORY. PRE-TENSION ALL PRIMARY FRAMING CONNECTIONS IN CANADA.

PRE-TENSION BOLTS ON PRIMARY FRAMING, BOLTED BRACING, STRUTS AND CRANE RUNWAY CONNECTIONS IF BUILDING SUPPORTS A CRANE WITH A CAPACITY GREATER THAN 5 TONS.

CONNECTIONS THAT SUPPORT RUNNING MACHINERY AND OTHER SOURCES OF IMPACT OR STRESS REVERSAL MUST BE PRE-TENSIONED.

ALL SLIP CRITICAL CONNECTIONS AS INDICATED IN THESE DRAWINGS WITH -SC DESIGNATION MUST BE PRE-TENSIONED. SC TYPE CONNECTIONS MUST BE FREE OF PAINT, OIL OR OTHER MATERIALS THAT REDUCE THE FRICTION AT CONTACT SURFACES.

CONNECTIONS DESIGNATED AS A325-X OR A490-X SHALL BE INSTALLED WITH BOLT HEAD ON SIDE OF THE THINNEST PLATE BEING CONNECTED.

SECONDARY MEMBERS AND FLANGE BRACE CONNECTIONS ARE ALWAYS "SNUG TIGHTENED", EVEN IF ABOVE CONDITIONS EXIST, UNLESS SPECIFICALLY NOTED OTHERWISE ON DETAILS.

WASHERS ARE NOT REQUIRED FOR "SNUG-TIGHT" CONNECTIONS. PRE-TENSIONED A325 OR A490 CONNECTIONS TIGHTENED USING THE TURN-OF-THE-NUT METHOD DO NOT REQUIRE WASHERS. A490 BOLTS MUST ALWAYS BE PRE-TENSIONED.

**CODES AND LOADS**

WHEN MULTIPLE BUILDINGS ARE INVOLVED, SPECIFIC LOAD FACTORS FOR DIFFERING OCCUPANCIES, BUILDING DIMENSIONS, HEIGHTS, FRAMING SYSTEMS, ROOF SLOPES, ETC., MAY RESULT IN DIFFERENT LOAD APPLICATION FACTORS THAN INDICATED BELOW. SEE CALCULATIONS FOR FURTHER DETAILS.

Building Code: 2008 Wisconsin Building Code  
Based on Building Code: 2006 International Building Code

Building A: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not Including bldg wt)  
Building B: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not Including bldg wt)  
Building C: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not Including bldg wt)  
Building D: Building Use:Hazardous / Special Occupancy, Collateral Gravity: 11.00 psf (Not Including bldg wt)

LIVE LOADS AND RAINFALL  
Live Load: 20.00 psf (Not Reducible)  
Rainfall: 5.00 inches per hour

**SNOW LOAD**  
Ground Snow: 40.00 psf, Flat Roof Snow: 25.20 psf  
Snow Exposure Category (Factor): 1 Fully Exposed (0.90)  
Snow Importance: 1.000 Thermal Category (Factor): Heated (1.00)

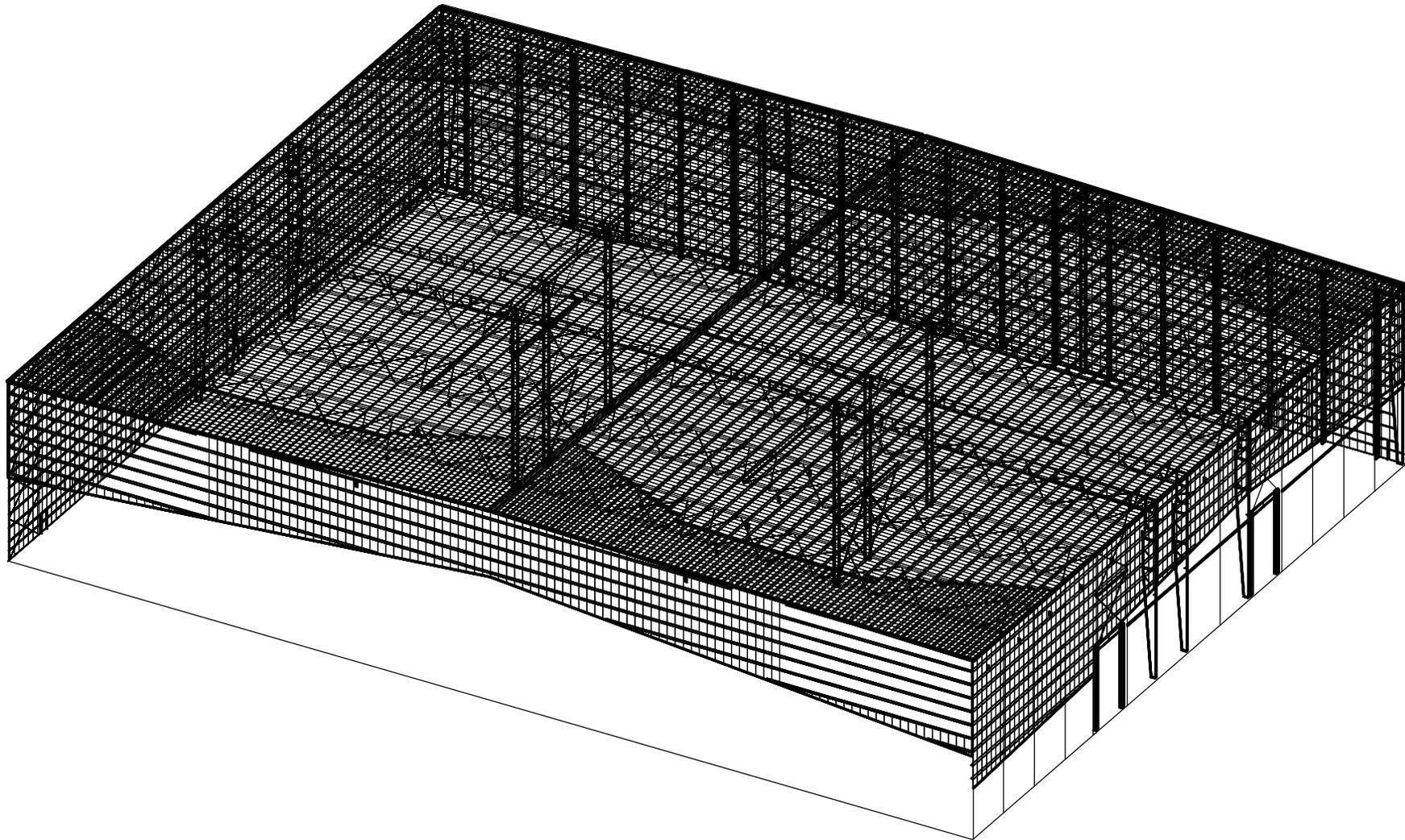
**WIND LOAD**  
Wind Speed: 90.00 mph, Wind Exposure: C  
Risk: Wind Pressure: 20.50 psf  
Wind Importance Factor: 1.000, Ft= Topographic Factor: 1.0000  
Wind Enclosure: Enclosed, 0.180  
Note: All windows, doors, skylights and other covered openings must be designed for the specified above wind loads

**EARTHQUAKE DESIGN DATA**  
Lateral Force Resisting Systems using Equivalent Force Procedure  
Mapped Spectral Response - Sds:6.67 %g, S1:3.10 %g  
Seismic Hazard / Use Group: Group 1  
Seismic Performance / Design Category: A (See Bolt Tightening Note Above)  
Seismic Snow Load: 0.00 psf  
Seismic Importance: 1.000  
Soil Profile Type: Stiff soil (D, 4)  
Design Spectral Response - Sds: 0.0000, Sd1: 0.0000

**Ordinary Steel Moment Frames**  
Frame Redundancy Factor:1.0000  
Framing R-Factor: 3.0000, Frame Seismic Factor (%s): 0.0100, Design Base Shear = 0.0100 W  
**Ordinary Steel Concentric Brace Frames**  
Brace Redundancy Factor:1.0000  
Bracing R-Factor: 3.0000, Brace Seismic Factor (%s): 0.0100, Design Base Shear = 0.0100 W

THE GENERAL CONTRACTOR AND/OR ERECTOR IS SOLELY RESPONSIBLE FOR ACCURATE, GOOD QUALITY WORKMANSHIP IN ERECTING THIS BUILDING IN CONFORMANCE WITH THIS DRAWING, DETAILS REFERENCED IN THIS DRAWING, AND ALL APPLICABLE ERECTION GUIDES AND INDUSTRY STANDARDS PERTAINING TO PROPER ERECTION, INCLUDING THE CORRECT USE OF TEMPORARY BRACING.

COVER SHEET		JOB #
BUILDER	General Steel	
CUSTOMER		DATE 6/20/2007
LOCATION	Green Bay, Wisconsin	DRAWN / CHECK
PROJECT		PAGE 1
BUILDERS PO#		
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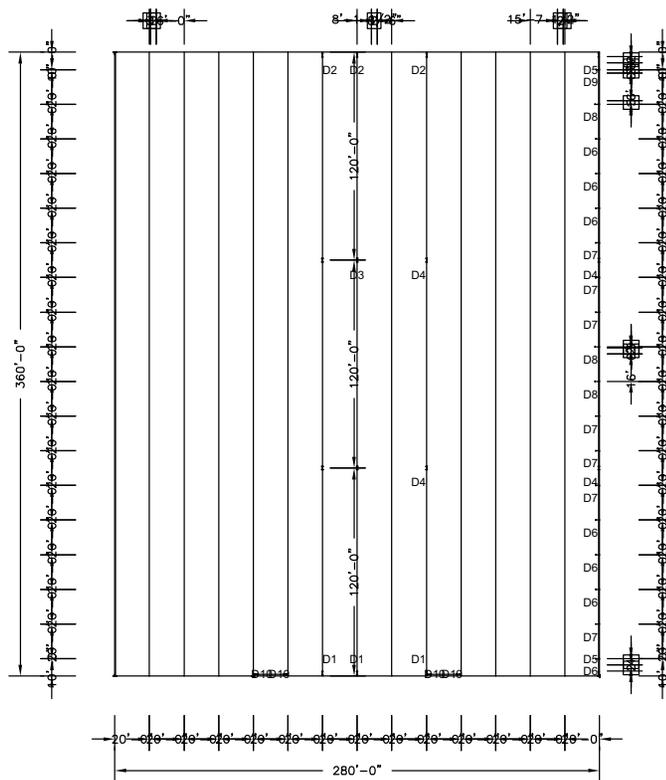
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				General Steel		Green Bay, Wisconsin			
									DATE
									6/20/2007
									DRAWN/CHECK
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Building A

General Steel  
Green Bay, Wisconsin

5/2/2008 12:56:20

JOB #  
DATE  
DRAWN/CHECK  
PAGE



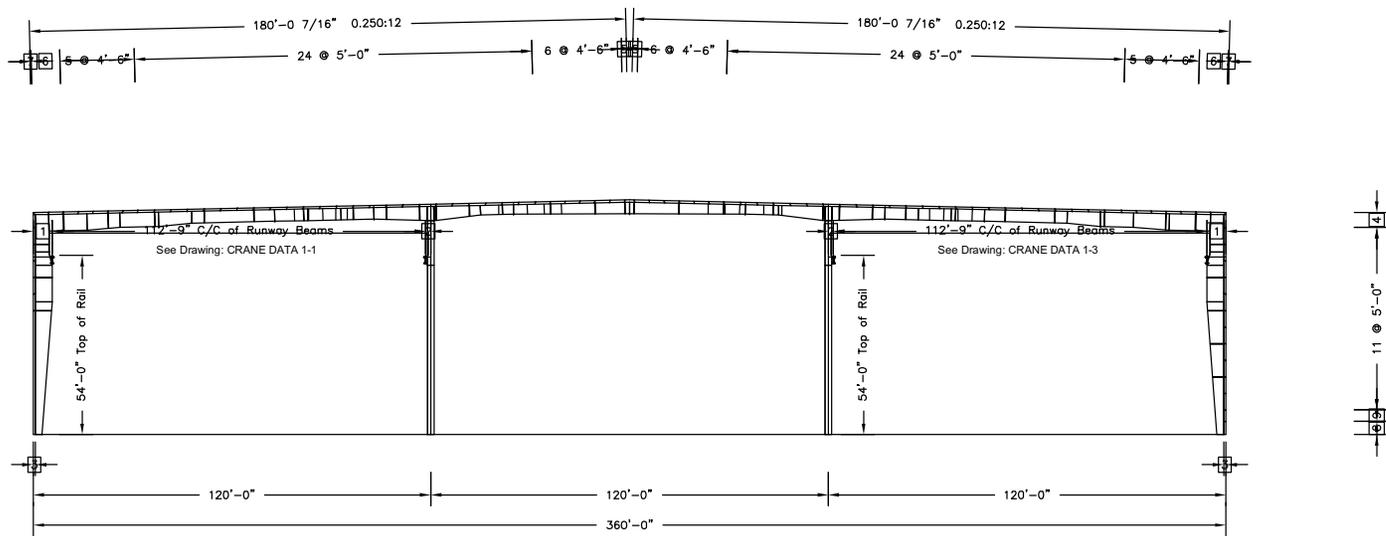
Building A

- 6 4'-0"
- 5 2'-0"
- 4 3'-7 1/2"
- 3 7 1/2"
- 2 3'-4 1/2"
- 1 1'-0"

□ Dimension Key

Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)

				Building A			
REV	DATE	BY	DESCRIPTION	BUILDER	General Steel	JOB #	
				CUSTOMER		DATE	
				LOCATION	Green Bay, Wisconsin	5/20/2007	
				PROJECT		DRAWN/CHECK	
				BUILDER'S P.O.#		PAGE	
NTS							
				5/2/2008	12:57:16	FILENAME:	



FRAME CROSS SECTION AT FRAME LINE(S) 10

- 10 70'-9" Ridge Ht.
- 9 3'-5 1/4"
- 8 4'-0"
- 7 3 1/2"
- 6 2 @ 4'-4 3/8"
- 5 1'-6 3/16"
- 4 4'-6 3/4"
- 3 8 1/2"
- 2 1'-6 1/2" BL to CL of Runway Beam
- 1 5'-8 1/2" BL to CL of Runway Beam

Dimension Key

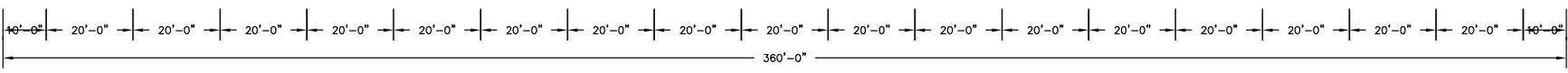
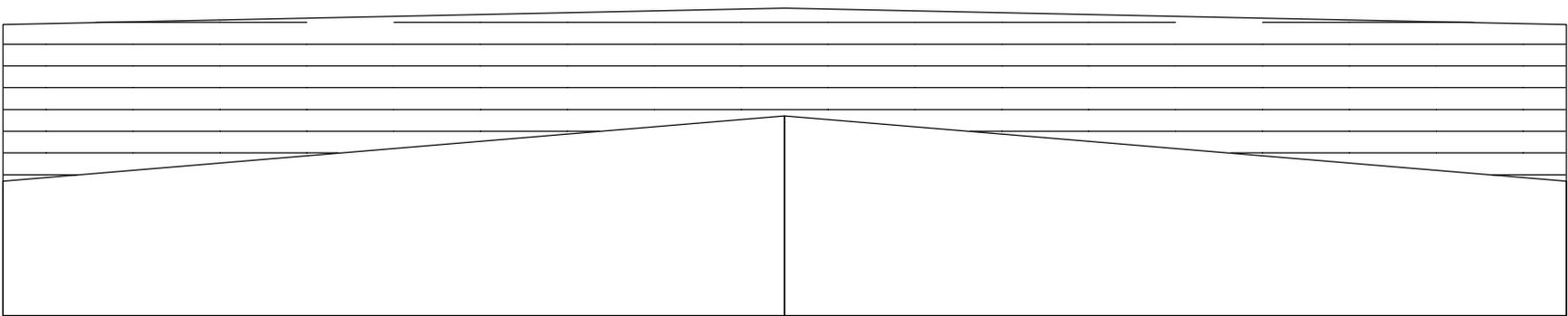
Shape Name = Building A Wall 4, Frame 8

1. USE 1/2 X 1 1/2 A325 SNUG TIGHTENED BOLTS FOR PURLIN TO FRAME, GIRT TO FRAME, AND GIRT TO CLP CONNECTIONS UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

REV	DATE	BY	DESCRIPTION	BUILDER	General Steel	JOB #
				CUSTOMER		DATE
				LOCATION	Green Bay, Wisconsin	6/20/2007
				PROJECT		DRAWN/CHECK
				BUILDER'S PO#		PAGE
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Building A Typical Frame

67'-0"  
 32'-5 1/4"  
 7 @ 5'-0"



Building A LEW Secondary

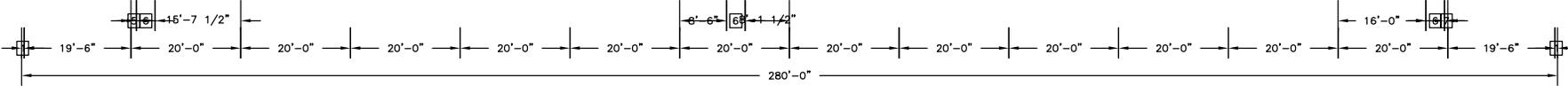
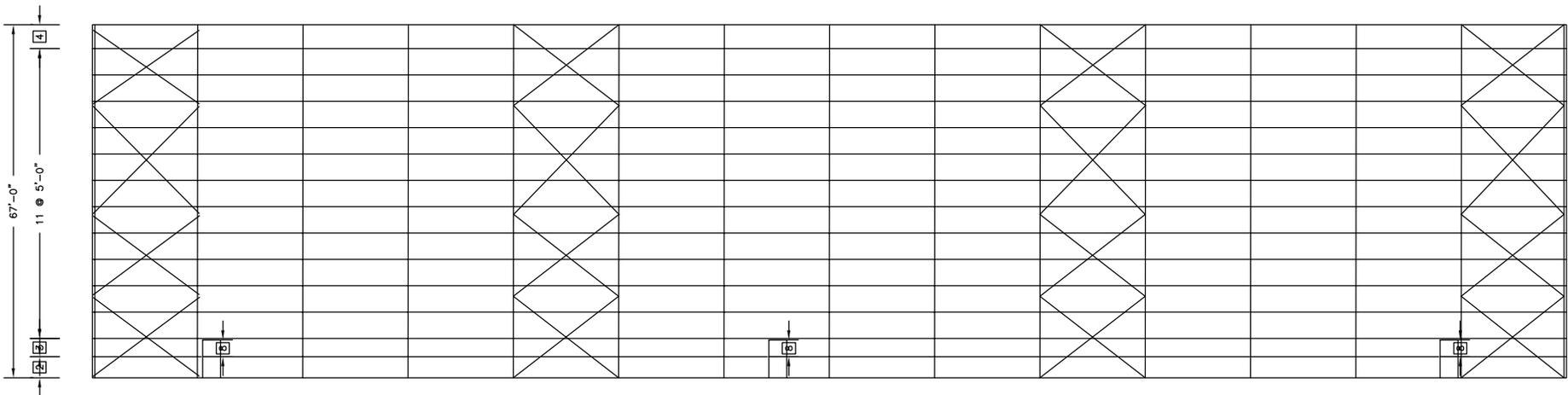
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- UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SING TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
- WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	BUILDER	CUSTOMER	LOCATION	PROJECT	BUILDER'S PO#	JOB #
				General Steel		Green Bay, Wisconsin			
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Building A BSW Secondary

- 8 3'-2 1/4"
- 7 7 1/2"
- 6 3'-4 1/2"
- 5 1'-0"
- 4 4'-6 3/4"
- 3 3'-5 1/4"
- 2 4'-0"
- 1 6"

Dimension Key

Shape Name = Building A, Wall = 2

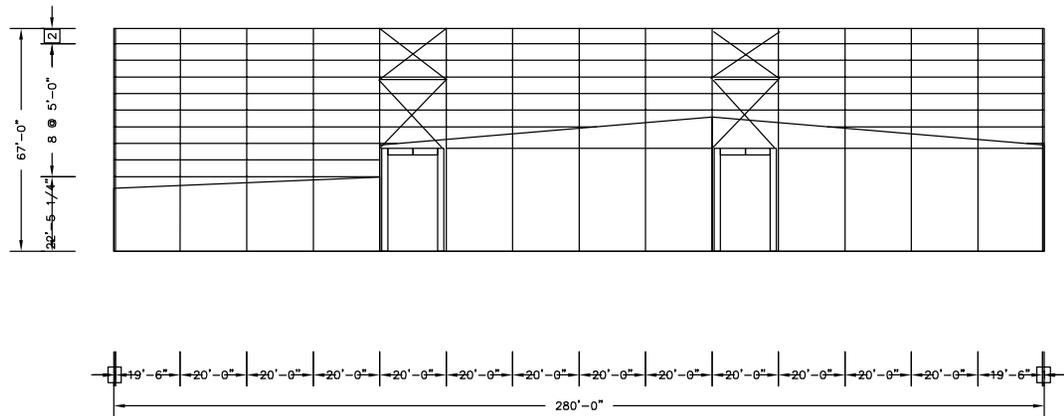
1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SING TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	BUILDER	CUSTOMER	LOCATION	PROJECT	BUILDER'S PO#	JOB #
				General Steel		Green Bay, Wisconsin			
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									DRAWN/CHECK
									PAGE

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FILENAME:





Building A FSW Secondary

- 2 4'-6 3/4"
- 1 6"

□ Dimension Key

Shape Name = Building A, Wall = 4

1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SING TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

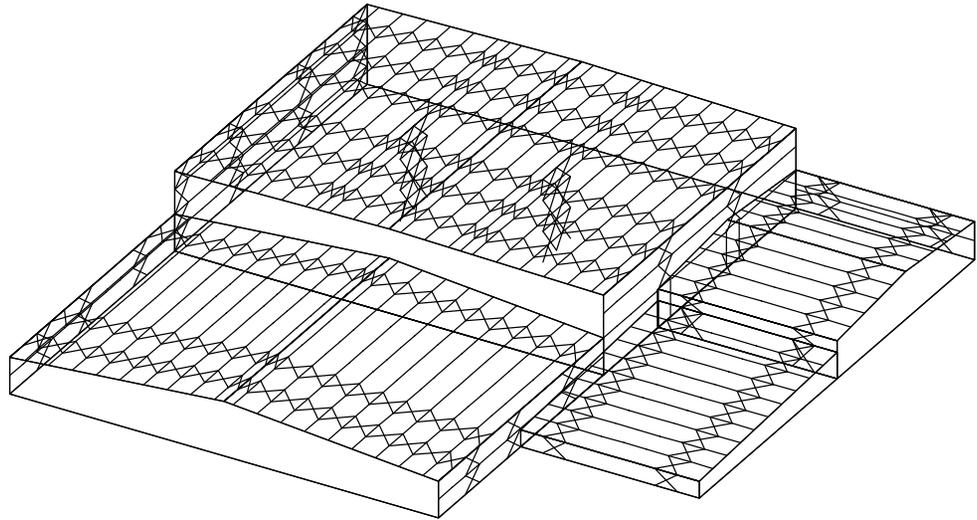
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									DATE 6/20/2007
									DRAWN/CHECK
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DRAWING TITLE	PAGES	TYPE	DATE	DESCRIPTION
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Notes				
Anchor Rod Plan				
Primary Structural				
Secondary Structural				
Covering				
Special Drawings				
Standard Erection Details				



### GENERAL NOTES

**MATERIALS**

3 PLATE WELDED SECTIONS	A529, A572, A1011, A1018	GRADE 55
COLD FORMED LIGHT GAGE SHAPES	A653, A1011	GRADE 55
GRADE RODS	A572	GRADE 65
HOT ROLLED MILL SHAPES	A36, A529, A572, A588, A709, A992	GRADE 36 KSI UNLESS NOTED
HOT ROLLED ANGLES	A529, A572, A588, A709, A992	GRADE 50
HOLLOW STRUCTURAL SECTION (HSS)	A500	GRADE B
CLADDING	A653, A792	GRADE 50 OR GRADE 80

**A325 & A490 BOLT TIGHTENING REQUIREMENTS**

IT IS THE RESPONSIBILITY OF THE ERECTOR TO INSURE PROPER BOLT TIGHTNESS IN ACCORDANCE WITH APPROPRIATE REGULATIONS. THE FOLLOWING CRITERIA IS IN COMPLIANCE WITH THE LATEST SPECIFICATIONS, HOWEVER THE ERECTOR IS RESPONSIBLE TO VERIFY LOCAL AUTHORITY REQUIREMENTS.

ALL CONNECTIONS MADE WITH A325 BOLTS MAY BE TIGHTENED TO THE "SNUG TIGHT" CONDITION AS PERMITTED BY THE SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS (2004 ED), UNLESS INDICATED AS "PRE-TENSIONED" ELSEWHERE IN THESE DRAWINGS, OR AS INDICATED BELOW.

PRE-TENSION BOLTS ON PRIMARY FRAMING, BOLTED BRACING, AND STRUT CONNECTIONS IF LOCATED IN IBC SEISMIC PERFORMANCE / DESIGN CATEGORY D, E OR F, UBC ZONE 3 OR 4. SEE CODES AND LOADS NOTES BELOW FOR SEISMIC DESIGN CATEGORY. PRE-TENSION ALL PRIMARY FRAMING CONNECTIONS IN CANADA.

PRE-TENSION BOLTS ON PRIMARY FRAMING, BOLTED BRACING, STRUTS AND CRANE RUNWAY CONNECTIONS IF BUILDING SUPPORTS A CRANE WITH A CAPACITY GREATER THAN 5 TONS.

CONNECTIONS THAT SUPPORT RUNNING MACHINERY AND OTHER SOURCES OF IMPACT OR STRESS REVERSAL MUST BE PRE-TENSIONED.

ALL SLIP CRITICAL CONNECTIONS AS INDICATED IN THESE DRAWINGS WITH -SC DESIGNATION MUST BE PRE-TENSIONED. SC TYPE CONNECTIONS MUST BE FREE OF PAINT, OIL OR OTHER MATERIALS THAT REDUCE THE FRICTION AT CONTACT SURFACES.

CONNECTIONS DESIGNATED AS A325-X OR A490-X SHALL BE INSTALLED WITH BOLT HEAD ON SIDE OF THE THINNEST PLATE BEING CONNECTED.

SECONDARY MEMBERS AND FLANGE BRACE CONNECTIONS ARE ALWAYS "SNUG TIGHTENED", EVEN IF ABOVE CONDITIONS EXIST, UNLESS SPECIFICALLY NOTED OTHERWISE ON DETAILS.

WASHERS ARE NOT REQUIRED FOR "SNUG-TIGHT" CONNECTIONS. PRE-TENSIONED A325 OR A490 CONNECTIONS TIGHTENED USING THE TURN-OF-THE-NUT METHOD DO NOT REQUIRE WASHERS. A490 BOLTS MUST ALWAYS BE PRE-TENSIONED.

**CODES AND LOADS**

WHEN MULTIPLE BUILDINGS ARE INVOLVED, SPECIFIC LOAD FACTORS FOR DIFFERING OCCUPANCIES, BUILDING DIMENSIONS, HEIGHTS, FRAMING SYSTEMS, ROOF SLOPES, ETC., MAY RESULT IN DIFFERENT LOAD APPLICATION FACTORS THAN INDICATED BELOW. SEE CALCULATIONS FOR FURTHER DETAILS.

Building Code: 2008 Wisconsin Building Code  
Based on Building Code: 2006 International Building Code

Building A: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not Including bldg wt)  
Building B: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not Including bldg wt)  
Building C: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not Including bldg wt)  
Building D: Building Use:Hazardous / Special Occupancy, Collateral Gravity: 11.00 psf (Not Including bldg wt)

LIVE LOADS AND RAINFALL  
Live Load: 20.00 psf (Not Reducible)  
Rainfall: 5.00 inches per hour

**SNOW LOAD**  
Ground Snow: 40.00 psf, Flat Roof Snow: 25.20 psf  
Snow Exposure Category (Factor): 1 Fully Exposed (0.90)  
Snow Importance: 1.000 Thermal Category (Factor): Heated (1.00)

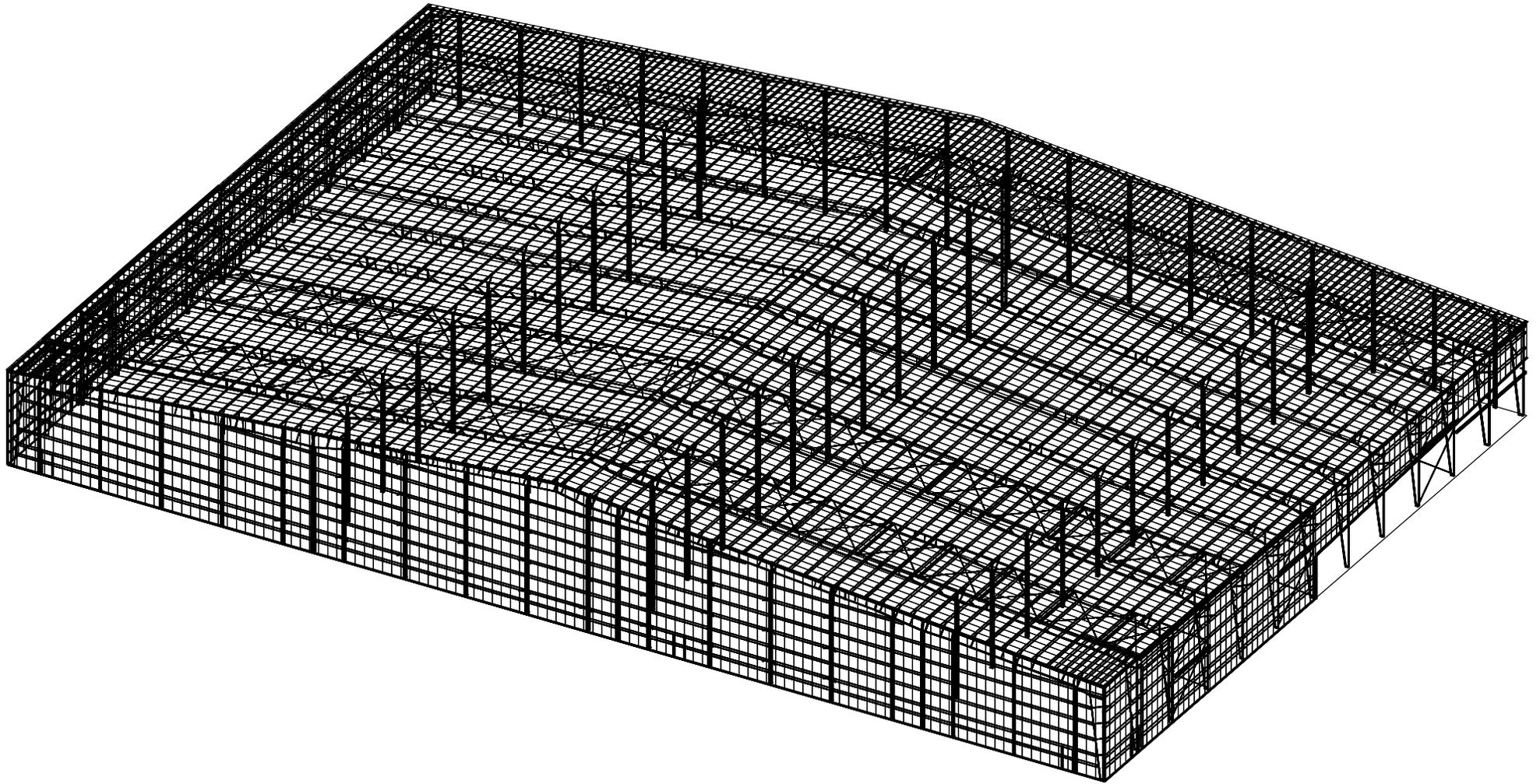
**WIND LOAD**  
Wind Speed: 90.00 mph, Wind Exposure: C  
Risk: Wind Pressure: 20.50 psf  
Wind Importance Factor: 1.000, Ft= Topographic Factor: 1.0000  
Wind Enclosure: Enclosed, 0.180  
Note: All windows, doors, skylights and other covered openings must be designed for the specified above wind loads

**EARTHQUAKE DESIGN DATA**  
Lateral Force Resisting Systems using Equivalent Force Procedure  
Mapped Spectral Response - Sds:6.60 %g, S1:3.10 %g  
Seismic Hazard / Use Group: Group 1  
Seismic Performance / Design Category: A (See Bolt Tightening Note Above)  
Seismic Snow Load: 0.00 psf  
Seismic Importance: 1.000  
Soil Profile Type: Stiff soil (D, 4)  
Design Spectral Response - Sds: 0.0000, Sd1: 0.0000

**Ordinary Steel Moment Frames**  
Frame Redundancy Factor:1.0000  
Framing R-Factor: 3.0000, Frame Seismic Factor (%s): 0.0100, Design Base Shear = 0.0100 W  
**Ordinary Steel Concentric Brace Frames**  
Brace Redundancy Factor:1.0000  
Bracing R-Factor: 3.0000, Brace Seismic Factor (%s): 0.0100, Design Base Shear = 0.0100 W

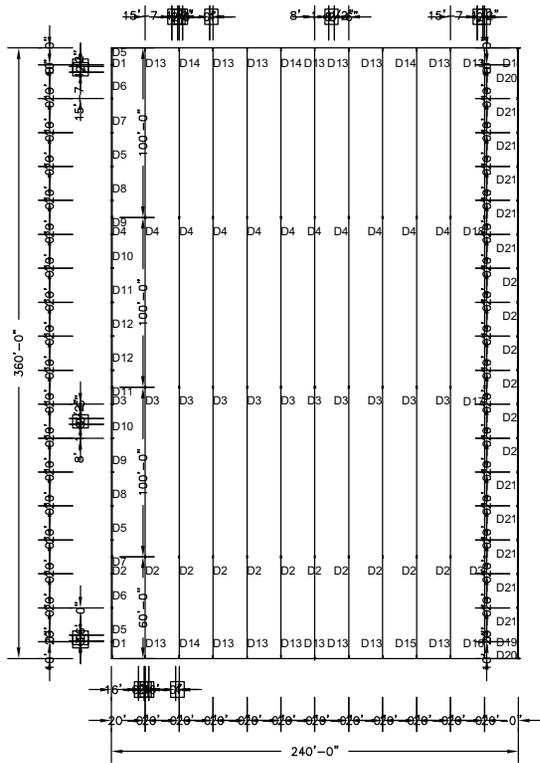
THE GENERAL CONTRACTOR AND/OR ERECTOR IS SOLELY RESPONSIBLE FOR ACCURATE, GOOD QUALITY WORKMANSHIP IN ERECTING THIS BUILDING IN CONFORMANCE WITH THIS DRAWING, DETAILS REFERENCED IN THIS DRAWING, AND ALL APPLICABLE ERECTION GUIDES, AND INDUSTRY STANDARDS PERTAINING TO PROPER ERECTION, INCLUDING THE CORRECT USE OF TEMPORARY BRACING.

COVER SHEET		JOB #
BUILDER	General Steel	
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Building B Perspective

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				CUSTOMER		DATE
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Building B Plan

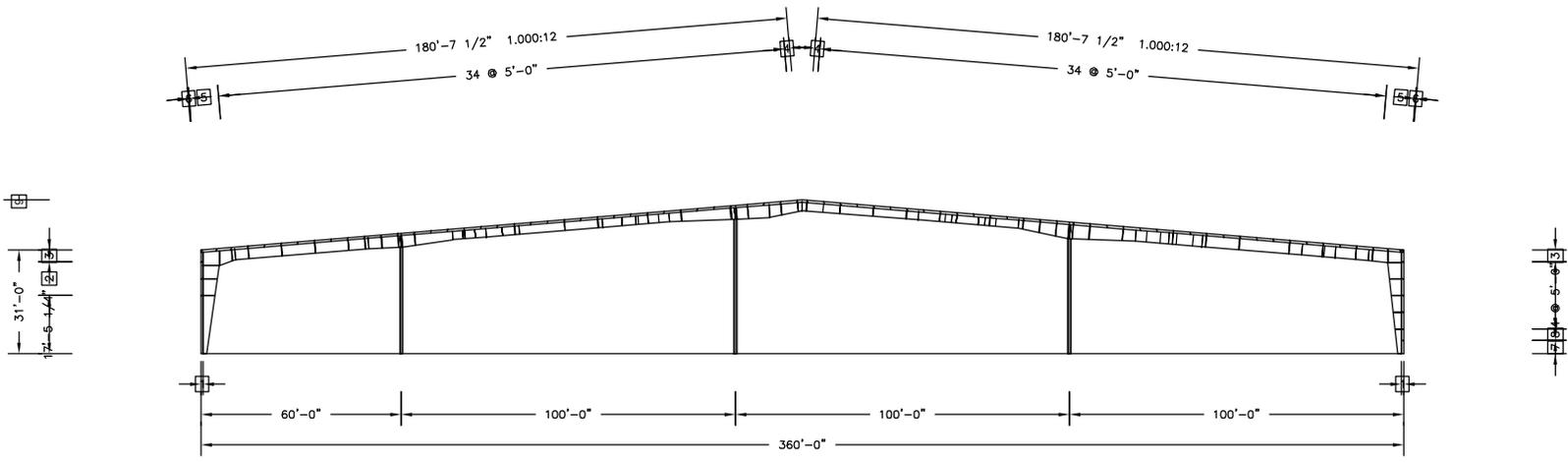
- 4 2'-0"
- 3 7 1/2"
- 2 3'-4 1/2"
- 1 1'-0"

□ Dimension Key

Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)

					Building B Plan			
REV		DATE	BY	DESCRIPTION	BUILDER	General Steel		JOB #
					CUSTOMER			DATE
					LOCATION	Green Bay, Wisconsin		6/20/2007
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Frame Clearances  
 Horiz. Clearance between members 1(CX015) and 26(CX016): 349'-9"  
 Vert. Clearance at member 1(CX015): 26'-4 3/4"  
 Vert. Clearance at member 26(CX016): 27'-3 1/8"  
 Vert. Clearance at member 27(ICX001): 31'-9 5/16"  
 Vert. Clearance at member 28(ICX002): 40'-2 3/8"  
 Vert. Clearance at member 29(ICX003): 34'-3 3/8"  
 Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)



FRAME CROSS SECTION AT FRAME LINE(S) 9

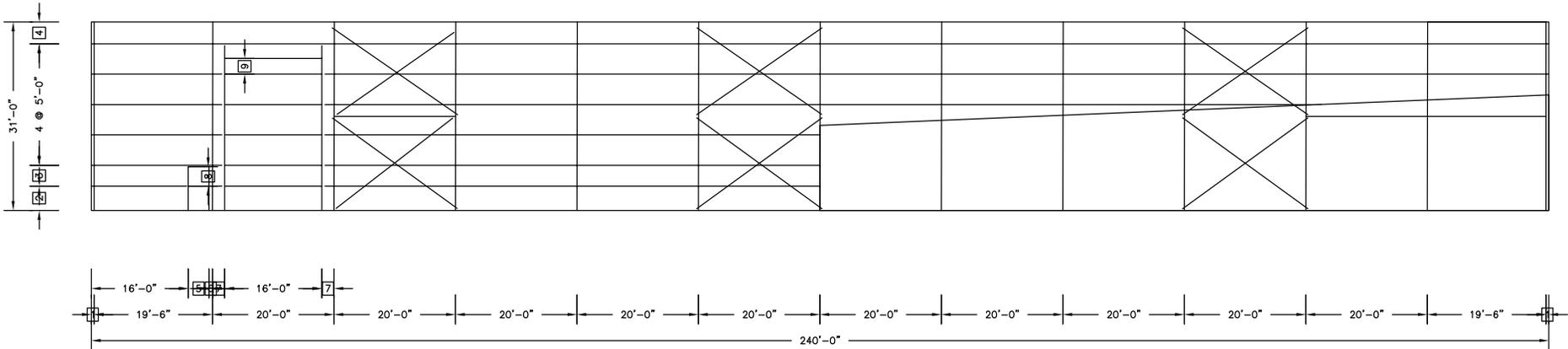
- 9 46'-0" Ridge Ht.
  - 8 3'-5 1/4"
  - 7 4'-0"
  - 6 3 1/2"
  - 5 2 @ 4'-4 5/8"
  - 4 1'-6 11/16"
  - 3 3'-6 3/4"
  - 2 2 @ 5'-0"
  - 1 8 1/2"
- Dimension Key

Shape Name = Building B Wall 4, Frame 9

1. USE 1/2 X 1 1/2 A325 SNUG TIGHTENED BOLTS FOR PURLIN TO FRAME, GIRT TO FRAME, AND GIRT TO CLIP CONNECTIONS UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

REV	DATE	BY	DESCRIPTION	BUILDER	General Steel	JOB #
				CUSTOMER		DATE
				LOCATION	Green Bay, Wisconsin	6/20/2007
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Building B Typical Frame Section



Building B FSW Secondary

- 9 2'-6 3/4"
- 8 3'-2 1/4"
- 7 2'-0"
- 6 7 1/2"
- 5 3'-4 1/2"
- 4 3'-6 3/4"
- 3 3'-5 1/4"
- 2 4'-0"
- 1 6"

□ Dimension Key

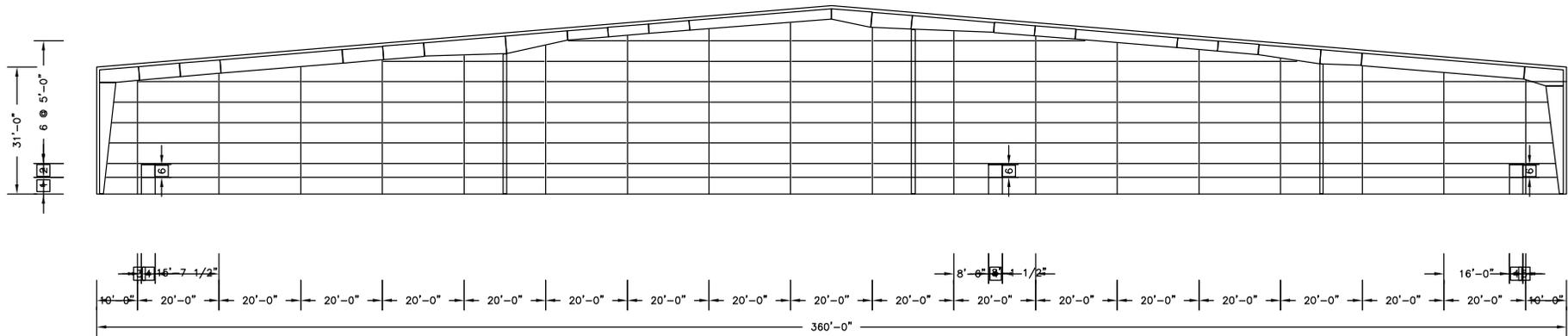
Shape Name = Building B, Wall = 4

1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SING TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.  
 2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	BUILDER	CUSTOMER	LOCATION	PROJECT	BUILDER'S PO#	JOB #
				General Steel		Green Bay, Wisconsin			
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FILENAME:



Building B LEW Secondary

- 6 3'-2 1/4"
- 5 7 1/2"
- 4 3'-4 1/2"
- 3 1'-0"
- 2 3'-5 1/4"
- 1 4'-0"

□ Dimension Key

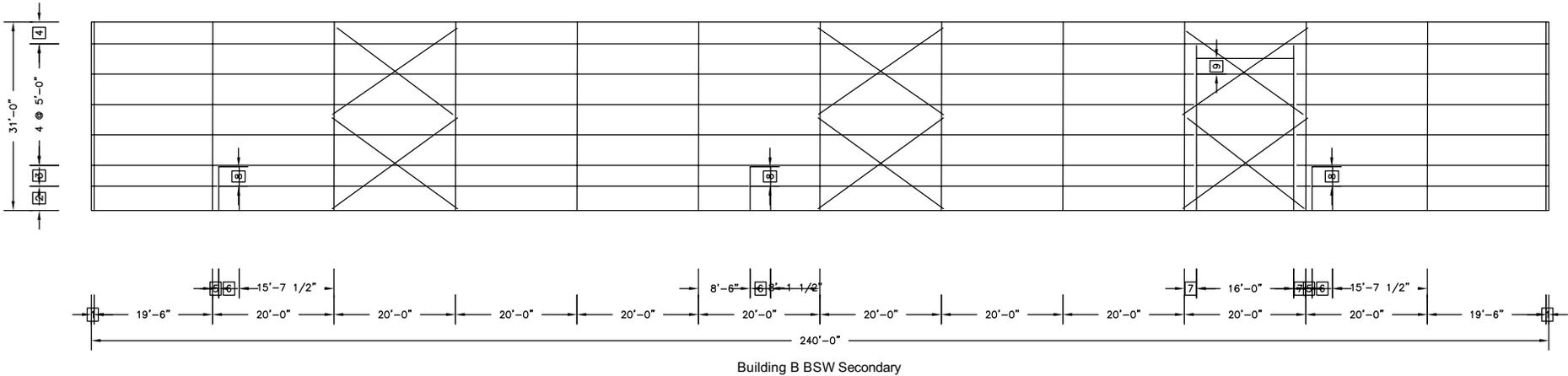
Shape Name = Building B, Wall = 1

1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SING TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.

2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

Building B LEW Secondary

REV	DATE	BY	DESCRIPTION	BUILDER	CUSTOMER	LOCATION	PROJECT	BUILDER'S PO#	JOB #
				General Steel		Green Bay, Wisconsin			
									DATE 6/20/2007
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			NTS						
			5/2/2008	14:33:43					
				FILENAME:					



Building B BSW Secondary

Shape Name = Building B, Wall = 2

- UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SING TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
- WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	BUILDER	CUSTOMER	LOCATION	PROJECT	BUILDER'S PO#	JOB #
				General Steel		Green Bay, Wisconsin			
									DATE 6/20/2007
									DRAWN/CHECK
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FILENAME:

DRAWING INDEX	
DRAWING TITLE	PAGES
Cover Sheet	
Notes	
Anchor Rod Plan	
Primary Structural	
Secondary Structural	
Covering	
Special Drawings	
Standard Erection Details	

DRAWING RELEASE HISTORY		
TYPE	DATE	DESCRIPTION

### GENERAL NOTES

#### MATERIALS

J PLATE WELDED SECTIONS  
 COLD FORMED LIGHT GAGE SHAPES  
 BRACE RODS  
 HOT ROLLED MILL SHAPES  
 HOT ROLLED ANGLES  
 HOLLOW STRUCTURAL SECTION (HSS)  
 CLADDING

#### ASTM DESIGNATION

A529, A572, A1011, A1018  
 A653, A1011  
 A572  
 A36, A529, A572, A588, A709, A992  
 A529, A572, A588, A709, A992  
 A500  
 A653, A792

GRADE 55  
 GRADE 55  
 GRADE 65  
 GRADE 36 KSI UNLESS NOTED  
 GRADE 50  
 GRADE B  
 GRADE 50 OR GRADE 80

#### A325 & A490 BOLT TIGHTENING REQUIREMENTS

IT IS THE RESPONSIBILITY OF THE ERECTOR TO INSURE PROPER BOLT TIGHTNESS IN ACCORDANCE WITH APPROPRIATE REGULATIONS. THE FOLLOWING CRITERIA IS IN COMPLIANCE WITH THE LATEST SPECIFICATIONS, HOWEVER THE ERECTOR IS RESPONSIBLE TO VERIFY LOCAL AUTHORITY REQUIREMENTS.  
 ALL CONNECTIONS MADE WITH A325 BOLTS MAY BE TIGHTENED TO THE "SNUG TIGHT" CONDITION AS PERMITTED BY THE SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS (2004 ED), UNLESS INDICATED AS "PRE-TENSIONED" ELSEWHERE IN THESE DRAWINGS, OR AS INDICATED BELOW.

PRE-TENSION BOLTS ON PRIMARY FRAMING, BOLTED BRACING, AND STRUT CONNECTIONS IF LOCATED IN IBC SEISMIC PERFORMANCE / DESIGN CATEGORY D, E OR F, UBC ZONE 3 OR 4. SEE CODES AND LOADS NOTES BELOW FOR SEISMIC DESIGN CATEGORY. PRE-TENSION ALL PRIMARY FRAMING CONNECTIONS IN CANADA.

PRE-TENSION BOLTS ON PRIMARY FRAMING, BOLTED BRACING, STRUTS AND CRANE RUNWAY CONNECTIONS IF BUILDING SUPPORTS A CRANE WITH A CAPACITY GREATER THAN 5 TONS.

CONNECTIONS THAT SUPPORT RUNNING MACHINERY AND OTHER SOURCES OF IMPACT OR STRESS REVERSAL MUST BE PRE-TENSIONED.

ALL SLIP CRITICAL CONNECTIONS AS INDICATED IN THESE DRAWINGS WITH -SC DESIGNATION MUST BE PRE-TENSIONED. SC TYPE CONNECTIONS MUST BE FREE OF PAINT, OIL OR OTHER MATERIALS THAT REDUCE THE FRICTION AT CONTACT SURFACES.

CONNECTIONS DESIGNATED AS A325-X OR A490-X SHALL BE INSTALLED WITH BOLT HEAD ON SIDE OF THE THINNEST PLATE BEING CONNECTED.

SECONDARY MEMBERS AND FLANGE BRACE CONNECTIONS ARE ALWAYS "SNUG TIGHTENED", EVEN IF ABOVE CONDITIONS EXIST, UNLESS SPECIFICALLY NOTED OTHERWISE ON DETAILS.  
 WASHERS ARE NOT REQUIRED FOR "SNUG-TIGHT" CONNECTIONS. PRE-TENSIONED A325 OR A490 CONNECTIONS TIGHTENED USING THE TURN-OF-THE-NUT METHOD DO NOT REQUIRE WASHERS. A490 BOLTS MUST ALWAYS BE PRE-TENSIONED.

#### CODES AND LOADS

WHEN MULTIPLE BUILDINGS ARE INVOLVED, SPECIFIC LOAD FACTORS FOR DIFFERING OCCUPANCIES, BUILDING DIMENSIONS, HEIGHTS, FRAMING SYSTEMS, ROOF SLOPES, ETC., MAY RESULT IN DIFFERENT LOAD APPLICATION FACTORS THAN INDICATED BELOW. SEE CALCULATIONS FOR FURTHER DETAILS.

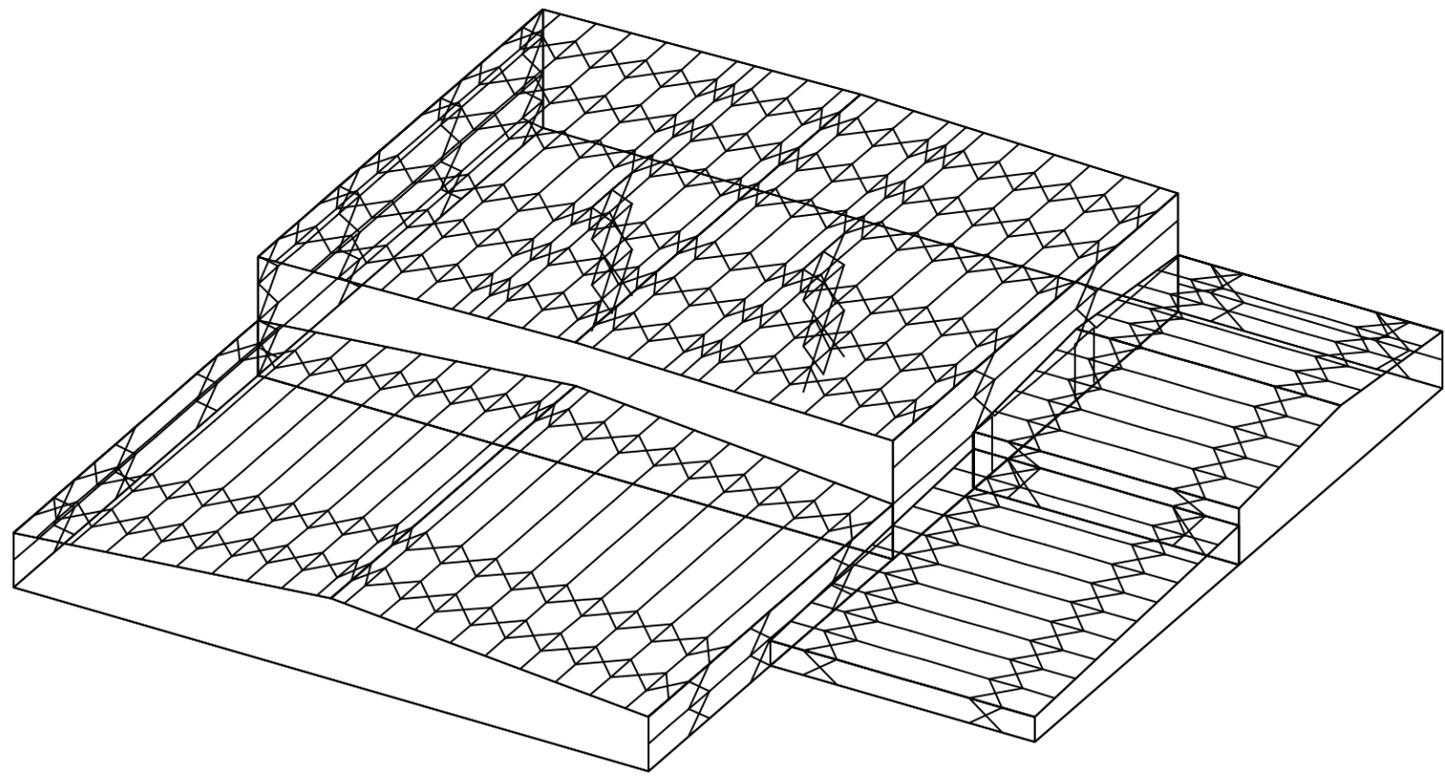
Building Code: 2008 Wisconsin Building Code  
 Based on Building Code: 2006 International Building Code  
 Building A: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not including bldg wt)  
 Building B: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not including bldg wt)  
 Building C: Building Use:Standard Occupancy Structure, Collateral Gravity: 3.00 psf (Not including bldg wt)  
 Building D: Building Use:Hazardous / Special Occupancy, Collateral Gravity: 11.00 psf (Not including bldg wt)  
 LIVE LOADS AND RAINFALL  
 Live Load 20.00 psf (Not Reducible)  
 Rainfall: 5.00 inches per hour

SNOW LOAD  
 Ground Snow: 40.00 psf, Flat Roof Snow: 25.20 psf  
 Snow Exposure Category (Factor): 1 Fully Exposed (0.90)  
 Snow Importance: 1.000 Thermal Category (Factor): Heated (1.00)

WIND LOAD  
 Wind Speed: 90.00 mph, Wind Exposure: C  
 Basic Wind Pressure: 20.50 psf  
 Wind Importance Factor: 1.000, Ft= Topographic Factor: 1.0000  
 Wind Enclosure: Enclosed, 0.180  
 Note: All windows, doors, skylights and other covered openings must be designed for the specified above wind loads

EARTHQUAKE DESIGN DATA  
 Lateral Force Resisting Systems using Equivalent Force Procedure  
 Mapped Spectral Response - Ss:6.60 %g, S1:3.10 %g  
 Seismic Hazard / Use Group: Group 1  
 Seismic Performance / Design Category: A (See Bolt Tightening Note Above)  
 Seismic Snow Load: 0.00 psf  
 Seismic Importance: 1.000  
 Soil Profile Type: Stiff soil (D, 4)  
 Design Spectral Response - Sds: 0.0000, Sd1: 0.0000

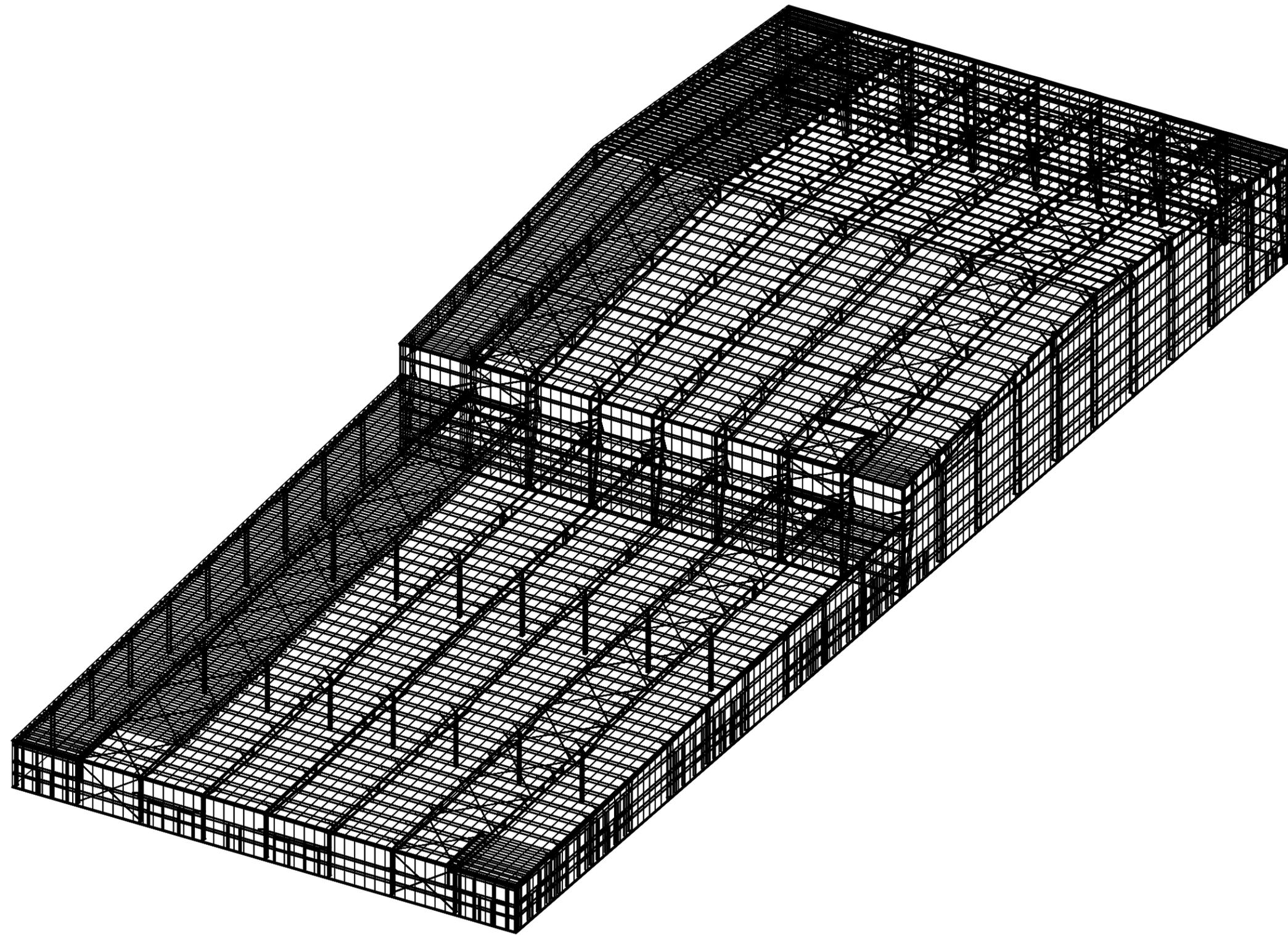
Ordinary Steel Moment Frames  
 Frame Redundancy Factor:1.0000  
 Framing R-Factor: 3.0000, Frame Seismic Factor (%): 0.0100, Design Base Shear = 0.0100 W  
 Ordinary Steel Concentric Braced Frames  
 Brace Redundancy Factor:1.0000  
 Bracing R-Factor: 3.0000, Brace Seismic Factor (%): 0.0100, Design Base Shear = 0.0100 W



THE GENERAL CONTRACTOR AND/OR ERECTOR IS SOLELY RESPONSIBLE FOR ACCURATE, GOOD QUALITY WORKMANSHIP IN ERECTING THIS BUILDING IN CONFORMANCE WITH THIS DRAWING, DETAILS REFERENCED IN THIS DRAWING, ALL APPLICABLE ERECTION GUIDES, AND INDUSTRY STANDARDS PERTAINING TO PROPER ERECTION, INCLUDING THE CORRECT USE OF TEMPORARY BRACING.

### COVER SHEET

BUILDER	General Steel	JOB #
CUSTOMER		DATE
LOCATION	Green Bay, Wisconsin	6/20/2007
PROJECT		DRAWN / CHECK
BUILDERS PO#		PAGE
		1

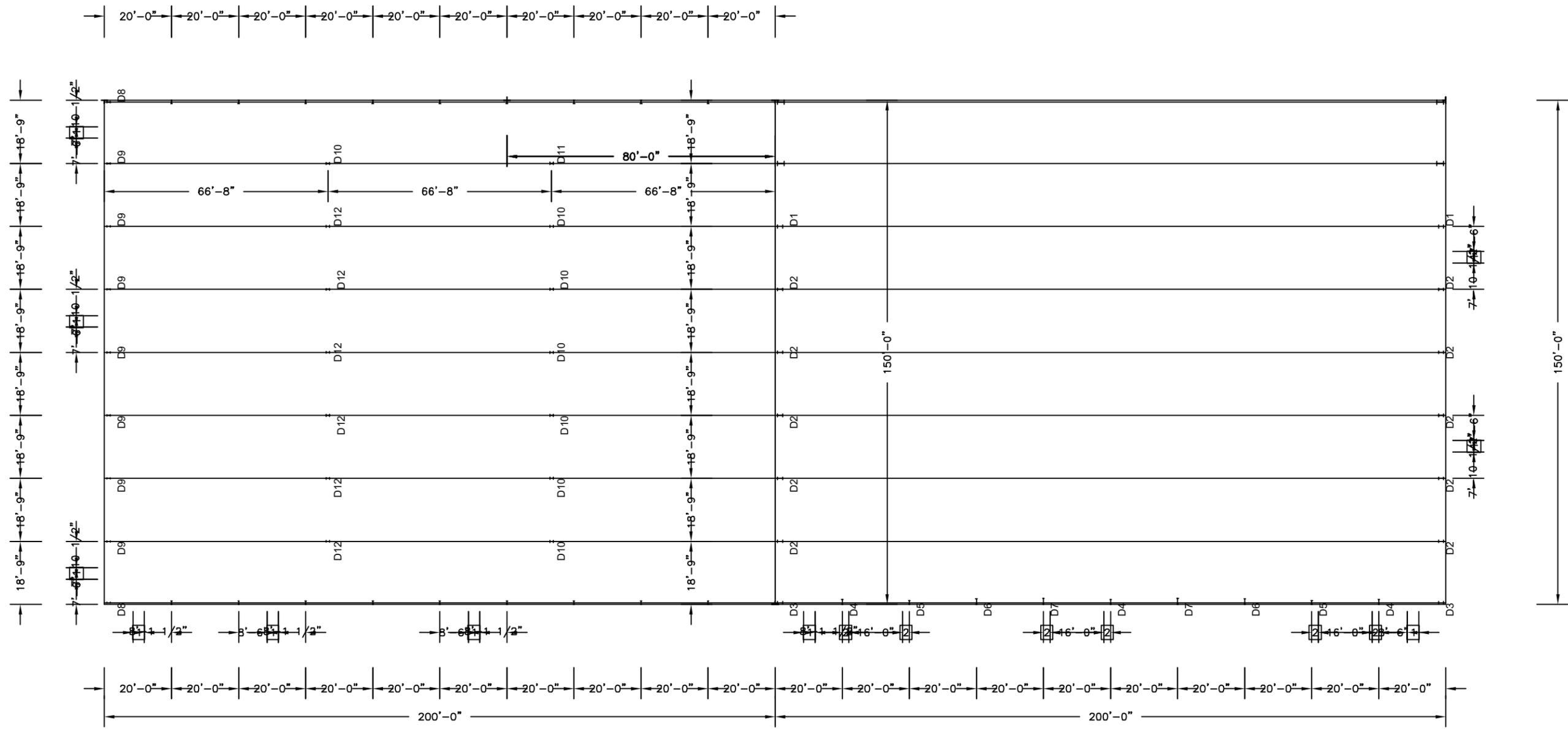


Buildings C and D Perspective

REV	DATE	BY	DESCRIPTION

BUILDER	General Steel
CUSTOMER	
LOCATION	Green Bay, Wisconsin
PROJECT	
BUILDER'S PO#	
FILENAME:	

JOB #
DATE
DRAWN/CHECK
PAGE



Buildings C and D Plan

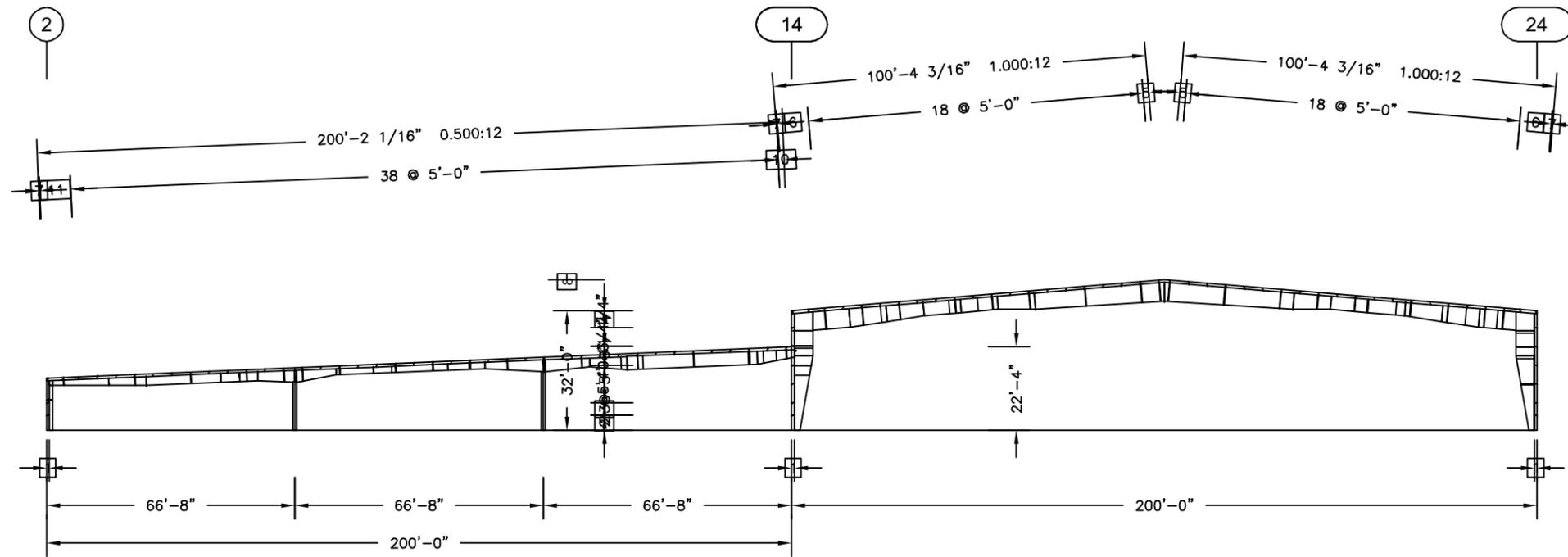
2 2'-0"  
 1 3'-4 1/2"  
 □ Dimension Key

Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)

				Buildings C and D Plan			
REV	DATE	BY	DESCRIPTION	BUILDER	General Steel	JOB #	
				CUSTOMER		DATE	6/20/2007
				LOCATION	Green Bay, Wisconsin	DRAWN/CHECK	
				PROJECT		PAGE	
			NTS	BUILDER'S PO#			
				FILENAME:			

Frame Clearances

- Horiz. Clearance between members 1(CX007) and 17(CX008): 188'-7"
- Horiz. Clearance between members 1(CX007) and 18(CX008): 188'-7"
- Horiz. Clearance between members 2(CX007) and 17(CX008): 188'-7"
- Horiz. Clearance between members 2(CX007) and 18(CX008): 188'-7"
- Vert. Clearance at member 2(CX007): 26'-9"
- Vert. Clearance at member 17(CX008): 26'-9"
- Vert. Clearance at member 1(CX017): 12'-0 7/8"
- Vert. Clearance at member 16(ICX005): 12'-11 1/16"
- Vert. Clearance at member 17(ICX004): 15'-8 3/8"
- Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)



Building C and D Frame Section

- 11 2 @ 4'-2 1/8"
- 10 1'-6 3/8"
- 9 9 3/4"
- 8 40'-4"
- 7 3 1/2"
- 6 2 @ 4'-3"
- 5 1'-6 11/16"
- 4 4'-6 3/4"
- 3 3'-5 1/4"
- 2 4'-0"
- 1 8 1/2"

□ Dimension Key

Shape Name = Building C Wall 2, Frame 5 , Shape = Building D Wall 2, Frame 5

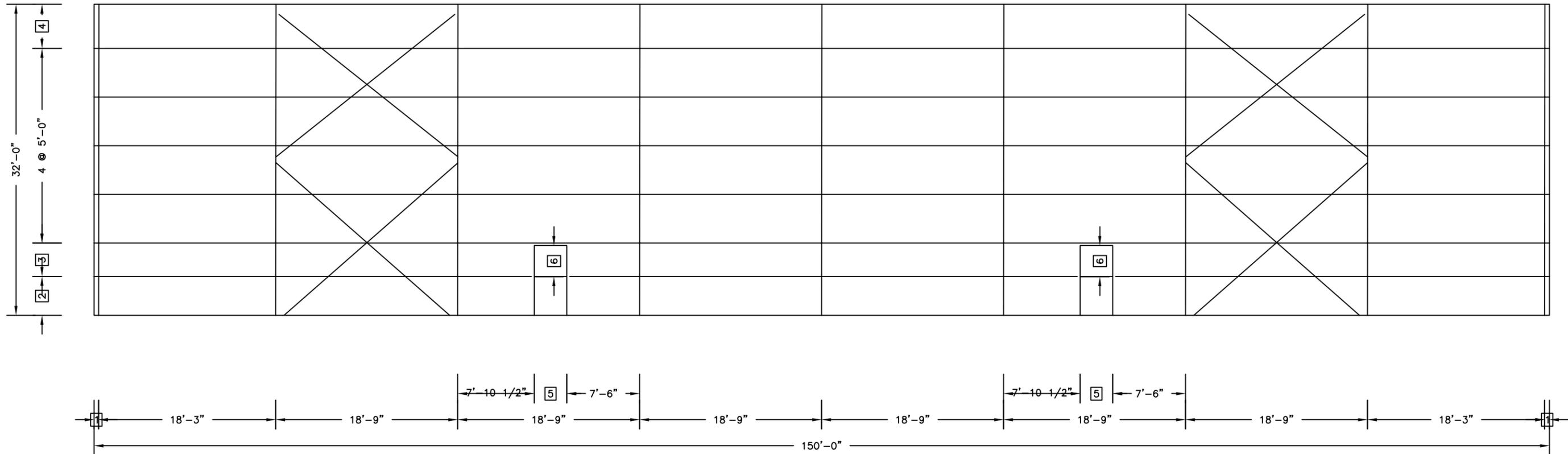
1. USE 1/2 X 1 1/2 A325 SNUG TIGHTENED BOLTS FOR PURLIN TO FRAME, GIRT TO FRAME, AND GIRT TO CLIP CONNECTIONS UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

REV	DATE	BY	DESCRIPTION	Building C and D Frame Section	
				BUILDER	General Steel
				CUSTOMER	
				LOCATION	Green Bay, Wisconsin
				PROJECT	
				BUILDER'S PO#	
				FILENAME	

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JOB #  
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6/20/2007  
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PAGE



Building C Sidewall B Secondary

- 6 3'-2 1/4"
- 5 3'-4 1/2"
- 4 4'-6 3/4"
- 3 3'-5 1/4"
- 2 4'-0"
- 1 6"

□ Dimension Key

Shape Name = Building C, Wall = 4

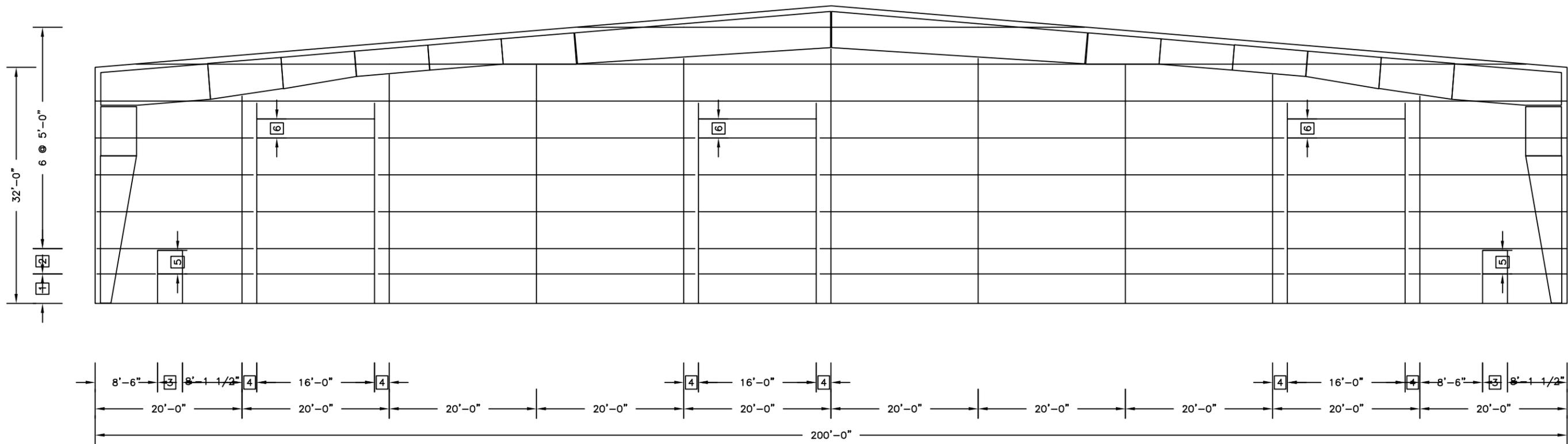
1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SNUG TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	Building C Sidewall B Secondary	
				BUILDER	General Steel
				CUSTOMER	
				LOCATION	Green Bay, Wisconsin
				PROJECT	
				BUILDER'S PO#	
				DATE	6/20/2007
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FILENAME:



Building C Endwall C Secondary

- 6 2'-6 3/4"
- 5 3'-2 1/4"
- 4 2'-0"
- 3 3'-4 1/2"
- 2 3'-5 1/4"
- 1 4'-0"

□ Dimension Key

Shape Name = Building C, Wall = 1

1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SNUG TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.

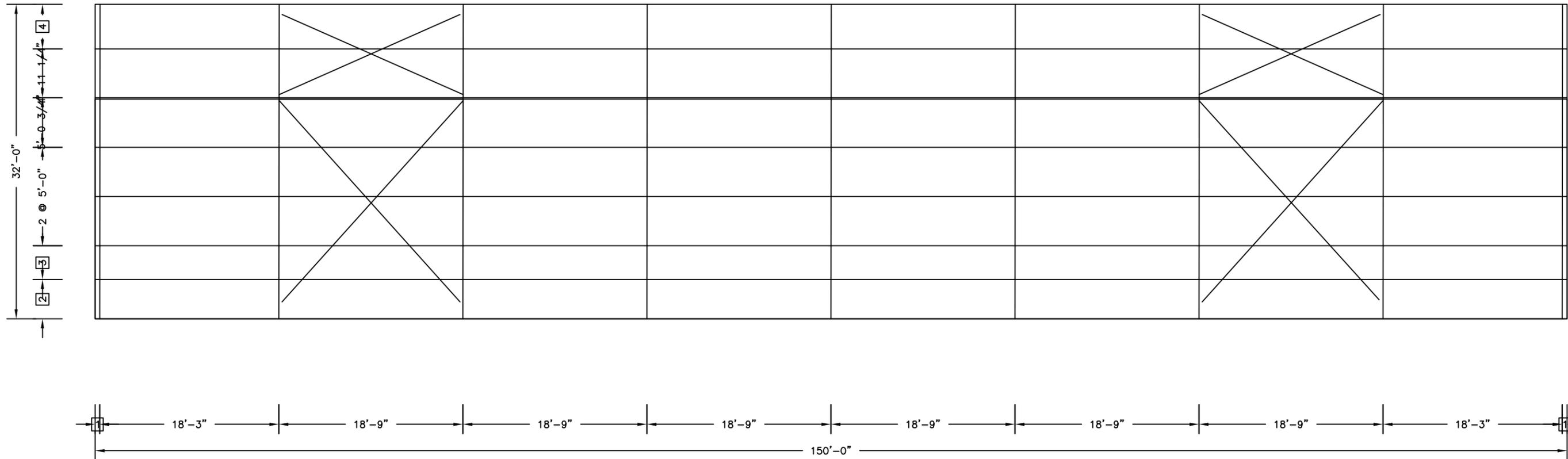
2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	Building C Endwall C Secondary	
				BUILDER	General Steel
				CUSTOMER	
				LOCATION	Green Bay, Wisconsin
				PROJECT	
				BUILDER'S PO#	
				JOB #	
				DATE	6/20/2007
				DRAWN/CHECK	
				PAGE	

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FILENAME:



Building C Sidewall D Secondary

- 4 4'-6 3/4"
- 3 3'-5 1/4"
- 2 4'-0"
- 1 6"

□ Dimension Key

Shape Name = Building C, Wall = 2

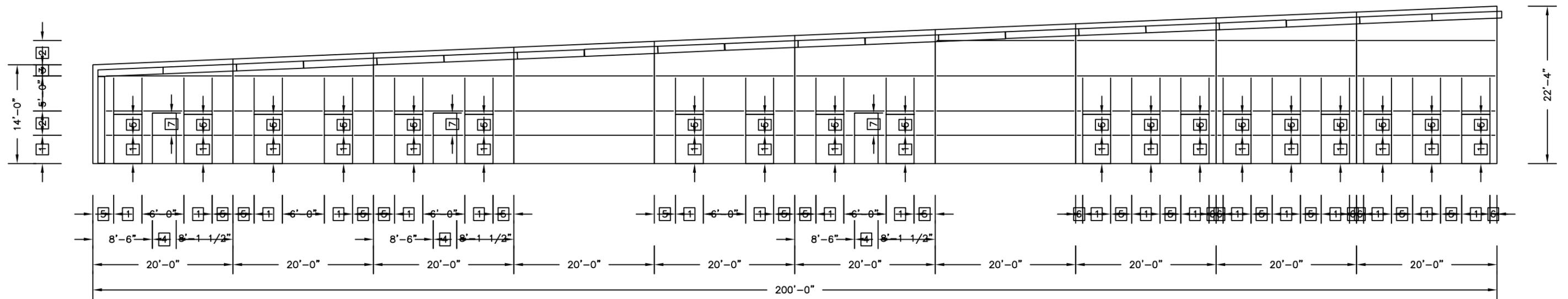
1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SNUG TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	Building C Sidewall D Secondary	
				BUILDER	General Steel
				CUSTOMER	
				LOCATION	Green Bay, Wisconsin
				PROJECT	
				BUILDER'S PO#	
			NTS		
				DATE	6/20/2007
				DRAWN/CHECK	
				PAGE	

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FILENAME:



Building D Endwall C Secondary

- 7 3'-2 1/4"
- 6 1'-0"
- 5 3'-0"
- 4 3'-4 1/2"
- 3 1'-6 3/4"
- 2 3'-5 1/4"
- 1 4'-0"

□ Dimension Key

Shape Name = Building D, Wall = 1

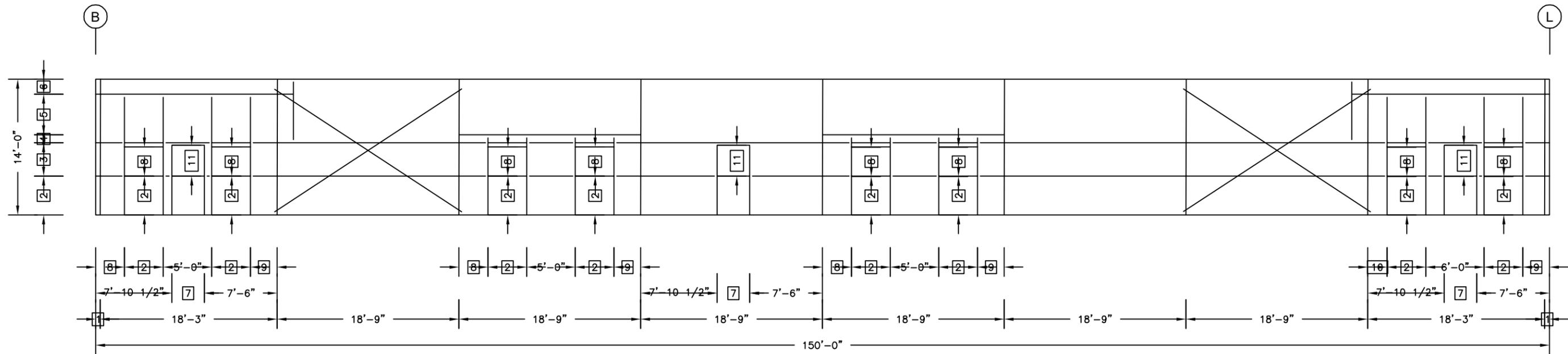
1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SNUG TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	Building D Endwall C Secondary	
				BUILDER	General Steel
				CUSTOMER	
				LOCATION	Green Bay, Wisconsin
				PROJECT	
				BUILDER'S PO#	
				DATE	6/20/2007
				DRAWN/CHECK	
				PAGE	

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FILENAME:



Building D Sidewall D Secondary

- 11 3'-2 1/4"
- 10 2'-0"
- 9 2'-9"
- 8 3'-0"
- 7 3'-4 1/2"
- 6 1'-6 3/4"
- 5 4'-2 1/4"
- 4 9 3/4"
- 3 3'-5 1/4"
- 2 4'-0"
- 1 6"

□ Dimension Key

Shape Name = Building D, Wall = 2

1. UNLESS NOTED, USE 1/2 X 1 1/2 A-325 SNUG TIGHTENED BOLTS FOR GIRT LAP, GIRT TO FRAME, FLANGE BRACE TO FRAME, FLANGE BRACE TO GIRT, JAMB AND HEADER CONNECTIONS.
2. WIND AND FLANGE BRACING ARE AN INTEGRAL PART OF THE WALL STRUCTURAL SYSTEM AND SHOULD BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS. REMOVAL OR ALTERATION OF WALL BRACING WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.

REV	DATE	BY	DESCRIPTION	Building D Sidewall D Secondary	
				BUILDER	General Steel
				CUSTOMER	
				LOCATION	Green Bay, Wisconsin
				PROJECT	
				BUILDER'S PO#	
				JOB #	
				DATE	6/20/2007
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FILENAME:

**Appendix C-6**

**Survey and Geodetic Control Equipment**

## HYPACK®

HYPACK® is a Windows™-based software package used primarily for hydrographic surveying and data processing.

It is optimized to run under:

- Windows 2000™
- Windows XP™

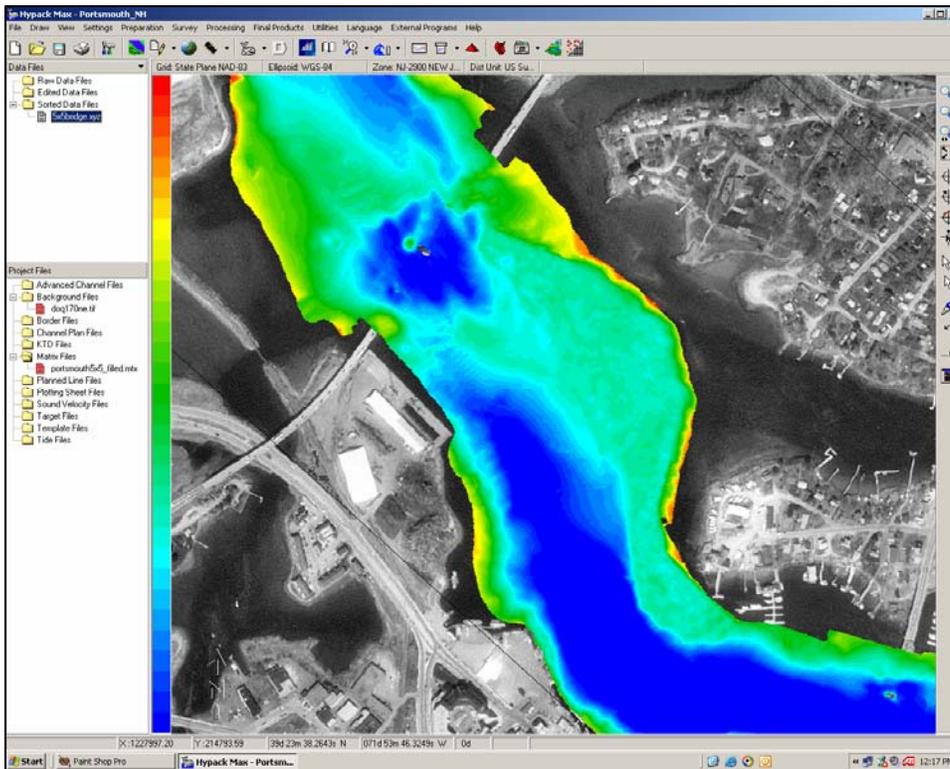
HYPACK® performs all of the tasks necessary to complete your survey from beginning to end.

- Geodetic Parameters
- Planned Line Design
- Equipment Configuration
- Data Collection supporting over 200 sensors
- Data Processing
- Tides and Sound Velocity
- Sounding Reduction
- Export to DXF/DGN
- Plotting of Smooth Sheets
- Volumes by Section
- Volumes by Surface Model
- Contouring to DXF
- 3D Visualization
- Side Scan Collection and Processing
- ACDP Collection and Display

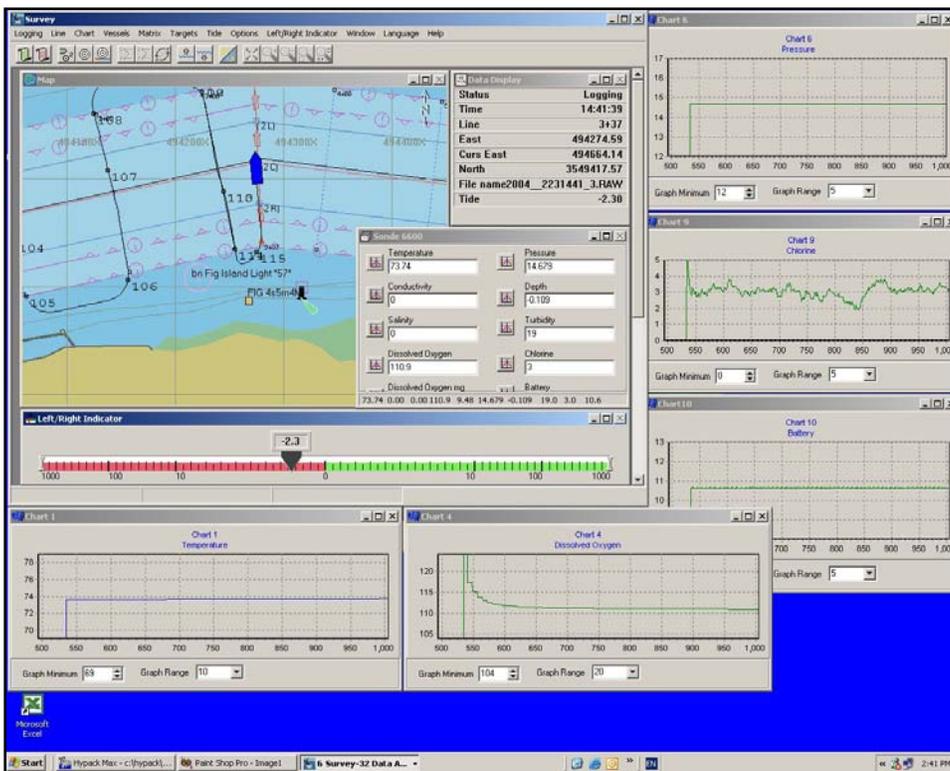
The optional HYSWEEP® module allows for the configuration, calibration, collection and processing of multibeam and multiple transducer sonar systems.

The DREDGEPACK® version allows you to maximize the efficiency of your dredge operations by tracking and maintaining a history of where the cutting tool has passed and how deep it was.

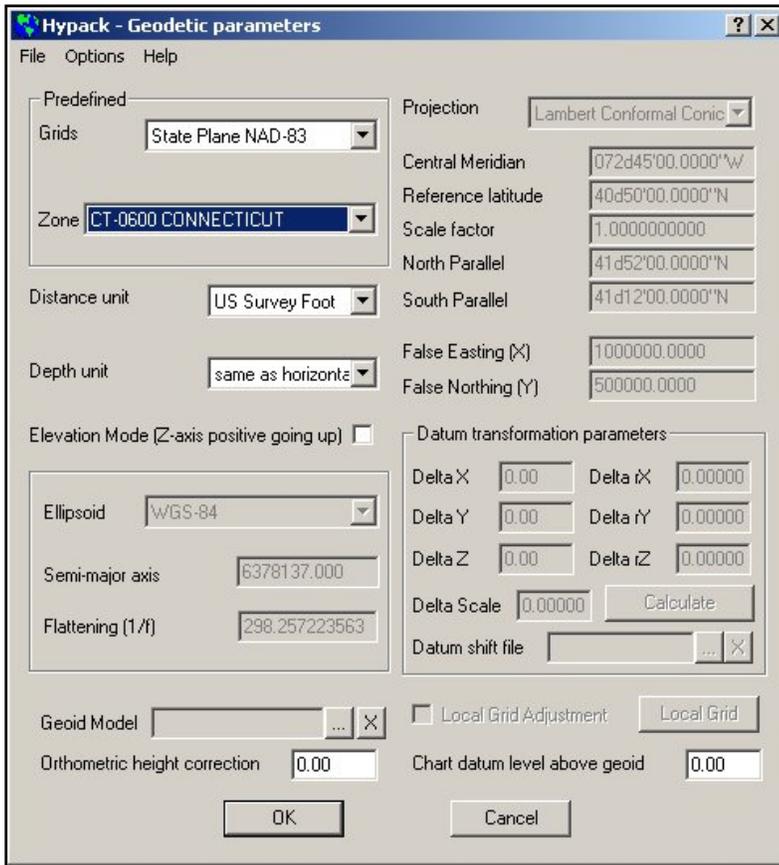
HYPACK®, HYSWEEP® and DREDGEPACK® are all developed by HYPACK, Inc.



HYPACK® screen with GeoTIFF background and multibeam sounding matrix.  
[Data courtesy USACE New England District]



The SURVEY program of HYPACK® collecting data from the YSI Sonde 6600.



The GEODETIC PARAMETERS program allows you to quickly specify the geodesy for each survey project.

## Geodesy

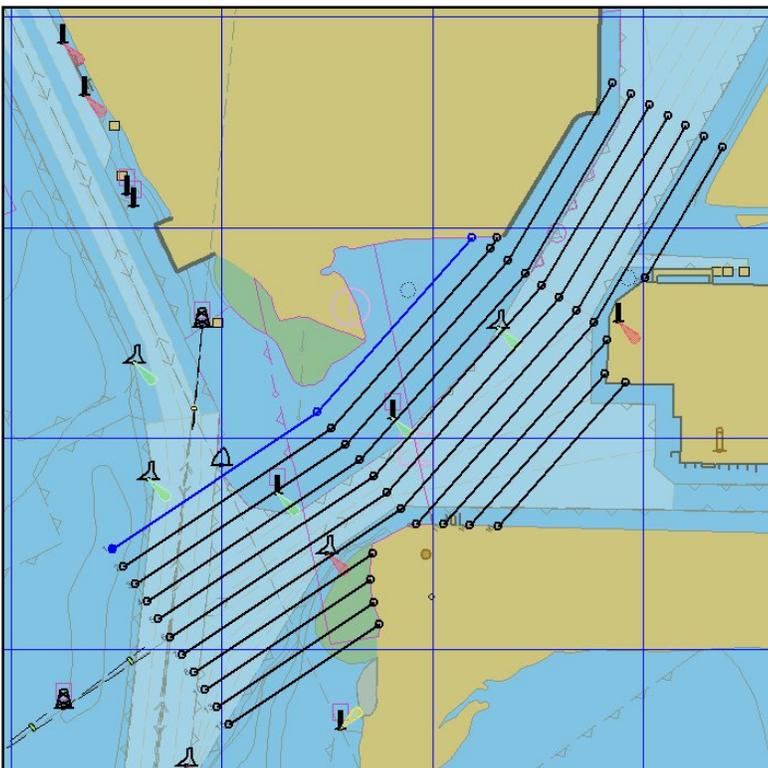
HYPACK® allows you to quickly configure your geodetic parameters for each project.

- National grids are pre-defined and available from a list.
- National datum transformation models are available for the USA, UK and France.
- Users can determine a 3 or 7-parameter transformation based on local test points.
- All standard projections used in hydrographic surveying are available.
- Users can also configure their parameters to utilize GPS on a local survey grid.
- Entire projects can be converted from an old to a new geodetic basis.

## Planned Lines

You can quickly create planned lines for your survey.

- Manually enter X-Y or Lat-Long waypoints for your planned lines.
- Use the cursor to set waypoints.
- Create offsets from one of several methods.
- Import planned lines created in your CAD/GIS package (\*.DXF).
- Generate 3-D planned lines that contain your channel toe-point and top-of-bank info.
- Clip planned lines to your exact area, using a HYPACK Border file.
- Planned lines can have:
  - 2 or more segments
  - Straight or curved segments



GEODETIC PARAMETERS program from HYPACK®.

## CHANNEL DESIGN

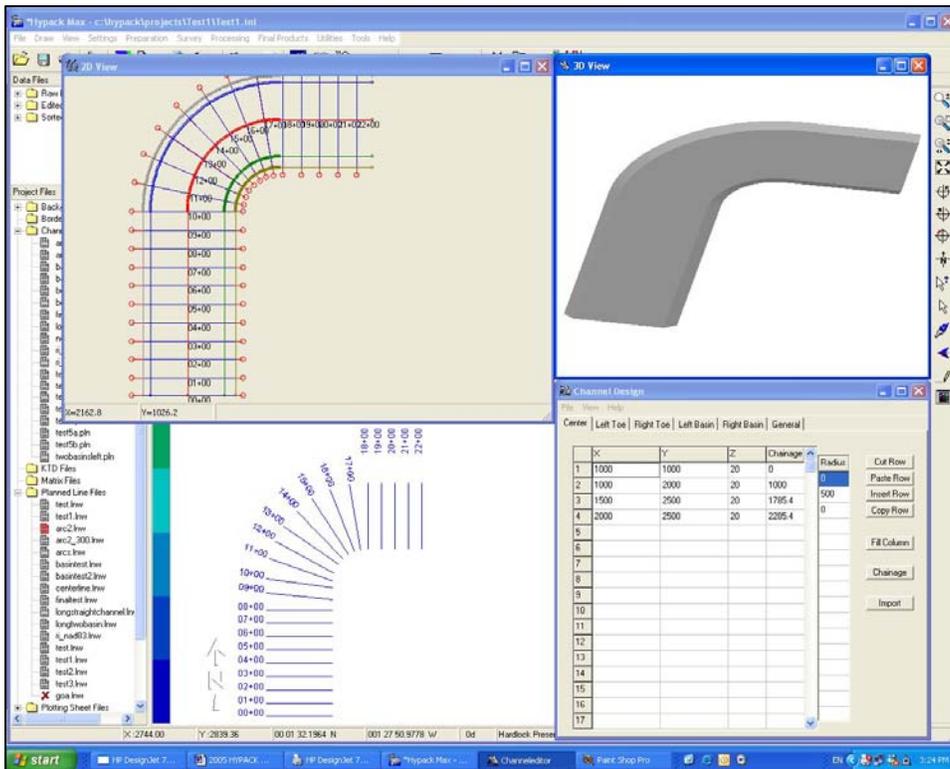
CHANNEL DESIGN is a special HYPACK® program that allows you to create planned lines by entering the channel geometry.

By entering info for:

- Left toe line and side slope.
- Centerline waypoints, chainage, and depth.
- Right toe line and side slopes.
- Turning basins.

...CHANNEL DESIGN can generate planned lines at user-defined intervals. Each line will contain the cross-sectional design profile at the section.

CHANNEL DESIGN has been recently upgraded to handle curved centerlines.



The CHANNEL DESIGN program creates 3-D planned lines with information on the channel centerline, toe lines and top of bank lines.

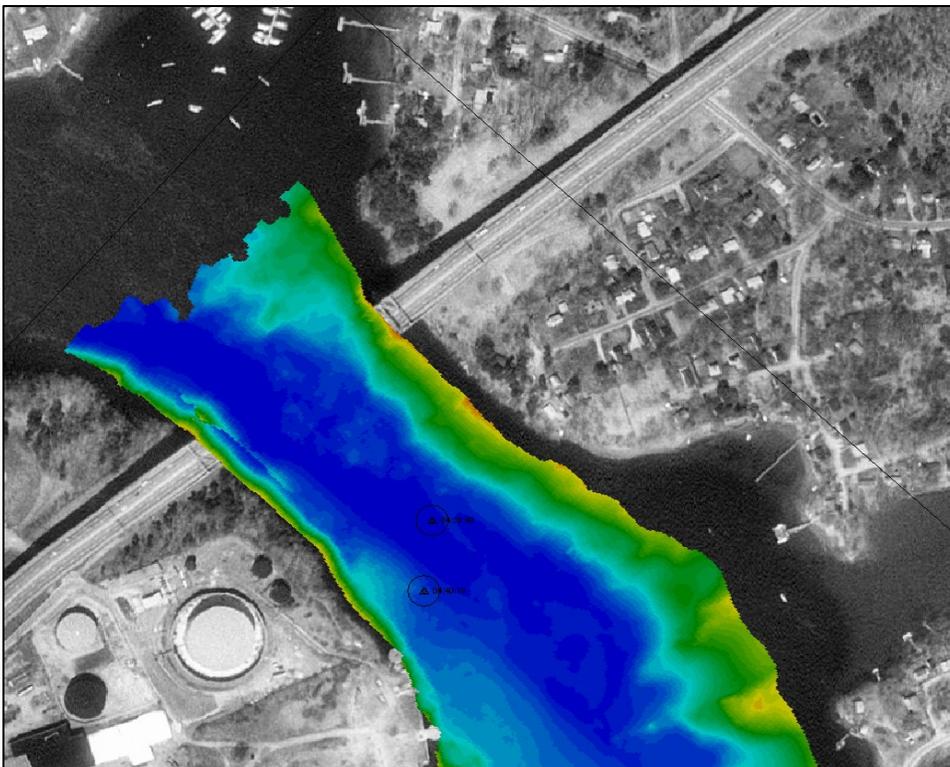
## Matrix Files

A Matrix file (\*.MTX) allows you to display real time bottom coverage and to quickly display the bottom depth info in a color scheme of your selection.

MTX files can be filled with pre-existing survey data or can be filled in real time with single beam, multiple transducer or multibeam sounding info.

In post-processing the MAPPER program allows you to select which depth is used to represent each 'cell' of the matrix:

- Minimum depth
- Maximum depth
- Depth closest to cell center
- Average depth
- Median depth
- Depth above or below strike value



A matrix file showing color-coded multibeam depth data superimposed over a GeoTIF. [Data courtesy USACE New England District]

## CAD/GIS Support

A majority of our clients want to be able to import their CAD/GIS information and display it in HYPACK® during survey design, data collection and generation of final products.

HYPACK® allows the display of several different background formats:

- DXF/DGN
- S-57/S-63
- OrthoTIF, GeoTIF
- BSB, UKHO ARCS
- Vector Product Format
- SHP from ArcInfo

HYPACK® also provides several tools to export data files and project files to both DXF and Microstation DGN.

## SURVEY

The SURVEY program of HYPACK® supports many kinds of devices.

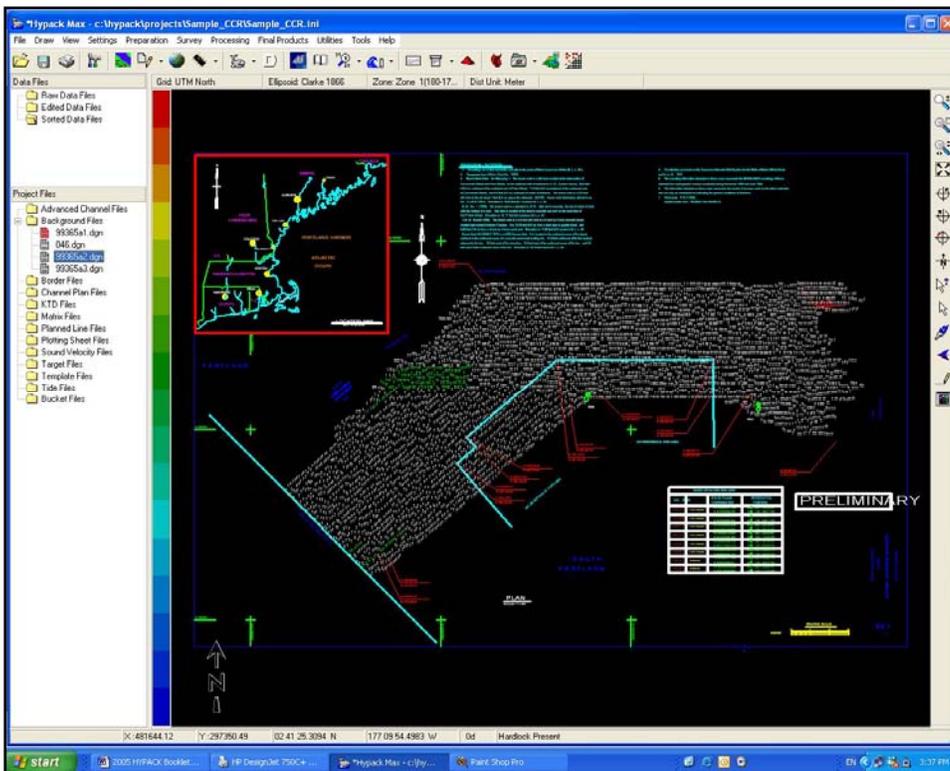
- RTK, DGPS and GPS systems
- Range-Azimuth
- Range-Range
- USBL
- ROV Transponders
- Single beam and Dual Frequency echosounders
- Heave-Pitch-Roll sensors
- Gyros and magnetic compass
- Magnetometers
- Environmental sensors

SURVEY provides windows for the Area Map, Data Display, Left-Right Indicator, Boat Profile and duplicate windows for the helm monitor.

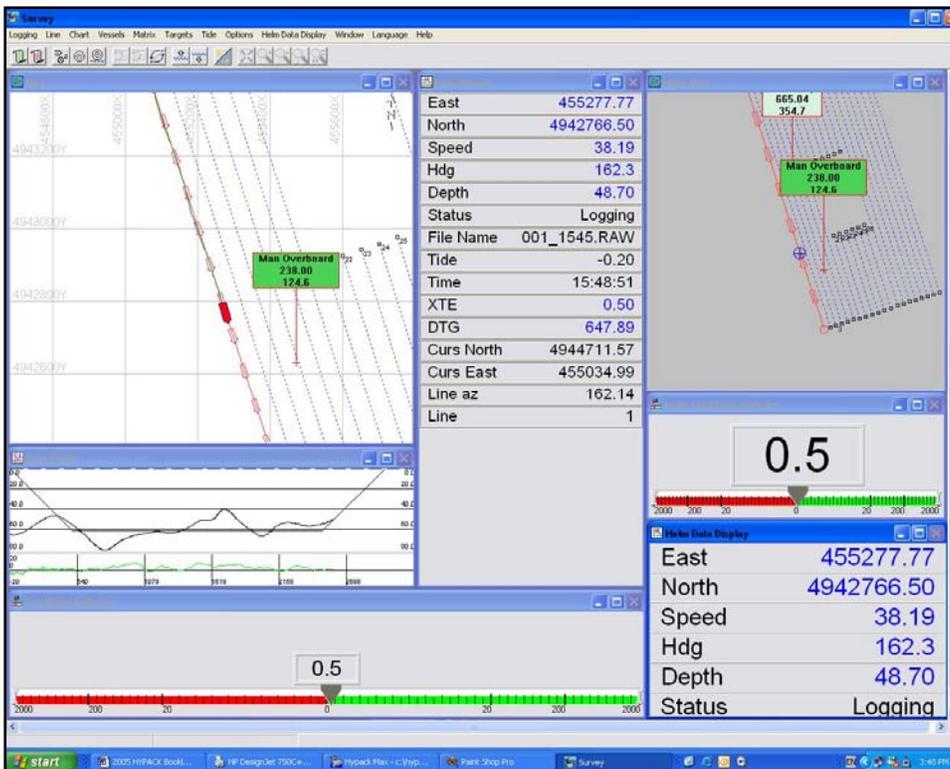
HYPACK®'s SURVEY program was the first to support real time RTK TIDES.

The Shared Memory Area of SURVEY allows you to:

- Generate custom messages for other devices.
- Transmit survey info and graphics across the network, serial connections or to data file.



One of HYPACK®'s strengths is in its import and export to CAD. The above screen capture shows a Microstation DGN file in MAX.



The SURVEY program showing standard windows with separate windows intended for the helmsman monitor.

# Vessel Display

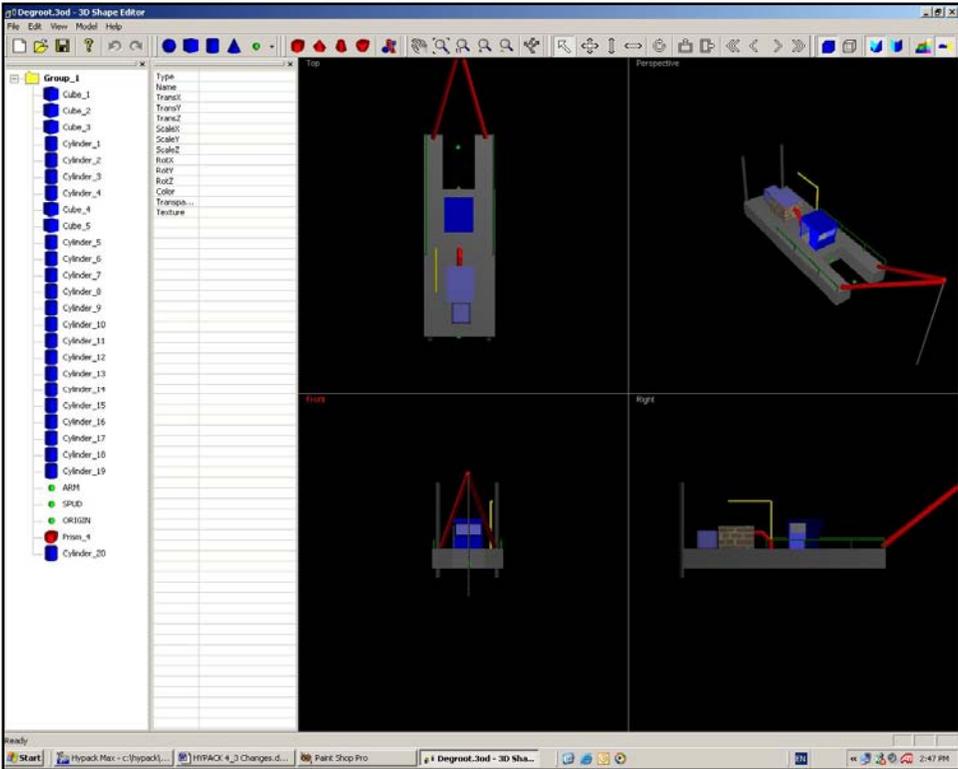
HYPACK® provides tools for the display of both 2-dimensional and 3-dimensional vessel shapes.

The BOAT SHAPE EDITOR is used to create 2-D shapes that are displayed in the plan view (Area Map) of SURVEY.

The 3D SHAPE EDITOR is used to create 3-D vessels that can be displayed in real time in the 3D TERRAIN VIEWER (3DTV) program.

The vessel perimeter and the location of all sensors are relative to a 'boat origin' established by the user.

This means you can have the exact perimeter of your vessel, dredge or work barge displayed in its exact location in real time.



The 3D SHAPE EDITOR (3DSE) program allows you to create the exact shape of your vessel and display it in the 3DTV program.

# SIDE SCAN

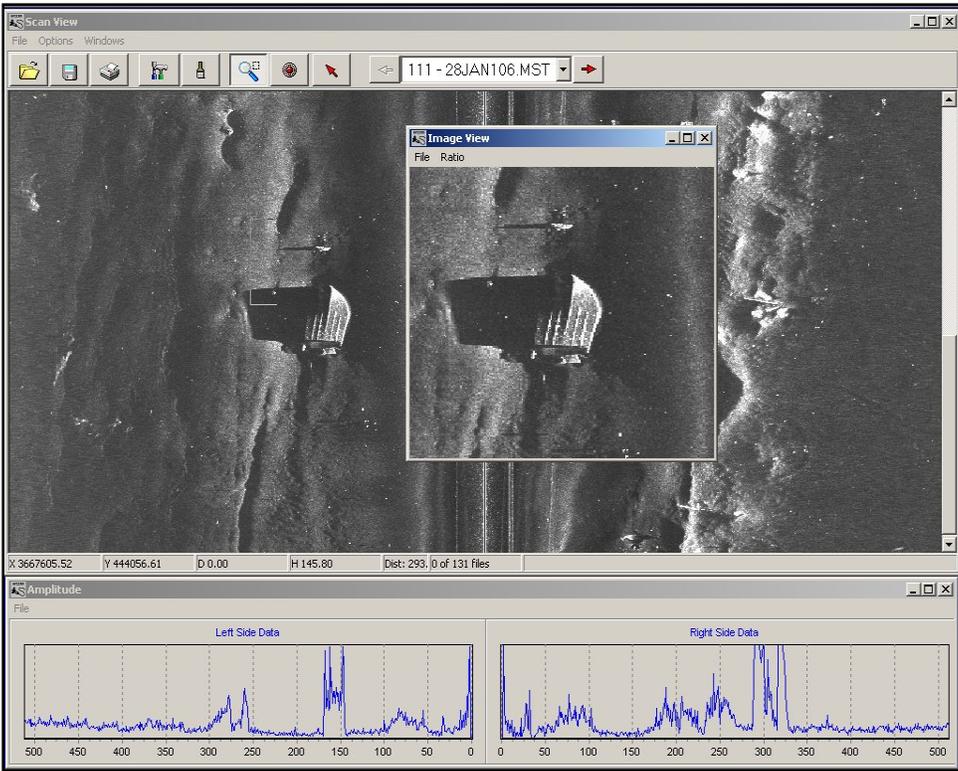
The collection and mosaicing of side scan data is now an integral part of HYPACK®.

The SIDE SCAN SURVEY program allows for the collection of digital and analog side scan data.

Target analysis can be performed in real time or in post-processing.

The SIDE SCAN MOSAIC program allows you to generate a mosaic from data collected in the HYPACK SURVEY program or from many XTF file formats. The resulting mosaic is saved to a GeoTIF format.

The SIDE SCAN routines can also process the backscatter intensity data from many multibeam systems to generate interesting mosaics.



Side scan data collected with Marine Sonics PCScan program displayed in the SIDE SCAN MOSAIC program. [Data courtesy Marine Sonics]

## Targets

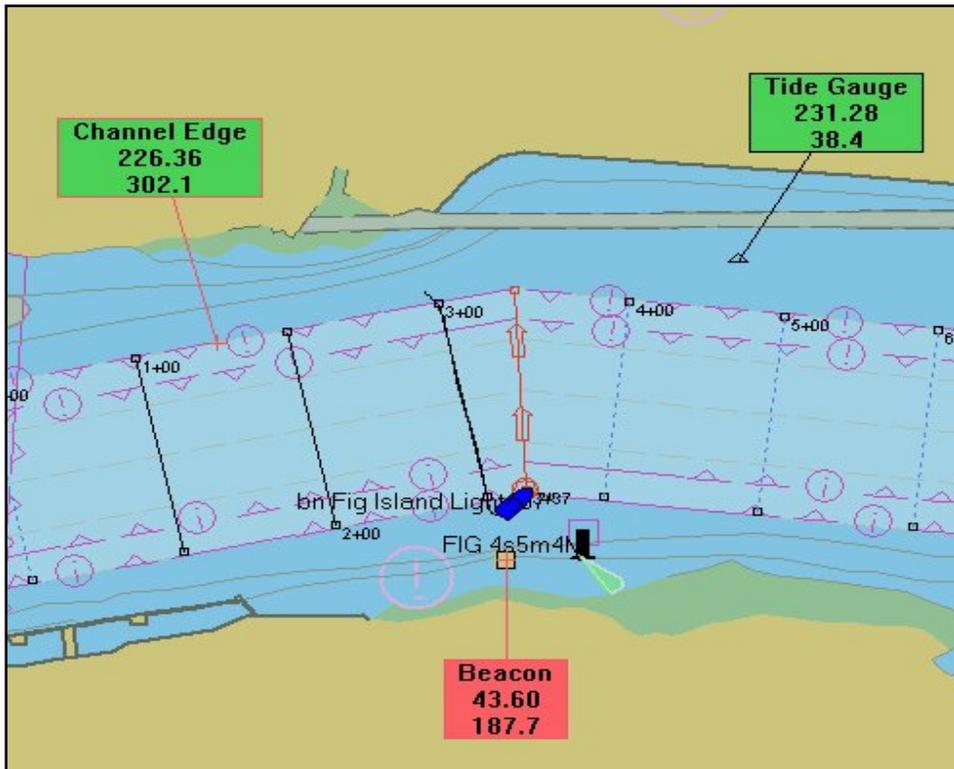
A target is an X-Y position of interest to the user. Targets can be used to mark aids to navigation or locations of bottom samples or any point of interest.

- Targets can be created in advance in the TARGET EDITOR.
- Targets can be marked in real time by hitting the F5 key in SURVEY. Targets can then be 'offset' based on a range and bearing.
- The new-style 'alarm' target provides a color-coded box that displays the name, distance-to-vessel and bearing-to-vessel info. The color of the alarm target changes color based on the distance to the vessel.

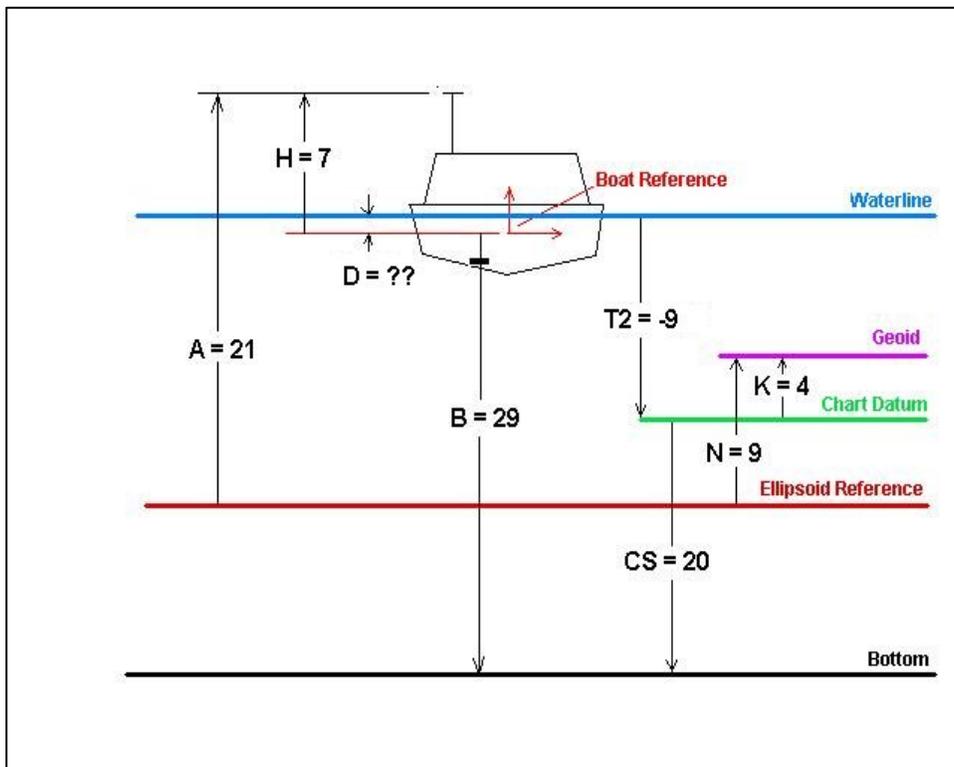
## Water Level Corrections

HYPACK® has several ways to generate water level corrections:

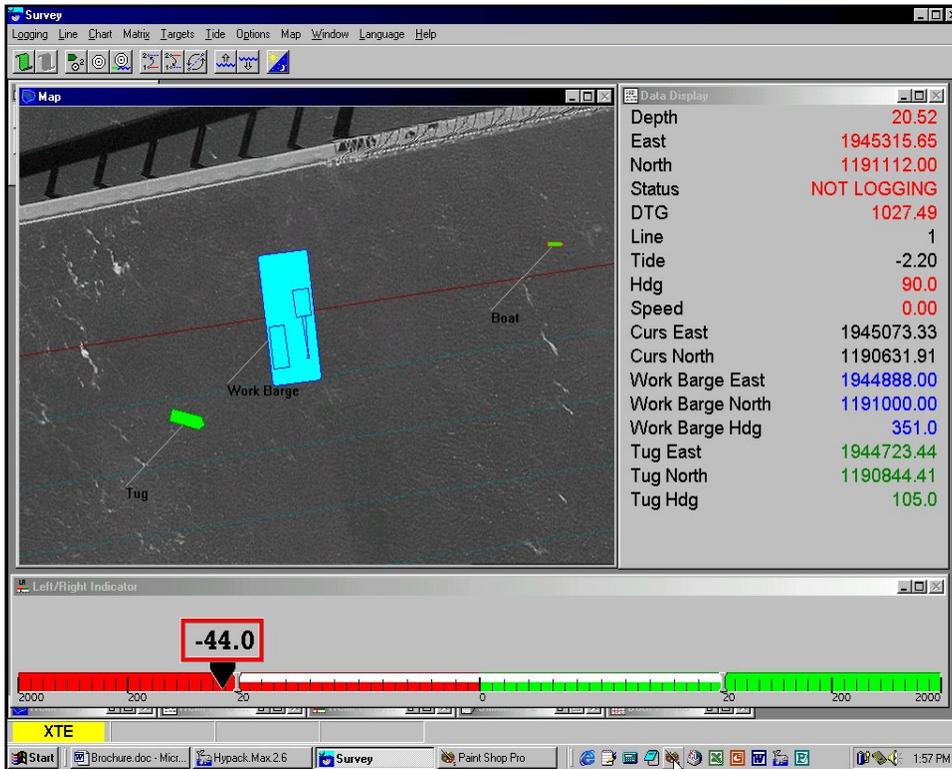
- Telemetry tide gauges can be integrated directly into SURVEY.
- Users can manually enter corrections in SURVEY.
- Users can create a tide correction table during post-processing and apply those corrections.
- Users can generate predicted tide corrections based on high water and low water times and heights or by using harmonic constituents.
- HYPACK worked together with the US Army Corps of Engineers to pioneer the use of RTK GPS to determine real time water levels.



The new 'alarm' style targets in SURVEY constantly show the distance and bearing from the boat to the target.



Using the elevation of the RTK antenna to determine the real time water-level correction is one of several tide correction methods available in HYPACK®.

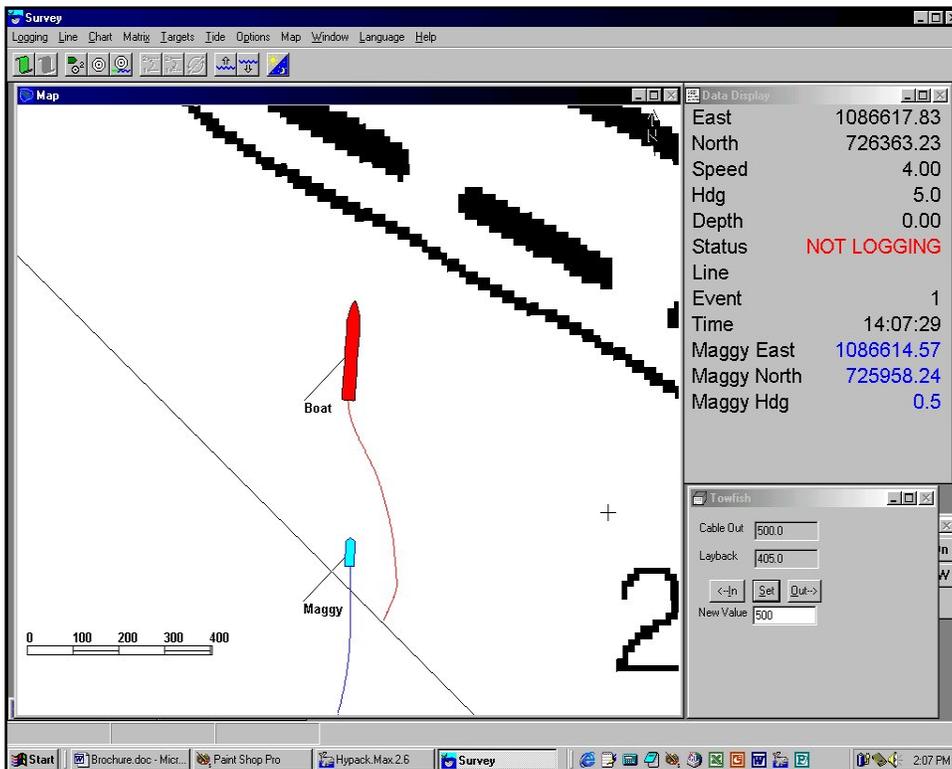


A work barge with two vessels in SURVEY.  
[Background file courtesy USACE Rock Island]

## Multiple Vessel Support

SURVEY can track up to eight separate vessels.

- Each vessel can be assigned its own shape and color attributes.
- Names of vessels can be attached to the shapes.
- Information from each vessel is available for display in the Data Display window of SURVEY.
- Info in the data display is color-coded to match the vessels color attribute.
- Any vessel can be designated the 'Main' vessel that is used to generate distance-to-go, cross-track-error and other navigation parameters.



A vessel with a towed magnetometer in SURVEY.

## ROV & Towfish Support

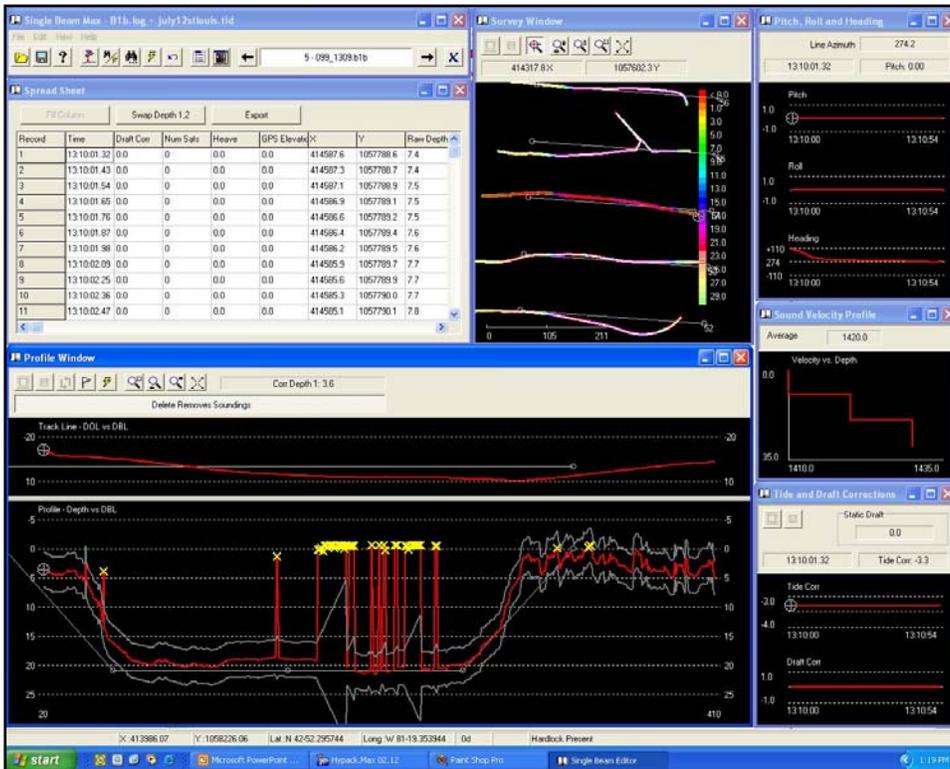
HYPACK®'s SURVEY program can simultaneously track, display and record the position and sensor information from your main vessel and towfish.

- Acoustic systems such as Trackpoint, Trackpoint LXT and Nautronic ATS are supported.
- USBL systems have been integrated.
- For short tows, the user can apply a manual layback, based on the amount of cable.
- The towfish or ROV can be designated as the 'Main' vessel. This means that all navigation parameters (Cross track error, distance to go, etc.) are based on the fish or ROV position.

## SINGLE BEAM EDITOR

The SBMAX program provides a powerful graphical interface for editing your single beam and dual frequency sounding data.

- Loads and displays and entire day's work in seconds.
- Applies water level corrections, standard or RTK Tides.
- Permits smoothing of track lines and RTK Tidal corrections.
- Displays depth profiles based on distance along line or time.
- Configurable spreadsheet shows all survey info for each data point and can be output to ASCII TXT.
- Automated filters quickly eliminate outliers.

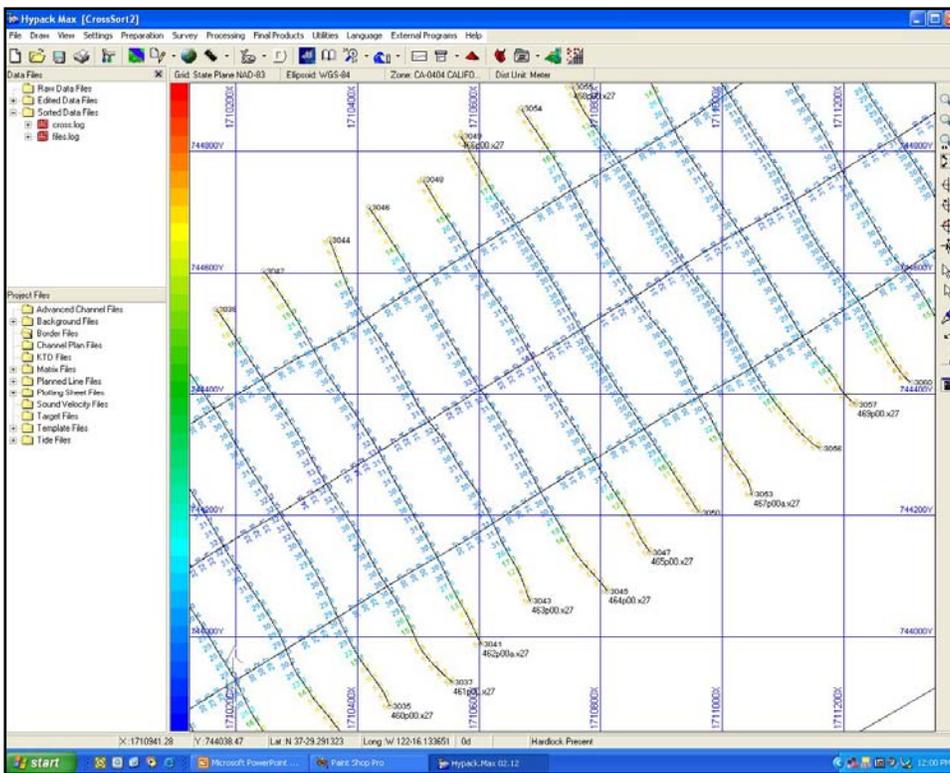


The SINGLE BEAM EDITOR allows you to quickly review, edit and save your single beam and dual frequency data.

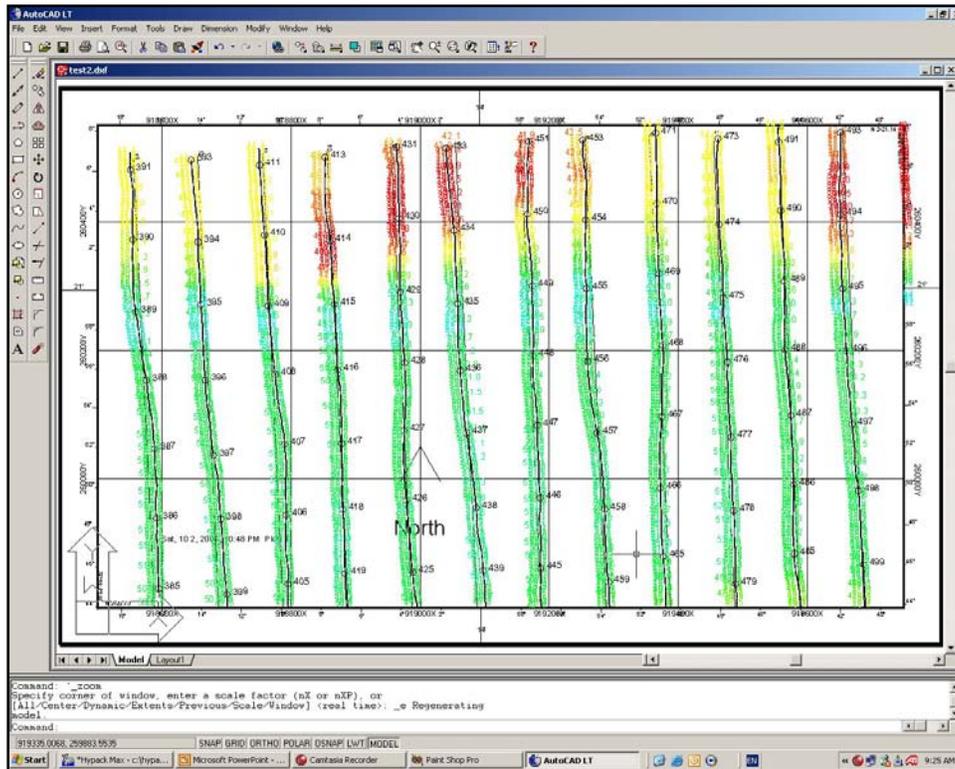
## Sounding Selection Programs

HYPACK® contains several programs to help you reduce your final data set.

- SORT: Creates a cartographic data set that guarantees the minimum or maximum soundings will be saved.
- CROSS SORT: Selects soundings to prevent overwrites at where lines intersect.
- MAPPER: A binning program used to reduce multibeam data.
- SOUNDING REDUCTION: Creates a subset of XYZ data points that accurately models the original data set.



Sounding selection programs allow you to eliminate overwrites and to prepare your data set for plotting and export to CAD.



The EXPORT TO CAD program converts HYPACK data to DXF and DGN formats.  
[Data courtesy USACE Jacksonville]

## EXPORT TO CAD/GIS

HYPACK® has all the tools you will need to transfer your hydrographic survey data into AutoCAD, ArcInfo, Terramodel, Microstation and other CAD/GIS packages.

The EXPORT TO CAD program allows you to send the following items directly to DXF or DGN:

- Soundings
- Track lines
- Planned lines
- Projection grids and labels
- Matrix Files
- Channel Plan Files
- Border Files

The CROSS SECTION AND VOLUMES program also allows the user to export sections to DXF.

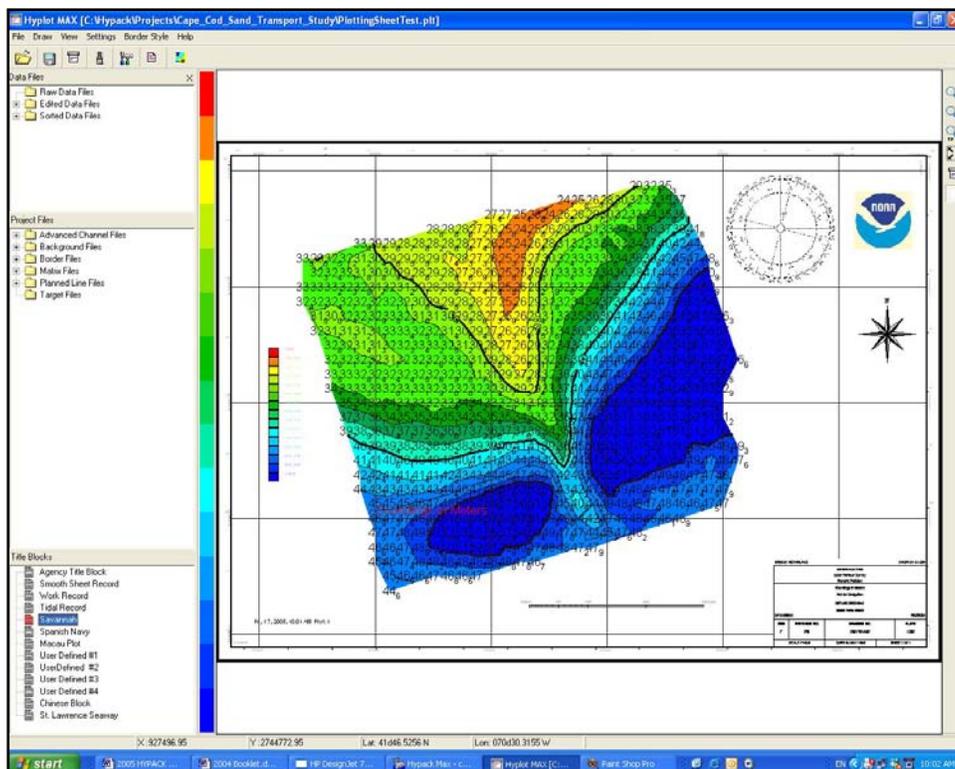
## Plotting Smooth Sheets

HYPACK® has a powerful plotting program named HYLOT that outputs high-quality plots to any Windows™ printer-plotter.

Plotting sheet limits and scales are defined in the PLOTTING SHEET EDITOR.

HYLOT has some great features:

- A WYSIWYG display.
- Several border options including IHO.
- The ability to zoom in and preview your plot.
- Import of user supplied graphics (BMP and JPG).
- Compass roses, scale bars and default title blocks.
- Drag and drop to move plot features.
- Plotting of contour lines and solid fills.

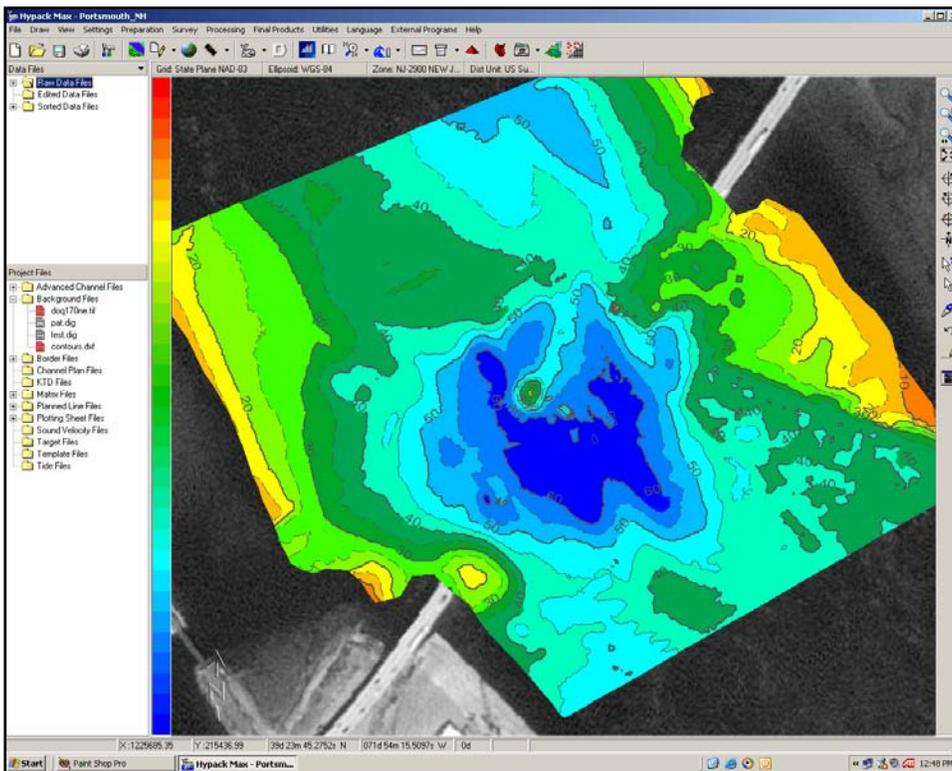


The HYLOT program is used to generate smooth sheets and can also export borders, compass roses, scale bars, soundings and other items directly to DXF.

## CONTOURING

DXF Contours are generated in the TIN MODEL program of HYPACK®.

- Contours are saved to DXF format, allowing for easy import into your CAD/GIS application.
- Contours can be either lines, labeled lines, and/or solid color fills.
- The TIN MODEL program accepts any HYPACK® data file or data collected in any application, provided it is in an ASCII XYZ format.
- Users can control the line weight, style, color and labeling option for each contour line.

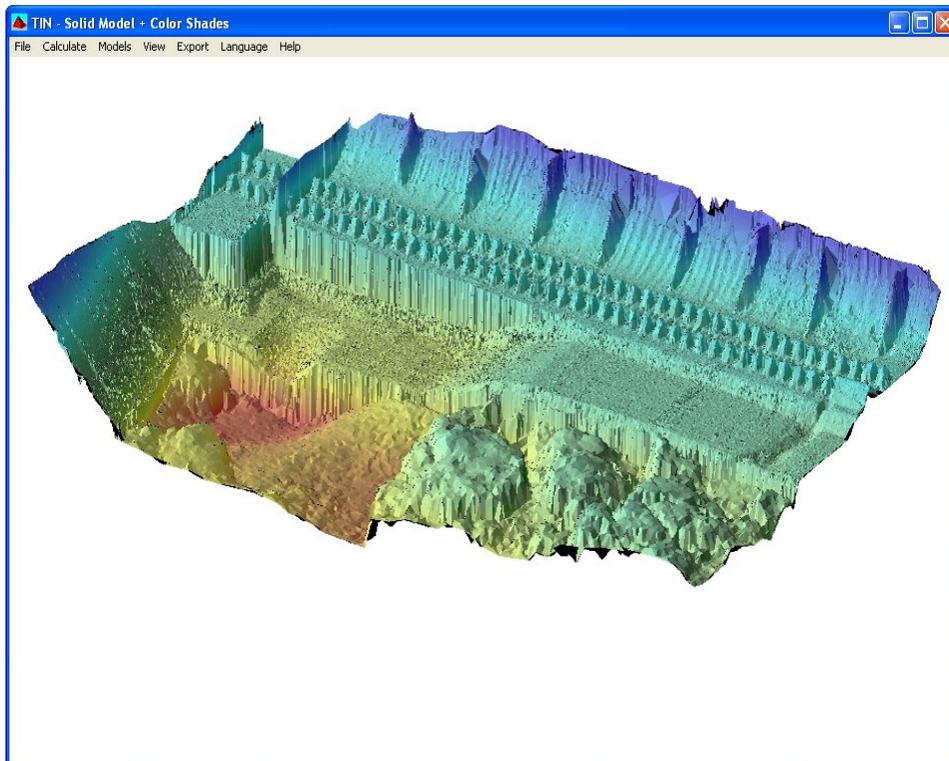


Solid filled contours with labels superimposed over a GeoTIF in HYPACK®

## TIN MODEL

The TIN MODEL is a powerful tool that creates surface models (Triangulated Irregular Networks) of your survey data.

- Models can be viewed in gray-scale or color from any angle and perspective.
- Models can be printed to any Windows™ printer or plotter.
- Models can also be saved to BMP or JPG for import into documents.
- The TIN MODEL contains powerful volume routines to compute volumes for single beam or multiple transducer or multibeam data sets:
  - TIN to Level
  - TIN vs. Channel
  - TIN vs. TIN
  - Volume by sections.



A TIN Model of Bonneville Dam.  
[Data courtesy David Evans and Assocs., Portland, OR]

# CROSS SECTIONS AND VOLUMES

The CROSS SECTIONS AND VOLUMES (CS&V) program of HYPACK® is the most versatile volume computation program in the industry.

CS&V computes volume quantities by determine the area of material in segments above the design, overdepth and supergrade templates.

Available methods include:

- AEA 1 – Standard Average End Area (AEA) report as used by USACE.
- AEA2 – Standard AEA with contour dredging computation in overdepth.
- AEA3 – Standard AEA report for a Pre-Dredge versus Post-Dredge computation.
- Philadelphia Pre-Dredge and Post-Dredge – AEA method with special provisions for box cuts.
- Jacksonville Pre-Dredge and Post-Dredge – Special treatment of side slope material.
- Savannah – Specially formatted AEA report.
- Standard HYPACK – Improved method for non-parallel lines where material is stacked on the inside or outside of the turn.
- CHEC 1 and CHEC 2 – Methods developed for Chinese National standards.
- Panama City – Generates ENG 80 report format.
- GLDD 1 and 3 – Special routine for treatment of side slope material

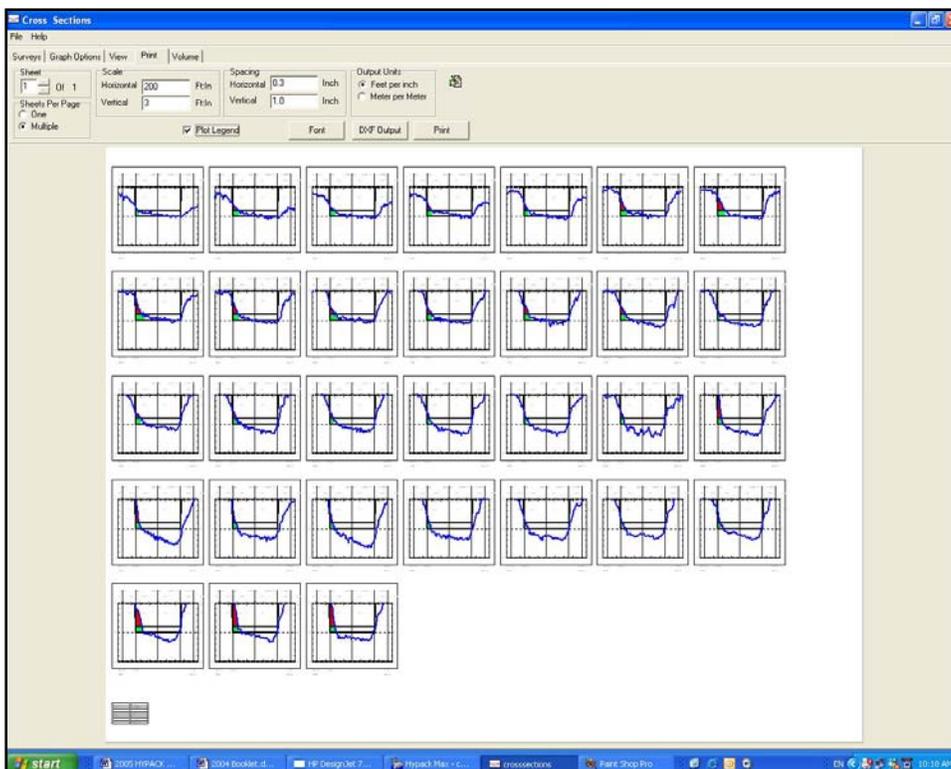
CS&V generates ASCII TXT reports for each method selected.

Sections and results can be sent to any Windows™ printer or plotter device.

- Plot one sections.
- Plot all sections each to their own page.
- Plot as many sections as you can fit on a page.



A display of a sectional profile showing the depth profile and the design template in the CROSS SECTIONS AND VOLUMES program. [Data courtesy USACE Buffalo]



A series of sections ready for plotting on a large format plotter.

## 3D TERRAIN VIEWER (3DTV)

The 3DTV program creates stunning visual representations of your survey data.

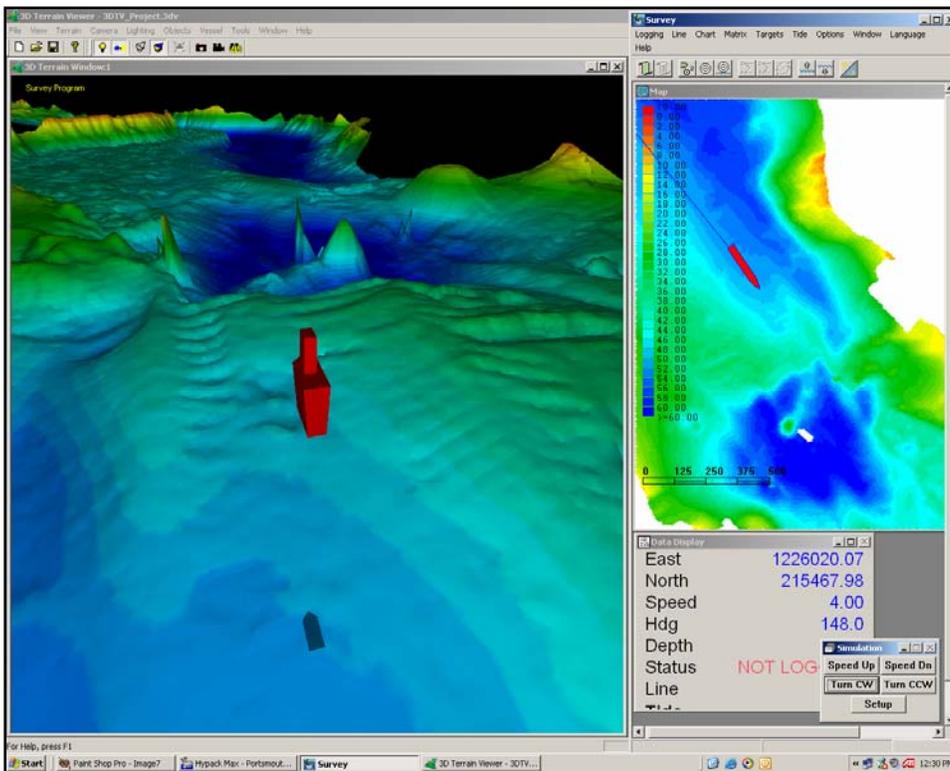
3DTV can read any HYPACK® LOG or XYZ data file to generate the surface model of the bottom.

The user can position the 'camera' using one of the following methods:

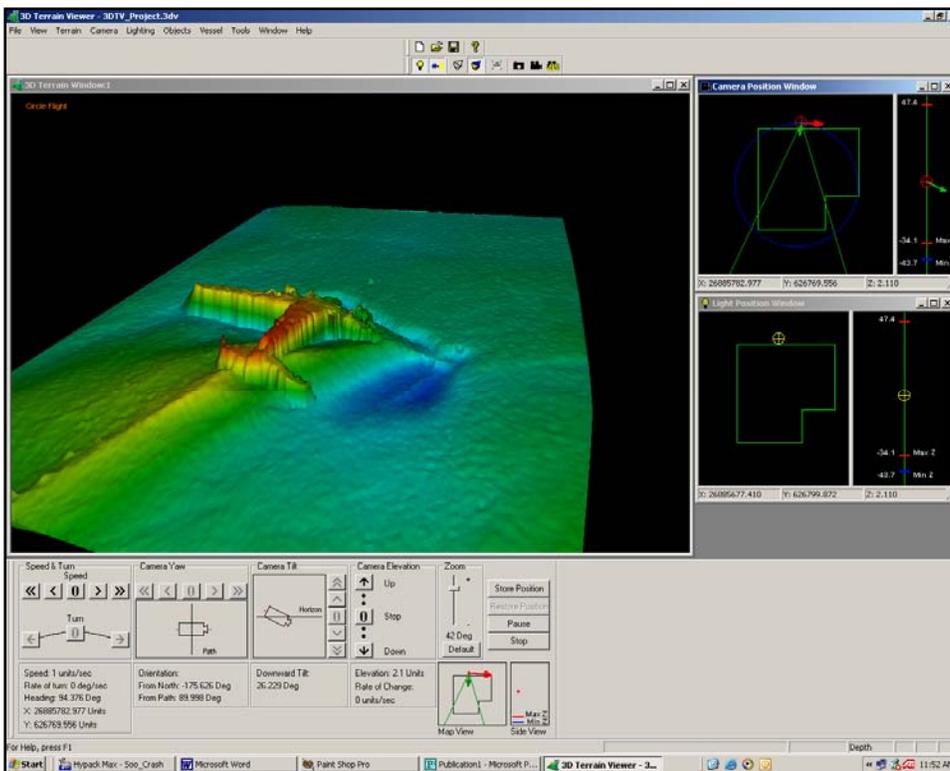
- Manual Flight: The user can position the camera and has complete control over its movements and direction.
- LNW Flight: The camera travels along a planned line file created in HYPACK®. The user can point the camera to the left or right of the planned line, but cannot move the camera off the line.
- Circle Flight: The camera travels around the perimeter of a user drawn circle. The camera always points towards the center of the circle. (Shown in the bottom figure.)
- SURVEY Mode: The camera is positioned and oriented relative to the vessel position and heading as supplied by the SURVEY program. (Shown in the top figure.)

The real time water level can also be displayed in different levels of transparency while in SURVEY mode.

Users can also display a channel design file, using the \*.CHN files created in the ADVANCED CHANNEL DESIGN program.



3DTV working in conjunction with the SURVEY program. The 3-D vessel shape is positioned and oriented based on real time info coming from SURVEY.



Viewing a plane using 'Circle Mode' in 3DTV.  
[Data courtesy USACE – Sault Ste. Marie, MI]

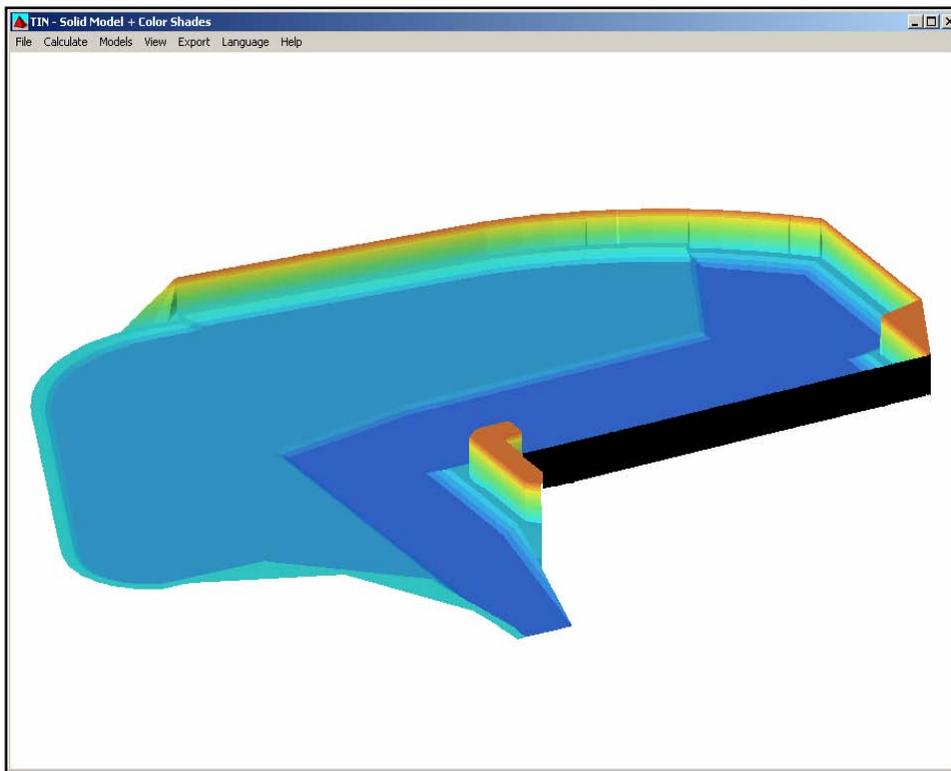
## ADVANCED CHANNEL DESIGN (ACD)

ACD allows user to create an exact dredging plan for complex areas.

The channel files (\*.CHN) created in ACD can be loaded in DREDGEPACK® to generate a real time cross sectional design profile based on the position of the digging tool.

The channel files can also be imported into 3DTV so the user can see exactly how the channel bottom relates to the design channel.

In ACD, the user enters X-Y-Z node information and then joins the nodes into planar faces.



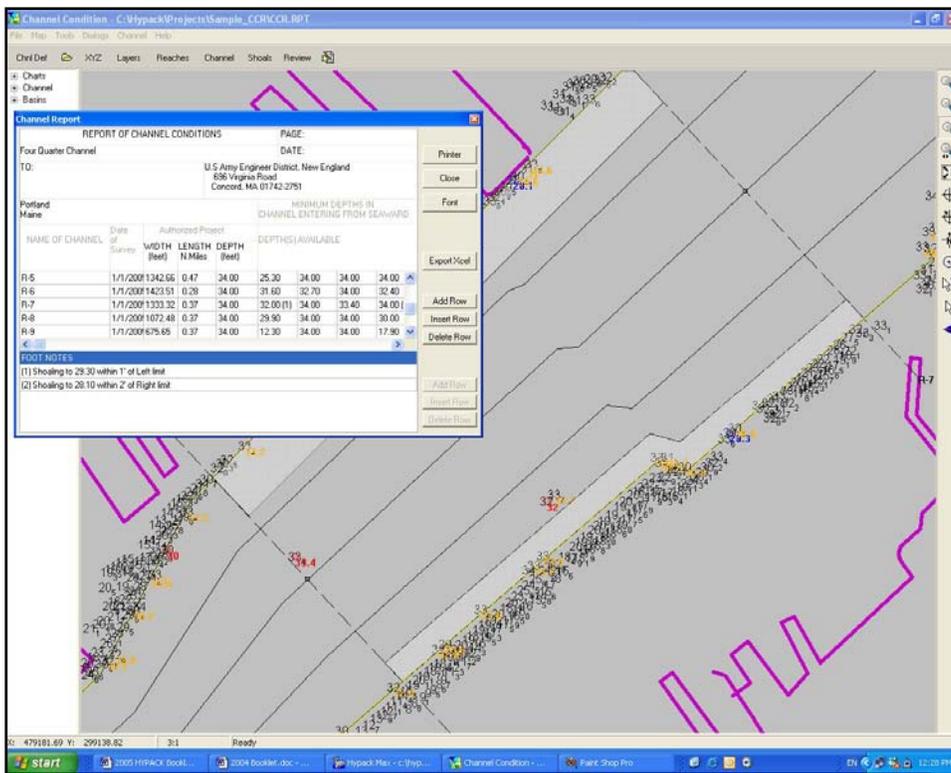
A complex dredging plan created in the ADVANCED CHANNEL DESIGN program.

## CHANNEL CONDITION REPORTER (CCR)

CCR is a specialty program, designed for the US Army Corps of Engineers to meet Federal requirements of certifying the minimum depth at different reaches of a channel.

In the design phase of CCR, the user defines the channel lines and divides the channel into 'reaches'.

In the shoal phase of CCR, the user imports their latest survey data and CCR determines the minimum (controlling) depth for each segment of each reach. It then generates a report, as per the NOAA format, that can be printed or exported to EXCEL.



Determine shoal depths per channel segment in CHANNEL CONDITION REPORTER.

## DREDGEPACK®

DREDGEPACK® is a specialty version of HYPACK® that is designed to operate on the bridge of dredges, excavators and derricks.

DREDGEPACK® maximizes the digging efficiency by providing real time information as to how deep the dredge is currently digging and how deep is the dredge plan at their current location.

The cross sectional profile views show:

- The As Surveyed Surface
- The As Dredged Surface
- The Channel Design Profile.

Profiles can be generated:

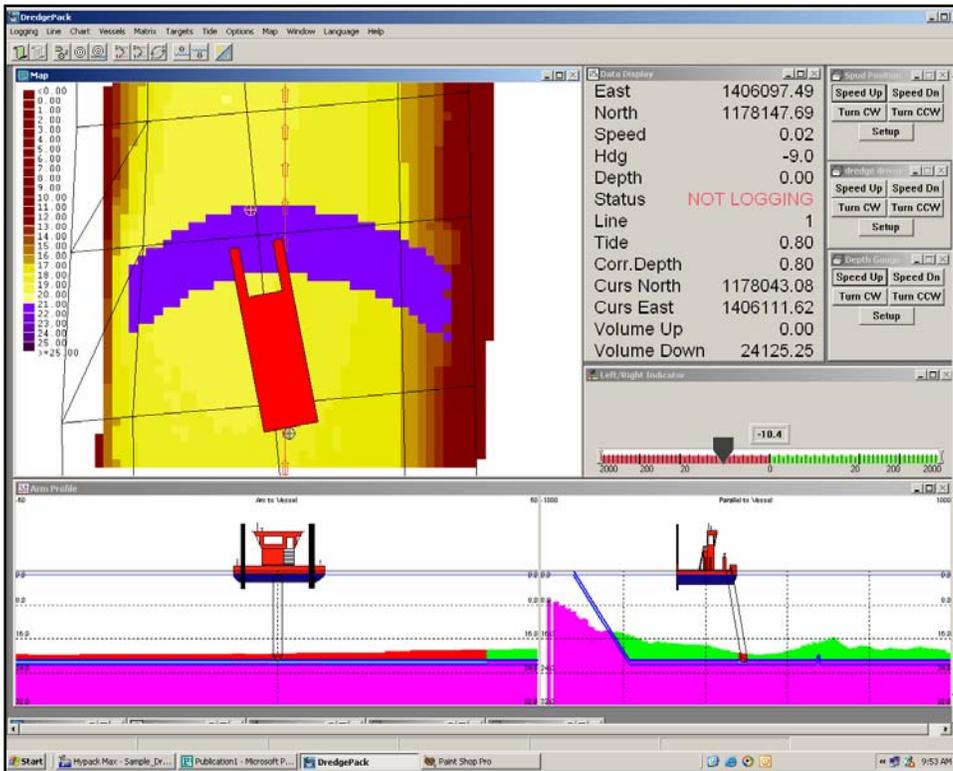
- Parallel to the vessel
- Perpendicular to the vessel
- Parallel to the planned line
- Perpendicular to the planned line.
- Along an arc (cutter suction swing)

DREDGEPACK® can access multiple matrix files, allowing you the detail needed when dredging long channels. The matrix file can show the depth that the cutting tool was at as it passes through each cell.

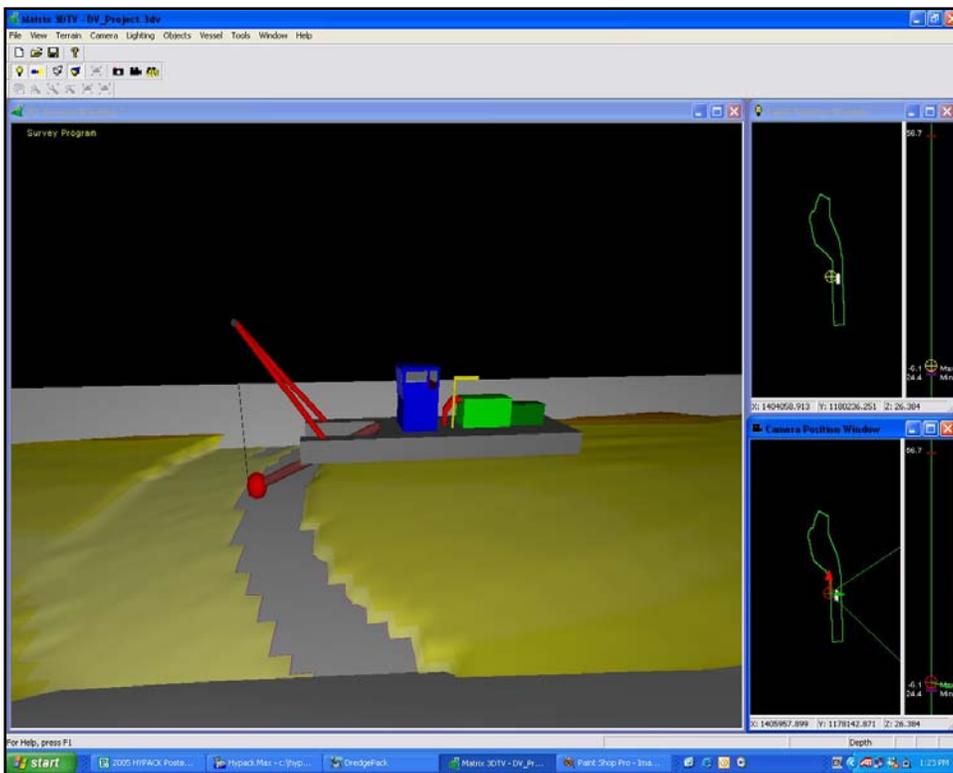
DREDGEPACK® supports the following dredge types:

- Cutter Suction
- Hopper
- Excavators
- Cranes & Derricks.

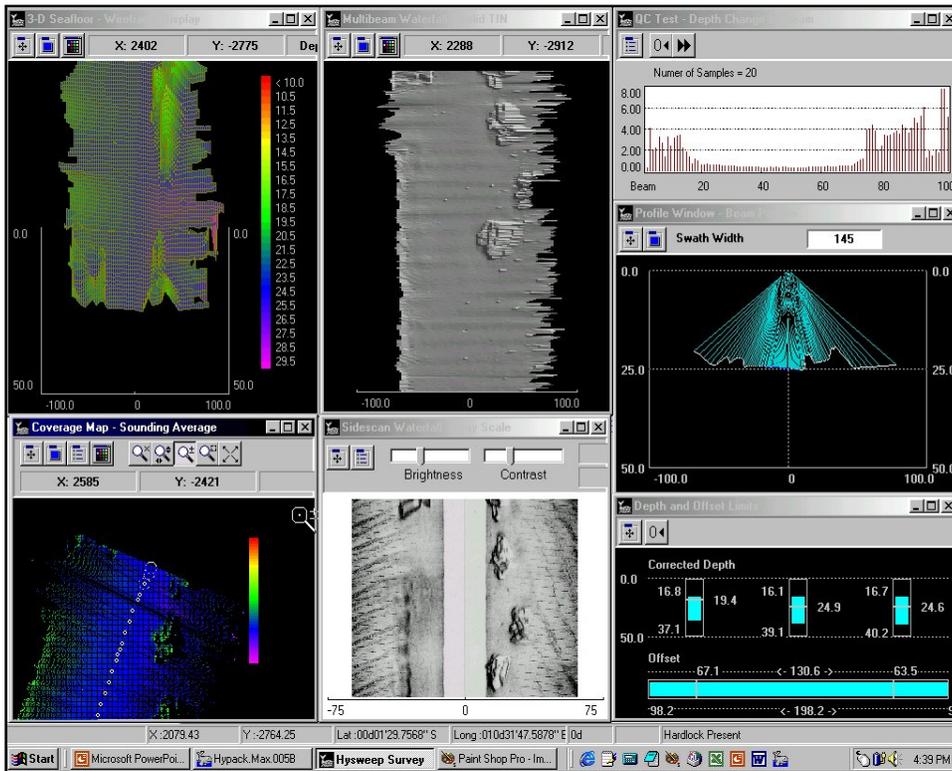
DREDGEPACK® can also be set up to track bucket 'drops' or 'placements', allowing you to generate a precise diagram to show capping operations.



A screen capture from DREDGEPACK® showing arc and longitudinal sections.



3DVIEW in SURVEY MODE, showing the position of the dredge and the digging tool relative to the design channel (gray) and the as-surveyed bottom.

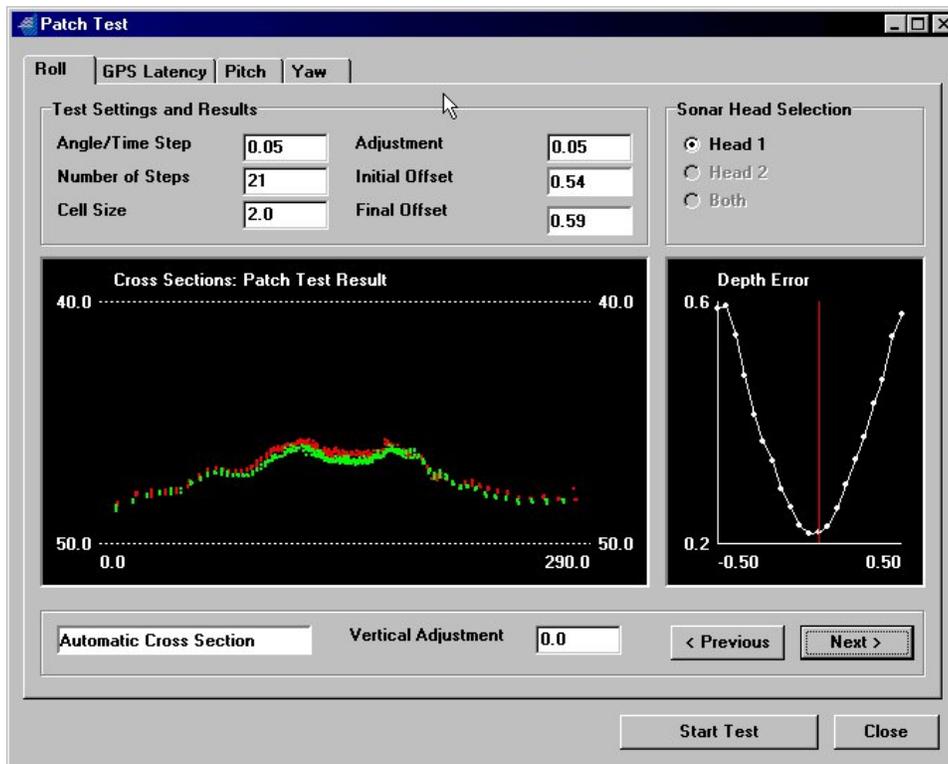


The HYSWEEP® SURVEY program, providing real time feedback during the collection of multibeam data.

## HYSWEEP® SURVEY

The HYSWEEP® option to HYPACK® adds the ability to calibrate, log and edit data from multibeam and multiple transducer sonar systems.

- Integrates multibeam sonars from:
  - Atlas
  - Benthos
  - Elac/Seabeam
  - Odom
  - Reson
  - Simrad
  -
- Provides for real-time display of:
  - Bottom coverage
  - Swath wire frames
  - Swath TIN surface
  - QC information
  - Side scan
  - Nadir beam to single beam comparison.

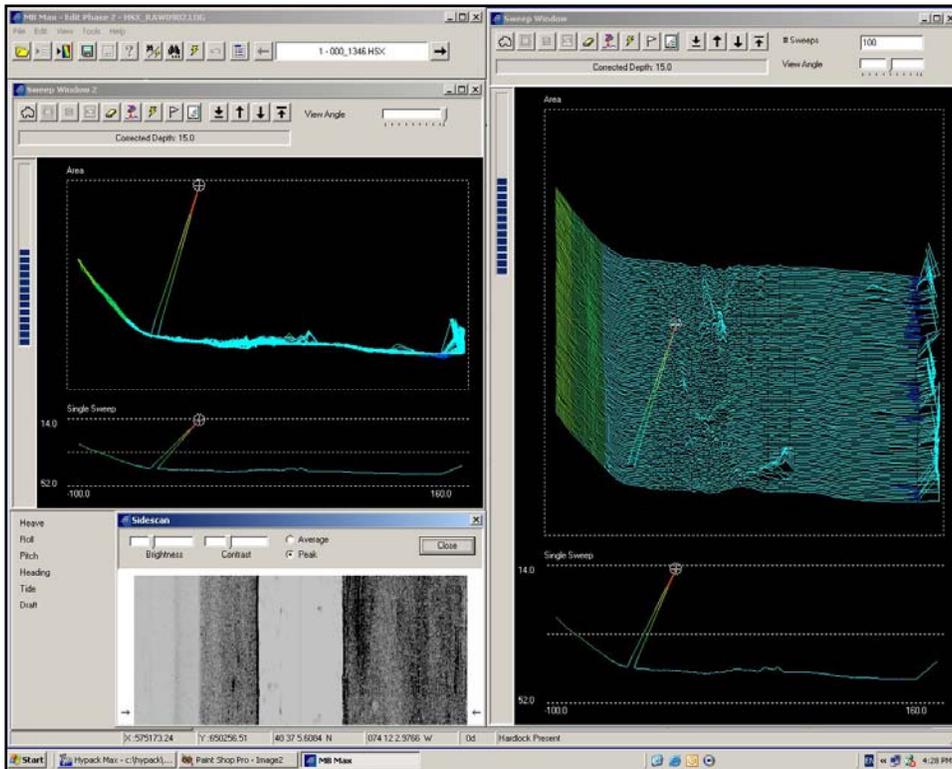


The 'Patch Test' portion of HYSWEEP® allows users to determine the exact alignment of their equipment.

## HYSWEEP® CALIBRATION

HYSWEEP® provides tools to allow you to quickly and accurately calibrate the orientation of your multibeam transducer and the time delays between the sonar and positioning system.

- The Patch Test function inside the MBMAX multi-beam editor computes the following errors from a set of test lines:
  - Roll
  - Pitch
  - GPS Latency
  - Yaw
- Data that has already been collected can be corrected for alignment and delay errors.
- System calibration should be a matter of hours, not days.



Stage 2 Editing in MBMAX now allows for dual Sweep windows, allowing you to view the data in different perspectives.

## HYSWEEP® EDITING (MBMAX)

The MBMAX program is allows you to edit your multibeam and multiple transducer data.

- MBMAX allows you to enter a tide correction file or to use water level corrections determined by RTK GPS elevations.
- The first stage of editing in MBMAX allows you to review and edit:
  - Vessel tracklines
  - Heave-pitch-roll
  - Gyro
  - Tide
  - Draft
  - Sound Velocity

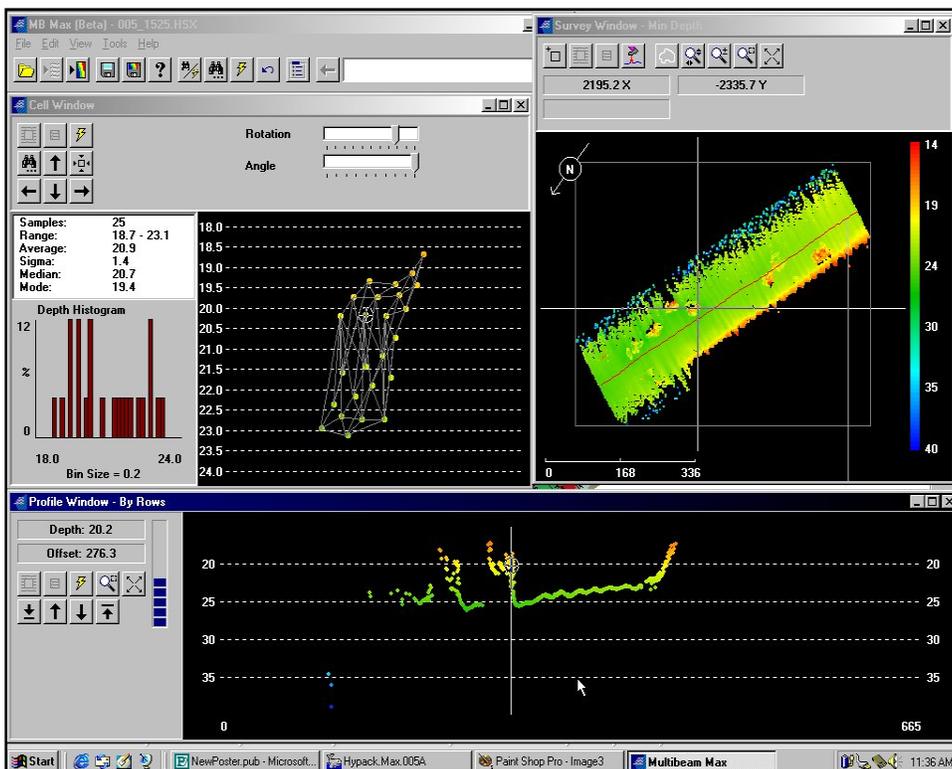
- The second stage of editing takes you to the Sweep Editor. During this stage, you can visually review each line and graphically edit or apply automated filters to each line. Filters include:

- Min/Max Depth
- Spike
- Overhang/Undercut Topography
- Sonar Quality Flag
- Port/Starboard Beam Angle Limits
- Specific Beams

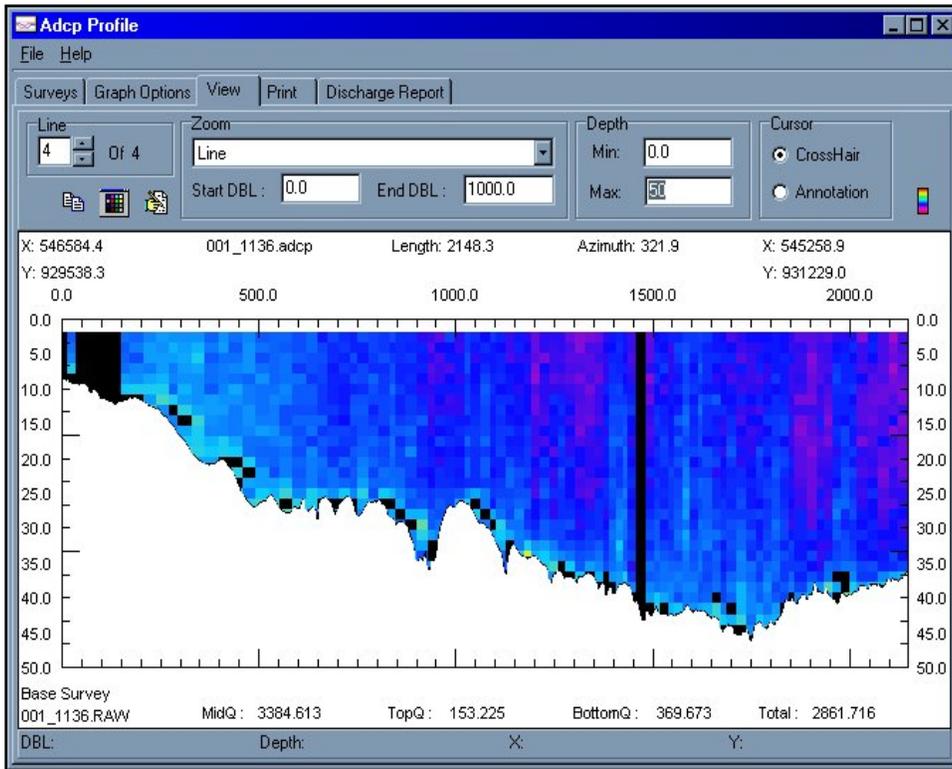
- During the third stage of editing, data from all multibeam lines is combined and displayed. Statistical filters can now be applied based on the surrounding multibeam data points. Displays include:

- Survey window
- Profile window
- Cell window

- The third stage also contains the calibration (Patch Test) and System Performance tools to judge the overall quality of your multibeam system.



Stage 3 editing of MBMAX performs statistical filtering



The Adcp Profile program of HYPACK® processes ADCP data to generate cross-sectional flow profiles.

## ADCP SUPPORT

HYPACK® now supports ADCP sensors from RD Instruments. The following programs are included in MAX:

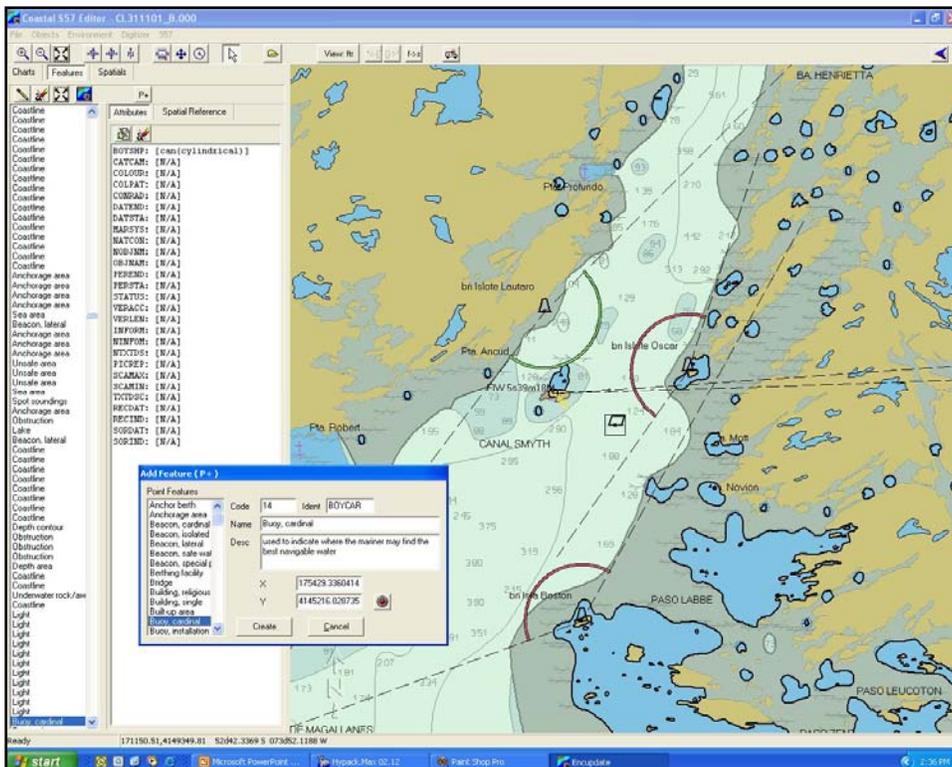
- **ADCP Logger:** Runs simultaneous with SURVEY. Allows you to 'deploy' and log ADCP data from the RD Instruments Workhorse and Rio Grande ADCPs.
- **ADCP Profiles:** Combines velocity data from the ADCP files with cross sectional data from the edited HYPACK files. Provides color-coded flow diagrams and overall flow values.
- **ADCP to DXF:** Allows you to export DXF current vectors at selected depth levels for import of velocity data to CAD/GIS.

## ENCEdit

ENCEdit is sold separately from HYPACK®. It is designed to allow users to modify existing S-57 charts by adding, moving, deleting, and re-attributing chart objects.

## MiniENC

The MiniENC program is also sold separately from HYPACK®. This program was designed under the direction of the US Army Corps of Engineers. It automatically updates S-57 charts by removing old sounding data, entering new soundings, re-contouring, and saving the updated S-57 data to a new chart.



The ENCEdit program is designed to modify S-57 charts by allowing you to add, delete, move and re-attribute features. ENCEdit is not a part of HYPACK®.

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AGEOTEC srl	Italy
Atlas Hydrographic	Australia
Bruttour International Pty.Ltd.	Australia
Cledir, SA	Uru. & Arg.
Dissmann Ingeneria	Colombia
Dorami International	Israel
Dragon & Elephant Ent. Co.	Taiwan
E.K. Boustead Inc.	Philippines
Elcee Instrumentation Sdn.	Malaysia
Elmar	Italy
Envir. Tech. Co.,LTD.	Thailand
eTrac	USA
Gemini Positioning Systems	Canada
Geoceano	Chile
Geosys Ltda.	Uruguay
Geotech Mercantile Corp.	Philippines
Grafinta s.a.	Spain
Hadi Hazzazi Est.	Saudi Arabia
Hydrographic Consultants	USA
Innerspace Technology	USA
International Industries	USA
Intersat Radio	Romania
Irtisaal Enterprises	Pakistan
Kongsberg Simrad	Norway
Knudsen Engineering	Canada
L3 Communications Elac	Germany
Mecco, Inc.	USA
Multitech Systems	Bangladesh
Nautiradar	Portugal
Navicom Marine	Denmark
Odom Hydrographic Systems	USA
PEISE, c.a.	Venezuela
Pertec	South Africa
Ren Star Instrumentation	Malaysia
Reson, Inc.	USA
Ross Laboratories	USA
Sea and Land Technologies	Singapore
Seafloor Systems	USA
Seaprod, s.a. de c.v.	Mexico
Seatronics Ltd.	UAE
Specialty Devices	USA
Survey Equipment Services	USA
Surveying Systems	Egypt
Tecnica Carvallo, S.A	Panama
Unique Systems	UAE

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# SeaBat 8124

Multibeam Echosounder System



## SeaBat 8124

- **200kHz frequency**
- **120° swath coverage**
- **80 beams**
- **Amplitude/phase bottom detect**
- **100% coverage for condition and pay quantities**

Specially designed for harbor and river surveys, the SeaBat 8124 is ideal for condition and pay quantity surveys in support of dredging operations.

Operating at 200kHz, the SeaBat 8124 multibeam echosounder successfully penetrates the suspended material inherent in dredging operations to accurately measure a profile of the bottom that is 3.5 times the measured water depth. High accuracy, even on the outer beams, is assured by an advanced bottom detection system that incorporates both the amplitude and phase detection methods.

The SeaBat 8124 is a lightweight and portable system—the transducer array is only about 1 square foot in size (30.48cm), which maximizes installation flexibility. Choose temporary or permanent installations, on the hull or over-the-side, on large dredges or small survey vessels operating with limited draft.

Based upon the proven design and architecture of the SeaBat 8100 Series, the SeaBat 8124 is controlled by an intuitive point-and-click menu and monitored by a real-time color display.





# SeaBat 8124

## Multibeam Echosounder System

### SYSTEM PERFORMANCE

Frequency:	200kHz
Range Resolution:	1cm
Swath Coverage:	120°
Min/Max Range:	0.5/750m
Number of Beams:	80
Along-Track Beamwidth:	1.5°
Across-Track Beamwidth:	1.5°
Accuracy:	IHO Compliant
Operational Speed:	Up to 12 knots
Max. Update Rate:	30Hz
Transducer Depth Rating:	100m

### INTERFACE

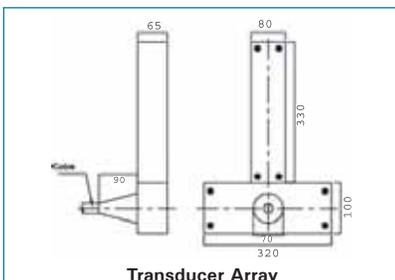
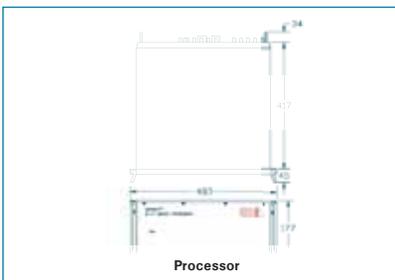
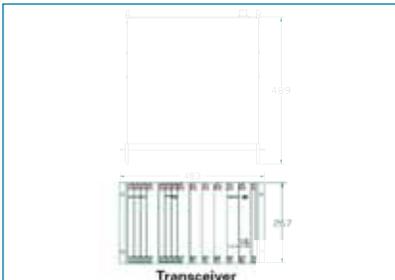
System Supply:	115V/230V 50/60Hz, 200W max
Video Display:	SVGA, 800 x 600, 72Hz
System Control:	Trackball or from Ethernet
Data Output:	10MB Ethernet
Data Uplink:	High-speed digital coax with fiber-optic option
Temperature:	
Operating:	0° to +40°C
Storage:	-30° to +55°C

### MECHANICAL INTERFACE

Dimensions (HWD):	
Transducer Array:	430 x 320 x 65mm
Processor:	177 x 483 x 417mm
Transceiver:	267 x 483 x 489mm
Weight:	
Transducer Array:	8.3kg (dry) / 4.6kg (wet)
Processor:	20kg
Transceiver:	13.6kg

### OPTIONS

Side-scan upgrade
Sound velocity profiler
24DC power supply for SeaBat 81-P Processor



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[www.reson.com](http://www.reson.com)



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### INTERFACE

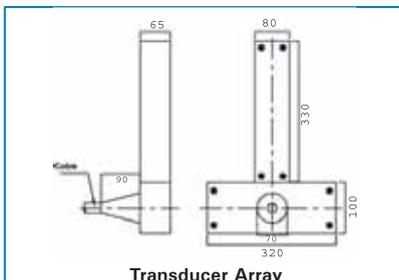
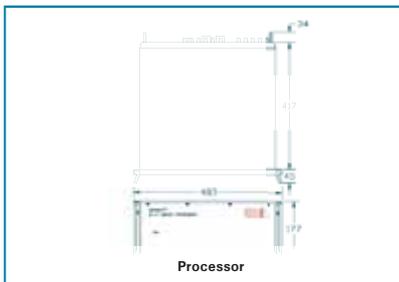
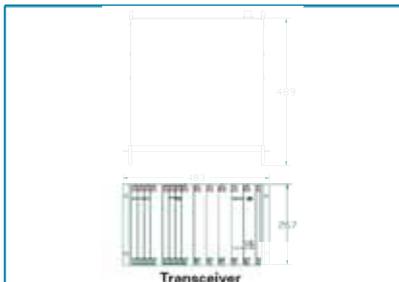
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Video Display:	SVGA, 800 x 600, 72Hz
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Operating:	0° to +40°C
Storage:	-30° to +55°C

### MECHANICAL

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Transducer Array:	430 x 320 x 65mm
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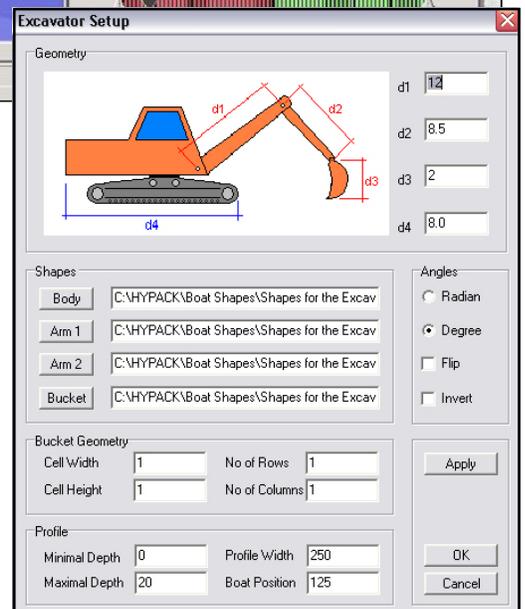
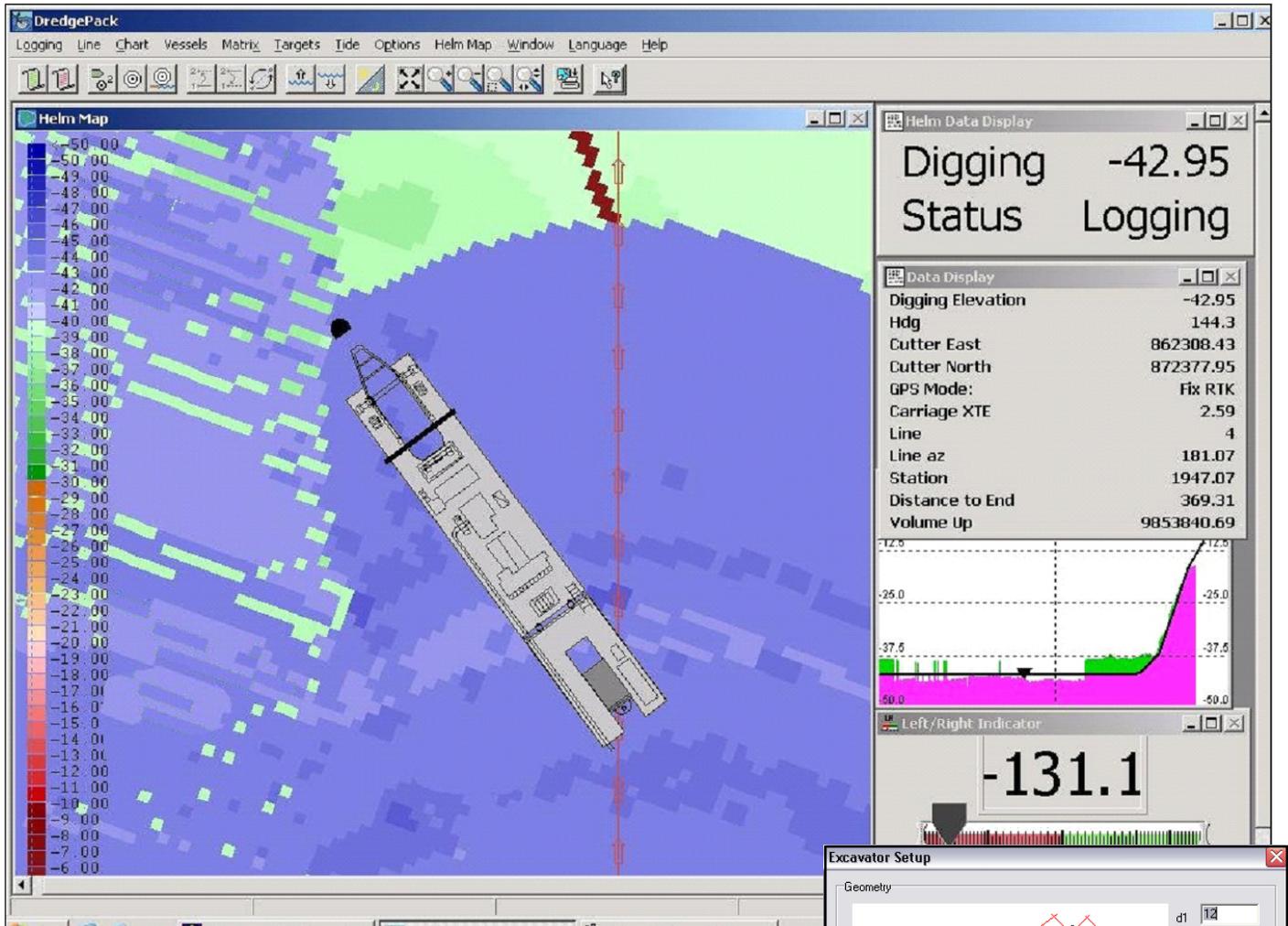
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E-mail: [sales@reson.co.uk](mailto:sales@reson.co.uk)

[www.reson.com](http://www.reson.com)

# DREDGEPACK<sup>®</sup>



Real Time Dredging Information  
for Excavators and Cutter Suction, Hopper and Bucket Dredges



- Precise digging over complex plans
- Real time visualization:
  - Plan view
  - Sectional views
  - 3DTV Perspective view
- Work in depth or elevation mode.
- Satisfies USACE Silent Inspector requirements.
- OPC Network capable.

**DREDGEPAK**<sup>®</sup> provides operators with precise digging information, showing the exact position of your dredge and digging tool in your channel. Using any XYZ file of survey data, the program creates the 'As Surveyed' surface that represents your starting point. An 'As Dredged' surface is then modified based on the position and depth of the cutting tool.

**DREDGEPAK**<sup>®</sup> provides real time cross section information, showing the 'As Surveyed' and 'As Dredged' sections against the Channel Plan section. This allows for precise digging on side slopes and in complex channel areas.

Real time sections in **DREDGEPAK**<sup>®</sup> can be:

- Perpendicular to Vessel
- Perpendicular to Centerline
- Parallel to Vessel
- Parallel to Centerline
- Arc Profile (Using Spud to Tool distance as arc radius.)

**DREDGEPAK**<sup>®</sup> also provides real time output to satisfy reporting requirements. The USACE Silent Inspector requirements are a standard part of the software. It can output selected parameters to a radio modem or across a network, making the operational parameters available to other systems.

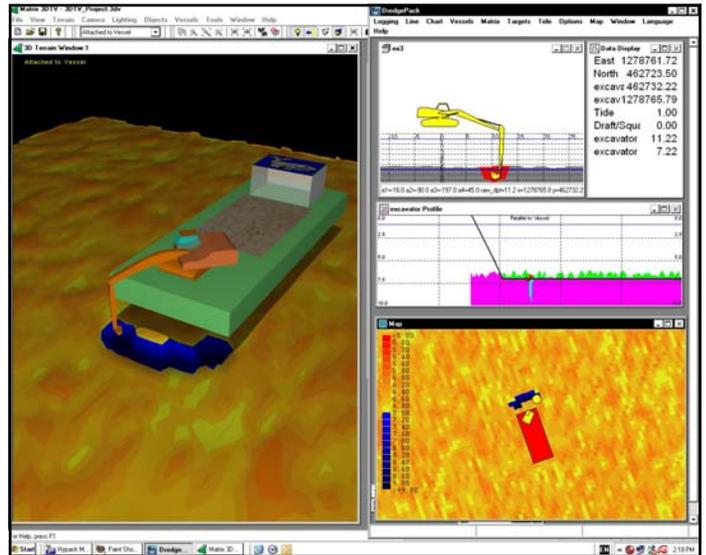
**DREDGEPAK**<sup>®</sup> is a special adaptation of HYPACK<sup>®</sup>, one of the most widely-used hydrographic surveying packages in the world. It contains all of the modules necessary to:

- Define your project geodesy
- Configure the hardware on the dredge
- Create the 'As Surveyed' surface
- Create your channel design plan
- Perform real time monitoring and visualization

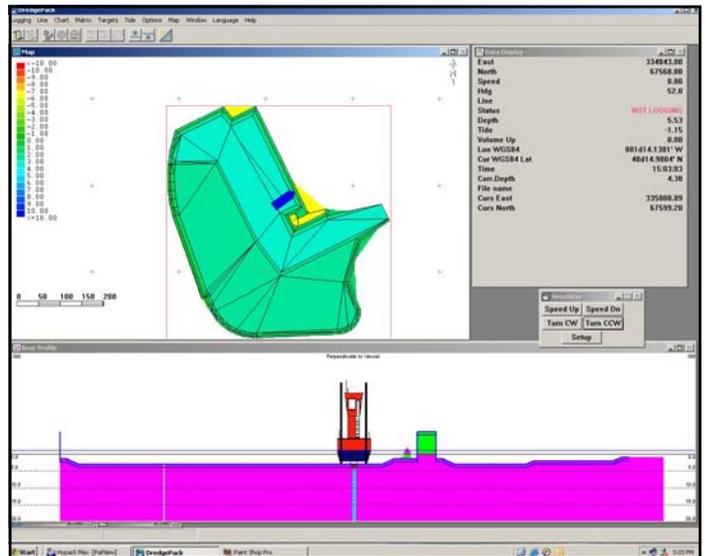
**DREDGEPAK**<sup>®</sup> has been successfully installed on:

- Hopper dredges
- Cutter suction dredges
- Vacuum dredges
- Clamshell and bucket dredges
- Excavators

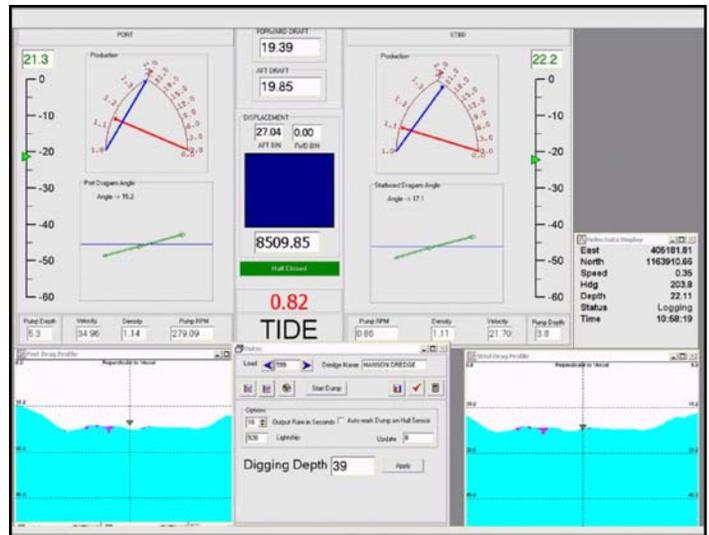
**HYPACK, Inc.**  
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 Sales: [sales@hypack.com](mailto:sales@hypack.com)  
 Phone: 860-635-1500  
 Fax: 860-635-1522



3D Visualization with an excavator integrated in **DREDGEPAK**<sup>®</sup>.



A real time cross section through the complex dredging plan.

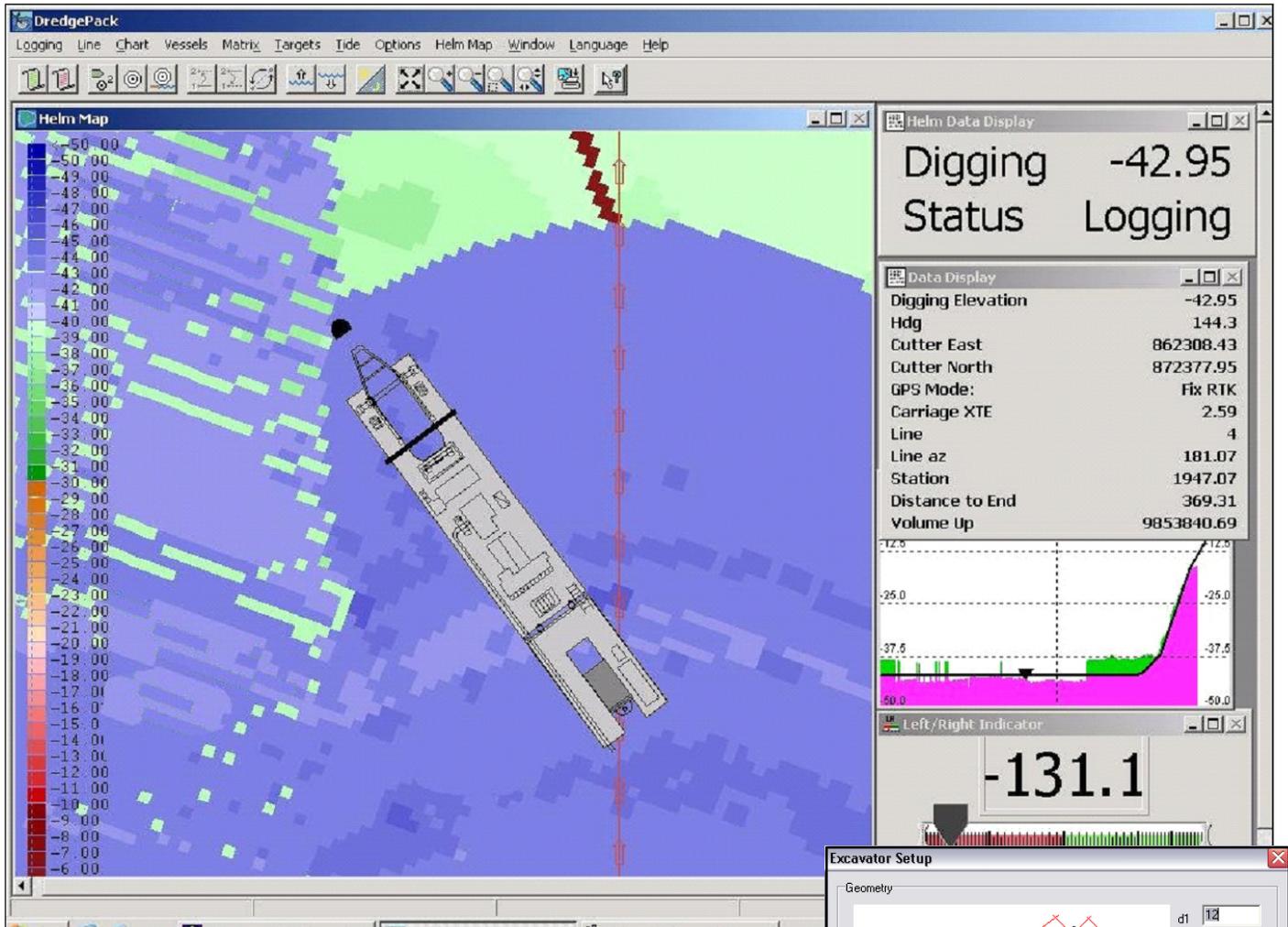


Customized display for hopper dredge using OPC Network.

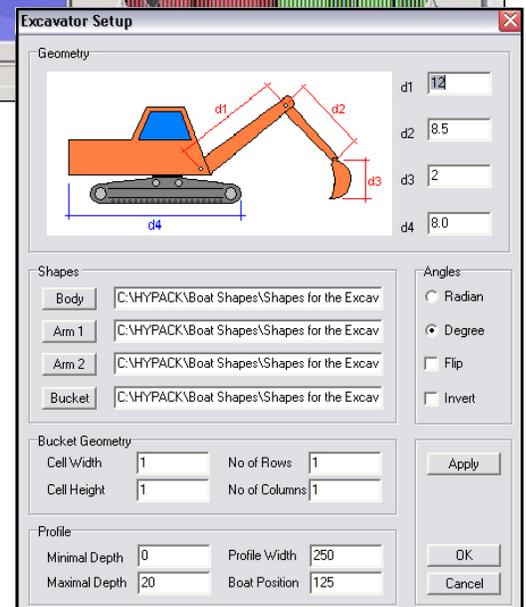
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- Precise digging over complex plans
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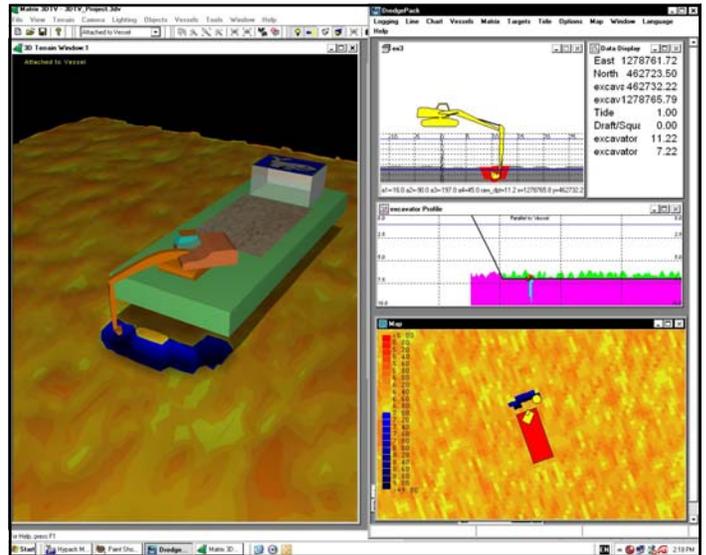
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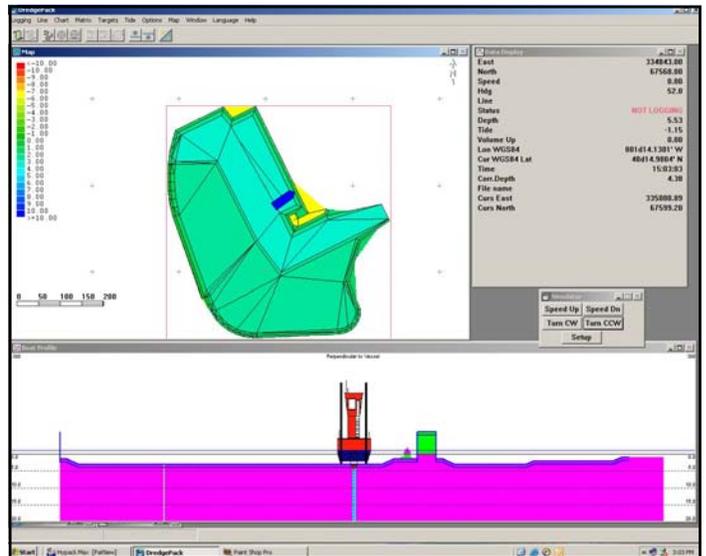
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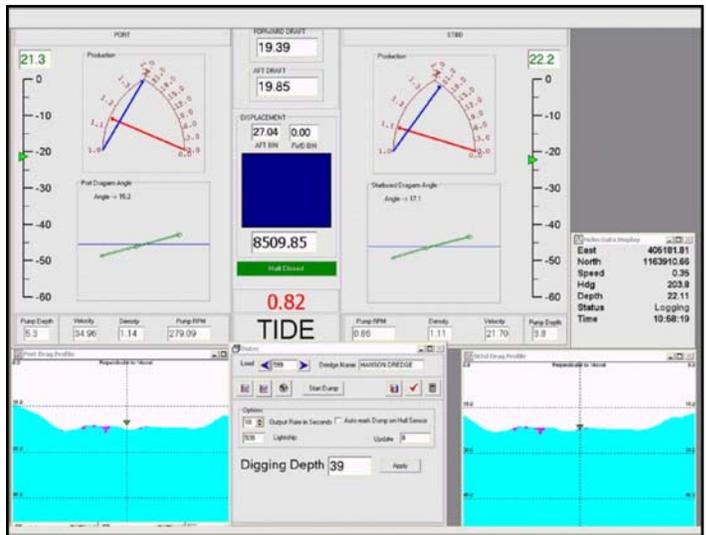
**HYPACK, Inc.**  
 56 Bradley St.  
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 Sales: [sales@hypack.com](mailto:sales@hypack.com)  
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 Fax: 860-635-1522



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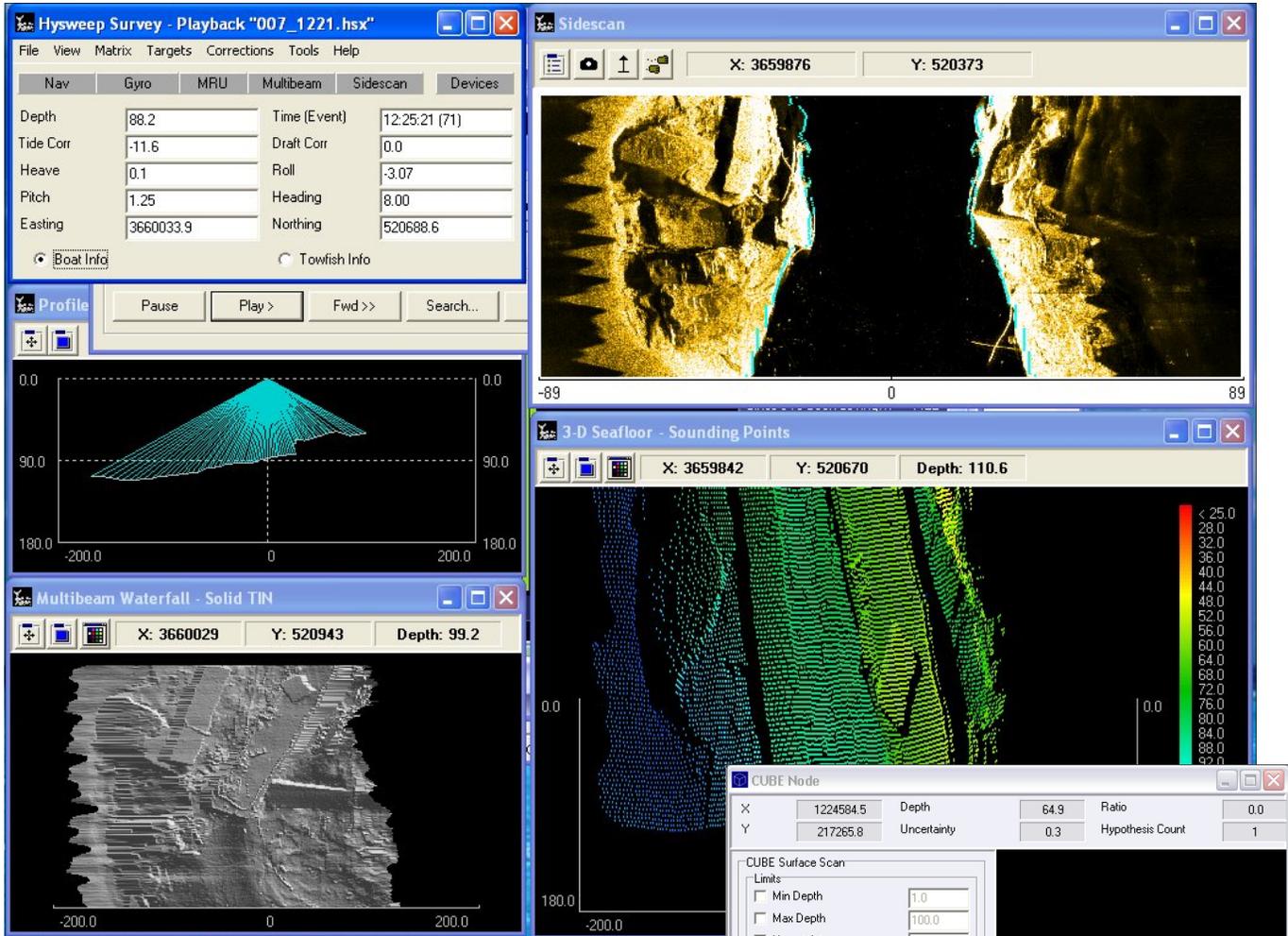
Features	Fledermaus Standard	Fledermaus Professional
Available across a wide variety of platforms , eg. Windows, Mac & Linux	✓	✓
Specially designed interface for exploring multiple data sets simultaneously in a 3D scene	✓	✓
Explore very large data sets easily with ShiftScape™ rendering engine	✓	✓
All datasets are geo-referenced and displayed in 3D space	✓	✓
Navigate the 3D scene using the BAT, a 6-degrees-of-freedom input device	<i>(Optional)</i>	<i>(Optional)</i>
Record flight-paths and generate movies (output MPEG or raw frames)	✓	✓
Visualization displayed in split-screen stereo mode (e.g. for GeoWalls)	✓	✓
Visualization displayed with 3D stereo graphics hardware	✓	✓
Generate a digital terrain model from ungridded data	✓	✓
Display surfaces with a realistic shading including cast shadow	✓	✓
Visualize sub-bottom seismic profiles in the same 3D view as the bathymetric DTM and draped sidescan	✓	✓
Output screen captures and map sheets	✓	✓
Ability to drape sidescan, backscatter, charts, and other imagery into DTM	✓	✓
Analyze data sets with profiles, histograms, contours, slope and surface differences	✓	✓
Import gridded data, imagery, points, lines, solid models, and seismic data in a variety of different formats	✓	✓
Import data for Area-Based Editing from a variety of multi-beam formats including GSF, CARIS HDCS, SHOALS, HTF, etc.		✓
State-of-the-art QC tools for all types of bathymetric data		✓
Powerful editor for multi-beam, lidar data and single-beam data via PFM		✓
Auto-processing of multi-beam data with CUBE (combined Uncertainty and Bathymetric Estimator)		✓
Advanced statistical computations and checks for multibeam surveys		✓
Real-time tracking of ROV, AUV, or any Vessel		✓
Interactively plan routes for pipelines or cables		✓

**“3D Visualization – more than just a pretty picture”**

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 - Email: info@ivs3d.com - Web: www.ivs3d.com

# HYSWEEP®

Calibration, Collection, Editing  
and Performance Testing of  
Multibeam Systems in HYPACK®



## Supports:

- Atlas Fansweep
- Atlas Hydrosweep MD2
- Benthos C3D
- Geoacoustics Geoswath+
- Imagenex DeltaT
- Odom Echoscan II
- Odom Miniscan
- Reson 7125
- Reson 8124
- Reson 8124/8125
- Reson 9001
- Reson 9003
- Ross Smart Sweep
- Seabeam 1000 Series
- Seabeam 2100
- Simrad EM1002
- Simrad EM2000
- Simrad EM3000/3002
- Simrad SM2000
- Tritech SeaKing

HYSWEEP now contains the CUBE data cleaning algorithm, licensed from UNH-CCOM as a standard feature.

**HYSWEEP®** is an optional module of HYPACK® that integrates multibeam and multiple transducer sonar systems. It provides programs for:

- System alignment and calibration
- Multibeam data collection and review
- Multibeam data editing
- QC and performance testing

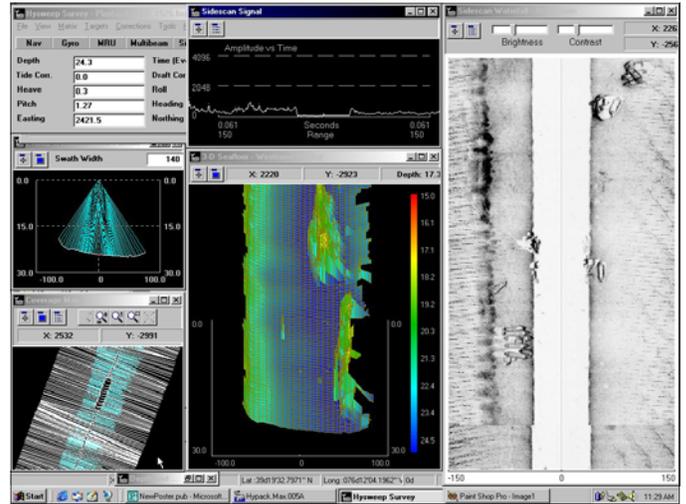
**System Alignment:** Using the integrated 'Patch Test' in HYSWEEP®'s MULTIBEAM EDITOR, you can quickly determine the exact mounting angles and time delays for both single and dual-head multibeam sonar systems. Your system calibration takes hours, not days.

**Data Collection and Review:** HYSWEEP® SURVEY runs simultaneous with the HYPACK® SURVEY program. It performs all data collection, logging and time tagging while providing graphics for data visualization, bottom coverage and quality control.

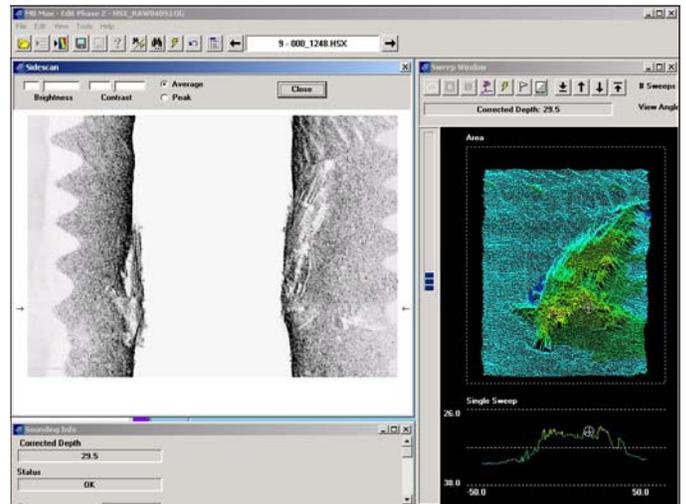
**Multibeam Data Editing:** HYSWEEP® provides powerful tools to review your data, apply geometric and statistical filtering methods to remove outliers and saves your editing session at any time. The MULTIBEAM EDITOR applies tidal corrections (both conventional and RTK tides) and sound velocity corrections to your data.

**QC and Performance Testing:** HYSWEEP® contains the Performance Test, as required by the U.S. Army Corps of Engineers. It provides a statistical summary of the repeatability of your system and justifies the use of wider beam angles for different surveys and bottom conditions. HYSWEEP® generates statistical comparisons between multibeam and single beam surveys, allowing you to determine the differences between the two data sets.

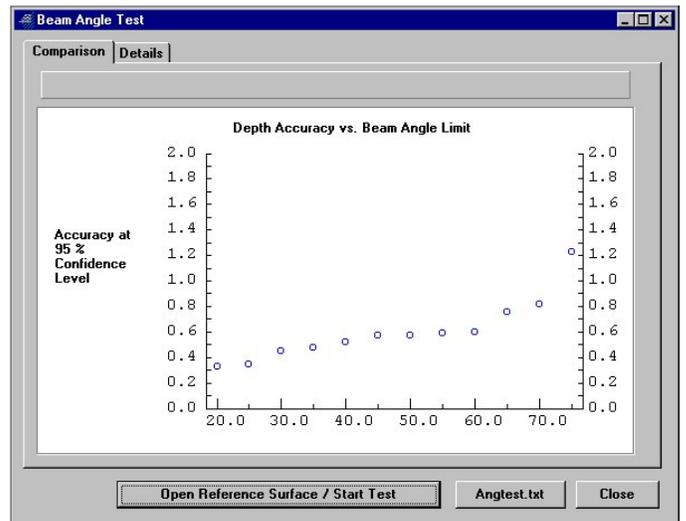
**CUBE Integration:** A new feature in HYSWEEP® is the integration of the 'CUBE' multibeam data cleaning algorithm licensed from the University of New Hampshire's Center for Coastal and Ocean Mapping. HYCUBE generates error models of your multibeam data set and outputs cleaned statistical and actual data sets.



Real time collection display from HYSWEEP® SURVEY.



Editing swath data with backscatter imagery displayed in the MULTIBEAM EDITOR of HYSWEEP®.



The Performance Test results from HYSWEEP® show the repeatability of your system versus beam angle.



**HYPACK, Inc.**

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Middletown, CT 06457 USA

Phone: (860)-635-1500

Web: [www.hypack.com](http://www.hypack.com)

Sales: [sales@hypack.com](mailto:sales@hypack.com)

	HYPACK®	HYPACK® LITE	HYPACK® SURVEY	HYPACK® OFFICE	HYSWEEP®	HYSWEEP® OFFICE	HYPACK® & HYSWEEP®	HYPACK® SURVEY & HYSWEEP®	HYPACK® OFFICE & HYSWEEP® OFFICE	DREDGEPACK®
HYPACK® Shell	✓	✓	✓	✓			✓	✓	✓	✓
Geodetic Parameters	✓	✓	✓	✓			✓	✓	✓	✓
Geodetic Utilities	✓	✓	✓	✓			✓	✓	✓	✓
CHANNEL DESIGN (CD)	✓	✓	✓	✓			✓	✓	✓	✓
ADVANCED CHANNEL DES.	✓	✓	✓	✓			✓	✓	✓	✓
SINGLE BEAM LATENCY	✓	✓	✓	✓			✓	✓	✓	✓
Support File Editors	✓	✓	✓	✓			✓	✓	✓	✓
HYPACK® SURVEY	✓	✓	✓				✓	✓		
DREDGEPACK										✓
Tide Correction Routines	✓	✓	✓	✓			✓	✓	✓	✓
Sound Velocity Corrections	✓	✓	✓	✓			✓	✓	✓	✓
Shared Memory Routines	✓	✓	✓	✓			✓	✓	✓	✓
Single Beam Editor—SBMAX	✓	✓	✓	✓			✓	✓	✓	✓
Sounding Selection	✓	✓	✓	✓			✓	✓	✓	✓
EXPORT TO CAD	✓	✓	✓	✓			✓	✓	✓	✓
HYPLOT (Plotting)	✓		✓	✓			✓	✓	✓	✓
CROSS SECTIONS & VOLUMES	✓		✓				✓	✓		
TIN MODEL	✓		✓				✓	✓		✓
Digitizing Programs	✓	✓	✓	✓			✓	✓	✓	✓
Metadata (Corpsmet95)	✓	✓	✓	✓			✓	✓	✓	✓
3DTV	✓	✓	✓	✓			✓	✓	✓	✓
Matrix 3DTV	✓	✓	✓	✓			✓	✓	✓	✓
ADCP Programs	✓	✓	✓	✓			✓	✓	✓	✓
ENCEdit	✓	✓	✓	✓			✓	✓	✓	✓
Multibeam (MB) Data Collection					✓		✓	✓		
MB Data Processing MBMAX					✓		✓	✓		
MB Performance Test					✓	✓	✓	✓		
MB vs SB Comparison					✓	✓	✓	✓		
MB Calibration (Patch Test)					✓	✓	✓	✓		
SSS Data Collection	✓	✓	✓				✓	✓		
SSS Mosaic & Targeting	✓		✓				✓	✓		

## HYPACK® Packages

**HYPACK®:** Our standard package. It has everything you need to design your survey, collect your single beam data, process it and generate final products, such as contours, plotting sheets, output for CAD, fly-throughs, cross sections and volumes. The side scan sonar collection and processing modules are now standard features. It does not contain the modules for multibeam data collection and multibeam processing. You'll need a HYSWEEP® module for that.

**HYPACK® LITE:** This is our single beam package designed for users who will perform their final product work in a CAD-GIS package. It contains all of the programs necessary to design your survey, collect the data, process it and export it to DXF/DGN for import into your CAD-GIS package.

**HYPACK® SURVEY:** This package allows you to outfit additional survey vessels at a lower cost. It contains the programs for survey design and single beam data collection. It excludes the programs for editing the data or for generating final products. You will still need a HYPACK® or HYPACK® OFFICE license to process your data.

**HYPACK® OFFICE:** This is the 'office' version of HYPACK®. It allows you to perform all of the features of HYPACK® package with the exception of the data collection. You can use it to set up additional processing stations in your office or for supervising the processing of your survey data.

**HYSWEEP®:** This is the module for the collection and processing of multibeam data. HYSWEEP® requires a HYPACK® license (above). As your agency moves from single beam to multibeam surveying, you can just upgrade your package to multibeam by purchasing a HYSWEEP® license.

**HYSWEEP® OFFICE:** This package contains the multibeam modules that relate to processing of the multibeam data. The package is intended for office use. It does not include the HYSWEEP® SURVEY program and requires a HYPACK® license.

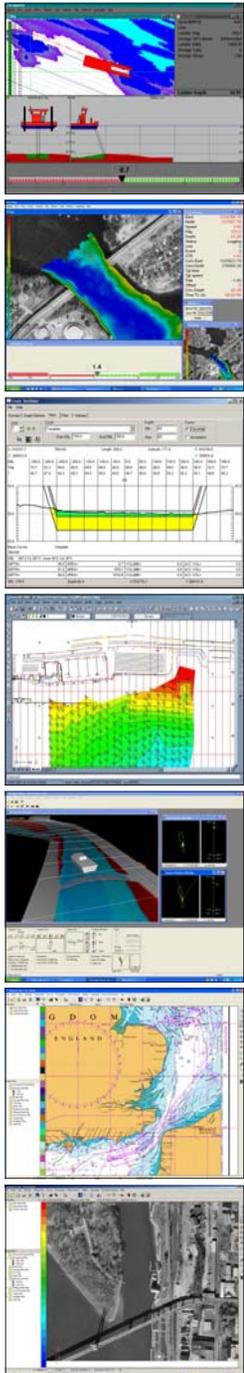
**HYPACK® and HYSWEEP®:** Everything you need to be able to design your survey, collect data (both single beam and multibeam), process it, and generate final products.

**HYPACK® SURVEY and HYSWEEP®:** The recommended combination when outfitting a new multibeam survey boat. You would be transferring the data to another location for processing.

**HYPACK® OFFICE & HYSWEEP® OFFICE:** This combination is recommended for your office and allows you to process both single beam and multibeam data all of the way to the final products.

**DREDGEPACK®:** A specially modified HYPACK® SURVEY package used onboard dredges to improve efficiency and to visualize the digging process. This is not a package for hydrographic surveying.

# HYPACK<sup>®</sup> Features



## Creating Planned Lines:

- Work in X-Y or Lat-Long
- Straight or curved segments
- Unlimited waypoints per line
- Automatically create 3-D profiles in CHANNEL DESIGN
- Import 2-D or 3-D planned lines from DXF.

## Geodesy:

- All US State Plane zones and many national grids available from a drop down list.
- Compute and perform 3-parameter or 7-parameter transformations.
- Use CORPSCON (USA), OSTN-02 (UK) or French national transformation models. Transform is updated based on position of vessel in real time
- Grid conversion program converts between X-Y and Lat-Long
- Converts an entire project to a new geodetic basis.
- Supports using the RTK GPS vertical component for real time water level determination.

## Surveying:

- Single or multiple vessel support
- Supports up to ten sensors simultaneously in standard version.
- Time tagging of data accurate to less than 8mSec on Windows<sup>™</sup> XP and Windows 2000<sup>™</sup>.
- Separate Data Display, Area Map and Left-Right Indicator windows for the operator and the helm.
- Over 200 sensors supported including GPS, range-range, range-azimuth, echosounders, gyros, magnetometers, HPR, ...

## Background Files Supported:

- S-57
- BSB
- DXF
- Microstation DGN
- UKHO ARCS
- GeoTIF (OrthoPhoto and Side Scan Overlays)
- VPF
- ArcInfo SHP

## Single Beam Processing:

- Water level (tide) corrections using conventional and RTK tides.
- Sound velocity corrections
- Automated filtering and manual editing.
- Final data contains deleted records, allowing later restoration.
- Export to all available items to ASCII TXT format.

## HYSWEEP<sup>®</sup>: Multibeam Module (Optional)

- Integrate almost all commercially available multibeam systems.
- Real time data collection, display and quality controls.
- Perform sensor alignment in hours using the Patch Test in the Multibeam Editor.
- Process data using the Multibeam Editor or HYCUBE.
- Determine overall system performance using the Performance Test in the Multibeam Editor
- Determine statistical comparison between single beam and multibeam test sets.
- Use your edited multibeam data in all of HYPACK<sup>®</sup>'s final product programs.
- Import XTF, GSF and XSE data.

## Export to CAD:

- Converts HYPACK<sup>®</sup> data files to DXF or Microstation DGN
- Exports HYPACK data to ASCII.

## Plotting Smooth Sheets:

- HYPLLOT plots all HYPACK data files, including all supported background charts.
- WYSIWYG view allows users to easily activate and reposition smooth sheet features.
- Plots to any Windows<sup>™</sup> printer/plotter device.

## Cross Sections & Volumes:

- Display multiple historic cross sections on one graph.
- Computes volume quantities:
  - ◊ Single Survey
  - ◊ Pre-Dredge vs. Post-Dredge
- Supports most USACE methods:
  - ◊ Average End Area (AEA)
  - ◊ Philadelphia District
  - ◊ Jacksonville District
  - ◊ Savannah
  - ◊ Norfolk
  - ◊ Chinese AEA
  - ◊ Standard HYPACK
- Plots sections to any Windows<sup>™</sup> printer/plotter device.

## TIN MODEL:

- Generates DXF contours, labels and fills.
- Exports a gridded XYZ data set.
- Exports soundings along a planned line.
- Combines hydrographic and topographic data.
- Generates 3D models and color-

## TIN MODEL (con't.):

- Compute volume quantities:
  - TIN vs. Level (Reservoir)
  - TIN vs. Channel
  - TIN vs TIN (Beach Erosion Studies)
  - Philadelphia method allows you to compute volume quantities with multibeam data and assign the quantities based on planned lines.

## 3D Terrain Viewer (3DTV):

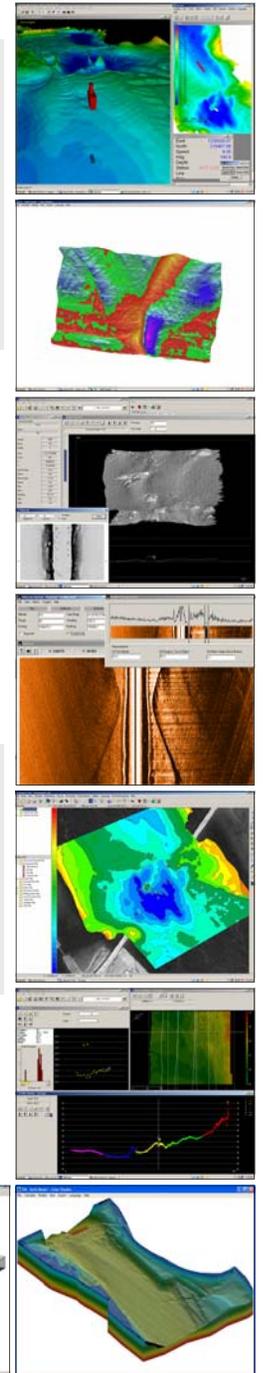
- Create a fly-through from XYZ data sets.
- Accepts XYZ or MTX data sets.
- Positions the 'camera':
  - ◊ Manually (free flight).
  - ◊ Along a planned line.
  - ◊ In circle flight (around an object).
  - ◊ Using the position and heading of the vessel from the SURVEY program.
- Capture the screen to a BMP or the flight to an AVI file.

## Side Scan Sonar Tools:

- A standard part of HYPACK<sup>®</sup>.
- Data collection provides for input from digital or analog side scan sonars.
- Flag and capture targets in real time or in post-processing.
- Create mosaics of side scan data.

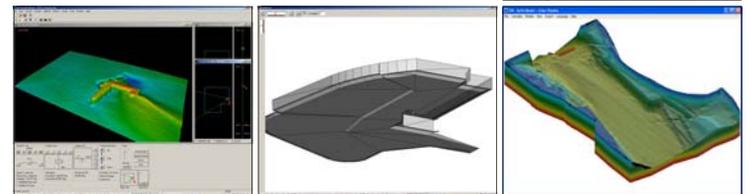
## ENCEdit:

- A standard module of HYPACK<sup>®</sup>.
- Perform real-time field verification of S-57 charts.
- Re-attribute, move, add or de-



**HYPACK, Inc.**  
 56 Bradley St.  
 Middletown, CT 06457 USA  
 (860)-635-1500

Web: [www.hypack.com](http://www.hypack.com)  
 Sales: [sales@hypack.com](mailto:sales@hypack.com)



Providing the Marine Industry with robust, reliable, and repeatable position and orientation solutions in all dynamics

### Accurate Position and Orientation Solution

POS MV™ WaveMaster maintains positioning accuracy under the most demanding conditions. With its high data update rate, the system delivers a full six degree-of-freedom position and orientation solution to provide the following:

- Position (latitude, longitude and elevation)
- Velocity (north, east and vertical)
- Attitude (roll, pitch and true heading)
- Heave (real-time & delayed)
- Acceleration Vectors
- Angular Rate Vectors

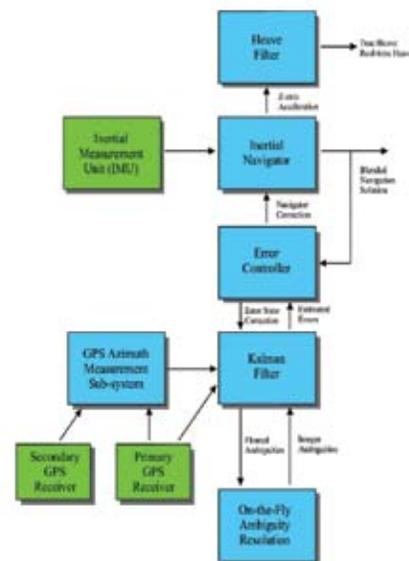
The new POS MV™ WaveMaster generates a tightly-integrated solution for survey vessels, which means the system's Inertial Navigator will provide continuous positioning information while surveying in areas where GPS reception is compromised by multipath and signal loss. Raw GPS data from as few as one satellite can now be processed directly within the WaveMaster.

### Tightly-coupled integration offers the following advantages:

- Advantage** – Strengthens the system's ability to provide continuous, accurate data in areas with intermittent GPS reception
- Advantage** – Reduces position drift
- Advantage** – Enables almost instantaneous RTK re-acquisition (with internal RTK option)

### WaveMaster Features and Benefits:

- Uses the latest GPS receiver technology from Trimble:
  - Maxwell™ chip technology
  - Everest™ multipath elimination technology
  - 10Hz raw observables for post-processing
  - Outstanding positioning performance and low elevation satellite tracking accuracy
- TrueHeave - Applinix's ground breaking delayed time heave processor
  - Removes processing artifacts but not real motion
  - Provides online quality measurement
- Faster CPU (700Mhz)
  - Low system loading allows for enhanced capabilities in the future
  - Runs at less than 10% of its total capacity to allow for upgrades and additional features
- TCP/IP protocol for raw data logging
  - Reliable logging of all raw data with microsecond-accurate time stamping
  - POSpac ready (for post-mission analysis)
- Firmware migration path
  - Access to new releases with new features as they become available
- New DC powered compact form-factor available
- New Graphical User Interface
  - Makes installation and setup intuitive
  - Reduces operator error



Tightly Coupled POS MV™ WaveMaster



POS MV WaveMaster



POS MV WaveMaster RM

## SYSTEM COMPONENTS

### POS Computer System (PCS)

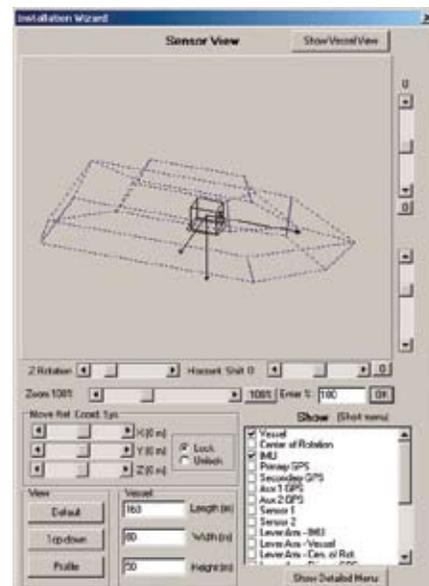
A rugged, compact computer system contains the core POS processor and IMU interface electronics, plus two GPS receivers. The PCS provides all motion variables and timing data at high rate and/or provides motion compensation and georeferencing data to all multibeam systems.

### POS Inertial Measurement Unit

The system's primary sensor is a Ring Laser Gyro (RLG) manufactured by one of the world's experts in inertial technology. This high performance, low drift rate gyro ensures that the attitude data remains robust as the dynamics increase.

### Primary and Secondary GPS Antennas

Dual frequency antennas for use with GAMS and RTK.



POS MV WaveMaster Graphical User Interface

## POS MV WAVEMASTER MAIN SPECIFICATIONS (with Differential Corrections)

Roll, Pitch accuracy:	0.03° (1 sigma with GPS or DGPS) 0.02° (1 sigma with RTK)
Heave Accuracy:	5 cm or 5% (whichever is greater) for periods of 20 seconds or less
Heading Accuracy:	0.06° (1 sigma) with 1 m antenna baseline, 0.03 (1 sigma) with 2 m baseline, 0.015 (1 sigma) with 4 m baseline
Position Accuracy:	0.5 - 2 m (1 sigma) depending on quality of differential corrections 0.02 - 0.10 m (RTK) with input from auxiliary RTK or optional internal RTK receiver
Velocity Accuracy:	0.05 m/s horizontal

## POS MV WAVEMASTER DURING GPS OUTAGES

Roll, Pitch accuracy:	0.04° (1 sigma)
Heave accuracy:	5 cm or 5% (whichever is greater) for wave periods of 18s or less
Heading accuracy:	Drift less than 2° per hour
Position accuracy degradation:	3 m (1 sigma) for 30 s outages <10 m (1 sigma) for 60 s outages

## PHYSICAL CHARACTERISTICS

### Size POS MV WaveMaster

IMU	160mm x 160mm x 102mm
PCS	281mm x 165mm x 90mm
GPS Antenna (2)	187mm x 53mm

### Size POS MV WaveMaster RM

IMU	160mm x 160mm x 102mm
PCS	432mm x 89mm x 356mm
GPS Antenna (2)	187mm x 53mm

### Weight

POS MV WaveMaster	POS MV WaveMaster RM
IMU	3.6kg
PCS	3.0kg
GPS Antenna	<0.5kg

### Power POS MV WaveMaster

IMU	Power provided by PCS
PCS	24vdc, 50 W (peak)
GPS Antenna	Power provided by PCS

### Power POS MV WaveMaster RM

IMU	Power provided by PCS
PCS	110/230 Vac, 50/60 Hz, auto-switching 80 Watt
GPS Antenna	Power provided by PCS

## ENVIRONMENTAL

### Temperature Range (Operating)

IMU	-40 °C to +60 °C
PCS	-20 °C to +60 °C
GPS Antenna	-40 °C to +70 °C

### Temperature Range (Storage)

IMU	-40 °C to +60 °C
PCS	-20 °C to +60 °C
GPS Antenna	-40 °C to +70 °C

### Humidity

IMU	0-100% RH, Ingress Protection of 66
PCS	5-90% RH, non-condensing
GPS Antenna	0-100% RH

## Applanix Marine Offices

Applanix Corporation  
85 Leek Crescent  
Richmond Hill, Ontario  
Canada L4B-3B3

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SY10 7PW UK

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WEB: [www.applanix.com](http://www.applanix.com)  
EMAIL: [marine@applanix.com](mailto:marine@applanix.com)

## Ethernet (100 base-T)

Parameters	Time tag, status, position, attitude, heave, velocity, track and speed, dynamics, performance metrics, raw IMU data, raw GPS data
Display Port	Low rate (1 Hz) UDP protocol output
Control Port	TCP/IP input for system commands
Data Port 1	Real-time (up to 200 Hz) UDP protocol output
Data Port 2	Buffered TCP/IP protocol output for data logging to external device

## Serial RS232 I/O

5 COM Ports	User assignable to: NMEA output (0-5), Binary output (0-5), Auxiliary GPS input (0-2), Base GPS correction input (0-2)
-------------	--

## NMEA ASCII Output

Parameters	NMEA Standard ASCII messages: Position (\$INGGA, \$INGGK), Heading (\$INHDT), Track and Speed (\$INVTG), Statistics (\$INGST), Attitude (\$PASHR, \$PRDID), Time and Date (\$INZDA, \$UTC).
Rate	Up to 50 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port.

## High Rate Attitude Output

Parameters	User selectable binary messages: attitude, heading, speed
Rate	Up to 100 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port.

## Auxiliary GPS Inputs

Parameter	NMEA Standard ASCII messages: \$GPGGA, \$GPGST, \$GPGSA, \$GPGSV. Uses Aux input with best quality.
Rate	1 Hz

## Base GPS Correction Inputs

Parameter	RTCM 1, 9, 18, 19, CMR and CMR+ input formats accepted. Combined with raw GPS observables in tightly-coupled navigation solution.
Rate	1 Hz

## Digital I/O

IPPS Output	1 pulse-per-second Time Sync output, normally high, active low pulse
Event Input (2)	Time mark of external events. TTL pulses > 1 msec width, rising or falling edge, max rate 200 Hz.

### Features

- Dynamic roll and pitch accuracy to 0.25
- IP65 rated
- Solid state angular rate gyros
- High dynamic accuracy during vessel turns

### Benefits

- DMSView intuitive control software
- User-configurable outputs
- Real-time digital outputs
- Compact and lightweight

The DMS range of motion sensors has been designed specifically for the motion measurement needs of the marine industry. The DMS-RP25 DP meets the requirements of the dynamic positioning industry for accurate vessel roll and pitch measurement. The unit provides accurate motion measurement in all sea conditions.

Incorporating an enhanced external velocity and heading aiding algorithm for improved accuracy during dynamic manoeuvres, the solid state angular rate sensors offer reliability and a complimentary blending algorithm has proven that the DMS is the highest performance vertical reference unit ever produced by TSS.

The DMSView software programme is an intuitive Windows™ - based programme enabling installation, set-up and integrity checking, and monitoring of the sensor. The user can select from a series of frequently used data protocols or configure a bespoke output from a selection of variables.

The DMS-RP25 DP is IP65 rated. The sensor can be supplied in various configurations for integration with towed vehicles and other bespoke applications. As with all TSS systems, the DMS is certified to meet all current and anticipated European legislation for electromagnetic compatibility and electronic emissions.



# TSS DYNAMIC MOTION SENSORS

Dynamic accuracy	Roll & Pitch
	0.25°
	Amplitude ±30°
Bandwidth	0 to 30 Hz
Data output rate (digital)	Up to 200 Hz
Available output parameters	Adjustable data packet output rate down to 1Hz Roll; pitch; angular rate X, Y, Z – acceleration X, Y, Z (body frame); angular rate east north, up – acceleration east, north, up (geographical frame); IMU temperature; surge; sway; sensor status; external speed; external heading; UTC time
Dimensions	172mm x 99mm diameter (excluding connector)
Weight	1.5Kg in air
Power supply	15-30 Vdc
Temperature range	0°C to 55°C
Power requirement	10-36V, <6.5W
Shock (survival)	30g peak 40ms half-sine
Vibration (operating)	30mm/s or 0.2mm, 7-300 Hz
Software interface (digital)	RS232 or RS422 (software selectable)
MTBF (computed)	50,000 hours
Warranty	12 months international warranty including parts & labour

*Due to continuous development, specifications may vary from those listed above.*

1 Garnett Close, Greycaine Industrial Estate, Watford, Hertfordshire WD24 7GL, UK  
Tel: +44 (0)1923 470800 Fax: +44 (0)1923 470842 Email: [tssmail@tss-int.com](mailto:tssmail@tss-int.com)

**Aberdeen:** 10 The Technology Centre, Aberdeen Offshore Technology Park, Claymore Drive, Bridge of Don, Aberdeen AB23 8GD, UK  
Tel: +44 (0)1224 707081 Fax: +44 (0)1224 707085 Email: [tssmail@tss-int.com](mailto:tssmail@tss-int.com)

**Houston:** Hammerly Blvd, Suite 128, Houston TX 77043, USA  
Tel: +1 713 461 3030 Fax: +1 713 461 3099 Email: [tssusa@tssusa.com](mailto:tssusa@tssusa.com)

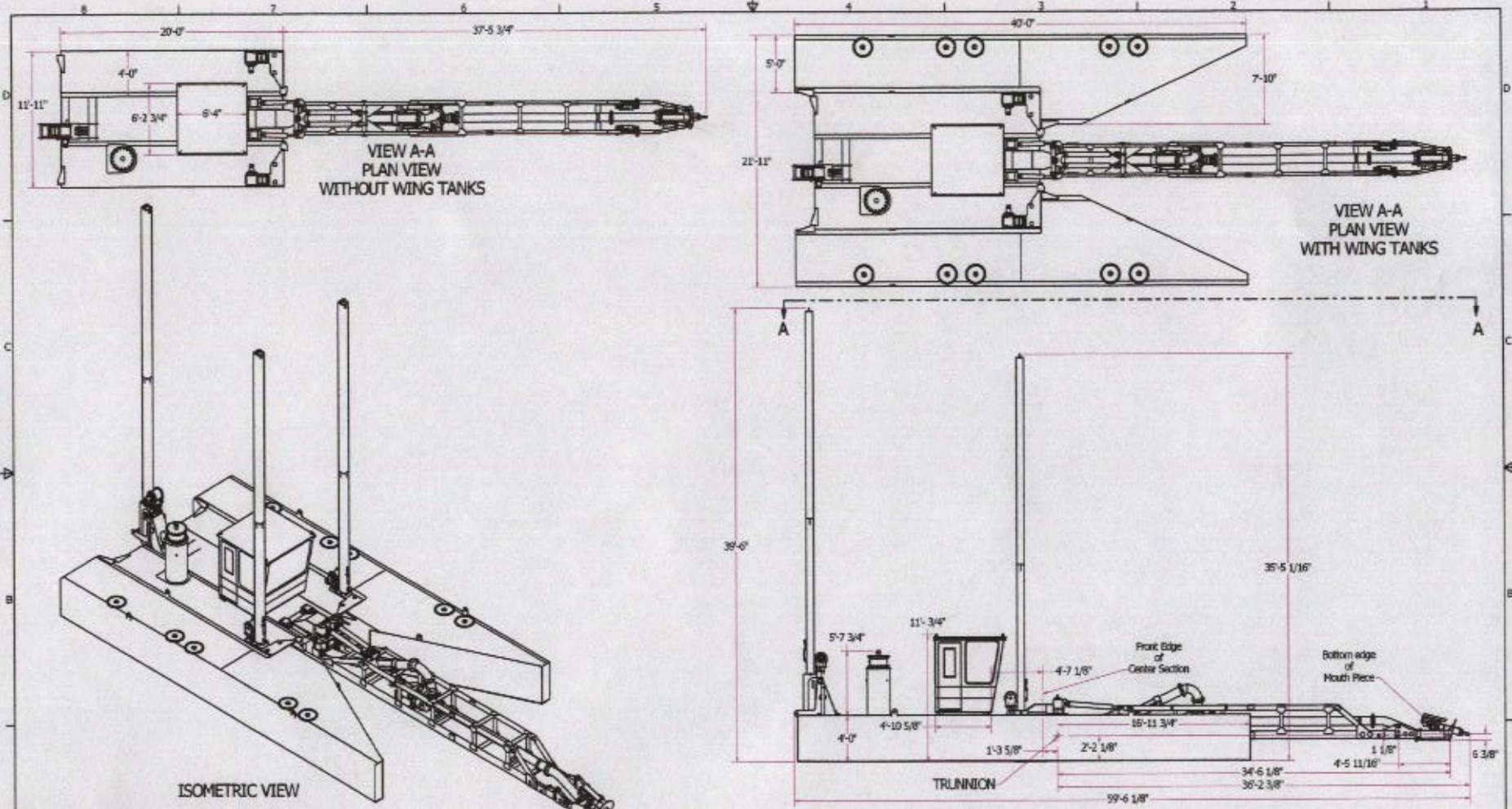


**Appendix C-6**

**Dredge Equipment**



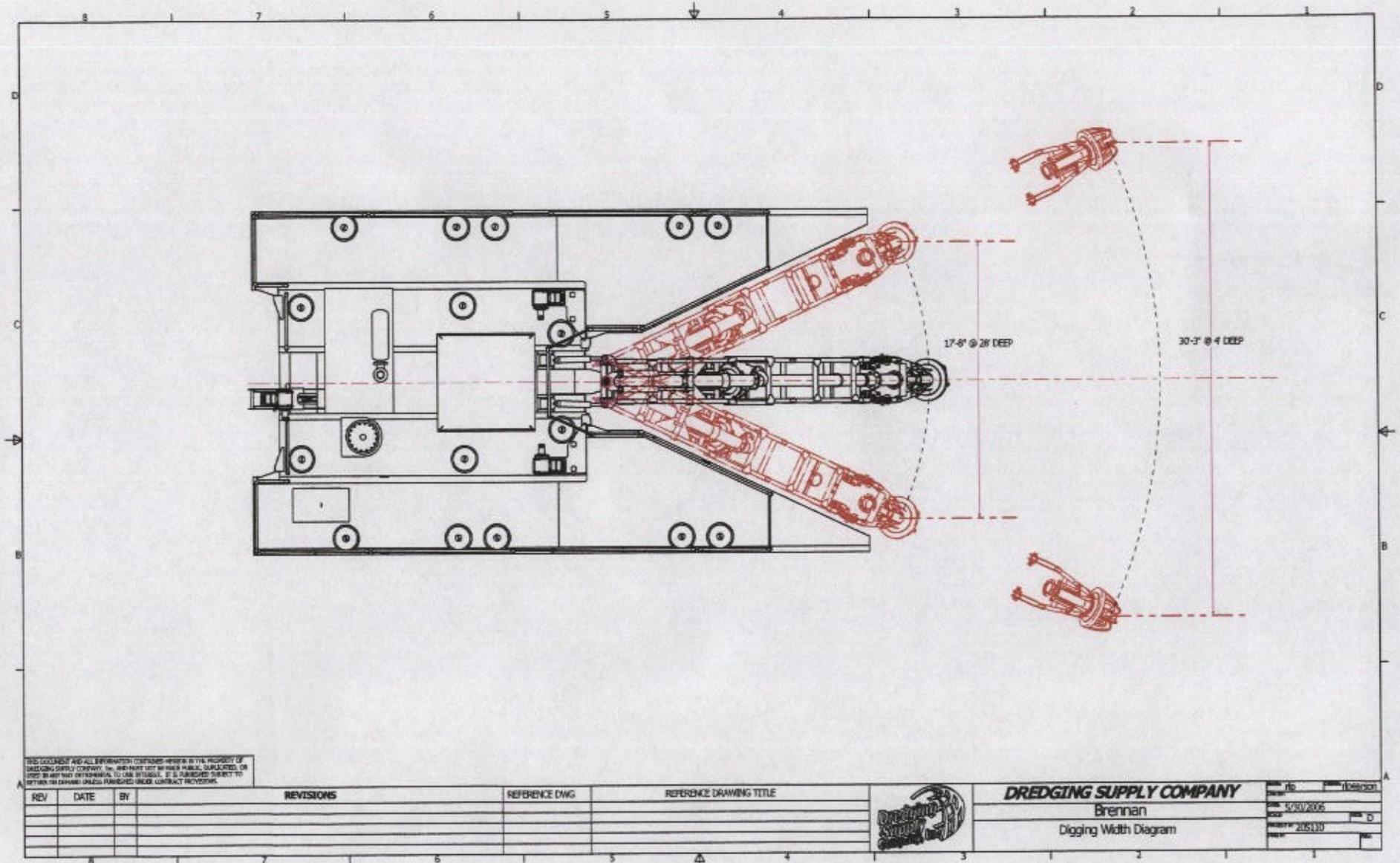
MAY 2006



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A	5-28-06	MLP	Additional Dimensions			BRENNAN		3/21/2006	D
						General Arrangement		205110	
								205110001	A

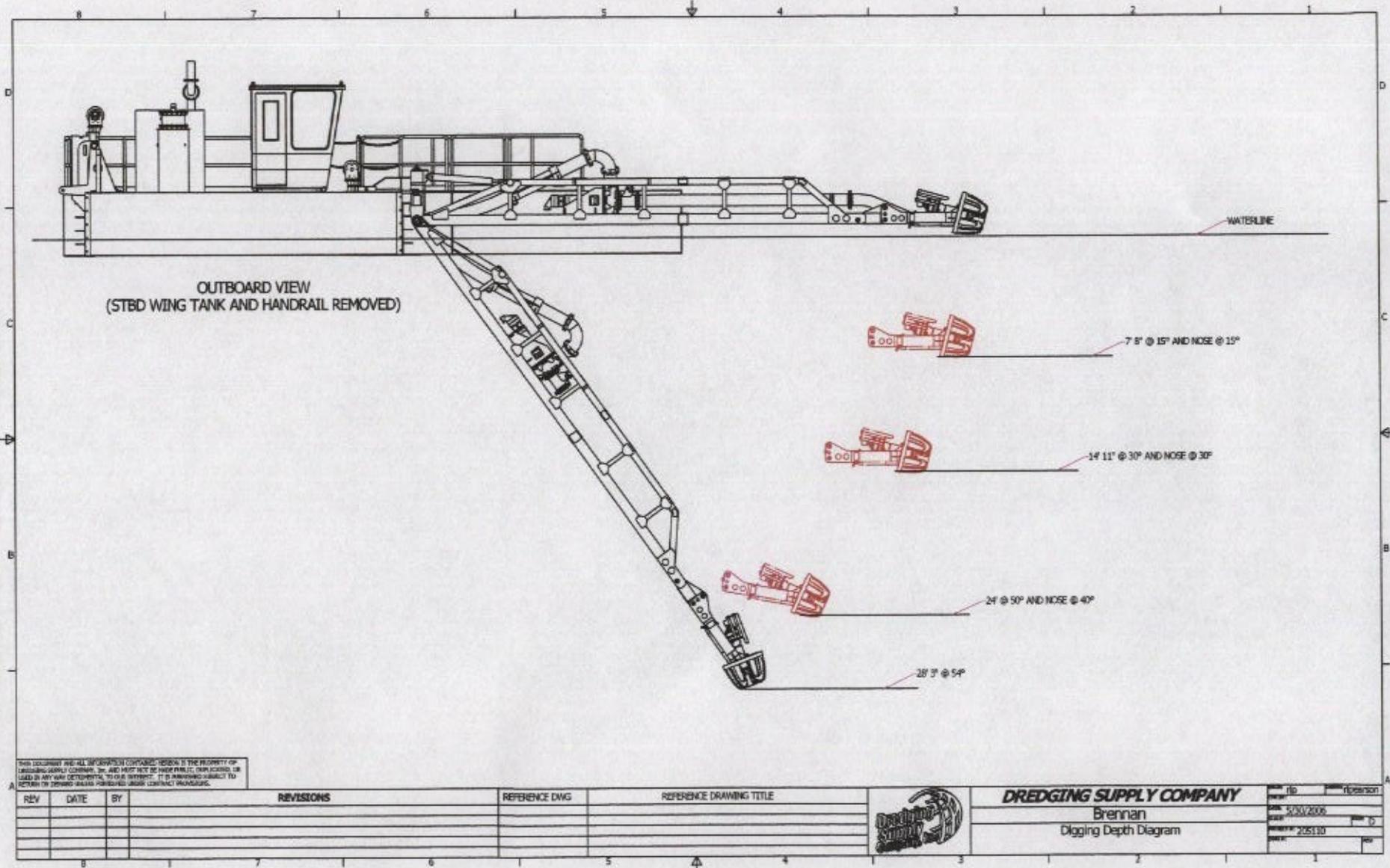
MAY 2006



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REV	DATE	BY	REVISIONS	REFERENCE DWG	REFERENCE DRAWING TITLE	 <b>DREDGING SUPPLY COMPANY</b> Brennan Digging Width Diagram		No. 205110 Date 5/20/2006 Rev. D Project 205110

MAY 2006



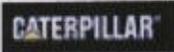
## MORAY - DREDGE SPECIFICATIONS

### GENERAL

OVERALL LENGTH	57'-6"
TRANSPORTATION WIDTH	11'-11"
OPERATING WIDTH	21'- 11"
HULL DEPTH	4'
MEAN OPERATING DRAFT (WITH FUEL)2'-9"	
FUEL CAPACITY	500 gallons
DRY WEIGHT <i>(ESTIMATED)</i>	59,500 lb

### OPERATING CONDITIONS:

MINIMUM DIGGING DEPTH	3'
MAXIMUM DIGGING DEPTH	25'
SWING WIDTH (SWINGING LADDER):	
SWING WIDTH @ MINIMUM DIGGING DEPTH	19'-4"
SWING WIDTH @ MAXIMUM DIGGING DEPTH	13'
NOMINAL PUMP CAPACITY (WATER)	2000 gpm @ 185 TDH



**Main Power:**

ENGINE MAKE	CATERPILLAR
ENGINE MODEL	3126B
MAXIMUM H.P. @ 2400 R.P.M.	275 H.P.
ENGINE COOLING	RADIATOR
RESIDENTIAL GRADE SILENCER, EPA & CARB Tier II Compliant	



**Cutter Module:**

Sealed planetary drive with alloy cutter shaft and anti-friction bearings. 24" inside diameter 5-blade basket cutter with replaceable cast serrated edges

NOMINAL DRIVE TORQUE	31,512 in-lb
CUTTER FORCE	2,626 lb
CUTTER FORCE PER LINEAR INCH	109 lb/in
CUTTER SPEED	0-40
NOMINAL DRIVE POWER	20 HP
CUTTER RATING	20 H.P.
CUTTER SPEED VARIABLE	0 to 40 R.P.M.



**Swing Cylinders (swing ladder mode):**

Double acting hydraulic swing cylinder for swinging ladder operation

MODEL: Z40015136CCAZ (2)



**Ladder Hoist Cylinder:**

Double acting hydraulic ladder cylinders for ladder lifting operation

MODEL: Z40034332CCAZ



**Stern Spud Kicker Cylinder:**

Double acting hydraulic kicker cylinder for swinging ladder operation

MODEL: #S40006032SS

**Dredge Pump:**



**Manufactured for DSC**

SUCTION DIAMETER	8"
DISCHARGE DIAMETER	8"
IMPELLER DIAMETER	19 1/2"
MAXIMUM PARTICLE CLEARANCE	3 1/2"

**Spud Hoist Winches:**



Planetary spud winches with integral parking brake and API designed.

MANUFACTURER:	DSC
MODEL	RMLF091
WIRE ROPE LENGTHS	
Front Top:	65 ft. 8 in.
Front Bottom	53 ft. 1 in.
Kicker Top	66 ft. 8 in.
Kicker Bottom	53 ft. 5 in.

**Electrical System:**



- 24 VDC for starting, lighting, and controls.
- 12 VDC (8 amp maximum) for convenience and user furnished radios.
- All circuits fused for protection.
- Two 950 cold cranking amp batteries Capacities.
- Owner furnished AC generator.
- AC wiring in operator cab and for lighting.

**Capacities:**

FUEL	500 GAL.
HYDRAULIC	180 GAL.

**Service Water Pump (Not furnished)**

MANUFACTURER	Carver
SIZE	25X1X7L
MODEL	VERTICAL CANTILEVERED PUMP CAST IRON PROVIDED w/ NPT
DSC PART NUMBER	PP-00129
HYDRAULIC DRIVE MOTOR	CROSS
MODEL	40MH05-DACSC

**Hydraulic System**

Closed loop dredge pump circuit with infinite electronic speed control. Pressure compensated cutter, swing, and ladder/spud circuits for simultaneous operation. All circuits protected by suction strainer, return filters, and relief valves. The Moray dredge features a variable displacement hoisting and cutter hydraulic drive.

**Control System**

The DSC control system provides the dredge operator with a simple, ergonomic, and user-friendly interface to efficiently operate the dredge. The system is designed, manufactured, programmed, and tested in house by trained professionals with years of dredge experience. The heart of the system is its, performing automatic loop control, displaying pertinent information, and recording historical data.

The standard dredge control system protects against pump engagement and disengagement at high speed and locks out all hydraulic functions during start-up and control activation. The system also alarms on poor engine conditions and hydraulic and transmission problems. All of the alarmed conditions, along with the time and date, are logged; the last sixty-four alarms are retained for review.

The standard dredge control system provides electronic operation of the prime mover throttle; pump engagement, and all hydraulic speeds and directions. Hydraulic controls are ramped to prevent jarring when controls are started, stopped or reversed.

The standard dredge control system records and displays the operating hours of all major dredge systems including engine, dredge pump, cutter, swing winches, spud winches, and ladder winch. This data is useful for servicing and for managing dredge utilization.

**Standard Features:**

Fire Extinguishers (2) 5 Lbs. Abc

Handrails And Kick Rails

Cabin And Outdoors Lights

Early Warning Alarm System And Engine Shutdown System

Operator's Chair With Finger Tip Controls

**Optional Equipment**

Air conditioning and Heater combination in lever room. Longer Spuds and bigger spud winches.

Custom articulated long ladder and ladder lifting and modified swinging system.

Lighted Ring Buoy

Guards

Replaceable Edge Cutter





## DESCRIPTION OF EQUIPMENT

The Moray - Dredge is a diesel powered pump system constructed to excavate and pump materials such as mud, silt, or sand from the bottom of a shallow body of water (up to 16 feet deep) through a pipeline to a disposal site some distance away from the dredge.

The following paragraphs describe the functions of the machinery located on the dredge. It is suggested that the reader refer to the drawings, which are enclosed, and the supplied machinery operating manuals while reading these sections.

### Dredge Ladder

The dredge ladder consists of a structural steel frame that houses the dredge underwater pump, suction and discharge pipe, cutter and cutter motor and cutter drive. The ladder is supported at its aft end by trunnions and pins mounted on the ladder gimbal. It is supported midway by hydraulic cylinders, which are mounted between the ladder gimbal and the ladder. The cylinders are used to raise and lower the ladder. The dredge cutter is driven by a hydraulic motor/gearbox through a shaft with sealed bearings. A flexible rubber hose connects the dredge ladder discharge pipe elbow to the through hull discharge pipe to permit the ladder to pivot up and down, and swing side to side freely.



**LADDER GIMBAL & LIFT CYLINDERS**

### **Ladder Gimbal**

The ladder gimbal consists of a hull structural section and ladder section connected together with a large steel pin. The hull gimbal, located at the forward end of the center section, remains stationary at all times. The ladder gimbal pivots from side to side to allow the dredge to operate in the swinging ladder mode. The swing gimbal houses the swing cylinders, the ladder trunnions, and the ladder lift hydraulic cylinders. For shipping, the ladder gimbal can be rigidly fixed to the hull gimbal by a locking bar between the ladder and the gimbal.

### **Dredge Pump**

The pump consists of a custom DSC pump; bearings, bearing pedestal, and pump foundation. (See the pump section for more details of the pump arraignment).

### **Diesel Power Source**

The Caterpillar 3126B diesel engine, which drives the hydraulics, and keeps the batteries charged, is radiator cooled. For more information on the engine system, refer to the accompanying Caterpillar manual.

### **Dredge Pump Piping**

The suction piping consists of a long flanged suction pipe mounted on the pump clean out and a short flanged rubber suction hose between it and a flanged pipe to the mouth piece. The rubber hose allows the articulation and absorbs vibration.

The ladder discharge pipe consists of a flanged elbow at the pump with a supported, eight-inch I D, flanged, rubber discharge hose that connects a straight section of eight-inch ID pipe.



**UNDERWATER PUMP**

### **Spuds**

In the swinging ladder mode, the dredge spud system consists of two square digging spuds located at the front of the hull and one square, kicking spud located at the stern of the hull. All three spuds are used to hold the dredge stable when it is operating in the swinging ladder mode. In swinging ladder operation, the kicker spud helps maintain hull stability during dredging. It also provides forward or backward movement to the hull. The spuds are raised and lowered by DSC custom hydraulic winches in a power-up power-down fashion to any depth without resetting pins.

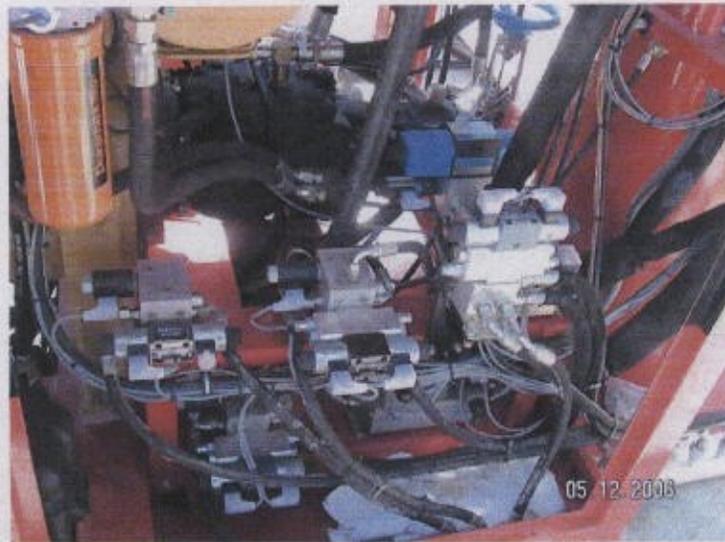
## Hydraulic Power System

Two hydraulic pumps mounted, in tandem, on a single pump drive behind the Cat. 3126, hydraulically powers the dredge's auxiliary functions and the dredge underwater pump. One pump powers the auxiliary functions, which include the dredge cutter, swing winches or cylinder, ladder lifting cylinder, spud winches and the kicker spud cylinder. The other pump is in a closed loop system that only drives the underwater dredge pump. This pump incorporates a system charge pump for the closed loop. The hydraulic system is protected from dirt and contamination by a filtered breather cap, in-tank suction strainer and return filter. All hydraulic circuits have pressure gages and relief valves to protect from spikes and large hydraulic loads. The hydraulic tank has a thermometer, sight gage, a low-level sensor alarm, and a low-level shutdown device.

---

NOTE: The hydraulic tank filler cap must be on and tight to keep the tank pressurized or the hydraulic pumps will be severely damaged. After an extended shut down or if the hydraulic tank has been opened, the engine must be operated at a low speed for ten minutes to re-establish the pressure in the hydraulic tank before resuming full speed operation.

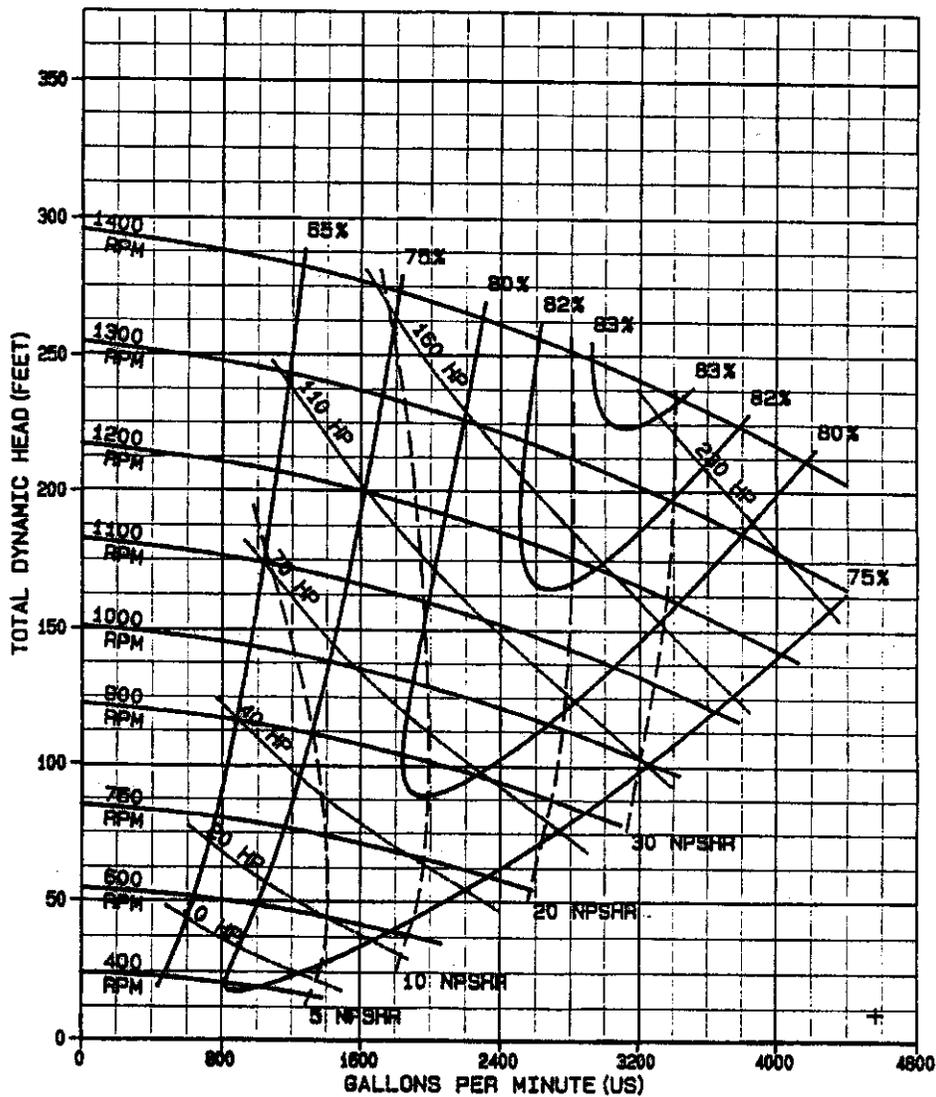
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HYDRAULIC VALVES

# DREDGE PUMP CURVE

<b>DREDGE PUMP</b>	Vane Diameter <b>19.75"</b>	Free Passage <b>3.5x3.0"</b>	<b>Dredging Supply Company, Inc.</b>
<small>Clear Water Performance The effects of specific gravity, viscosity and solids on performance with slurry must be accounted for. Alternate choice for frame size or seal type may also have some effects.</small>	Frame Size <b>3</b>	Curve Number <b>E 8H-87</b> Seal Type <b>P</b> Test Number <b>B300 -93</b>	



# 10" x 8" Booster Unit

## Preliminary Specifications

*presented to:*

**J.F. BRENNAN CO., INC.**



820 BAINBRIDGE • LACROSSE, WI 54603 PHONE: 608/784-7173 FAX: 608/785-2090 [info@jfbrennan.com](mailto:info@jfbrennan.com)

**October 2007**

### **Prime Mover**



Caterpillar C-9 industrial diesel engine, radiator cooled with residential grade silencer and a continuous rating of 275 bhp @ 1800-2200 rpm. EPA & CARB Tier 3 compliant, Caterpillar premium gages, alarms, and shutdown systems

### **Dredge Pump Reduction Gear/drive**



Twin Disc marine gear complete with Centa torsional coupling, electronic selector valve and gear cooler. The reduction gear is close-coupled to the Caterpillar engine with a stub/output shaft. The stub/output shaft is coupled to the dredge pump shaft through an elastomer style coupling.

### **Dredge Pump – with cleanout**



Suction diameter	10" (8")
Discharge diameter	8"
Impeller diameter	24"

### **Skid**

Structural Base Type	Heavy-duty structural WF beam
Enclosure Type	Roof only

### **Service Pump**

To be provided by JF Brennan

### **Miscellaneous**

- Batteries and battery cases
- Machinery guards
- Fire extinguisher
- Wash down system
- Gages

**Booster Control Package:**

The booster control package consists of a PLC, touch screen operator interface, transmitters and enclosure with mounting brackets. The sensors that will be supplied are discharge pressure and inlet pressure. The booster panel will have start/stop switches for the main pump and service water pump. The panel also has a booster mode switch and a touch screen. The touch screen will display data, alarms and it allows the operator to change control and alarm set points. The booster has an auto and manual mode. The auto mode is controlled off the inlet pressure and discharge pressure and the manual mode allows you to control the booster manually.

**Coatings****Engine enclosure and equipment skids:**

1. Blast all steel SSPC-SP6. Blast to achieve 1- to 2- mils profile as determined with a surface profile comparator
2. First coat; 1-3 mils (dry film thickness) Epoxy (Oxide red)
3. Second coat; 4-6 mils (dry film thickness) Epoxy (Pearl Grey)
4. Finish coat: 4-6 mils (dry film thickness) Epoxy (Pearl Gray)

**Building Standards**

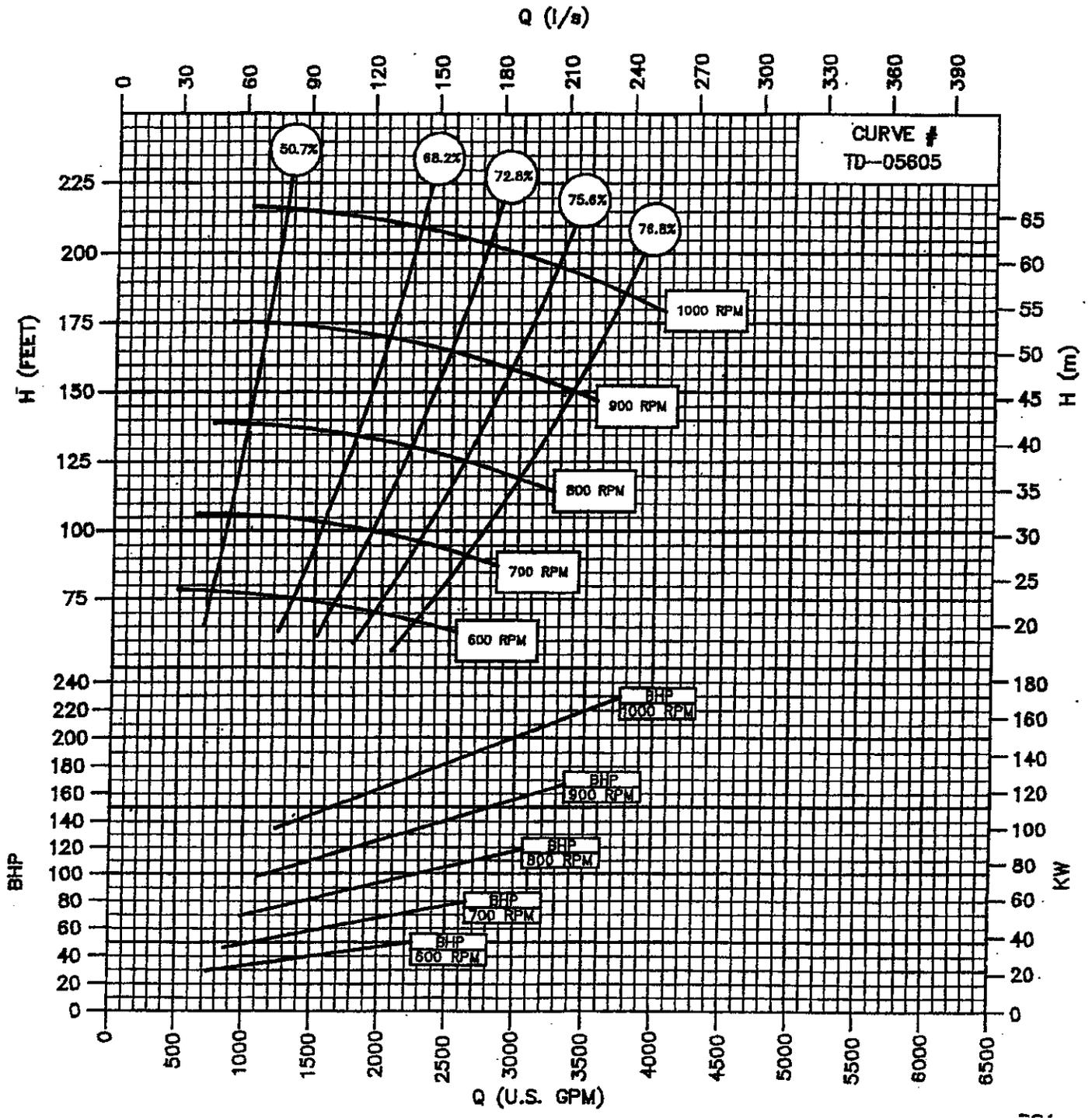
Dredges manufactured by Dredging Supply Company, Inc. are designed and built using the following regulations as our guidelines:

- Rules for Building and Classing Steel Vessels for Service on Rivers and Inland Coastal Waterways by the American Bureau of Shipping, 1997, RNC2-8, Corr1,2.
- Manual of Steel Construction, Ninth Edition by the American Institute of Steel Construction.
- Joint Industrial Council Hydraulic Standards T2.24.1 - 1990.
- Structural Welding Code - Steel ANSI/ANS D1.1-2004 by the American Welding Society and the American National Standards Institute.
- Mining Safety and Health Act.
- Occupational Safety and Health Act.
- Surface Preparation Specifications Steel Structures Painting Council No. 91-08.
- National Electrical Code Handbook, 2002.

***Note: Specifications may change due to continual product improvement***



PUMP MODEL	SIZE	IMPELLER # F-6125/FL-602		CASE# H-8118/H-890	
8" H-24	8 X 10	TYPE	VANES	VANE #	MAX PARTICLE
		CLOSED	3/4	24.00 IN	4.00 IN
PERFORMANCE FOR WATER @ 1.0 SG @ 68°F/20°C CORRECTIONS MUST BE MADE FOR HEAD AND EFFICIENCY LOSSES FROM MIXTURE SPECIFIC GRAVITY AND SOLIDS EFFECT. CONSULT FACTORY				610 MM	102 MM
				MAX.SPEED	TEST# A 24.0
				1114 RPM	DATE 11/13/89





December 24, 2007



**To:** Vic Buhr  
JF Brennan

**From:** Bob Wetta  
Dredging Supply Co.

The graphs below are based on the following data:

The top graphs in each series represents two (2) 8" Moray dredges with eight (8) additional boosters – each Moray with a flow rate of 650 GPM flowing into a common 8" discharge pipe.

The bottom graphs in each series represents one (1) 8" Moray dredge with eight (8) additional boosters – the single Moray with a flow rate of 650 GPM.

The material is representative of a well-graded very fine sand. While the production rates may look higher than what is expected to be achieved, we based the production on being able to maximize the concentration of solids. It is understood that the production rate will be significantly less than what is represented, which allows data to say that the pumping hydraulic calculations are achievable by the equipment options.

You find in the graphs the major difference is in the maximum horsepower requirements. With the single Moray, the high horsepower requirement based on the maximum conditions is due to the inefficiency of the booster pumps. This is only expected in the event that one of the Moray dredges is down and you must operate with a single dredge. However, the 53,000 feet of discharge line can still be achieved with these conditions.

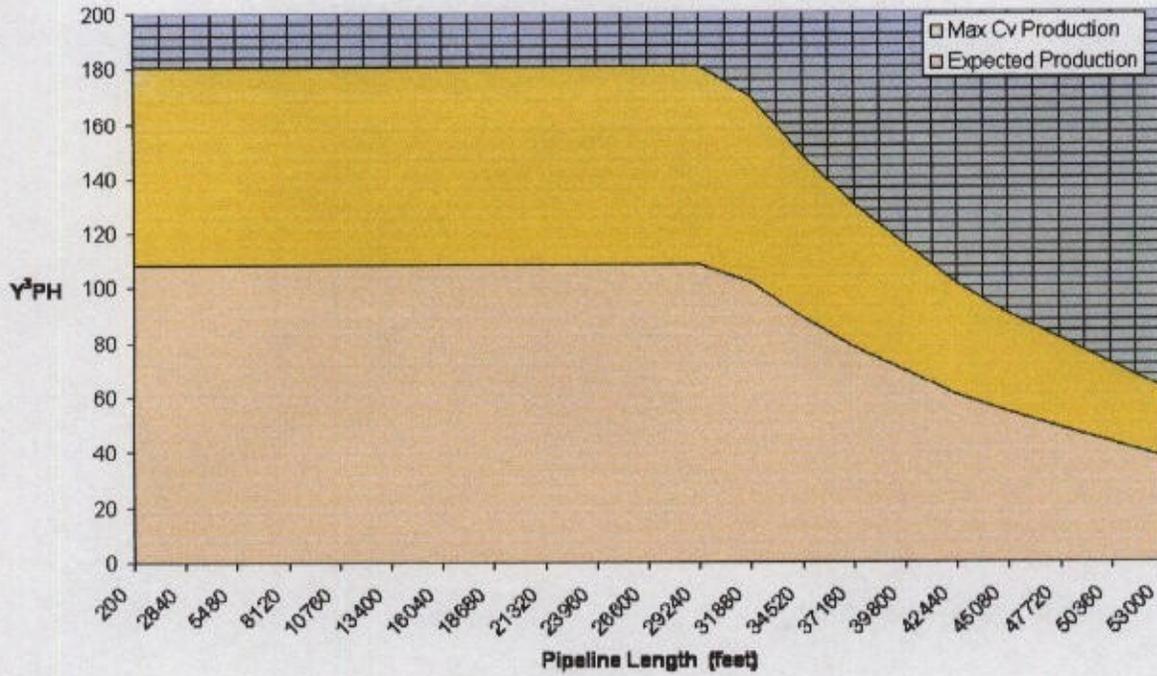
Again I want to point out that this data was used to maximize production in order to look at the hardest pumping conditions to see if the equipment selections will work.

Please get back to me at your convenience if you need any additional details.

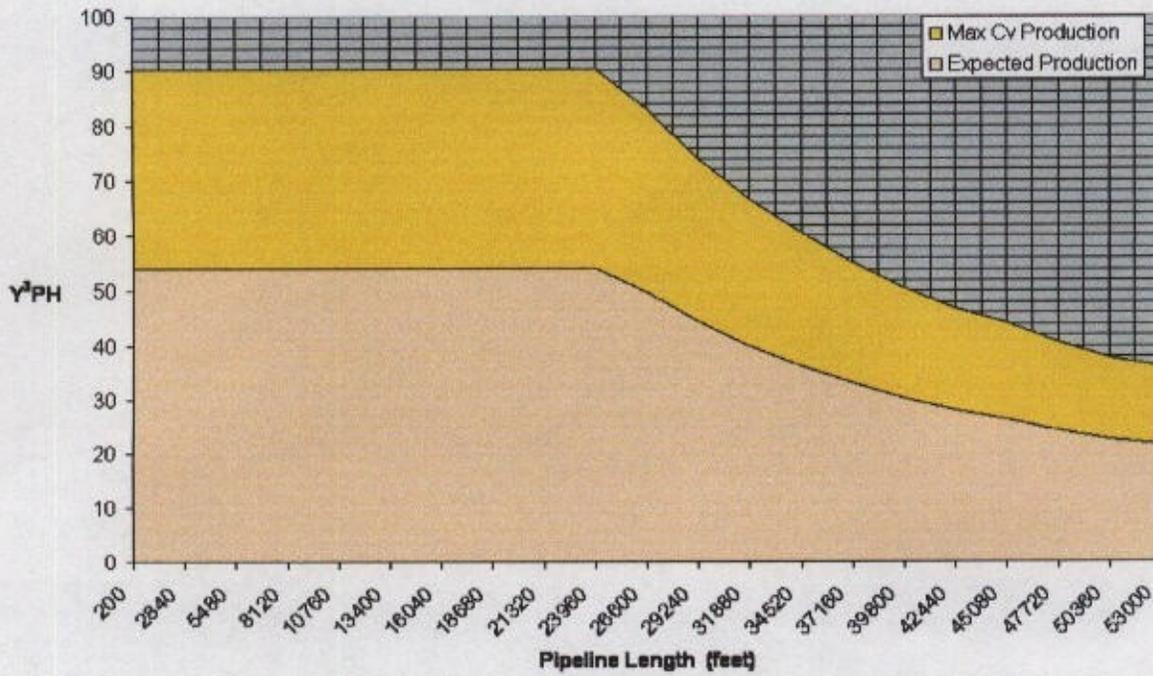
A handwritten signature in blue ink, appearing to read 'Bob Wetta', is written over a light blue horizontal line.

Bob Wetta

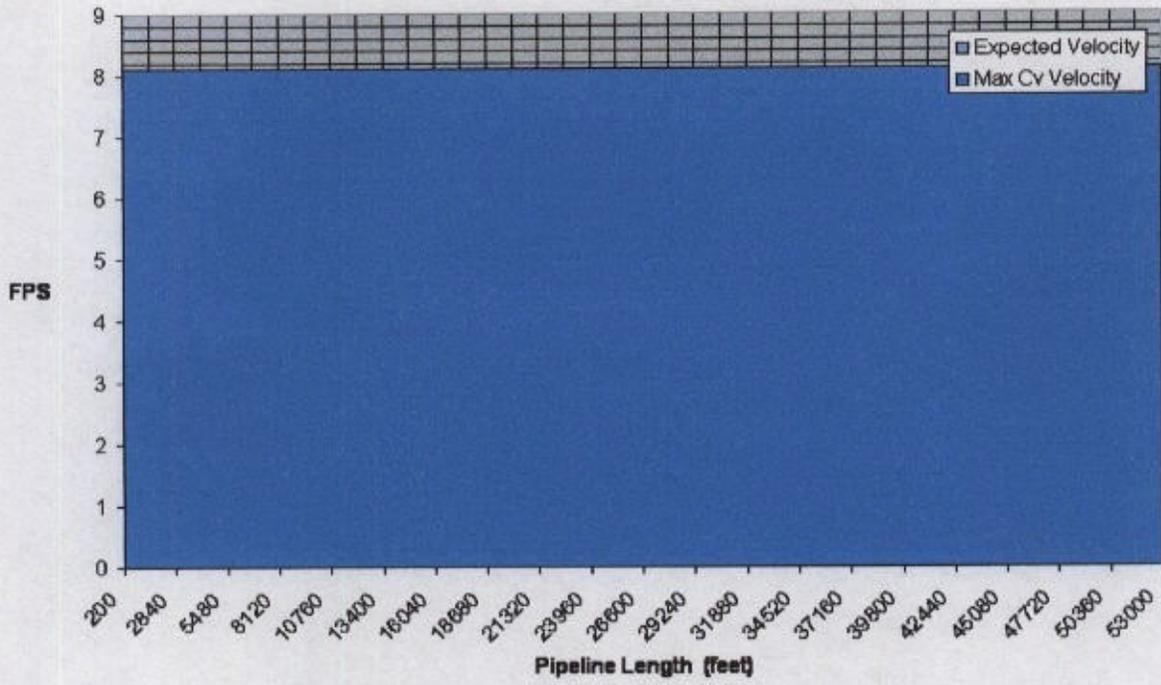
### Production



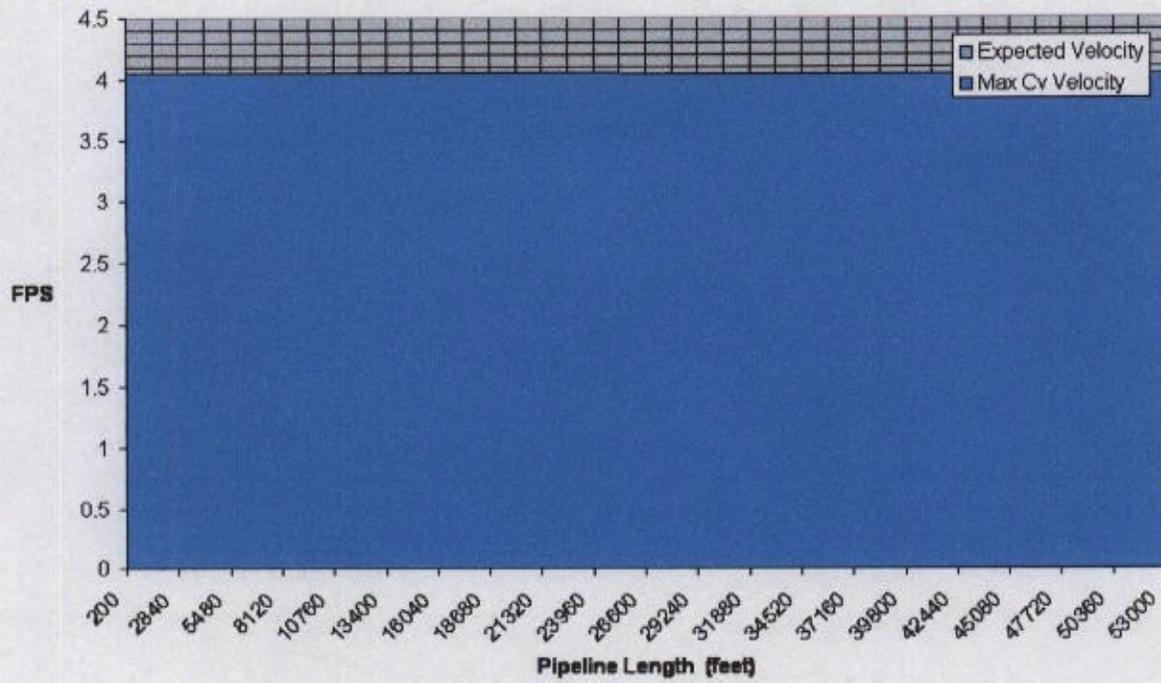
### Production



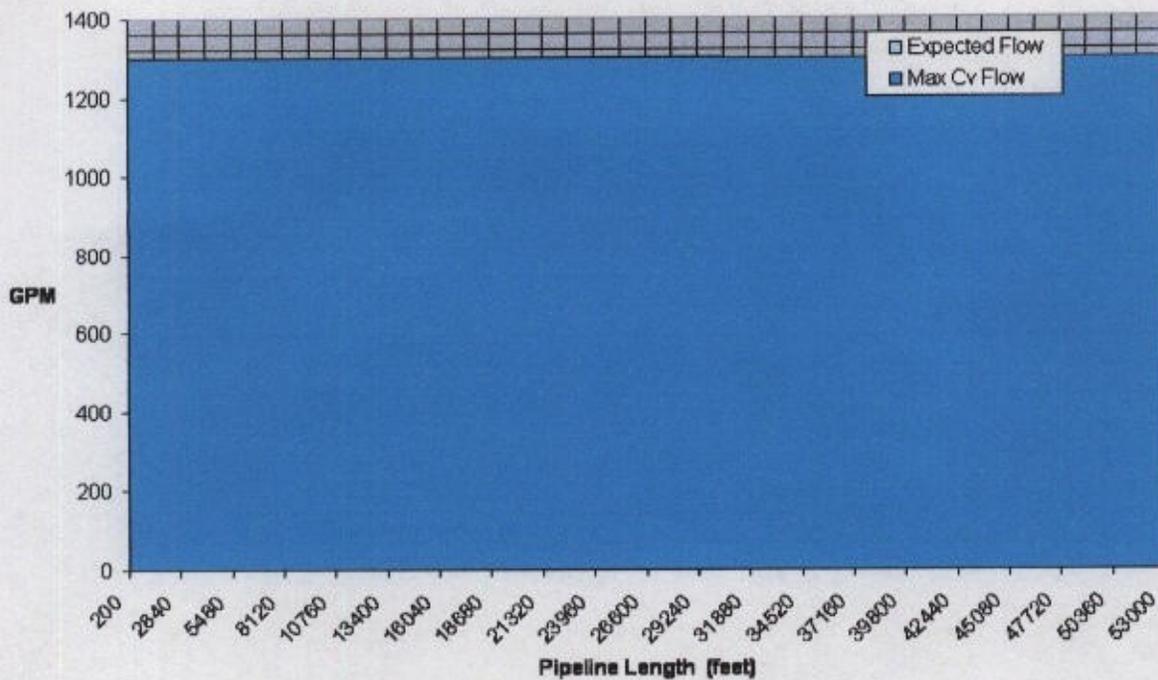
### Velocity



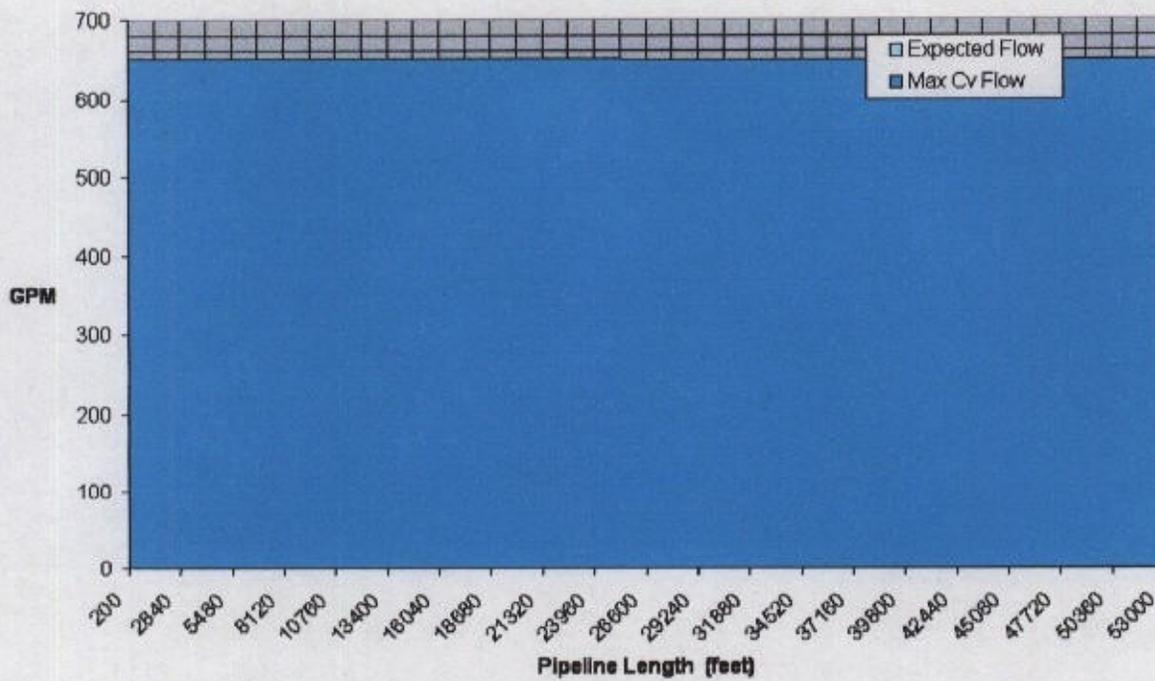
### Velocity



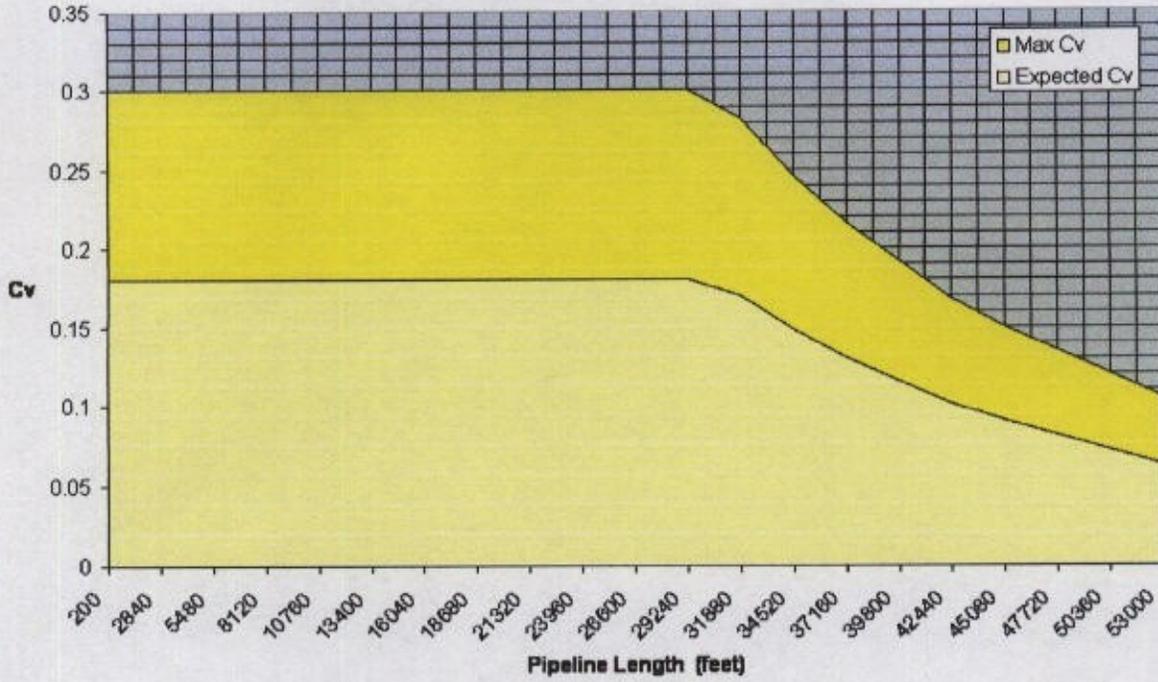
### Flow



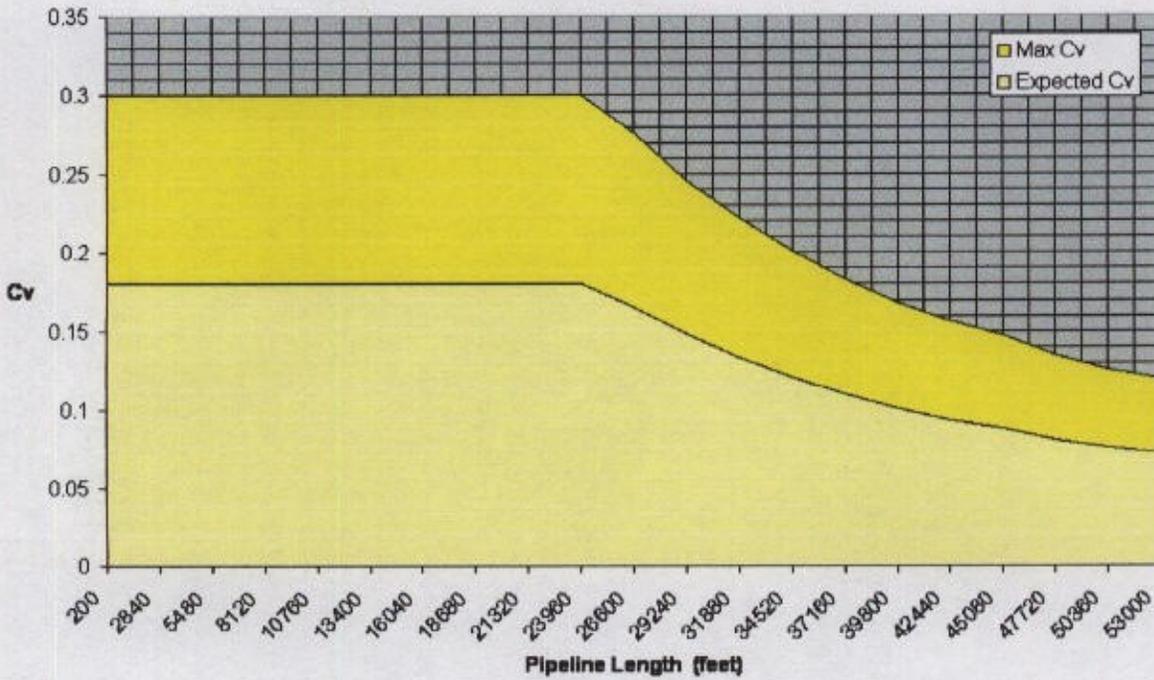
### Flow



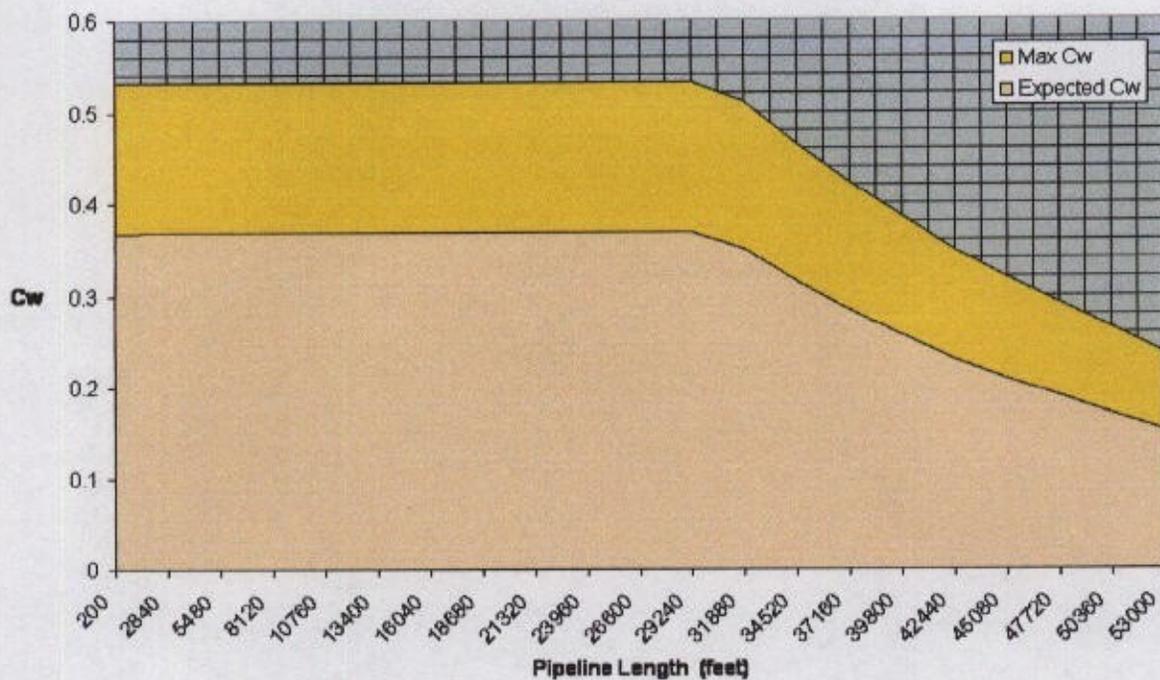
### Concentration



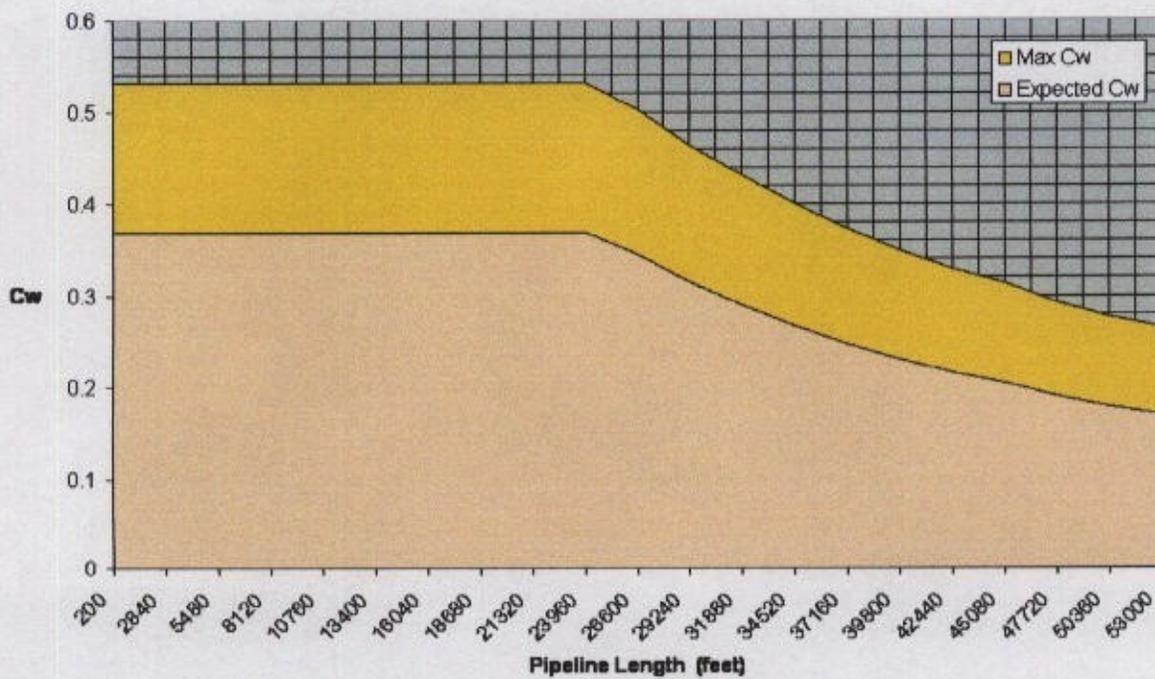
### Concentration



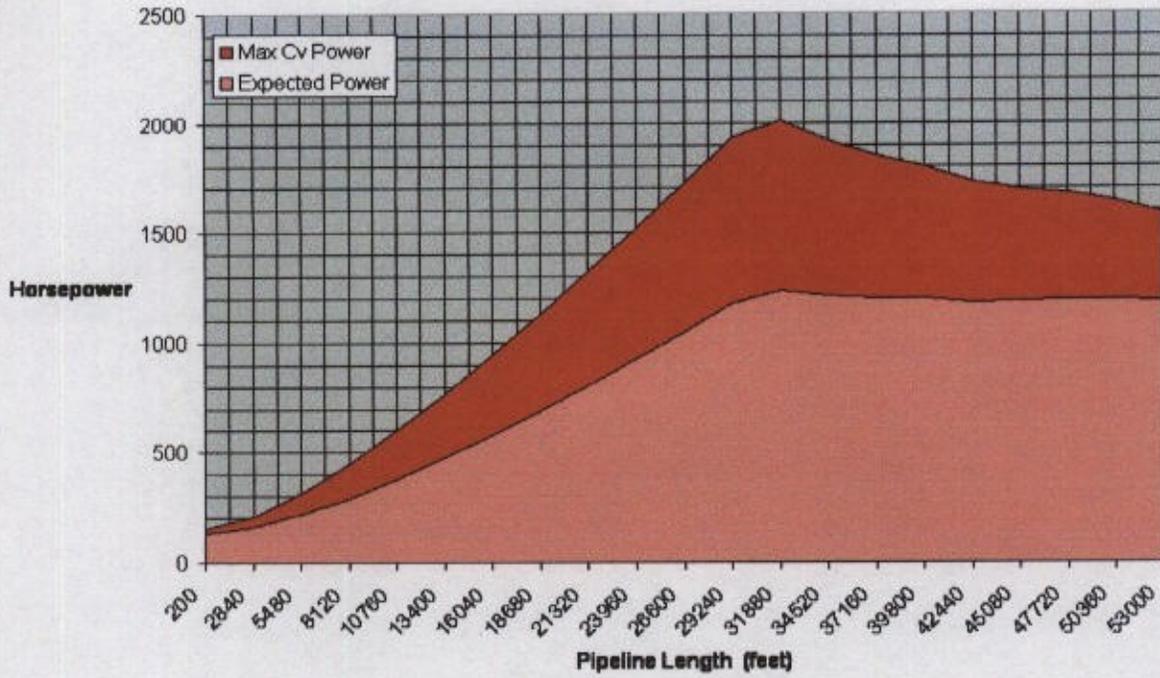
### Weight Concentration



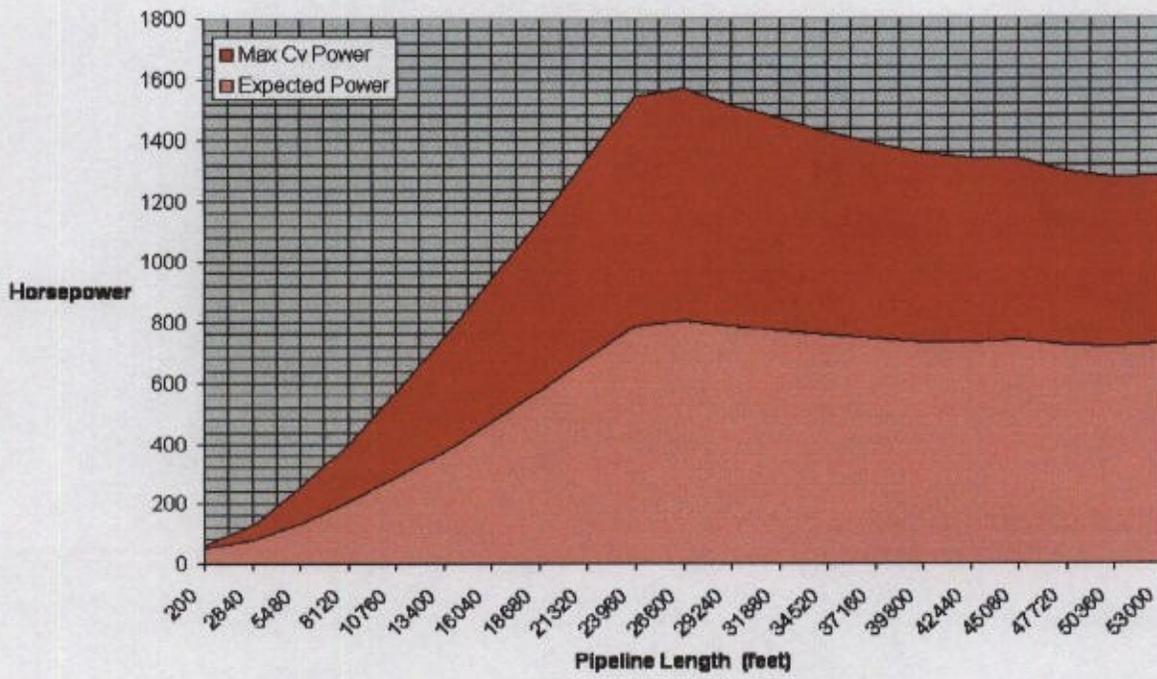
### Weight Concentration



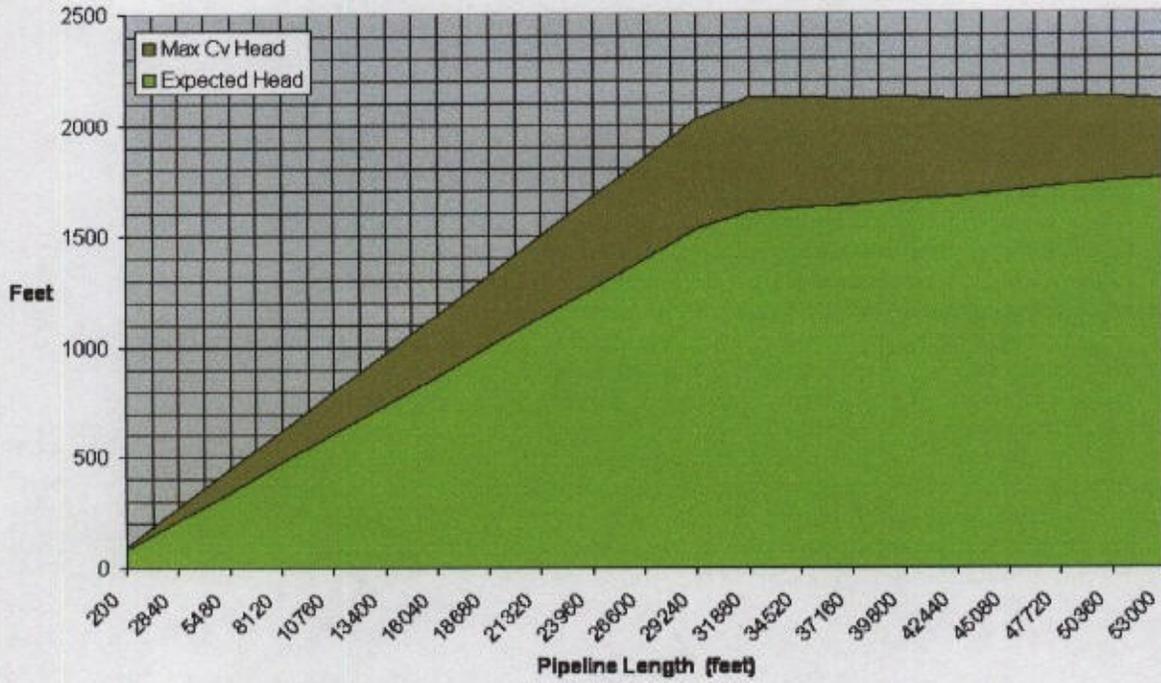
Power



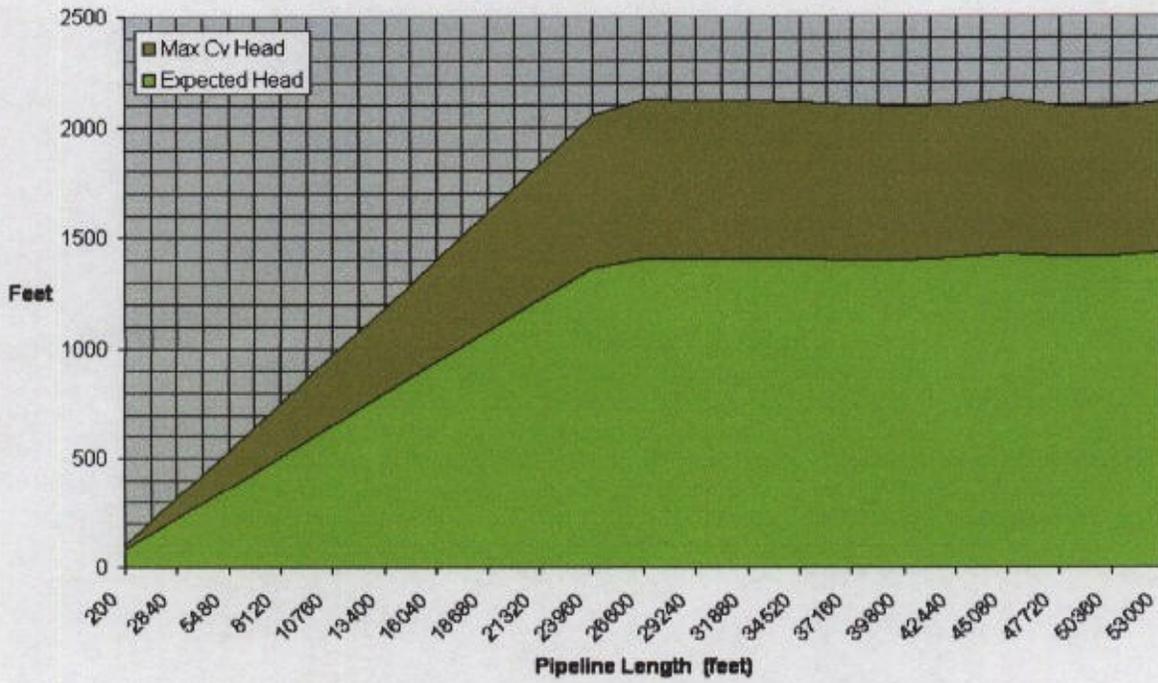
Power



**Total Head**



**Total Head**





## DIPS Size and Dimension Data

## PE3608 (PE3408)

### DriscoPlex<sup>®</sup> Municipal & Industrial & Energy Series/DIPS Pipe Data

Pressure Ratings are calculated using 0.50 design factor for HDS at 73°F as listed in PPI TR-4 for PE 3608 materials.  
 Temperature, Chemical, and Environmental use considerations may require use of additional design factors.

Pressure Rating		255 psi DR 7.3			200 psi DR 9.0			160 psi DR 11.0			130 psi DR 13.5			IPS Pipe Size
DIPS Pipe Size	Nominal OD (in)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	
4"	4.800	0.658	3.405	3.72	0.533	3.870	3.11	0.436	3.876	2.61	0.356	4.045	2.17	4"
6"	6.900	0.945	4.897	7.68	0.767	5.274	6.44	0.627	5.571	5.39	0.511	5.817	4.48	6"
8"	9.050	1.240	6.421	13.22	1.006	6.917	11.07	0.823	7.305	9.28	0.670	7.630	7.70	8"
10"	11.100	1.521	7.875	19.90	1.233	8.486	16.65	1.009	8.961	13.95	0.822	9.357	11.59	10"
12"	13.200	1.808	9.367	28.13	1.467	10.090	23.55	1.200	10.656	19.73	0.978	11.127	16.40	12"
14"	15.300	2.096	10.856	37.79	1.700	11.696	31.64	1.391	12.351	26.51	1.133	12.898	22.02	14"
16"	17.400	2.384	12.346	48.89	1.933	13.302	40.91	1.582	14.046	34.29	1.289	14.667	28.49	16"
18"	19.500	2.671	13.837	61.38	2.167	14.906	51.40	1.773	15.741	43.07	1.444	16.439	35.77	18"
20"	21.600				2.400	16.512	63.05	1.964	17.436	52.85	1.600	18.208	43.91	20"
24"	25.800				2.867	19.722	89.97	2.345	20.829	75.38	1.911	21.749	62.64	24"
30"	32.000							2.909	25.833	115.97	2.370	26.976	96.35	30"
†36"	38.300							3.482	30.918	166.15	2.837	32.286	138.04	†36"
†42"	44.500										3.296	37.512	186.34	†42"

Pressure Rating		100 psi DR 17.0			80 psi DR 21.0			65 psi DR 26.0			50 psi DR 32.5			IPS Pipe Size
DIPS Pipe Size	Nominal OD (in)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	
4"	4.800	0.282	4.202	1.75	0.229	4.315	1.44							4"
6"	6.900	0.406	6.039	3.62	0.329	6.203	2.97	0.265	6.338	2.42	0.212	6.451	1.95	6"
8"	9.050	0.532	7.922	6.22	0.431	8.136	5.11	0.348	8.312	4.17	0.278	8.461	3.36	8"
10"	11.100	0.653	9.716	9.37	0.529	9.979	7.69	0.427	10.195	6.27	0.342	10.375	5.06	10"
12"	13.200	0.776	11.555	13.24	0.629	11.867	10.87	0.508	12.123	8.87	0.406	12.339	7.15	12"
14"	15.300	0.900	13.392	17.80	0.729	13.755	14.60	0.588	14.053	11.90	0.471	14.301	9.61	14"
16"	17.400	1.024	15.229	23.03	0.829	15.643	18.88	0.669	15.982	15.39	0.535	16.266	12.42	16"
18"	19.500	1.147	17.068	28.91	0.929	17.531	23.71	0.750	17.910	19.34	0.600	18.228	15.60	18"
20"	21.600	1.271	18.905	35.49	1.029	19.419	29.10	0.831	19.838	23.74	0.665	20.190	19.16	20"
24"	25.800	1.518	22.582	50.63	1.229	23.195	41.51	0.992	23.697	33.85	0.794	24.117	27.32	24"
30"	32.000	1.882	28.010	77.86	1.524	28.769	63.84	1.231	29.390	52.10	0.985	29.912	42.04	30"
†36"	38.300	2.253	33.524	111.55	1.824	34.433	91.45	1.473	35.177	74.61	1.178	35.803	60.18	†36"
†42"	44.500	2.618	38.950	150.60	2.119	40.008	123.44	1.712	40.871	100.75	1.369	41.598	81.25	†42"

Pipe weights are calculated in accordance with PPI TR-7. Average inside diameter is calculated using Nominal OD and Minimum Wall plus 6% for use in estimating fluid flows. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimensions and tolerances in the applicable pipe manufacturing specification.

†OD available upon special request – Check with your performance Pipe contact for availability of dimensions not listed.

## TECHNICAL NOTE PP 750-TN-05

### BUTT FUSION JOINING PROCEDURES

For DriscoPlex<sup>®</sup> Municipal/Industrial/Energy Piping Products

This bulletin has been developed to assist those responsible for the Butt-Fusion joining of Performance Pipe products in Municipal, Industrial and Energy applications. For more specific fusion information; safety requirements, saddle (sidewall) fusion procedures, socket fusion procedures and Federal regulations for gas pipe joining, please refer to Performance Pipe Bulletin PP 750, "Heat Fusion Joining Procedures and Qualification Guide."

These procedures are in alignment with Plastic Pipe Institute's (PPI) TR-33 Generic Butt Fusion Joining Procedures.

#### OVERVIEW

In heat fusion joining, mating surfaces are prepared by cleaning and facing, simultaneously melted with a hot-plate heater, the heater is removed, and the melted surfaces are pressed together and held under pressure. As the molten materials cool, they mix and fuse into a permanent, monolithic joint.

#### SET-UP PARAMETERS

**HEATING TOOL SURFACE TEMPERATURE — MINIMUM 400°F — MAXIMUM 450°F (204 – 232°C)**

Heating tool surfaces must be up to the specified temperature before you begin. All points on both heating tool surfaces where the surfaces will contact the pipe must be within the prescribed minimum and maximum temperatures. Heating tool surfaces must be clean.

**INTERFACE PRESSURE — minimum 60 psi – maximum 90 psi (414 – 621 kPa; 4.14 – 6.21 bar)**

Interface pressure is used to calculate a fusion joining pressure value for hydraulic butt fusion machines or manual machines equipped with a torque wrench. For hydraulic machines, the interface pressure, the fusion surface area, the machine's carriage cylinder size and internal drag pressure, and if necessary, the pressure needed to overcome external drag resistance, are used to calculate hydraulic fusion joining pressure gauge settings. The equipment manufacturer's instructions are used to calculate this value. *Interface pressure and fusion machine hydraulic fusion joining pressure gauge settings are not the same!*

#### PROCEDURE

1. **Secure.** Clean the inside and outside of the component (pipe or fitting) ends by wiping with a clean, dry, lint-free cloth or paper towel. Align the component ends in the machine. **Do not force pipes into alignment against open fusion machine clamps.** Component ends should protrude past the clamps enough so that facing will be complete. Bring the ends together and check high-low alignment. Adjust alignment as necessary by tightening the high side down. Make sure clamps are properly secured to prevent slippage of the component ends.

**NOTICE:** This publication is for informational purposes and is intended for use as a reference guide. It should not be used in place of the advice of a professional engineer. This publication does not contain or confer any warranty or guarantee of any kind. Performance Pipe has made every reasonable effort towards the accuracy of the information contained in this publication, but it may not provide all necessary information, particularly with respect to special or unusual applications. This publication may be changed from time to time without notice. Contact Performance Pipe to ensure that you have the most current edition.

2. **Face.** Place the facing tool between the component ends, and face them to establish smooth, clean, parallel mating surfaces. If stops are present, face down to the stops. Remove all shavings from pipe ends after facing. **Do not touch the component ends with your hands after facing.**
3. **Align.** Bring the component ends together, check alignment and check for slippage against fusion pressure. Look for complete contact all around both ends with no detectable gaps, and outside diameters in high-low alignment.
4. **Melt.** Verify that the heating tool is maintaining the correct temperature. Place the heating tool between the component ends, and move the ends against the heating tool. The initial contact should be under moderate pressure to ensure full contact. Hold the ends against the heating tool **without force.**

Beads of melted polyethylene will form against the heating tool at the component ends. When the proper melt bead size is formed, quickly separate the ends, and remove the heating tool.

**Table 1 Approximate Melt Bead Size**

Pipe Size	Approximate Melt Bead Size
2" - 4"	1/8" - 3/16"
4" - 12"	3/16" - 1/4"
12" - 24"	1/4" - 7/16"
24" - 54"	7/16" - 9/16"

5. **Join.** Immediately after heating tool removal, **QUICKLY** inspect the melted ends, then bring the ends together applying the correct joining force, using 60-90psi interfacial pressure. **Do not slam.** The correct joining force will form a double bead that is rolled over to the surface on both ends.
6. **Hold.** Hold joining force against the ends until the joint is cool. The joint is cool enough for **GENTLE** handling when the double bead is cool to the touch. Cool for about 30-90 seconds per inch of pipe diameter.
  - Heavier wall thickness pipes may require longer cooling times.
7. **Inspect.** On both sides, the double bead should be rolled over to the surface, and be uniformly rounded and consistent in size all around the joint.

It is a common practice and accepted industry "Rule of Thumb" when fusing pipes of unlike DR's, to fuse a maximum mismatch of one SDR. For example, this would allow fusion of DR 11 pipe to DR 9 or DR-11 to DR 13.5. A successful fusion may be accomplished without the need of any change in the actual fusion procedure.

Per ASTM, Standard Dimension Ratio, SDR, value is when the outside diameter divided by the minimum wall thickness equals one of the following values:

5.0	6.0	7.0	9.0	11.0	13.5	17	21.0	26.0	32.5
-----	-----	-----	-----	------	------	----	------	------	------

The terms DR and SDR are often used interchangeably.

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For more information and technical assistance contact:

Performance Pipe, a division of  
Chevron Phillips Chemical Company LP  
P.O. Box 269006  
Plano, TX 75026-9006  
800.527.0662



Members Of  PLASTICS PIPE INSTITUTE

NOTICE: This data sheet provides typical physical property information for polyethylene resins used to manufacture PERFORMANCE PIPE polyethylene piping products. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for piping products. Some of these typical physical property values were determined using compression molded plaques. Values obtained from tests of specimens taken from piping product can vary from these typical values. Performance Pipe has made every reasonable effort to ensure the accuracy of this data sheet, but this data sheet may not provide all necessary information, particularly with respect to special or unusual applications. The data sheet may be changed from time to time without notice. Contact Performance Pipe to determine if you have the most recent edition.

Bulletin: PP 109

Revision Date September, 2006

Another quality product from



The Woodhead, Jones

Before using the piping product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the piping product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the piping product is suited and the information is applicable to the user's specific application. This data sheet provides typical physical property information for polyethylene resins used to manufacture the piping product. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for the piping product. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from the piping product can vary from these typical values. Performance Pipe does not make, and expressly disclaims, all warranties, of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of trade or from any course of dealing in connection with the use of information contained herein or the piping product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with th

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Chevron Phillips Chemical Company LP  
P.O. Box 269006  
Plano, TX 75026-9006  
800.527.0662



**SUGGESTED INDUSTRIES AND APPLICATIONS**

<b>Potable Water Mains</b>	<b>Horizontal Directional Drilling (HDD)</b>	<b>Marine Service</b>
<b>Sliplining</b>	<b>Water transmission Lines</b>	<b>Pipe Bursting</b>
<b>Industrial Water Mains</b>	<b>Ash, Tailings &amp; Abrasives</b>	<b>Mining</b>
<b>Municipal Water Utilities</b>	<b>Open-cut and Bury</b>	<b>Culverts</b>
<b>Rural Water Distribution</b>	<b>River Crossings</b>	<b>Plow-in</b>
<b>Mun. &amp; Ind. Sewer</b>	<b>Trenchless Technologies</b>	<b>Crude oil</b>
<b>Fire Main Piping</b>	<b>Rural Water Distribution</b>	<b>Plow-in</b>

**Butt Fusion Conditions**

- 60-90 psig (4.14-6.21 bar) interfacial fusion pressure.
- 400-450° (204-232°C) heater surface temperature range.
- Please refer to Performance Pipe's PE3608 (PE3408) fusion procedure, Bulletin PP 750.

**Available Sizes**

- 3/4" through 54" IPS
- 4" through 36" DIPS

**Specification Data**

The resin, pipe and fitting listed may comply with one or more of the standards below.

Applicable Standards	DriscoPlex® Pipe Series	PE3608 (PE3408)	PE4710 (d <sub>r</sub> )
ASTM F714, NSF 61, ASTM D3035	4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700	0.5	0.63
AWWA C906, AWWA C901	4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700	0.5	0.63
FMA, AWWA, F714	1500, 1600	0.5	—
API 15LE, ASTM D2513	6400	0.5	0.63

Bulletin: PP 109

Revision Date September, 2006

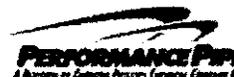
Another quality product from



Before using the piping product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the piping product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the piping product is suited and the information is applicable to the user's specific application. This data sheet provides typical physical property information for polyethylene resins used to manufacture the piping product. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for the piping product. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from the piping product can vary from these typical values. Performance Pipe does not make, and expressly disclaims, all warranties, of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of trade or from any course of dealing in connection with the use of information contained herein or the piping product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with th

For more information and technical assistance contact:

Performance Pipe, a division of  
Chevron Phillips Chemical Company LP  
P.O. Box 269006  
Plano, TX 75026-9006  
800.527.0662



## DriscoPlex<sup>®</sup> PE3608 / (PE3408) Pipe Pipe and Fittings Data Sheet

### Typical Material Physical Properties of DriscoPlex<sup>®</sup> PE3608 / (PE3408)

#### High Density Polyethylene Materials

Property	Unit	Test Procedure	Typical Value
Material Designation	--	PPI TR-4	PE3608
Cell Classification	--	ASTM D3350	345464C
<b>Pipe Properties</b>			
Density	gms / cm <sup>3</sup>	ASTM D1505	0.955 (black)
Melt Index Condition 190 / 2.16	gms / 10 minutes	ASTM D1238	0.08
Hydrostatic Design Basis 73°F (23°C)	psi	ASTM D2837	1600
Hydrostatic Design Basis 140°F (60°C)	psi	ASTM D2837	800
Color: UV Stabilizer [C] [E]	--	ASTM D3350	Min 2% carbon Black Color UV Stabilizer
<b>Material Properties</b>			
Flexural Modulus 2% Secant - 16:1 span; depth, 0.5 in / min	psi	ASTM D790	>110,000
Tensile Strength at Yield	psi	ASTM D638 Type IV	3200
Elongation at Break 2 in / min., Type IV bar	%	ASTM D638	>700
Elastic Modulus	psi	ASTM D638	>150,000
Hardness	Shore D	ASTM D2240	62
PENT	hrs	ASTM F1473	>100
<b>Thermal Properties</b>			
Vicat Softening Temperature	°F	ASTM D1525	256
Brittleness Temperature	°F	ASTM D746	-103
Thermal Expansion	in / in / °F	ASTM D696	1.0 x 10 <sup>-4</sup>

Bulletin: PP 109

Revision Date September, 2006

Another quality product from

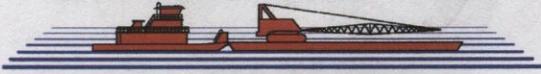


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# PIPELINE WEIGHT AND BUOY ASSEMBLY



# BRENNAN



MARINE PROFESSIONALS  
LA CROSSE, WI

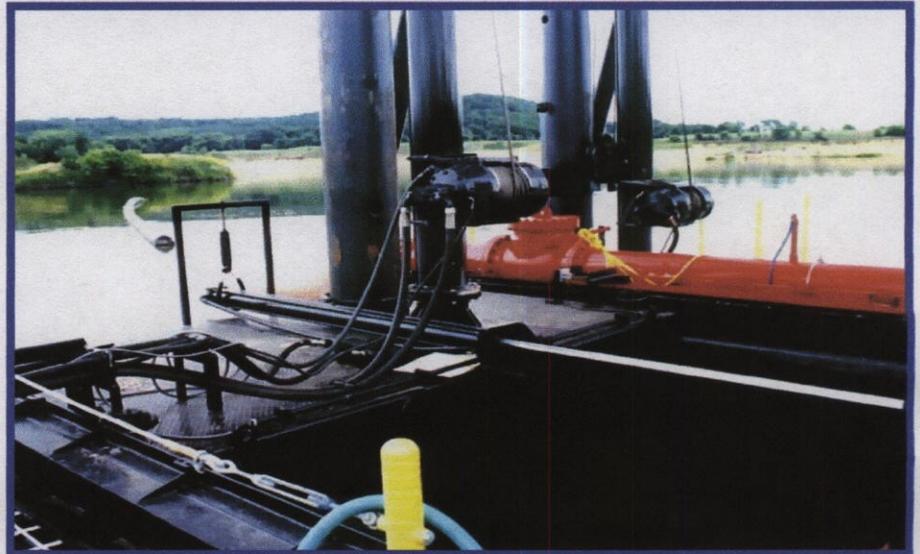
## **EQUIPMENT:** **12" HYDRAULIC DREDGE** **"Mark Anthony II"**

### **Features:**

- Type: Cutter-head
- Functions: Swinging ladder or conventional mode
- Overall Size
  - Length - 113'
  - Width - 29'
  - Draft- 3'
- Working Capacity
  - Maximum Depth of Cut -  
26' Swinging ladder  
40' Conventional mode
- Swing Width - 150' Maximum
- Hydraulic Pump - Above waterline

### **Benefits:**

- **Versatility** - Operates in swinging ladder & conventional modes
- **Cost Effective** - Pumping capacity of larger dredges
- **Portability** - Reduced mobilization costs
- **Environmentally Sensitive** - Both the size of dredge and the operating oils used respond to most environmental concerns.



# BRENNAN

MARINE PROFESSIONALS

820 Bainbridge St., LaCrosse, WI 54603 Phone:608-784-7173 Fax:608-785-2090 [www.jfbrennan.com](http://www.jfbrennan.com)



## BARRACUDA SPECIFICATIONS

### GENERAL:

OVERALL LENGTH (WITH LADDER EXTENSION)	113 FT.
OVERALL WIDTH (OPERATIONAL MODE)	29 FT. 3 IN.
HULL DEPTH	5 FT.
HEIGHT - OVERALL (LESS SPUDS AND SPUD FRAMES)	19 FT. 10 IN.
MEAN DRAFT (WITH FUEL EST.)	22 IN.
LADDER LENGTH (WITH EXTENSION & CUTTER)	47 FT. 6IN.
SPUD LENGTH (EACH STERN SPUD INCLUDES POINT)	58 FT
SPUD SIZE (STERN SPUDS)	20 IN. Diameter
SPUD LENGTH (EACH BOW SPUD, INCLUDES POINT)	42 FT. 6 IN.
SPUD SIZE (BOW SPUDS)	16 IN. X16 IN Tub.
TOTAL DREDGE DRY WEIGHT - EST.	325,000 LB

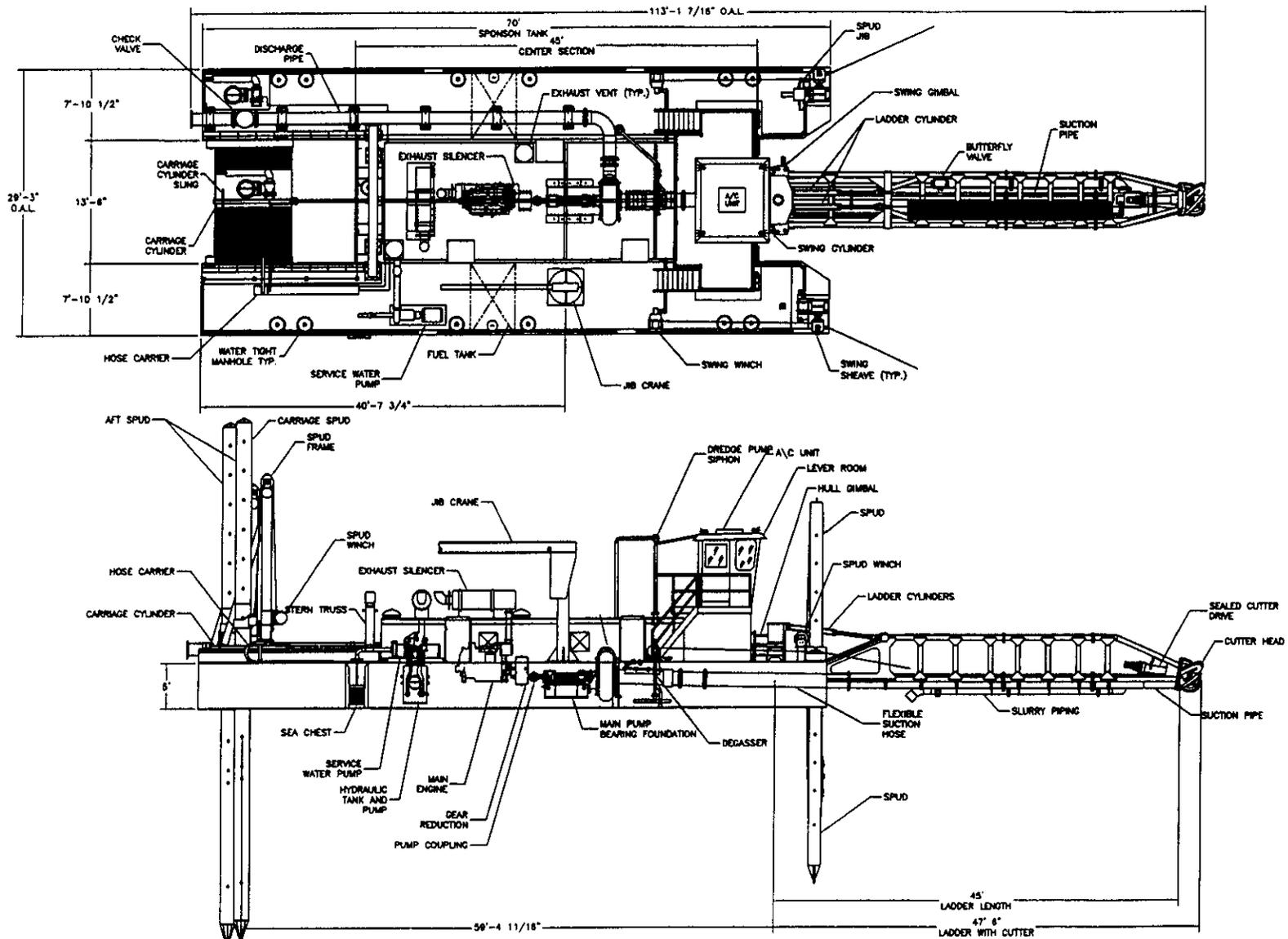
### OPERATING CONDITIONS:

#### DIGGING DEPTH

MINIMUM	3'
MAXIMUM (conventional mode w/ extension)	41'

#### MAXIMUM CUT OF DREDGE (SINGLE CUT)

@ MINIMUM DIGGING DEPTH (SWINGING LADDER)	24'
@ MAXIMUM DIGGING DEPTH (SWINGING LADDER)	18'
@ MINIMUM DIGGING DEPTH (conventional w/extension)	150'



NO.	DATE	BY	REVISIONS	CHK	APP	REFERENCE DWG	DESCRIPTION

**DREDGING SUPPLY COMPANY, Inc.**  
**BARRACUDA DREDGE**

J. F. BRENNAN  
 GENERAL ARRANGEMENT

DRAWING NO. 9902001F  
 DATE 5/15/20  
 FILE NO. 29020  
 SHEET NO. 1 OF 1

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@ MAXIMUM DIGGING DEPTH (conventional w/extension) 122'

**PRIME MOVER:**

ENGINE MAKE CATERPILLAR  
ENGINE MODEL 3412 E-Series  
MAXIMUM H.P @ 2100 R.P.M. 860 H.P.  
SERIAL NUMBER 4CR01037

**AUXILIARY ENGINE:**

ENGINE MAKE CATERPILLAR  
ENGINE MODEL 3306DITA  
MAXIMUM H.P @ 2200 R.P.M. 300 H.P.  
SERIAL NUMBER 64Z27195

**CUTTER MODULE:**

CUTTING FORCE 8,794 LB  
OPERATING TORQUE 203,500 IN-LB  
CUTTING FORCE PER LINEAR INCH 204 LB/IN  
CUTTER DIAMETER 43"  
SHAFT DIAMETER 5"  
CUTTER RATING 90 H.P.  
CUTTER SPEED VARIABLE 0 - 28 R.P.M.

**SWING WINCHES:**

MANUFACTURER Pullmaster  
MODEL H18  
LINE PULL (1ST LAYER) 18,000 LB  
LINE SPEED (1ST LAYER) 121 FT/MIN  
WIRE 9/16"  
DRUM CAPACITY 310'

**LADDER HOIST CYLINDERS (2):**

MANUFACTURER	Hydro-Line
MODEL	N5C 70X75.3
EXTENDING FORCE	65,000 LB
RETRACTING FORCE	125,000 LB

**DREDGE PUMP:**

MANUFACTURER	Svedala Tomas
MODEL	P40-WD-L4V
SERIAL NUMBER	3-16274
SUCTION	12"
DISCHARGE	12"
IMPELLER DIAMETER	40"

**DREDGE PUMP REDUCTION GEAR**

MANUFACTURER	Rexnord
MODEL	B280-44VS-DC-3.375
RATIO	3.313:1
SERIAL NUMBER	H99X-08421-A1

**DREDGE PUMP CLUTCH**

MANUFACTURER	Wichita
MODEL	ATD214H-DUCTIL IRON

**BOW SPUD WINCHES:**

MANUFACTURER	DSC
MODEL	DSC-095
LINE PULL	4,000 LB
LINE SPEED (1ST LAYER)	100 FT/MIN
WIRE SIZE	9/16 IN.

## **STERN SPUD WINCHES**

MANUFACTURER	Pullmaster
MODEL	H18
LINE PULL (1ST LAYER)	18,000 LB
LINE SPEED (1ST LAYER)	122FT/MIN
WIRE	9/16"
DRUM CAPACITY	310'

## **ELECTRICAL SYSTEM:**

BATTERY (24 VDC )

STANFORD AC GENERATOR mounted on the auxiliary engine. 120/208 ACV three phase, 60Hz

## **CAPACITIES:**

FUEL	3,000 GAL
HYDRAULIC	455 GAL

## **STANDARD AND CUSTOM FEATURES:**

SIPHON PRIMING SYSTEM

OPERATOR'S CHAIR

FIRE EXTINGUISHERS (2) 5 LBS.  
ABC

LIGHTED RING BUOY

HANDRAILS AND KICK RAILS

ELECTRONIC DEPTH GAUGE

ELECTRONIC PROPORTIONAL  
CONTROL

GUARDS

EARLY WARNING ALARM SYSTEM  
AND ENGINE SHUTDOWN SYSTEM

CABIN LIGHTS

BILGE PUMP - ELECTRIC

REPLACEABLE EDGE CUTTER

DREDGE WASH DOWN SYSTEM

HI-CAPACITY SERVICE PUMP

HYDRAULIC PUMP/ENGINE  
CLUTCH DISCONNECT

PUMP/ENGINE REDUCTION GEAR  
(NO BELTS REQUIRED)

PAINT: HULL - BLAST WITH COAL  
TAR EPOXY PAINT

SUPERSTRUCTURE AND  
STRUCTURAL - BLAST WITH

PRIMER AND TOP COAT OF PAINT

CARRIAGE SPUD SYSTEM

CUTTER ROTATING RING

STERN PULLING EYES

TOUCH SCREEN COMPUTER WITH  
OPERATING GAUGE DISPLAY  
SOFTWARE.

JOYSTICK SWINGING AND LADDER  
OPERATION

OPTIONAL TOGGLE SWITCH AND  
KNOB FOR SWING CONTROL

AIR CONDITIONED AND HEATED  
LEVER ROOM



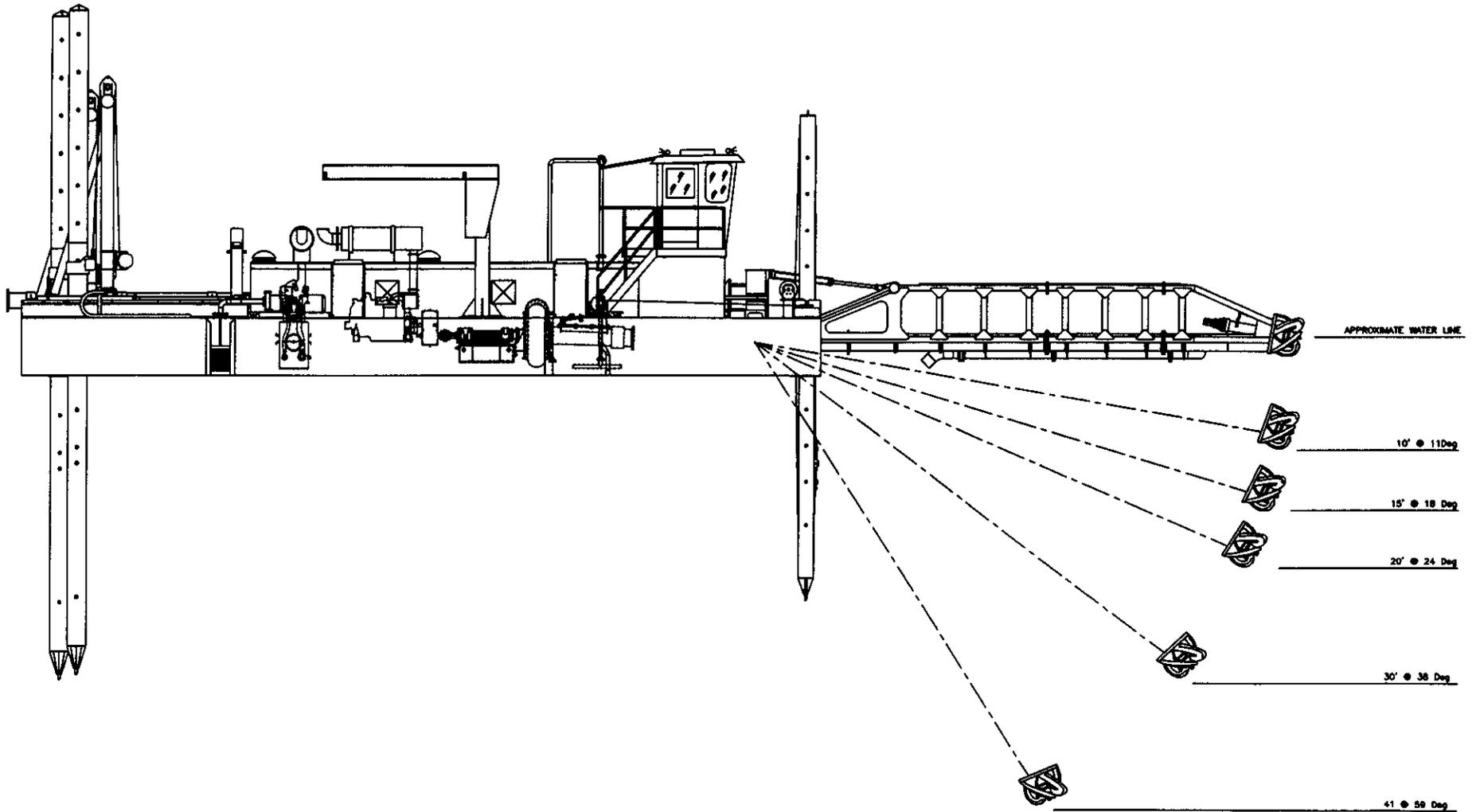
## **RANGE DIAGRAMS**

**DIGGING DEPTH DIAGRAM DWG. 99020121A**

**MAXIMUM SWINGING LADDER SWING DWG. 99020122**

**MAXIMUM SWING CONVENTIONAL MODE (Hull Grounded) DWG. 99020123**

**MAXIMUM SWING (Conventional Mode) DWG. 99020124**

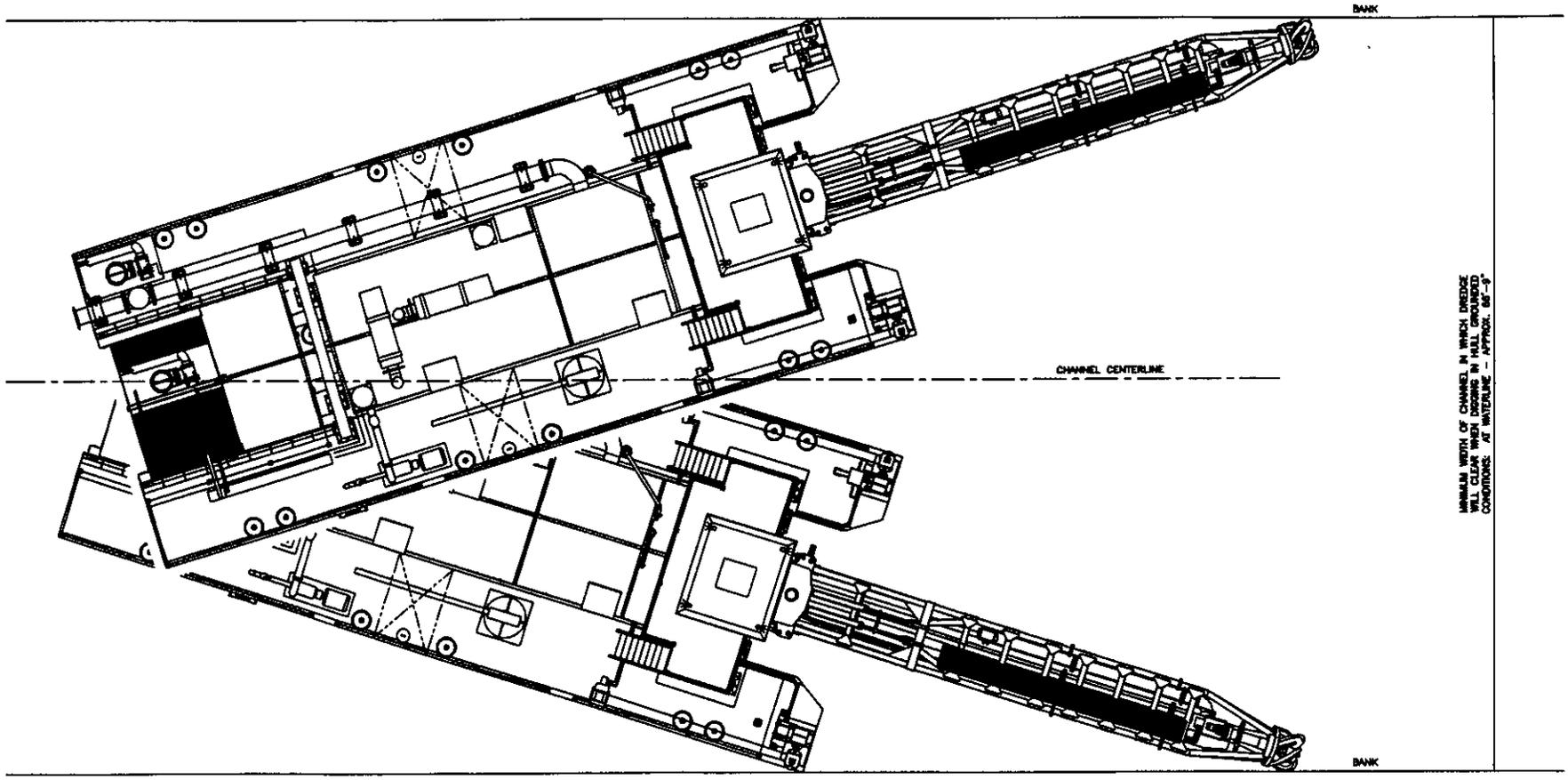


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NO.	DATE	BY	REVISIONS	CHK	APP	REFERENCE	DWG	DESCRIPTION

<b>DREDGING SUPPLY COMPANY, Inc.</b>		DATE/ISSUE	MC
<b>J. F. BRENNAN MOD. BARRACUDA</b>		ISSUE	0/0
<b>DIGGING DEPTH DIAGRAM</b>		DATE	9/17/86
		PROJECT	990220
		DWG NO.	99020121A
		REV	0



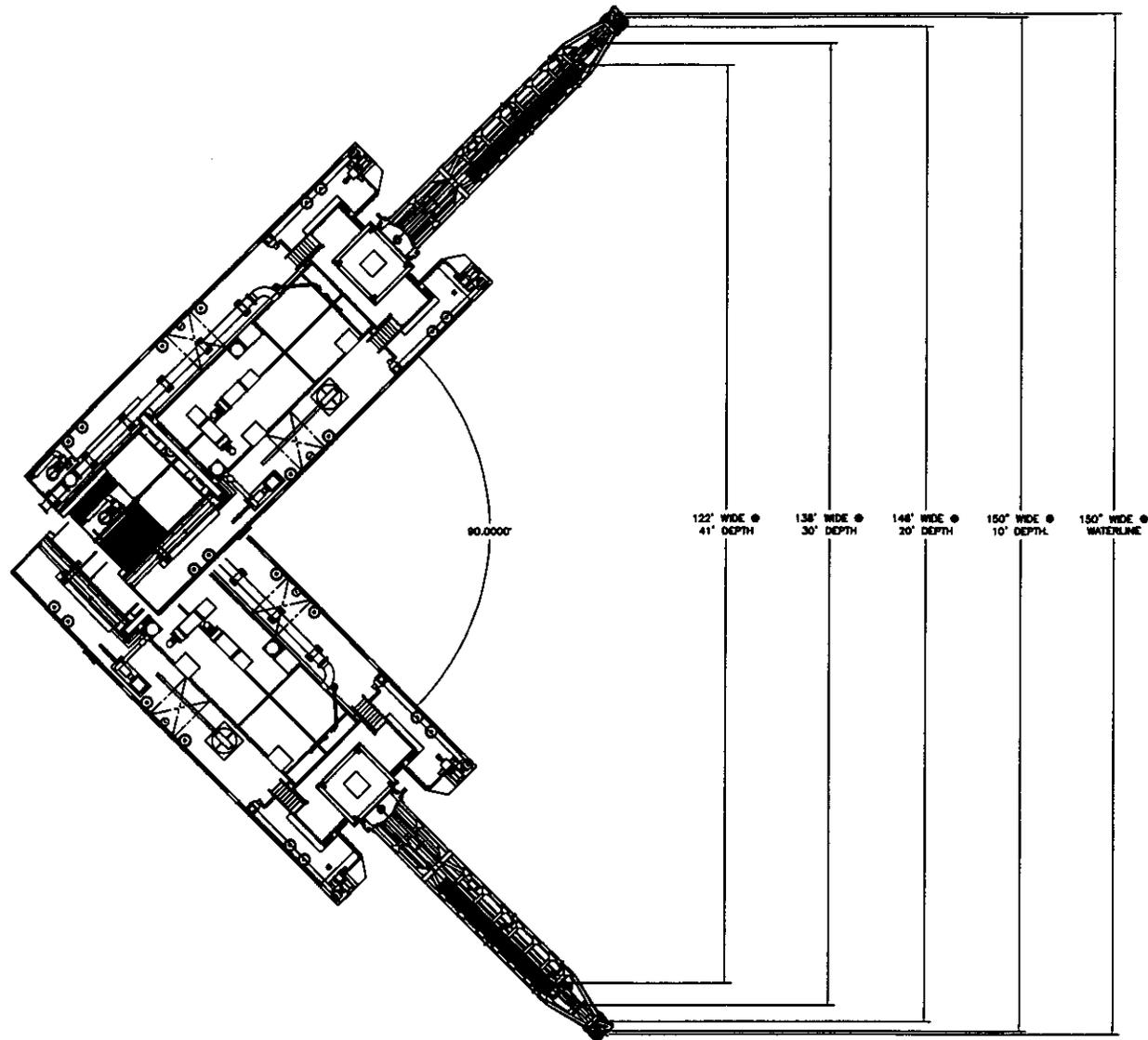


MINIMUM WIDTH OF CHANNEL IN WHICH DREDGE  
WILL CLEAR WHEN DREDGE IS HULL GROUNDED  
CONDITIONS: AT WATERLINE - APPROX. 60'-0"

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NO.	DATE	BY	REVISIONS	CHK	APP	REFERENCE DWG	DESCRIPTION

<b>DREDGING SUPPLY COMPANY, Inc.</b>		DRAWING NO. <b>WJB</b>	
<b>J. F. BRENNAN MOD. BARRACUDA</b>		DATE <b>1/14</b>	APP'D <b> </b>
<b>MINIMUM SWING (CONVENTIONAL MODE)</b>		SCALE <b>N.S.</b>	PROJ <b>6/12/76</b>
<b>HULL GROUNDED</b>		PROJECT <b>990220</b>	
			<b>99020123</b>



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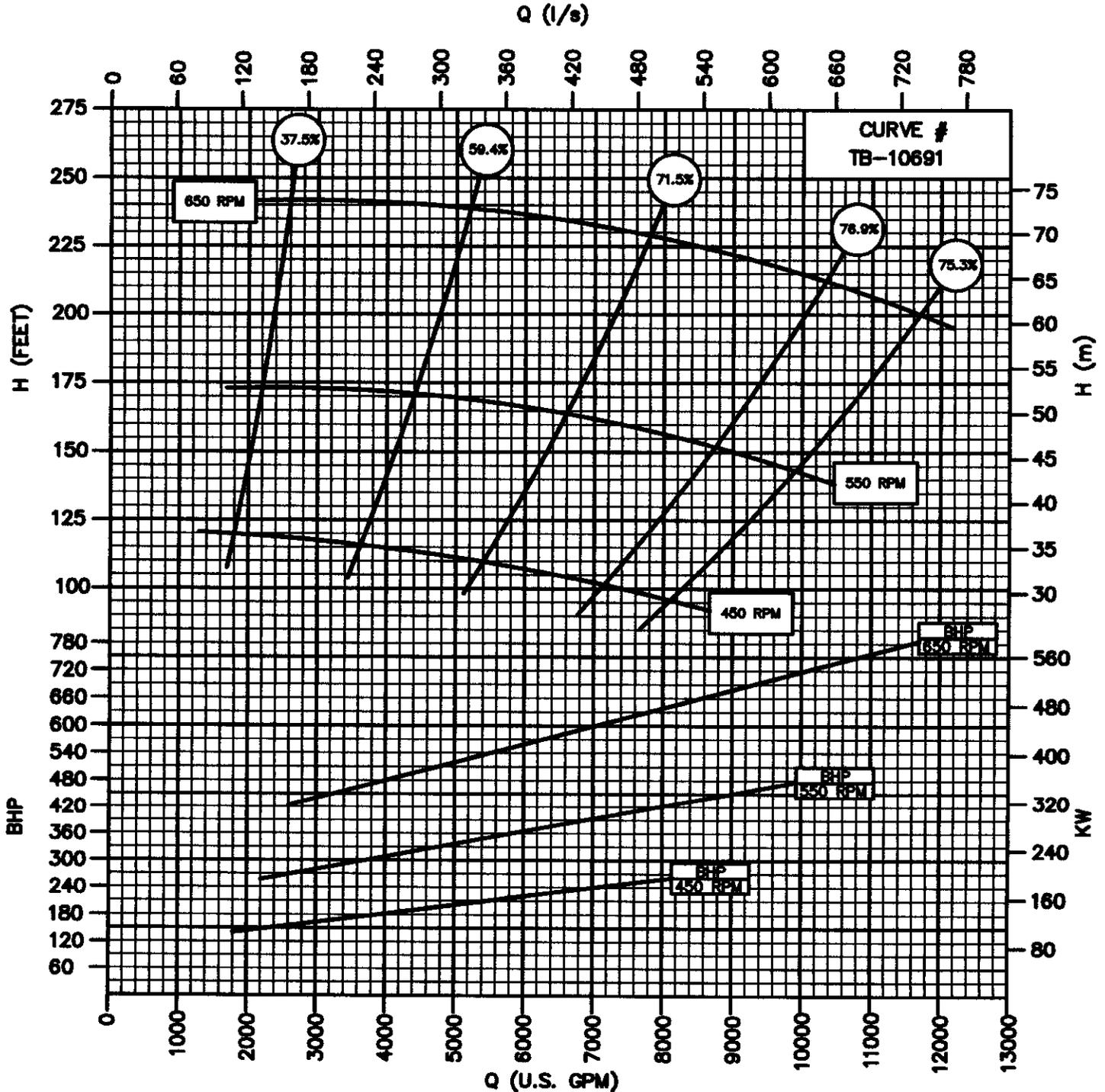
NO.	DATE	BY	REVISIONS	CHK	APP	REFERENCE DWG	DESCRIPTION

<b>DREDGING SUPPLY COMPANY, Inc.</b>		DESIGNER: WJB
<b>J. F. BRENNAN MOD. BARRACUDA</b>		CHECKED: JLM
MAXIMUM SWING (CONVENTIONAL MODE)		DATE: 8/21/99
PROJECT: 99020		NO. 99020124

# DREDGE SWING CHART

Swing Chart				
	CONVENTIONAL	SWINGING LADDER		
Ladder Length( plus cutter )	47.5	37.5		
Spud to Trunion	59.5			
Trunion Height above Water	-0.5	-0.5		
DEPTH	Ladder Angle With Extention	Dredge Length With Extention	Ladder Angle Without Extention	Dredge Length Without extention
0	-0.76	107	-0.76	97
5	5.44	107	6.89	97
10	11.54	106	14.67	96
15	17.77	105	22.75	94
20	24.24	103	31.33	92
25	31.05	100	40.79	88
41	58.50	84		
SWINGING LADDER				
30DEG OFF CENTER Ladder without extension				
Depth (without extension)	WIDTH			
0	37			
5	37			
10	36			
15	35			
20	32			
25	28			
Limited to 25' deep in swinging ladder mode  Only the short ladder may be used in swinging ladder mode				
SWING CHART (Conventional mode w/extension )				
DEGREES SWING = THE TOTAL SWING FROM PORT TO STARBOARD CUT LIMITS				
DEPTH	10	20	25	41
DEGREES SWING	WIDTH	WIDTH	WIDTH	WIDTH
10	18	18	17	15
20	37	36	35	29
30	55	53	52	44
40	73	70	69	58
45	81	79	77	65
50	90	87	85	71
55	98	95	93	78
60	106	103	100	84
65	114	110	108	91
70	122	118	115	97
75	129	125	122	103
80	136	132	129	108
85	143	139	135	114
90	150	145	142	119
SWING CHART (CONVENTIONAL MODE WITHOUT THE EXTENSION)				
DEPTH	10	15	20	25
DEGREES SWING	WIDTH	WIDTH	WIDTH	WIDTH
10	17	16	16	15
20	33	33	32	31
30	50	49	47	45
40	66	64	63	60
45	73	72	70	67
50	81	80	77	74
55	88	87	85	81
60	96	94	92	88
65	103	101	98	94
70	110	108	105	101
75	117	115	111	107
80	123	121	118	113
85	129	127	124	119
90	135	133	129	124

<b>PUMP MODEL</b>	<b>SIZE</b>	<b>IMPELLER # L12632RH</b>		<b>CASE # L1277</b>	
12" L40	12 X 14	<b>TYPE</b>	<b>VANES</b>	<b>VANE #</b>	<b>MAX PARTICLE</b>
		CLOSED	3	40.00 IN	8.375 IN
<b>PERFORMANCE FOR WATER @ 1.0 SG @ 68° F/20° C</b> CORRECTIONS MUST BE MADE FOR HEAD AND EFFICIENCY LOSSES FROM MIXTURE SPECIFIC GRAVITY AND SOLIDS EFFECT. CONSULT FACTORY				1016 MM	212.7 MM
				<b>MAX.SPEED</b>	<b>TEST#</b>
				668 RPM	DATE



# 14" x 12" Booster Unit

## Preliminary Specifications

*presented to:*

**J.F. BRENNAN CO., INC.**



820 BAINBRIDGE • LACROSSE, WI 54603 PHONE: 608/784-7173 FAX: 608/785-2090 info@jfbrennan.com

**October 2007**

### Prime Mover



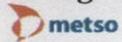
Caterpillar C15 ACERT industrial diesel engine, radiator cooled with residential grade silencer and a continuous rating of 440 bhp @ 1800-2200 rpm. EPA & CARB Tier 3 compliant, Caterpillar premium gages, alarms, and shutdown systems

### Dredge Pump Reduction Gear/drive



Twin Disc marine gear complete with Centa torsional coupling, electronic selector valve and gear cooler. The reduction gear is close-coupled to the Caterpillar engine with a stub/output shaft. The stub/output shaft is coupled to the dredge pump shaft through an elastomer style coupling.

### Dredge Pump – with cleanout



Suction diameter	14"
Discharge diameter	12"
Impeller diameter	36"

### Skid

Structural Base Type	Heavy-duty structural WF beam
Enclosure Type	Roof only

### Service Pump

To be provided by JF Brennan

### Miscellaneous

Batteries and battery cases  
Machinery guards  
Fire extinguisher  
Wash down system  
Gages

**Booster Control Package:**

The booster control package consists of a PLC, touch screen operator interface, transmitters and enclosure with mounting brackets. The sensors that will be supplied are discharge pressure and inlet pressure. The booster panel will have start/stop switches for the main pump and service water pump. The panel also has a booster mode switch and a touch screen. The touch screen will display data, alarms and it allows the operator to change control and alarm set points. The booster has an auto and manual mode. The auto mode is controlled off the inlet pressure and discharge pressure and the manual mode allows you to control the booster manually.

**Coatings****Engine enclosure and equipment skids:**

1. Blast all steel SSPC-SP6. Blast to achieve 1- to 2- mils profile as determined with a surface profile comparator
2. First coat; 1-3 mils (dry film thickness) Epoxy (Oxide red)
3. Second coat; 4-6 mils (dry film thickness) Epoxy (Pearl Grey)
4. Finish coat: 4-6 mils (dry film thickness) Epoxy (Pearl Gray)

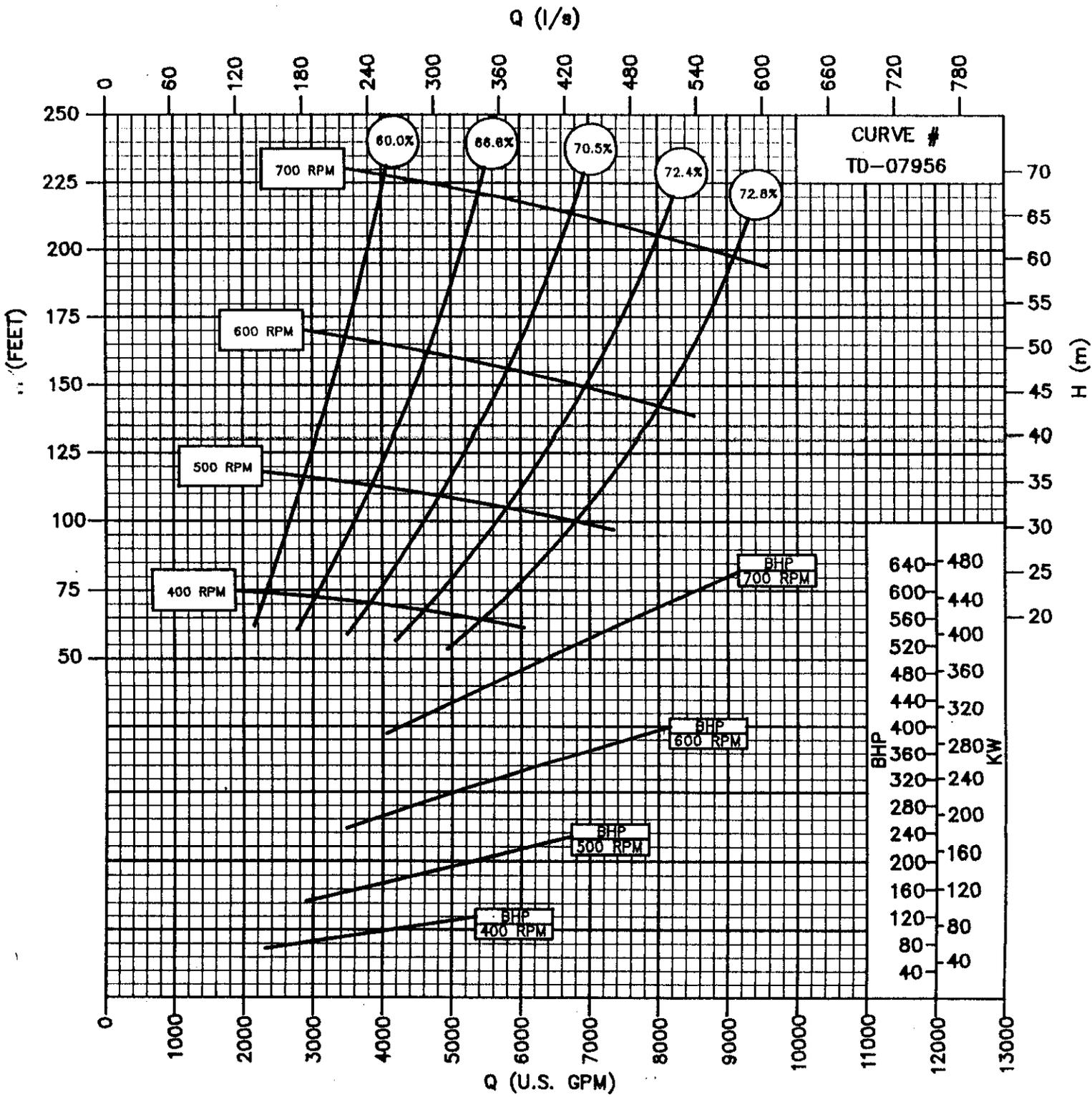
**Building Standards**

Dredges manufactured by Dredging Supply Company, Inc. are designed and built using the following regulations as our guidelines:

- Rules for Building and Classing Steel Vessels for Service on Rivers and Inland Coastal Waterways by the American Bureau of Shipping, 1997, RNC2-8, Corr1,2.
- Manual of Steel Construction, Ninth Edition by the American Institute of Steel Construction.
- Joint Industrial Council Hydraulic Standards T2.24.1 - 1990.
- Structural Welding Code - Steel ANSI/ANS D1.1-2004 by the American Welding Society and the American National Standards Institute.
- Mining Safety and Health Act.
- Occupational Safety and Health Act.
- Surface Preparation Specifications Steel Structures Painting Council No. 91-08.
- National Electrical Code Handbook, 2002.

***Note: Specifications may change due to continual product improvement***

PUMP MODEL	SIZE	IMPELLER # J-1020		CASE # L-1284			
12" L-36	12 X 14	TYPE	VANES	VANE #			
		CLOSED	4	36.00 IN	MAX PARTICLE		
PERFORMANCE FOR WATER @ 1.0 SG @ 68° F/20° C CORRECTIONS MUST BE MADE FOR HEAD AND EFFICIENCY LOSSES FROM MIXTURE SPECIFIC GRAVITY AND SOLIDS EFFECT. CONSULT FACTORY				914 MM	124 MM		
				MAX.SPEED		TEST # B 52.0	
				710 RPM		DATE 11/13/89	





05.12.2005



## IPS Size and Dimension Data

PE3608 (PE3408)

### DriscoPlex<sup>®</sup> Municipal & Industrial & Energy Series/IPS Pipe Data

Pressure Ratings are calculated using 0.50 design factor for HDS at 73°F as listed in PPI TR-4 for PE 3608 materials.  
 Temperature, Chemical, and Environmental use considerations may require use of additional design factors.

Pressure Rating		100 psi DR 17.0			80 psi DR 21.0			65 psi DR 26.0			50 psi DR 32.5			IPS Pipe Size
IPS Pipe Size	Nominal OD (in)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	
1 1/4"	1.660													1 1/4"
1 1/2"	1.900													1 1/2"
2"	2.375	0.140	2.078	0.43										2"
3"	3.500	0.206	3.063	0.93										3"
4"	4.500	0.265	3.938	1.54	0.214	4.046	1.26							4"
6"	6.625	0.390	5.798	3.34	0.315	5.957	2.73	0.255	6.084	2.23	0.204	6.193	1.80	6"
8"	8.625	0.507	7.550	5.65	0.411	7.754	4.64	0.332	7.921	3.79	0.265	8.063	3.05	8"
10"	10.750	0.632	9.410	8.78	0.512	9.665	7.21	0.413	9.874	5.87	0.331	10.048	4.75	10"
12"	12.750	0.750	11.160	12.36	0.607	11.463	10.13	0.490	11.711	8.26	0.392	11.919	6.67	12"
14"	14.000	0.824	12.253	14.91	0.667	12.586	12.22	0.538	12.859	9.96	0.431	13.086	8.05	14"
16"	16.000	0.941	14.005	19.46	0.762	14.385	15.96	0.615	14.696	13.01	0.492	14.957	10.50	16"
18"	18.000	1.059	15.755	24.64	0.857	16.183	20.19	0.692	16.533	16.47	0.554	16.826	13.30	18"
20"	20.000	1.176	17.507	30.41	0.952	17.982	24.93	0.769	18.370	20.34	0.615	18.696	16.41	20"
22"	22.000	1.294	19.257	36.80	1.048	19.778	30.18	0.846	20.206	24.61	0.677	20.565	19.86	22"
24"	24.000	1.412	21.007	43.81	1.143	21.577	35.91	0.923	22.043	29.30	0.738	22.435	23.62	24"
26"	26.000	1.529	22.759	51.39	1.238	23.375	42.14	1.000	23.880	34.39	0.800	24.304	27.74	26"
28"	28.000	1.647	24.508	59.62	1.333	25.174	48.86	1.077	25.717	39.88	0.862	26.173	32.19	28"
30"	30.000	1.765	26.258	68.45	1.429	26.971	56.12	1.154	27.554	45.78	0.923	28.043	36.93	30"
32"	32.000	1.882	28.010	77.86	1.524	28.769	63.84	1.231	29.390	52.10	0.985	29.912	42.04	32"
34"	34.000	2.000	29.760	87.91	1.619	30.568	72.06	1.308	31.227	58.81	1.046	31.782	47.43	34"
36"	36.000	2.118	31.510	98.57	1.714	32.366	80.78	1.385	33.064	65.94	1.108	33.651	53.20	36"
42"	42.000	2.471	36.761	134.16	2.000	37.760	109.97	1.615	38.576	89.71	1.292	39.261	72.37	42"
48"	48.000	2.824	42.013	175.23	2.286	43.154	143.65	1.846	44.086	117.18	1.477	44.869	94.56	48"
54"	54.000				2.571	48.549	181.75	2.077	49.597	148.33	1.662	50.477	119.70	54"

Performance Pipe can produce to specialized pipe dimensions. Check with your Performance Pipe contact for availability of dimensions not listed.

DriscoPlex<sup>®</sup> and PERFORMANCE PIPE are trademarks of Chevron Phillips Chemical Company LP

## TECHNICAL NOTE PP 750-TN-05 BUTT FUSION JOINING PROCEDURES For DriscoPlex<sup>®</sup> Municipal/Industrial/Energy Piping Products

This bulletin has been developed to assist those responsible to for the Butt-Fusion joining of Performance Pipe products in Municipal, Industrial and Energy applications. For more specific fusion information; safety requirements, saddle (sidewall) fusion procedures, socket fusion procedures and Federal regulations for gas pipe joining, please refer to Performance Pipe Bulletin PP 750, "Heat Fusion Joining Procedures and Qualification Guide."

These procedures are in alignment with Plastic Pipe Institute's (PPI) TR-33 Generic Butt Fusion Joining Procedures.

### OVERVIEW

In heat fusion joining, mating surfaces are prepared by cleaning and facing, simultaneously melted with a hot-plate heater, the heater is removed, and the melted surfaces are pressed together and held under pressure. As the molten materials cool, they mix and fuse into a permanent, monolithic joint.

### SET-UP PARAMETERS

**HEATING TOOL SURFACE TEMPERATURE — MINIMUM 400°F — MAXIMUM 450°F (204 – 232°C)**

Heating tool surfaces must be up to the specified temperature before you begin. All points on both heating tool surfaces where the surfaces will contact the pipe must be within the prescribed minimum and maximum temperatures. Heating tool surfaces must be clean.

**INTERFACE PRESSURE — minimum 60 psi – maximum 90 psi (414 – 621 kPa; 4.14 – 6.21 bar)**

Interface pressure is used to calculate a fusion joining pressure value for hydraulic butt fusion machines or manual machines equipped with a torque wrench. For hydraulic machines, the interface pressure, the fusion surface area, the machine's carriage cylinder size and internal drag pressure, and if necessary, the pressure needed to overcome external drag resistance, are used to calculate hydraulic fusion joining pressure gauge settings. The equipment manufacturer's instructions are used to calculate this value. ***Interface pressure and fusion machine hydraulic fusion joining pressure gauge settings are not the same!***

### PROCEDURE

1. **Secure.** Clean the inside and outside of the component (pipe or fitting) ends by wiping with a clean, dry, lint-free cloth or paper towel. Align the component ends in the machine. ***Do not force pipes into alignment against open fusion machine clamps.*** Component ends should protrude past the clamps enough so that facing will be complete. Bring the ends together and check high-low alignment. Adjust alignment as necessary by tightening the high side down. Make sure clamps are properly secured to prevent slippage of the component ends.

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2. **Face.** Place the facing tool between the component ends, and face them to establish smooth, clean, parallel mating surfaces. If stops are present, face down to the stops. Remove all shavings from pipe ends after facing. **Do not touch the component ends with your hands after facing.**
3. **Align.** Bring the component ends together, check alignment and check for slippage against fusion pressure. Look for complete contact all around both ends with no detectable gaps, and outside diameters in high-low alignment.
4. **Melt.** Verify that the heating tool is maintaining the correct temperature. Place the heating tool between the component ends, and move the ends against the heating tool. The initial contact should be under moderate pressure to ensure full contact. Hold the ends against the heating tool **without force.**

Beads of melted polyethylene will form against the heating tool at the component ends. When the proper melt bead size is formed, quickly separate the ends, and remove the heating tool.

**Table 1 Approximate Melt Bead Size**

Pipe Size	Approximate Melt Bead Size
2" -4"	1/8" - 3/16"
4" -12"	3/16" - 1/4"
12" -24"	1/4" - 7/16"
24" -54"	7/16" - 9/16"

5. **Join.** Immediately after heating tool removal, **QUICKLY** inspect the melted ends, then bring the ends together applying the correct joining force, using 60-90psi interfacial pressure. **Do not slam.** The correct joining force will form a double bead that is rolled over to the surface on both ends.
6. **Hold.** Hold joining force against the ends until the joint is cool. The joint is cool enough for **GENTLE** handling when the double bead is cool to the touch. Cool for about 30-90 seconds per inch of pipe diameter.
  - Heavier wall thickness pipes may require longer cooling times.
7. **Inspect.** On both sides, the double bead should be rolled over to the surface, and be uniformly rounded and consistent in size all around the joint.

It is a common practice and accepted industry "Rule of Thumb" when fusing pipes of unlike DR's, to fuse a maximum mismatch of one SDR. For example, this would allow fusion of DR 11 pipe to DR 9 or DR-11 to DR 13.5. A successful fusion may be accomplished without the need of any change in the actual fusion procedure.

Per ASTM, Standard Dimension Ratio, SDR, value is when the outside diameter divided by the minimum wall thickness equals one of the following values:

5.0	6.0	7.0	9.0	11.0	13.5	17	21.0	26.0	32.5
-----	-----	-----	-----	------	------	----	------	------	------

The terms DR and SDR are often used interchangeably.

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For more information and technical assistance contact:

Performance Pipe, a division of  
Chevron Phillips Chemical Company LP  
P.O. Box 269006  
Plano, TX 75026-9006  
800.527.0662



Members Of:  PLASTICS PIPE INSTITUTE™

**NOTICE:** This data sheet provides typical physical property information for polyethylene resins used to manufacture PERFORMANCE PIPE polyethylene piping products. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for piping products. Some of these typical physical property values were determined using compression molded plaques. Values obtained from tests of specimens taken from piping product can vary from these typical values. Performance Pipe has made every reasonable effort to ensure the accuracy of this data sheet, but this data sheet may not provide all necessary information, particularly with respect to special or unusual applications. The data sheet may be changed from time to time without notice. Contact Performance Pipe to determine if you have the most recent edition.

Bulletin: PP 109

Revision Date September, 2006

Another quality product from



The Woodmark, Texas

Before using the piping product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the piping product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the piping product is suited and the information is applicable to the user's specific application. This data sheet provides typical physical property information for polyethylene resins used to manufacture the piping product. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for the piping product. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from the piping product can vary from these typical values. Performance Pipe does not make, and expressly disclaims, all warranties, of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of trade or from any course of dealing in connection with the use of information contained herein or the piping product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with th

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Plano, TX 75026-9006  
800.527.0682



**SUGGESTED INDUSTRIES AND APPLICATIONS**

<b>Potable Water Mains</b>	<b>Horizontal Directional Drilling (HDD)</b>	<b>Marine Service</b>
<b>Sliplining</b>	<b>Water transmission Lines</b>	<b>Pipe Bursting</b>
<b>Industrial Water Mains</b>	<b>Ash, Tailings &amp; Abrasives</b>	<b>Mining</b>
<b>Municipal Water Utilities</b>	<b>Open-cut and Bury</b>	<b>Culverts</b>
<b>Rural Water Distribution</b>	<b>River Crossings</b>	<b>Plow-In</b>
<b>Mun. &amp; Ind. Sewer</b>	<b>Trenchless Technologies</b>	<b>Crude oil</b>
<b>Fire Main Piping</b>	<b>Rural Water Distribution</b>	<b>Plow-In</b>

**Butt Fusion Conditions**

- 60-90 psig (4.14-6.21 bar) interfacial fusion pressure.
- 400-450° (204-232°C) heater surface temperature range.
- Please refer to Performance Pipe's PE3608 (PE3408) fusion procedure, Bulletin PP 750.

**Available Sizes**

- ¾" through 54" IPS
- 4" through 36" DIPS

**Specification Data**

The resin, pipe and fitting listed may comply with one or more of the standards below.

Applicable Standards	DriscoPlex® Pipe Series	PE3608 (PE3408)	PE4710 (d <sub>r</sub> )
ASTM F714, NSF 61, ASTM D3035	4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700	0.5	0.63
AWWA C906, AWWA C901	4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700	0.5	0.63
FMA, AWWA, F714	1500, 1600	0.5	—
API 15LE, ASTM D2513	6400	0.5	0.63

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## DriscoPlex<sup>®</sup> PE3608 / (PE3408) Pipe Pipe and Fittings Data Sheet

### Typical Material Physical Properties of DriscoPlex<sup>®</sup> PE3608 / (PE3408)

#### High Density Polyethylene Materials

Material Designation	—	PPI TR-4	PE3608
Cell Classification	—	ASTM D3350	345464C
<b>Pipe Properties</b>			
Density	gms / cm <sup>3</sup>	ASTM D1505	0.955 (black)
Melt Index Condition 190 / 2.16	gms / 10 minutes	ASTM D1238	0.08
Hydrostatic Design Basis 73°F (23°C)	psi	ASTM D2837	1600
Hydrostatic Design Basis 140°F (60°C)	psi	ASTM D2837	800
Color: UV Stabilizer [C] [E]	—	ASTM D3350	Min 2% carbon Black Color UV Stabilizer
<b>Material Properties</b>			
Flexural Modulus 2% Secant - 16:1 span; depth, 0.5 in / min	psi	ASTM D790	>110,000
Tensile Strength at Yield	psi	ASTM D638 Type IV	3200
Elongation at Break 2 in / min., Type IV bar	%	ASTM D638	>700
Elastic Modulus	psi	ASTM D638	>150,000
Hardness	Shore D	ASTM D2240	62
PENT	hrs	ASTM F1473	>100
<b>Thermal Properties</b>			
Vicat Softening Temperature	°F	ASTM D1525	256
Brittleness Temperature	°F	ASTM D746	-103
Thermal Expansion	in / in / °F	ASTM D696	1.0 x 10 <sup>-4</sup>

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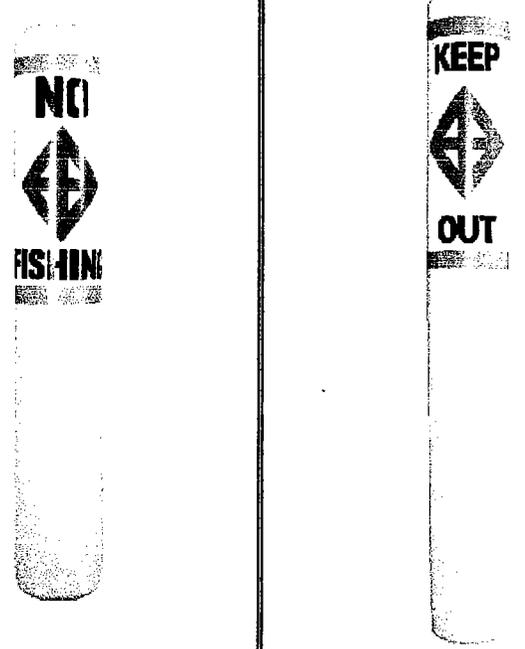
Before using the piping product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the piping product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the piping product is suited and the information is applicable to the user's specific application. This data sheet provides typical physical property information for polyethylene resins used to manufacture the piping product. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for the piping product. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from the piping product can vary from these typical values. Performance Pipe does not make, and expressly disclaims, all warranties, of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of trade or from any course of dealing in connection with the use of information contained herein or the piping product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with th

# PIPELINE WEIGHT AND BUOY ASSEMBLY



## **Appendix C-6**

### **Buoys and Pipeline Markers**

Regulatory Buoys and Channel Markers		
<i>Calm Water Reg. Buoy Model #410</i>	<i>Deep Water Reg. Buoy Model #410-X</i>	
		
(410 and 410-X also available in Channel Markers)		
<b>Specifications:</b>		
Molded-in color	White	White
Overall height	61-1/2"	71-1/2"
Can diameter	9"	9"
Base Diameter		
Height above waterline (foam line)	37"	44"
Weight	50 lbs.	58 lbs.
Galv. Steel eyebolt	1/2"	1/2"
Chain req'd to float upright	Yes	Yes

Floats  
 Horseshoe  
 Buoys  
 Hurricane Boat  
 Fenders  
 Industrial Floats  
 and Buoys  
 Life Floats  
 Life Preservers  
 and Work Vests  
 Life Rings  
 Life Ring Racks  
 Life Ring  
 Cabinets  
 Lights  
 Lok-On Rope  
 Floats  
 Man Overboard  
 Lights  
 Man Overboard  
 Poles and  
 Mounts  
 Mast Buoys and  
 Pick up Buoys  
 Mooring Buoys  
 Regulatory  
 Buoys and  
 Channel Markers  
 Safety  
 Harnesses  
 Sea Anchors  
 Sombrero Buoys  
 Trip Line and  
 Anchor Marker  
 Buoy

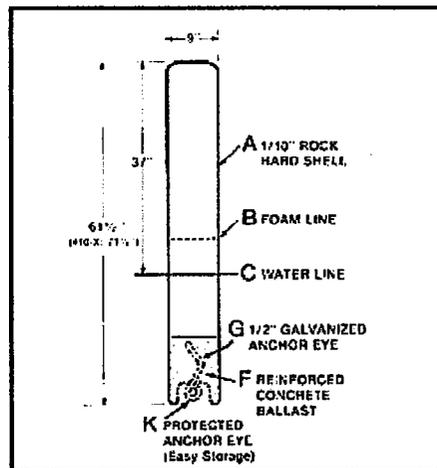
**All Models:**

- Shell: High density polyethylene
- Internal foam: 2-3 LB density polyurethane foamed to waterline (foam filled upon request)
- Internal Ballast: Reinforced concrete
- Labels: 200 stock labels included in buoy price - no extra charge.
- Special labels - call for quotation

**Accessories:**

- Reflective tape: Various colors (orange, red, green, silver) and widths available upon request
- #9000 Jim-Buoy lights available for all models
- Pickup eye
- Radar reflection

**#410**



**Appendix C-7**

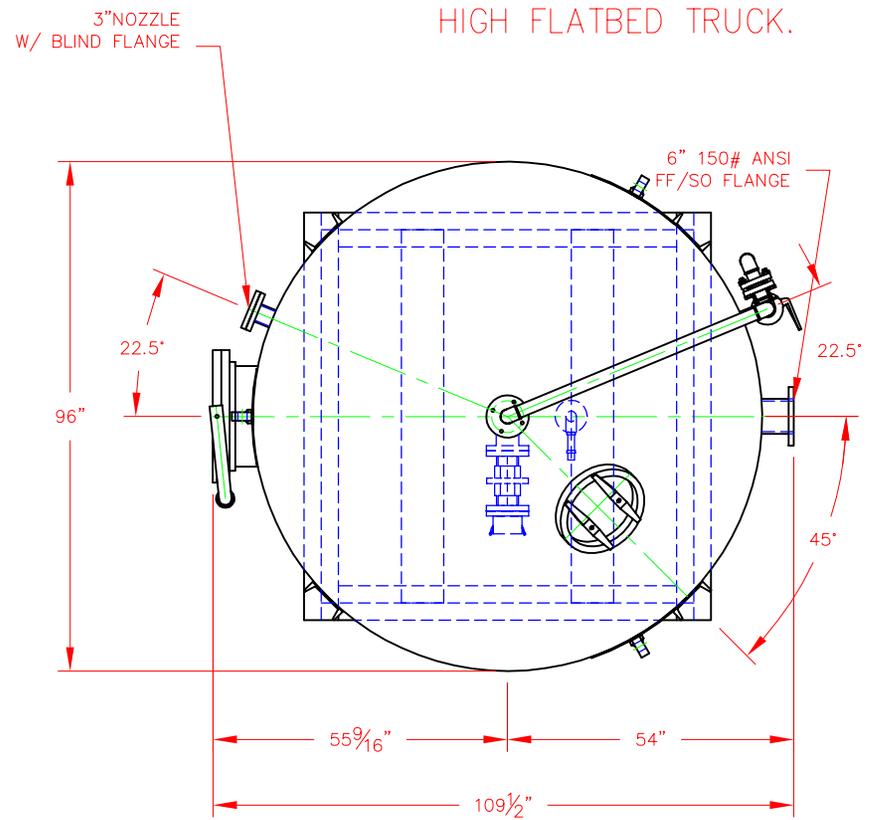
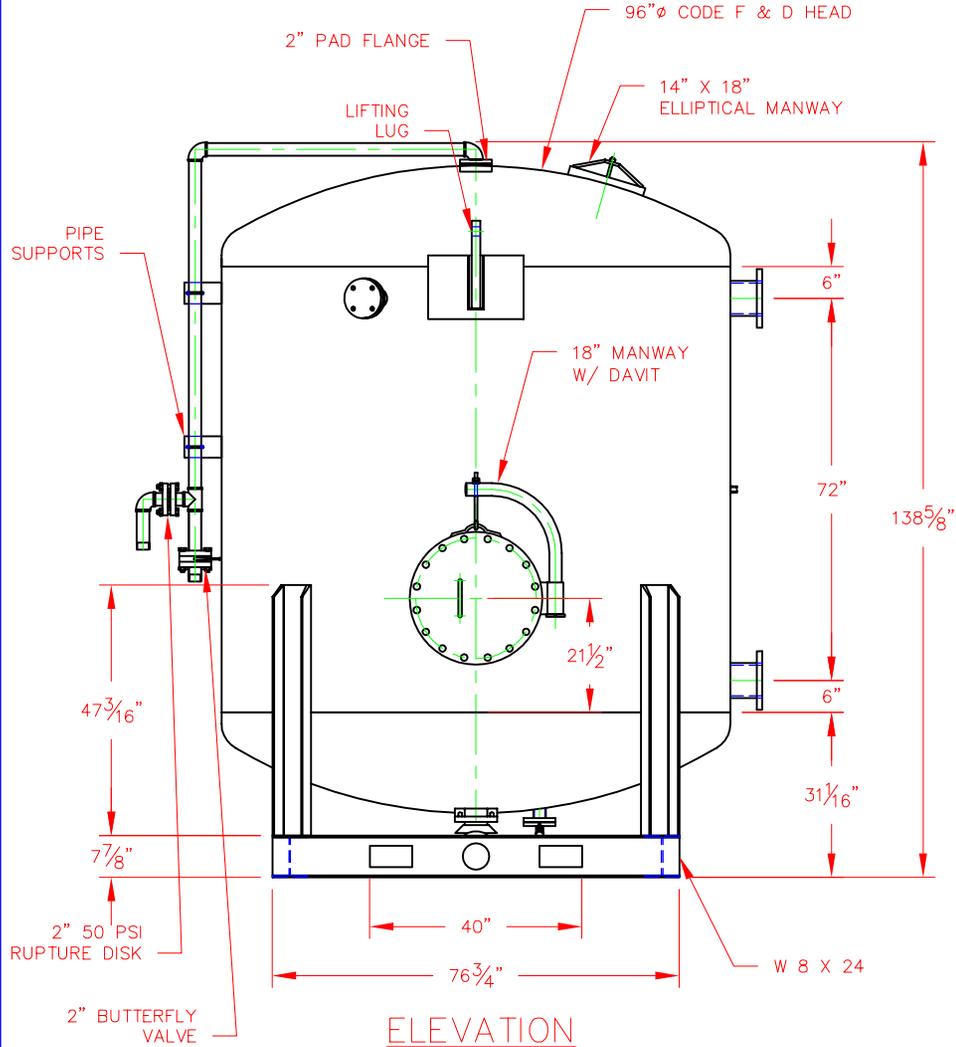
**Dewatering Plant Equipment**



**Appendix C-8**

**Multi-Media Filter Equipment**

NOTE: SEE PLAN VIEW FOR CORRECT ORIENTATIONS.  
VESSEL MUST SHIP ON 18" HIGH FLATBED TRUCK.



## VESSEL STANDARDS

VESEL MATERIALS : SA 516 70	LIQUID DRAIN ASSEMBLY : CARBON STEEL
LINING : HIGH SOLIDS EPOXY	VOLUME OF VESSEL : 400 FT <sup>3</sup>
EXTERIOR PAINT : ACRYLIC ALKYD ENAMEL	STANDARD/MAX CARBON FILL : 8,000 LBS / 10,000 LBS
HEAD THICKNESS : 5/16" CODE F&D	SHIP WT. OPERATING WT.STD.FILL : 14,500 LBS / 26,000 LBS
SHELL THICKNESS : 5/16" 516 - 70	CARBON TYPE : 12 X 40
INTERNALS : PVC	MAX. OPERATING PRESSURE : 50 PSIG
ADSORBENT OUTLET ASSEMBLY : 14" X 18" MANWAY	MAX. OPERATING TEMP. : 140°F

1	REVISE CARBON WEIGHT	JB	1/20/04
NO.	REVISION	BY	DATE
PROJECT			
STANDARD			
PROJ. NO.	SALES		
P.O. NO.		C-500	
<small>THIS DRAWING AND DESIGN ARE THE PROPERTY OF TIGG CORP. AND SHALL NOT BE REPRODUCED IN WHOLE OR IN PART, NOR EMPLOYED FOR ANY PURPOSE OTHER THAN SPECIFICALLY PERMITTED IN WRITING BY TIGG CORP. THIS DRAWING IS SUBJECT TO REVISION ON DEMAND.</small>			
DRAWN BY	JB	DWG. NO. C-500-1001	
DESIGN BY	BL		
CHKD. BY	BL	REV. 1	
DATE	7/5/02		
SCALE	NTS		

# CANSORB®

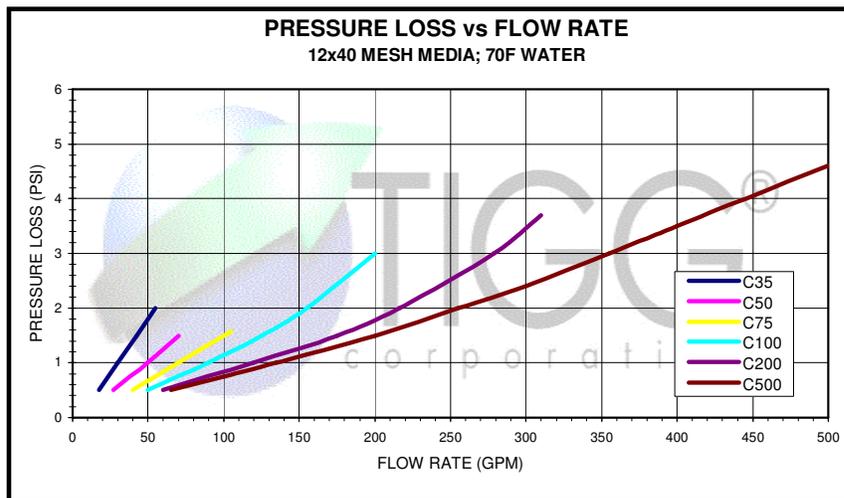
## STEEL VESSELS

MODEL	MAX FLOW (GPM)	MAX PRESS (PSIG)	MAX TEMP (deg F)	FLG. INLET / OUTLET (IN)	DIAMETER / HEIGHT (IN)	STANDARD ADSORBENT FILL (LBS)	MAXIMUM ADSORBENT FILL (LBS)	SHIPPING WEIGHT - STANDARD FILL (LBS)
C-35	60	30	115	2 / 2	38 / 83	660	875	1380
C-50	90	30	115	3 / 3	46 / 96	1000	1600	2040
C-75	140	30	115	3 / 4	57 / 98	2000	2500	3420
C-100	200	30	115	3 / 4	68 / 102	3000	3600	4790
C-200	310	30	115	4 / 6	85 / 118	6000	6725	8410
C-500	500	50	140	6 / 6	96 / 139	8000	10000	14500

### NOTES:

- 1) Desired contact time may allow higher or lower flow rates.
- 2) Dry virgin activated or reactivated carbon provided as standard adsorbent.
- 3) Maximum adsorbent fill is based on a bed density of 27 lb/ft<sup>3</sup>.
- 4) Maximum adsorbent fill can differ based on variable bed density and alternate adsorbents.
- 5) Vessels are available in higher-pressure ratings in accordance with ASME Section VIII.
- 6) Pressure drops are based on a dense packed bed of activated carbon.

The CANSORB Series Modular Adsorbers are fabricated of carbon steel and provided with a high solids epoxy lining. Where process conditions dictate, the vessels can be fabricated from other materials such as stainless steel. In addition, a different lining can be substituted for the high solids epoxy. Media discharge and drain lines are provided with ball valves. The liquid collection system is designed to promote even flow distribution and thus, efficient adsorbent utilization. The liquid outlet is designed to maintain a liquid level above the carbon bed. Manways are 18 inches in diameter for easy access. The vessels are provided with lifting lugs and fork channels. *Specifications and properties are subject to change without notice.*



C-200 ILLUSTRATION



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**Appendix C-8**

**Carbon Filter Equipment**

# Equipment Bulletin

## MODEL 10 MODULAR CARBON ADSORPTION SYSTEM

### Description

The Calgon Carbon Model 10 is an adsorption system designed for the removal of dissolved organic contaminants from liquids using granular activated carbon. The modular design concept allows selection of options or alternate materials to best meet the requirements of the site and treatment application.

The Model 10 system is delivered as two adsorbers and a compact center piping network, requiring only minimal field assembly and site connections. An optional mounting skid is available to facilitate installation. The pre-engineered Model 10 design assures that all adsorption system functions can be performed with the provided equipment.

The process piping network for the Model 10 accommodates operation of the adsorbers in parallel or series (with either adsorber placed in first stage). The piping can also isolate either adsorber from the flow. This permits carbon exchange or backwash operations to be performed on one adsorber without interrupting treatment.

The unique internal cone under-drain design provides for the efficient collection of treated water and the distribution of backwash water. The internal cone also insures efficient and complete discharge of spent carbon from the adsorber. The Model 10 system is designed for use with Calgon Carbon's closed loop carbon exchange service. Using special designed trailers, spent carbon is removed from the adsorbers and returned to Calgon Carbon for reactivation. The trailers also recharge the adsorbers with fresh activated carbon.

### System Specifications

#### Carbon Adsorbers

- ◆ Carbon steel ASME code pressure vessels
- ◆ Internal vinyl ester lining (nominal 35 mil) where GAC contacts steel, for potable water and most liquid applications
- ◆ Polypropylene slotted nozzles for water collection and backwash distribution

#### Standard Adsorption System Piping

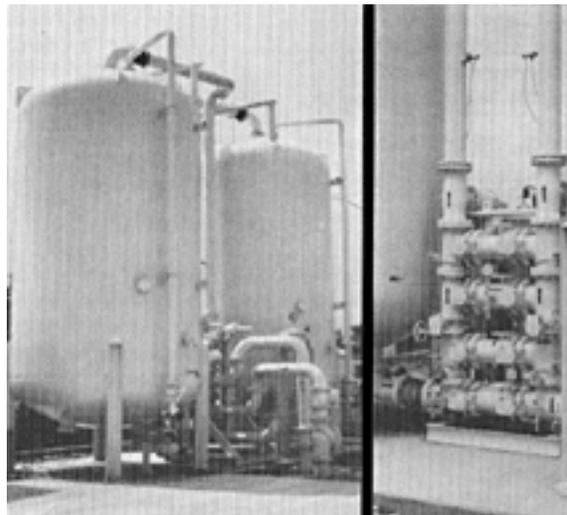
- ◆ Schedule 40 carbon steel process piping with cast iron fittings
- ◆ Full bore stainless steel ball valves for GAC fill and discharge
- ◆ PPL lined steel pipe for GAC discharge
- ◆ Cast iron butterfly valves for process piping

#### System External Coating

- ◆ Epoxy mastic paint system

#### Available Options

- ◆ Unifying system skid
- ◆ In-bed water sample collection probes

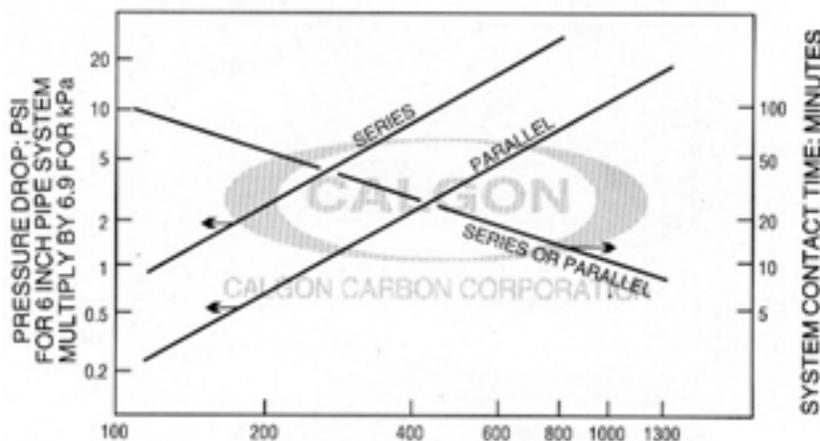


Visit our website at [www.calgoncarbon.com](http://www.calgoncarbon.com), or call 1-800-4-CARBON to learn more about our complete range of products and services, and local contact information.

**Chemviron  
Carbon**

## Operating Conditions

Carbon per Adsorber	20,000 lbs. (9080 kg)
Pressure Rating	125 psig (862 kPa)
Pressure Relief	Graphite rupture disk (94 psig)
Vacuum Rating	14 psig
Temperature Rating	150°F maximum (65°C)
Backwash Rate	Typical 1000 gpm (30% expansion)
Carbon Transfer	Air pressure slurry transfer
Utility Air	100 scfm at 30 psig (reduce to 15 psig for trailer)
Utility Water	100 gpm at 30 psig
Freeze Protection	None provided; enclosure or protection recommended



## Dimensions and Field Conditions

Adsorber Vessel Diameter	10 ft. (3050 mm)
Process Pipe	6 in. or 8 in.
Process Pipe Connection	125# ANSI flange
Utility Water Connection	3/4 in. hose connection
Utility air Connection	3/4 in. hose connection
Carbon Hose Connection	4 in. Kamlock type
Carbon Dry Fill	Top 8" nozzle
Backwash Connections	6 in. or 8 in. flange
Drain/vent Connection	6 in. or 8 in. flange
Adsorber Maintenance Access	20 in. round flanged man-way, 14 in. x 18 in. man-way below cone
Adsorber Shipping Weight	18,500 lbs. (empty) (8400 kg)
System Operating Weight	215,000 lbs. (97,610 kg)

## Caution

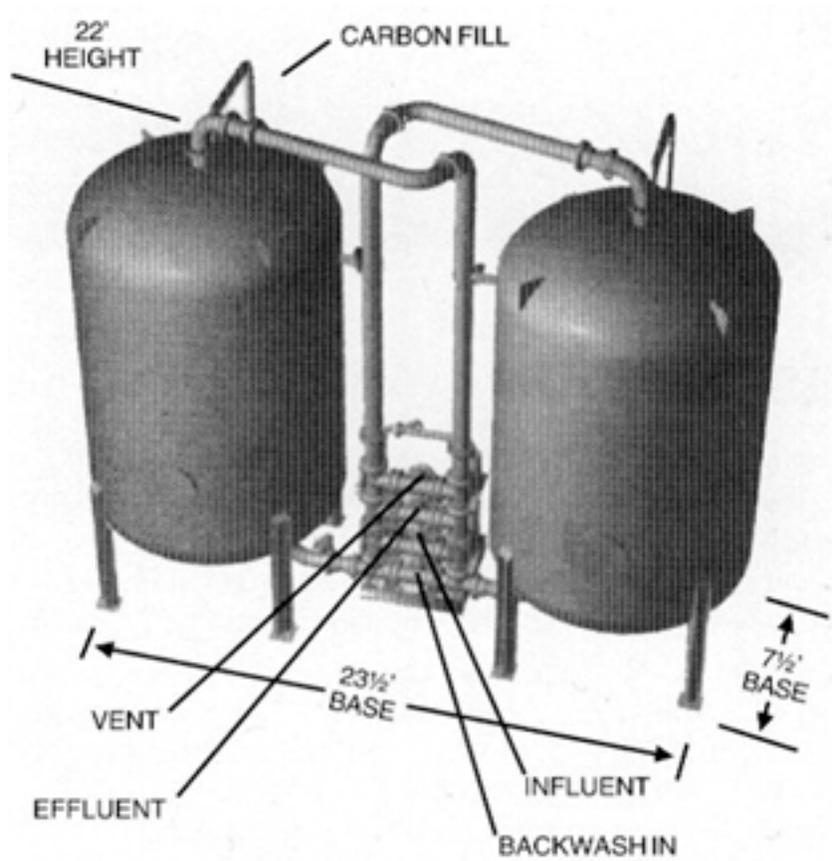
Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low-oxygen spaces should be followed, including all applicable federal and state requirements.



Calgon Carbon Corporation  
P.O. Box 717  
Pittsburgh, Pa 15230

Chemviron Carbon  
Zoning Industriel C  
B-7181 Feluy, Belgium





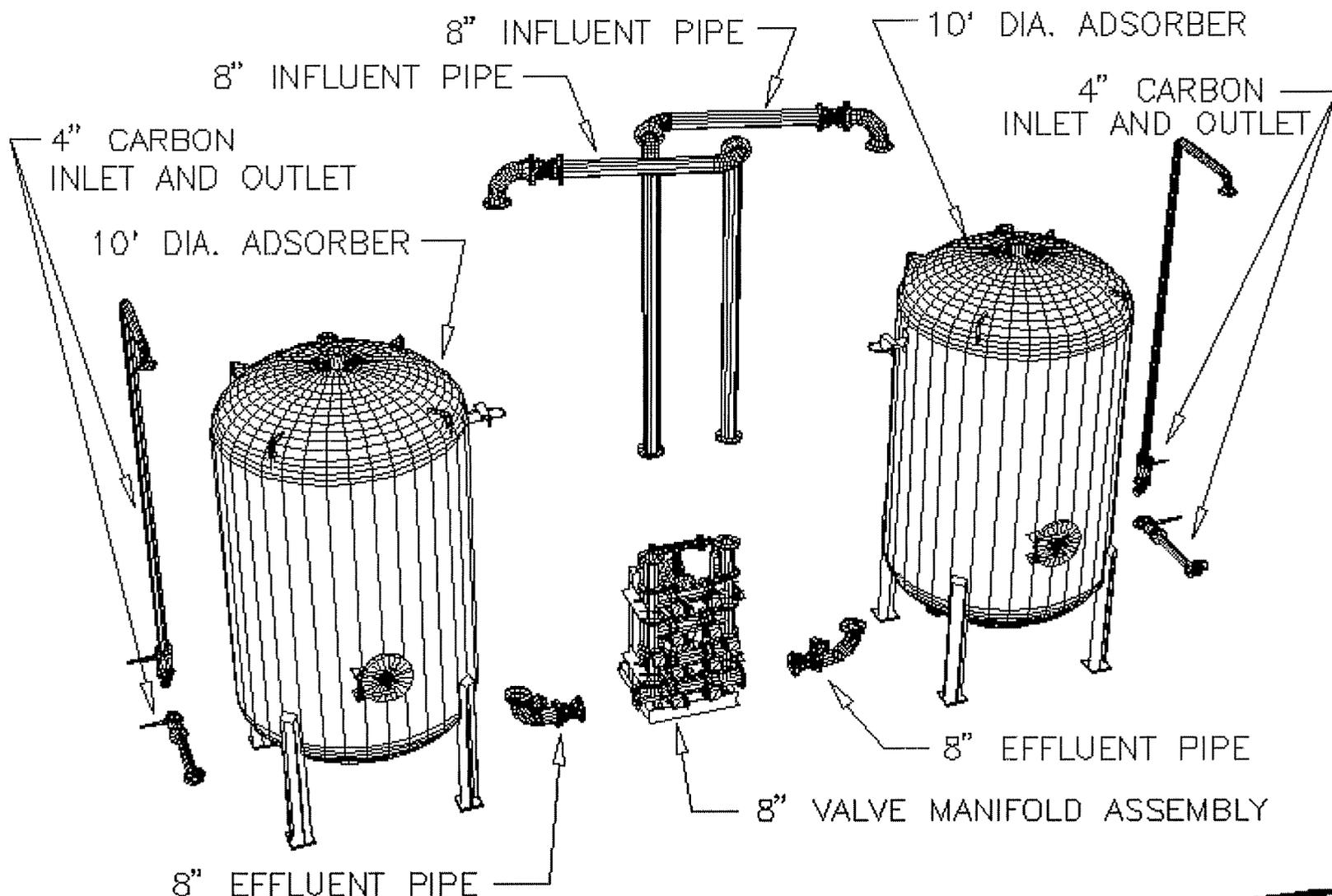
### Safety Message

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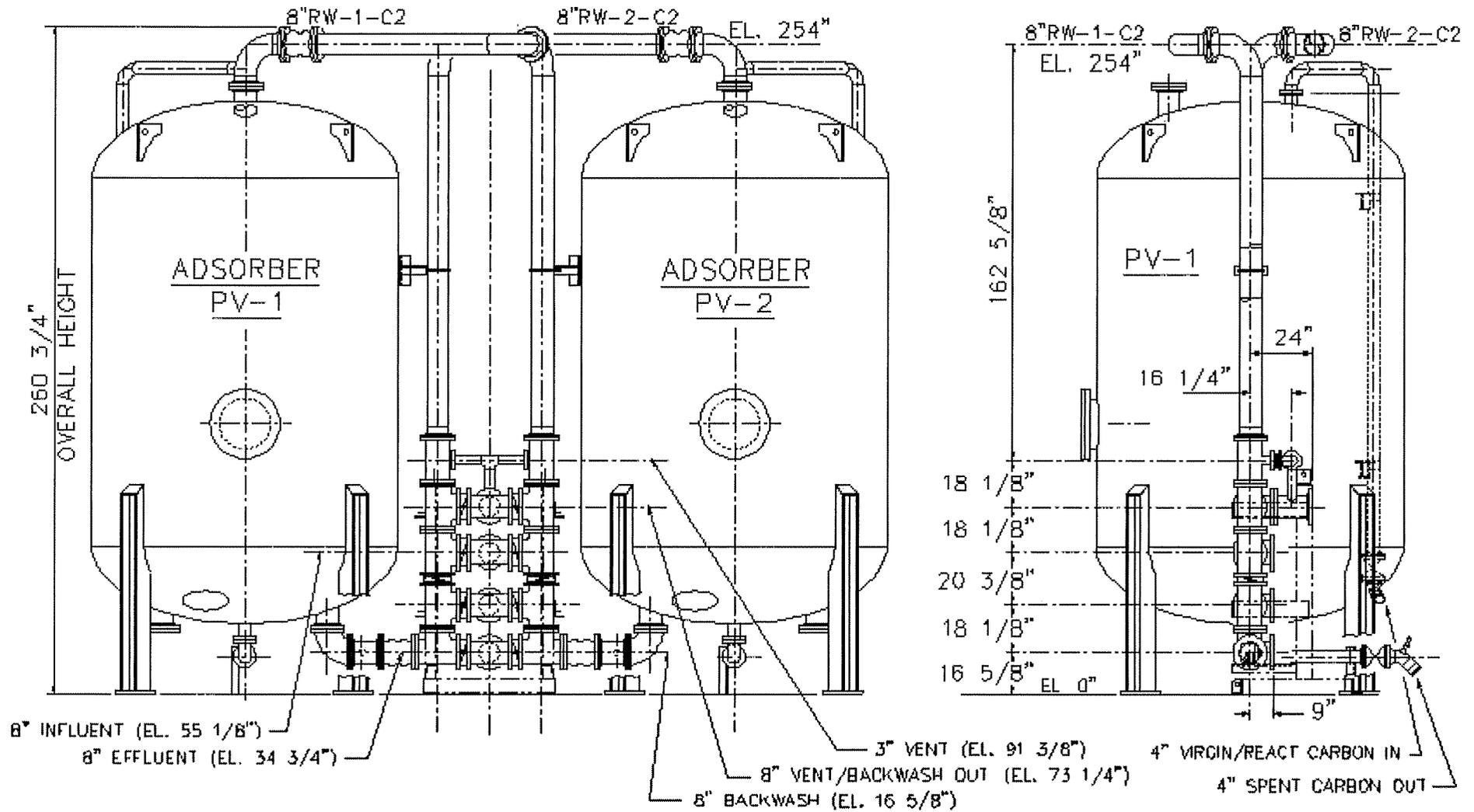
Visit our website at [www.calgoncarbon.com](http://www.calgoncarbon.com), or call 1-800-4-CARBON to learn more about our complete range of products and services, and local contact information.





**Assembly Diagram**  
**Modular 10 System**

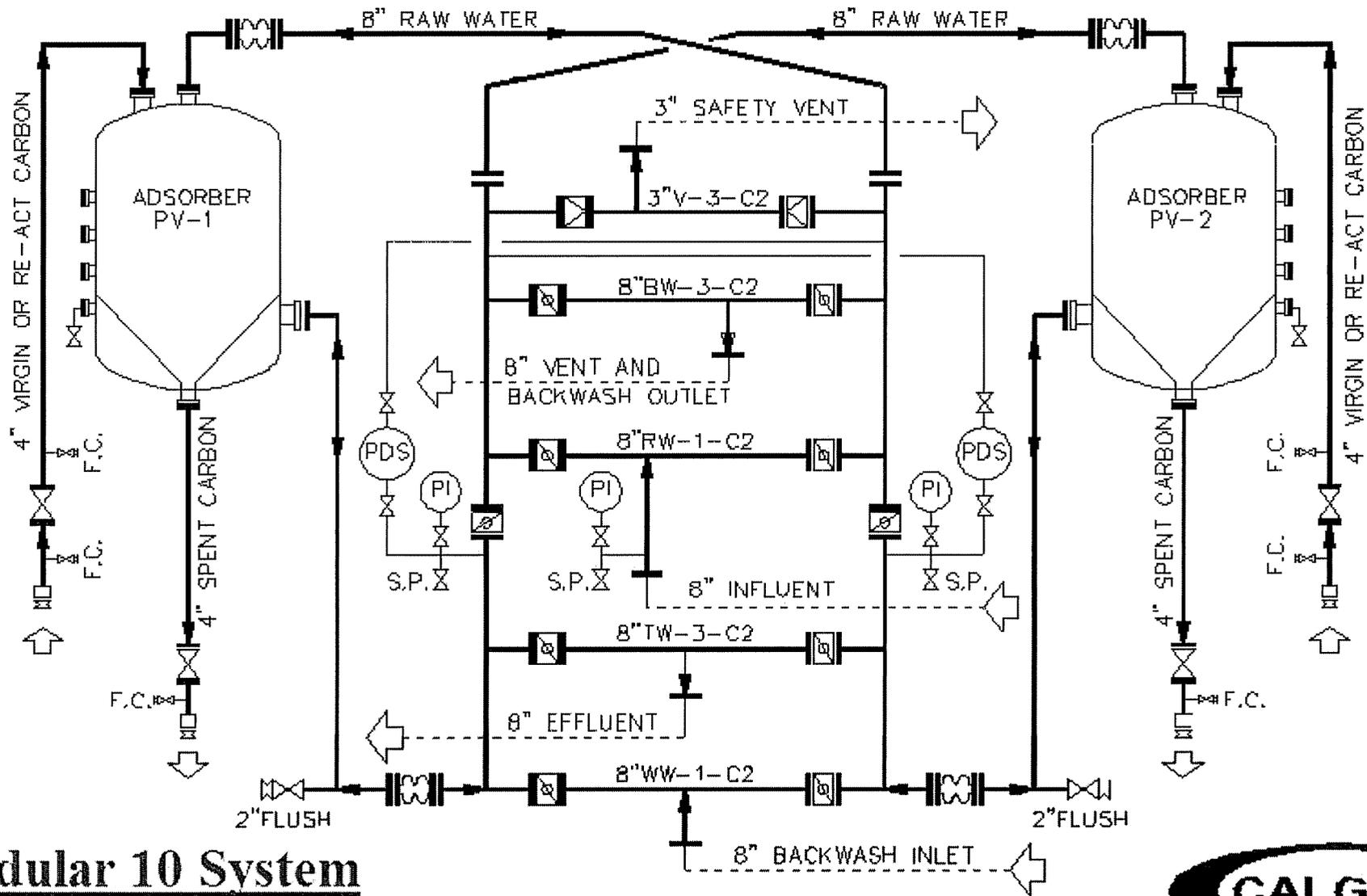




**Modular 10 System**  
**Elevation View**

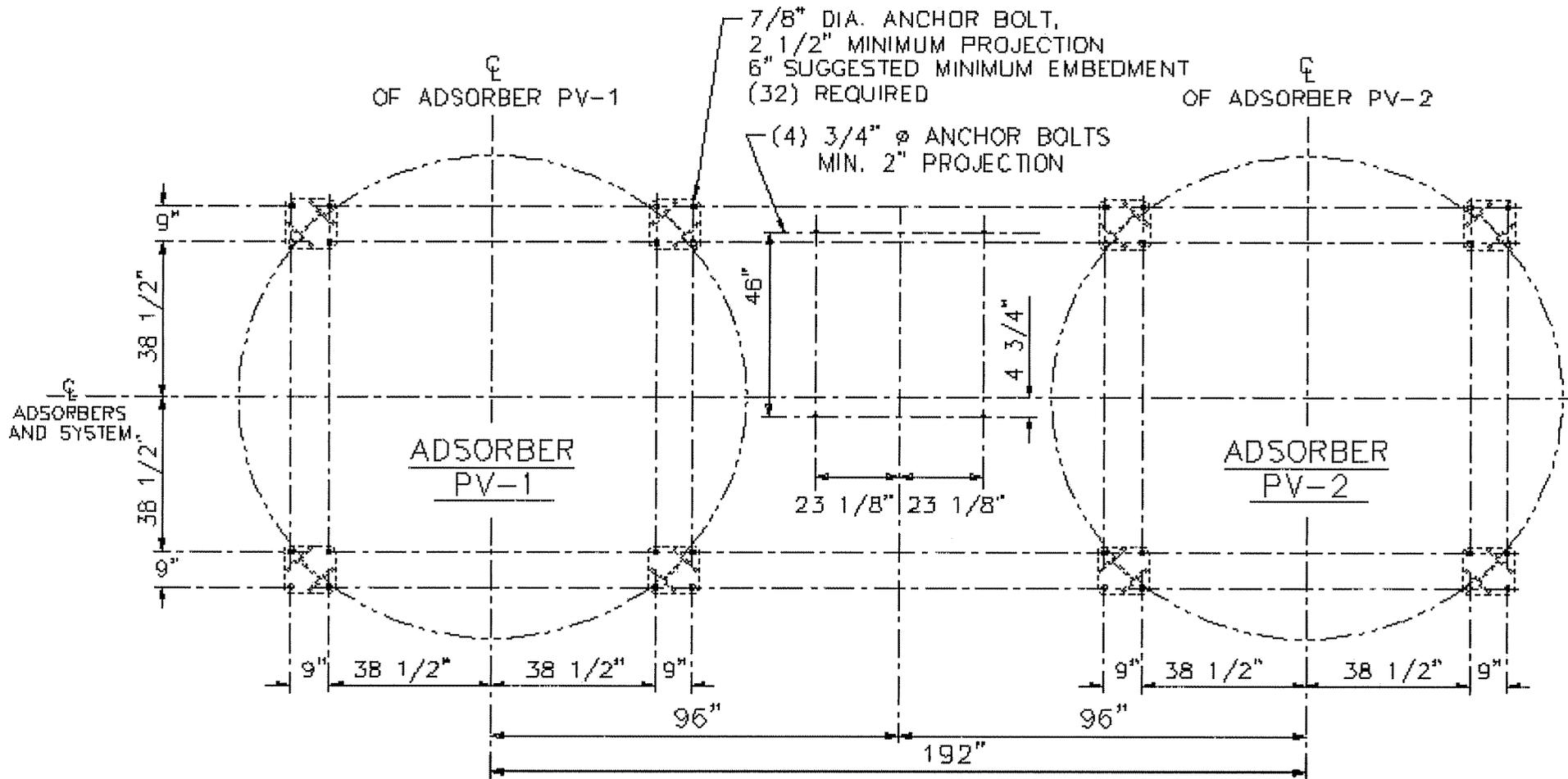


CALGON CARBON CORPORATION



**Modular 10 System**  
**Flow Diagram**



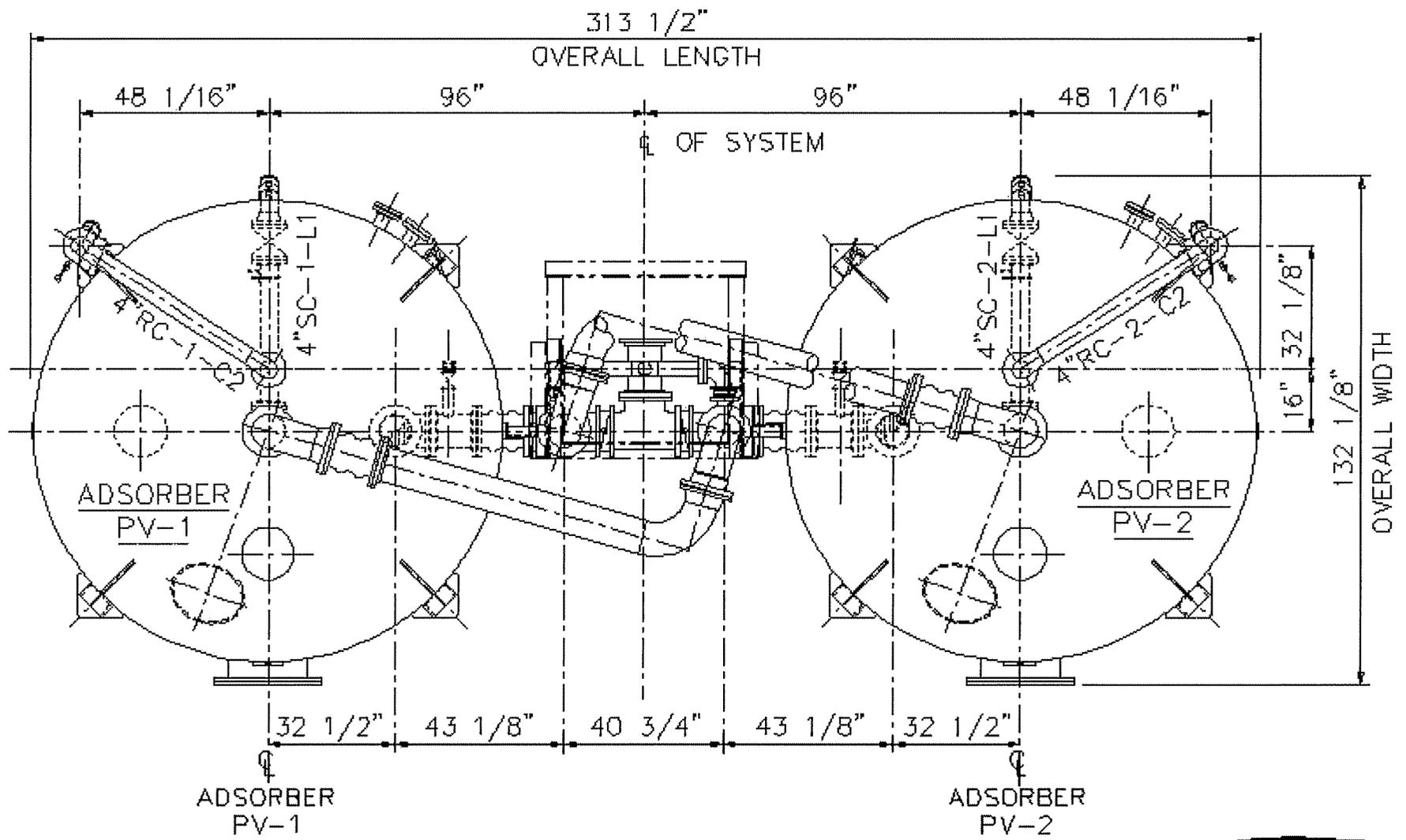


ANCHOR PATTERN SHOWN IS FOR ATTACHMENT OF VESSEL BASEPLATES TO A CONCRETE SLAB IN SEISMIC ZONE 4. THE TWO LARGE CENTER HOLES IN EACH BASEPLATE ARE FOR ATTACHMENT TO STEEL FRAMING.

## Modular 10 System Footprint



CALGON CARBON CORPORATION



**Modular 10 System**  
**Plan View**



**Appendix C-8**

**Effluent Tank Equipment**

# ModuStor



## Free Standing or Anchored Bolted Steel Round Tanks

ModuStor tanks are ideal for most liquid containment needs. They are available in diameters from 12' to more than 100' with capacities over 1,000,000 gallons. Installation time is reduced by utilizing low-cost modular components designed for rapid bolt-together assembly by unskilled workers using common hand tools. Welding and other field fabrication methods are eliminated.

### Cost Range

Factory fabricated modular steel components, fast bolt-together assembly by unskilled workers, and minimal site prep combine to reduce overall ModuStor costs below those for welded steel counterparts. Furthermore, the ModuStor's bolted construction allows quick disassembly for relocation to a new site.

### Site

ModuStor tanks can be erected on any firm surface such as gravel, compacted earth, concrete, or asphalt. They can be anchored to a 4' wide concrete apron or for shorter term projects, installed on gravel with unique corrosion resistant steel anchor plates. Interior area can be flat, slightly pitched or dished to ease emptying.

### Liners

The large selection of premium liner materials available is chemically compatible with most commonly handled liquids. Lining materials include reinforced XR-5 and polypropylene.

### Covers

Floating covers are fabricated from reinforced membrane materials including XR-5 and polypropylene. Covers, buoyed up by floatation logs, ride the fluid's surface and produce practically vapor-tight enclosures.

### Leak Detection

Double liner leak detection systems are available.

### Ladders

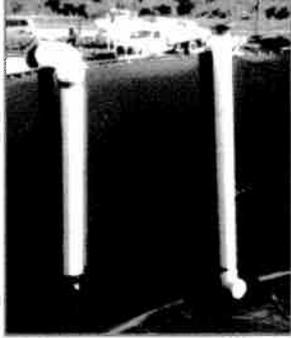
Ladders with or without platforms or cages are available.

### General Specifications

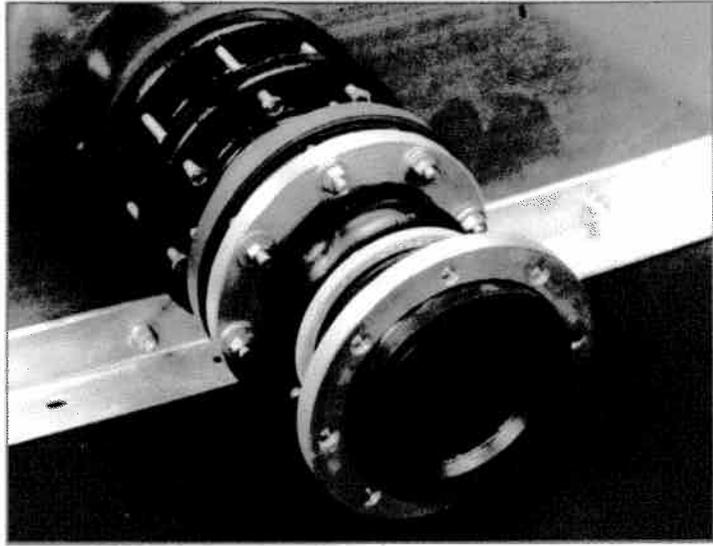
Wall panels are G-90 mill galvanized steel sheet of varying thicknesses, ranging from 16 ga. to 10 ga. All girths are hot dip galvanized structural steel angle. Structural hardware is zinc plated steel, grade 5.

## PIPING

Input, output and level equalization piping can be attached to ModuStor tanks by bottom or through-the-wall connections or over the top. Wall openings can be precut at the factory.



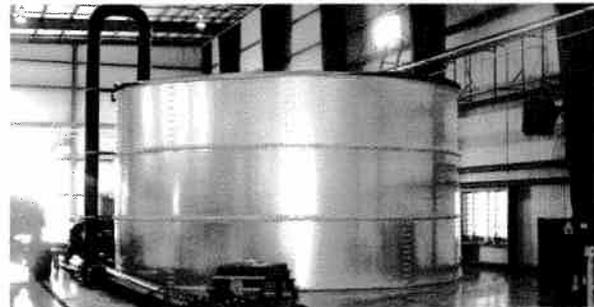
Customized Piping



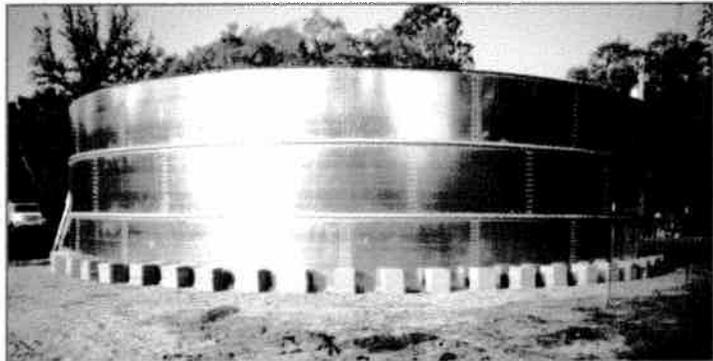
Typical through-the-wall piping connection with expansion joint

## ANCHORING

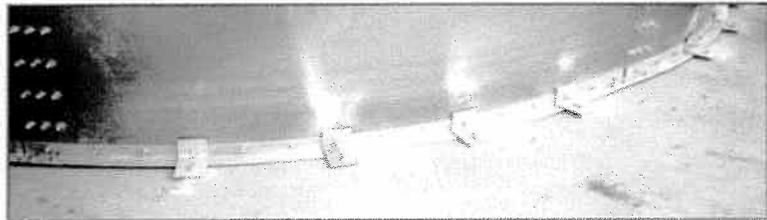
Our unique anchor plate system anchors tanks without concrete footings, eliminates guy wires or other ground penetrations, a preferred system for short term use or where concrete footings are undesirable. ModuStor tanks can be anchor bolted to concrete ring foundations or used free-standing indoors.



Free Standing installation indoors



Three tier ModuStor with anchor plates and weight system



Anchor brackets bolted to concrete



Multiple two tier ModuStor tanks used for hazardous waste storage

# **ModuTank Inc.**

41-04 35<sup>th</sup> Avenue, Long Island City, NY 11101

(800)245-6964 NY: (718)392-1112 FAX: (718)786-1008 WEB: www.modutank.com Email: info@modutank.com

April 23, 2008

VIA FAX (617) 457-8498

TEL (617) 457-8409

E MAIL [joseph.francis@tteci.com](mailto:joseph.francis@tteci.com)

Mr. Joe Francis

**Tetra Tech**

133 Federal Street 6<sup>TH</sup> Fl

Boston MA 02110

Reference: **Quotation # 040208-P-180**

Dear Mr. Francis:

Thank you for your response to our quotation #040208-P-164 regarding a treated water holding tank for your Green Bay, Wisconsin project. We offer the following additional option as requested:

<u>Item</u>	<u>Description</u>	<u>Unit Price*</u>
1	Model MS 4920 ModuStor 49' 1 3/4" dia x 20'0" ht 280,300 gallon capacity with 3" freeboard - galvanized steel structure - 45 mil reinforced polypropylene liner - 8 oz. geotextile liner underlay - Thru-the-Wall Piping Connections including steel wall panel with cutout - Wetted parts - No bolt penetrations - Expansion joint in Neoprene - Internal elbow in PVC Sch 40 6" (qty. 1) 8" (qty. 1) 12" (qty. 2) - mounting brackets for concrete ring wall installation	\$112,215.00

\*Freight terms: FOB, point of shipment.

Note: Freight charges subject to fuel surcharge differential at time of shipment.

Shipment schedule to be based upon your requirements.

Terms: 25% with order; 25% plus freight at time of shipment; balance Net 30.

All steel components, liners, covers, and piping accessories are warranted against defective materials and workmanship for one year from date of shipment. Defective parts will be repaired or replaced. Leaks caused by penetration of liner with piping connections or equipment or leaks caused by accidents or improper installation are not covered by the warranty. ModuTank Inc. is not liable for consequential damages due to cause. For critical applications tanks must be tested by purchaser before being placed into service, by filling them with clean water to check for liner integrity. Quotation does not include taxes, piping, piping connections, site preparation, or installation.

**Appendix C-8**

**Cartridge Equipment**

# CUNO High Flow Filtration Systems



## High Flow Performance in a Compact Design

- Innovative technology to achieve flow rates up to 500 gpm per element
- Absolute-rated for consistent product quality
- Operator-friendly cartridge and housing system
- Unique design to reduce capital investment expenses



# CUNO High Flow Filtration System

The CUNO High Flow Filtration System is an advanced design that uses 3M Innovation and CUNO’s extensive filtration experience to deliver a high flow filter in a compact housing design. When compared to conventional cartridge systems, this system provides the following advantages:

## High Flow Capability

The unique construction of CUNO High Flow Filters (patent pending) permits flow rates of up to 500 gpm in a single cartridge. The result? Fewer filter elements to accommodate your flow requirements. In fact, the CUNO High Flow Filtration System requires as few as one-tenth the number of elements as competitive 2.5” pleated cartridges (see Figure 1).

## Compact Design

Using fewer elements combined with an outside-to-in flow path enables a reduction in the size of housing required for your application. The CUNO High Flow Housing takes up as little as one-half the size of competitive housings for a given flow rate. The result is lower capital investment costs and a compact footprint that saves valuable plant space (see Figure 1).



## Ease of Use

The CUNO High Flow Filtration System is designed with ease-of-use in mind. From a user-friendly, ergonomically designed handle that makes cartridge installation and removal easier without the use of special tools or other hardware, to a unique "twist-to-lock" cartridge seating mechanism that provides a positive seal, the CUNO High Flow System facilitates easy operation and maintenance of your filter system.

CUNO High Flow Filter Applications
<b>Industrial</b> - Municipal Water, RO Prefiltration, Reclaimed Water, Coolants, Nozzle Protection, Boiler Condensate
<b>Chemical</b> - Quench Water, Aqueous Salt Solutions, Final Products
<b>Petrochemicals</b> - Waterflooding, Produced Water, Enhanced Oil Recovery, Completion Fluids, Amine Sweetening, Final Products
<b>Electronics</b> - RO Prefiltration, Process Water
<b>Food &amp; Beverage</b> - Process Water
<b>Pharmaceutical</b> - Process Water

Features	Benefits
<ul style="list-style-type: none"> <li>■ High flow capability of up to 500 gpm per cartridge</li> </ul>	<ul style="list-style-type: none"> <li>■ Reduced Filter Usage – minimizes product loss, labor, disposal costs, operator exposure, and downtime for filter change-out</li> </ul>
<ul style="list-style-type: none"> <li>■ Patent Pending Compound Radial Pleat design</li> </ul>	<ul style="list-style-type: none"> <li>■ High loading capacity for long life and lower cost filtration</li> </ul>
<ul style="list-style-type: none"> <li>■ Compact design</li> </ul>	<ul style="list-style-type: none"> <li>■ Smaller housing minimizes capital expense requirements</li> <li>■ Reduces system footprint</li> </ul>
<ul style="list-style-type: none"> <li>■ Absolute rating</li> </ul>	<ul style="list-style-type: none"> <li>■ Reproducible effluent quality throughout the filter’s life</li> </ul>
<ul style="list-style-type: none"> <li>■ Easy to Use</li> </ul>	<ul style="list-style-type: none"> <li>■ No special tools or hardware required for filter change-out – minimizes downtime</li> <li>■ "Twist to lock" seating mechanism provides positive seal</li> <li>■ Ergonomically designed handle – facilitates easy cartridge installation and removal</li> </ul>
<ul style="list-style-type: none"> <li>■ FDA compliant</li> </ul>	<ul style="list-style-type: none"> <li>■ Compatible in applications requiring direct food contact in food and beverage processing per 21 CFR.</li> </ul>

# CUNO High Flow Filter

## High Performance Media in an Innovative Design

CUNO High Flow Filters are designed using state-of-the-art technology, optimizing both performance and effluent quality to ensure customer satisfaction. The elements use a unique pleat design that results in a high usable filtering surface area per filter.

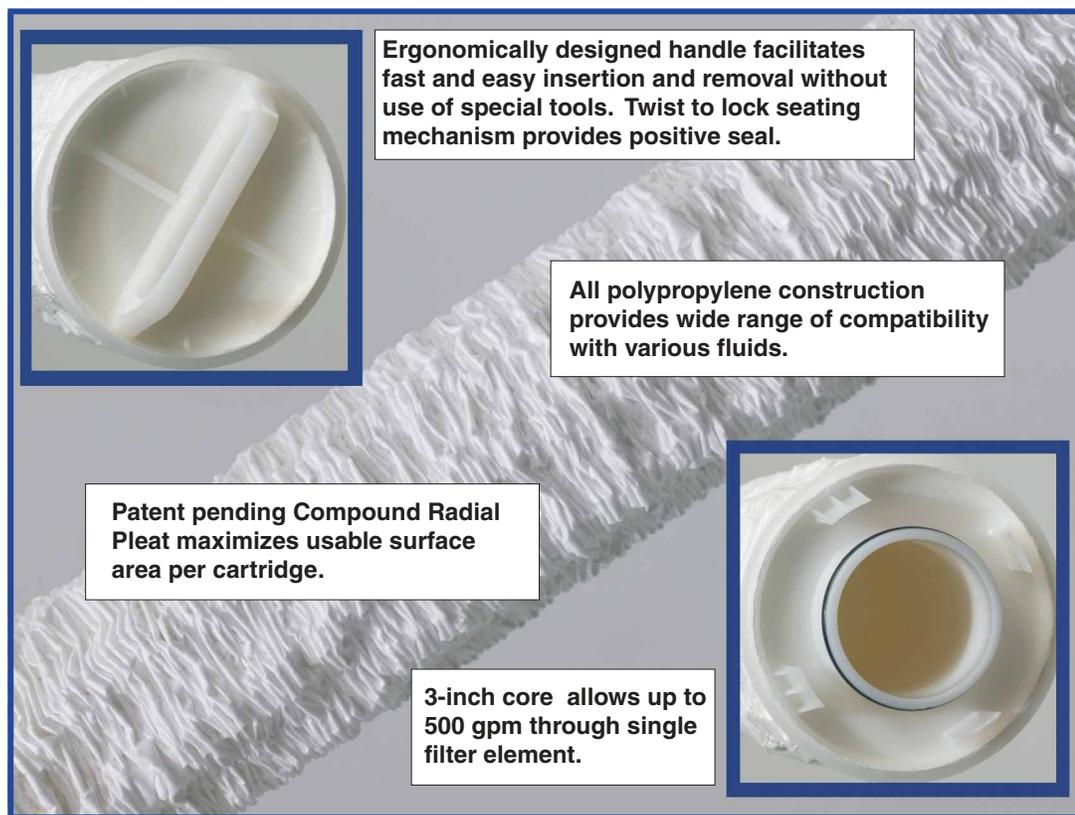
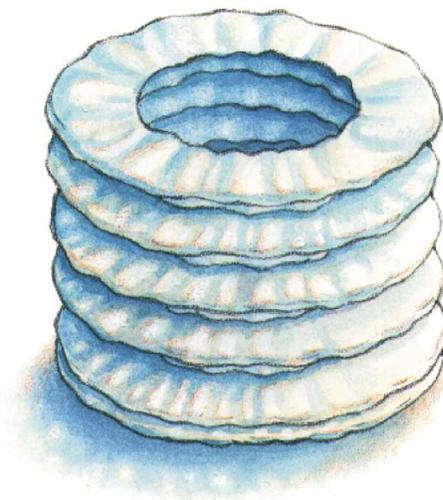
## Radial pleat design

3M Innovation is at the heart of the CUNO High Flow Filter. A patent pending compound radial pleat design maximizes the usable surface area per filter. Blown microfiber forms the basis of the filter media, which is made to tightly controlled fiber diameter specifications to produce a media with absolute rated particle retention characteristics. Our unique manufacturing process embosses the media to produce a more uniform pleat pattern, which, in turn, allows greater utilization of the media by evenly distributing the fluid throughout the entire filter structure. This results in consistent particle retention in a compact, space-saving design.

## Design Features

The CUNO High Flow Filter contains several features to combine high performance with easy operation.

Compound Radial Pleat design maximizes usable media surface area



**Ergonomically designed handle facilitates fast and easy insertion and removal without use of special tools. Twist to lock seating mechanism provides positive seal.**

**All polypropylene construction provides wide range of compatibility with various fluids.**

**Patent pending Compound Radial Pleat maximizes usable surface area per cartridge.**

**3-inch core allows up to 500 gpm through single filter element.**

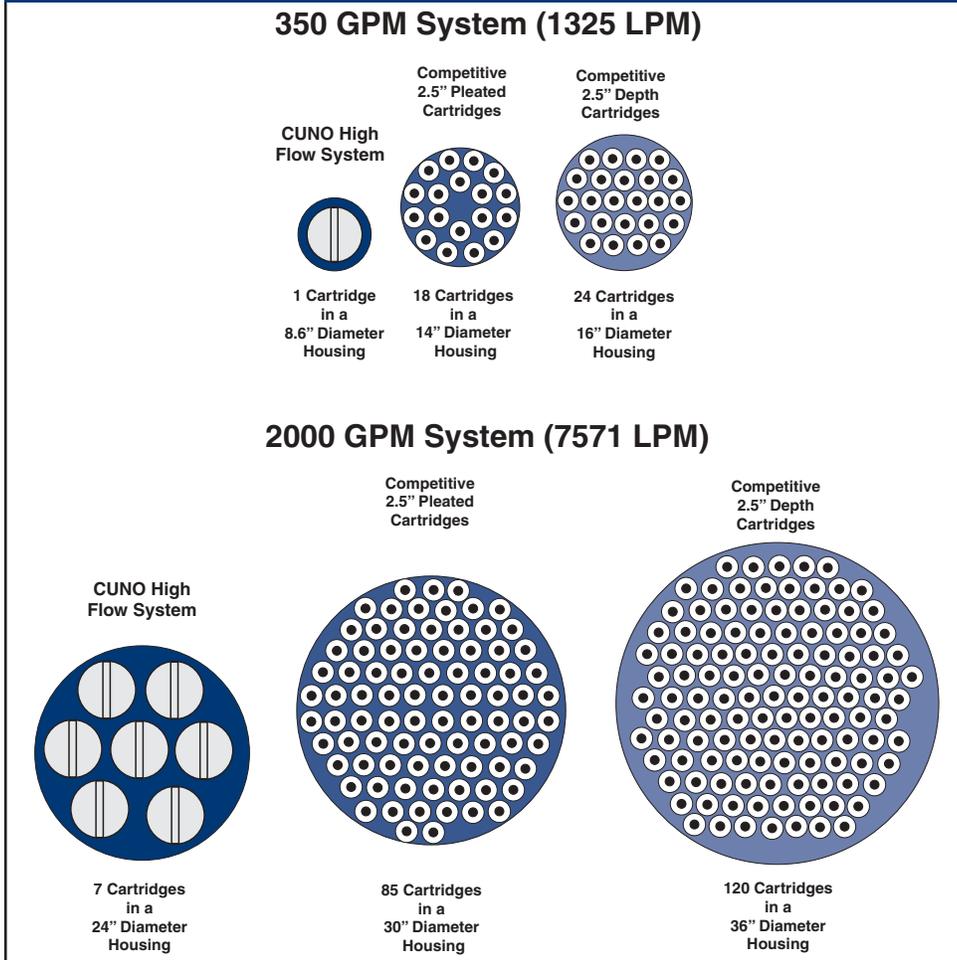


- A large diameter core allows up to 500 gpm through a single filter element.
- An ergonomically designed handle has been designed to facilitate fast and easy insertion and removal without the use of special tools. Cartridges are simply inserted over a built-in guide tube.
- The seating mechanism uses a “twist to lock” design to provide a positive seal.

# Filter Comparison

Consider the following benefits of the CUNO High Flow System over competitive 2.5" cartridges in a 350 gpm (1325 lpm) and a 2000 gpm (7571 lpm) system\*:

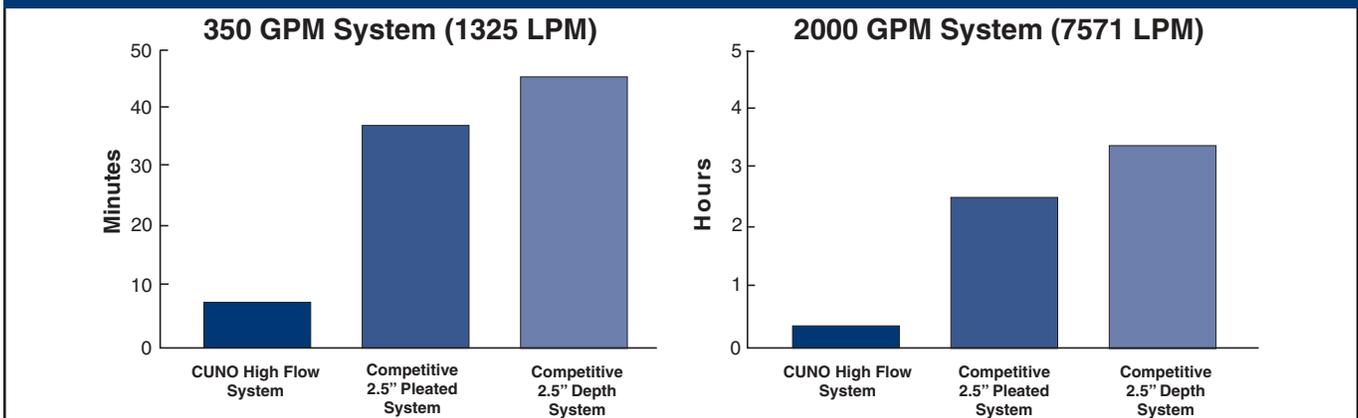
**Figure 1 – Typical Cartridges Required & Housing Footprint Comparison**



- The CUNO High Flow System requires 90% fewer cartridges as competitive 2.5" cartridge systems for a given flow rate.
- CUNO High Flow Housings are 33% to 50% smaller than competitively sized housings for a given flow rate.
- Fewer filters and a user-friendly housing design means faster change-outs than competitively sized systems.

\* Comparison assumes fluid viscosity of 1 cp

**Figure 2 – Typical Time/Labor for Change-Out**



# CUNO High Flow Filter Specifications and Operating Parameters

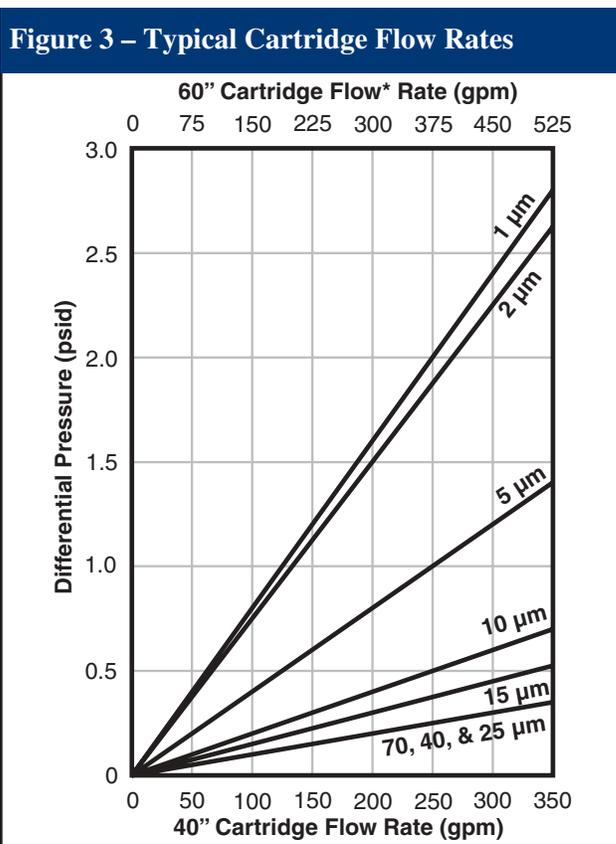
## Materials of Construction

**Filter Media** - Each grade of the CUNO High Flow Filter is manufactured from meltblown FDA compliant polypropylene microfiber media, providing high particle removal efficiency with broad chemical compatibility. No adhesives, binders, or silicone are used in the manufacturing process. The raw materials composing these filters are FDA compliant according to CFR Title 21. All support layers and hardware are constructed with polypropylene.

**O-rings** - O-rings are available in a variety of materials to suit your applications, including the standard nitrile, Ethylene Propylene Rubber (EPR), silicone, and fluorocarbon.

CUNO High Flow Filter Element Specifications		
Parameter	Elements	
	40" High	60" High
Removal Ratings (microns)	1, 2, 5, 10, 15, 25, 40, and 70	
Flow vs. Differential Pressure	See Figure 3	
Filter Diameter (inches/cm)	6.5 / 16.5	
Filter Length (inches/cm)	40 / 101.6	60 / 152.4

Operating Parameters by Cartridge Length		
Operating conditions	Elements	
	40" High	60" High
Maximum Operating Temperature (°F / °C)	160 / 71	
Maximum Recommended Flow Rate in water @ 70°F (gpm / lpm)	350 / 1325	500 / 1893
Maximum Forward Differential Pressure	50 psid @ 68°F (3.4 bar @ 20°C)	
Recommended Change-out Differential Pressure	35 psid @ 68°F (2.4 bar @ 20°C)	
Regulatory Status - All component materials of the CUNO High Flow polypropylene element are listed for food contact per 21 CFR.		



Fluid Compatibility					
Chemical	Temperature	Chemical	Temperature	Chemical	Temperature
Acetic Acid 20%	160°F (71°C)	Hydrogen Peroxide	100°F (38°C)	Sodium Carbonate	160°F (71°C)
Alkanolamines	140°F (60°C)	Methyl Ethyl Ketone	70°F (21°C)	Sodium Hydroxide 70%	160°F (71°C)
Ammonium Hydroxide 10%	160°F (71°C)	Mineral Oil	70°F (21°C)	Sulfuric Acid 20%	160°F (71°C)
Bleach 5.5%	120°F (49°C)	Nitric Acid 20%	120°F (49°C)	Sulfuric Acid 70%	160°F (71°C)
Ethylene Glycol	160°F (71°C)	Potassium Hydroxide	140°F (60°C)	Urea	160°F (71°C)

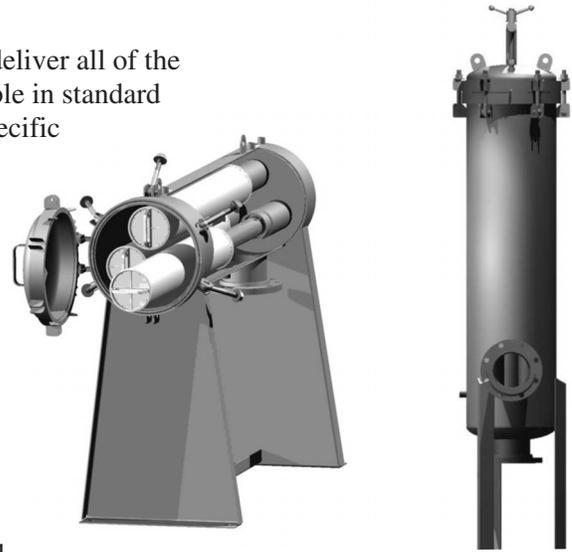
The thermal and chemical resistance data presented in this brochure is for guidance only. Factors such as duration of exposure, fluid concentration, and temperature should also be considered. Thermal and chemical resistance should also be considered when choosing all materials exposed to fluids.

\* estimated

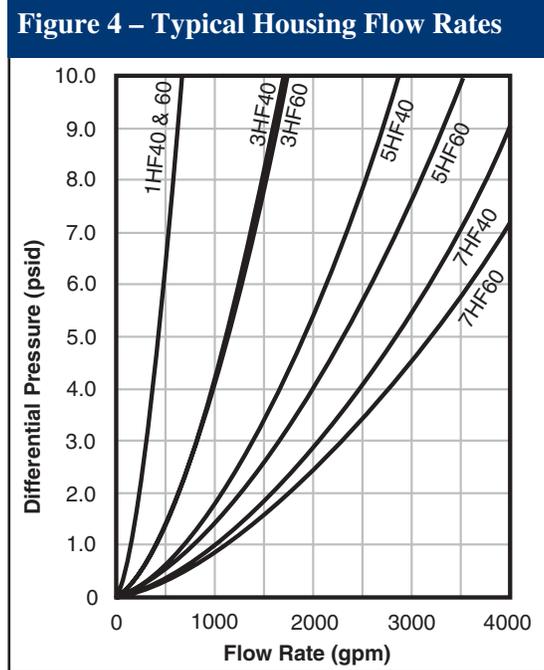
# CUNO High Flow Housings

The CUNO High Flow Housings are specifically designed to deliver all of the system’s benefits in a compact footprint. Housings are available in standard designs, as well as customizable configurations to suit your specific needs. All standard CUNO High Flow Housings are designed, manufactured, tested, and code stamped in accordance with ASME Section VIII, Division 1. Stainless steel housing external surfaces are glass-bead blasted for a consistent, easy care finish, while carbon steel units are painted.

The CUNO High Flow Housing is available in a variety of sizes to accommodate from 1 to 7 filter elements in both 40-inch and 60-inch lengths. Larger housings are available upon request. Housings are also available in horizontal or vertical configurations, depending on your needs. Choose the horizontal option to maximize ease of operation, or the vertical to minimize the system’s footprint.



Features	
Horizontal	Vertical
■ ASME Code design	
■ Robust cartridge center-post design eliminates bulky support plates providing easy access to housing internals	
■ Hinged cover for easy element change-outs	■ User-friendly cover lifting device for easy element change-outs
■ Handles liquid at pressures and temperatures of up to 150 psig and 250 °F	
■ Manufactured from 304 or 316L stainless steel for excellent corrosion protection (carbon steel option available in multi-element housing)	
■ Available for 40” and 60” element lengths	■ Available for 40” element lengths
■ Upstream and downstream gauge ports and drains	
Options	
■ Corrosion allowance for carbon steel housing – consult factory	
■ Choice of inlet/outlet flange size	



## Housing Specifications

CUNO High Flow ASME Code Housing Specification										
Model	Vessel Outside Diameter (in. / cm)	Material	Connection Size/Type (all ANSI flanges)		Recommended Maximum Flow (gpm / lpm) *		Maximum Pressure & Temperature	Approximate Shipping Weight (lb / kg)		
			40”	60”	40”	60”		40” Horiz.	40” Vert.	60” Horiz.
1HF	8 5/8 / 21.9	316L SS	4”	4”	350 / 1325	500 / 1893	150 psig @ 250°F (10 bar @ 121 °C)	340 / 154	305 / 138	375 / 170
3HF	16 / 40.6	Carbon steel, 304, or 316L SS	6”	8”	875 / 3312**	1500 / 5678		625 / 284	575 / 261	750 / 340
5HF	20 / 50.8		8”	10”	1550 / 5867**	2450 / 9274**		975 / 442	825 / 374	1150 / 522
7HF	24 / 61		10”	12”	2450 / 9274	3500 / 13249		1350 / 612	1250 / 567	1550 / 703
Larger housings available, consult factory										

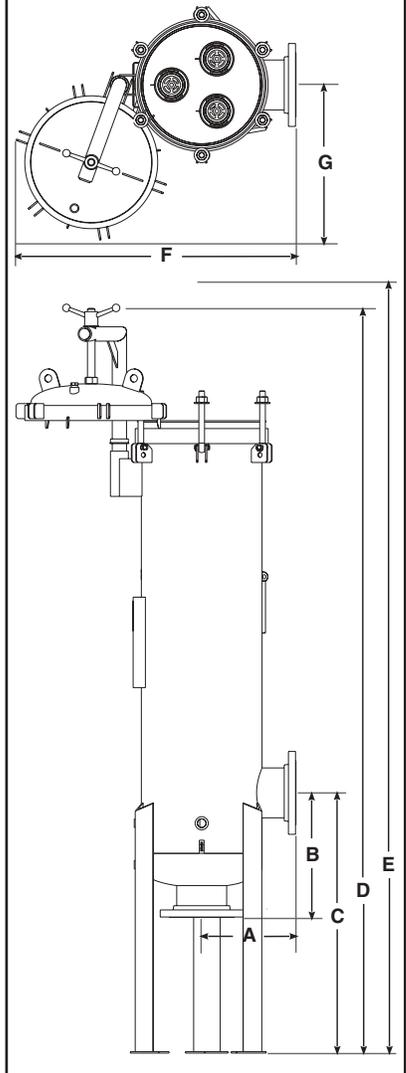
\* Pressure drop across cartridge not included (see Figure 3). \*\* Maximum flow rate based on nozzle size.

# Housing Dimensions

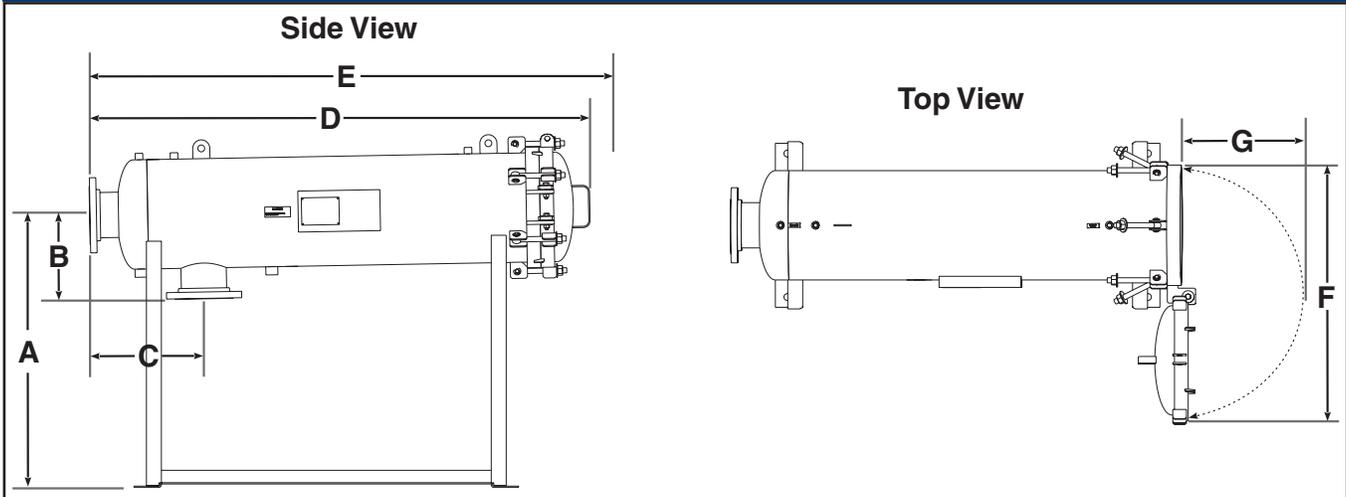
CUNO High Flow ASME Code Model Housing								
Housing Model	Outside Diameter (in.)	Dimensions (inches)						
		A	B	C	D	E	F	G
<b>Vertical Housing Models (available for 40" cartridges only)</b>								
1HF40V	8 5/8	7 1/2	12 1/2	26 1/2	78 5/16	120	28 3/8	5 1/2
3HF40V	16	12 1/2	16 1/2	34 9/16	99 3/8	132	37 1/8	20 5/8
5HF40V	20	14 1/2	20 1/2	42 5/8	113	140	45	23 5/8
7HF40V	24	16 1/2	22 3/4	48 11/16	126	150	55	26
<b>Horizontal Housing Models*</b>								
1HF40H	8 5/8	35	7 1/2	12 1/2	64 1/4	108	24 1/2	12
1HF60H		35 9/16	7 1/2	12 1/2	84 1/2	150	24 1/2	12
3HF40H	16	40	12 1/2	16 1/2	73 1/8	115	30	21
3HF60H		40	12 1/2	18 1/2	97 1/4	156	30	21
5HF40H	20	40 15/16	14 1/2	20 1/2	81 3/4	120	36 1/2	25
5HF60H		40 15/16	14 1/2	21 1/4	103 3/4	160	36 1/2	25
7HF40H	24	47 1/32	16 1/2	22 3/4	87	124	40	30
7HF60H		47 7/16	16 1/2	24 5/8	108 11/16	165	40	30
Housing Model	Outside Diameter (cm)	Dimensions (cm)						
<b>Vertical Housing Models (available for 101.6 cm cartridges only)</b>								
1HF40V	21.9	19	31.7	66	198.9	317.5	72	13.9
3HF40V	40.6	31.75	42.06	87.78	252.41	322.58	94.29	52.38
5HF40V	50.8	36.67	52.22	108.26	287.02	351.79	114.3	60
7HF40V	61	41.91	60.96	136.36	320.04	381	139.7	66.04
<b>Horizontal Housing Models</b>								
1HF40H	21.9	86.3	18.8	32.3	163.1	276.8	62.2	30.4
1HF60H		100.4	18.8	48.2	198.1	363.2	62.2	30.4
3HF40H	40.6	101.6	31.5	42.38	185.73	292.1	76.2	53.3
3HF60H		101.6	31.1	47.30	247.01	406.4	73.6	53.3
5HF40H	50.8	103.9	36.8	52.7	207.6	317.5	92.7	63.5
5HF60H		103.9	36.8	54.6	263.5	419.1	92.7	63.5
7HF40H	61	119.4	40.7	58.8	220.9	330.2	101.6	76.2
7HF60H		120.4	41.7	63.2	276	381	101.6	76.2

\* Sloped for drainage 1° to 3°

## Vertical Housing



## Horizontal Housing



## CUNO High Flow Filter Element Ordering Guide

Filter Designation	Element Length (inches)	Material	Absolute Removal Rating (Microns)	O-Ring	Packaging Options (per box)
<b>HF</b> – High Flow	40 – 40 in. 60 – 60 in.	<b>PP</b> - Polypropylene	001 – 1 µm 002 – 2 µm 005 – 5 µm 010 – 10 µm 015 – 15 µm 025 – 25 µm 040 – 40 µm 070 – 70 µm	A – Silicone B – Fluorocarbon C – EPR D – Nitrile	01 - 1 pack

## CUNO High Flow ASME Code Housing Ordering Guide

Number of Filter Elements	Model	Size	Configuration	Housing Material	Gasket Material
1 3 5 7	<b>HF</b>	40 – 40 in. 60 – 60 in.**	H – Horizontal V – Vertical **	A – Carbon Steel * B – 304 SS* C – 316L SS	GA – Silicone GB – Fluorocarbon GC – EPR GD – Nitrile

\* Not available for single element (1-around) housing

\*\* 60 inch vessel not available in vertical configuration

### Important Notice

CUNO MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Since a variety of factors can affect the use and performance of a CUNO product in a particular application, some of which are uniquely within the user's knowledge and control, user is responsible for determining whether or not the CUNO product is fit for a particular purpose and suitable for user's method of application.

### Limitation of Remedies and Liability

If the CUNO product is proved to be defective, THE EXCLUSIVE REMEDY, AT CUNO'S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OR TO REPAIR OR REPLACE THE DEFECTIVE PRODUCT. CUNO shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including, but not limited to, contract, negligence, warranty or strict liability.

### WARRANTY

Seller warrants its equipment against defects in workmanship and material for a period of 12 months from date of shipment from the factory under normal use and service and otherwise when such equipment is used in accordance with instructions furnished by Seller and for purposes disclosed in writing at the time of purchase, if any. Any unauthorized alteration or modification of the equipment by Buyer will void this warranty. Seller's liability under this warranty shall be limited to the replacement or repair, F.O.B. point of manufacture, of any defective equipment or part which, having been returned to the factory, transportation charges prepaid, has been inspected and determined by the Seller to be defective. THIS WARRANTY

IS IN LIEU OF ANY OTHER WARRANTY, EITHER EXPRESSED OR IMPLIED, AS TO DESCRIPTION, QUALITY, MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR ANY OTHER MATTER. Under no circumstances shall Seller be liable to Buyer or any third party for any loss of profits or other direct or indirect costs, expenses, losses or consequential damages arising out of or as a result of any defects in or failure of its products or any part or parts thereof or arising out of or as a result of parts or components incorporated in Seller's equipment but not supplied by the Seller.



a 3M company

## CUNO Incorporated

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(203) 237-5541  
Fax: (203) 630-4530  
www.cuno.com

**Appendix C-8**

**Bag Filter Equipment**

## Multi-Basket Strainers and Multi-Bag Filters

These multi-basket strainers and bag filters offer a wide range of flow capacities and contaminant-holding capabilities. They contain from 2 to 23 baskets.

To serve as a strainer, a unit is ordered with perforated stainless steel baskets (mesh-lined if desired). When ordered as a filter, it's fitted with perforated stainless steel baskets designed to hold disposable or cleanable filter bags. Industry-standard size bags are used: the standard 30 inch baskets accept bag size 2, the optional 15 inch baskets take size 1.

The standard pressure rating for all models is 150 psi. All housings can be supplied with an ASME code stamp, if required.

### Features

- Multiple housing styles available (standard, quick access, low profile, hinged)
- Permanently piped housings are opened without tools and without disturbing the piping
- Machined cover gasket groove provides positive O-ring sealing
- Carbon steel, 304 or 316 stainless steel construction housings
- Large-area, 30 inch deep, heavy-duty, 9/64 inch perforated baskets
- Easy to clean
- Low pressure drop
- Four cover seal materials: Buna N, Ethylene Propylene, Viton®, and Teflon®
- Pressure rating 150 psi
- Flanged connections for 2 through 12 inch pipe
- Vent, drain and gage connections

### Options

- ASME code stamp
- Higher pressure ratings
- Corrosion allowances
- Steam jackets
- Special connection locations



- Bag hold down assembly (standard on QAC design)
- Inner baskets for dual-stage straining or filtering
- Cleanable wire mesh lined or perforated strainer baskets
- Special alloy materials
- Hydraulic cover lifting assembly
- Sanitary fittings
- Differential pressure indicators

### Duplex Systems

All multi-basket models described here are also available as duplex systems. Two units come piped together with valves to permit continuous use of either unit while servicing the other. One lever actuates all valves simultaneously or it can be ordered for automatic service. See page 63.

**Rosedale Quick  
Access "QAC"  
Low Maintenance  
Filter/Strainer**



**COUNTERBALANCED  
COVER - Stops In  
Any Position**

**COVER SEAL**

**COVER HINGE  
MECHANISM**

**SECONDARY  
SAFETY RELEASE**

**CLAMP  
RELEASE BAR**

**COVER SUPPORT  
ASSEMBLY**

**PRIMARY RELEASE  
SAFETY LEVER**

**LOW PROFILE  
CLEARANCE**

**DRAIN**

**POSITIVE BAG  
RESTRAINT**

**INLET**

**INLET  
DRAIN/VENT**

**OUTLET**

## Choose Baskets That Strain or Filter Whatever your needs dictate

Strainer baskets are cleanable, reusable.

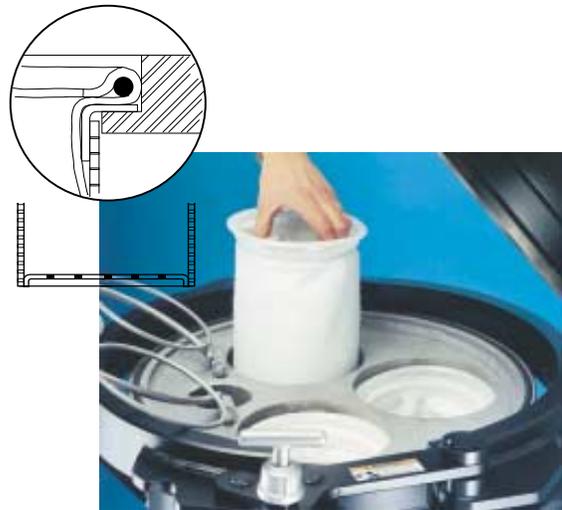
A seal is supplied on any strainer basket. It forms a seal between basket and housing to prevent dirty fluid bypass. Choose between various perforation sizes or wire mesh. Strainer baskets have flat, non-perforated bottoms and contain heavy-duty handles.



Filter bag baskets hold disposable filter bags.

Filter bags have an interference fit between the bags top rim and the housing causing a positive seal to prevent fluid bypass. Filter bag baskets have flat perforated bottoms.

Filter bags are available in a wide variety of felt, micro-fiber, monofilament and multifilament mesh materials. They are detailed completely on pages 126-128.



**DUAL-STAGE**– Dual-stage action will increase strainer or filter life and reduce servicing needs. This straining/filtering action can be achieved by ordering a second, inner basket. It is supported on the top flange of the outer basket. Both baskets can be utilized as strainers (with or without wire mesh linings), filter bag baskets, or a combination of strainer and bag basket.



### Basket Data

Surface area of each 30 in. basket: 4.4 sq. ft. Volume of each 30 in. basket: 0.6 cu. ft.

### Basket Construction

For cleanable strainer baskets, choose from the following perforation diameters: 1/4, 3/16, 9/64, 3/32, or 1/16 inch (for other not shown consult factory).

Any perforated basket can also be ordered lined with wire mesh. Stainless steel wire is used in mesh sizes 20, 30, 40, 50, 60, 70, 80, 100, 150, or 200.

Filter bag baskets, have standard 9/64 inch diameter perforations that are 51% open area. A wire mesh can also be utilized with bag baskets for two advantages:

1. Fiber migration is minimized.
2. In the unlikely event of bag rupture, the wire mesh better contains the contaminant.

## Choose Housing Style Designed to suit your requirements

The versatility of Rosedale Products provides a choice of several different designs.

- **Quick Access Cover (QAC)** features a clamp and spring assisted hinged cover that is quick and easy to open and close with no tools required. This will significantly reduce change-out time and lower operating costs. The QAC is rated to 150 PSI and constructed to meet ASME code requirements. Built-in safety features ensure that the cover cannot be opened unless the internal pressure is first released. The QAC is offered with our low profile design making bags more accessible and easy to remove.
- **Low Profile Design (SLP) Housings** are compact and space saving, allowing for ease of bag change-out. Standard operating height is reduced, resulting in a safe design by eliminating platforms and ladders. The SLP is manufactured in any housing version, including our standard davit arm cover, QAC design, and spring assisted hinged cover.
- **Spring Assisted Hinged Cover (HLP)** opens and closes without effort. Simply loosen the swing bolts and lift the cover up to open. An automatic cover stop is provided. This design saves time by eliminating the labor intensive handwheel. It is offered standard with our low profile design, or can be ordered in the QAC design.
- **Standard Housing Design (STD)** is durable and economic. It includes a davit arm and handwheel to facilitate cover removal. It is our most versatile housing design offering a variety of options, including our low profile design.



Quick Access Cover



Low Profile Design

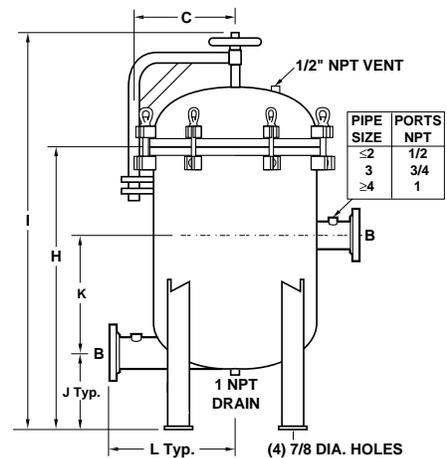
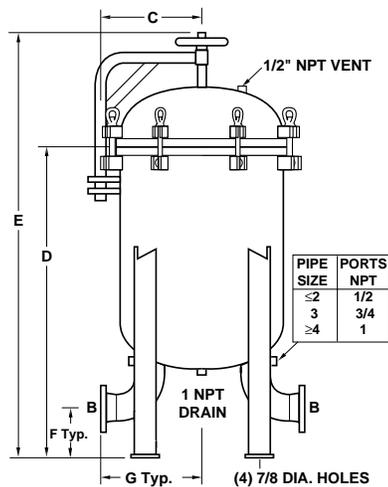
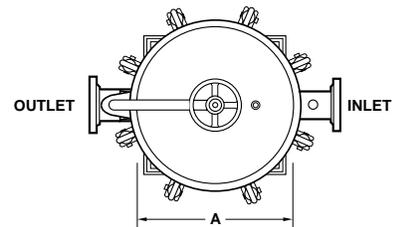
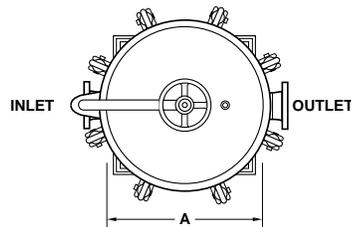


Standard Davit Arm

MODEL NUMBER & Dim. A	Pipe Sizes B	Leg Bolt Circle Dia.	Standard						Low Profile				
			C	D	E	F	G	Weight, lb (Approx)	H	I	J	K	L
16	2	14.0	10.9	40.1	57.1	4.50	10.5	400	37.9	54.9	8.00	15.0	13.0
	3		42.5	59.5	5.25	12.3	425	38.3	55.3	9.00	17.0	14.0	
	4		44.9	61.9	6.00	14.0	450	N/A	N/A	N/A	N/A	N/A	
18	2	16.0	11.9	40.5	58.0	4.50	11.1	450	39.6	58.5	8.00	15.0	14.0
	3		42.9	60.4	5.25	12.9	475	40.0	58.9	9.00	17.0	15.0	
	4		45.3	62.8	6.00	14.6	500	N/A	N/A	N/A	N/A	N/A	
22	2	20.0	14.0	41.4	60.0	4.50	11.9	485	39.5	58.0	8.00	15.0	16.0
	3		43.9	62.4	5.25	13.7	500	40.0	58.5	9.00	17.0	17.0	
	4		46.2	64.7	6.00	15.4	515	39.5	58.0	9.00	19.0	18.0	
	6		50.4	69.0	7.00	18.9	560	N/A	N/A	N/A	N/A	N/A	
24	2	22.0	15.0	41.7	60.7	4.50	13.1	675	41.2	61.6	8.00	15.0	17.0
	3		44.1	63.1	5.25	14.8	700	41.6	62.0	9.00	17.0	18.0	
	4		46.5	65.5	6.00	16.6	725	41.1	61.5	9.00	19.0	19.0	
	6		50.7	69.7	7.00	20.1	750	N/A	N/A	N/A	N/A	N/A	
30	2	28.0	18.0	42.8	63.3	4.50	15.2	635	41.3	61.9	8.00	15.0	20.5
	3		45.2	65.7	5.25	17.0	650	41.8	62.4	9.00	17.0	21.0	
	4		47.6	68.1	6.00	18.7	665	41.3	61.9	9.00	19.0	22.5	
	6		51.9	72.4	7.00	22.2	705	41.2	61.8	10.0	17.0	23.0	
	8		56.4	76.8	8.25	25.7	850	N/A	N/A	N/A	N/A	N/A	
36	3	34.0	21.0	46.4	68.4	5.25	18.8	840	43.3	64.5	9.00	17.0	24.0
	4		48.8	70.8	6.00	20.6	860	43.2	64.5	9.50	19.0	25.0	
	6		53.1	75.1	7.00	24.1	870	43.2	64.4	10.5	17.0	26.0	
	8		57.6	79.6	8.25	27.6	1010	43.2	64.4	11.5	17.0	27.0	
	10		62.1	84.1	9.50	30.6	1150	N/A	N/A	N/A	N/A	N/A	
42	4	40.0	24.0	50.0	73.5	6.00	22.6	1840	45.9	70.7	9.50	19.0	28.0
	6		54.3	77.8	7.00	26.1	1870	45.9	70.6	10.5	17.0	28.0	
	8		58.8	82.3	8.25	29.6	1960	45.9	70.6	11.5	17.0	29.5	
	10		63.3	86.8	9.50	32.6	2070	45.8	70.5	12.5	17.0	30.0	
	12		68.0	91.5	11.0	36.1	2200	N/A	N/A	N/A	N/A	N/A	
48	4	46.0	27.0	51.0	76.0	6.00	24.8	2015	46.5	71.5	9.50	19.0	32.0
	6		55.4	80.4	7.00	28.3	2075	46.4	71.4	10.5	17.0	32.0	
	8		60.0	85.0	8.25	31.8	2200	46.4	71.4	11.5	17.0	32.5	
	10		64.4	89.4	9.50	34.8	2350	46.4	71.4	12.5	17.0	33.0	
	12		69.2	94.2	11.0	38.3	2530	N/A	N/A	N/A	N/A	N/A	

**Dimensions (IN)**

(30-inch deep basket)

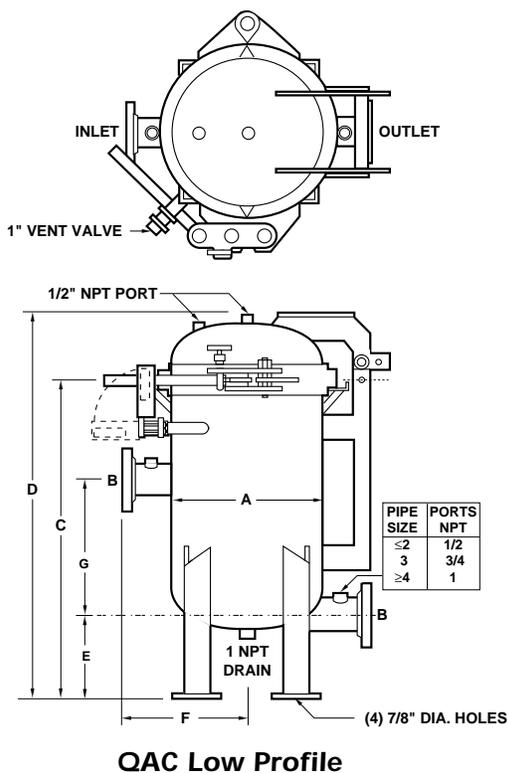


**Standard**

**Low Profile**

QAC Low Profile								
MODEL NUMBER	Pipe Sizes		Leg Bolt Circle Dia.	C	D	E	F	G
	A	B						
16 & 18	18	2	16.0	37.6	45.4	8.00	14.0	15.0
		3						
22 & 24	24	2	22.0	41.2	49.9	8.00	17.0	15.0
		3		41.6	50.3	9.00	18.0	17.0
		4		41.1	49.8	9.00	19.0	19.0

### Dimensions (IN)



QAC Low Profile

### Model Selection (For all housings)

Model No.	Number of Baskets	Straining, Filtering Area, ft <sup>2</sup>	Nominal Flow Rate (gpm)**	Inlet/Outlet Size (in)	Available Housing Styles
16	2	8.8	200	2,3,4*	Std, SLP, HLP, QAC
18	3	13.2	300	2,3,4*	Std, SLP, HLP, QAC
22	4	17.6	400	2,3,4,6*	Std, SLP, HLP, QAC
24	6	26.4	600	2,3,4,6*	Std, SLP, HLP, QAC
30	8	35.2	800	2,3,4,6,8*	Std, SLP, HLP
36	12	52.8	1200	2,3,4,6,8,10*	Std, SLP, HLP
42	17	74.8	1700	2,3,4,6,8,10,12*	Std, SLP, HLP
48	23	101.2	2300	2,3,4,6,8,10,12*	Std, SLP, HLP

\*Not available on SLP, HLP, and QAC styles.

\*\*Nominal flow rate is based on water @ 1 psi ΔP. For optimum filtering effectiveness, a maximum fluid velocity of 10 ft/sec should be maintained.

### Pressure Drop Data

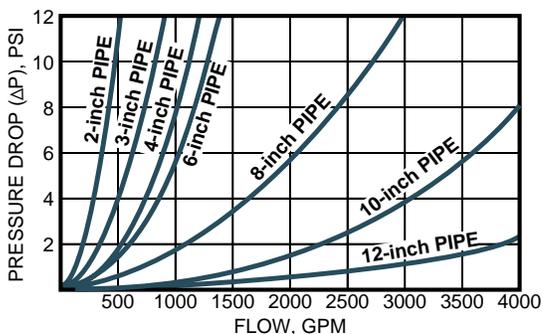
Basket strainers and bag filters are usually selected so that the pressure drop does not exceed 2 psi, when they are clean. Higher pressure drops may be tolerated when contaminant loading is low.

#### Determining housing pressure drop:

The pressure drops shown on the graph are reliable for all multi-basket housings, including strainer baskets or bag filter (perforated only or mesh lined). The pressure drop of any housing is governed by the size of the inlet and outlet, not the vessel itself.

- Using the desired pipe size and approximate flow rate, determine the basic pressure drop from the graph.
- Multiply the pressure drop obtained in step 1 by the viscosity correction factor found in the accompanying table.
- You now have the pressure drop for a clean multi-basket unit. If bag filters are to be employed, you must add the pressure drop they incur to get a true pressure drop for the assembly.

**Note:** Filter bags are specified separately. See pages 120-130.



Recommended flow rates are based on housing only. Fluid viscosity, filter bag used, and expected dirt load should be considered when sizing a filter.

### Viscosity Factors

1 (H <sub>2</sub> O)	CPS NUMBER							
	50	100	200	400	600	800	1000	2000
.65	.85	1.00	1.10	1.20	1.40	1.50	1.60	1.80

# How To Order

Build an ordering code as shown in the example

**Example: SLP-24-30-4F -1-150-C- B -S -M-20- C- 2P 1/16**

<p><b>HOUSING STYLE</b></p> <p>Standard (std) = <b>No Symbol</b>                  Standard Low Profile = <b>SLP</b>                  Quick Access Cover (16-24) = <b>QAC</b>                  Hinged Low Profile = <b>HLP</b></p> <p><b>MODEL NO.</b></p> <p>16 = <b>16</b>      30 = <b>30</b>                  18 = <b>18</b>      36 = <b>36</b>                  22 = <b>22</b>      42 = <b>42</b>                  24 = <b>24</b>      48 = <b>48</b></p> <p><b>BASKET DEPTH</b></p> <p>15-in. = <b>15</b>                  30-in. (std) = <b>30</b></p> <p><b>PIPE SIZE (FLANGED<sup>1</sup>)</b></p> <p>2-in. (Std, SLP, HLP 16-48 / QAC 18 &amp; 24) = <b>2F</b>                  3-in. (Std, SLP, HLP 16-48 / QAC 18 &amp; 24) = <b>3F</b>                  4-in. (Std 16-48 / SLP, HLP 22-48 / QAC 24) = <b>4F</b>                  6-in. (Std 22-48 / SLP, HLP 30-48) = <b>6F</b>                  8-in. (Std 30-48 / SLP, HLP 36-48) = <b>8F</b>                  10-in. (Std 36-48 / SLP, HLP 42 &amp; 48) = <b>10F</b>                  12-in. (Std 42, 48) = <b>12F</b></p> <p><b>OUTLET STYLE</b></p> <p>In-line, bottom (std) = <b>1</b>                  Side inlet/outlet (SLP, HLP, QAC) = <b>2</b>                  Side inlet/outlet, same side (SLP, HLP, QAC) = <b>4</b></p> <p><b>PRESSURE RATING<sup>2</sup></b></p> <p>150 psi (flanged) = <b>150</b></p> <p><b>HOUSING MATERIAL</b></p> <p>Carbon steel = <b>C</b>                  304 stainless steel = <b>S</b>                  316 stainless steel = <b>S316</b></p> <p><b>* COVER SEAL</b></p> <p>Buna N = <b>B</b>                  Ethylene Propylene = <b>E</b>                  Viton® = <b>V</b>                  Teflon® Encapsulated Viton® = <b>TEV</b>                  Teflon® (solid white) = <b>TSW</b></p> <p><b>BASKET SEAL</b></p> <p>No seal = <b>N</b>                  Seal (only on strainer housings) = <b>S</b></p>	<p style="text-align: center;"><b>OPTIONAL INNER BASKET</b></p> <p><b>OPTIONAL INNER BASKET, MEDIA SIZE</b></p> <p>Perforation diameters (for type 2P baskets)</p> <p><b>1/4, 3/16, 9/64, 3/32, 1/16</b></p> <p>Mesh sizes (for type 2M &amp; 2BM baskets)</p> <p><b>20, 30, 40, 50, 60, 70, 80, 100, 150, or 200</b></p> <p><b>OPTIONAL INNER BASKET, TYPE</b></p> <p><b>2B</b> = Filter bag basket, 9/64 perforations  <b>2P</b> = Strainer basket, perforated metal  <b>2BM</b> = Filter basket, mesh lined  <b>2M</b> = Strainer basket, perforated, mesh lined</p> <p><b>ASME CODE STAMP</b></p> <p><b>C</b> = Code</p> <p><b>BASKET, MEDIA SIZE No symbol if type B basket was selected</b></p> <p>Perforation diameters (for type P baskets)</p> <p><b>1/4, 3/16, 9/64, 3/32, 1/16</b></p> <p>Mesh sizes (for type M &amp; BM baskets)</p> <p><b>20, 30, 40, 50, 60, 70, 80, 100, 150, or 200</b></p> <p><b>BASKET, TYPE</b></p> <p><b>PB</b> = Filter bag basket, 9/64 perforations  <b>P</b> = Strainer basket, perforated metal  <b>BM</b> = Filter bag basket, perforated, mesh lined  <b>M</b> = Strainer basket, perforated, mesh lined  <b>HWM</b> = Filter bag basket, heavy wire mesh</p>
---	---

1. Flanges provided with the housing match the pressure rating of the vessel. Housings rated 150 psi have 150 class flanges. Housings rated 300 psi have 300 class flanges. Other styles and classes available. ANSI B16.5 Pressure-Temperature rating tables determine flange class for ASME code housings. Consult factory.

2. Higher pressure ratings available. Consult factory.

**\*Note:** The TEV and TSW cover seals are not available on the low profile QAC.

## **Appendix C-8**

### **Process and Effluent Pumps Equipment**

A B C E

# Standard Centrifugal Pump



Basic Pedestal  
Model VGH8D31 -- B  
Size 10" x 8"

## PUMP SPECIFICATIONS

**Size:** 10" x 8" (254 mm x 203 mm) Raised Face Flanges.  
**Casing:** Ductile Iron. Maximum Operating Pressure 173 psi (12,2 kg/cm<sup>2</sup>).\*  
**Closed Type, Six Vane Impeller:** Gray Iron No. 40. Handles 1 3/8" (35 mm) Diameter Spherical Solids.  
**Impeller Shaft:** Steel No. 1045.  
**Bearing Housing:** Gray Iron No. 25.  
**Replaceable Wear Rings:** Gray Iron No. 25.  
**Seal Plate:** Gray Iron No. 25.  
**Mounting Foot:** Structural Steel Plate, Grade C.  
**Radial Bearing:** Open Cylindrical Roller.  
**Thrust Bearing:** Open Double Ball.  
**Bearing Lubrication:** Oil.  
**Gaskets:** Nitrile Rubber.  
**Hardware:** Standard Plated Steel.

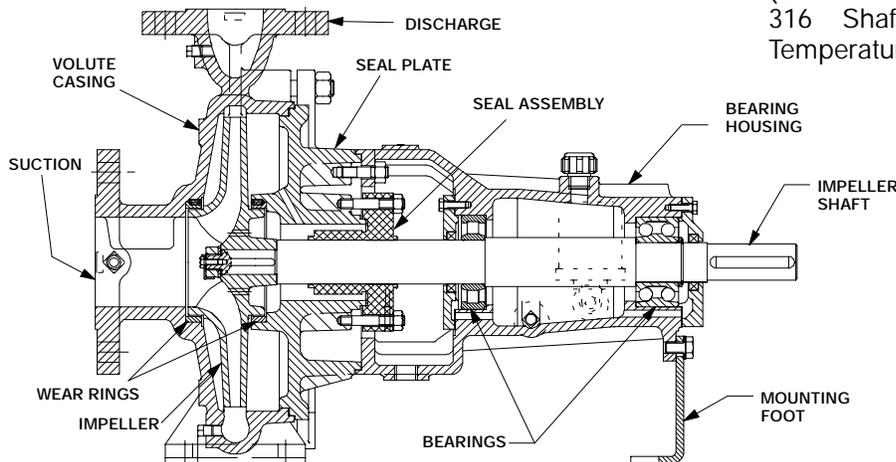
**Standard Equipment:** Bearing Housing Constant Level Oiler.

**Optional Equipment:** 10" NPT Suction Flange; 8" NPT Discharge Flange; Strainer; Bronze Impeller; Discharge Check Valve.

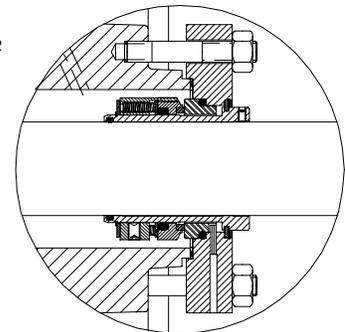


## Seal Specifications

Cartridge Type, Mechanical, Self-Lubricated. Tungsten Carbide Rotating Face. Silicone Carbide Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel No. 316 Shaft Sleeve and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).\*



## SEAL DETAIL



\* Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.



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**Specification Data**

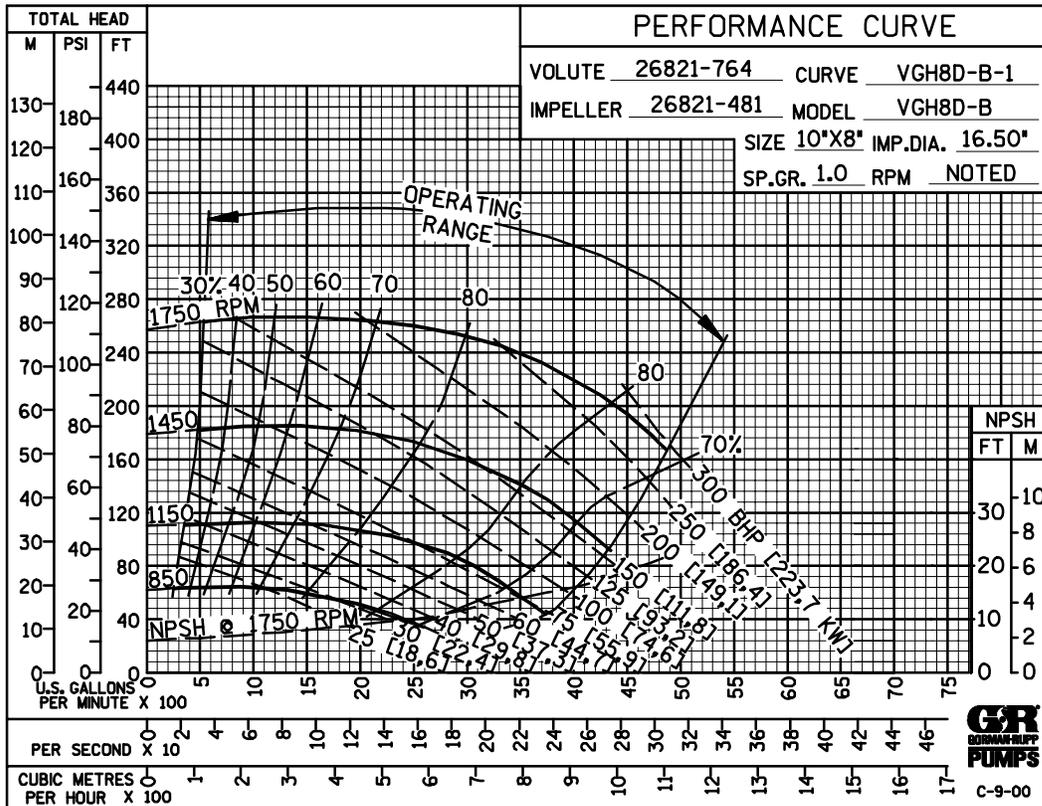
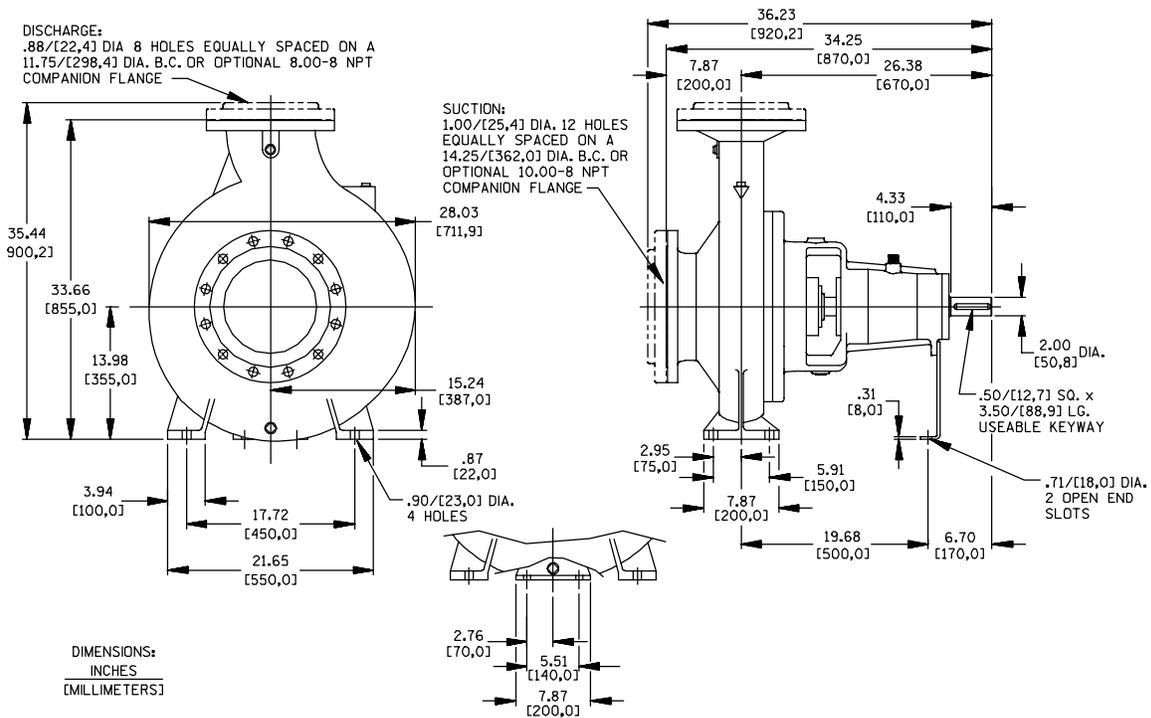
SECTION 70, PAGE 1551

APPROXIMATE  
DIMENSIONS and WEIGHTS

NET WEIGHT: 705 LBS. (320 KGS.)

SHIPPING WEIGHT: 755 LBS. (342 KGS.)

EXPORT CRATE: 27.1 CU. FT. (0,77 CU. M.)



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**Appendix C-8**

**Auto-Sampler Equipment**

## 4700 Sampler

OUR  
NEWEST  
SAMPLER!



### 4700 Stationary Refrigerated Sampler

Forward thinking is evident from top to bottom in Isco's groundbreaking 4700 Sampler. Its rotationally-molded construction, user-friendly controls, and workplace-savvy features make it the new choice for stationary sampling in both municipal and industrial wastewater applications.

Control and programming are fast, simple, and easily accomplished on-site. A unique slide-out bottle rack eliminates awkward stooping and bending to reach sample containers.

The controller actively regulates and displays the sample compartment temperature, and logs a one-minute average to confirm proper sample cooling. You can download the temperature record with a basic utility program such as *HyperTerminal*.

The tough, double-wall LLDPE cabinet shrugs off exposure to weather and harsh environments. It's filled from top to bottom with insulation for efficient, economical cooling even in hot, humid environments.

Heat-treated polyester powder coating protects the refrigeration system, ensuring long life and reliability in corrosive conditions.

### Sampling modes

- ❖ Uniform time intervals – uniform sample volumes
- ❖ Uniform time intervals – flow-proportioned sample volumes
- ❖ Uniform sample volumes – flow-proportioned time intervals

### Standard features

- ❖ Composite or sequential sampling
- ❖ -20° to 120° F operating range – without additional heaters
- ❖ Four digital alarm outputs
- ❖ 4-20 mA flow meter input
- ❖ Powerful compressor delivers energy-efficient, high-performance cooling

The 4700 is especially well suited for outdoor environments. Its roto-molded cabinet provides a degree of durability and insulation that's unmatched in the industry.



Weight (dry)	159 lbs.	72 kg
Dimensions: (H x W x D)	51 x 28 x 33 in	130 x 72 x 84 cm
Operating Temperature:	-20° to 120° F	-29° to 49° C
Controller Rating:	NEMA 4X, 6	IP67

For complete information and specifications, request Data Sheet #L-1141.

---

**APPENDIX D**

**CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN**

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**CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN**

**2009 REMEDIAL ACTION FOR OPERABLE UNITS 2, 3, 4, AND 5**

**LOWER FOX RIVER AND GREEN BAY SITE**

**Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Prepared for:**

**Appleton Papers Inc.  
Georgia-Pacific Consumer Products LP  
NCR Corporation  
CBC Coatings, Inc.  
U. S. Paper Mills Corporation**

**For Submittal to:**

**Wisconsin Department of Natural Resources  
U.S. Environmental Protection Agency**

**Prepared by:**

**Tetra Tech EC, Inc.  
Anchor Environmental  
J. F. Brennan  
Boskalis Dolman**

**June 2008**

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---

## APPROVALS

By their signature, the undersigned hereby certify that this Construction Quality Assurance Project Plan has been reviewed and approved for use at the Remediation of Lower Fox River, Operable Units 2 through 5.

---

Ray Mangrum  
Project Manager

---

Date

---

Mike Nicol  
Corporate Director Quality Programs

---

Date

---

Mike Estess  
Construction Manager

---

Date

---

Kevan McCaslin  
QA / QC Manager

---

Date

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## Acronyms and Abbreviations

2007 RA Order Respondents	Appleton Papers Inc., CBC Coating, Inc. (formerly known as Riverside Paper Corporation), Georgia-Pacific Consumer Products, LP (formerly known as Fort James Operating Company), Menasha Corporation, NCR Corporation, P.H. Glatfelter Company, U.S. Paper Mills Corp., and WTM 1 Company (formerly known as Wisconsin Tissue Mills, Inc.)
A/OT	Agency/Oversight Team
ASQ	American Society for Quality
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CM	Construction Manager
CQAPP	Construction Quality Assurance Project Plan
CQC	Construction Quality Control
CQM	Construction Quality Management
CQMP	Chemical Quality Management Plan
CRL	Corporate Reference Library
DCN	Design Change Notices
DMU	dredge management units
FCR	Field Change Requests
mg/L	milligrams per liter
NR	Nonconformance Report
NTU	nephelometric turbidity unit
OU	Operable Unit
PCB	polychlorinated biphenyl
Phase 2A Respondents	Appleton Papers Inc., CBC Coating, Inc., Georgia-Pacific Consumer Products, LP, NCR Corporation, and U.S. Paper Mills Corp.
ppm	parts per million
QA	quality assurance
QC	quality control
RA	remedial action
RAL	remedial action level
RD	Remedial Design
RD Respondents	Fort James Operating Company, Inc. (Fort James) and NCR Corporation
Response Agencies	USEPA and WDNR
ROD	Record of Decision
SAP	Sampling and Analysis Plans
Tetra Tech Team	Tetra Tech EC Inc, J.F. Brennan Company, Boskalis Dolman
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
TtEC	Tetra Tech EC Inc
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
WDNR	Wisconsin Department of Natural Resources

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## **1.0 INTRODUCTION**

The Lower Fox River and Green Bay Site (“Site”) includes approximately 39 miles of the Lower Fox River, as well as the bay of Green Bay. The Fox River portion of the Site extends from the outlet of Lake Winnebago and continues downstream to the mouth of the Fox River at the city of Green Bay. The Bay portion of the Site extends from the mouth of the Fox River at the city of Green Bay to the point where Green Bay enters Lake Michigan. The Site has been divided into five geographically defined Operable Units (OUs) (1, 2, 3, 4, and 5) for the remediation of polychlorinated biphenyls (PCBs) that have been released into the river.

Remedial design (RD) and remedial action (RA) in OU 1 is being addressed under an agreement between the United States Environmental Protection Agency (USEPA), Wisconsin Department of Natural Resources (WDNR), and the WTM 1 Company. The PCB cleanup remedy for the Lower Fox River OUs 2 through 5 was originally set forth in Records of Decision (RODs) issued in December 2002 and June 2003 by USEPA and WDNR (collectively known as the “Response Agencies”) under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. §§ 9601-9675. RD sampling in OUs 2 through 5 indicated elevated concentrations of PCBs in sediments downstream of the De Pere Dam in OU 4A. The Response Agencies determined that the RA for OUs 2 through 5 should be conducted in two phases with Phase 1 implemented to address sediments just downstream of the De Pere Dam. The Phase 1 RA is currently being conducted under a Consent Decree (CD) between the Response Agencies, and NCR Corporation and Sunoco–U. S. Mills, Inc. All remaining elements of the OUs 2 through 5 RA will be implemented in Phase 2.

Phase 2 of the OUs 2 through 5 RA was subdivided into two stages: Phase 2A and 2B. Certain of the Respondents to the 2007 Administrative Order for RA (collectively, the “Phase 2A Respondents”) are required to conduct the Phase 2A work; these are Appleton Papers Inc., CBC Coating, Inc., Georgia-Pacific Consumer Products, LP, NCR Corporation, and U.S. Paper Mills Corp. Phase 2A work elements have been expedited and are being completed in 2008 to commence full-scale sediment remediation in OUs 2 through 5 at the start of the 2009 construction season and/or as necessary to allow for continuation of full-scale actions in subsequent years. The Agency-approved Phase 2A Construction Quality Assurance Project Plan (CQAPP) was developed to establish quality assurance/quality control (QA/QC) ground rules for the Phase 2A work. Phase 2B comprises all remaining work to implement the OUs 2 through 5 RA such as the performance of full-scale sediment remediation at the start of the 2009 construction season and subsequent years, along with operation and maintenance and long-term monitoring activities. This 2009 CQAPP will pertain to all Phase 2B tasks described herein.

## **2.0 PURPOSE AND SCOPE**

### **2.1 PURPOSE**

This 2009 CQAPP, prepared by Tetra Tech EC, Inc. (TtEC) and its OUs 2 through 5 RD/RA team members, presents a systematic management approach for planning, implementing, controlling, and assessing work to ensure that the results produce an end product that satisfies technical, administrative, and quality objectives for the completion of the OUs 2 through 5 RA. It follows the requirements of the Quality Management System located on TtEC’s Corporate Reference Library. This 2009 CQAPP was developed under the guidelines of USEPA document

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USEPA QA / R-5 (USEPA Requirements for Quality Assurance Project Plans) and encompasses the policies and procedures, authorities, requirements, and guidance necessary for implementation and assessment of work in compliance with governing regulations and contractual requirements. This CQAPP applies the graded approach to quality such that quality systems for different operations and tasks will vary according to the specific objectives and needs of the operation.

This 2009 CQAPP establishes requirements for managing and implementing the QA/QC system both on and off site. It provides the framework and criteria for establishing project-specific QC plans and also applies to work by subcontractors, fabricators, and suppliers. Effective implementation of detailed QA/QC requirements, procedures, instructions, and reports developed from this plan will ensure the completed work is in compliance with the provisions of the applicable regulations, contract, and scope of work.

In general, the CQAPP establishes the requirements for the following:

- QA/QC organization, responsibilities, and authority
- Personnel qualifications and training
- Procedures, guidelines, checklists, and forms for conducting and controlling work
- Definable features of work
- Reporting, records, and documentation
- Inspections and tests
- Deficiencies, noncompliances, and corrective actions
- Audits and surveillance
- Protocols for sampling and testing used to monitor the remedial action
- Identification of proposed quality assurance sampling activities

This 2009 CQAPP provides the criteria for planning and implementing an effective QA/QC system for use in the design, construction, and operation as required by the governing codes, standards, and regulations.

## **2.2 SCOPE**

The OUs 2 through 5 RA consists of work to be performed at the start of the 2009 construction season and continuing into subsequent years. While this 2009 CQAPP has been developed only for work to be performed in 2009, follow-on addenda to this CQAPP will address RA tasks to be performed in 2010 and beyond, including related response activities such as operation and maintenance and long-term monitoring activities.

Remedial work activities described in this 2009 CQAPP include:

- Mobilization of dredging equipment
- Removal of Toxic Substances Control Act (TSCA) sediments
- Removal of non-TSCA sediments
- Sediment desanding using banks of hydrocyclones

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- Sediment dewatering using membrane presses
  - Sediment disposal and transportation of both TSCA and non-TSCA sediments to approved landfill facilities
  - Water treatment accomplished with sand filtration, bag filters, and carbon canisters with polishing accomplished using cartridge filters; a diffuser will be located in the river channel for discharge
  - Verification sampling conducted after dredging is complete to verify that the 1 part per million (ppm) PCB remedial action level (RAL) has been achieved
  - Post-dredge residual management in the form of additional dredging, if warranted (a CQAPP Addendum will address alternate residuals management techniques including sand covers)

Other requirements include developing a Health and Safety Plan, Contingency Plan, Sampling and Analysis Plan Addenda, and Final Design submittals. This 2009 CQAPP applies to work, inspections, and testing activities performed under the terms of the contract, including work performed by subcontractors for the completion of RA. It includes control measures for verifying the quality of equipment and materials, processing submittals, monitoring construction activities, and testing. TtEC and subcontractor personnel must comply with the sections of the CQAPP specific to them.

### **3.0 QUALITY ASSURANCE/QUALITY CONTROL ORGANIZATION**

#### **3.1 GENERAL**

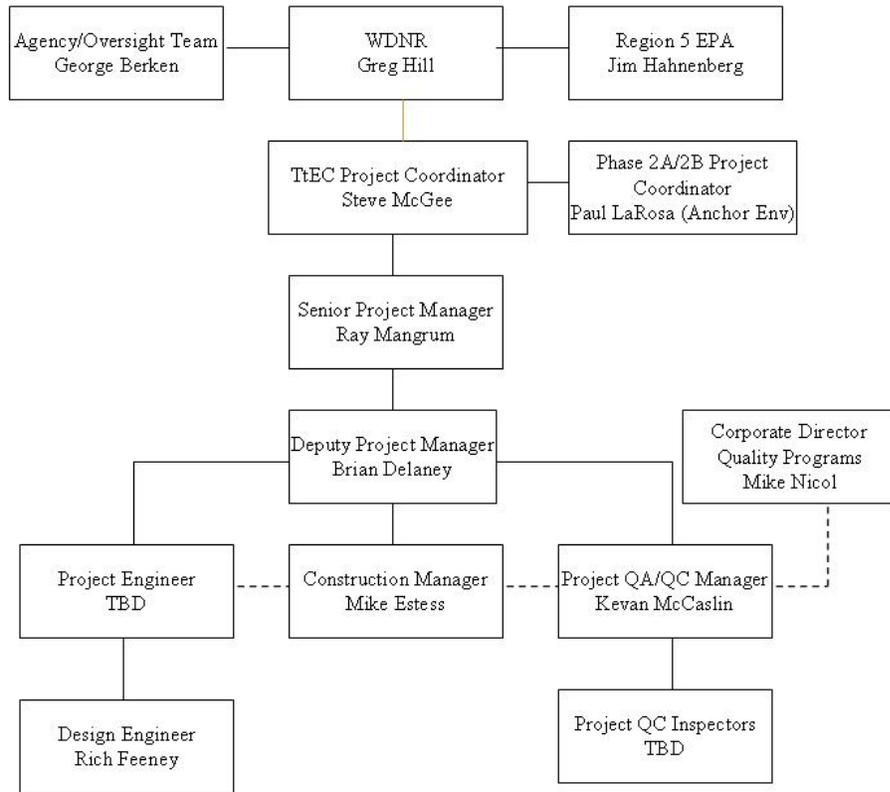
QA is an audit function used to verify that QC is being performed and performed properly. It may include review of QC documentation or conducting actual testing on a spot or periodic basis. QC is performing the necessary observations, testing, and documentation that verify the work performed meets or exceeds the minimum standards established by the project specifications or contract. QC involves the routine and systematic inspections and tests that are conducted to verify that each phase of the work is in compliance with the applicable specification.

Project personnel are essential in achieving project success and will be responsible for reporting issues that could adversely affect the safety, scope definition, cost control, schedule performance, and/or the expected level of quality. The project QA/QC staff will be trained and responsible for identifying, reporting, documenting, and verifying that the appropriate remedial and/or corrective actions have been implemented to ensure items and services conform to the specified contract requirements. The QA/QC staff will maintain a close working relationship with project management and will keep management advised of situations, which if not corrected or controlled, could adversely affect delivery of the expected level of quality of the project.

This section describes and documents the organization and authority for the development, approval, and implementation of the CQAPP, including verification of work activities utilizing the U.S. Army Corp of Engineers (USACE) Construction Quality Management (CQM) three phases of control. It documents the organizational structure, functional responsibilities, personnel qualifications, levels of authority, and lines of communication.

### 3.2 ORGANIZATION, DUTIES, RESPONSIBILITIES, AND AUTHORITIES OF QA/QC PERSONNEL

Figure 3-1 presents TtEC’s organizational structure, showing the reporting lines for each individual by category.



**Figure 3-1.** Quality Assurance Organization

It is the responsibility of personnel involved in project activities that may affect the quality of data collection, design, implementation of remedial actions, operation, or other quality related functions to be aware of and to implement the quality policies and practices set forth by the CQAPP.

The duties, responsibilities, and authorities of project personnel are described in the following paragraphs. Personnel assignments are subject to change over time; therefore, the QA/QC Manager will maintain a QA /QC Staffing List of personnel assignments including each person’s role and organization.

**Line Management.** TtEC’s position is that quality is the primary responsibility of those performing the work and not the sole domain of a single QA/QC group or person.

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Line management encompasses a variety of disciplines and is comprised of those managers, engineers, superintendents, and scientists reporting to senior management.

**Senior Project Manager.** The Senior Project Manager is TtEC's single point of contact for coordination with the Project. As the chief contract representative, the Project Manager technically and administratively manages the contract and has authority and is responsible for the following activities:

- Issue and authorize, in conjunction with TtEC's Corporate Director, Quality Programs, Appointment Letters describing duties/responsibilities and delegating authority to the QA/QC Manager to act on the Project Manager's behalf for site-related quality activities
- Issue stop-work order when necessary
- Monitor and control, through surveillance of project activities, ensuring that relevant portions of the plan are implemented
- Interface directly with the client to maintain an awareness in planning and scheduling of QA/QC processes
- Establish an overall records management system for the project that ensures clarity, completeness, retrievability, and conformance to contract requirements, and ensures document security
- Implement the approved site-specific plans
- Evaluate site-specific procedures and plans
- Evaluate the project schedule and budget

**Corporate Director, Quality Programs.** The Corporate Director Quality Programs will ensure the necessary independence required for unbiased and objective assessments. The responsibilities of the Corporate Director, Quality Programs or designee include the following activities:

- Review and approve the CQAPP and following revisions
- Periodically evaluate the effectiveness of the CQAPP through conducting surveillances, audits, or management assessments
- Assign, direct, and support the QA/QC Manager and staff
- Train, qualify, and evaluate the QA/QC Manager and staff project personnel according to the CQAPP
- Review project site-specific Chemical Quality Management Plans (CQMPs) and Sampling and Analysis Plans (SAP)
- Directing QA audits

**QA/QC Manager.** The Project QA/QC Manager is responsible for the overall management of on-site quality processes, has the authority to act on quality matters for TtEC, and is responsible for maintaining the CQAPP. Either the QA/QC Manager or designee will physically be at the project site whenever activities are being performed and will oversee quality functions. The QA/QC Manager will be the single point of contact for ensuring compliance with the quality

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requirements identified in the contract and for QA/QC matters. Duties, responsibilities, and authorities of the QA/QC Manager include the following:

- Provide and maintain an effective QA/QC system in accordance with the approved CQAPP
- Review and manage submittals in compliance with contract requirements and the CQAPP
- Prepare Daily Quality Control Reports for each day work is performed and submit to the Project Manager
- Conduct completion inspections of completed work and develop a “punch list” of items not conforming to approved plans and specifications and ensure punch list items are completed
- Monitor QC activities to ensure conformance with authorized policies, procedures, and sound practices, and recommend improvements, as necessary
- Ensure that records, logs, standard procedures, and project plans are maintained in a retrievable fashion and that controlled copies of standard procedures and project plans are distributed to appropriate personnel
- Ensure that a document control system is established and maintained current for records of QA/QC operations, activities, and tests performed on the project
- Direct stop work or re-performance of any nonconforming activity resulting from improper application of prescribed procedures
- Monitor corrective action documentation for conditions adverse to quality, verify implementation of corrective action, track and analyze corrective action, and close-out corrective action documentation upon completion of corrective action
- Perform audits used to verify that QC is being performed and performed properly
- Maintain a document control system to ensure project personnel have the most current version of plans and specs

**Project Engineer.** The Project Engineer is responsible for the overall management of the design process. The Project Engineer ensures appropriate technical support is available to the project during construction. The Project Engineer responsibilities include, but are not limited to, the following:

- Ensure appropriate reviews and approvals to all changes to the drawings and specifications
- Ensure appropriate reviews and approvals to all Requests for Information that clarify the intent of the design
- Ensure appropriate reviews and approvals to all Subcontractor’s shop drawings and submittals, as requested by the Project Manager

The Project Engineer has authority to provide unilateral recommendations for changes to the design for approval by the Project Manager.

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**Design Engineer.** The Design Engineer is responsible for the overall development of the design and any revision. The Design Engineer provides technical support to the project during construction. The Project Engineer responsibilities include, but are not limited to, the following:

- Review and approve all changes to the drawings and specifications
- Review and approve Requests for Information that clarify the intent of the design
- Maintain design continuity
- Assist with the review and approval of the Subcontractor's shop drawings and submittals, as requested by the Project Manager

The Design Engineer can make unilateral recommendations for changes to the design for approval by the Project Engineer and Project Manager.

**QC Inspectors.** QC Inspectors will perform the construction and operation QC functions specified for the project in task-specific Construction Quality Control (CQC) Plans and will report to the QA/QC Manager. They will perform the necessary observations, testing, and documentation that verify the work performed meets or exceeds the minimum standards established by the project specifications or contract. The type and number of QC personnel present, whether TtEC or subcontractor, will vary depending upon the complexity and nature of the definitive features of work, shift work, or other operations that may require QC coverage. The QC personnel will be fully qualified in the area of their responsibility according to verified training and experience. The duties, responsibilities, and authorities of the QC staff may include:

- Assist/represent the QA/QC Manager in the performance of their duties when so directed
- Authorize the issuance of a Nonconformance Report (NR), and recommend stop-work orders to the QA/QC Manager, when necessary
- Maintain a daily log of inspections, and provide necessary information to complete the Daily Quality Control Report and other inspection records including deficiency reports
- Inspect and document the implementation of corrective action
- Monitor sampling activities and laboratory testing activities
- Perform field inspections of construction and operating activities, including oversight of subcontractor's activities
- Remain on the project site whenever work is being performed in the area of their responsibility or as directed by the QA/QC Manager

### **3.3 QUALIFICATIONS OF QA/QC PERSONNEL**

TtEC and its subcontractors performing work for the OUs 2 through 5 RA under the requirements of this 2009 CQAPP will be trained and qualified in accordance with the contract-specific requirements and TtEC's Environmental, Safety, and Quality Procedure QP-2, Selection and Qualification of Quality Control Personnel (see Appendix B). TtEC's management emphasizes education, experience, and training to achieve and maintain proficiency and to create an environment of individual responsibility and accountability for quality. Our management will provide resources for required education, training, and retraining. This requirement applies to TtEC personnel and subcontract personnel performing or managing activities affecting quality.

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Specific requirements for indoctrination, subject matter training, qualification, certification, and personnel training records (and their maintenance) also will be implemented.

Other QA/QC personnel selected to perform or verify activities affecting quality will possess the education, certification, experience, and training specified in the contract specifications.

## **4.0 PROCEDURES FOR SCHEDULING INSPECTIONS**

### **4.1 GENERAL**

TtEC procedures contained in the task-specific CQC Plans will be submitted as addenda to this 2009 CQAPP as they are developed. These procedures establish controls inspections and requirements for planning and performing QC activities for each definable feature of work. A definable feature of work is a task that is separate and distinct from other tasks, and which has separate control requirements. The procedures establish controls and inspections. Implementation of the three phases of control (preparatory, initial, follow-up) allows for the Project Manager and QA/QC Manager to plan and schedule work to ensure that preparatory actions have been completed, work is understood by project personnel, and required materials and equipment are available and stored correctly. The three-phase inspections will be performed for Definable Features of Work activities, as specified in the task-specific CQC plan. As defined in the Phase 2B Statement of Work, certain tasks will be completed in the 2009 construction season, with continuation of high-production remedial actions in subsequent years. Services provided by TtEC and its subcontractors will include, but are not limited, to the following:

- Pre-sediment removal sampling
- Sediment removal
- Post-sediment removal verification sampling
- Water treatment effluent sampling
- Transportation and disposal of sediments

The types of inspections performed will include preparatory, initial, follow-up, and completion phase inspection as described in the following paragraphs.

### **4.2 PREPARATORY PHASE INSPECTION**

Preparatory Phase Inspections will be performed prior to starting a definable feature of work. The Preparatory Phase Inspection meeting will be conducted by the QA/QC Manager and attended by the responsible construction staff personnel, the Construction Manager, any applicable subcontractor involved with the feature of work and the responsible QA/QC staff.

The Preparatory Phase Inspection meeting includes:

- Reviewing pertinent contract requirements
- Reviewing material and equipment documentation for required tests, submittals, and approvals
- Reviewing required control inspections and test requirements
- Establishing that the preliminary work required to begin the feature of work is complete and conforms to approved drawings and submittal data

- 
- Establishing that the required materials and equipment for commencement of the work are on hand or available for use on the feature of work and that equipment is properly stored, calibrated, and in proper working condition
  - Establishing acceptable levels of workmanship required to meet contract requirements for the definable features of work

The Preparatory Phase Inspection meeting results will be documented on meeting minutes prepared by the QA/QC Manager using the Preparatory Phase Inspection Checklist (Appendix A). Preparatory Phase Inspections will be reported on the Daily QC Report (Appendix A), and the meeting minutes/checklist will be included as an attachment. Notifications of the Preparatory Phase Inspection will be given at least 24 hours in advance to allow for the attendance of Project Management, client representatives, regulatory personnel, and the Agency/Oversight Team (A/OT).

Additional Preparatory Phase Inspections will be conducted if the project staff change, if problems develop, or if work resumes after a substantial stoppage.

#### **4.3 INITIAL PHASE INSPECTION**

An Initial Phase Inspection will be conducted by the QA/QC Manager at the beginning of each definable feature of work. The inspection will be performed as soon as QC personnel determine that a sufficient portion of the feature of work has been accomplished to evaluate the following criteria:

- Compliance with the specifications, drawings, submittals, and other contract requirements
- Acceptable levels of workmanship
- Compliance with material specifications
- Resolution of differences

The Initial Phase Inspections will include the participation of the responsible personnel, including appropriate subcontractors and QC personnel involved with the feature of work. Notifications of the Initial Phase Inspection will be given at least 24 hours in advance to allow for the attendance of Project Management, client representatives, regulatory personnel, and A/OT.

The Initial Phase Inspection results will be documented on meeting minutes prepared by the QA/QC Manager using the Initial Phase Inspection Checklist (Appendix A). Initial Phase Inspections will be reported on the Daily QC Report (Appendix A) and the meeting minutes/checklist will be included as an attachment.

The Initial Phase Inspections will be repeated for new site staff.

#### **4.4 FOLLOW-UP PHASE INSPECTIONS**

A Follow-up Phase Inspection will be performed on a continuous basis. Any deficiencies will be corrected as soon as possible prior to starting the new work or will be identified on the punch list.

The Follow-up Phase Inspection results will be documented on the Daily QC Report (Appendix A) by the QA/QC Manager.

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## **4.5 COMPLETION INSPECTION**

At the completion of the work, it will be inspected for compliance with the contract plans and specifications.

The QA/QC Manager is responsible for initiating the completion inspection and for verifying development of a punch list, when necessary, which will identify any nonconforming or incomplete work that does not conform to the specified requirements. Upon completion of the punch list items, a second inspection will be conducted by QC personnel to verify that the items conform to the requirements. Documentation of the completed punch list items will be provided to the QA/QC Manager and included in the Daily QC Report (Appendix A).

## **4.6 INSPECTION DOCUMENTATION**

The QA/QC Manager is responsible for the maintenance of the inspection records. Inspection records will provide all necessary information clearly to verify that the items or activities inspected conform to the specified requirements or, in the case of nonconforming conditions, provide evidence that the conditions were brought into conformance. During on-site activities, inspection documentation will be stored on site and will be available to the client representatives, regulatory agencies, and A/OT upon request. QA/QC documentation will be archived annually at one of TtEC's office locations and/or archive storage. Retention/storage procedures for inspections will be in accordance with the contract and TtEC's Procedure PO-8 Document Control.

## **5.0 TRAINING**

### **5.1 GENERAL**

Designated TtEC personnel performing QC work under the requirements of this CQAPP will be trained and qualified in accordance with the requirements of the CQAPP as well as in accordance with contract-specific requirements. The QA/QC Manager is certified by the American Society for Quality (ASQ) as a Certified Quality Auditor. Project training topics will include, but are not limited, to the following:

- Design Plans and Specifications
- Work Plans
- Task-specific QC Plans
- CQAPP
- Procedures for performing or inspecting work
- Procedures for documenting QC activities
- Procedures for tracking deficiencies and corrective actions
- Procedures for handling Design Change Notifications

Personnel selected to perform or verify activities affecting quality will possess the education, experience, and/or training commensurate with the specified activity and contract requirements.

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## **6.0 DOCUMENTATION**

### **6.1 GENERAL**

The Construction Manager (CM) will be responsible for the maintenance of records providing factual evidence that required QC activities and/or tests have been performed. The records will include the work of subcontractors and suppliers as well as the following information:

- TtEC/subcontractor and their area of responsibility
- Operating plant/equipment with hours worked, idle, or down for repair
- Work performed each day, giving location, description, and by whom
- Quantity of materials received at the site with a statement as to acceptability, storage, and reference to specifications/drawings requirements
- Submittals and deliverables reviewed, with contract reference, by whom, and action taken
- Job safety evaluations stating what was checked, results, and instructions or corrective actions
- Instructions given/received and conflicts in the plans and/or specifications
- TtEC's verification statement

These records will indicate a description of the classification of personnel working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records will cover both conforming and deficient features and will include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Reports will be signed and dated by the QA/QC Manager. The report from the QA/QC Manager will include copies of test reports and copies of reports prepared by QC personnel.

## **7.0 PROCEDURES FOR SCHEDULING, REVIEWING, AND MANAGING SUBMITTALS**

### **7.1 RESPONSIBILITY**

The Project Manager is responsible for the preparation and maintenance of the required project submittals. Submittals will be listed in the project Submittal Register, which will be updated and distributed on a monthly basis by the QA/QC Manager. Required submittals will be made on or before the dates shown in the submittal register.

### **7.2 SCHEDULING OF SUBMITTALS**

The Project Manager, in conjunction with the QA/QC Manager, reviews the contract for required submittals and directs the preparation of the submittal register to assure that submittals are made. This will ensure timely arrival of approved personnel, equipment, and materials on site.

### **7.3 REVIEW OF SUBMITTALS**

The Project Manager and QA/QC Manager, or authorized designees, will review submittals for completeness and accuracy. Any submittals requiring modifications or changes will be returned to the originating organization for correction and then resubmitted for review and approval by the QA/QC Manager and Project Manager prior to submittal to the client.

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#### **7.4 TRANSMITTAL**

Submittals will be transmitted to the client in accordance with the contract requirements. Submittals will be sent under the cover of a transmittal form and/or cover letter in the quantities required to the addresses specified by the client. Submittals will be sent to arrive in accordance with the project schedule. The transmittal form/cover letter will reference the appropriate specification sections or reference documents to facilitate the client review.

#### **7.5 REQUIREMENTS FOR SUPPLIERS OF MATERIALS AND SERVICES**

The CQAPP establishes a management system to ensure that procurement processes are controlled, and that procured items and services conform to the requirements identified in procurement documents. The procurement management system applies to items and services that have an impact on the quality of environmental processes and conditions and engineered environmental systems. The basic management system includes the following elements (as appropriate) for the specific item or service purchased:

- Preparation, review, and approval of procurement documents (e.g., purchase requisitions, buy cards, purchase orders, basic ordering agreements, subcontracts) and revisions or supplements prepared, reviewed, and approved in accordance with established written procedures and instructions
- Quality requirements identification in procurement documents that cite equipment and service purchasing
- Procurement source evaluation and selection
- Method for ensuring the level of supplier quality through inspections, tests, certifications, source inspections, and other valid methods of verifying compliance of items and services
- Requirements for suppliers, contractors, subcontractors, or financial assistance recipients document and implement quality programs consistent with the requirements of this section and the subcontract and/or purchase order specifications
- Requirements for suppliers to incorporate appropriate quality requirements into their sub-tier procurement documents
- Provisions for assessing, monitoring, and controlling the performance of suppliers through periodic audits, source inspections, or receipt inspection upon delivery (as appropriate)
- Quality receiving inspections shall be performed to verify proper configuration; identification; dimensional, physical, and other specified characteristics; freedom from damage; and cleanliness using specified quantitative and/or qualitative accept/reject criteria
- If deficiencies are identified, the inspector shall perform applicable re-inspection of the item (i.e., supplies, equipment, and services) or activity after the supplier completes any required re-inspection and records the inspection test results
- Interface measures with internal procurement, project, and QA/QC personnel

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## **7.6 SUBCONTRACTOR SUBMITTALS**

Subcontractors performing work on the project are responsible for compliance to the requirements of their respective subcontract. Subcontractors included are organizations supplying quality-related items or services to the project. TtEC has overall responsibility for maintaining conformance to the quality requirements for the subcontracted items or services.

Submittal requirements for proper licenses, certifications, work plans, personnel qualifications, technical performance levels, QC procedures, acceptability levels, and documentation will be included as part of the subcontract documents. The QA/QC Manager, or designee, will review the subcontract procurement documents to verify that the QC requirements are passed on to the subcontractor.

The QA/QC Manager is responsible for the implementation of inspections, surveillance, document reviews, audits, and other QC activities for monitoring the subcontractor's compliance with the contract and subcontract requirements. These activities will be documented on inspection reports, pre-established checklists, audit reports, field logs, or other forms appropriate to the function performed. In addition, the submittals will be stamped to indicate the results of the inspections and reviews. The submittal register will be updated at the conclusion of the inspection or review to indicate the status of the required submittal.

The project QC staff will provide QC checks during the three phases of control while the subcontractor's activities are being performed, to the extent necessary, to determine compliance with the QC requirements set forth in the contract and applicable subcontract documents, including:

- Meeting quality requirements
- Generating, controlling, and maintaining required documentation
- Performing and documenting required inspections and tests
- Identifying, reporting, and correcting nonconformance conditions

## **8.0 MATERIAL RECEIPT INSPECTIONS**

### **8.1 GENERAL**

All items shall be received in accordance with the requirements of TtEC's corporate procedures. Receiving inspection is one method used to accept an item from a supplier. Other methods of acceptance are source verification, supplier certificate of conformance, post installation test at the facility, or a combination of any of the above.

### **8.2 QUALITY INSPECTIONS**

The inspector must establish Quality Receiving Inspection Requirements accept / reject criteria in accordance with specified requirements in the procurement documents.

The quality inspector shall obtain a copy of procurement documents, and all documents provided with the shipment. The designated quality inspector shall generate a Quality Receiving Inspection Requirements and complete the inspection checklist to verify materials received are in compliance with procurement documents.

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## 9.0 CONTROL TESTING PROCEDURES

One of the primary CQAPP elements is the design of a post-construction verification plan for assessing compliance with the remedial action objectives outlined by the remedial design, consistent with the ROD and ROD Amendment. This includes a post-dredge verification sampling program to confirm the attainment of the RAL and or/compliance with the surface weighted average concentration goals of the ROD. If the RAL is not met within a remedial action certification area, a range of response actions may be appropriate. The post-construction verification program described in the CQAPP Addendum presented as part of the 60 Percent Design, Volume 2 also includes plans for verifying the engineered caps and sand covers have been constructed in compliance with the remedial design.

The section below presents a summary of plans developed to verify the performance of dredging, capping, and sand cover placement within OUs 2 through 5 relative to the remedial design and ROD requirements. The verification plans and performance criteria presented below were developed consistent with the ROD Amendment and build on similar plans and criteria that have been utilized for the Phase 1 and OU 1 projects, and address the following issues relevant to verification sampling and contingency response actions:

### Post-Dredge Verification

- Verification that dredging has been completed to the limits and extents required by the design
- Verification that dredging has addressed the RAL for PCBs in dredge only areas
- Verification that post-dredge surface concentrations in dredge-and-cap areas are consistent with remedial design expectations and that post-dredge cap thicknesses have been selected appropriately
- Post-dredge PCB concentrations for which placement of a minimum 6-inch sand cover would be a suitable management response action, consistent with the provisions of the ROD Amendment, to permanently address post-dredge residuals exceeding the RAL, without the need for further engineering evaluations or post-construction monitoring
- Description of specific elements of the more detailed post-dredge engineering evaluations that would be performed in “real time” to inform expedited contingency response decisions (e.g., re-dredging, engineered capping, or sand cover placement) within a given certification area

The sampling will be performed in accordance with the detailed work plan for 2008 sediment sampling (including a SAP and QAPP Addendum) submitted to the Response Agencies on June 2, 2008. Each of these sampling compliance criteria and contingency response action issues is addressed in the sections below.

### 9.1 PRE- AND POST-DREDGE SAMPLING

A sediment sampling program will be performed in 2008 to further refine the neatline delineation of sediments containing PCB concentrations above the 1.0 ppm RAL in dredge-only areas in upper OU 3 targeted for dredging in 2009. As part of the collaborative workgroup design process, an evaluation of potential further refinements to the geostatistically based depth of contamination model was performed. The recent geostatistical evaluation, presented as an Attachment C to this CQAPP, indicated that additional sampling to double the current sampling

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density along each transect in OU 3 dredge-only areas would further optimize the dredge plans. As described in Attachment C the objectives of the additional pre-dredge “infill” sampling plans are to: a) reduce remediation of non-target sediment; b) reduce costs of post-dredge verification sampling; and c) reduce (and potentially eliminate) the need for re-dredging cleanup passes.

Upon completion of the infill sediment sampling and analysis program in OU 3 and OU 4 (summarized in the SAP and QAPP Addendum [Tetra Tech et al. 2008]), the dredging neatline elevation in dredge-only areas of upper OU 3 will be updated using ordinary kriging of all available data. The forthcoming geostatistical analyses, which will be incorporated into the annual RA Work Plans, will target a significance level of 0.5, but will also evaluate whether alternative significance levels may provide improved overall performance, with and without consideration of anticipated overdredge allowances.

The additional infill sampling is expected to substantially improve the performance of the neatline dredging plans based on ordinary kriging. The updated dredging neatline will serve as the basis for final dredge plans to be implemented in OU 3 and OU 4 dredge-only areas.

## **9.2 POST-DREDGE SAMPLING**

The ROD Amendment adopted sediment removal (i.e., dredge-only) as the primary remedial approach for addressing sediment exceeding the RAL in OUs 2 through 5. This section discusses how post-dredge data for dredge-only areas will be evaluated to determine the nature and extent of and management alternatives for dealing with dredging residuals, both generated and undisturbed, using guidance provided in the ROD Amendment.

**Dredge Certification Unit Areas.** Consistent with the approach currently being utilized on the Phase 1 Project, dredge areas within OUs 2 through 5 will be subdivided based on location and operational considerations into dredge management units (DMUs). Typically, two to five adjacent DMUs will be combined into DCUs for verifying compliance with performance criteria described in the ROD Amendment.

The appropriate size (acreage) range of a given DCU will be based on consideration of the practical frequency of Agency-approved certification decisions (i.e., allowing for appropriate data review and discussion periods), and will be documented in the 2009 RA Work Plan.

Consistent with decision time-frames utilized for the Phase 1 Project and as discussed in the BODR, the optimal frequency of Agency-approved certification decisions during RA (i.e., allowing for appropriate data review and discussion periods) is approximately every 1 to 2 weeks. Given anticipated production rates described in the 60 Percent Design, Volume 1, on average, a 3- to 6-acre dredge unit would need to be certified every 1 to 2 weeks during the 2009 RA. The size of a dredge unit for certification will vary depending on physical setting and operational considerations for a particular area, including the water depth, dredge equipment, depth of contamination, and the nature and extent of debris. Grouping of DMUs and DCUs will also consider geographical similarities (e.g., channels, near shore, etc). In some limited cases, a DCU may only encompass an area of as little as 1 to 2 acres.

Separate from Agency-approved certification decisions, the size range of a given DMU will be developed by the Tetra Tech Team, including appropriate collaboration with the A/OT, based on operational factors associated with dredging in order to facilitate timely and cost-effective completion of activities within individual work units. The final size and grouping of DMUs will be determined considering Tetra Tech Team’s operational plans, also considering geographic

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similarities within and between DMUs. In general, DMUs will typically range from 0.5 to 2 acres. Figure 9-1 presents a preliminary layout of DMUs and DCUs for the 2009 dredging area. Final DMU and DCU boundaries will be developed in the 2009 RA Work Plan based on the final 2008 infill sampling, updated geostatistical analyses, and associated engineering evaluation (e.g., DMU/DCU boundaries adjusted to correspond to RD and 2008 infill sampling locations; see below.)

**Post-Dredge Monitoring and Sampling.** After bathymetric monitoring confirms that the target dredge elevation has been achieved within 0.1 foot of the required elevation in at least 90 percent of a given DMU, sediment grab and/or core samples will be collected to characterize residual sediments and to inform the selection of appropriate management actions if residual PCB concentrations above the RAL are identified.

Sediment cores (potentially supplemented with surface grab samples) will be collected from each pre-dredge sampling location within a given DMU. Sediment cores/grab samples collected at each sampling location will be sectioned into 6-inch intervals, and corresponding depth intervals (e.g., 0- to 6-inch and 6- to 12-inch segments) will be composited within each DMU. In addition, aliquots of each individual surface and subsurface sample (see below) used to create the composite will be archived for potential future testing. Verification samples representative of a given DMU will be prepared as composites for chemical analysis. Composite sediment samples will be made up of individual samples collected as practicable from RD and 2008 in-fill sampling locations, achieving an overall average pre-dredge sampling density in upper OU 3 dredge areas of approximately 5 samples per 2 acres. An equal aliquot from each of the individual samples will be mixed together to form the composite sample, and the remaining material from the individual samples will be separately archived for possible future analysis.

The composited surface (0- to 6-inch) samples representative of a given DMU will be analyzed for total solids, dry density, and total PCBs. In addition to the surface composite from each DMU, the 6- to 12-inch interval from a randomly selected 10 percent of the DMUs will be also be analyzed for total solids, dry density, and total PCBs to verify that the geostatistical model (refined based on pre-construction in-fill sampling) has accurately defined the depth of contamination above the RAL (i.e., identifying undisturbed residuals). If undisturbed residuals significantly above action levels described in the ROD Amendment are identified in the 6- to 12-inch composite samples on a consistent basis, the technical workgroup, including the A/OT, will determine appropriate response actions, potentially including increasing the frequency of subsurface verification sampling.

DMU composite samples of the surface and subsurface sediments, respectively, will be arithmetically averaged with corresponding depth intervals from other DMU composites in the same DCU. PCB concentrations for each DCU will be evaluated for compliance with the ROD and ROD Amendment as described below.

**Post-Dredge Evaluation.** Consistent with the ROD Amendment, and subject to further workgroup discussion, the post-dredge sampling data will be evaluated initially against the following criteria:

- If the average surface (0- to 6-inch) composite sediment PCB concentration in a given DCU is less than 1.0 ppm, no post-dredge management (including sand cover) will be needed.

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- If the average surface (0- to 6-inch) composite sediment PCB concentration in a given DCU is greater than 1.0 ppm, an initial screening using the following criteria will be performed to determine if a sand cover may be suitable for residuals management, consistent with the ROD Amendment:
    - Arithmetic mean of all 0- to 6-inch DMU composite samples within a DCU  $\leq 10.0$  ppm
    - Arithmetic mean of all DMU composite samples within a DCU for layers below the upper 0- to 6-inch interval  $\leq 1.0$  ppm
  - If the average surface (0- to 6-inch) composite sediment PCB concentration in a given DCU is greater than 10 ppm, and/or if the average subsurface (layers below 6 inches) composite sediment PCB concentration in a given DCU is significantly greater than 1.0 ppm, the Tetra Tech Team and A/OT will collaboratively determine the appropriate extent of areas requiring additional response. An engineering evaluation will be conducted to determine the most appropriate residual management action(s). The engineering evaluation will consider the following:
    - Calculation of the percent PCB mass removed to date within each DCU, along with updated mass per unit area calculations that provide increased statistical confidence relative to pre-dredge estimates of PCB mass
    - Practicability, technical feasibility, cost-effectiveness, and implementability factors (e.g., layer thickness, PCB concentration, and density)
    - Consideration of the residual management (if any) in adjacent DCUs

For areas requiring an engineering evaluation, updated mass per unit area calculations (as well as percent PCB mass removal estimates) will be developed for each DCU on an area-weighted average basis.

In order to expedite response actions, it may be appropriate to focus supplemental response actions in a DCU within individual DMUs (or portions thereof). To inform the engineering evaluation, individual composite samples representing each DMU within the DCU may be analyzed to determine the spatial and vertical extent of sediment significantly exceeding the 1.0 ppm RAL. In the event that PCB concentrations exceeding 1.0 ppm are identified in subsurface (below 6 inches) composite samples on a recurring basis, the Tetra Tech Team and Response Agencies will discuss additional evaluation of individual archived aliquot samples, as appropriate.

Potential response and adaptive management actions (e.g., balancing the need for real-time decisions, maintaining productivity, and statistical rigor) will be refined during the implementation of the RA, incorporating A/OT input. The following section further describes the process by which post-dredge engineering evaluations would be conducted and the need for an expedited decision-making process.

**Post-Dredge Expedited Engineering Evaluations.** For those DCUs that exceed the initial screening criteria summarized above, a more detailed post-dredge engineering evaluation will be performed on a case-by-case basis to identify post-dredge contingency response decisions appropriate within all or a portion of a given DCU. Possible management actions include placement of 6 or more inches of sand cover; placement of an engineered cap; additional dredging (followed by resampling); and additional dredging immediately followed by placement

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of a sand cover or engineered cap. Because such contingency response decisions will need to be made in “real time” to facilitate certification of DCUs on an approximate 1- to 2-week frequency (and potentially more rapidly in certain RA scenarios), such evaluations will need to be performed on an expedited basis. The section below describes key elements of the expedited post-dredge engineering evaluation. In order to facilitate an expedited engineering evaluation, the Tetra Tech Team will provide to the A/OT boring logs, analytical/geotechnical data, photos, bathymetric results in an overlay fashion, dredge cuts, volume of sediment removed (in situ and processed), and approximate mass of PCB removed from the DCU.

The initial step of the expedited engineering evaluation will be analysis (likely on a quick turn-around basis) of individual aliquot samples from DCU and/or DMU composites, in order to provide a detailed characterization of the spatial extent and variability of PCB concentrations within a given DCU. These data will then be compiled into tabular and graphical summaries of layer thicknesses, PCB concentrations, densities, and PCB mass distributions within the DCU. Available information concerning remedial actions in adjacent DCUs, shoreline stability, presence of hardpan or bedrock immediately underlying the residual sediment layers, and the presence of debris and infrastructure within the DCU will also be compiled. The engineering evaluation will also consider the presence or indication of disturbed sediment that is not typical of generated residuals (i.e., higher solids content, thicker intervals, etc.).

The compiled data will be used to develop cost-effectiveness and implementability factors specific to that DCU, including evaluations of sediment dredgeability and consistency with adjacent remedial actions. If only a thin layer of sediment is present that contains PCB concentrations only marginally above the RAL, there may be little technical rationale supporting a re-dredging response, as discussed in the ROD Amendment. On the other hand, higher PCB concentrations and/or thicker layers may indicate a need to redredge. The volume of sediment with PCB concentrations below the RAL that would likely be removed if dredging were to be selected as the response action is also an important element of the evaluation. The design of prospective engineered caps will be consistent with that used for areas remediated by capping or by partial dredging followed by capping, as described in the ROD Amendment, BODR, 30 Percent Design report and in the 60 Percent Design, Volume 2. Operational efficiencies will be developed consistent with standard accepted dredging and cover/capping practices. The overall cost effectiveness of each response action under consideration will include capital and operation, maintenance, and monitoring costs. Items common to all response actions or indirect costs would not normally be included in the cost effectiveness evaluation. Additional discussion of engineering evaluations and contingency response actions is presented in the Adaptive Management and Value Engineering Plan, presented as Appendix E of the 60 Percent Design, Volume 2.

Protocols for sediment sampling and analysis are provided in the RD SAP/QAPP and the 2008 SAP/QAPP Addendum (Tetra Tech EC, Inc 2008).

The QA/QC Manager is responsible for monitoring outside laboratory operations to verify the following:

- Satisfactory performance of tests
- Location of tests
- Frequency of tests

- Calibration of test equipment (calibration program)
- Test results
- Documentation (including acceptance criteria)

Submittals from testing laboratories will be inspected, reviewed, and managed in accordance with the approved submittal procedures contained in the project-specific CQC Plan.

### 9.3 EFFLUENT DISCHARGE MONITORING

TSS concentrations in the water pumped from the clarifiers (thickeners) to the wastewater treatment system and in the treated water discharged from the wastewater treatment system will be monitored to ensure efficient operation of the system. Based on preliminary discussions with WDNR, the effluent discharge monitoring requirements for this project are expected to be same as for the OU 1 and Phase 1 projects, as summarized in Table 9-1.

**Table 9-1.** Discharge Monitoring Requirements

Parameter	Sampling Frequency
Mercury	Once per week
PCBs	Daily sampling using ISCO (or equivalent) automatic sampler. Sample made up of automatic composites based on discharge flow rate. Discrete samples may also be used in combination with flow proportional sampling.
Biochemical oxygen demand	
Ammonia	
TSS	
pH	

Notes:

PCBs – polychlorinated biphenyls

TSS – total suspended solids

Real time monitoring will be conducted on the influent and effluent using continuous monitoring instrumentation. In addition, a refrigerated auto-sampler (ISCO Model 4700 or equivalent) will be utilized to collect daily composite effluent samples for PCBs, ammonia, biochemical oxygen demand, pH, and TSS. Discrete grab samples may be periodically collected for various parameters in order to evaluate performance of system processes. Mercury sampling and analysis will require special low-level clean techniques.

### 9.4 TESTING PROCEDURES

Testing is an important part of the QA/QC program. Tests will be performed to determine whether procedures are producing the desired results. Proposed testing and procedures will be documented in task specific CQC Plans to be reviewed prior to the start of work. They will list the project-specific required QC tests and specify whether the tests are to be performed by an independent approved testing laboratory, or by TtEC personnel in facilities on site. The scope of the QC testing is addressed in the CQC Plan and involved personnel will be aware of the methods to be used, and the extent of the testing. In addition, test reporting requirements are defined; facilities and testing equipment verified, calibrated, and accepted; and personnel are qualified. Testing procedures will be developed, approved, and implemented to perform the tests specified for each definable feature of work of the project as applicable or specified. The type, number, and frequency of the tests will be as specified in the CQC Plan and will include the requirements of referenced standards or regulatory guidelines.

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## **9.5 TESTS**

Testing performed during project activities will be documented on QC test forms, which will include the following information:

- Test name/procedure/frequency
- Specification paragraph number
- Responsible laboratory/personnel
- Acceptance criteria
- Statement of acceptability of the feature of work being tested

The QA/QC Manager, or designee, is responsible for monitoring the testing activities to verify conformance to the contract requirements. The monitoring will include on-site project activities and both on and off-site laboratories activities. Monitoring may include the following:

- Sampling methods, locations, and frequencies
- Qualifications of personnel performing test procedures
- Testing procedures
- Test equipment availability and compliance
- Calibration methods and frequency
- Test documentation and results

## **9.6 DOCUMENTATION**

Testing activities and results of the tests and monitoring activities will be included in the Daily QC Report (Appendix A). Test reports, calibration records, and other recording forms used to document test activities will be maintained by the QA/QC Manager.

## **9.7 CONSTRUCTION AND ACCEPTANCE TESTING**

Procedures will be implemented to perform construction and operational inspections and acceptance testing of engineered systems and their components according to approved design specifications. These procedures also provide for an appropriate level of independence for inspection and test personnel, according to the design specifications and CQC Plan requirements. If acceptance criteria are not met, the QA/QC Manager will resolve deficiencies and conduct additional inspections, as required.

Procedures will be established and implemented to demonstrate that inspection and testing of items and processes will be performed as follows:

- Procedures will be used at appropriate levels of independence in the testing program, according to the design specifications and CQC Plan requirements
- Procedures will be implemented and maintained to ensure that measuring and test equipment are of the proper type, range, and accuracy; are properly calibrated, maintained, and used according to design specifications and other planning documents; and are used for operational process monitoring and acceptance

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- Equipment found unsatisfactory for acceptance testing will be recalibrated and certified as within tolerances before using for acceptance testing; the validity of measurements and tests will be repeated as required
  - Measuring and test equipment used in quality-affecting work will be calibrated against certified equipment with known valid relationships to nationally recognized performance standards; if no such standards exist, the basis for the calibration will be documented

## **10.0 MONITORING AND MAINTENANCE MEASURES**

### **10.1 WATER QUALITY MONITORING (TURBIDITY)**

Total suspended solids (TSS) and turbidity have been used as reliable indicators for other chemicals of concern. Because TSS samples must be collected and submitted to an analytical laboratory, monitoring for a TSS surrogate (e.g., turbidity) in real time in the field will be employed. If water quality meets the TSS limit of no greater than an 80 mg/L increase above ambient concentrations, water quality effects from other constituents would not be expected. Real time turbidity measurements during sediment removal operations have been proven to be an effective way to provide meaningful feedback regarding the effectiveness of controls and water quality impacts.

#### **10.1.1 Pre-Construction Ambient Monitoring**

Prior to the start of any marine activities, water quality monitoring will be performed to establish ambient water quality (turbidity) conditions, and to develop a quantitative correlation between turbidity levels and TSS concentrations. Pre-removal monitoring will be conducted over a range of conditions, including a range of river flows, seiches, and runoff events.

#### **10.1.2 Point of Compliance**

During dredging operations, upstream and downstream in situ turbidity monitoring will be conducted using an in situ nephelometer. The upstream (background) monitoring station will be located approximately 500 feet upstream of the sediment removal equipment. The exact location will be representative of the water that will pass through the dredge area (i.e., not in the main river channel where the water is flowing faster and not so close to the dredge area as to be affected by remediation activities). The downstream monitoring station (point of compliance) will be located no less than 250 feet and no greater than 500 feet downstream of the sediment removal equipment (the length of the mixing zone boundary). The monitoring stations will be periodically repositioned as the sediment removal process moves. At each station, turbidity will be monitored at two depths near surface (within 3 feet of the surface) and intermediate (midpoint of the water column).

#### **10.1.3 Turbidity Monitoring**

Water quality monitoring will be conducted in accordance with Wisconsin state regulations (Chapter NR 105 to ensure that the in-water construction operations do not cause TSS concentrations at the downstream compliance point to increase more than 80 mg/L above background levels (i.e., upstream sampling location). A turbidity action level corresponding to 80 mg/L TSS above background, based on site-specific correlations between turbidity (NTU) and TSS, will be used during dredging operations in OUs 2 through 5, as well as a turbidity trigger level, or early warning criterion, corresponding to 40 mg/L TSS above background.

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Upstream and downstream turbidity measurements will be collected at 15-minute intervals with in situ nephelometers mounted on rafts. Turbidity measurements will be obtained automatically, and results will be transmitted to a base station located at the Resident Engineer's office. In addition, a hand-held turbidity meter will be used to check the raft-mounted, real time turbidity meters at least three times per week.

If the turbidity trigger level (NTU level corresponding to 40 mg/L above background) is exceeded over four consecutive readings (i.e., 60 minutes), the dredge operator will be notified and directed to evaluate dredging BMPs or potentially modify dredging operations. Dredging will be suspended if the turbidity action level (NTU level corresponding to 80 mg/L above background) above background is exceeded over four consecutive readings (i.e., 60 minutes), and dredging will not resume until the turbidity level returns to below the action level (NTU level corresponding to 80 mg/L above background) for four consecutive readings (i.e., 60 minutes), unless it can be demonstrated that dredging is not the cause of the exceedance.

In the event that dredging operations are suspended due to exceedance of the turbidity action level over four consecutive readings (i.e., 60 minutes), the appropriate Response Agencies representatives (determined prior to the start of the project) will be notified within one hour of the start of the shutdown. Actions taken in order to address elevated turbidity measurements will be noted in the Daily Quality Control Report.

Tetra Tech will conduct routine visual observations of water quality to identify potential turbidity plumes that may not be detected or accurately measured by the raft-mounted turbidity meters. If such a plume is visually identified, response actions may include discrete measurements using the hand-held turbidity meter for comparison with the raft-mounted meters, relocation of the raft-mounted meters, and/or potential modification of dredging techniques to reduce unusual or excessive plumes. In the event that turbidity monitoring of a previously undetected plume shows an exceedance of the turbidity action level (NTU level corresponding to 80 mg/L above background) for 60 minutes, then response actions, as described above, would be implemented including potentially suspending dredging operations and collecting water column samples for PCB analysis.

## **10.2 WATER COLUMN PCB ANALYSIS**

In the event that turbidity measurements persistently (i.e., over 60 minutes) exceed the turbidity action level (NTU level corresponding to 80 mg/L above background) due to dredging-induced water quality impacts, discrete water column samples will be collected and analyzed for dissolved (and total) PCB Aroclors.

## **11.0 REPORTING PROCEDURES**

### **11.1 DOCUMENTATION**

The Project Manager will establish a document control system to provide measures for the control of issuing, distribution, storage, and maintenance of quality-related documents, including documents from subcontractors, off-site fabricators, laboratory suppliers, vendors, and other suppliers.

Document controls include the identification of documents and their specified distribution; the identification of those responsible for preparing, reviewing, approving, and issuing documents;

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and the review of documents for adequacy, completeness, and correctness prior to approval and issuance.

Preparation, review, approval, and issuance of documents (including revisions) affecting quality will be controlled to the extent necessary to determine that the documents include the specified requirements and provide adequate procedures or guidelines to perform the intended activities. Such documents may include the following:

- Drawings and Specifications
- Calculations
- Procedures
- Plans
- Reports
- Design Change Notice (DCN)
- Field Change Request (FCR)

The QA/QC Manager, or designee, will review the documents to verify the inclusion of appropriate quality requirements.

## **11.2 DAILY QUALITY CONTROL REPORT**

A Daily QC Report (Appendix A) will be prepared in accordance with the CQAPP and will document the results of construction activities, inspections, testing, and QC activities performed during remedial activities on the project. The Daily QC Report will include the following information:

- Significant and/or unusual occurrences
- Phases of construction in progress
- Material and/or equipment delivered to, or leaving, the site
- Weather conditions and their impact on construction activities
- Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase will be identified (preparatory, initial, follow-up). List of deficiencies will be noted, along with corrective action.
- Details of preparatory, initial, and follow-up phase inspections
- Reference to test reports and/or data
- References to relevant documents (specifications and drawings)
- Submittals and deliverables reviewed, with contract reference, by whom, and action taken
- Off-site surveillance activities, including actions taken
- Description of nonconformance or deficiencies identified
- Instructions given or received
- Changed conditions/delays/conflicts encountered and directives given by the client or their representatives that change the existing contract performance requirements

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Reports will be signed and dated by the QA/QC Manager. The report from the QA/QC Manager will include copies of test reports as well as copies of reports prepared by QC personnel.

### **11.3 DAILY PRODUCTION REPORT**

The Construction Manager will be prepare a Daily Production Report (Appendix A) for each day work was performed on site. The records will include the work of subcontractors and suppliers, and will include the following information:

- TtEC/subcontractor and their area of responsibility including personnel and hours on site
- Operating plant/equipment with hours worked, idle, or down for repair
- Work performed each day, giving location, description, and by whom
- Quantity of materials received at the site with a statement as to acceptability, storage, and reference to specifications/drawings requirements
- Job safety evaluations stating what was checked, results, and instructions or corrective actions
- Instructions given/received and conflicts in the plans and/or specifications
- TtEC's verification statement

These records will indicate a description of the classification of personnel working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records will cover both conforming and deficient features, and will include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Reports will be signed and dated by the Construction Manager, and will include copies of material receipt inspections and daily production reports generated by subcontractors.

### **11.4 STORAGE OF RECORDS**

QC records will be prepared to furnish documentary evidence of the quality of items, services, environmental processes, and engineered systems provided. Records will be maintained and stored in fire-resistant storage facilities at the project site until turnover to the client. The records will be readily retrievable for review and auditing purposes by TtEC personnel, RA Order Respondents, or Response Agencies. The records will be controlled in a manner that prevents loss, damage, or other detrimental conditions of the records. Duplicate records will be maintained in separate storage facilities for a period of 10 years after EPA's notice of completion.

### **11.5 INDEXING AND FILING OF RECORDS**

Only authorized personnel will perform indexing and filing of records, and the records will be maintained in a central filing system under the direction of the Project Manager. Various project file categories and letter designations will organize the project record files. File folders will be divided into appropriate categories based on content, and then the files will be numbered and filed sequentially within each category. Folder tabs will indicate the folder number and file title as it appears on the project index.

A numbered index will be prepared and updated as designated personnel add records. The index will list the individual file folders and the records within them for easy identification. The index will be kept in a separate folder at the front of the project file.

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The QC Manager is responsible for monitoring the control of records and performing scheduled audits or surveillances of the document control system in accordance with the requirements of this CQAPP.

## **12.0 PROCEDURES FOR TRACKING DEFICIENCIES AND CORRECTIVE ACTIONS**

### **12.1 NONCONFORMANCE REPORT**

Work or materials not conforming to the specifications or contract requirements will be identified and documented on an NR (Appendix A). The NR will detail the nonconforming condition, recommended corrective action(s), and disposition of the corrective action(s). The NR will remain open until the nonconforming condition has been satisfactorily resolved and verified by QA/QC personnel.

### **12.2 IDENTIFICATION OF NONCONFORMING ITEMS**

Items identified as nonconforming will be documented on a NR, which will include the following:

- Description of nonconforming item or activity
- Detailed description of nonconformance
- Referenced criteria
- Recommended disposition and corrective action to prevent recurrence (as applicable)
- Affected organization

### **12.3 CONTROL AND SEGREGATION**

The nonconforming materials or items will be controlled to prevent inadvertent use or further processing. Items determined to be nonconforming will be identified and segregated from acceptable items.

### **12.4 DISPOSITION**

The disposition of NRs will include the necessary actions required to bring the nonconforming condition to an acceptable condition and may include reworking, replacing, retesting, or re-inspecting. Implementation of the disposition may be done in accordance with the original procedural requirements, a specific procedure or instruction, or an FCR.

### **12.5 CORRECTIVE ACTIONS**

In addition to resolving identified nonconforming conditions, the corrective action record will also address the initial cause of adverse conditions and establish methods and controls to prevent recurrence of the same or similar types of nonconformance. The QA/QC Manager will track the nonconformance and corrective actions to identify any trends in the causes of the nonconforming conditions and then initiate necessary actions to prevent recurrence. The QA/QC Manager will also monitor the corrective actions to verify that they were properly implemented and accepted and that the NR was closed out.

Additional requirements for handling nonconformance and corrective actions during sampling and analytical activities are defined in the SAP.

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## **12.6 EVENT REPORTS**

Events are reported in accordance with Corporate Procedure, Event Reporting, and Investigation.

## **12.7 REFERENCE TO CORPORATE PROCEDURES**

TtEC maintains standardized corporate policies and procedures for providing environmental and remediation services. These corporate documents are the basis for developing project-specific plans and procedures to incorporate unique requirements and special scopes of work. TtEC personnel have ready access to our comprehensive set of science and engineering procedures, and quality and safety programs and policies maintained on-line in our Corporate Reference Library (CRL).

## **13.0 PROCEDURES FOR CONTROLLING DESIGN ACTIVITIES**

### **13.1 SCOPE OF DESIGN ACTIVITIES**

Activities involving the design, construction, and operation of environmental technology are planned and documented. Project-specific design planning involves TtEC, key users, vendors, and the client personnel responsible for the technology. Project, processes, and procedures will be established and implemented to ensure that systems are designed using sound engineering/scientific principles and appropriate standards. Implementation of these procedures ensures control of design inputs, processes, outputs, configuration changes, interfaces, and quality records, and provide for efficiency, cost effectiveness, accuracy, practicality, and constructability.

Design process control will provide for the following:

- Correct translation of design inputs into design outputs
- Effective coordination and interfaces of organizations comprising the client, client representatives, TtEC's personnel, and subcontractors participating in the design process
- Acceptance and verification of design outputs in a timely manner
- Control and systematic performance of design and engineering assignments
- Control and appropriate approval of design changes made in the field, after issue of design documents for construction or fabrication

### **13.2 REFERENCE TO CORPORATE DESIGN PROCEDURES**

Engineering and design activities include but not limited to, the preparation of calculations, analyses, drawings, and specifications will be performed in accordance with TtEC written procedures and instructions, and will be subject to review and/or verification to ensure correctness and completeness.

Corporate design procedures maintained on-line in our CRL will form the basis of design control activities. These procedures may be modified to meet specific project contractual requirements or be used as written. The following procedures are incorporated into this CQAPP by reference:

- ENG-1, General Procedure for Professional Activities
- ENG-2, Developing and Issuing Engineering Design Documents
- ENG-3, Developing, Issuing, and Revising Other Engineering Documents

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### **13.3 RESPONSIBILITIES FOR DESIGN**

The Project Manager is responsible for ensuring that design documents are prepared that meet the project technical requirements. The Project Manager coordinates overall design activities and monitors compliance with the project scope, schedule, budget, and level of quality. The Project Manager is also the interface with data collection efforts performed as part of field studies and investigations as well as for all design changes generated as a result of field activities.

The Project Engineer/Design Lead is responsible for preparing an integrated design that meets project requirements. The Project Engineer is responsible for furnishing project-specific design criteria to personnel performing the design function. At the initiation of the project, the Project Engineer is responsible for determining the design criteria, applicable technical requirements, and professional engineering sealing requirements for the design documents. The Project Engineer is responsible for developing an Inter-discipline Review Matrix for the project documents.

The Professional Engineer or designee has the prime responsibility for affixing their signature and seal on criteria, drawings, reports, specifications, and other technical documents developed for the project. The Professional Engineer is involved in the engineering/design of the project, and is the Project Engineer or Senior Design Engineer.

### **13.4 PREPARATION, REVIEW, AND APPROVAL OF DESIGN DOCUMENTS**

The detailed procedures for the preparation, review, and approval of design documents are provided in the Corporate Engineering Procedures referenced in Section 13.2. These procedures ensure that the design issues discussed in the following bullets are addressed.

- Design documents, such as specifications, calculations, and drawings, will be consistent with established design criteria, and remedial design documents will be in compliance with the contract requirements and appropriate regulatory requirements and national standards applicable to the project
- Specifications and standards referenced in the contract, including addenda, amendments, and errata, will govern the design of engineered systems
- Persons other than those who designed the process or item will verify design adequacy; complex designs will be verified at critical stages of the development process to ensure correction of deficient conditions
- Computer software used for design and associated design calculations will be verified, validated, and documented in accordance with written procedures
- Design documents will specify technical and quality acceptance criteria and detail the inspection and test requirements to verify acceptable construction and operation
- Complex systems will be examined and as-built drawings will be developed to depict actual configurations
- Submittals will be prepared, maintained, and reviewed in accordance with Section 6.0 of this CQAPP

Reports, technical plans, design documents, and other technical deliverables are subject to TtEC's internal review and approval process. The Project Engineer will ensure that design

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drawings are transmitted to reviewers. A record of review comments will be documented in one of the following four ways:

- A memorandum listing itemized comments from the reviewer to the author and a corresponding response memorandum from the author to the reviewer
- A marked-up copy of the document with the reviewer's comments and signature with the author's written response on the same copy
- A completed Comment Resolution Sheet
- Appropriate approval boxes on forms, graphics, and printouts that have been initialed and dated

### **13.5 DESIGN SCOPING AND REVIEW MEETINGS**

Design scoping meetings are conducted during the project planning process. The purpose of the scoping meetings are to determine the project technical requirements; develop schedule, cost, and staffing plans; review existing data; perform site visits as necessary; and develop the project technical approach. The Project Manager is responsible for scheduling and leading the design scoping meetings. The Project Engineer and Design Engineer are active participants in the scoping process, along with active involvement by the client. Design review meetings will be conducted as needed in accordance with ENG-5, Design Classification Levels and Project Engineering Reviews.

### **13.6 CHANGES TO DESIGN DOCUMENTS**

Revisions to drawings, specifications, reports, and technical documents will be processed, approved, and sealed following the procedures contained in ENG-3, Developing and Issuing Engineering Documents. Proposed changes that are initiated by engineering will be processed using a DCN prepared by the Project Engineer or Lead Discipline Engineer. Changes initiated during construction by the Resident Engineer (or equivalent) will be processed using an FCR.

### **14.0 REFERENCES**

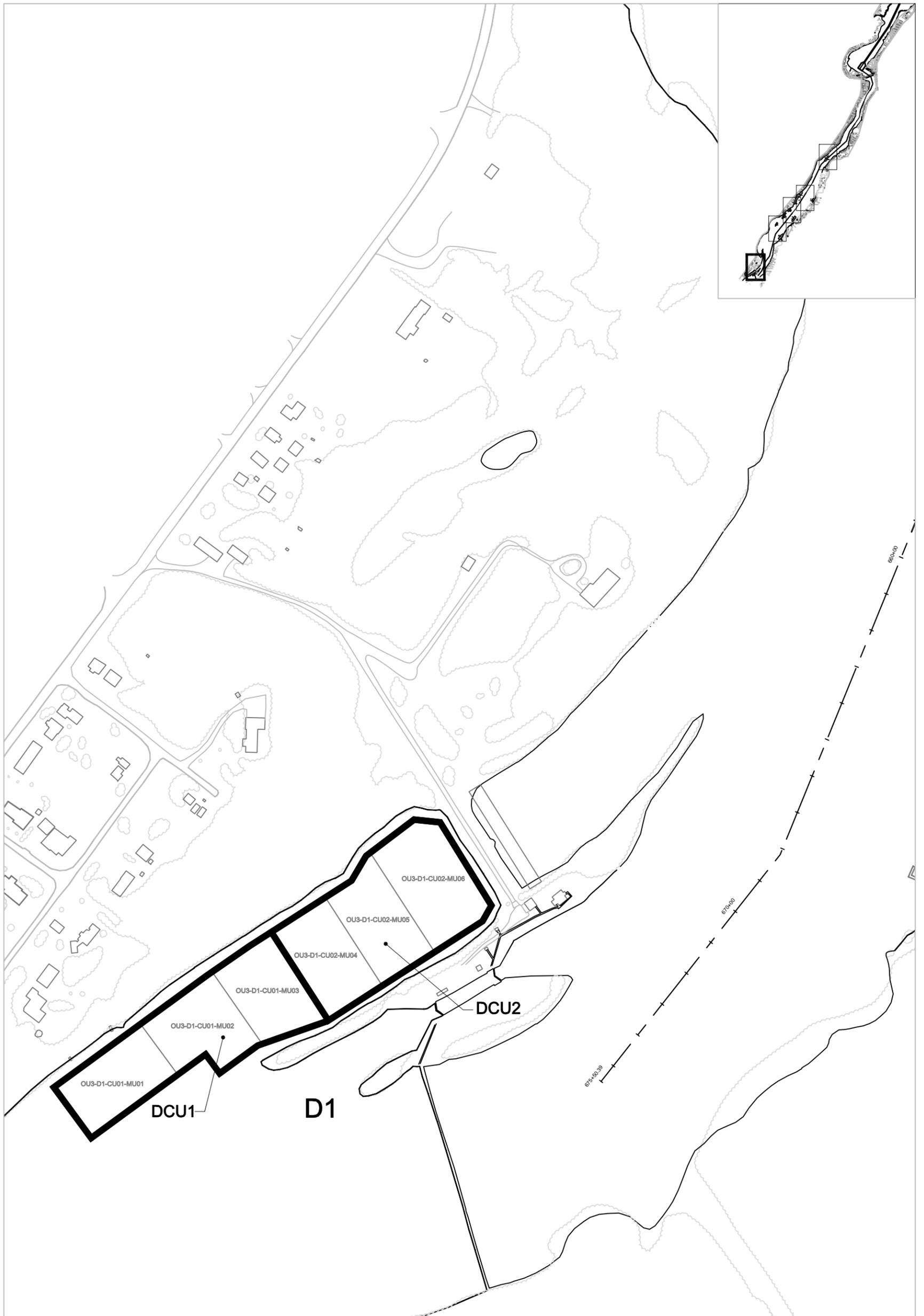
- Tetra Tech EC, Inc. 2008. Lower Fox River Operable Units 2 through 5 Phase 2A Remedial Action Sampling Plan Addendum, 2008 Sampling. Prepared for Appleton Papers Inc, Georgia Pacific Consumer Products, LP, and NCR Corporation for submittal to Wisconsin Department of Natural Resources and U.S. Environmental Protection Agency. Draft, June 2, 2008.
- WDNR and USEPA, 2002. Record of Decision, Operable Unit 1 and Operable Unit 2. Lower Fox River and Green Bay Wisconsin. December 2002.
- WDNR and USEPA, 2003. Record of Decision, Operable Units 3, 4, and 5. Lower Fox River and Green Bay Wisconsin. June 2003.
- WDNR and USEPA, 2007. Record of Decision Amendment, Operable Unit 2 (Deposit DD), Operable Unit 3, Operable Unit 4, and Operable Unit 5 (River Mouth). Lower Fox River and Green Bay Superfund Site. June 2007.

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USEPA, 2006. Amended Administrative Settlement Agreement and Order on Consent in the matter of Lower Fox River and Green Bay Site. Respondents: Georgia-Pacific Consumer Products LP (formerly known as Fort James Operating Company) and NCR Corporation. CERCLA Docket No. V-W-'04-C-781. U.S. EPA Region 5.

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## FIGURES

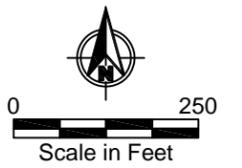


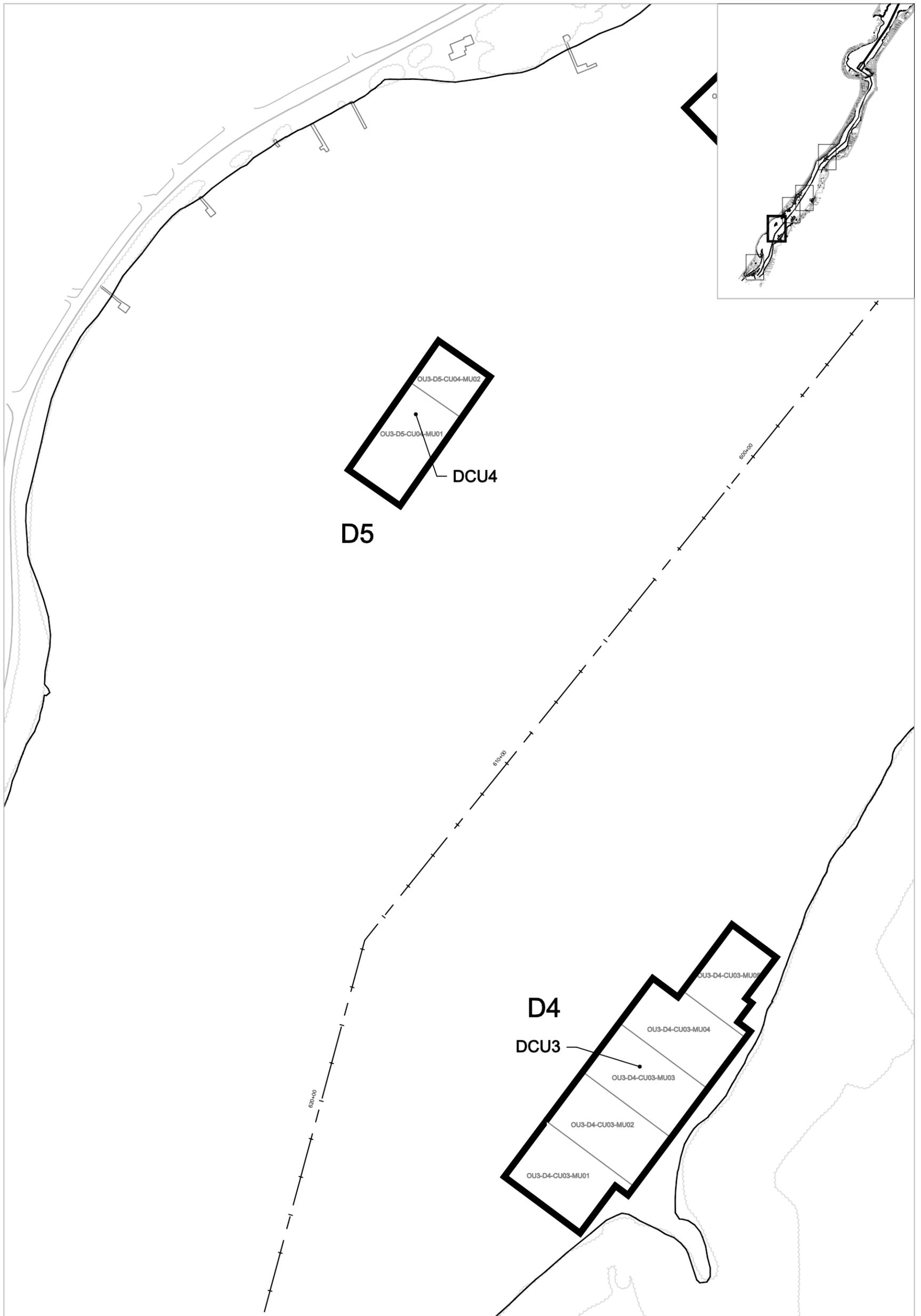
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OU3-D1-CU01-MU02 - DREDGE MANAGEMENT UNIT (DMU) IDENTIFICATION

**—** - DREDGE MANAGEMENT UNIT (DMU) BOUNDARY

**D1** - DREDGE MANAGEMENT AREA

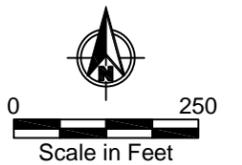


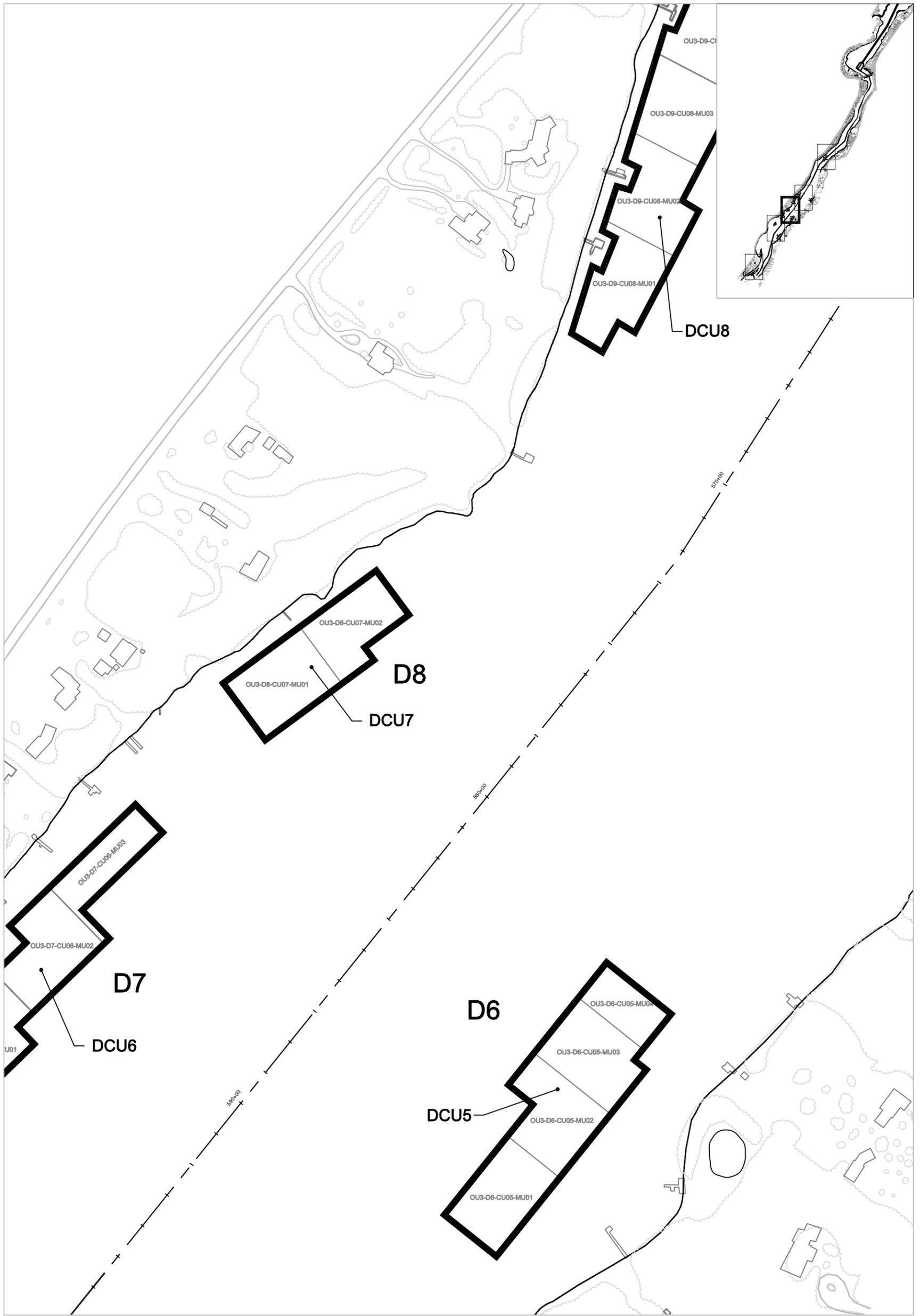


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 - DREDGE MANAGEMENT UNIT (DMU) BOUNDARY

OU3-D1-CU01-MU02 - DREDGE MANAGEMENT UNIT (DMU) IDENTIFICATION

**D1** - DREDGE MANAGEMENT AREA



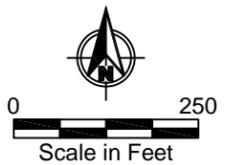


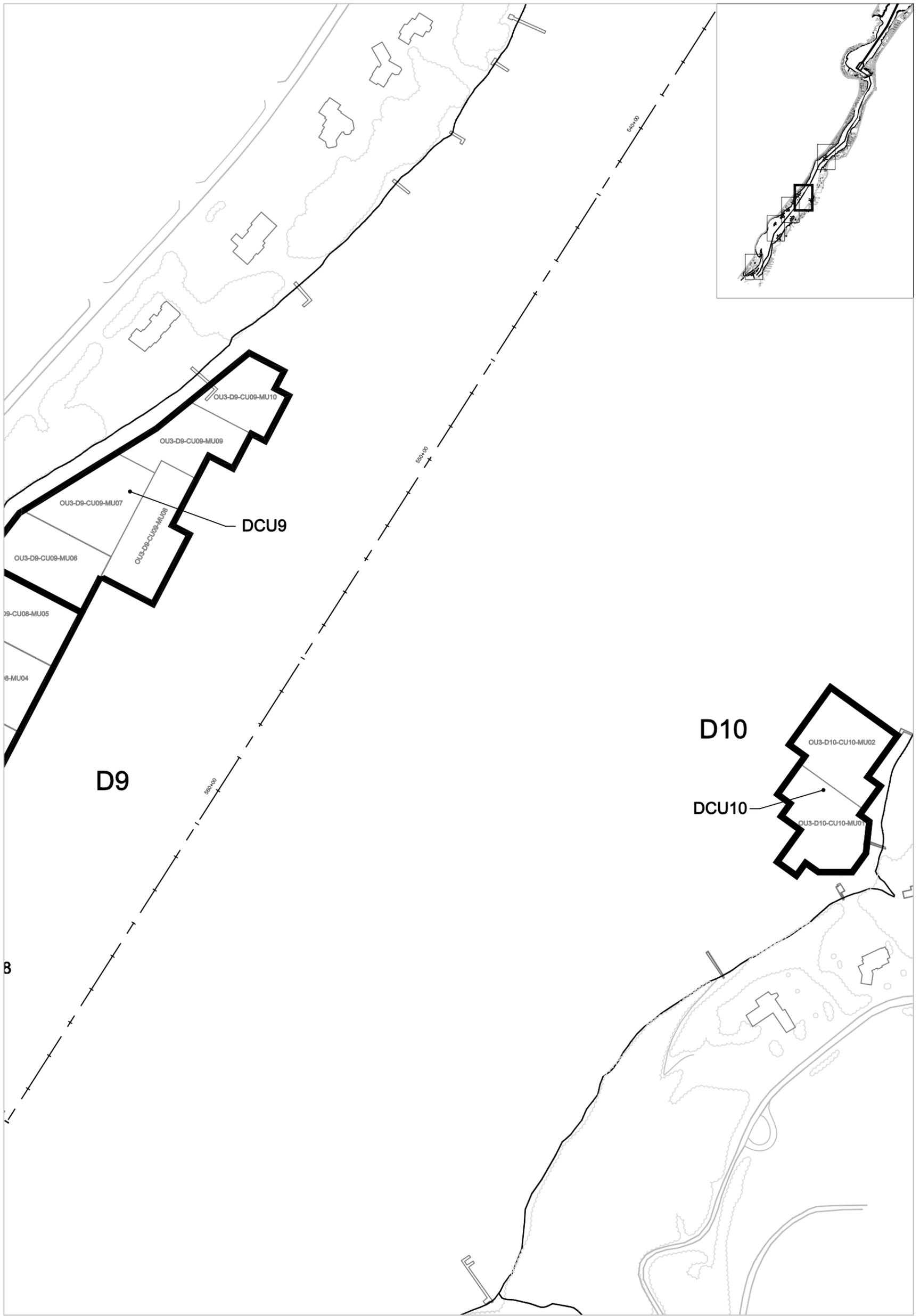
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**- - -** - DREDGE MANAGEMENT UNIT (DMU) BOUNDARY

OU3-D1-CU01-MU02 - DREDGE MANAGEMENT UNIT (DMU) IDENTIFICATION

**D1** - DREDGE MANAGEMENT AREA

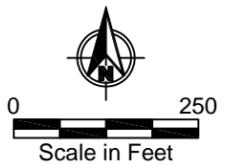


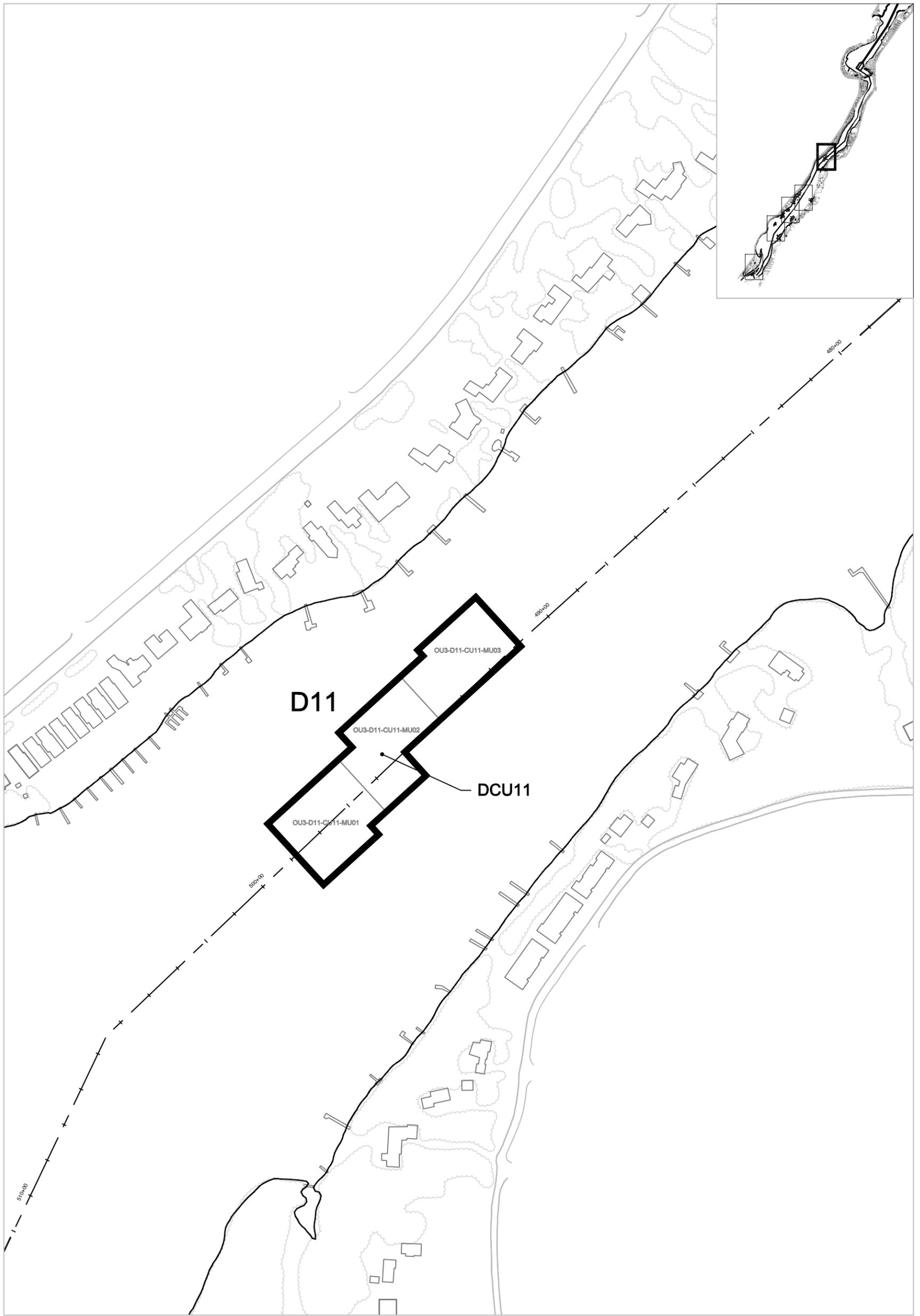


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 - DREDGE MANAGEMENT UNIT (DMU) BOUNDARY

OU3-D1-CU01-MU02 - DREDGE MANAGEMENT UNIT (DMU) IDENTIFICATION

**D1** - DREDGE MANAGEMENT AREA



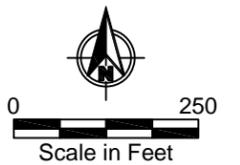


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OU3-D1-CU01-MU02 - DREDGE MANAGEMENT UNIT (DMU) IDENTIFICATION

**- - - - -** - DREDGE MANAGEMENT UNIT (DMU) BOUNDARY

**D1** - DREDGE MANAGEMENT AREA



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**ATTACHMENT A  
EXAMPLE PROJECT REPORTS**

**Preparatory Phase Inspection Checklist  
Initial Phase Inspection Checklist  
Daily Production Summary Report  
Daily Construction Quality Control Report  
Nonconformance Report**

## PREPARATORY PHASE INSPECTION CHECKLIST

CONTRACT No.		REPORT No.	
PROJECT NAME/NUMBER		DATE/SHIFT	
ITEM/ACTIVITY INSPECTED			
DRAWING REFERENCE	REV.	SPECIFICATION REFERENCE	REV.
WORK PLAN APPROVED	YES/NO	REFERENCE No.	
CQC PLAN WRITTEN	YES/NO	REFERENCE No.	
REQUIRED SUBMITTALS APPROVED	YES/NO	REFERENCE No.	
REQUESTS FOR INFORMATION ANSWERED	YES/NO	REFERENCE No.	
FCRs/DCNs APPROVED/ISSUED	YES/NO	REFERENCE No.	
NONCONFORMANCES DISPOSITIONED/CLOSED	YES/NO	REFERENCE No.	
MATERIAL/EQUIPMENT AVAILABLE	QUANTITY	CONDITION	

---

## PREPARATORY PHASE INSPECTION CHECKLIST

PROJECT NAME & No.	REPORT No.
ITEM/ACTIVITY INSPECTED	DATE/SHIFT
PREPARATORY SITE CONDITIONS	
CONTRACT VARIANCE	
ACTIVITIES/ITEMS REQUIRING COMPLETION	
COMMENTS	
MEETING ATTENDEES	

---

NAME

---

SIGNATURE

---

TITLE

## INITIAL PHASE INSPECTION CHECKLIST

CONTRACT NO.		REPORT NO.		
PROJECT NAME		DATE/SHIFT		
LOCATION				
ITEM/ACTIVITY INSPECTED				
DRAWING REFERENCE	REV.	DRAWING REFERENCE	REV.	
SITE CONDITIONS				
INSPECTION ATTRIBUTE	SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA	INSPECTION RESULT	ACCEPT/REJECT
REQUESTS FOR INFORMATION ISSUED/SUBJECT			REFERENCE NO.	
CHANGE DOCUMENTS (i.e. FCRs) ISSUED/SUBJECT			REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT			REFERENCE NO.	
REINSPECTION REQUIRED	YES	NO		

---

## INITIAL PHASE INSPECTION CHECKLIST

PROJECT NAME & NO.	REPORT NO.
ITEM/ACTIVITY INSPECTED	DATE/SHIFT
COMMENTS	
CONTRACT VARIANCE	
ATTENDEES	

---

NAME

SIGNATURE

TITLE

<b>PROJECT:</b>		<b>PROJECT NO:</b>					
<b>SUBCONTRACTOR:</b>		<b>DATE:</b>					
<b>DAILY PRODUCTION SUMMARY</b>							
<b>CONTRACTOR HOURS</b>							
<b>NAME:</b>	<b>TRADE:</b>	<b>REG HOURS:</b>	<b>OT HOURS:</b>	<b>STANDBY HOURS:</b>	<b>TOTAL HOURS:</b>	<b>CUM HOURS:</b>	<b>LOCATION/TASK:</b>
					0.0		
					0.0		
					0.0		
					0.0		
					0.0		
					0.0		
					0.0		
					0.0		
					0.0		
<b>TOTAL FOR SUBCONTRACTOR:</b>		0.0	0.0	0.0	0.0	0.0	
<b>TOTAL FOR SUBCONTRACTOR + ALL LOWER TIERS:</b>		0.0	0.0	0.0	0.0	0.0	

<b>SUBCONTRACTOR DAILY PRODUCTION SUMMARY</b>							
<b>LOWER TIER SUBCONTRACTOR NAME:</b>							
<b>NAME:</b>	<b>TRADE:</b>	<b>REG HOURS:</b>	<b>OT HOURS:</b>	<b>STANDBY HOURS:</b>	<b>TOTAL HOURS:</b>	<b>CUM HOURS:</b>	<b>LOCATION/TASK:</b>
N/A	N/A				0.0		
					0.0		
					0.0		
					0.0		
<b>TOTALS:</b>		0.0	0.0	0.0	0.0	0.0	

<b>LOWER TIER SUBCONTRACTOR NAME:</b>							
<b>NAME:</b>	<b>TRADE:</b>	<b>REG HOURS:</b>	<b>OT HOURS:</b>	<b>STANDBY HOURS:</b>	<b>TOTAL HOURS:</b>	<b>CUM HOURS:</b>	<b>LOCATION/TASK:</b>
N/A	N/A				0.0		
					0.0		
					0.0		
					0.0		
					0.0		
<b>TOTALS:</b>		0.0	0.0	0.0	0.0	0.0	

LOWER TIER SUBCONTRACTOR NAME:							
NAME:	TRADE:	REG HOURS:	OT HOURS:	STANDBY HOURS:	TOTAL HOURS:	CUM HOURS:	LOCATION/TASK:
N/A	N/A				0.0		
					0.0		
					0.0		
					0.0		
					0.0		
<b>TOTALS:</b>		0.0	0.0	0.0	0.0	0.0	
PRODUCTION SUMMARY BY TASK							
SCHEDULE OF VALUE:	DESCRIPTION:				QTY:	UNIT:	CUM TOTAL:
OPERATING PLANT OR EQUIPMENT (NOT HAND TOOLS)							
PLANT/EQUIPMENT:	DATE OF ARRIVAL:	SAFETY CHECK:	HOURS USED:	REPAIR / IDLE HRS:	TOTAL HOURS:	CUM HOURS:	
					0.0	N/A	
					0.0		
					0.0		
					0.0		
					0.0		
					0.0		
					0.0		
<b>COMMENTS:</b>							
<p>I certify this personnel report is complete and correct and all personnel/equipment listed did work the hours noted on this project on this date.</p>							
NAME:				TITLE/COMPANY:			
SIGNATURE:				DATE:			

<b>PROJECT:</b>	<b>REPORT NO:</b>
<b>DATE:</b>	<b>PROJECT NO:</b>
<b>TASK:</b>	<b>SUBCONTRACTOR:</b>
	<b>LOWER TIER SUB:</b>

**DAILY QUALITY CONTROL REPORT**

**SUMMARY OF CONSTRUCTION ACTIVITIES:**

--

**QUALITY CONTROL ACTIVITIES PERFORMED:**

--

**TESTS PERFORMED (ATTACH COPY OF TEST RESULTS):**

--

**MATERIALS RECEIVED (NOTE INSPECTION RESULTS AND STORAGE PROVIDED):**

--

**FIELD ACTION ITEMS NOTED AND CORRECTIVE ACTIONS TAKEN:**

--

**ADDITIONAL DOCUMENTATION SUBMITTED (E.G. TEST RESULTS, CHECKLISTS, ETC.):**

--

Contractor's Verification: On behalf of the Contractor, I certify this report is complete and correct, and all materials used and work performed during this reporting period are in compliance with the contract plans and specifications to the best of my knowledge, except as may be noted above.

NAME:	TITLE/COMPANY:
SIGNATURE:	DATE:
REVIEWED BY:	TITLE/COMPANY:
SIGNATURE:	DATE:

## NONCONFORMANCE REPORT

PROJECT NAME & NO.		AREA/LOCATION		NONCONFORMANCE REPORT NO.	
RESPONSIBLE CONTRACTOR					
REFERENCE DWG. NO.		REV.	SPECIFICATION NO.		REV.
1			1		
2			2		
DESCRIPTION OF NONCONFORMANCE					
NAME & SIGNATURE		TITLE/COMPANY			DATE
RECOMMENDED DISPOSITION					
NAME & SIGNATURE		TITLE & COMPANY			DATE
ENGINEERING ACCEPTANCE OF DISPOSITION					
NAME & SIGNATURE		TITLE & COMPANY			DATE
DESIGN CHANGE REQUIRED		YES	NO		
DOCUMENT MODIFIED		MODIFICATION TYPE/IDENTIFICATION			DATE ISSUED
CERTIFICATION THAT REWORK OR REPAIR DISPOSITIONS COMPLETED					
NAME & SIGNATURE		TITLE & COMPANY			DATE
QC VERIFICATION OF DISPOSITION COMPLETION					
NAME & SIGNATURE		TITLE & COMPANY			DATE
CLIENT ACCEPTANCE OF NONCONFORMANCE DISPOSITION COMPLETION					
NAME & SIGNATURE		TITLE & COMPANY			DATE

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**ATTACHMENT B  
CORPRATE QUALITY PROCEDURES**

**Preparation Review and Approval of QA/QC Plans  
Selection and Qualification of Quality Control Personnel  
Source Verification  
Receiving Inspection  
Control of Special Processes  
Quality Control on Risk-Sensitive Projects  
Control of Measuring and Test Equipment  
Control of Nonconforming Conditions  
Corrective Action  
Surveillance Procedure  
Lessons Learned Procedure**

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## QP-1: Preparation Review and Approval of QA/QC Plans

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### Purpose

This procedure establishes the responsibilities and requirements for preparation, review and approval of QA/QC Plans.

**Version Date:** 03/01/2002 -  
New

**Original Issue Date:** 03/01/2002

**Category:** Company  
Procedures

**Sub Category:** Departmental/Discip  
line

**Keyword:** Field

**Index:** Activities/Quality  
Assurance

**Approved by:**



**Sections:** ESQ - Quality Programs

**Document Type:** Procedure

**Document Owner:** Mike Nicol

### Table of Contents

- 1.0 PURPOSE
- 2.0 SCOPE
- 3.0 MAINTENANCE
- 4.0 DEFINITIONS
- 5.0 DISCUSSION
- 6.0 REFERENCES

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## **1.0 PURPOSE**

The purpose of this procedure is to define responsibilities and provide requirements and guidance for project quality program planning.

## **2.0 SCOPE**

This procedure applies to all Tetra Tech EC, Inc. (TtEC) projects that warrant a quality program planning element via the work plan, project management plan, or stand alone QA/QC plan. The level of quality for a project is established during the project proposal phase and is further refined during the life cycle of design and engineering, and throughout the construction and operations effort. Determination of whether a written Quality Assurance/Quality Control (QA/QC) Plan is warranted is documented on the Project Planning Element Checklist (Company Procedure PO-1, Attachment 2).

## **3.0 MAINTENANCE**

The Vice President, Environmental, Safety, and Quality (ESQ) is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to the Vice President, ESQ and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

The following definitions are provided for the purpose of understanding their intent as they pertain to this procedure and projects requiring quality program planning.

### **4.1 Contractor Quality Control (CQC) Plans**

The Project CQC Plan is a comprehensive, detailed and logical description of the quality control system to be applied on Department of Defense (DOD) construction projects. It is required by clients such as the Army Corps of Engineers and the Navy and describes the management system for producing construction complying with the terms of the contract and forms the foundation upon which work is based. On other DOD remediation and waste management projects this planning document is also referred to as the QC Plan. The QC Plan is similar to the CQC Plan on DOD projects but the format and criteria may change depending on contract requirements.

### **4.2 Environmental Data Acquisition**

An environmental data acquisition involves gathering of environmental data or use of technology in which the data or technology is used for decision making on complex environmental issues. The data may be gathered for the Environmental Protection Agency (EPA), clients funded by EPA, or clients that must adhere to Federal, State, or local regulations.

### **4.3 Graded Approach**

The selective level of controls applied to a project to provide adequate confidence that the end product or service will perform satisfactorily and meet client expectations. A graded QA program

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is structured to apply QA measures and controls to items and activities in proportion to the significance of their risk.

#### **4.4 Nuclear Related Project**

Any project dealing with radioactive material or waste, structures, systems, components, equipment or facilities subject to the requirements of Title 10 (Energy) Parts 0 through 199 and Title 40 (Protection of Environment) Parts 190 through 192 of the Code of Federal Regulations.

#### **4.5 Project**

As established in PO-1 a Project is defined by its four project objectives and comprises the activities planned and implemented to meet them. The term project is used interchangeably herein to mean activities organized at the program, project, task, or delivery order level. The terms “program” and “project” are often used interchangeably to describe a set of activities defined by a contract. The terms “task” and “delivery order” are often used interchangeably to describe discrete activities which are part of a larger program or project.

#### **4.6 Quality Assurance**

An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected as defined by the contract.

#### **4.7 QA Plan**

A Project-specific description of the QA Program to be implemented on a project. On nuclear related projects this document is normally referred to as the QA plan.

#### **4.8 Quality Control**

Quality Control (QC) is the overall system of checks to measure the attributes and performance of a process, item, or service against defined standards to verify that they meet established requirements. On DOD projects the term QC is typically used to include what is referred to as QA.

On nuclear related projects, QC is considered an element of the overall QA program. The QC element is usually limited to inspection and test activities used to verify acceptance of an item.

#### **4.9 Remediation Project**

Any project involving intrusive behavior, field work or other physical activity (including without limitation, demolition and new construction), whether or not this work is ensured clean or non-hazardous. This definition does not include intrusive sampling, via drilling, which is required solely for assessment.

#### **4.10 Waste Management Project**

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Any project that generates wastes (e.g., soil, groundwater, personal protective equipment, decontamination water, debris, laboratory/sampling waste, disposal of drummed and bulk materials and disposable equipment) that is not remediation.

## **5.0 DISCUSSION**

### **5.1 Responsibilities**

#### **5.1.1 Project Manager**

The TtEC Project Manager (PM) is responsible for ensuring an adequate project specific QA/QC plan is created for the project. The PM is responsible for determining if the project specific plan will be contained in a document, or communicated and implemented by other means (such as identifying applicable CRL procedures). The PM is also responsible for obtaining the review of these decisions by competent QA representation, such as defined by the Quality Discipline Lead (Director Quality Programs). It is the PM's responsibility to consult with TtEC's Director, Quality Programs or QC Program Manager or their designated representative to determine if Quality Programs staff or other designee can be tasked with authoring the required QA/QC Plan. Once the author has been assigned, the PM is to assure that the designated author include the appropriate TtEC personnel in the peer/independent review process for both the draft and final QA/QC Plans. Adequate budget should be established in the proposal stage for the performance of any reviews required by company procedures or as considered necessary by the PM. The PM shall be involved in the review process and shall also be an approval authority for the QA/QC Plan.

#### **5.1.2 Director, Quality Programs**

The TtEC Director, Quality Programs, shall assign appropriate staff resources when requested by the PM for preparation of the QA/QC Plan. In addition, the Director, Quality Programs or his designee shall be included in the review process of the draft QA/QC plan and included as an approval authority for the final QA/QC plan and subsequent revisions.

### **5.2 General**

TtEC policy requires that company guidance documents incorporate the tenets of Client Service Quality, Do it Right, and Shared Vision to achieve the level of quality required by our clients. Project specific plans utilizing these philosophies document and describe the project approach necessary to meet requirements of the regulations, standards or guidance documents as stipulated in each project contract. Project specific QA/QC Plans, when required, describe the overall system of activities that measure project performance against requirements assuring achievement of the level of quality desired by the client.

### **5.3 Minimum Requirements**

The overall project planning process is described in company Project Operations Procedure PG-1. The project planning process consists of 11 primary planning elements. Quality is one of the 11 elements. In PG-1 the term level of quality describes the specifics of deliverables to ensure understanding of a client's expectations. Consistent with the level of quality determined for a project, the QA/QC plan documents the accountability and responsibility of key personnel who

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manage and perform work affecting the project. In the absence of any defined quality requirements, conformance to TtEC procedures identified in the Work Plan defines the minimum level of quality. Project Operations Procedure PO-6, Section 4.3.8, provides further discussion and guidance on quality and level of quality for projects.

Prior to developing the QA/QC Plan, the author shall review the proposal, and or the project contract to determine quality requirements. The Task Initiation Procedure (TIP) Package, including the Risk Management Plan (RMP) shall also be reviewed for quality requirements.

The QA/QC requirements will vary depending on the type of project.

- Quality programs for nuclear related projects under regulation by the Nuclear Regulatory Commission (NRC) will most likely have to address 18 quality criteria of 10 CFR 50, Appendix B; 10 CFR 71, Subpart G; or 10 CFR 72, Subpart H (see Attachment 1).
- Quality Programs for nuclear related projects under jurisdiction of the Department of Energy (DOE) will have to address 10 quality criteria grouped into 3 categories of 10 CFR 830, Subpart A (see Attachment 2).
- Quality programs for environmental data acquisition projects under the purview of the U.S. Environmental Protection Agency (EPA) may have to address the higher level contract quality requirement clause of 48 CFR 46. The quality standard selected will likely be ANSI/ASQC E4 which addresses 15 quality elements categorized into 4 groups (see Attachment 3).
- QA/QC planning for construction/remediation projects that do not have client stipulated quality criteria shall be addressed in either a QC Plan (Attachment 5), the Work Plan or Project Management Plan. The QA/QC planning elements described in Attachment 5 shall be addressed in either the Work Plan or Project Management Plan if they used to describe the project QA/QC planning.

The author of the QA/QC Plan shall refer to the project contract to determine the client specified quality requirements.

Each QA/QC Plan shall address the criteria of the regulations, standards, or guidance documents as stipulated in the project contract. For nuclear related projects, Quality Program implementing requirements may be found in ASME NQA-1. For environmental projects Quality Program implementing requirements and guidance may be found in: ANSI/ASQC E4; or EPA Requirements and Guidance Documents QA/G or R1 - 6. Quality programs for DOD related construction or remediation projects under the jurisdiction of the Army Corps of Engineers, the Navy, or other DOD branches will most likely have to address the quality criteria found in the Army Corps of Engineers Specification 1440 or Navy Guide Specification Section 01450, (see Attachment 4). Normally the QC plan will address the three phase control concept. The three phase control concept describes QC during the preparatory phase, Initial phase and the follow-up phase for all definable features of work (see Company Procedure QP-9 for more details on the three phases of control). In addition, organization, training and personnel qualifications, testing and inspection, nonconformance, rework and corrective action, and documentation will have to be addressed.

Once the designated author has reviewed the contract requirements and has determined which codes, standards and regulations are applicable for the project, copies of the applicable documents should be obtained for reference. When thoroughly familiar with the requirements, the author may begin developing the QA/QC Plan. Additional guidance may also be found in Attachments 1 through 5 of this procedure.

The author may also want to consult with TtEC's ESQ Quality staff and other disciplines as necessary, utilizing the appropriate expertise to assist in the development of the Plan.

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## 5.4 Review

The author of the QA/QC Plan and the Project Manager shall identify the individuals/organizations, including client representatives, as appropriate, who are required to review the QA/QC Plan. The Quality Programs Director or designee shall be included in all reviews. The author will distribute the QA/QC Plan to the reviewers using the appropriate distribution forms. The author shall resolve each comment/question provided by the reviewers and maintain a written record of the resolution. Reviews should be routed using the Engineering Form ENG-525 or project specific forms as appropriate. Comment resolution should be documented on Engineering Form (ENG-525A) or project specific forms as appropriate. Comments which cannot be resolved between the author and the reviewer shall be addressed by successively higher levels of management until a resolution is achieved. All internal comments shall be resolved prior to forwarding the QA/QC Plan to the client for review when required by the contract.

Revisions to the QA/QC Plan shall be subject to the same level of review as required by the original QA/QC Plan.

## 5.5 Approval

At a minimum the author, Project Manager, and Director, Quality Programs (or designee) will approve project specific QA/QC Plans. These approvals are also required for the Work Plan or Project Management Plan if they are used to define the quality planning element for a project in lieu of a stand alone QA/QC Plan. Additional approvals shall be based upon client requirements and the scope of services addressed in the contract. All approvals shall be documented.

## 6.0 REFERENCES

### 6.1 TtEC Corporate Reference Library Procedures:

Engineering Procedure ENG-3, Developing and Issuing Engineering Documents <sup>(1)</sup>  
Personnel Practices PP-25, Procedures - Authorization, Preparation and Distribution <sup>(2)</sup>  
Project Initiation/Operations Guidelines PG-1, Approach to Project Management <sup>(3)</sup>  
Project Initiation/Operations Guidelines PG-3, Project Management - Implementation <sup>(4)</sup>  
Project Initiation/Operations Procedure PO-1, Project Management Planning <sup>(5)</sup>  
Project Initiation/Operations Procedure PO-2, Task Initiation (TIP) <sup>(6)</sup>  
Project Initiation/Operations Procedure PO-8, Document Control <sup>(7)</sup>  
Quality Program Procedure QP-9, DoD Contractor Quality Control <sup>(8)</sup>

### 6.2 Other Reference Documents:

10 CFR 830, Code of Federal Regulations, Nuclear Safety Management, Subpart A-Quality Assurance Requirements  
ANSI/ASQC E4 –1994, Specifications and Guidelines for Quality Systems for Environmental Technology Programs, American National Standard, January 1995  
ASME NQA-1-2000, Quality Assurance Requirements for Nuclear Facility Applications, American National Standard, May 2001  
EPA Directive 2100 (1998), Information Resources Management Policy Manual, U.S. Environmental Protection Agency, Washington, DC  
EPA Order 2180.1 (June 1987), Chemical Abstract Service Registry Number Data Standard, U.S. Environmental Protection Agency, Washington DC

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EPA Order 2180.2 (December 1988), Data Standards for the Electronic Transmission of Laboratory Measurement Results, U.S. Environmental Protection Agency, Washington DC  
EPA Order 7500.1A (October 1992), Minimum Set of Data Elements for Ground-Water Quality, U.S. Environmental Protection Agency, Washington, DC  
Title 10, Code of Federal Regulations, Parts 0 through 199, Energy  
Title 10, Code of Federal Regulations, Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants  
Title 10, Code of Federal Regulations, Part 71, Packaging and Transportation of Radioactive Material, Subpart H, Quality Assurance  
Title 10, Code of Federal Regulations, Part 72, Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI), Subpart G, Quality Assurance  
Title 40, Code of Federal Regulations, Parts 190 through 192, Protection of Environment  
U.S. Department of Energy Order 414.1A, 1999, Quality Assurance  
U.S. Department of Army, Army Corps of Engineers CECS 01440, Contractor Quality Control  
U.S. Department of the Navy, Naval Facilities Engineering Command, Guide Specification NFGS – 01450G, Quality Control  
U.S. Environmental Protection Agency, 2000. EPA Guidance for Data Quality Objectives Process (QA/G-4), EPA/600/R-96/055, Office of Environmental Information  
U.S. Environmental Protection Agency, 2001. EPA Requirements for Quality Assurance Project Plans (QA/R-5), EPA/240/B-01/003, Office of Environmental Information

Tetra Tech EC, Inc.

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## QP-2: Selection and Qualification of Quality Control Personnel

### **Purpose**

To define the methods and responsibilities for qualification and certification of personnel performing quality control activities.

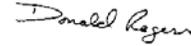
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- 2.0 SCOPE
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## **1.0 PURPOSE**

This procedure defines the responsibilities and requirements for selection, qualification and certification of personnel performing quality control verification activities.

## **2.0 SCOPE**

This procedure applies to personnel who perform quality control verification activities for the purpose of accepting items and activities.

## **3.0 MAINTENANCE**

The Vice President, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

### **4.1 Certification**

The act of determining, verifying, and attesting in writing to the qualifications of personnel in accordance with specified requirements.

### **4.2 Inspection**

An examination, observance, or measurement to determine the conformance of an item, process, or activity to specified requirements.

### **4.3 Inspector**

An individual trained and qualified in accordance with established requirements to carry out the independent inspection necessary to ensure the quality of work, document inspection results, and report discrepant conditions.

### **4.4 Qualification**

The characteristics or abilities gained through education, training, or experience, as measured against established requirements, such as standards or tests, that qualify an individual to perform a required function.

### **4.5 Testing**

An element of verification for the determination of the capability of an item to meet specified requirements by subjecting the item to a set of physical, chemical, environmental, or operating conditions.

### **4.6 Verification**

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The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements.

## **5.0 DISCUSSION**

Project Operations Procedures PO-1 and PO-6, describe the project personnel [including Quality Assurance/Quality Control (QA/QC) staff] selection and qualification process as part of project planning element 8, Staffing/Resource Management. The Project Manager identifies staff position requirements and qualifications and proposes candidate staff to fill the positions. Resource Managers work with the Project Manager to select the appropriately trained and qualified person to fill the position. It is the Resource Manager's responsibility to ensure the selected individual's qualifications are appropriate to the task. The Resource Managers for project QA/QC staff are the Quality Program Director (all projects) or QC Program Manager (DOD and commercial projects).

Personnel selected to verify activities affecting quality shall possess the education, experience, and/or training commensurate with the specified activity and contract requirements. Personnel performing quality verification activities shall be authorized to perform those duties by the Quality Programs Director or QC Program Manager.

New Army Corps of Engineers (USACE) construction contracts require that the prime contractor's quality control representatives have successfully completed a "Construction Quality Management for Contractor's" course. Personnel successfully completing this course are awarded a training certificate valid for 5 years. Quality Control personnel supporting Department of Defense (DOD) and commercial projects should complete this course in addition to QC personnel required to under USACE contracts.

Nuclear related projects regulated by the Nuclear Regulatory Commission (NRC) or Department of Energy (DOE) are required by regulation to qualify inspection, test, and nondestructive examination (NDE) personnel. These projects are also required to use national consensus standards in the development of their QA programs. A national consensus standard endorsed by NRC and DOE for QA programs, including the qualification and certification of inspection, test, and NDE personnel, is ASME NQA-1 (NQA-1). NQA-1 defines qualification requirements for inspection and test personnel. NQA-1 references the American Society of Nondestructive Testing Recommended Practice No. SNT-TC-1A and its applicable Supplements as requirements for NDE. The following qualification and certification requirements are based on NQA-1 and SNT-TC-1A. These requirements shall be used on projects when specified in the project management plans (e.g., Project Management Plan, Work Plan, Staffing Plan, or QA/QC Plan).

### **5.1 Inspection and Test Personnel (NQA-1 Projects)**

The minimum capabilities that qualify personnel to perform inspections and tests are summarized in Attachment 1, Minimum Levels of Capability for Inspection and Test Personnel.

Certification is based on a combination of education, experience, and training. The education and experience requirements for each level are not absolute. Previous performance, training, and satisfactory completion of proficiency tests are factors that provide assurance that a candidate can perform a particular task. If used to determine qualification, these factors shall be documented in the individual's certification file.

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When an inspection or test is implemented by a team, non-certified personnel may take data or operate equipment if they are supervised by a qualified individual participating in the inspection or test.

### **5.1.1 Capabilities**

**Level I** personnel shall:

- Be capable of performing the required inspections and tests according to documented procedures of industry practices.
- Be familiar with, and have demonstrated proficiency in using, the tools and equipment employed.
- Be capable of determining that the inspection and measuring equipment is in proper operating condition with current calibration status.
- Be capable of determining that the inspection and test procedures are approved.

**Level II** personnel shall:

- Have all the capabilities of a Level I person for the applied inspection or test category.
- Be capable of planning and setting up inspections and tests, including preparation and set up of related equipment.
- Be capable of supervising or maintaining surveillance over inspections and tests, and of supervising and certifying Level I personnel.
- Be capable of reporting and evaluating the validity of inspection and test results.

**Level III** personnel shall:

- Have all the capabilities of a Level II person for the applied inspection or test category.
- Be capable of evaluating the adequacy of programs used to train and certify inspection and test personnel.
- Be capable of reviewing and approving inspection and testing procedures, including evaluating the adequacy of procedures to accomplish the objectives.
- Be capable of supervision and certifying Level I and II personnel.

### **5.1.2 Education, Experience, and Training**

#### **5.1.2.1 Requirements for Level I Personnel**

The education and experience requirements for Level I personnel are as follows:

- Two years of related experience in equivalent inspection or testing activities; or
- A high school diploma plus six months of related experience in equivalent inspection activities; or
- An Associate Degree in a related discipline plus three months of related experience in equivalent inspection or testing activities.

#### **5.1.2.2 Requirements for Level II Personnel**

The education and experience requirements for Level II personnel are as follows:

- One year of satisfactory performance at Level I in the corresponding inspection or testing activities; or

- 
- A high school diploma plus three years of related experience in equivalent inspection or testing activities; or
  - An Associate Degree in a related discipline plus one year of related experience in equivalent inspection or testing activities; or
  - Four-year college degree plus six months of related experience in equivalent inspection or testing activities.

#### **5.1.2.3 Requirements for Level III Personnel**

The education and experience requirements for Level III personnel are as follows:

- Six years of satisfactory performance at Level II in the corresponding inspection or testing activities; or
- A high school diploma plus either;
  - Ten years of related experience in equivalent inspection or testing activities; or
  - Eight years of related experience in equivalent inspection or testing activities, with at least two years of the experience associated with nuclear applications, or sufficient training to be acquainted with the relevant QA aspects of nuclear work; or
- An Associate Degree in a related discipline plus seven years of related experience in equivalent inspection or testing activities, with at least two years of the experience associated with nuclear applications, or sufficient training to be acquainted with the relevant QA aspects of nuclear work; or
- Four-year college degree plus five years of related experience in equivalent inspection or testing activities, with at least two years of the experience associated with nuclear applications, or sufficient training to be acquainted with the relevant QA aspects of nuclear work.

#### **5.1.2.4 Training**

The responsible Project QA Manager shall provide for the indoctrination of inspection and test personnel as to the technical objectives and requirements of the applicable codes and standards for the activity involved, as well as the Project QA Plan elements that are to be employed.

When it is determined that formal training is needed to qualify inspection and test personnel, the Quality Programs Director or designee shall define (in writing) training programs (content and responsibility). Where possible, on-the-job participation shall be part of the training program, with emphasis on first-hand experience gained through actual performance of inspections or tests.

#### **5.1.2.5 Visual and Physical Examinations**

The Director of Quality Programs or designee shall identify any special physical characteristics (such as color vision or respiratory screening) needed in performance of inspection and test activities. The need for initial and subsequent physical examinations shall also be determined.

#### **5.1.2.6 Evaluation and Certification**

The Director of Quality Programs or assigned Project QA Manager shall evaluate candidates for Level I or II certification. A certified Level III in the applicable discipline may also perform this evaluation.

The Director of Quality Programs shall evaluate candidates for Level III certification.

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The evaluator shall determine the capabilities of the candidate based on the candidate's education, experience, training, test results, and demonstrated capabilities, as compared to the requirements in Sections 5.1.1 and 5.1.2. The evaluator shall obtain documentation verifying the candidate's education, experience, and background.

Based on the acceptability of the employee's qualifications, the responsible manager or Level III shall sign and issue a Personnel Qualification Certification to the employee. The certificate shall include the following:

- Employer's name – TtEC;
- Identification of person being certified;
- Level of Certification
- Activities certified to perform;
- Basis used for certification, including such factors as:
  - Education, experience, indoctrination, and training;
  - Test results, where applicable; and
  - Results of capability demonstration.
- Results of periodic evaluation;
- Results of physical examinations, when required;
- Signature of certifying individual (QA Manager or Level III); and
- Date of certification and date of certification expiration.

The Personnel Qualification Certificate shall expire one year from the effective date or upon termination of employment with TtEC, whichever comes first.

#### **5.1.2.7 Performance Evaluation and Re-certification**

The responsible QA Manager or Level III shall evaluate the performance of inspection and test personnel they certify on an annual basis. Evaluation shall be by evidence of continued satisfactory performance or re-determination of capability in accordance with the requirement of this procedure. If during this evaluation or at any other time it is determined by Quality Programs management that capabilities of an individual are not in accordance with the qualification requirements specified for the job, the person shall be removed from that activity until such time as the required capability has been demonstrated.

Any person who has not performed inspection or testing activities in their qualified area for a period of one year shall be re-evaluated by a re-determination of required capability in accordance with the requirements of this procedure.

Based on satisfactory results of the employee's performance, the certification may be extended for another year and documented on the Personnel Qualification Certificate.

## **5.2 Nondestructive Examination Personnel (SNT-TC-1A)**

The following requirements are for qualification and certification of personnel performing NDE tasks. They are limited to radiographic (RT), ultrasonic (UT), magnetic particle (MT), liquid penetrant (PT), and leak testing (LT). These requirements are based on ASNT SNT-TC-1A.

An individual may be certified to NDE Level I, II, or III after completing the prescribed education, experience, and training, and passing visual and technical examinations.

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## 5.2.1 Capabilities

The expectations of each level of certification are as follows:

**NDE Level I** personnel shall:

- Be qualified to properly perform specific calibrations, tests, and evaluations for acceptance or rejection determinations according to written instructions (procedures) and record the results.
- Be required to provide test data to the Project QA Manager or designee for review and final acceptance.

**NDE Level II** personnel shall:

- Be qualified to set up and calibrate equipment and to interpret and evaluate results with respect to applicable codes, standards, and specifications.
- Be thoroughly familiar with the scope and limitations of the NDE method.
- Be responsible for on-the-job training and guidance of trainees and NDE Level I personnel.
- Be able to prepare written instructions and organize and report NDE investigations.

**NDE Level III** personnel shall:

- Be capable of, and responsible for, establishing techniques and procedures; interpreting codes, standards, and specifications; designating the particular test method, technique, and procedures to be used; and for the review of NDE procedures.
- Be capable of evaluating results in terms of existing codes, standards, and specifications.
- Have sufficient practical background in applicable materials, fabrication, and product technology to establish and to assist in establishing acceptance criteria where none are otherwise available.
- Have general familiarity with other commonly used NDE methods.
- Be qualified to train and examine NDE Level I and II personnel for certification.

## 5.2.2 Education, Experience, and Training

### 5.2.2.1 Requirements for NDE Level I, II, and III Personnel

In order to be eligible for certification, the candidate shall have met the requirements of education, experience, and training stipulated in Attachment 2, Education and Training for NDE Level I, II, and III Personnel.

Documented training and/or experience gained in positions and activities equivalent to those of Levels I, II, or III prior to establishment of this procedure may be considered in satisfying requirements of this section. If the specific requirements of this section for training and/or experience are not met, the designated Level III individual may evaluate the individual knowledge, performance, and other factors, and place in the candidate's certification file the justification for waiver of the requirements.

### 5.2.2.2 Requirements for NDE Level I Personnel Only

Experience for Level I candidates shall be attained under the supervision of either a Level II or Level III individual certified in the pertinent method.

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The Level I candidate shall have completed a study of the appropriate instruction training manuals or an equivalent course taught either by TtEC or a recognized school. Material covered in the training manuals shall be reviewed by a Level III individual with the candidates.

### **5.2.2.3 Requirements for NDE Level II Personnel Only**

Experience for Level II candidates shall be attained under the supervision of a Level III individual certified in the pertinent method. The Level II candidate shall be instructed by a Level III individual in the application of written instructions and procedures.

The Level II candidate shall have completed a study of the appropriate instruction training manuals or an equivalent course taught either by TtEC or a recognized school. Material covered in the training manuals shall be reviewed by a Level III individual with the candidates.

### **5.2.2.4 Requirements for NDE Level III Personnel Only**

Initial experience may be gained simultaneously in two or more methods if:

- 25% or more of the candidate's work time is spent on each method for which certifications are sought; and
- The remainder of the candidate's work time claimed as experience is spent on NDE-related activities.

### **5.2.3 Visual Examination**

Prior to certification, and annually thereafter, the candidate shall take an eye examination to ensure natural or corrected near-distance acuity. The candidate shall be capable of reading J-2 letters at a distance of not less than 12 inches (30.5 cm) on the Jaeger's Test Type Chart of Near Vision (or equivalent test type) in at least one eye. Visual acuity shall be certified by a licensed optometrist.

The candidate shall, as applicable, by practical examination or test performance, demonstrate capability of distinguishing and differentiating contrast between colors used in the NDE method. (See Attachment 4 for example of Visual Acuity Record Form.)

### **5.2.4 Technical Examination**

Prior to certification, the candidate shall pass a technical examination as outlined in Attachment 3, Technical Examination Requirements for NDE Level I, II and III. Outside agencies may be contracted to provide these examinations. Level III personnel may be certified by examination by ASNT.

### **5.2.5 Certification**

Level I and Level II personnel shall be certified by a Level III individual or the Project QA Manager. Level III personnel shall be certified by the Director of Quality Programs or designee.

An outside agency may be retained to provide NDE Level III services. In such cases, TtEC retains responsibility for certification and for ensuring that training and examination services are in compliance with this procedure.

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Certification/qualification records shall include the following:

- Name of certified individual;
- Level of certification;
- Test method;
- Educational background and experience record;
- Statement indicating satisfactory completion of training;
- Visual examination results;
- Current examination copies or evidence of examination completion;
- Composite grades of examination;
- Certification dates;
- Dates of assignment to NDE; and
- Signature of TtEC's certification representative.

### **5.2.6 Re-certification and Revocation of Certification**

Re-certification is required for NDE personnel within three years for Levels I and II or within five years for Level III of the initial certification date.

Re-certification shall be by evidence of continued satisfactory performance or by a re-determination of capability. Documentation of the re-certification shall be by the issuance of a new personnel qualification certificate.

A Level III individual or the Project QA Manager is responsible for evaluating and completing re-certification statements for Level I and Level II individuals. The Director of Quality Programs or designee shall do so for Level III individuals.

### **5.2.7 Revocation of Certification**

Certifications shall be revoked for any of the following causes:

- A 12 month lapse of involvement with the particular method (for leak testing only, a lapse of between 12 and 24 months requires only that the individual pass a successful leak test administered by a Level III individual or the Project QA Manager prior to leak test performance).
- Unsatisfactory performance (as determined by a Level III individual or the Project QA Manager for Levels I and II or the Director of Quality Programs for Level III).
- Termination of employment with TtEC, unless rehire occurs within 6 months of termination and the prior certification has not run out.

At the time of revocation, the following shall be added to the individual's certification file:

- Reason for revocation; and
- Signature of the authority revoking certification.

The Level III is authorized to revoke Level I and II certification. The Director of Quality Programs has the authority for all levels.

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### 5.3 Records

Records of QC personnel qualification, including certifications, shall be maintained in the ESQ Department training and qualification files. Copies shall also be maintained in project records as defined in the project QA/QC Plan or Document Control Plan.

### 6.0 REFERENCES

Unless indicated otherwise, the latest published dates of the following referenced documents are applicable:

ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications  
Project Initiations/Operations Guidelines PG-3, Project Management - Implementation <sup>(1)</sup>  
Project Initiations/Operations Procedure PO-1, Project Management Planning <sup>(2)</sup>  
SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing

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## QP-5: Source Verification

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**Version Date:** 04/02/2002 -  
New

**Approved by:**

**Original Issue Date:** 04/02/2002



**Category:** Company  
Procedures

**Sections:** ESQ - Quality Programs

**Sub Category:**  
Departmental/Discip  
line

**Document Type:** Procedure

**Keyword:** Source

**Document Owner:** Mike Nicol

**Index:** verification,  
inspections and  
testing

**Purpose**

To establish the measures to be employed by Tetra Tech EC, Inc. to perform source verifications.

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- 3.0 MAINTENANCE
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- 5.0 DISCUSSION
- 6.0 REFERENCES

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## **1.0 PURPOSE**

This Quality Procedure (QP) states the responsibilities and describes the process for performing source verification inspections and testing, documenting results and releasing shipments from supplier facilities, for the Tetra Tech EC, Inc. (TtEC).

## **2.0 SCOPE**

This procedure applies to the performance of inspections and testing at supplier and subcontractor supplier facilities for TtEC procured supplies, equipment or services.

## **3.0 MAINTENANCE**

The Vice President, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

### **4.1 Acceptance Criteria**

Specified limits placed on characteristics of an item, process, or service that is defined in design documents, codes, standards, or other requirement documents for the purpose of determining acceptability.

### **4.2 Hold Point**

A mandatory inspection point, identified by the purchaser (TtEC) in appropriate procurement documents, beyond which work shall not proceed without the specific consent of the designated TtEC representative.

### **4.3 Inspection**

An examination, observance, or measurement to determine the conformance of an item, process, or activity to predetermined requirements.

### **4.4 Inspector**

An individual (e.g., subcontractor and/or TtEC Project personnel) trained and qualified in accordance with established requirements to carry out the independent inspections and tests necessary to ensure the quality of work, document results, and report discrepant conditions.

### **4.5 Source Verification**

A method the purchaser (TtEC) uses to accept an item or service from a supplier. Source verification includes monitoring, witnessing, or observing selected activities at the supplier's

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facility. Other methods of acceptance (outside the scope of this procedure) include a supplier certificate of conformance, receiving inspection, or post installation test at the site.

#### **4.6 Supervisor**

An individual assigned to a TtEC Project who is a group, focus, task, or project leader or a manager with the authority and responsibility to direct and authorize TtEC Project activities. A supervisor may also be an individual directed by a Project Manager to act in their behalf.

#### **4.7 Testing**

An element of verification for the determination of the capability of an item to meet specified requirements by subjecting the item to it to a set of physical, chemical, environmental, and/or operating conditions.

#### **4.8 Verification**

The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements.

#### **4.9 Witness Point**

An inspection point, identified in procurement documents, where it is mandatory to formally notify the appropriate TtEC Project personnel when a certain stage in the work activity is reached or about to be reached. At that time, the TtEC Project may elect to conduct and document the inspection.

### **5.0 DISCUSSION**

#### **5.1 Responsibility**

##### **5.1.1 Project QA/QC Manager**

Ensure that source verification is performed in accordance with this procedure.

Ensure required information is submitted for the Source Verification Log.

Ensure inspectors are qualified in accordance with Procedure QP-2, Selection and Qualification of Quality Control Personnel.

##### **5.1.2 Inspection and Test Personnel**

Plan, conduct, document, and control source verification in accordance with this procedure.

Submit inspection and test reports to project files and the ESQ Program Coordinator for maintenance.

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Ensure follow-up and closure of inspection reports.

### **5.1.3 ESQ Program Coordinator**

The ESQ Program Coordinator is responsible to:

Note: The ESQ Coordinator reports to the Director, Quality Programs and is located in the Oak Ridge Office. The ESQ Coordinator responsibilities may be performed by Project QA/QC staff with the approval of the Director, Quality Programs.

- Ensure that the appropriate information is entered into the Source Verification Log; and
- Maintain record storage of source verification inspection and test reports in the supplier QA files.

### **5.1.4 Project Organizations**

Allocate resources necessary to provide inspection and test personnel performance of source verification at supplier facilities.

## **5.2 General**

Source verification is one method used to accept an item or service from a supplier. Other methods of acceptance are receiving inspection (QP-6), supplier certificate of conformance (QP-4), post-installation test at the facility (QP-4), or a combination of any of the above. Guidance on how to determine when source verification should be required is provided in QP-4.

## **5.3 Prepare for Inspection or Testing**

Inspections and test personnel must ensure they are prepared for source verification by reviewing and approving documentation prepared for the implementation of the verification.

Inspection and test personnel shall obtain the necessary information such as inspection/test requirements, accept/reject criteria, etc., from the latest procedures and process control documentation.

Inspection and test personnel shall ensure they obtain the appropriate measurement and test equipment (M&TE) necessary to perform inspections and tests.

Inspection and test personnel shall prepare for their inspections and tests by taking the following actions:

- Familiarize themselves with the requirements of the inspections/tests by reviewing the latest approved procedures, codes, standards, specifications, and drawings;
- Ensure that all necessary information, test plans, procedures forms, etc., required to perform specified inspections and tests are available;
- Verify that M&TE used for inspections and tests have identification marking and valid calibration status; and
- Ensure they have received the appropriate training for the M&TE to be used.

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Prior to developing inspection and/or test reports and associated documentation, the inspection and test personnel must obtain a TtEC Source Verification Report Number from the ESQ Program Coordinator. The TtEC Source Verification Number shall be used to track all appropriate inspection and test result reporting documentation.

#### **5.4 Notify Supplier Facility**

Notification of the supplier of upcoming source verification activities shall be through the TtEC Procurement organization. The inspection and test personnel shall coordinate source verification notification with Procurement.

#### **5.5 Perform Inspection or Testing**

Upon arrival at the supplier facility, the inspection and test personnel shall perform the following:

- Perform a thorough inspection and test in accordance with applicable inspection plans, test plans, procedures, and specifications.
- Review material/equipment test reports and laboratory analysis reports, when applicable, to ensure completeness and compliance to designated specifications.
- Review the supplier's inspection/validation/verification/data, where applicable, to determine the following:
  - Supplier inspection and/or analysis have been performed as required, and that recorded data conforms to procurement and/or contract requirements.
  - Supplier inspection reports and/or laboratory reports were signed and dated by the supplier's inspector.

Date and sign the TtEC Project's copy of each supplier record or inspection document that was examined. (The date and signature verifies acceptance of the supplier data.)

Document any nonconformances in accordance with QP-11, Control of Nonconforming Conditions.

Prior to offering an item for acceptance, the supplier should verify that the item being furnished complies with the procurement requirements. A form, such as Attachment 1, may be used for this purpose.

#### **5.6 Perform Re-inspection**

If there is reason to question the supplier's results of the inspection or test, the inspector may request the supplier to repeat the inspection or test to ensure all requirements are met. Such requests shall be coordinated with TtEC Procurement.

The inspector shall perform any applicable reinspection of the item (i.e., supplies, equipment, and services) or activity after the supplier completes their re-inspection and records the inspection test results.

#### **5.7 Document Results**

The inspector shall document the inspection and test results in accordance with the instructions of specific procedures or specifications and/or the inspection report (Attachments 1 and 2).

The inspector shall include in the inspection and test report the following information:

- 
- Item inspected/tested;
  - Date of inspection/test;
  - Work package number or task;
  - Inspector (including signature);
  - Type of observation;
  - Results of acceptability; and
  - Reference to information on action taken in connection with nonconformances.

## 5.8 Records

Inspection and test personnel are responsible for submitting the following records to the project files and ESQ Coordinator at the completion of inspection/testing:

- Completed Supplier Certification and Release Form, Attachment 1 (or comparable equipment release form used);
- Completed Source Inspection Trip Report, Attachment 2; and
- Associated correspondence.

## 6.0 REFERENCES

### 6.1 TtEC Corporate Reference Library Procedures:

Quality Program Procedure QP-2, Selection and Qualification of Quality Control Personnel <sup>(1)</sup>

Quality Program Procedure QP-6, Receiving Inspection <sup>(2)</sup>

Quality Program Procedure QP-11, Control of Nonconforming Conditions <sup>(3)</sup>

Tetra Tech EC, Inc.

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## **QP-6: Receiving Inspection**

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**Version Date:** 04/02/2002 -  
New

**Original Issue Date:** 04/02/2002

**Approved by:**



**Category:** Company  
Procedures

**Sections:** ESQ - Quality Programs

**Sub Category:** Departmental/Discip  
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**Document Type:** Procedure

**Keyword:** Receiving  
**Index:** inspection,  
inspections

**Document Owner:** Mike Nicol

**Purpose**

This procedure establishes the responsibilities, requirements and describes the process for performing receiving inspection activities and testing, documenting results, for Tetra Tech EC, Inc. (TtEC).

**Table of Contents**

- 1.0 PURPOSE
- 2.0 SCOPE
- 3.0 MAINTENANCE
- 4.0 DEFINITIONS
- 5.0 DISCUSSION
- 6.0 REFERENCES
- 7.0 ATTACHMENTS

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## **1.0 PURPOSE**

This Quality Procedure (QP) states the responsibilities and describes the process for performing receiving inspection activities and testing, documenting results, for Tetra Tech EC, Inc. (TtEC).

## **2.0 SCOPE**

This procedure applies to the performance of receiving inspections when required in the procurement documents for TtEC procured supplies and equipment.

## **3.0 MAINTENANCE**

The Vice President, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

### **4.1 Acceptance Criteria**

Specified limits placed on characteristics of an item, process, or service that is defined in design documents, codes, standards, or other requirement documents for the purpose of determining acceptability.

### **4.2 Certificate of Conformance**

An authenticated document, signed or by alternate method by a recognized/authorized individual attesting and certifying the degree to which an item or service meets the specified requirement.

### **4.3 Commercial Grade Items**

An item used in a nuclear facility and satisfying the following:

- Not subject to design or specification requirements that are unique to nuclear facilities.
- Used in applications other than nuclear facilities.
- To be ordered from the manufacturer/supplier on the basis of specification set forth in the manufacturer's published product description (for example, a catalog).

### **4.4 Hold Quality Receiving Required**

A mandatory receiving inspection point, that places a tag on items requiring quality receiving inspection, or placing items in a designated hold area, and notifying the responsible manager of the required inspection.

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#### **4.5 Inspection**

Verification, by examination or measurement, of an item or activity's conformance to specified requirements.

#### **4.6 Inspector**

A qualified/certified individual who performs inspection activities to verify conformance to specified requirements.

#### **4.7 Item**

Used as an all-inclusive term in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit.

#### **4.8 Supervisor**

An individual assigned to a TtEC Project who is a group, focus, task, or project leader or a manager with the authority and responsibility to direct and authorize TtEC Project activities. A supervisor may also be an individual directed by a Project Manager to act in her or his behalf.

#### **4.9 Nonconformance**

A deficiency in characteristic, documentation, or procedure that renders the quality of an item, process, or activity unacceptable or indeterminate.

#### **4.10 Objective Evidence**

Any recorded statement of fact, other documented information, or record, pertaining to the quality of an item, process or activity based on measurements, tests, or observation.

#### **4.11 Procurement Document**

Procurement documents are purchase requisitions, purchase orders, drawings, contracts, specifications, or instructions used to define requirements for purchase.

#### **4.12 Receiving**

Taking receipt of an item at a designated location.

### **5.0 DISCUSSION**

#### **5.1 Responsibility**

##### **5.1.1 QA/QC Project Manager (QC System Manager)**

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Ensure required inspections are performed in accordance with approved plans, schedules, and procedural requirements. Ensure inspections are completed in accordance with the requirements of this procedure.

Ensure the Receiving Inspection Log is maintained current.

Ensure inspectors are qualified in accordance with TtEC Procedure QP-2, Selection and Qualification of Quality Control Personnel.

Ensure that affected personnel are trained in accordance with this procedure.

### **5.1.2 Inspector**

Plan, conduct, document, and control receiving inspection activities in accordance with this procedure.

Ensure the receiving inspection reports are entered into a Receiving Inspection Log.

Ensure receiving inspection reports are maintained in the project files.

Ensure follow-up and closure of receiving inspection reports.

### **5.1.3 Project Organizations**

Allocate resources necessary to provide inspector performance of receiving inspections.

## **5.2 Quality Inspector**

The Inspector must establish Quality Receiving Inspection Requirements (QRIR) accept/reject criteria in accordance with specified requirements in the procurement documents.

## **5.3 Quality Inspector Performance**

Generating a QRIR which will indicate acceptance, conditional acceptance, or rejection of item(s) received.

Maintaining the QRIR in an open file until deficiencies are reinspected and acceptable, or a Nonconformance Report is generated.

Attaching copies of the Material Receiving Report, (reference TtEC Procedure CP 6, Office and Warehouse Administration for details), purchase order, and applicable supplier documentation to the QRIR.

## **5.4 General**

All items (i.e., materials, supplies, and equipment) shall be received in accordance with the requirements of TtEC Procedure CP-6, Office and Warehouse Administration. Receiving inspection is one method used to accept an item from a supplier. Other methods of acceptance are source verification (QP-5), supplier certificate of conformance (QP-4), post installation test at

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the facility (QP-4), or a combination of any of the above. Guidance on how to determine when source verification should be required is provided in QP-4.

When a quality receiving inspection is required, as defined in the procurement documents, items shall be inspected to the extent necessary to verify conformance is to specified requirements.

Department of Energy (DOE) projects subject to DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees, are required to implement suspect and counterfeit items (S/CI) controls. Receiving inspection performed for these projects shall include provisions to inspect for S/CI. See DOE G 440.1-6 for additional guidance on identifying and reporting S/CI.

Quality receiving inspections shall be performed to verify proper configuration; identification; dimensional, physical, and other specified characteristics; freedom from damage; and cleanness using specified quantitative and/or qualitative accept/reject criteria.

When specified in procurement documents, a review of supplier documentation shall be performed prior to receiving inspection activity.

If deficiencies are identified, the inspector shall perform applicable reinspection of the item (i.e., supplies, equipment, and services) or activity after the supplier completes any required reinspection and records the inspection test results.

Quality inspectors shall be qualified to perform receiving inspection activities in accordance with TtEC Procedure QP-2, Selection and Qualification of Quality Control Personnel. Qualification should include training in various inspection activities and receiving inspection methods.

The QA/QC Project Manager shall assign a Quality Inspector to perform required quality receiving inspections.

The Quality Inspector shall obtain a copy of the procurement documents supporting receiving inspection from the Procurement Department.

Utilizing the procurement documents and required support documentation, the Quality Inspector shall initiate a QRIR (see Attachment 1).

NOTE: Initiation of a QRIR should be prior to receiving of an item.

## **5.5 Receiving of Items**

Items shall be received in accordance with the requirements of TtEC Procedure CP-6, Office and Warehouse Administration.

## **5.6 Quality Receiving Inspection Planning**

The Quality Inspector shall obtain a copy of procurement documents, the Material Receiving Report, and any documentation provided with the shipment.

The designated Quality Inspector shall generate a QRIR and complete the inspection checklist listed on the QRIR utilizing the documents provided.

The following criteria, when applicable, are provided to assist the Quality Inspector in preparing the QRIR checklist.

- 
- Identification and Markings - Identification and markings comply with procurement documents by ensuring completeness and legibility, and ensuring that the item is traceable to the received documentation.
  - Protective Covers and Seals - Covers and seals are intact and meet the specified requirements.
  - Coatings and Preservation - Coatings and preservations have been applied and maintained as required by the specifications, manufacturer instructions, and the procurement documents.
  - Inert Gas Blanket and Desiccant - Inert gas pressure is within specified limits and the desiccant is not saturated.
  - Physical Damage - The item and/or parts of the item are not broken, cracked, missing, deformed, and misaligned, and rotating parts freely turn without binding. Accessible internal and external areas are free of detrimental scratches, nicks, gouges, burrs, and dents.
  - Cleanness - Accessible internal and external areas are within the limits for dirt soil, mill scales, weld spatter, oil, grease, or stains. If the supplier's documentation received with the item indicates that inspections for cleanness were performed prior to sealing and shipping, receiving inspection shall verify that there have been no penetrations of the sealed boundary.
  - Dimensions - Verification of major (significant) dimensions such as length, width, diameter, thickness, and configuration and verifications of minor dimensions have been randomly verified to ensure they are within the specified limits.
  - Welding - Welds and weld end preparations are in accordance with specified requirements.
  - Workmanship - Workmanship meets the specified requirements in accessible areas.
  - Electrical Insulation - Insulation tests for motors, generators, instruments, control and power cable have been performed to ensure conformance to specified requirements, as applicable.
  - Lubricants and Oils - Specified lubricants and oils are present.
  - Additional Inspections - Identified additional inspections are entered in the "special inspection" block and/or on the "continuation page" and delineate the exact requirements with accept/reject criteria.
  - Documentation - Documentation specified is legible, complete, and in the quality per the specified requirement.
  - Bulk Quantity - The inspection activity shall be noted in the "special inspection" block and/or on the "continuation page". Sampling methods specified in procurement documents shall be noted in the "accept/reject criteria" block.

**NOTE:** Items that will be used for critical applications and received by documentation only shall have samples provided for analysis (i.e., fasteners: bolts and nuts).

## **5.7 Quality Receiving Inspection of Commercial Grade Items (Nuclear Facility Applications)**

The designated Quality Inspector shall generate a QRIR in accordance with the requirements of procurement documents and enter the applicable "accept/reject, criteria including the following verifications:

- No physical damage.
- Required inspection/testing has been performed assuring conformance with the manufacturer's published requirements, as required by procurement documents.
- Random dimensional checks have been performed to specified criteria.
- Receiving of legible and acceptable required documentation applicable to the item or items.

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## 5.8 Quality Receiving Inspection Performance

The designated Quality Inspector shall perform the quality receiving inspection in accordance with the QRIR and document the acceptance” or rejection” of each activity on the QRIR.

Receiving inspection activities identified as nonconforming shall be documented in the conditional acceptance or rejection section with a description of the identified deficiency and a notation of an acceptable re-inspection.

The designated Quality Inspector shall identify and document any measuring and test equipment used to verify acceptability in the remarks section.

Measuring and test equipment used to verify specified requirements in an inspection activity shall be controlled in accordance with TtEC Procedure QP-10, Control of Measuring & Test Equipment.

The designated Quality Inspector shall complete the inspection by:

- Performing an evaluation based on the inspection criteria established in the procurement documents.
- Indicating on the QRIR the disposition of the inspection activity as “A” - accepted, “C” - conditional acceptance, “R” - rejected, or “N/A” - not applicable.
- Identifying deficiencies noted during the inspection in the appropriate section of the QRIR.
- Evaluating deficiencies to determine if a conditional acceptance or rejection should be designated for the item.
- Checking items as accepted and signing the QRIR when it is determined the item or items received are accepted.
- Giving a conditional acceptance if it is determined that the deficiencies noted are minor, missing documentation, or items can be readily corrected.
- Describing the deficiency and corrective action required and due date indicated on the QRIR. If appropriate, a Quality Hold Tag should be issued and attached to the item in accordance with TtEC Procedure QP-11, Control of Nonconforming Conditions. The QRIR file shall remain open and follow-up on the corrective action shall be required.
- Releasing deficient items from the hold area prior to resolving the deficiency only by adding the condition release data and date.
- Performing a follow-up receiving inspection upon completion of the corrective action, and if acceptable, indicating final acceptance/release on the QRIR form.
- Determining whether the deficiencies are minor. If the item or items being received inspected are not minor, they shall be rejected.
- Rejecting items for return to the supplier in accordance with procurement procedures. A nonconformance report may be issued if necessary to provide additional backup for rejection and return to the supplier.
- Identifying nonconforming items to the Material Supervisor for relocation into a segregated hold area.
- Removing the Hold-Quality Receiving Inspection Required Tag.

The designated Quality Inspector shall, upon completing inspection activities and resolving deficiencies, forward the QRIR with a copy of the Material Receiving Report, procurement documents, and applicable supplier documentation to the Project QA/QC Manager or designee.

The Project QA/QC Manager or designee shall perform a final review of the QRIR. Upon acceptance, the Project QA/QC Manager or designee shall perform the following activities:

- 
- Sign and date the QRIR.
  - Complete the QRIR log.
  - Forward the original QRIR with a copy of the Material Receiving Report, procurement documents, and applicable supplier documentation to records.

The Material Supervisor shall, upon notification from the designated Quality Inspector and the Quality Inspector's removal of the Quality Hold Tag(s), move acceptable items to the designated storage area using applicable material control, handling, and storage requirements.

## **5.9 Records**

The Quality Inspector is responsible for submitting the following records to the project records system at completion of the receiving inspection activity:

- Completed Quality Receiving Inspection Reports; and
- Associated correspondence.

## **6.0 REFERENCES**

### **6.1 TtEC Corporate Reference Library Procedures:**

Construction Procedure CP-6, Office and Warehouse Administration <sup>(1)</sup>  
Quality Program Procedure QP-2, Selection and Qualification of Quality Control Personnel <sup>(2)</sup>  
Quality Program Procedure QP-10, Control of Measuring and Test Equipment <sup>(3)</sup>  
Quality Program Procedure QP-11, Control of Nonconforming Conditions <sup>(4)</sup>

### **6.2 Other References**

DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees  
DOE Guide 440.1-6, Implementation Guide for use with DOE O 440.1; Worker Protection Management, 10 CFR 830.120; and DOE 5700.6C, Quality Assurance

## **7.0 ATTACHMENTS**

Attachment 1 - Example – Hold-Quality Receiving Inspection Required Tag

**ATTACHMENT 1**  
**Tetra Tech EC, Inc.**  
**EXAMPLE - HOLD-QUALITY RECEIVING INSPECTION REQUIRED TAG**

<h1 style="margin: 0;">HOLD</h1> <p style="margin: 10px 0 0 0;">Quality Receiving Inspection Required</p> <hr/> <p style="margin: 0;">See Other Side</p>	<p style="margin: 0;">Date _____</p> <p style="margin: 0;">W.O. # _____</p> <p style="margin: 0;">P.O.# _____</p> <p style="margin: 0;">Item # _____</p> <p style="margin: 0;">Description _____</p> <p style="margin: 0;">_____</p> <p style="margin: 0;">Spec. # _____</p> <p style="margin: 0;">Ref. Dwg. _____</p> <p style="margin: 0;">Signature _____</p> <p style="text-align: center; margin: 20px 0 0 0;"><b>DO NOT REMOVE THIS TAG UNLESS AUTHORIZED BY QUALITY ASSURANCE PERSONNEL</b></p>
<b>Instructions</b>	
<ol style="list-style-type: none"><li>1. Enter date tag posted.</li><li>2. Enter work order number when applicable.</li><li>3. Enter purchase order number.</li><li>4. Enter item line number from purchase order.</li><li>5. Enter description of item.</li><li>6. Enter specification number and reference drawing number from purchase order when available.</li><li>7. Signature of individual posting tag.</li></ol>	

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## QP-7: Control of Special Processes

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**Version Date:** 04/02/2002 -  
New

**Original Issue Date:** 04/02/2002

**Approved by:**



**Category:** Company  
Procedures

**Sections:** ESQ - Quality Programs

**Sub Category:**  
Departmental/Discip  
line

**Document Type:** Procedure

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- 1.0 PURPOSE
- 2.0 SCOPE
- 3.0 MAINTENANCE
- 4.0 DEFINITIONS
- 5.0 DISCUSSION
- 6.0 REFERENCES

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## **1.0 PURPOSE**

This procedure establishes the requirements for the control of special processes. Included herein are provisions for the establishment of critical process parameters, qualification of the processes, and training and qualification of personnel who perform the functions covered by this procedure.

## **2.0 SCOPE**

This document applies to all employees of Tetra Tech EC, Inc. (TtEC) and its subsidiaries who perform special processes.

## **3.0 MAINTENANCE**

The Vice President, Environmental Safety and Quality Programs is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

### **4.1 Special Process**

A special process is a work process, the results of which are highly dependent on the control of the process or the skill of the operators, or both, and in which the specified quality cannot be readily determined by inspection or test of the product. Special processes that control or verify quality include welding, heat treating, and nondestructive examination.

## **5.0 DISCUSSION**

### **5.1 Responsibilities**

#### **5.1.1 Suppliers**

Suppliers shall be responsible for submitting procedures which control special processes to TtEC in accordance with purchase order or subcontract requirements.

#### **5.1.2 Engineering Department**

The Engineering Department shall be responsible for the review function associated with supplier special process procedures, such as welding and heat treating, and for the review of supplier nondestructive examination (NDE) procedures as defined in company procedure ENG-4, Review and Processing of Vendor Documents.

### **5.2 General Requirements**

Each special process shall be performed in accordance with appropriate instructions, which include or reference procedure, personnel, and equipment qualification requirements.

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Qualification of personnel, procedures, and equipment shall comply with specified requirements. TtEC personnel performing NDE shall be qualified in accordance with company procedure QP-2, Selection and Qualification of Quality Control Personnel.

Conditions necessary for the accomplishment of the special process shall be included in procedures or instructions. These conditions shall include proper equipment, controlled parameters of the special process, and calibration requirements.

The requirements of applicable codes and standards, including acceptance criteria for the process, shall be specified or referenced in the procedures or instructions.

For special processes not covered by existing codes and standards or where quality requirements specified for an item exceed those of existing codes and standards, the necessary requirements for qualifications of personnel, procedures, or equipment shall be specified or referenced in the procedures or instructions.

### **5.3 Welding Procedures**

The Engineering Department is responsible for developing and maintaining welding procedures.

The Construction Department is responsible for implementing the welding procedures, for qualifying personnel when performing these operations, and for providing technical assistance for procedure review and development.

### **5.4 Nondestructive Examination**

The Quality Programs Department with assistance from the Engineering Department is responsible for developing NDE procedures.

The Quality Programs Department is responsible for performing NDE used to verify quality acceptance and for qualifying personnel performing NDE. Other organizations may be designated to perform NDE if authorized by Quality Programs management.

### **5.5 Other Special Processes**

The Engineering Department is responsible for developing procedures for other special processes, such as heat treating, cadwelding, chemical cleaning, flushing, or any process which is required to be performed by qualified personnel using qualified procedures.

The Construction Department is responsible for implementing procedures for other special processes and is responsible for the training of personnel performing these functions.

### **5.6 Methods for Control of Special Processes**

The TtEC purchase order shall indicate to a supplier the types of procedures required for submittal to TtEC for review. These requirements shall be developed by Engineering with technical assistance from Quality Programs and other appropriate disciplines and shall reflect, as a minimum, the procedures to be used in the fabrication and inspection of the item. The methods for input of this information into the purchase orders are described in company procedure PD-401, Acquisition Planning.

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Procedures which describe the methods used in performing special processes shall be sent to Engineering. The process of performing Engineering reviews of supplier submittals is described in company procedure ENG-4, Review and Processing of Vendor Documents.

No item in the supplier's shops shall be considered acceptable if TtEC has not reviewed the procedures, unless specifically waived by the Project QA/QC Manager or designee. Items are also unacceptable if unqualified individuals are performing an activity for which a qualification is required.

## 6.0 REFERENCES

Engineering Procedure ENG-4, Review and Processing of Vendor Documents <sup>(1)</sup>

Procurement Procedure PD-401, Acquisition Planning <sup>(2)</sup>

Quality Program Procedure QP-2, Selection and Qualification of Quality Control Personnel <sup>(3)</sup>

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**QP-8:****Quality Control on Risk-Sensitive Projects**

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**Version Date:** 04/02/2002 -  
New

**Approved by:**

**Original Issue Date:** 04/02/2002



**Category:** Company  
Procedures

**Sections:** ESQ - Quality Programs

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line

**Document Type:** Procedure

**Keyword:** Quality Control

**Document Owner:** Mike Nicol

**Index:**

**Purpose**

To define the methods and responsibilities for quality control on risk-sensitive projects.

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- 1.0 PURPOSE
- 2.0 SCOPE
- 3.0 MAINTENANCE
- 4.0 DEFINITIONS
- 5.0 DISCUSSIONS
- 6.0 REFERENCES

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## **1.0 PURPOSE**

This procedure defines the requirements for quality control inspection and testing of risk-sensitive items on projects.

## **2.0 SCOPE**

This procedure applies to inspection and testing performed on risk-sensitive items. It applies to nuclear projects subject to regulation by the Nuclear Regulatory Commission (NRC) or Department of Energy (DOE). It also applies to non-nuclear projects with high loss potential when so specified in the Project Work Plan or Project Management plan.

## **3.0 MAINTENANCE**

The Vice President, Environmental Safety and Quality Programs is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

None.

## **5.0 DISCUSSION**

### **5.1 Responsibilities**

Personnel assigned to Quality Control activities shall be responsible for the following activities:

- Develop written procedures for the inspection of risk-sensitive items or services when existing inspection documents such as standard specifications and drawings do not provide an adequate basis for inspection.
- Preparation of reports for all inspections and tests performed.
- Control inspection procedures and revisions thereto.
- Scheduling and coordinating on-the-job training for assigned Quality Control personnel in advance of implementing the applicable inspection documents. This training shall be conducted in sufficient detail and with sufficient frequency to assure that the personnel responsible for the inspection fully understand the requirements contained in the applicable inspection documents.

Personnel assigned to Quality Control activities shall be responsible for performing inspection and testing activities in accordance with appropriate inspection documents.

### **5.2 General**

Inspection documents shall be prepared based upon the quality requirements contained in documents such as contracts, subcontracts, purchase orders, specifications, quality control documents and procedures, work plans, compliance plans, risk mitigation documents, and other applicable codes and standards. (See Attachment 1 for an example inspection checklist.) Test

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requirements and acceptance criteria shall be based upon specified requirements contained in applicable design or other pertinent technical documents.

Inspection and test personnel shall not report directly to the immediate supervisors who are responsible for performing the work being verified. The selection of inspection and test personnel shall be authorized by the Quality Programs Director or designee. Personnel performing inspection and test activities shall be qualified in accordance with company procedure QP-2, Selection and Qualification of Quality Control Personnel.

If mandatory inspection hold points are required, the specific hold points shall be indicated in the inspection documents.

Inspection and test documents shall specify or reference as a minimum the activities to be performed, the acceptance criteria, by whom the activities are performed, and the sequence in which the activities are to be performed.

Where mandatory inspection hold points are indicated on inspection documents or procedures, work may continue beyond a hold point only with the written approval of the Quality Control supervisor or designee.

Inspection records shall indicate that the items or services inspected meet the applicable quality requirements.

When inspections are to be performed by use of a sampling program, the sample size shall be identified on the inspection documents. Justification for this sampling shall be based upon recognized standard construction practices; successful past experience; and the complexity and function of the activity, item, or service to be inspected.

### **5.3 In-Process Inspection**

Inspection of items in-process or under construction shall be performed for work activities where necessary to verify quality. If inspection of processed items is impossible or disadvantageous, indirect control by monitoring of processing methods, equipment, and personnel shall be provided. Both inspection and process monitoring shall be provided when control is inadequate without both.

A combination of inspection and process monitoring, when used shall be performed in a systematic manner to assure that the specified requirements for control of the process and quality of the item are being achieved throughout the duration of the process.

Controls, where required, shall be established and documented for the coordination and sequencing of these activities at established inspection points during successive stages of the conducted process or construction.

### **5.4 Final Inspections**

Final inspections shall include a records review of the results and resolution of nonconformances identified by prior inspections. The final inspection shall be planned to arrive at a conclusion regarding conformance of the item to specified requirements.

Completed items shall be inspected for completeness, markings, calibration, adjustments, protection from damage, or other characteristics as required to verify the quality and conformance of the item to specified requirements. Quality records shall be examined for adequacy and completeness if not previously so examined.

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The acceptance of the item shall be documented and approved by the authorized inspection and test personnel.

Modifications, repairs, or replacements of items performed subsequent to final inspection shall require reinspection or retest, as appropriate, to verify acceptability.

## **5.5 Inservice Inspection**

Required inservice inspection or surveillance of structures, systems, or components shall be planned and executed by Quality Programs personnel working in conjunction with the Construction Operations organization.

Inspection methods shall be established and executed to verify that the characteristics of an item continue to remain within specified limits. Inspection methods shall include evaluations of performance capability of essential emergency and safety systems and equipment, verification of calibration and integrity of instruments and instrument systems, and verification of maintenance, as appropriate.

## **5.6 Test Requirements**

Tests, including as appropriate, prototype qualification tests, production tests, proof tests prior to installation, construction tests, and operational tests shall be controlled. Test requirements and acceptance criteria shall be based upon specified requirements contained in the applicable design or other pertinent technical documents. See Procedure CP-9, Testing, Start-Up, Turnover and O&M, for further guidance on development of project-specific procedures for punchlists, testing, start-up, turnover, and operating and maintenance functions on construction projects.

Test procedures shall include or reference test objectives and provisions for assuring that prerequisites for the given test have been met, that adequate instrumentation is available and used, that necessary monitoring is performed, and that suitable environmental conditions are maintained.

Prerequisites shall include the following, as applicable:

- Calibrated instrumentation.
- Appropriate equipment for performing the test.
- Trained and qualified personnel.
- Condition of test equipment and the item to be tested.
- Suitable environmental conditions.
- Provisions for data acquisition.

In lieu of specially prepared written test procedures, appropriate sections of related documents, such as ASTM methods, supplier manuals, equipment maintenance instructions, or approved drawings or travelers with acceptance criteria, can be used. Such documents shall include adequate instructions to assure the required quality of work.

## **5.7 Inspection, Test, and Operating Status**

The status of inspection and test activities shall be identified either on the items or in documents traceable to the items where it is necessary to assure that required inspections and tests are performed. Status identification shall also provide assurance that items, which have not passed the required inspections and tests, are not inadvertently installed, used, or operated.

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Status shall be maintained through indicators, such as physical location and tags, markings, shop travelers, stamps, inspection records, or other suitable means. See Attachment 2 for example status tags.

Only the personnel authorized to perform inspections and test are allowed to apply and remove tags, markings, labels, and stamps.

Status indicators shall also be used to indicate the operating status of systems and components on nuclear facilities, such as by tagging valves and switches, to prevent inadvertent operation.

## 5.8 Records

Inspection and test records shall, as a minimum, identify:

- Item inspected or tested
- Date of inspection or test
- Person performing inspection or test
- Type of observation
- Results or acceptability
- Reference to information on action taken in connection with nonconformances or deviations
- Person evaluating results

## 6.0 REFERENCES

Construction Procedure CP-9, Testing, Start-Up, Turnover and O&M <sup>(1)</sup>  
Quality Program Procedure QP-2, Selection and Qualification of Quality Control Personnel <sup>(2)</sup>

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## QP-10: Control of Measuring and Test Equipment

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**Version Date:** 04/02/2002 -  
New

**Original Issue Date:** 04/02/2002

**Approved by:**



**Category:** Company  
Procedures

**Sections:** ESQ - Quality Programs

**Sub Category:**  
Departmental/Discip  
line

**Document Type:** Procedure

**Keyword Index:** M&TE, Calibration  
and Maintenance

**Document Owner:** Mike Nicol

**Purpose**

To define the methods and responsibilities for quality control of measuring and test equipment.

### Table of Contents

- 1.0 PURPOSE
- 2.0 SCOPE
- 3.0 MAINTENANCE
- 4.0 DEFINITIONS
- 5.0 DISCUSSION
- 6.0 REFERENCES

---

## **1.0 PURPOSE**

This procedure describes the requirements for control, calibration, adjustment, and maintenance of measuring and testing devices used for performing tests and inspections to verify quality. These devices shall be calibrated and adjusted at specified, predetermined intervals using equipment having known, valid relationships to nationally recognized standards.

## **2.0 SCOPE**

This document applies to all employees of Tetra Tech EC, Inc. (TtEC) and its subsidiaries who perform quality verification activities requiring the use of measuring and test equipment.

## **3.0 MAINTENANCE**

The Vice President, Environmental Safety and Quality Programs is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

None.

## **5.0 DISCUSSION**

### **5.1 Responsibilities**

Personnel assigned to Quality Control activities shall be responsible for performance of the following activities:

- Establish a list (see Attachment 1 for example) which includes the measuring and testing devices to be calibrated and the frequency of calibration of these devices. The method and interval of calibration shall be based on the type of device, stability characteristics, required accuracy, and other conditions affecting measurement control.
- Assure that the measuring and testing devices used are of the proper range, type, and accuracy to verify conformance to established requirements.
- Maintain a master calibration file (see Attachment 2 for example) for each measuring and testing device which includes at least the following information.
  - Name of device.
  - Device serial and/or identification number.
  - Frequency of calibration.
  - Date of last calibration.
  - Name of party performing last calibration.
  - Due date for next calibration.
  - Frequency of out-of-calibration status requiring device replacement or repair.

Assure that all measuring and testing devices are marked with calibration due dates whenever possible. When this marking is not possible, alternative methods of tracing the device to its calibration date (such as serialization) shall be employed.

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Assure that all measuring and testing devices are calibrated in accordance with the requirements of this procedure and that the required documentation is prepared.

Develop and maintain a system for issuance, collection, and return of all measuring and testing devices. This system shall provide for the identification of personnel withdrawing devices, methods for issuing devices, and methods for the collection and/or return of devices at prescribed calibration times or as otherwise required.

## 5.2 General

The standard of calibration shall be traceable to national standards. If no national standards exist, the basis for calibration shall be documented and traceable to the manufacturer's standards.

Measuring and test equipment shall be calibrated against working standards having tolerances no greater than one-fourth of the tolerance of the measuring and test equipment. Tolerances greater than one-fourth may be acceptable when limited by the state of the art. Reference standards shall be calibrated against higher-level standards of closer tolerance.

Methods shall be employed to assure proper handling, storage, and care of the measuring and test equipment in order to maintain its required accuracy.

Any measuring and test equipment found to be out of calibration shall be recalibrated. When measuring and test equipment is found to be out of calibration, damaged, lost or stolen, an evaluation shall be made to ascertain the validity of previous inspection or test results and the acceptability of components inspected and/or tested since the last calibration check. When it is necessary to assure the acceptability of suspect items, the originally required inspections and/or tests shall be repeated using properly calibrated equipment. Suspect items on which a questionable device was used shall be listed in a Nonconformance Report (see company procedure QP-11, Control of Nonconforming Conditions).

If any of the measuring and test equipment is consistently found to be out of calibration, it shall be removed from service, repaired, and/or replaced.

Inspection and test reports shall include identification of measuring and test equipment used to perform the inspection and/or tests.

## 6.0 REFERENCES

Quality Program Procedure QP-11, Control of Nonconforming Conditions <sup>(1)</sup>

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## QP-11: Control of Nonconforming Conditions

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**Version Date:** 04/02/2002 -  
New

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**Category:** Company  
Procedures

**Sections:** ESQ - Quality Programs

**Sub Category:**  
Departmental/Discip  
line

**Document Type:** Procedure

**Keyword:** Nonconforming

**Document Owner:** Mike Nicol

**Index:** items,  
Nonconformance  
and Corrective and  
Preventive Action

**Purpose**

This section establishes the requirements for the identification, control and disposition of nonconforming risk-sensitive materials, parts, components, or services.

### Table of Contents

- 1.0 PURPOSE
- 2.0 SCOPE
- 3.0 MAINTENANCE
- 4.0 DEFINITIONS
- 5.0 DISCUSSION
- 6.0 REFERENCES

---

## **1.0 PURPOSE**

This procedure establishes the requirements for the identification, control and disposition of nonconforming materials, parts, components, or services.

## **2.0 SCOPE**

This document applies to all projects and employees of Tetra Tech EC, Inc. (TtEC) and its subsidiaries. Nonconformances may also be detected by a supplier or by others. Project/site specific procedures must satisfy the requirements of this procedure as well as client requirements.

## **3.0 MAINTENANCE**

The Vice President, Environmental Safety and Quality (ESQ) is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the Vice President, ESQ and the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

### **4.1 Acceptance Criteria**

Specified limits placed on the performance, results, or other characteristics of an item, process, or service defined in codes, standards, or other requirement documents.

### **4.2 Characteristic**

Any property or attribute of an item, process, or service that is distinct, desirable, and measurable.

### **4.3 Condition Adverse to Quality**

An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items, and nonconformances. A significant condition adverse to quality is one which, if uncorrected, could have a serious effect on safety or operability.

### **4.4 Corrective Action**

Measures taken to rectify conditions adverse to quality and, where necessary, to preclude repetition.

### **4.5 Deviation**

A departure from specified requirements.

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#### **4.6 Nonconformance**

A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

#### **4.7 Repair**

The process of restoring a nonconforming characteristic to a condition such that the capability of an item to function reliably and safety is unimpaired, even though that item still does not conform to the original requirement.

#### **4.8 Rework**

The process by which an item is made to conform to original requirements by completion or correction.

#### **4.9 Use-As-Is**

A disposition permitted for a nonconforming item when it has been established that the item is satisfactory for its intended use.

### **5.0 DISCUSSION**

Approved project procedures shall be implemented to control nonconforming items, services, or activities to prevent inadvertent use or installation, in accordance with company procedure PO-8, Document Control. These controls shall include: identification; documentation; segregation (as appropriate); and review, evaluation; and disposition including notification to all affected organizations.

#### **5.1 Identification and Reporting of Nonconformances**

Nonconforming items shall be identified and documented. Individuals having knowledge of a nonconformance shall document the nonconforming condition on a Nonconformance Report Form (see Attachment 1) obtained from their supervisor or the appropriate TtEC project Quality Assurance/Quality Control (QA/QC) organization and then attach the appropriate identification to the nonconforming item as described in 5.2 below.

Identification of nonconforming items shall be by marking, tagging, or other methods which shall not adversely affect the end use of the item or service. The identification shall be legible and easily recognizable. If identification is not practical due to size or other physical conditions, the container, package, or segregated storage area, as appropriate, shall be identified as an alternative.

For a nonconformance detected by TtEC, the individual shall initiate a Nonconformance Report detailing the description of the nonconformance and obtaining a recommended disposition from the Discipline Supervisor or the Project Site Supervisor. The report shall then be forwarded to the Project QA/QC Manager or designee for processing in accordance with this procedure.

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Nonconformances detected by a supplier that are dispositioned as "Repair," or "Use-as-is" and that will not conform to the technical specification and/or drawing requirements shall be reported to TtEC. The supplier shall report these nonconformances to TtEC by forwarding copies of the Nonconformance Reports to the Project QA/QC Manager or designee. The supplier shall not initiate corrective action until receipt of written approval or other appropriate disposition from TtEC.

The Project QA/QC Manager shall determine if the nonconformance represents a significant condition adverse to quality (see definition of Condition Adverse to Quality). If the nonconformance is determined to be significant, the Project QA/QC Manager shall initiate a Quality Incident Report as described in company procedure EHS 1-7, Incident Reporting and Investigation.

## **5.2 Control of Nonconforming Conditions, Items or Services**

Upon receipt or preparation of a Nonconformance Report, the Project QA/QC Manager or designee shall perform the following activities.

- Log in the NCR report and assign it a number;
- Review the report to determine the nature of the nonconformance; and
- Transmit the report to the appropriate technical professional(s) for review and evaluation.

An NCR log shall be maintained for each project by the assigned project QA/QC organization. The NCR log shall be used to track and control each nonconformance.

The Project QA/QC Manager or designee, after logging the NCR, shall review the NCR to determine its validity. If the NCR is determined to be valid, the QA/QC organization shall transmit the NCR to the organization responsible for dispositioning the NCR.

All items or services identified as nonconforming shall be controlled to prevent inadvertent installation or use by identifying the item using a Hold Tag (see Attachment 2) and segregating the item or service when practical. If segregation of an item is not practical and or identification of the item or service by use of a Hold Tag is not practical, other methods as approved by the Project QA/QC Manager shall be used. The Project QA/QC Manager or designee is responsible for the application and removal of Hold Tags for TtEC generated NCR's.

## **5.3 Review, Evaluation, and Disposition of Nonconformance**

Upon receipt of the NCR form, the responsible organization shall review the deficiency/nonconformance and document the recommended disposition on the NCR form. The recommended disposition may be: "Use as is"; "Repair"; "Rework"; or "Reject/Scrap".

- If "Use as is" is recommended, the responsible organization must provide technical justification why the item should be used when the item does not meet acceptance criteria.
- If "Repair" or "Rework" is recommended, the responsible organization must provide technical justification for the recommendation, and develop repair/rework procedures including appropriate acceptance criteria.
- If "Reject/Scrap" is recommended, the item shall be controlled until it can be removed from the work area or site.

When the responsible organization has completed its evaluation of the nonconforming item, documented its recommended disposition, and signed and dated the NCR form, the NCR form shall be returned to the QA/QC organization for further processing. Upon receipt of the returned

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NCR form, the QA/QC Manager or designee shall update the NCR log, evaluate the recommended disposition, and determine if corrective action is required. The QA/QC organization shall also indicate on the NCR form the affected disciplines or organizations who must review the recommended disposition. The QA/QC Manager or designee shall route the NCR form for review, concurrence or rejection.

Appropriate qualified technical professional(s) shall review and evaluate the nonconformance, decide on the suitability of the recommended disposition; identify appropriate action, and enter details of the evaluation on the NCR form. Each condition adverse to quality and or nonconforming characteristic(s) shall be compared against acceptance criteria during the evaluation of the recommended disposition. The NCR form shall then be returned to the Project QA/QC Manager or designee.

Upon receipt of the reviewed and evaluated report, the Project QA/QC Manager or designee shall log in results of the review, indicate acceptance or rejection by signing the NCR form and distribute completed copies to the individuals that reviewed the NCR form and to the responsible organization.

Voided NCR's shall be marked or stamped "VOID" and initialed and dated by the QA/QC organization. The log shall indicate that the NCR is voided. The reason for voiding shall be indicated on the NCR and a copy distributed to the affected organizations. Voided NCR's shall be appropriately filed.

#### **5.4 Notification**

The Project QA/QC Manager or designee shall notify the Discipline Supervisor of the results of the review and of intentions to perform follow-up activities, if required.

#### **5.5 Re-inspection**

Repaired or reworked items shall be reexamined using the original acceptance criteria unless the nonconforming item disposition establishes alternate acceptance criteria.

The completed Nonconformance Report form shall provide sufficiently detailed information for as-built records and shall be included in the documentation package.

Nonconformances not corrected in accordance with the requirements of the Nonconformance Report shall not be accepted. Items or services shall not be accepted until the appropriate corrective action has been accomplished.

#### **5.6 Records**

Nonconformance Reports shall be maintained in accordance with company procedure PO-8, Document Control, and project contractual requirements.

### **6.0 REFERENCES**

Environmental, Health & Safety - Programs Procedure EHS 1-7, Incident Reporting and Investigation <sup>(1)</sup>

Personnel Practices Procedure PP-25, Procedures - Authorization, Preparation and Distribution <sup>(2)</sup>

Project Initiation/Operations Procedure PO-8, Document Control <sup>(3)</sup>

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**QP-12:****Corrective Action**

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**Purpose**

This section establishes the requirements for the identification, analysis, and implementation of corrective action for risk-sensitive items and services. This section also applies to activities performed at TtEC offices, at sites, and at suppliers' facilities.

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New

**Original Issue Date:** 04/02/2002

**Category:** Company  
Procedures

**Sub Category:**  
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line

**Keyword:** Monitoring,

**Index:** Nonconformance  
and Corrective and  
Preventive Action

**Approved by:**



**Sections:** ESQ - Quality Programs

**Document Type:** Procedure

**Document Owner:** Mike Nicol

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- 4.0 DEFINITIONS
- 5.0 DISCUSSION
- 6.0 REFERENCES

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## **1.0 PURPOSE**

This section establishes TtEC Quality Programs requirements for the identification, analysis, and implementation of corrective action for conditions adverse to quality.

## **2.0 SCOPE**

This procedure applies to corrective action taken to rectify project Quality Program deficiencies.

## **3.0 MAINTENANCE**

The Vice President, Environmental Safety and Quality Programs is responsible for updating this procedure. Approval authority rests with TtEC's President. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director, Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

### **4.1 Condition Adverse to Quality**

An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items, and nonconformances. A significant condition adverse to quality is one which, if uncorrected, could have a serious effect on safety or operability.

### **4.2 Corrective Action**

Measures taken to rectify conditions adverse to quality and, where necessary, to preclude repetition.

## **5.0 DISCUSSION**

### **5.1 General**

Corrective action shall be required for identified and documented deficiencies associated with quality-related activities.

The need for corrective action may be identified from the following sources.

- TtEC Quality Program audits performed in accordance with company procedure C-2, Audits.
- Management assessments performed in accordance with company procedure PO-11, Management Assessment for DOE Projects.
- Audits performed by Project QA/QC in accordance with project specific QA/QC plans.
- Audits of TtEC performed by the client or regulatory agencies.

Deficiencies identified from the above sources that are determined to be significant shall receive additional corrective action review as a Quality Incident Report in accordance with company procedure EHS 1-7, Incident Reporting and Investigation.

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Determination and review of corrective action shall be made as early as possible in order to preclude the possible repetition of deficiencies/nonconformances.

During the review of all corrective action items, consideration shall be given to the training of personnel if it is determined that this was a cause of the deficiency/nonconformances.

Dissemination of corrective action information to responsible individuals shall be performed in a minimum length of time.

## **5.2 Determination and Implementation Methods**

### **5.2.1 TtEC Management Assessments**

TtEC management assessments of project Quality Program performance shall be performed in accordance with company procedure PO-11, Management Assessment for DOE Projects. The purpose of these assessments is for management of those organizations which implement portions of the Quality Program (e.g., Engineering, Construction, Project Management) to assess the adequacy of that part of the Quality Program for which they are responsible. Management assessments are typically required for projects regulated by the Nuclear Regulatory Commission (NRC) or Department of Energy (DOE).

Deficiencies identified as a result of management assessment shall be reported and resolved in accordance with company procedure PO-11, Management Assessment for DOE Projects.

### **5.2.2 Quality Assurance Audits**

Auditors from the ESQ Department shall perform internal Quality Assurance audits as required by company procedure C-2, Audits or project specific QA/QC plans. These audits are designed to verify that responsible groups within TtEC are complying with the requirements of the TtEC Quality Program or project specific QA/QC plan. The assigned audit team shall also perform follow-up action as described in C-2 or project specific audit procedures to assure that corrective action, if required, has been accomplished. If disagreement about the type or effectiveness of corrective action exists, the problem shall be reviewed by successively higher levels of management until satisfactory resolution is obtained.

Audits of potential TtEC suppliers shall be performed as described in company procedure QP-4, Supplier Quality. If any aspect of a supplier's Quality Program does not meet the TtEC requirement and the supplier is being considered for award, corrective action shall be implemented to rectify the problem areas disclosed by the TtEC evaluation.

### **5.2.3 Nonconformances**

Nonconformances are reviewed by the Project QA/QC Manager in accordance with company procedure QP-11, Control of Nonconforming Conditions, in order to determine the need for corrective action. For those items which are deemed to require corrective action, direction is provided on the Nonconformance Report. Verification of corrective action is performed by QA/QC personnel and is noted on the Nonconformance Report. Verifying the overall effectiveness in correcting identified nonconformances is the responsibility of the Project QA/QC Manager.

### **5.2.4 Client or Regulatory Agency Audits**

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Audits of TtEC project Quality Programs may be performed by the client and/or appropriate regulatory agencies. If corrective action is required as a result of one of these audits, the Corporate Quality Program Director or designee shall be responsible for obtaining a response from the cognizant individual(s) at TEC for submittal to the auditing body. The Corporate Quality Program Director is responsible for coordinating corrective action and follow-up with the effected TtEC organizations and the external auditing organization.

### **5.2.5 Project Corrective Action Requests**

Projects regulated by the NRC or DOE are frequently required by the client to implement a Corrective Action Request (CAR) process. The purpose of the CAR is to document identification and correction of programmatic (non-hardware related) deficiencies that are considered significant. Attachment 1 is an example CAR form for use in such instances or when determined necessary for other projects. Attachment 2 is an example of a CAR status log for use if tracking CARs is needed. Project procedures shall address the processing of CARs. In addition to project level corrective action review, all CARs shall receive corporate level corrective action review as a QIR in accordance with company procedure EHS 1-7, Incident Reporting and Investigation.

### **5.3 Records**

Corrective action shall be documented and included in the project files.

## **6.0 REFERENCES**

Compliance Procedure C-2, Audits <sup>(1)</sup>  
Environmental, Health & Safety - Programs Procedure EHS 1-7, Incident Reporting and Investigation <sup>(2)</sup>  
Project Initiations/Operations Procedure PO-11, Management Assessment for DOE Projects <sup>(3)</sup>  
Quality Program Procedure QP-11, Control of Nonconforming Conditions <sup>(4)</sup>

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## QP-13: Surveillance Procedure

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### **Purpose**

The purpose of this procedure is to define responsibilities and provide requirements and guidance for performing and documenting surveillances.

**Version Date:** 04/14/2004 -  
New

**Original Issue Date:**

**Category:** Company Procedures

**Sub Category:** Departmental/Discipline

**Keyword Index:** Inspections, Monitoring, Surveillances

**Approved by:**



**Sections:** ESQ - Quality Programs

**Document Type:** Procedure

**Document Owner:** Mike Nicol

The purpose of this procedure is to define responsibilities and provide requirements and guidance for performing and documenting surveillances.

This procedure shall be used for the performance of surveillances in relation to any aspect of Tetra Tech EC, Inc. (TtEC) project operations.

The Director of Quality Programs has overall responsibility for the implementation of this procedure. The Corporate Quality Control Manager (CQCM) is delegated authority for the implementation of this procedure on projects under his/her review. These responsibilities include:

- a. Overall administration for the conduct and planning of surveillances;
- b. Assuring personnel performing surveillances are properly qualified;
- c. Assuring the surveillance process scheduled is completed and documented; and
- d. Reviewing surveillance results to identify any significant Quality Program improvement areas or any positive/negative trends.

The Project Quality Assurance (QA)/Quality Control (QC) Manager shall:

- a. Maintain and assign surveillance numbers from the Surveillance Log (Attachment 3).
- b. Review surveillance reports for completeness and accuracy.

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Personnel performing surveillances are responsible for:

- a. Conducting surveillances in accordance with this procedure;
- b. Performing surveillances of activities to evaluate compliance with specified requirements;
- c. Preparing and completing surveillance checklists;
- d. Promptly notifying the responsible manager when a significant condition is found that does not conform to requirements;
- e. Preparing and issuing surveillance reports, documenting surveillance activities and results, including: identified compliances, nonconformances, and corrective actions initiated
- f. Documenting surveillance activities, including the results of the surveillances, identified compliances, noncompliance, or deficiencies, and any corrective actions initiated;
- g. Monitor and follow-up action to verify that corrective action is accomplished as scheduled on any nonconformances or corrective action identified as a result of surveillance; and
- h. Distribution of surveillance report

The Responsible Managers, Discipline or Project Manager, are responsible for identifying and implementing required actions in response to identified nonconformance or corrective action.

Personnel performing surveillances will have the following:

- a. Successful completion of the TtEC Auditor Training Course; or
- b. On-The-Job-Training, guidance, and counseling under the direct supervision of a person designated by the Director of Quality Programs/CQCM; or
- c. Certification to a recognized standard, i.e., ASQ, ISO, N45.2 Level II, etc., and
- d. Required reading of this procedure

Surveillances shall be coordinated with the Responsible Manager of the activities to be evaluated in time to allow scheduling of people and facilities.

The Surveillance Performer will obtain the next available number from the Surveillance Log (Attachment 3 or similar) and indicate reference documents.

The Project QA/QC Manager will maintain and assign the next surveillance number from the Surveillance Log (Attachment 3). The surveillance number will appear for identification, reference, and tracking on documents related to the surveillance. Surveillances shall be numbered as: YYYY-XXXX-ZZZ, where YYYY is the four-digit year, XXXX is a project identifier or number, and the ZZZ is

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the sequential number for surveillances performed that year. (For example, 2003-WXYZ-003 would be the third Quality surveillance performed in 2003 on the WXYZ Project).

The Surveillance Performer will plan the surveillance as follows:

- a. Notify the organization to be evaluated;
- b. Obtain the relevant procedures, manuals, statements of work, contract specifications, regulations, or other documents containing requirements that apply to the activity;
- c. Review past surveillance reports/results.
- d. Review the requirements to determine which areas are to be reviewed and develop a checklist (Attachment 1 or equivalent) documenting the specific requirements being reviewed.

The Surveillance Performer shall coordinate surveillance activities with the identified project team member.

The Surveillance Checklist, or equivalent, shall be completed as the surveillance proceeds. If a significant item outside the scope of the surveillance is identified, the Surveillance Performer shall bring the item to the immediate attention of the responsible manager.

Checklist items that are found inappropriate to the goals of the surveillance shall be marked "N/A" from the checklist during the surveillance.

A condition or action noted during the surveillance that does not comply with the requirements, shall be immediately identified to the personnel responsible to allow them to correct the condition. Corrections that are made immediately shall be reported as such in the Surveillance Report (Attachment 2).

At the completion of the surveillance, the responsible manager shall be notified of the results.

If deficient areas were found and were not corrected during the course of the surveillance, they shall be identified for nonconformance or corrective action reporting and appropriate follow-up under the appropriate Company Procedure QP-11, Control of Nonconforming Conditions, or QP-12, Corrective Action. In order to ensure understanding, the Surveillance Performer shall cite the exact requirement not being complied with.

If the Surveillance Performer finds that significant deficiencies exist and with concurrence of the Responsible Manager, it is determined that a work suspension is necessary, an order to suspend/stop work may be issued to suspend activities until the deficiencies are resolved.

Results of surveillance shall be reported in writing as soon as possible after completion of the surveillance, preferably not later than 7 working days after completion.

- a. The Surveillance Report shall include that information specified in Attachment 2 and any additional information deemed necessary to properly explain the surveillance results.

Surveillances shall be closed as follows:

- a. Activities were found satisfactory and the surveillance is closed when the report is issued.

- 
- b. Minor deficiencies detected and corrected immediately are documented in the report and the surveillance is closed when the report is issued.
  - c. Deficient areas found and not corrected during the course of the surveillance are identified as findings in the report. The report is closed with reference to the relevant nonconformance report or corrective action report developed under the appropriate Company Procedure QP-11, Control of Nonconforming Conditions, or QP-12, Corrective Action.
  - d. Items that are not elements of compliance, or those that are minor in nature but may lead to future significant problems shall be described in the surveillance report as observations. The responsible manager of the activity shall be made aware that observations need to be evaluated and appropriate actions taken. Exemplary or noteworthy practices can also be identified as observations. Observations identified will be tracked and closed through the appropriate nonconformance or corrective action report.

The Surveillance Report is review for completeness and accuracy by the Project QA/QC Manager, if applicable.

The Surveillance Performer signs the Surveillance Report and distributes to the appropriate personnel.

The original Surveillance Report shall be sent to the responsible manager for the surveilled activity. Distribution of the completed report shall be promptly distributed as a minimum, to the Responsible Manager, the Project Manager, Project QA/QC Manager, CQCM, and project record files.

Responses and appropriate follow-up to Surveillance Report generated issues/deficiencies are addressed through the nonconformance reporting and/or corrective action reporting Company Procedure QP-11, Control of Nonconforming Conditions, or QP-12, Corrective Action.

The following documents, generated as a result of activities accomplished through this procedure, are considered records and shall be identified, classified, and maintained in accordance with the project records management program and related records inventory and disposition schedule. Reference Company Procedure PO-8, Document Control.

- a. Surveillance Reports; and
- b. Supporting documentation

Nonconformance - A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

Observation - A conclusion based on an evaluation of implementation practices or management system that reflects, in the opinion of the assessor, an opportunity for performance improvement. In the opinion of the assessor, an observation requiring a response is either a practice that has a high

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loss potential and/or is a needed process improvement. Observations that do not require a response may be an isolated nonconformance that was corrected during the audit process or an area that the assessor believes needs to be watched closely by the responsible manager.

The Project QC/QC Manager should develop a surveillance schedule reflecting the surveillances to be performed and a preliminary schedule for each surveillance. The schedule should identify the activity, person to perform the surveillance and preliminary schedule. The schedule may be modified as required, due to changing priorities, and/or available resources. The Project QA/QC Manager may elect to schedule and perform surveillance on a random basis.

Past surveillance reports/results should be reviewed and used for follow-up activities. Follow-up in specific areas identified in the reports verifies the correction of identified deficiencies and the implementation of corrective actions.

An informal entrance meeting should be conducted to describe the planned surveillance activities and goals of the surveillance.

Tetra Tech EC, Inc.

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## QP-14: Lessons Learned Procedure (Previously A-33)

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**Version Date:** 01/16/2001 -  
Revised

**Original Issue Date:** 01/31/2000

**Approved by:**



**Category:** Company  
Procedures  
Reference  
Documents

**Sections:** ESQ - Quality Programs

**Sub Category:**  
Departmental/Discip  
line  
Lessons Learned

**Document Type:** Procedure

**Keyword Index:** Nonconformance  
and Corrective and  
Preventive Action

**Document Owner:** John DeFeis

**Purpose**

The purpose of this procedure is to establish a procedure for the preparation, review, resolution, distribution, and follow-up activities which records and conveys Lessons Learned to promote continuous improvement.

### Table of Contents

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1.0	PURPOSE
2.0	SCOPE
3.0	MAINTENANCE
4.0	DEFINITIONS
5.0	DISCUSSION

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## **1.0 PURPOSE**

This document establishes the procedure for the preparation, review, resolution, distribution, and follow-up activities, which records and conveys Lessons Learned to promote continuous improvement.

## **2.0 SCOPE**

The procedure applies to all employees of Tetra Tech EC, Inc. (TtEC) and its subsidiaries (hereinafter "Company"). This procedure also applies to certain subcontractors; as identified in subcontract documents.

## **3.0 MAINTENANCE**

The Executive Director of Compliance and Corporate Counsel is responsible for the maintenance of this procedure. Approval authority rests with the President and Chief Executive Officer. Suggestions for revisions should be submitted to the Executive Director Compliance and Corporate Counsel.

## **4.0 DEFINITIONS**

**4.1 Impact** – The effect or impression of one action upon another.

**4.2 Lesson Learned** – An experience, example, or observation that imparts or provides an example for future reference of results or consequences due to a positive or negative action or event.

**4.3 Risk** – A factor, element, or course involving uncertainty for which there is a possibility of harm, loss, or damage.

## **5.0 DISCUSSION**

The Lessons Learned Program is designed to accomplish two primary goals:

1. Ensure that important corporate or external experiences and knowledge gained during the course of operations are communicated.
2. Identify issues or problem areas to prevent recurrence of activities that result in a negative impact or to identify positive action to ensure continuous improvement in the areas of safety, quality and efficiency of the organization or project execution.

### **5.1 Responsibilities**

#### **5.1.1 All Employees**

All Employees are considered "originators" of Lessons Learned reports. It is the responsibility of all Company employees and/or subcontractor personnel to identify any issues that may have a positive or negative significant impact on the project or other Company activities, and initiate the Lessons Learned process. The originator shall prepare a Lessons Learned report by completing the Lessons Learned Report Form.

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### **5.1.2 Resource Manager (RM), Program Manager (PM), or Functional Department Head**

The appropriate RM, PM, or Functional Department Head, or his/her designee, shall review and approve the Lessons Learned report before submission to the Vice President of Support Services. Ensure that the requirements of Section 5.4.3 below, are implemented.

### **5.1.3 Project Quality Assurance Manager (QAM)**

The Project QAM should review Lessons Learned Reports as requested by the PM, in accordance with this procedure.

### **5.1.4 Administration and Compliance Department**

The Corporate Reference Library (CRL) database administrator shall assign a number to each report upon receipt. The reports should be posted by the CRL database administrator in the "Other Reference Docs" section of the CRL within 1 week of receipt of an approved final version.

### **5.1.5 Vice President Support Services**

The Senior Vice President of Support Services should review and approve all Lessons Learned reports prior to posting on the CRL and forward all approved reports to the CRL database administrator for posting on the CRL.

## **5.2 Documentation**

Any topic that has been identified to have a significant impact on a project or the Company should be documented on the Lessons Learned Report Form (See Attachment 1 for a sample report format). All applicable portions of the form should be completed by the originator. The originator identifies the topic and provides a description of the program or benefit.

## **5.3 Lessons Learned Report Content**

**5.3.1 FUNCTIONAL AREA** - Choose the appropriate functional area for the Lessons Learned Report. Functional Areas include Field Activities, General, Subcontracting, Project Administration, Engineering and Sciences)

**5.3.2 DESCRIPTION** - Include a complete description of the events leading up to the impact. Also describe the resulting impact on the project, or Company. When preparing a Lessons Learned Report where the topic is an identified problem, consider possible causes, not just the first or obvious ones. When analyzing the cause of the identified problem, be explicit. Causes may be basic causes consisting of personnel factors, job factors, management factors, or consist of immediate causes resulting from substandard conditions or practices. This section does not include a complete discussion of the process of root cause analysis. The intent is to highlight the requirement that a root cause type of analysis process be applied in developing this section of the report.

**5.3.3 RECOMMENDED FUTURE ACTION** - The originator shall recommend any future actions that should be implemented to improve organizational or project execution. (Including a description of any project or Company policies or procedures that are effected.) The originator shall provide a well thought out solution which should include input from affected individuals. There may be more than one viable solution to any one problem and they all should be considered. Include a description of any action taken to resolve the issue, including a status of resolution efforts.

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## **5.4 Other Guidance**

**5.4.1** Lessons Learned can originate from a subcontractor. All subcontractor Lessons Learned report shall follow this procedure.

**5.4.2** Lessons Learned can also be developed from published case summaries that are illustrative of the Company's work.

**5.4.3** The text may be submitted anonymously to encourage participation. Specifically the text shall be drafted as follows:

- Do not use client, project, or employee names.
- Do not identify the project location.
- Only describe specific project characteristics essential for the lesson.
- Where possible, without detracting from the lesson, change some facts i.e., in some cases the type of equipment or vehicle etc. may not be essential.
- Always use language that conveys the information is developed for the purpose of preventing future accidents or problems.

## **5.5 Approval and Dissemination**

### **5.5.1 Project Reports**

For project related reports, the PM shall approve the draft and forward it to the project QAM as appropriate, for further review. Once the report is approved by the appropriate project personnel (as established by each PM), the report shall be forwarded to the Vice President of Support Services for review and approval. (Copies of draft and final Lessons Learned reports shall **not** be maintained in project files.)

If the Lessons Learned originates from a subcontractor, the recommendations/solutions in the Lessons Learned will not automatically apply to the Company. The appropriate Company Functional Department Head (e.g., ESQ, Science, Engineering etc.) will also review the report before forwarding the final draft to the Senior Vice President of Support Services.

The PM may chose to discuss lessons learned with Company project staff members during project meetings.

### **5.5.2 Non-Project Specific Reports**

For non-project related reports, the RM or Functional Department Head (as appropriate) shall approve the draft and forward it to the Senior Vice President of Support Services for review and approval.

### **5.5.3 Posting Reports on the CRL**

After approval, the Senior Vice President of Support Services shall submit a final approved electronic copy to the CRL Database Administrator for posting in the CRL. Lessons Learned reports shall be posted in the "Other Reference Docs" section of the CRL. The Database Administrator shall assign a number to each report as follows:

- Engineering = ELL-XXX

- 
- Field Activities = FLL-XXX
  - General = GENLL-XXX
  - Project Administration = PALL-XXX
  - Sciences = SLL-XXX
  - Subcontracting = SCLL-XXX

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**ATTACHMENT C**  
**OU 3 PRE-DREDGE INFILL SAMPLING SIMULATION MEMORANDUM**

DATE: May 30, 2008

## DRAFT MEMORANDUM

FROM: John Kern, John Wolfe, and Noemi Barabas

PROJECT: Lower Fox River Remedial Design

TO: Work Group 4

CC:

SUBJECT: Evaluation of Increased Sampling Density for Refinement of 30% Dredge Prism Design in Upper OU3

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### Objectives

The objective of this memo is to project expected performance of neatline dredging, using current depth-of-contamination (DOC) data from remedial design cores, and refining the current neatline with the collection of additional core samples, called “infill samples”. Possible performance benefits and costs of overdredging, consistent with a more conservative drawing of the neatline, are also evaluated. In each case, performance is compared to implementation of the required (i.e., excluding overdepth allowances) dredge prisms originally presented in the 30 Percent Design report, which consisted of a series of engineered cells of constant elevation or slope. This first evaluation of increased sampling density is limited to the upper portion of Operable Unit 3 (OU 3), where full-scale dredging-only actions are planned to begin in 2009. Similar evaluations of increased sampling density for the remainder of dredge-only areas in OU 3 and OU 4 may also be conducted at a later date.

Performance metrics discussed in this technical memorandum include: a) the volume of undredged inventory (i.e., undisturbed residuals exceeding 1 ppm total PCBs); b) the spatial extent of undredged inventory exceeding specified critical concentrations and thicknesses; and c) the volume of non-target sediments removed (i.e., sediments below 1 ppm total PCBs).

The geostatistical approach in this memorandum used existing bank-to-bank transects sampled during remedial design, and evaluated remedial performance within those transects, given alternative ways of setting the depth of the dredge cut, including adding new sample points within the transect. Ordinary Kriging was used to estimate the neatline, based on existing core data and also assuming the addition of infill data points. Infill sampling schemes that we investigated were based on the inclusion of additional samples along transect lines as well as the introduction of additional new transects between existing transects.

### Summary

Comparisons between the 30 Percent Design engineered dredge prisms and neatline dredging based on Ordinary Kriging of DOC, indicate that the 30 Percent Design dredge prism approach is more conservative in terms of the percentage of target sediment removed, but also would be expected to remove more clean material, with corresponding cost and schedule impacts. To achieve comparably conservative performance without additional infill sampling, it would be

necessary to increase the depth of the required neatline (i.e., still assuming no overdepth allowance) by approximately one standard deviation of DOC. This is equivalent to shifting the Ordinary Kriging-based required neatline downward from a 50 Percent Level of Significance (LOS; i.e., equally likely that contamination ends above or below the line at any given location) to a much more conservative 16 percent LOS (i.e., only 16% probability that contamination exists below the neatline, at a given location). This shift from 50 percent LOS to 16 percent LOS would increase dredged volume from between 10 and 100 percent, depending upon the specific dredge prism. Nevertheless, in all of these cases, significant undredged inventory could be left below the required dredge depth, again excluding overdredge allowances.

In contrast, the simulations show that additional infill sampling substantially improves the performance of the neatline approach, based on Ordinary Kriging, without the need to overdredge to a more conservative LOS. Infill strategies investigated included doubling and tripling the number of sample points along each bank-to-bank transect. Note that addition of one or two additional samples between individual samples along existing transects and one or two additional transects between each existing transect; has the effect of more than doubling or tripling the overall sample density. Based on the analyses presented in this memorandum, most of the performance improvement is accomplished by doubling the existing number of core samples, with relatively less improvement afforded by tripling the number of samples. These improvements in performance are achieved with only modest increases in the volume of sediment targeted for dredging, and would significantly reduce and likely eliminate the need for re-dredging to address undisturbed residuals.

Compared to the 30 Percent Design engineered dredge prisms, the use of infill samples to refine the neatline dredging approach offers potential net cost savings of between roughly \$10 MM to \$15 MM (based on a volume rate of dredging and disposing redredged material: actual savings could be much higher). These net savings would include avoided costs of remediating non-target sediment and reduced costs of post-dredge verification sampling and re-dredging cleanup passes, which can likely be eliminated except in rare cases, offsetting the cost of collecting and analyzing the infill samples.

## Methods

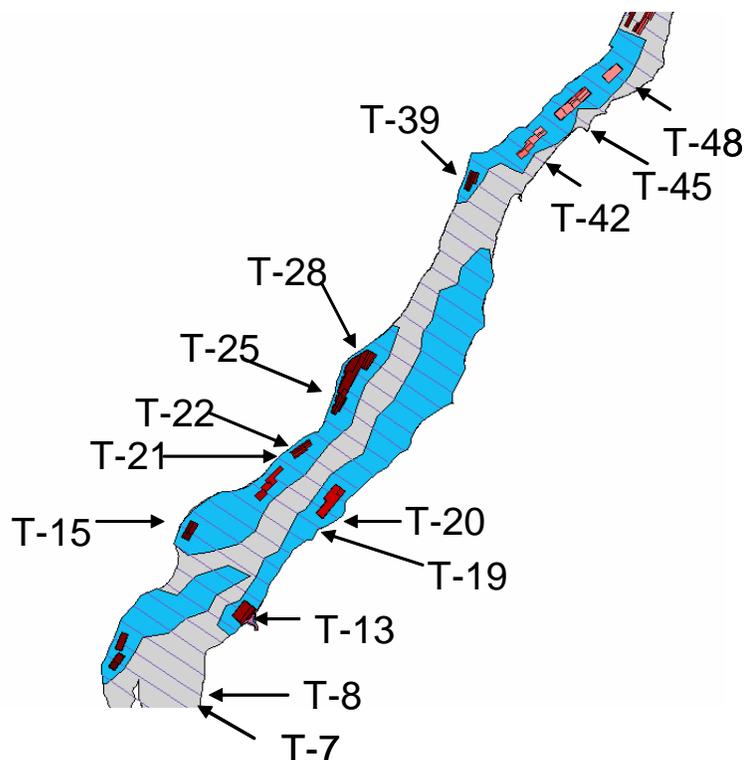
During remedial design, DOC was measured throughout OUs 2 to 5 by collecting and analyzing sediment sections from more than 1,700 core locations over approximately 2,000 acres, or roughly 1 core per 1.2 acres. The performance of planned dredge cuts depends on depths of contamination at locations intermediate to those samples. For this analysis, those intermediate depths of contamination were estimated using a technique called conditional simulation.

Conditional simulation uses a model to estimate DOC, taking into account the known DOCs at core locations, and also the pattern of spatial correlations between those measured DOCs. (The uncertainty associated with interpolating between core data points has been incorporated into the geostatistical analysis that has defined the DOC.) Conditional simulation interpolates between the known sample locations, while preserving the spatial variation observed in the actual data. Conditional simulations represent sets of equally likely values as opposed to the average. These simulated values are useful for investigation of processes that would otherwise be biased by the effects of smoothing introduced by conventional interpolation methods.

### One Dimensional Simulation Along Transects

DOC values along bank-to-bank transects were simulated by first applying the Fast Fourier Transform (FFT) simulation algorithm to produce a series of DOC values with the same statistical properties as the sample data (i.e., matching the histogram and semivariogram). This unconditional simulation was then adjusted to constrain the simulation to the known 1 ppm depths at core locations while also forcing the spatial correlation between simulated and actual values to be consistent with that observed in the sample data. In particular, the nugget effect, which reflects the imperfect correlation between DOC estimates from collocated cores, was estimated based on an actual set of collocated cores from the remedial design sampling and reproduced using the FFT technique. In essence, this method produces a complete DOC series along each transect that has the histogram and semivariogram, and therefore the same spatial correlation pattern, as actual data values from the remedial design transects. Each simulated DOC series can be interpreted as a random draw from the set of all possible DOC series, consistent with spatial variability of the observed data. These simulations serve two functions: 1) they generate an estimate of the true limits of contamination to which estimated neat lines are compared to measure performance; and 2) they provide a source from which to draw DOC values at hypothetical infill locations.

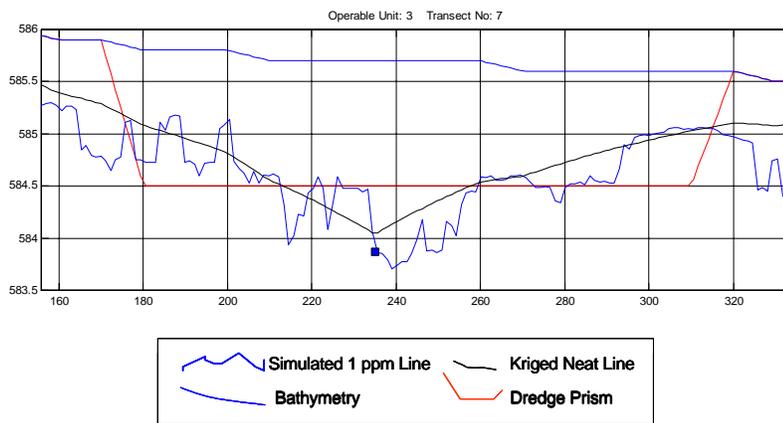
Along each transect, Ordinary Kriging was used to estimate the neatline elevation. The neatline was informed by actual sample data as well as simulated values from infill sampling locations, when investigating infill sampling scenarios. Scenarios were investigated that included addition of 0, 1, 2, or 3 additional sampling locations between existing sample points along transects. For OU3, conditional simulations were conducted for each of the 19 bank-to-bank transects that intersects a planned dredge-only portion of OU3. Figure 1 depicts those transects.



**Figure 1.** Nineteen bank-to-bank transects included in geostatistical simulation studies. Sampling locations within the blue study polygons were used to develop the sample histogram and semi-variogram used for simulation.

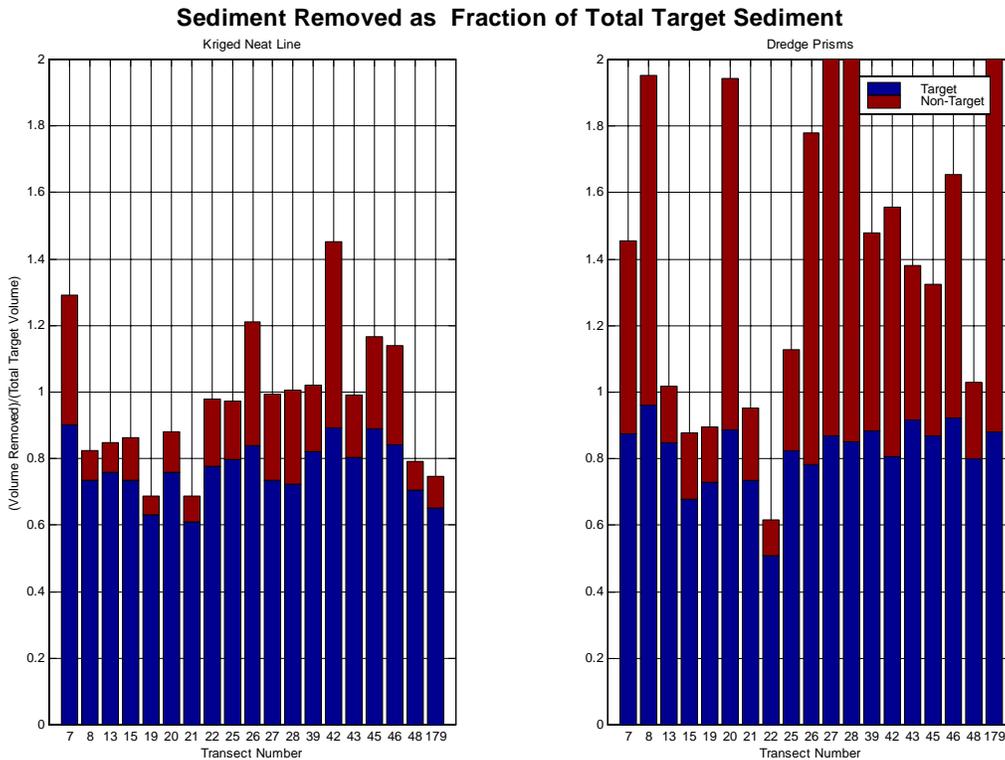
## Findings

Figure 2 compares a simulated 1 ppm line along OU3 transect 7 to a kriged neatline and to the original engineered dredge prism (required elevation; excluding overdepth allowances) from the 30 Percent Design report. Where the simulated 1 ppm lines are below either of the planned dredge lines, the area between them represents undredged inventory. Where the simulated 1 ppm lines lie above either of the planned dredge lines, the area between them represents dredged non-target sediment.



**Figure 2.** Example profiles including bathymetry, interpolated neat line, simulated 1 ppm line, and dredge prism based on 30% design.

Figure 3 presents a transect-by-transect performance comparison of kriged neatlines versus the engineered 30 Percent Design dredge prisms (required elevations), based on the existing sample density. The blue bars represent volumes of dredged target sediment, as fractions of total target volume, and the red bars represent dredged non-target sediment, also as a fraction of target volume. It is clear from the figure that in general the dredge prisms remove a slightly larger fraction of target volume, and also much larger volumes of non-target material.

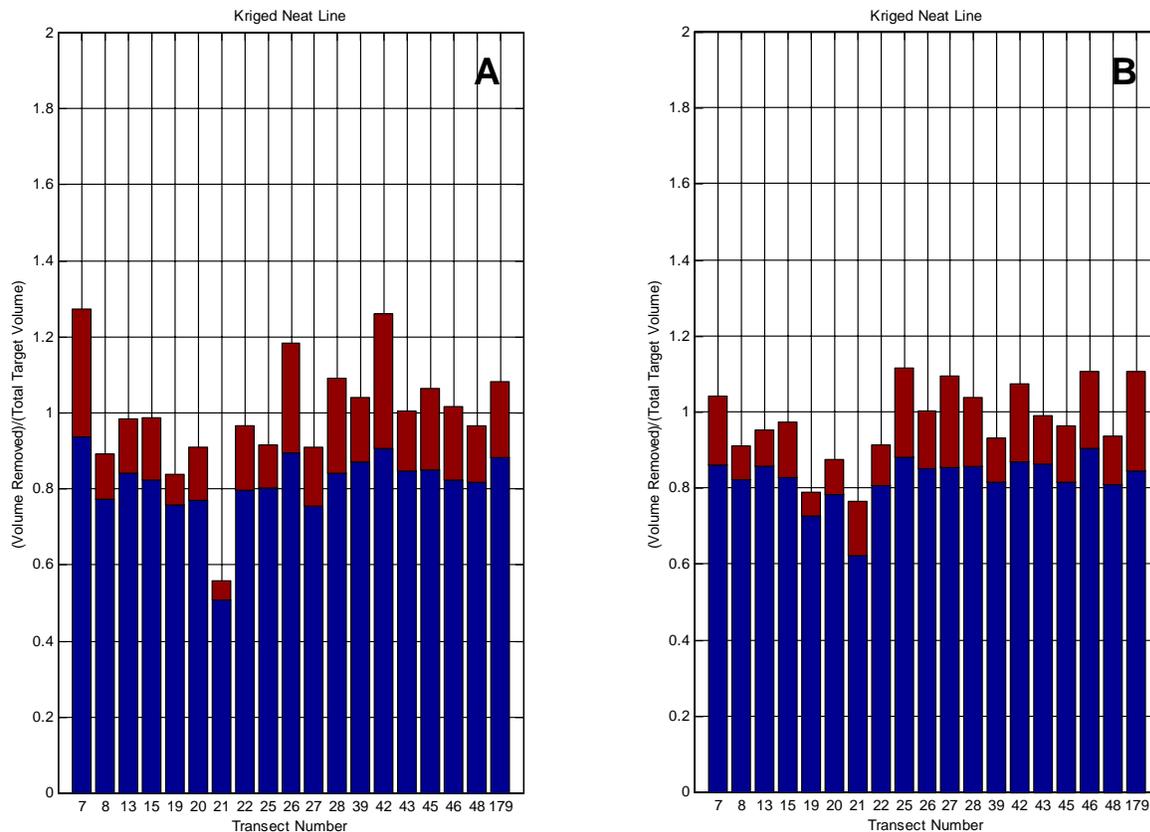


**Figure 3.** Sediment removed as a proportion of total target sediment.

Figure 4 shows the results of a doubling and tripling of sampling density. Increasing density in the direction of flow as well as perpendicular to flow may be needed to achieve similar changes in performance metrics over the whole two-dimensional areas of dredging footprints. Doubling density in both directions would increase the number of samples by a factor of four, and tripling by a factor of nine.

The left panel of Figure 4 shows the improvement in performance that can be achieved by adding a single infill sample between each current pair of samples in existing bank-to-bank transects. The volume of dredged non-target inventory would be reduced by 77 percent overall, by adding infill samples. The removal of target inventory is also decreased but by only 4 percent on average, and the fraction removed is typically between 80 and 90 percent for most transects.

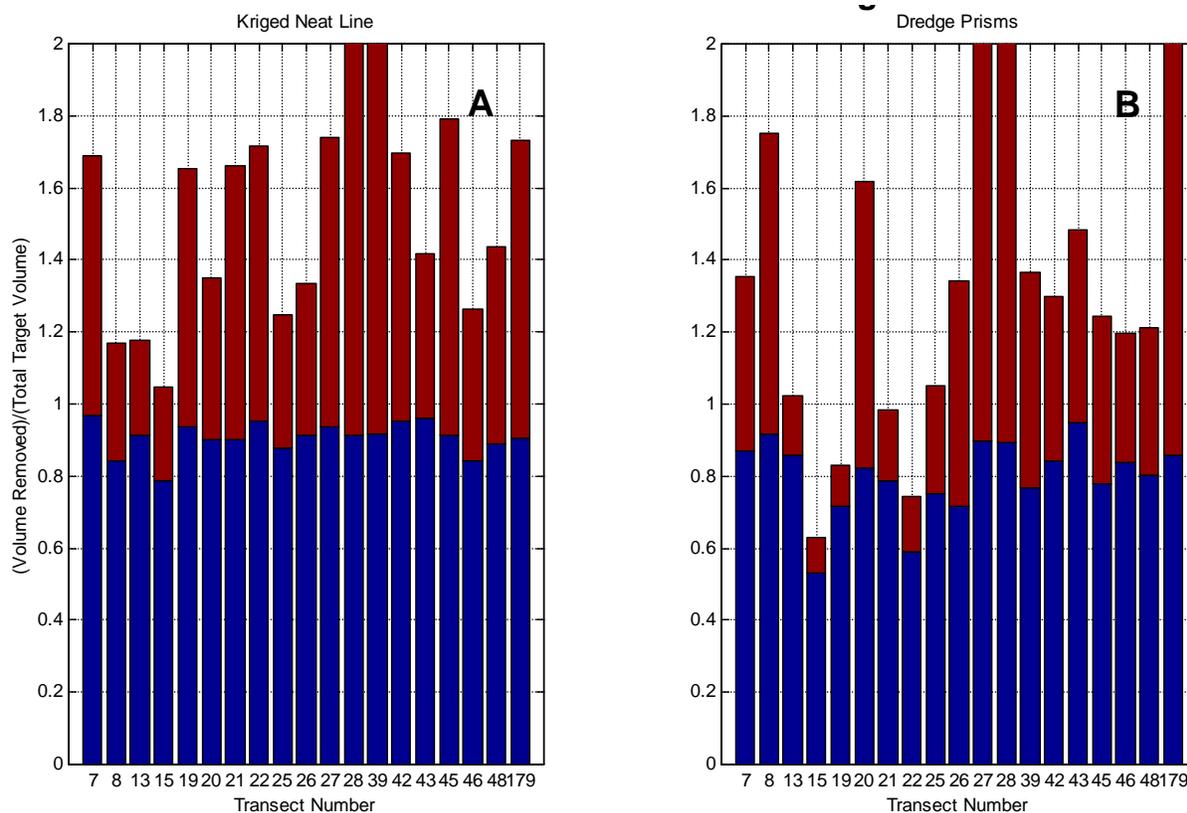
The right panel of Figure 4 shows the additional performance improvement gained by adding a second sample between each pair of existing samples. The additional gains shown in the figure are very modest compared to the gains from adding the first infill sample.



**Figure 4.** Sediment removed as a proportion of total target sediment based on current 30 percent design data plus one in-fill sample (Panel A) and two in-fill samples (Panel B). Blue bars represent target sediments and red bars represent non-target sediments. The Kriged neat-line is based on the 50% LOS line.

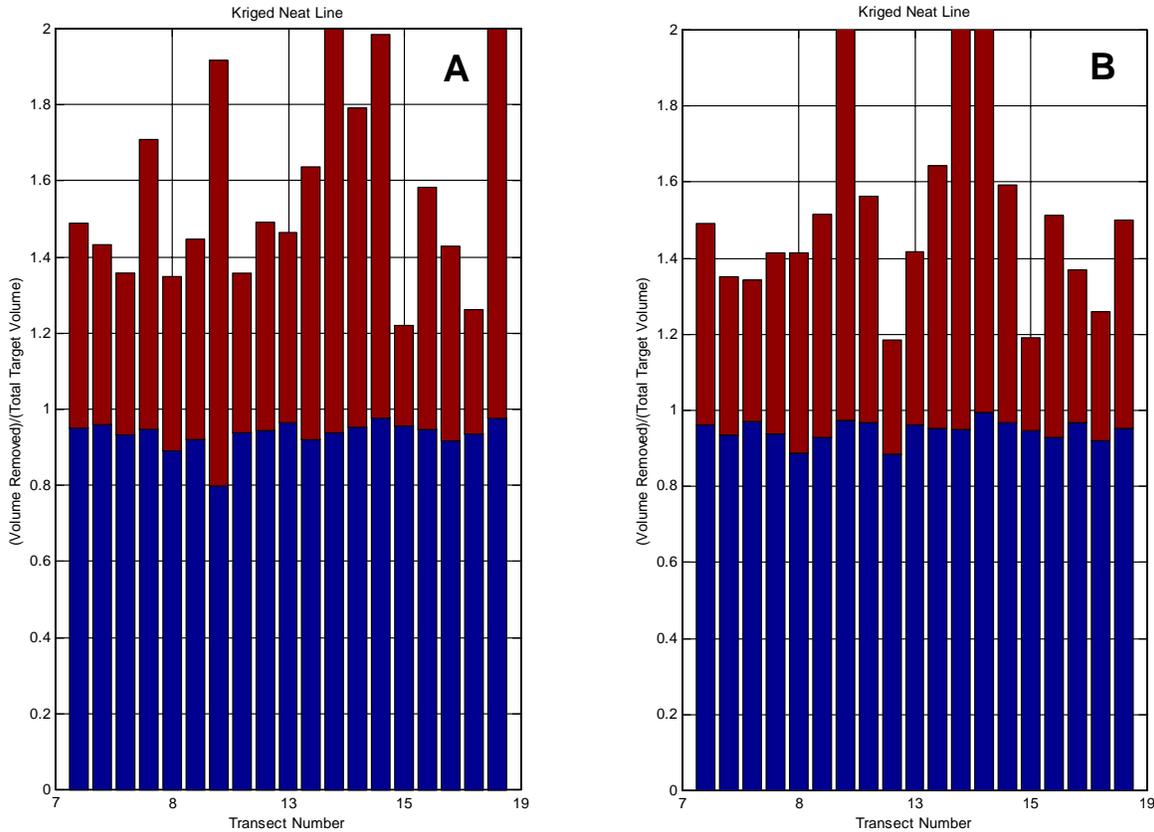
After infill data are collected, the uncertainty of depth of contamination will tend to be greatest at locations that are most distant from sample points. This distance will be greatest near the midpoints of sampling grid diagonals, and these diagonals are slightly longer than distances between points along transects. Thus, the uncertainty in DOC prediction may be somewhat greater when the whole of the two-dimensional surface is accounted for than when limited to transects as in this memorandum. It is planned to generalize the findings of this memorandum with the Full Indicator Kriging model that was used to interpolate DOC for the Basis of Design Report, providing a full two-dimensional evaluation of alternative sampling strategies.

Figure 5 shows the effects of a more conservative neat line (i.e. defined by the 16 percent LOS) estimate, based on existing core data, rather than incorporating infill cores. A neat line with a LOS of 16 percent was constructed by using Ordinary Kriging to interpolate between DOC values at cores, and then lowering the neat line downward by one kriging standard error. This produced a dredge line that would remove closer to 100 percent of target material along each transect, but would also remove larger volumes of non-target material, much more than would be removed using infill samples and an LOS of 50 percent.



**Figure 5.** Sediment removed as a proportion of total target sediment based on current 30 percent design data. Panel (A) represents the Kriged neat line at the 16% LOS and Panel (B) represents the dredge prisms without over dredge.

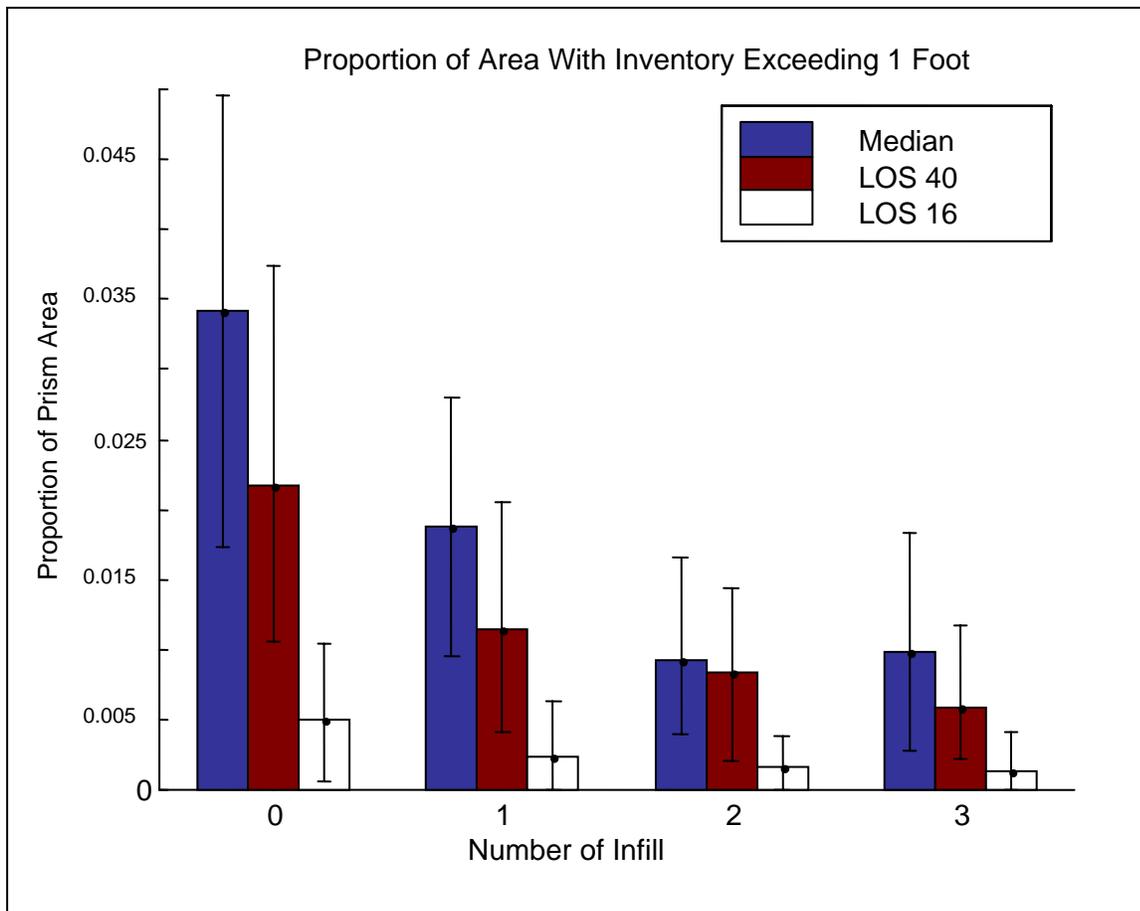
Figure 6 shows the combined effects of a more conservative neatline estimate and infill cores. As in Figure 5, a neatline with a LOS of 16 percent was constructed by using Ordinary Kriging to interpolate between DOC values at cores, and then lowering the neatline downward by one kriging standard error. In addition, the left and right panels show the effects of adding one and two infill samples between infill locations. It is apparent from a comparison of Figure 6 to the left panel of Figure 5 that the effect of adding infill samples on removal of target sediment is marginal, with the neat line is set at an LOS of 16 percent, and that the volume of nontarget sediment removed remains high with the addition of one or two infill samples.



**Figure 6.** Sediment removed as a proportion of total target sediment based on current 30 percent design data plus one in-fill sample (Panel A) and two in-fill samples (Panel B). The Kriged neat-line is based on the 16% LOS line.

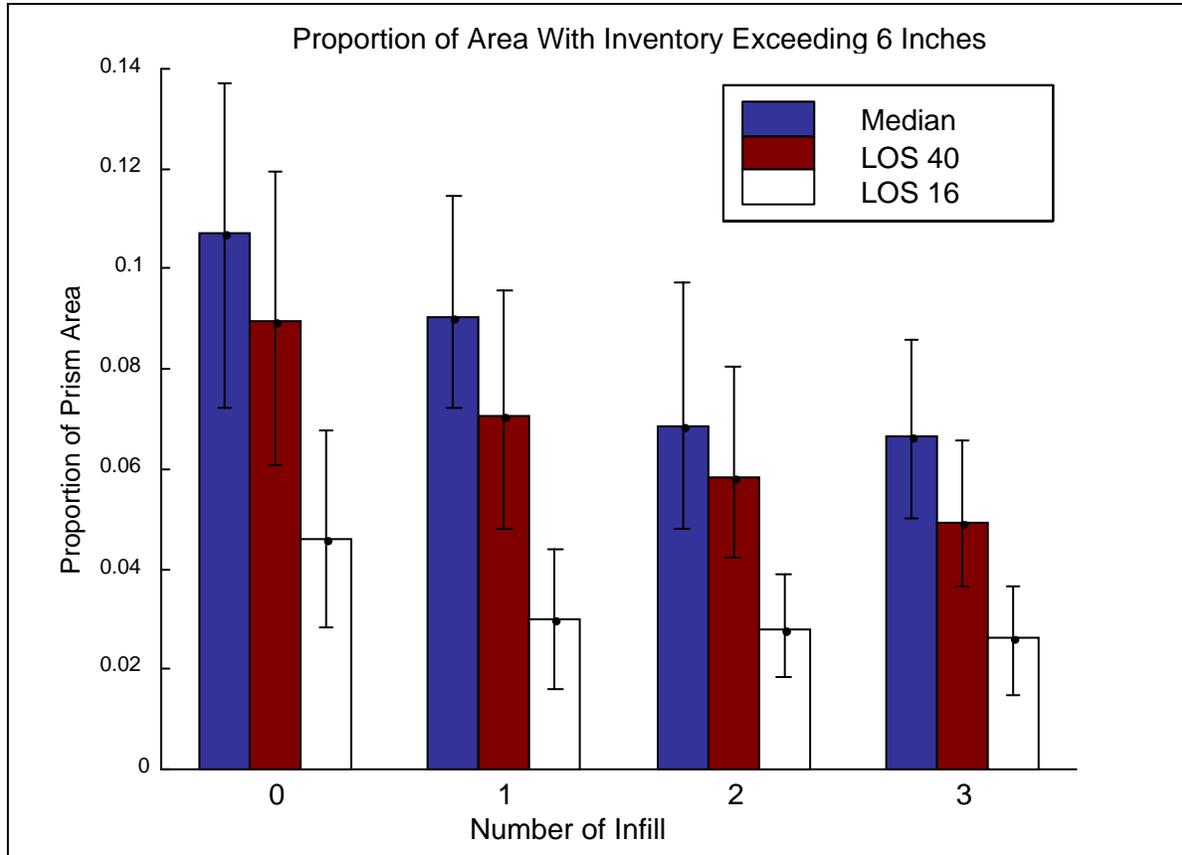
Figures 7 and 8 present additional performance metrics related to success in minimizing the thickness of undredged inventory. They show the percentage of dredged area having greater than 1 foot and greater than 6 inches of undredged inventory, respectively, remaining after following specific strategies to set the dredge prism.

Figure 7 shows that the baseline case of no infill samples and 50% LOS neatline leaves undredged inventory exceeding 1 foot in about 3.5 percent of the dredged area. The amount of undredged inventory declines to 2 percent with the addition of one infill sample, and continues to decrease but by smaller increments as additional infill samples are added. The amount of undredged inventory likewise declines to about 2 percent if sufficient additional dredge depth is added to the kriged neat line to represent the 40% LOS, and to less than 0.5 percent if taken to the 16% LOS.



**Figure 7.** Expected proportion of area with un-dredged residuals exceeding 1 foot for neat line dredging for a range of infill sampling rates and levels of significance. Error bars represent the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the simulation distribution.

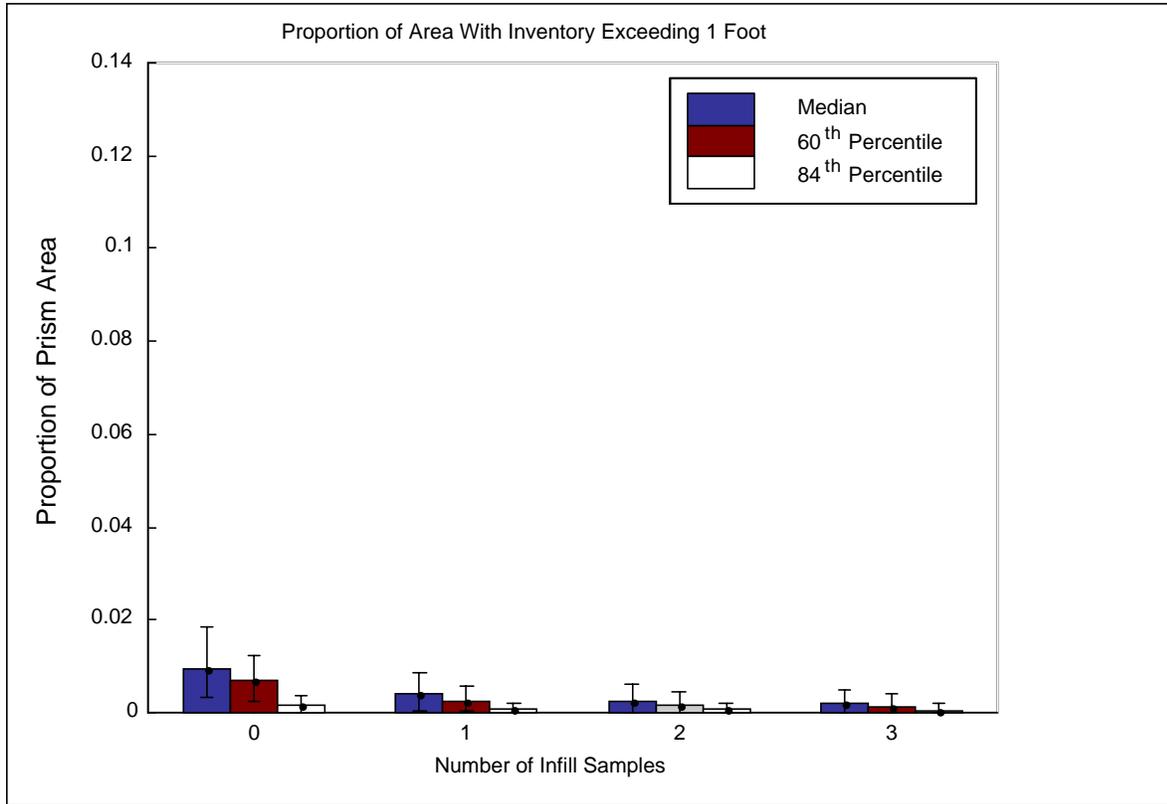
Figure 8 shows similar trends for the percentage of the dredged area with undredged inventory exceeding a thickness of 6 inches. This applies to a little over 10 percent of the dredged area in the baseline case, and declines to about 9 percent with either the addition of one infill sample or a shift to a 40% LOS.



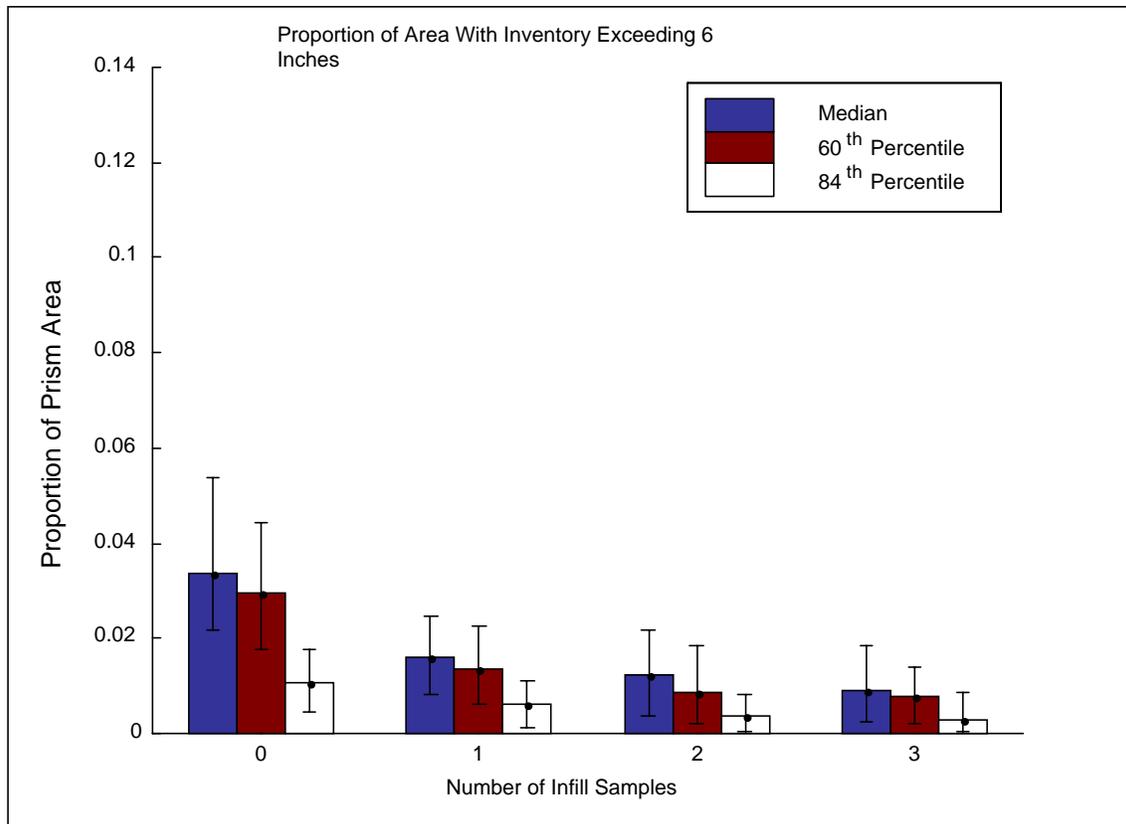
**Figure 8.** Expected proportion of area with un-dredged residuals exceeding 6 inches for neat line dredging for a range of infill sampling rates and levels of significance. Error bars represent the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the simulation distribution.

Figures 9 and 10 show percentages of the dredged area predicted to have undredged inventory remaining at concentrations exceeding 2 ppm to thickness of more than 1 foot and 6 inches, respectively. It is clear from these two figures that those percentages are very small (i.e. less than 2% of dredged area) when 1 infill sample per existing sample is added to each transect.

When a threshold of 5 ppm is applied, these percentages are even smaller (less than 1%), as Figures 11 and 12 show. The possibility of undredged inventory at concentrations exceeding 2 ppm or 5 ppm at thickness greater than 1 foot or 6 inches is greater in OU 4, where sediment PCB concentrations are generally higher. It therefore makes sense to revisit this issue when evaluating infill sampling in OU4.

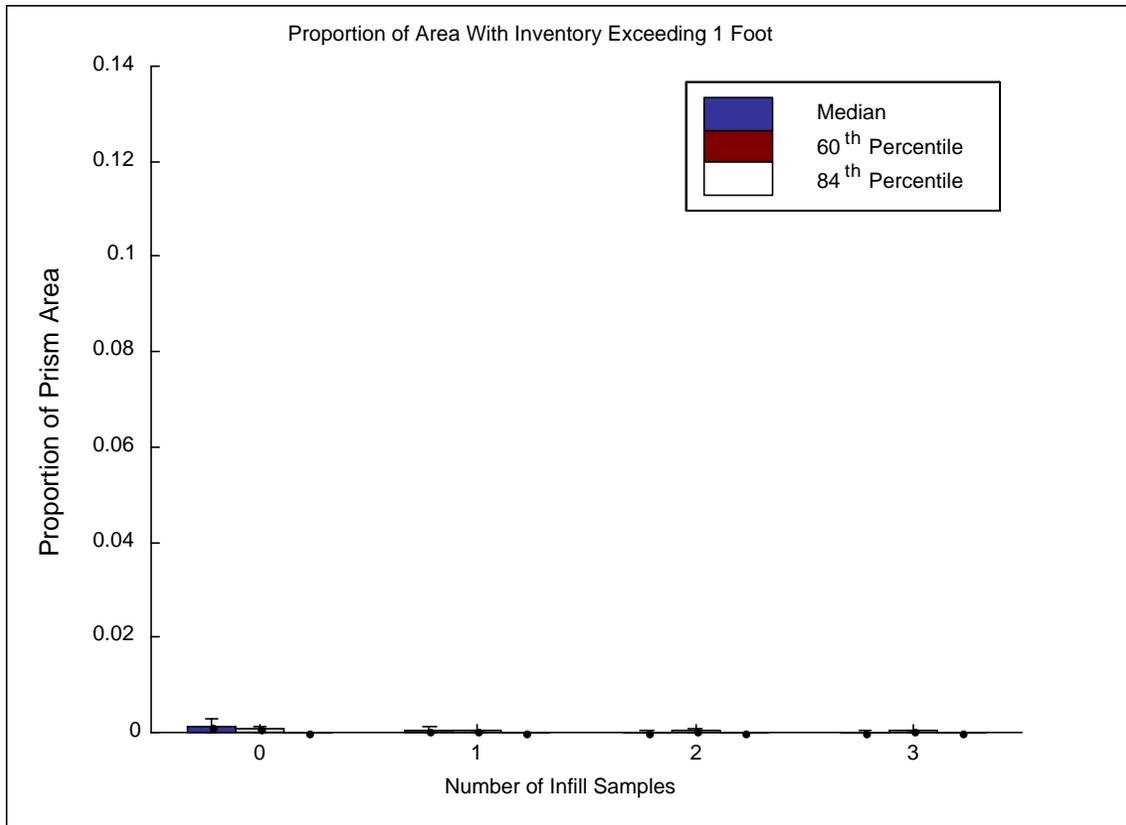


**Figure 9.** Expected proportion of area with un-dredged residuals exceeding 2ppm concentration and 1 foot in thickness for neat line dredging for a range of infill sampling rates and levels of significance. Error bars represent the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the simulation distribution.

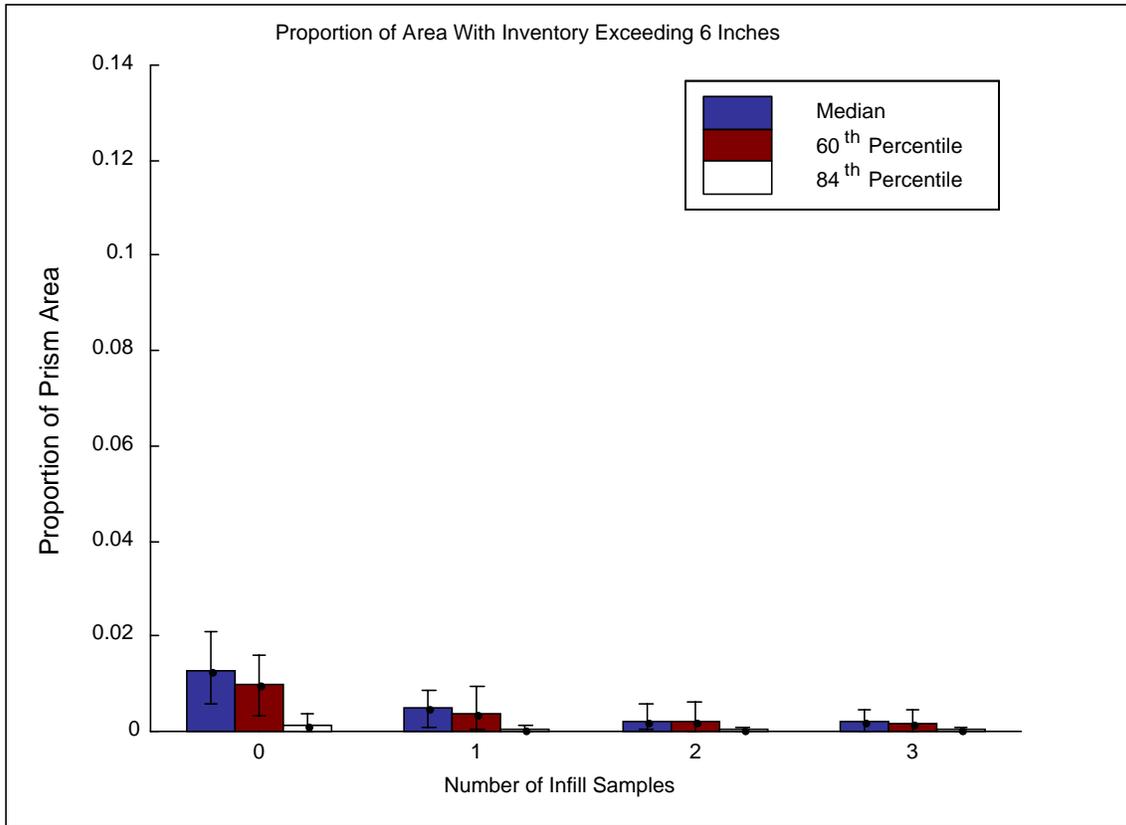


**Figure 10.** Expected proportion of area with un-dredged residuals exceeding 2ppm concentration and 6 inches in thickness for neat line dredging for a range of infill sampling rates and levels of significance. Error bars represent the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the simulation distribution.

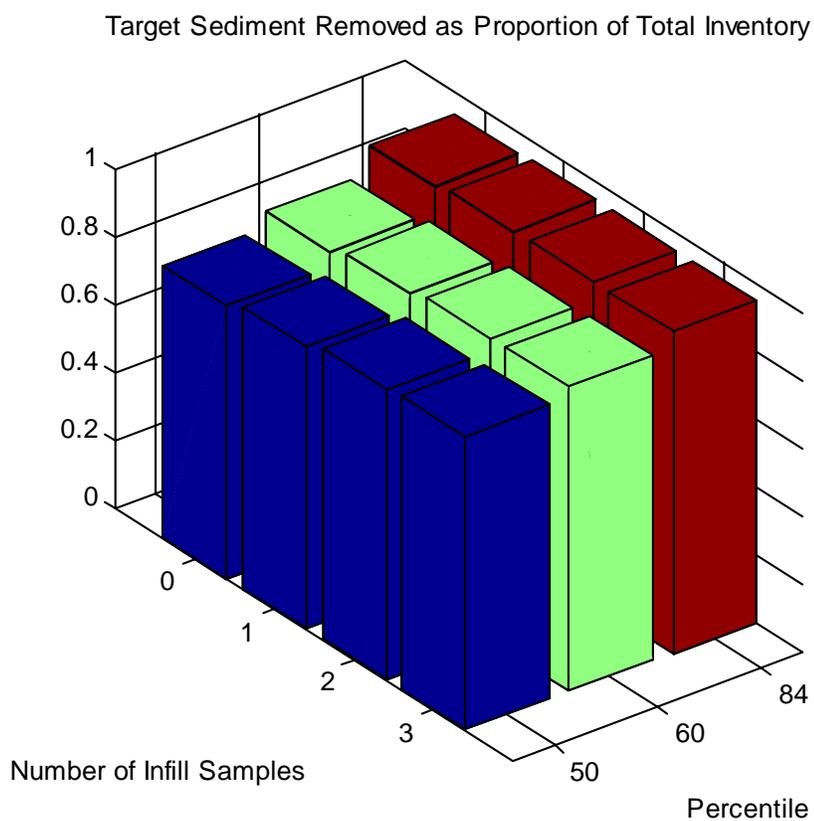
Figures 13 and 14 provide a visual comparison of the relative effects of infill sampling vs. more conservative neatline determination. Figure 13 shows effects on the volume of target inventory dredged and Figure 14 shows the effects on the volume of non-target sediment removed. Each is expressed as a fraction of total contaminated inventory. Figure 13 shows that the fraction of target inventory removed can be increased by either adding infill samples or by reducing the LOS applied to establish a neatline from dredging, and that adding one infill sample increases volume by about as the same amount as reducing LOS by 10 percent. Figure 14 shows, however, that these two strategies have opposite impacts on non-target volume dredged. Adding an additional infill sample reduces non-target volume dredged from about 20 percent to about 10 percent of total inventory. In contrast, reducing the LOS from 0.5 to 0.4 increases non-target volume dredged to about 25 percent of target inventory. Thus, additional infill samples increase the efficiency of dredging by increasing total volume dredged while decreasing dredging of non-target volume. In contrast, much of the volume increase from dredging to a higher LOS is due to dredging a greater volume of non-target sediment.



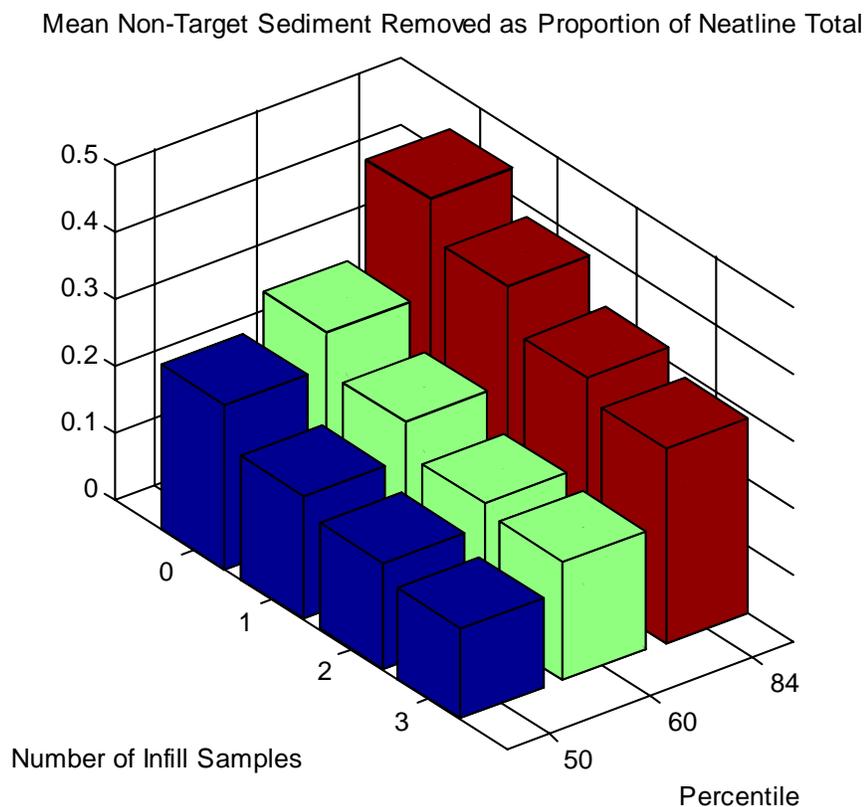
**Figure 11.** Expected proportion of area with un-dredged residuals exceeding 5ppm concentration and 1 foot in thickness for neat line dredging for a range of infill sampling rates and levels of significance. Error bars represent the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the simulation distribution.



**Figure 12.** Expected proportion of area with un-dredged residuals exceeding 5ppm concentration and 6 inches in thickness for neat line dredging for a range of infill sampling rates and levels of significance. Error bars represent the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the simulation distribution.



**Figure 13.** Expected target sediment removed as a proportion of total inventory for neat line dredging for a range of infill sampling rates and levels of significance.

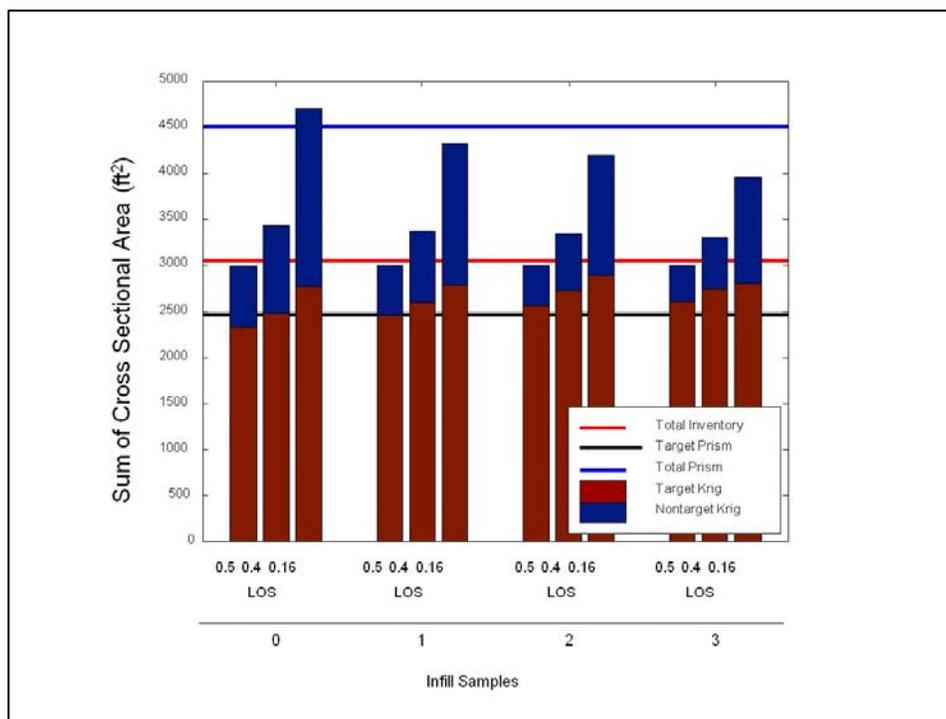


**Figure 14.** Expected nontarget sediment removed as a proportion of total inventory for neat line dredging for a range of infill sampling rates and levels of significance.

Table 1 and Figures 15 and 16 summarize the relative relationships between target and nontarget sediment that would be expected to be removed for neat-line and prism based designs excluding over dredge. It can be seen that substantially less total volume would be removed with the neat-line design than the prism based design; however, to insure that the neat-line adequately targets the contaminated sediment deposits, additional infill samples are needed. It is also clear that the addition of infill samples will significantly reduce the volume of uncontaminated sediments that would be removed by the prism based design.

Table 1. Estimated target and non-target sediments removed based on the average of 50 conditional simulations. Values are in cross sectional area (sq-ft) and are expected to be approximately proportional to volume removed.

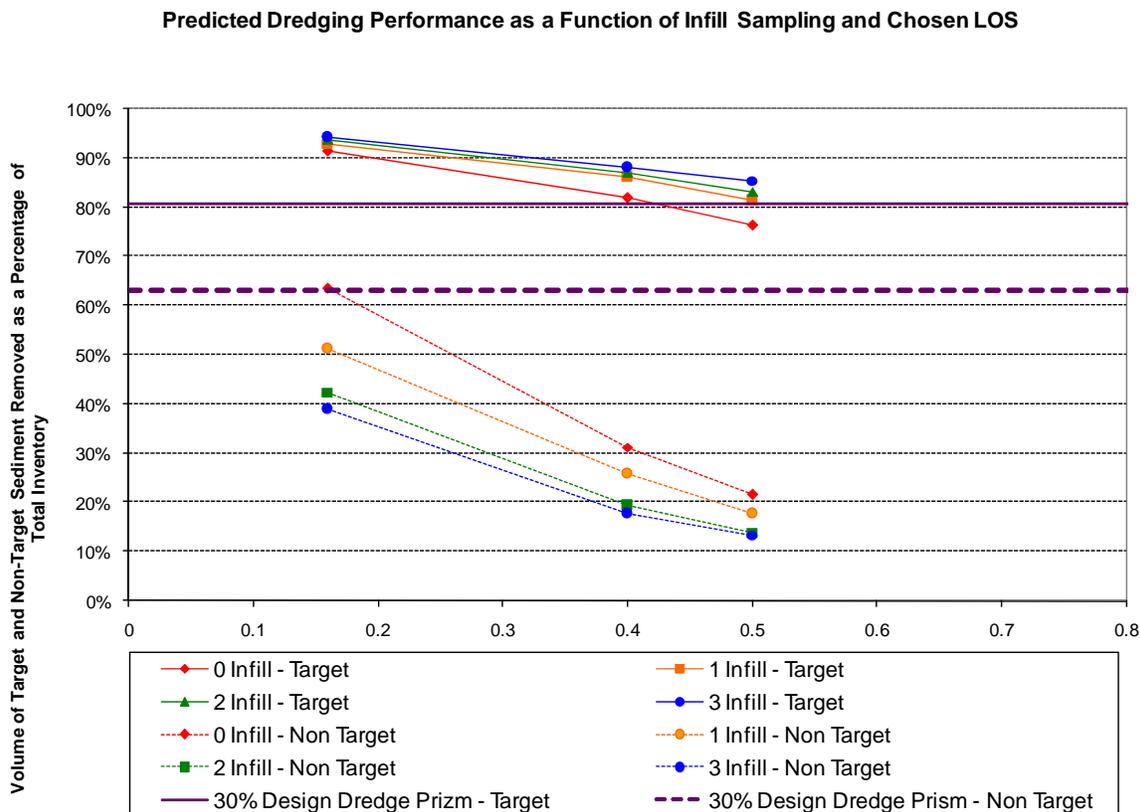
Infill Samples	LOS	Non-target Removed		Target Removed		Total Removed		Total Inventory	Percent Inventory Removed	
		Mean Krig	Mean Prism	Mean Krig	Mean Prism	Mean Krig	Mean Prism		Krig	Prism
0	50%	661	1919	2336	2470	2997	4389	3064	76%	81%
0	40%	947	1939	2483	2450	3430	4389	3031	82%	81%
0	16%	1930	1913	2776	2476	4706	4389	3039	91%	81%
1	50%	536	1945	2463	2444	2999	4389	3032	81%	81%
1	40%	779	1942	2592	2447	3371	4389	3013	86%	81%
1	16%	1533	1936	2787	2453	4320	4389	3000	93%	82%
2	50%	431	1886	2568	2503	2998	4389	3090	83%	81%
2	40%	609	1862	2733	2526	3342	4389	3142	87%	80%
2	16%	1306	1926	2891	2463	4197	4389	3085	94%	80%
3	50%	406	1914	2604	2475	3011	4389	3050	85%	81%
3	40%	553	1896	2747	2493	3300	4389	3122	88%	80%
3	16%	1157	2000	2801	2389	3958	4389	2978	94%	80%



**Figure 15.** Estimated target and non-target sediments removed based on the average of 50 conditional simulations. Values are in cross sectional area (sq-ft) and are expected to be approximately proportional to volume removed.

Another way of presenting the information in Table 1 and Figures 13 and 14 is shown in Figure 16 which compares volumes of targeted and non-targeted sediment removed to the predicted performance of the 30% design dredge prisms. All runs assume ideal or surgical dredging with no over dredge.

The figure shows that comparable performance to the 30% design dredge prisms can be achieved with neat line dredging with a significant savings in the amount of non-dredge sediment removed. For example, choosing a LOS of 0.4 with the existing level of sampling or choosing a LOS of 0.5 with one infill sampling provides comparable performance in terms of targeted sediment removed to the 30% design. Removal of a higher percentage of the targeted material would require either extra cost in dealing with additional non-targeted material removed and/or require additional infill sampling.



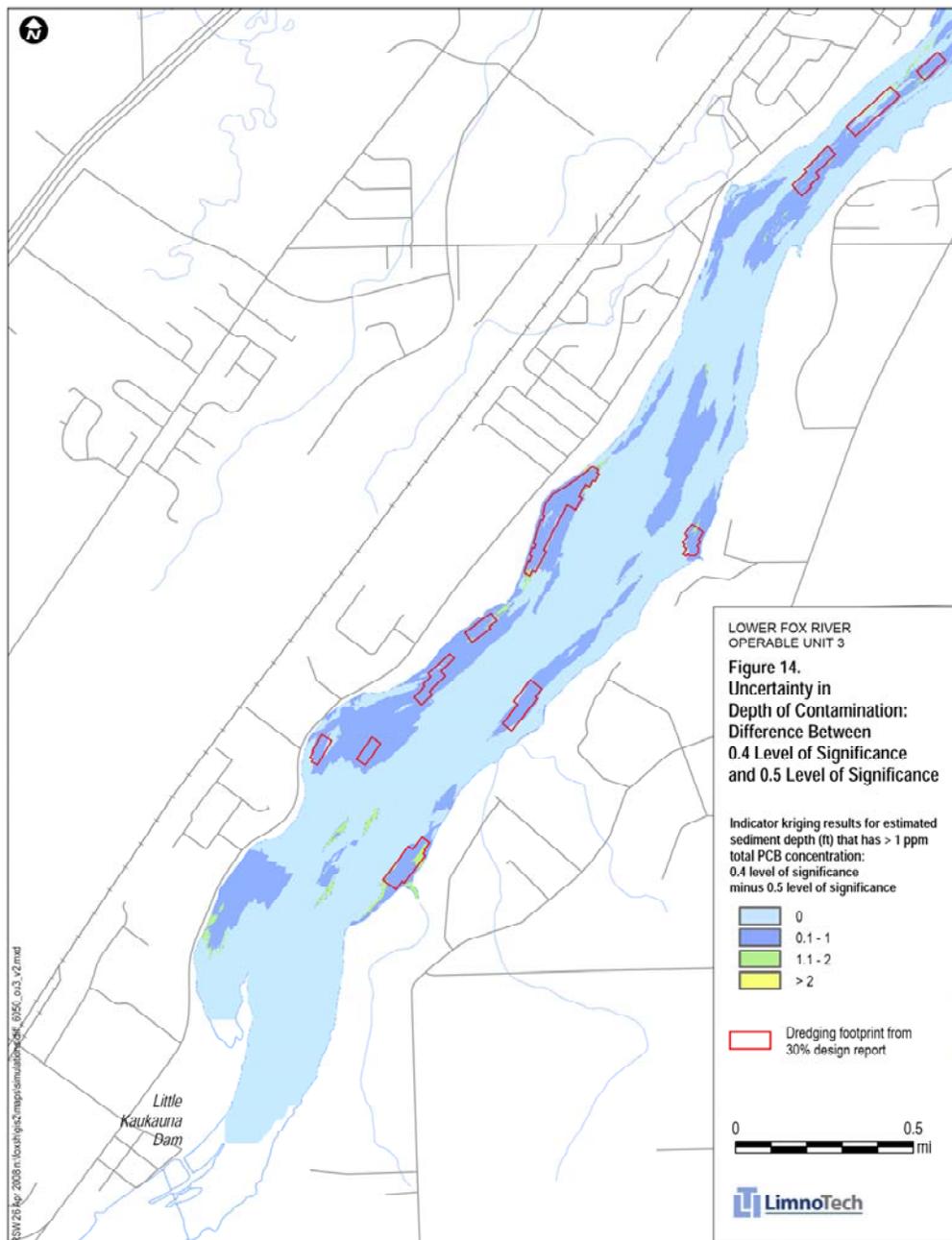
**Figure 16.** Predicted dredging volume as a percentage of volume of sediment containing PCBs with concentrations exceeding 1 ppm.

## High Uncertainty Areas

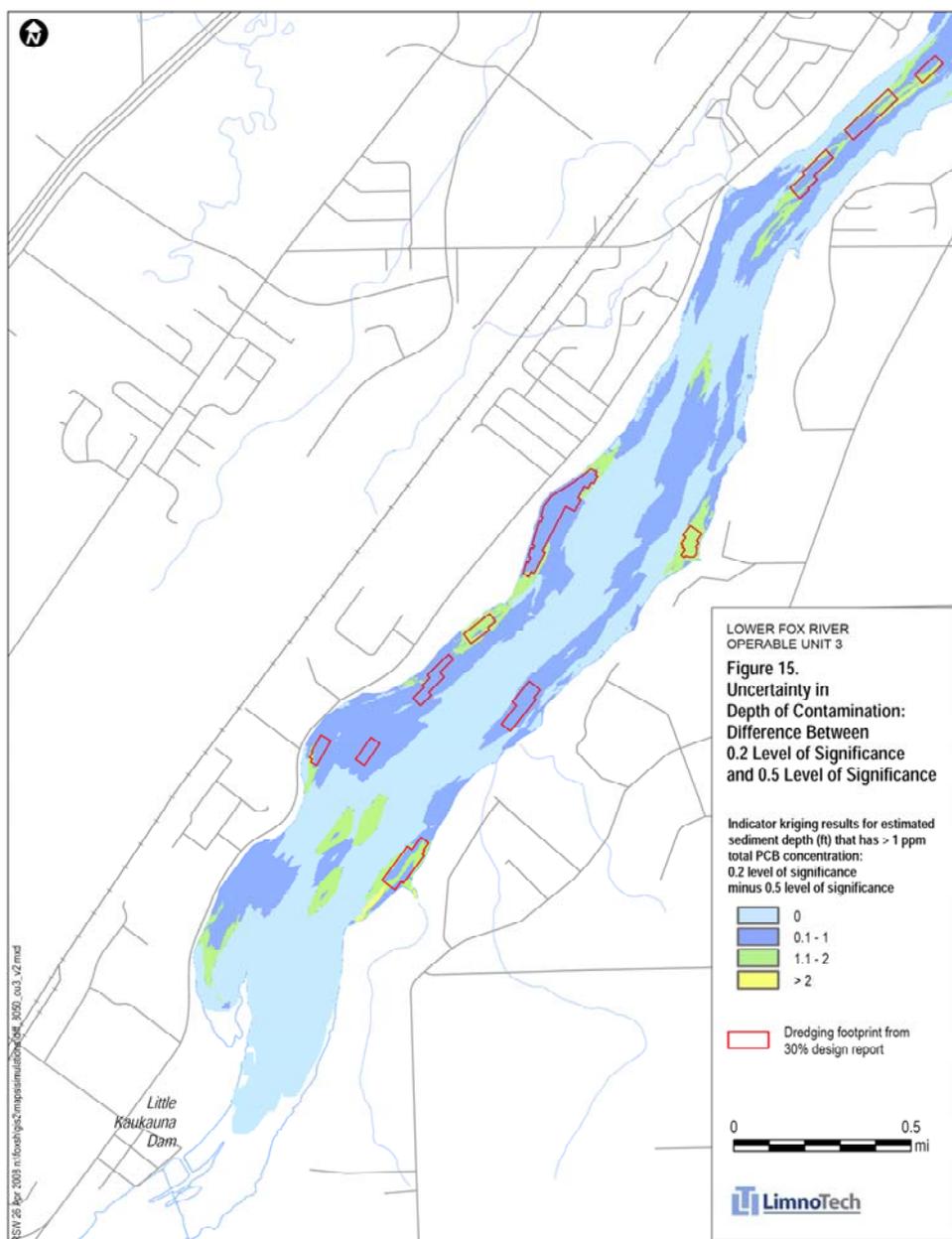
Given the number of infill samples to be added, there may be additional benefit in preferentially locating infill samples in areas of highest uncertainty. These are typically areas where there was found to be substantial variability in DOC among neighboring remedial design cores. Where this occurred, the prediction of DOC at intermediate locations is subject to relatively higher uncertainty.

This issue is relatively unimportant in the upper portion of OU 3, as Figures 17 and 18 show. Figure 17 is a map of DOC uncertainty in upper OU 3, based on Full Indicator Kriging methods and results described in the Basis of Design and 30 Percent Design documents. Uncertainty is expressed as the difference between the median estimate of DOC (i.e., at an LOS of 0.5) and a more conservative estimate with an LOS of 0.4. Figure 17 shows that this measure of uncertainty does not vary much across upper OU 3 areas to be dredged, and that the difference between the two DOC estimates is almost always less than one foot. Figure 18 shows the difference between DOC at LOS 0.5 and a much more conservative level of 0.2. Like Figure 17, Figure 18 shows that the difference between the LOS 0.5 DOC prediction and the more conservative prediction at LOS 0.2 is also less than a foot in most locations, and that there is little spatial variation in this

measure of DOC uncertainty in the upper portion of OU 3. It is expected that this issue will be more important in OU 4, because of greater and less uniform DOC uncertainty, so it will be revisited in evaluating infill sampling for OU 4.



**Figure 17.** Uncertainty in depth of contamination expressed as the difference between 0.4 and 0.5 levels of significance elevations. Estimates are based on full Indicator kriging of 30% design data.



**Figure 18.** Uncertainty in depth of contamination expressed as the difference between 0.2 and 0.5 levels of significance elevations. Estimates are based on full Indicator kriging of 30% design data.

## Benefits and Costs of Infill Sampling

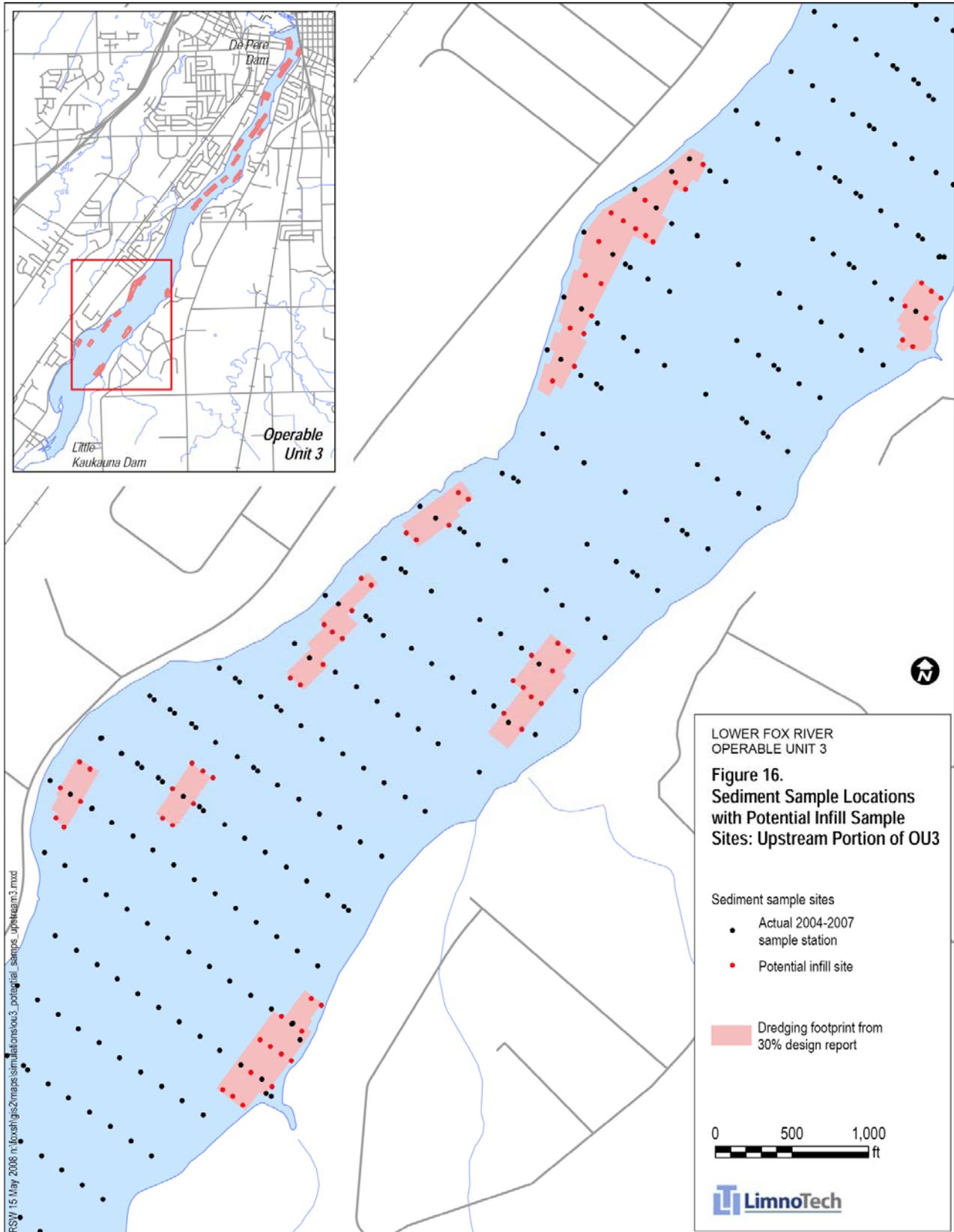
As shown above, the doubling of sampling density along each transect in OU 3 dredge-only areas can reduce the volume of non-target material dredged by about 77 percent, while also nominally decreasing the volume of target material removed. Overall, the addition of infill samples is expected to reduce the volume of material removed for disposal. Based on Tetra Tech's estimated remediation and core sampling costs, doubling the sampling density with infill samples to refine the neat line dredging approach, conservatively, offers potential net cost savings of between roughly \$10 MM to \$15 MM throughout OUs 2 to 5. These net savings would include avoided costs of remediating non-target sediment and reduced costs of post-dredge verification sampling and re-dredging cleanup passes. While verification sampling will always be conducted, it may be significantly reduced, to a level that is sufficient to determine a dredge unit's contribution to the surface weighted average concentration (SWAC) required by the Record of Decision. This would help offset the cost of collecting and analyzing the infill samples. An ancillary benefit is a reduction in delays and schedule uncertainty that are associated with cleanup re-dredging passes.

If cleanup re-dredge passes can be demonstrated to be unnecessary because of infill sampling and neatline dredging, then post-dredge verification sampling can also be minimized to determine the SWAC. The proposed infill sampling would add approximately 2 pre-dredge infill cores per acre, supplementing the current remedial design core density in most areas of upper OU 3.

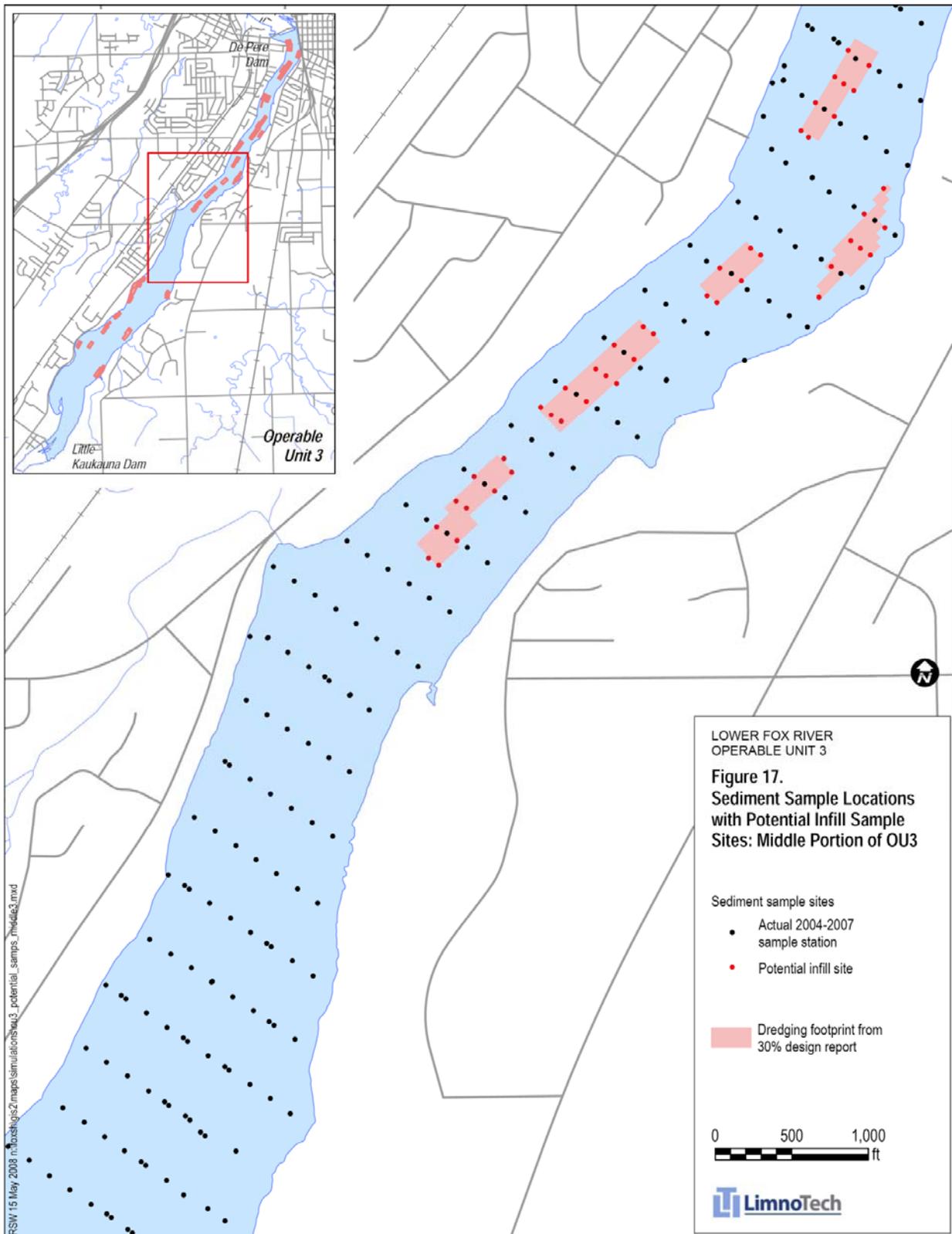
## Infill Sampling Plan

Figures 19 and 20 present a potential infill plan, assuming a doubling of the number of samples in each bank-to-bank transect. The number of east-west transects was also doubled, in order to also double the density of samples along transects in the direction of flow. In some cases, where the standard infill spacing would have placed samples just outside the areas to be dredged, additional samples have been added with a closer spacing within the edges of the areas to be dredged, to improve spatial coverage. In addition to those samples located on these figures, it is also recommended that additional "field duplicate" cores be collected from a fraction of infill locations. These duplicates should be collected at a moderate number of locations, adequate to estimate the nugget effect as well as the semivariogram at intermediate distances of perhaps 30 to 50 feet separation.

The performance metrics above have been calculated using simulated infill samples. As a verification step, the metrics can be recalculated for upper OU3 using actual infill sample data. This will provide a check on the spatial variability that was assumed for the simulations, and provide a data-based update of the metrics. This provisional plan may be modified (i.e. a different density of samples may be collected in some of the dredge areas) and will be subject to refinement as additional information is obtained that can improve DOC predictions, including planned sub-bottom profiling and geomorphic analysis.



**Figure 19.** Existing sediment sample locations, upstream portion of OU3, augmented with potential infill sampling locations allocated at approximately 2 per acre.



**Figure 20.** Existing sediment sample locations, middle portion of OU3, augmented with potential infill sampling locations allocated at approximately 2 per acre.

## **Additional Considerations for Application to Lower OU3 and to OU4**

In a number of respects the upstream portion of OU3 presents a good test case for verification of the expected benefits of infill sampling. PCB concentrations, contaminated sediment thicknesses, and spatial variabilities of concentrations and thicknesses are all generally lower in upper OU3 than in the remainder of OU3 or in OU4. The latter sections of river are also more sinuous than upper OU3. These differences suggest that there may be benefit to further method development to support evaluation of infill sampling to lower OU3 and to OU4.

Because PCB sediment concentrations are higher and contaminated thicknesses are greater in lower OU3 and in OU4, simulations like those shown above should be conducted for these more downstream areas to confirm or modify the conclusions stated above. OU4 also includes elevated concentrations near the maximum depth of contamination, such as in portions of the unmaintained navigation channel. It is possible that overdredging to achieve a higher level of confidence by may be of greater benefit in these areas than in upper OU3, and this should be explicitly evaluated. Because of the higher concentrations encountered in OU4, it may be appropriate for the evaluation metrics for this OU to include the percentage of dredged area with remaining residual concentration exceeding 50 ppm PCB, in addition to the predicted the percentage of dredged area exceeding 1 ppm and 5 ppm.

Thicker sediment in lower OU3 and in OU4 indicates higher sedimentation rates, and these may be high enough to imply the deposition of several inches of sediment between initial predesign sampling in 2004 and infill sampling in 2008 and thereafter. This factor can be neglected in upper OU3 because a very low net deposition rate can be inferred for this reach from the thinness of contaminated deposits, but should be taken into account in merging infill samples with prior samples to interpolate grading depths for lower OU3 and for OU4.

The DOC interpolations performed for the BODR were conducted in a frame of reference that “straightened” the river, aligned with the direction of flow. This was done after demonstrating improved goodness of fit, relative to interpolation with untransformed coordinates. While this factor is probably less important in upper OU3 than in lower OU3 and in OU4, because the latter reaches are more sinuous, a method for ordinary kriging in straightened space should be developed for upper OU3 so that it can be ready and tested by the time neat lines are drawn for lower OU3 and for OU4.

Gradients in depth of contamination are also greater in lower OU3 and in OU4 than in upper OU3, especially along the edges of the OU3 thalweg and along the OU4 navigation channel and former slips. These areas with sharp horizontal DOC gradients present the greatest local uncertainties about DOC. As discussed above, it may be appropriate to increase the density of infill sampling where there is the highest local uncertainty in DOC interpolation. Work is underway to evaluate the potential gains from this approach, simulating the potential benefits of accounting for uncertainty in the infill sampling design, using the Full Indicator Kriging model developed for the BODR.

An additional effort now underway that may be especially useful in areas where DOC is uncertain is sub bottom profiling. Results of subbottom profiling are expected to become available during summer 2008. It is expected that subbottom profiling will provide a surrogate for depth of contamination in the form of the depth of an interface between softer and harder sediment. If this depth correlates well with DOC based on chemical analyses, then the subbottom profiling can be used to support estimation of DOC at locations intermediate to cores. Differences between DOCs from cores and from subbottom profiling (possibly interpolated spatially) would likely be used to adjust the subbottom data. Once the subbottom data become available, these methods can be developed and tested.

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**APPENDIX E**  
**HEALTH AND SAFETY PLAN**

**Including**  
Attachment E-1 HASP  
Attachment E-2 Contingency Plan

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**ATTACHMENT E-1**

**HASP**

**SITE HEALTH AND SAFETY PLAN**

**VOLUME I**

**For the**

**IMPLEMENTATION OF THE REMEDIAL ACTION  
2008-2009 Remedial Activities**

**At the**

**LOWER FOX RIVER  
OPERABLE UNITS 2 THROUGH 5**

**In**

**Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Prepared for:**

**Appleton Papers Inc.  
Georgia-Pacific Consumer Products LP  
NCR Corporation**

**For Submittal to:**

**Wisconsin Department of Natural Resources  
U.S. Environmental Protection Agency**

**Prepared by:**

**Tetra Tech EC, Inc.  
Anchor Environmental  
J. F. Brennan  
Boskalis Dolman**

**May 2008**

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## **SITE HEALTH AND SAFETY PLAN**

Site: **Lower Fox River, Operable Units 2 through 5**

Location: **Brown, Outagamie, and Winnebago Counties, Wisconsin**

Prepared By: **Tetra Tech EC, Inc.**

Date Prepared: **May 2008**

Project Description: **Volume I – 2008 and 2009 Site Activities**

TETRA TECH EC, INC., TETRA TECH SUBCONTRACTORS, AND TETRA TECH'S CLIENT DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY TRAINED HEALTH AND SAFETY SPECIALISTS.

## APPROVALS

By their signature, the undersigned hereby certify that this Site Health and Safety Plan has been reviewed and approved for use at the Lower Fox River, OUs 2 through 5 for the 2008–2009 activities.

---

Donald Ray Mangrum  
Project Manager

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Date

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Grey Coppi, C.I.H.  
Project Environmental and Safety Manager

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Date

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Mike Estess  
Construction Manager

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Date

---

William Welch  
Environmental and Safety Supervisor

---

Date

## **1.0 INTRODUCTION**

### **1.1 PURPOSE**

This Site Health and Safety Plan (SHSP) addresses the health and safety practices that will be employed by all site workers participating in 2008–2009 remedial activities at the Lower Fox River, Operable Units (OUs) 2 through 5 as identified by the Records of Decision (RODs). The remedial action (RA) activities are in response to the two RODs (December 2002 and June 30, 2003) and ROD Amendment (June 26, 2007) issued by the U.S. Environmental Protection Agency (USEPA) and the Wisconsin Department of Natural Resources (WDNR). The SHSP takes into account the hazards inherent to the planned construction/marine activities. This SHSP also presents procedures to be followed by Tetra Tech EC, Inc. (TtEC), its subcontractors, and all other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. This document is to be used in conjunction with the Work Plans and will be supplemented with Site-Specific Health and Safety Plans developed for each phase of the RA.

Activities performed under this SHSP will comply with applicable parts of Occupational Safety and Health Administration (OSHA) regulations, primarily 29 Code of Federal Regulations (CFR) Parts 1910 and 1926, and TtEC's Environmental Health and Safety (EHS) Program. In addition, since the majority of site activities are being performed on or adjacent to water, they must also comply with 29 CFR 1917 Marine Terminals and the U.S. Coast Guard regulations. Many programs from the EHS Program are referenced in this SHSP and are included in the appendices. Modifications to the SHSP may be made with the approval of the Project Environmental and Safety Manager (PESM) for this project using the Field Change Request (FCR) Form found in Appendix A.

### **1.2 SITE DESCRIPTION**

The project study area includes the Lower Fox River and Green Bay aquatic systems. Approximately 270,000 people live in the communities along the river. The Lower Fox River is located in northeastern Wisconsin within the eastern ridges and lowlands of the state. The Lower Fox River is defined as the 39-mile portion of the Fox River, beginning at the outlet of Lake Winnebago and terminating at the mouth of the river into Green Bay, Lake Michigan. The river flows north and drains approximately 6,330 square miles, making it a primary tributary to Green Bay and a part of the Great Lakes system. Green Bay is a freshwater system approximately 120 miles long, which drains into Lake Michigan, and is located on the state border between Wisconsin and Michigan along a northeast- to southwest-trending axis. The bay portion of the site includes all of Green Bay from the city of Green Bay to the point where Green Bay enters Lake Michigan. The site has been divided into five discrete OUs by the WDNR and the (USEPA). The river and the bay operable units are:

- OU 1 – Little Lake Butte des Morts
- OU 2 – Appleton to Little Rapids
- OU 3 – Little Rapids to De Pere
- OU 4 – De Pere to Green Bay
- OU 5 – Green Bay

The river has 12 dams and includes the highest concentration of pulp and paper mills in the world. During the 1950s and 1960s, these mills routinely used polychlorinated biphenyls (PCBs) in their operations, which ultimately contaminated the river.

### **1.3 SITE BACKGROUND**

Historical discharges of PCBs from municipal, industrial, and agricultural sources in the Lower Fox River region have degraded sediment and water quality and adversely impacted the ecology of the river and bay. PCBs in the Lower Fox River pose the major potential threat to human health and ecological receptors due to their tendency to absorb to sediments, persist in the environment, and bioaccumulate in aquatic organisms. Contaminated sediments acting as “sinks” for PCBs and other contaminants are also subject to physical and chemical processes that affect the overlying water column and adjoining water bodies in natural (uncontrolled) environments. For example, PCBs from sediment in the Lower Fox River are discharged into Green Bay at the mouth of the river through sediment transport and PCB dissolution in the water column.

### **1.4 SCOPE**

This SHSP has been developed to address health and safety concerns when implementing the 2008–2009 activities at the Lower Fox River. This SHSP and a copy of the Work Plan will be available onsite for review and reference during the entire course of each project. The 2008 activities are the upfront activities that must be completed prior to beginning dredging operations as follows:

- Perform Phase I Environmental Site Assessment at the former Shell property.
- Site Preparation of former Shell property including:
  - Clearing and grading
  - Land and marine surveying
  - Sediment sampling
  - Construction of haul roads
  - Sheetpile installation along the shoreline (approximately 1,500 linear feet [LF])
  - Dredging on either side of the sheetpile wall
  - Debris removal
  - Placement of clean fill and/or dredged sand suitable for reuse (as available) behind the sheetpile wall
  - Mobilization and setup of temporary support trailers
  - Construction of personnel and equipment decontamination facilities
  - Preparation of site to allow for storage of materials and large pieces of equipment
  - Installation of perimeter fencing (6’ chainlink), signage, and gatehouse
- Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers.

- Installation of the dewatering and water treatment facilities. The majority of the equipment will be installed in 2008; however, there are some long-lead time items that will not be available until 2009.
- Set up stockpile areas for processed sand and gravel and for cover materials storage.
- Layout and placement of the dredge lines and booster stations.
- A second up-river facility (location to be determined) will be established later in the project to provide cover materials storage and loading in that area of the river. The site selection is in progress; however, the same type of activities listed above will be performed at this facility also. If some activities are not addressed in the current scope, this SHSP will be amended via the FCR.
- As the majority of Toxic Substances Control Act (TSCA) material is overlain by non-TSCA material, in the area between the De Pere Dam and the former Shell property, it is anticipated that minimal TSCA dredging will be conducted in 2009. The 2009 activities include full-scale dredging operations will begin in two areas:
  - The first area is adjacent to the former Shell property. The 12” hydraulic dredge will be operated within a 6,000’ radius of the former Shell property, removing non-TSCA sediment without the need for booster pumps.
  - The two 8” dredges will be deployed above the Little Rapids Dam in OU 2 in Area DD to begin dredging of non-TSCA material. It is anticipated that these dredges will be capable of removing contaminated sediment from the area south of Booster Station 8 through Booster Station 5.
- However, a small quantity of TSCA material will be removed in the immediate vicinity of the installed sheetpile wall at the former Shell property. Contrary to the general sequencing of TSCA and non-TSCA sediment for the remainder of the project, this 2009 TSCA dredging will be conducted at the beginning of the season to allow for finishing of the sheetpile installation and beginning of fill operations behind the wall. As this material will be dredged by the 12” dredge while the two 8” dredges are still mobilizing to their location in OU 2, there will be no crossover between non-TSCA and TSCA material at the dewatering plant. The dredge, dewatering plant, and water treatment plant will be flushed clean prior to processing the non-TSCA material.

## **1.5 APPLICATION**

The SHSP applies to all personnel involved in site tasks who wish to gain access to active work areas, including but not limited to:

- Client representatives
- Federal, state or local representatives
- TtEC employees and subcontractors
- Other project visitors

## **1.6 SUMMARY OF MAJOR RISKS**

- Work on/ and around water

- Heavy equipment hazards
- Slips, trips, and falls
- Exposure to PCBs

### **1.7 ZERO INCIDENT PERFORMANCE**

*Zero Incident Performance (ZIP)* describes our approach and expectations for both safety and project execution. We will achieve this level of performance excellence through teamwork and partnering with our client and our subcontractors, and through the participation of every person on this project.

We (TtEC and our client) believe that:

- All incidents are preventable through proper planning, tasking, and execution of plans as written.
- Any goal besides *Zero Incident Performance* is unacceptable and sends the message that incidents cannot be prevented and that losses are tolerated. Incidents are defined as OSHA recordables, property damage cases, fires, explosions, spills or releases to the environment and safety-related work stoppages. In addition, an incident includes an event which could have resulted in one of these outcomes had the circumstances been different (“near miss”).
- Active participation by all personnel is required to achieve *Zero Incident Performance*. This includes TtEC, the client, and all subcontractor personnel.
- Each person on this project is individually responsible and accountable for their safety performance.
- If any incident does occur, it must be reported and investigated to identify root causes, take corrective actions, and communicate the lessons learned.

All TtEC and Subcontractor personnel will sign a *ZIP* pledge poster affirming their belief in and commitment to *ZIP*. The *ZIP* Banner will be posted conspicuously at the project site and the hours worked without a loss time incident will also be posted. The TtEC EHS will continually evaluate planning and project execution to ensure that *ZIP* is embedded in the work process. In addition, awareness programs are utilized to assist in implementation of our *ZIP* initiative.

A Subcontractor, after award of a contract, shall be required to attend a pre-construction Health and Safety Orientation meeting. This meeting will involve the Subcontractor’s key personnel, and will cover such items as *ZIP* expectations and the Employee Participation Program (EPP).

## **2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES**

This section outlines the TtEC Project Organization and EHS responsibilities for the site activities.

### **2.1 PROJECT MANAGER (PM)**

The Project Manager is Mr. Ray Mangrum for the implementation of the 2008–2009 activities. It is the responsibility of the Project Manager to:

- Provide the major point of control to ensure that the program’s technical, financial and scheduling objectives are achieved.
- Coordinate problem resolution/corrective action implementation.
- Ensure implementation of this program through coordination with the responsible Project Environmental and Safety Manager (PESM).
- Conduct periodic inspections.
- Participate in all incident investigations.
- Ensure the SHSP has all of the required approvals before any site work is conducted.
- Ensure that the PESH or Environmental and Safety Supervisor (ESS) is informed of project changes that require modifications of the SHSP.
- Have overall project responsibility for Project Health and Safety.

### **2.2 CONSTRUCTION MANAGER (CM)**

The Construction Manager is Mr. Mike Estess for the implementation of the 2008–2009 activities. It is the responsibility of the CM to:

- Lead the day-to-day activities at the site, including team management, field operations, and report development.
- Ensure that the SHSP is implemented in conjunction with the designated PESH and ESS.
- Ensure that field work is scheduled with adequate personnel and equipment resources to complete the job safely.
- Ensure that adequate communication between field crews and emergency response personnel is maintained.
- Ensure that field site personnel are adequately trained and qualified to work at the site.
- Enforce site health and safety rules.
- Investigate all incidents.
- Assist in conducting and documenting daily safety briefings.
- Conduct weekly site inspections.
- Act as the alternate Emergency Coordinator.

### **2.3 PROJECT ENVIRONMENTAL AND SAFETY MANAGER (PESM)**

The PESM is a senior Health & Safety staff member with experience in hazardous and non-hazardous waste site investigations, remediation, mitigation, and construction activities. The PESM for TtEC for the 2008-2009 activities is Mr. Grey Coppi, CIH. Mr. Coppi's responsibilities include the following:

- Provide for the development and approval of the SHSP.
- Serve as the primary contact to review health and safety matters that may arise.
- Approve revised or new safety protocols for field operations.
- Approve individuals who are assigned Environmental and Safety Supervisor (ESS) responsibilities.
- Approve ESS to fulfill other project roles.
- Coordinate revisions of this SHSP with field personnel.
- Coordinate upgrading or downgrading of personal protective equipment (PPE) with the ESS.
- Assist in the investigation of all accidents.
- Conduct quarterly inspections for compliance with the SHSP and safety elements of the Construction Management Plan.

### **2.4 ENVIRONMENTAL AND SAFETY SUPERVISOR (ESS)**

The ESS is a person knowledgeable in appropriate safety and health regulations with at least one year of experience or specialized training in serving in a health and safety (H&S) staff role on hazardous waste or non-hazardous sites. The ESS is Mr. Bill Welch for the 2008–2009 activities. The ESS has the following responsibilities:

- Works as a member of the project team to ensure implementation of the SHSP.
- Ensures that all health and safety activities identified in the SHSP are conducted and/or implemented.
- Identifies operational changes which require modifications to health and safety procedures and the site safety plan, and ensures that the procedure modifications are implemented and documented through changes to the SHSP.
- Directs and coordinates health and safety monitoring activities.
- Ensures that proper personal protective equipment is utilized by field teams.
- Assists in conducting and documenting daily safety briefings.
- Monitors compliance with this SHSP.
- Notifies PESM of all incidents.
- Coordinates with the Project Manager in any incident investigation.
- Maintains Incident Report Forms.
- Determines upgrade or downgrade of PPE based on site conditions.

- Reports to PESM to provide summaries of field operations and progress.
- Acts as the Emergency Coordinator.
- Maintains health and safety field log books.
- Displays/maintains postings and handbooks such as:
  - OSHA Job Safety and Health Poster
  - OSHA Noise Regulation
  - Department of Labor Postings (Minimum wage, fair labor standards)
  - Hazard Warning Signs
  - Noise Hazard Warning Sign
  - Do It Right Poster
  - Client Service Quality (CSQ) Poster
  - TtEC Shared Vision
  - TtEC Mission Statement
  - TtEC Hot Line Poster
  - TtEC Work Rules
  - TtEC Environmental Safety Quality (ESQ) Policy Poster
  - Zero Incident Performance (ZIP) Bulletins
  - Flash reports
  - Emergency telephone numbers
  - Diagrams showing the location of fire extinguishers and emergency equipment
  - Emergency exit, evacuation routes and staging area
  - Project Rules Handbook

## **2.5 SITE PERSONNEL**

Site personnel include all other persons entering the site for the purpose of assisting in the completion of the project. This includes but is not limited to client representatives, subcontractors, regulatory personnel, and site workers. It is the responsibility of all site personnel to:

- Report any unsafe or potentially hazardous conditions to the ESS and/or CM.
- Maintain knowledge of the information, instructions and emergency response actions contained in the SHSP.
- Comply with rules, regulations, and procedures as set forth in this SHSP and any revisions.
- Prevent admittance to work sites by unauthorized personnel.
- Inspect all tools and equipment daily, including PPE, prior to use.

### 3.0 POTENTIAL HAZARDS OF THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the site activities at the Lower Fox River project.

#### 3.1 CHEMICAL HAZARDS

##### 3.1.1 On-site Chemicals

Activities will be performed on and around the Lower Fox River whose sediments are known to be contaminated with PCBs, some areas with concentrations greater than 50 parts per million (ppm). Worker exposure to PCBs would occur primarily through physical contact, ingestion, or inhalation of contaminated sediments. Potential worker exposure will not be an issue until 2009 when the dredging and subsequent dewatering and transportation and disposal (T&D) activities begin. The majority of TSCA material is overlain by non-TSCA material, in the area between the De Pere Dam and the former Shell property; therefore, it is anticipated that minimal TSCA dredging will be conducted in 2009. There is minimal to no contact using proposed methods to dredge contaminated sediments, and therefore worker exposure to PCBs is not considered a risk. For activities (i.e., dewatering operations and T&D) where exposure through inhalation is expected to be of concern, air monitoring procedures have been established in Section 6.0. Public protection during these activities is addressed in the *Community Health and Safety Plan*. In general, standard safe work practices, good hygiene, and proper PPE will minimize if not eliminate exposure to PCBs via physical contact or ingestion.

Table 3-1 lists the OSHA and/or the American Conference of Governmental Industrial Hygienists (ACGIH) worker exposure limits for PCBs. Also listed are significant physical and chemical data and symptoms of exposure. In addition, potential chemicals brought on-site may pose a potential exposure hazard to site workers. Material Safety Data Sheets (MSDSs) will be made available to site personnel for all chemicals brought on-site, and the SHSP will be amended as appropriate.

##### 3.1.2 Fuel

Storage of any fuel onsite must be according to TtEC's Procedure for Hazardous Material Storage and Transportation (EHS 3-7). Only Underwriters Laboratories (UL)-approved metal flammable liquid storage containers will be used at the project site with the exception of outboard motor gas, which will be in approved plastic gas tanks. All fuel storage containers will be labeled properly (i.e., Flammable and Diesel/Gasoline) in accordance with NFPA. Bulk storage containers will be stored in secondary containment that meets 110 percent of the largest container, or double wall storage tanks may be used instead of secondary containment. A properly rated fire extinguisher will be located adjacent to the fuel storage facility. The tank and containment will be inspected regularly (i.e., during the weekly EHS inspections or monthly if double walled tanks are used) to verify that they are in good condition and that rainwater is emptied from the containment area. MSDSs for onsite fuels will be made available to all site personnel. When refueling, personnel will place a drip pan or spill pads underneath the pump to catch any spillage or overflow.

**Site Specific Health and Safety Plan**

**Volume I**

**Lower Fox River (OUs 2 through 5)**

**Table 3-1**

**Chemical Data**

<b>Chemical CAS No.</b>	<b>ACGIH TLV</b>	<b>OSHA PEL</b>	<b>OSHA IDLH</b>	<b>Routes of Exposure</b>	<b>Symptoms of Exposure</b>	<b>Target Organs</b>	<b>Physical Data</b>
Polychlorinated Biphenyls (as Aroclor 1242) 53469-21-9	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]	Skin, eyes, liver, reproductive system	BP: 617-691°F Sp. Gr: 1.39 Insoluble Solid
Polychlorinated Biphenyls (as Aroclor 1254) 11097-69-1	0.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]	Skin, eyes, liver, reproductive system	BP: 689-734°F Sp. Gr: 1.38 Insoluble Solid

## 3.2 BIOLOGICAL HAZARDS

### 3.2.1 Insects and Other Arthropods

Insects, including bees, wasps, hornets, and spiders, may be present at this site making the chance of a bite or sting possible. Although some of the insects or other arthropods may not be common in the area, care must be taken on equipment that is brought in from other parts of the country. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition.

#### 3.2.1.1 Insects

The ESS will instruct the field crew in the recognition and procedures for encountering poisonous insects at the site. Additionally, any individuals who have been bitten or stung by an insect will notify the ESS. The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and as often as needed throughout the work shift. Apply DEET (vapor-active repellent) to any exposed skin surface (except eyes and lips), and apply the permethrin repellent spray to field clothing. Note: Allow the permethrin to dry before using the treated clothing.
- Wear proper protective clothing (work boots, socks, and pants).
- Field personnel who may have insect allergies will provide this information to the ESS prior to commencing work, and shall have allergy medication on site.

Mild insect bites should be treated by applying a baking soda paste or ice wrapped in a wet cloth. Bee stingers should be gently scraped off the skin, working from the side of the stinger. The suction device in commercially available snakebite kits can also be used to remove the stinger. If insect bites become red or inflamed or symptoms such as nausea, dizziness, shortness of breath, etc., appear, medical care will be sought. Immediate care is needed if a person is allergic to insect bites/stings. If an allergic person receives a spider bite or insect bite/sting, seek immediate medical attention, keep the victim calm, and check vital signs frequently. Rescue breathing should be given if necessary to supply oxygen to the victim.

#### 3.2.1.2 Spiders

Various spiders may be encountered at Lower Fox River; however, only one spider in the area is poisonous –the Black Widow. The Black Widow spider varies from dark brown to black in color. Its body is one-quarter inch wide and overall size is one and one-quarter inches with legs extended. Only the female is poisonous and can be determined by the red or yellow hourglass marking the underside of the abdomen. The victim will experience the following if bitten by a Black Widow spider:

- The spider's bite will feel like a sharp pinprick or may not even be noticed at all. In 15 minutes or less, the person will feel a dull numbing pain in the bitten area. A faint red bite mark appears.
- **Black Widow** – If the bite is in the lower part of the body or legs, the victim will have muscle stiffness or cramps in their abdomen. If the bite is on the upper body or arms, the victim will have muscle stiffness or cramps affecting the shoulders, back, or chest.

Additionally, the victim may experience headache, chills, fever, heavy sweating, dizziness, nausea, vomiting, and severe abdominal pain.

First aid procedures for a Black Widow bite are as follows:

- Clean the bitten area with soap and water or rubbing alcohol. Do not apply a constricting band because the Black Widow venom's action is swift; there is little to be gained by trying to slow absorption with a constriction band.
- To relieve pain, place an ice pack over the bite.
- Keep the victim quiet and monitor breathing.
- Seek immediate medical attention.
- If possible, catch the spider to confirm its identity, even if the body is crushed.

### **3.2.1.3 Ticks**

Both Lyme disease and Rocky Mountain Spotted Fever (RMSF) are caused by bites from infected ticks that are common in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma up to about one-quarter inch. When embedded into the skin, they may resemble a small freckle. Tick season extends from spring through summer, but may extend year-round in areas without significant cold weather.

#### **3.2.1.3.1 Lyme Disease**

Lyme disease is caused by infection from a deer and lone star ticks that carries a spirochete. Deer ticks range in size from approximately one-eighth inch to one-quarter inch and can be black or brick red in color. Lone star ticks are larger and chestnut brown in color. During the painless tick bite, the spirochete may be transmitted into the bloodstream, which could lead to the worker contracting Lyme disease. Lyme disease may cause a variety of medical conditions including arthritis, which can be treated successfully if the symptoms are recognized early and medical attention is received. Treatment with antibiotics has been successful in preventing more serious symptoms from developing. The effects of the disease vary from person to person, which often makes it difficult to diagnose. Typically, the incubation period ranges from two days to two weeks. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems as well as a disabling type of arthritis.

Symptoms can include a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. This flu-like illness is out of season, commonly happening between May and October when ticks are most active. A large expanding skin rash usually develops around the area of the bite. More than one rash may occur. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It's easy to miss the rash and the connection between the rash and a tick bite. The rash develops from 3 days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash. Joint or muscle pain may be an early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes with other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

Lyme disease can affect the nervous system. Symptoms include stiff neck, severe headache, and fatigue usually linked to meningitis. Symptoms may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease may also mimic symptoms of multiple sclerosis or other types of paralysis. Lyme disease can also cause serious but reversible heart problems, such as irregular heartbeat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Often, the effects of Lyme disease may be confused with other medical problems.

#### **3.2.1.3.2 Rocky Mountain Spotted Fever**

RMSF is an infection caused by rickettsia bacteria carried by the dog tick in the eastern United States and by the wood tick in the Rocky Mountain states. The lone star tick is also, though rarely, a carrier in the West. It is not as likely that personnel working at the Lower Fox River site will contract RMSF; however information on RMSF has been included as a precautionary measure. The signs and symptoms of RMSF may follow within 1 to 14 days of a tick bite. But in many cases, someone who develops the infection does not remember being bitten by a tick. Symptoms of RMSF usually begin suddenly. There is a high fever, often 103 °F (39 °C) to 105 °F (40 °C); chills; muscle aches; and a severe headache that may center on the forehead area. Eyes may become red, muscles may be tender to the touch, and there may be generalized body swelling.

The rash may begin anytime between 1 to 10 days after the fever and headache start, but it most often appears on the third to fifth day. The rash looks like small red spots or blotches that begin on the wrists, ankles, palms, and soles. It spreads up the arms and legs toward the trunk, but often spares the face. As the infection progresses, the original red spots may change in appearance to look more like bruises or bloody patches under the skin. Rarely, RMSF may cause either mild symptoms or no symptoms at all. Usually it causes a moderate to severe illness that can damage the liver, kidneys, and lungs.

#### **3.2.1.3.3 Prevention**

Control measures to prevent contracting Lyme disease and RMSF include:

- Avoid dense or high brush, when possible.
- Wear light colored clothing.
- Spray DEET on your skin and permethrin on clothing and work boots.
- Tuck pant legs into socks and shirts into gloves, if possible.
- Self/Buddy check of neck, hairline, groin, and body after working in areas that may contain deer ticks. Shower immediately after returning home from the job site.

If a tick is found biting an individual, the ESS will be contacted immediately. The tick can be removed by grasping the tick with tweezers as close to the skin as possible, and pulling gently or using a tick removal system (e.g., Pro-Tick, [www.scs-mall.com/store/](http://www.scs-mall.com/store/)). The affected area should then be disinfected with alcohol or similar antiseptic. If personnel feel sick or have signs similar to those above, they will notify the ESS immediately. Additionally, employees finding engorged ticks on their body will be given a medical examination.

### 3.2.2 Snake Bites

There are only two species of poisonous snakes living in the wilds of Wisconsin. These are the timber rattlesnake and the massasauga (erroneously called "pygmy rattler"). Only the massasauga may potentially be encountered at the project site. Pictures are provided in Appendix B. However, the following precautions should be used when working in areas potentially containing snakes:

- Wear appropriate protective equipment (e.g., work boots, snake chaps).
- Be alert and aware of your surroundings.
- Avoid walking in wooded areas, rock piles, stacks of old boards, heavy brush, or tall grass if possible.
- Never handle a "dead snake," they may not be completely dead and can bite due to reflex action.
- If a snake is encountered, do not attempt to catch or kill it. This is a major safety violation and grounds for dismissal from the site.

Immediately following a snake bite:

- Try to safely and quickly identify the species of snake if practical. **DO NOT TRY TO CATCH OR KILL THE SNAKE.** Move victim to safety. Try to keep the victim calm and comfortable. The victim's condition is assisted with an observation that calm and competent assistance is being firmly applied.
- Remove any jewelry or tight fitting clothing. Quickly tie a light-restricting band both above and below the bite area a few inches away from the puncture/bite marks. Immobilize the bitten area and keep it lower than the heart.
- Without cutting, apply strong suction using a commercial bite kit, preferably within seconds of the bite, directly on the main or deepest puncture/bite marks. Time is critical, as any venom present will become destructive very quickly.
- Apply antiseptic cleanser to the entire area and place a cold compress as close as possible to the wound without interfering with the suction process.
- Continue strong suction and alternate the location of compress to avoid injury from severe cold.
- Check constriction bands periodically as swelling may occur and loosen as appropriate.
- Monitor for symptoms of shock and be prepared to administer appropriate treatment. At any sign of major stress, shock or unusual/unexplained discomfort, check for the need to apply other first aid techniques – elevate legs from lying down position, keep warm, etc.
- Do not administer alcohol or cause additional stress to victim. Avoid food or liquid intake.
- Keep victim warm and immobilize as practical. Movement to proper treatment facility is more crucial than maintaining immobile status. Maintain above treatment functions throughout.

- Transport safely at the earliest possible time to competent medical service. Ideally, all of the above steps can be administered concurrently with transport phase.

### **3.2.3 Wild Animals**

Wild animals (e.g., skunks, wild turkeys, pheasants, snakes) present hazards to site personnel due to their potential to carry diseases (e.g., rabies) and inflict physical injuries. The following rules shall be followed when animals are present:

- Sighted animals will not be approached.
- When an animal is sighted, it should be avoided. A minimal level of disturbance should be employed.
- If the animal appears to behave strangely or aggressively, personnel will leave the area.
- At no time will personnel attempt to feed indigenous wildlife.

Workers shall use discretion and avoid all contact with wild animals. If these animals present a problem, the PESM will be notified and will develop a plan to alleviate the problem.

### **3.2.4 Poisonous Plants**

The potential for contact with poisonous plants (i.e., poison ivy, poison oak, and poison sumac) exists when performing fieldwork in undeveloped and wooded areas. Poison ivy can be found as vines on tree trunks or as upright bushes. Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring. Poison ivy has white berries and red or yellow foliage in the fall of the year. Additional information on Poison ivy is provided in Appendix B. Poison sumac can be present in the form of a flat-topped shrub or tree. It has fern-like leaves, which are velvety dark green on top and pale underneath. The branches of immature trees have a velvety “down”. Poison sumac has white, hairy berry clusters.

Contact with poison ivy may lead to a skin rash in susceptible individuals. A rash results from a toxin found in the sap that is extruded from the leaves and contained in the stems and roots. The rash is characterized by reddened, itchy, blistering skin that needs first aid treatment. If you believe you have contacted one of these plants, immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.

Avoidance of plant/sap contact is the only effective means of preventing the poisoning. A person experiencing symptoms of poisoning should remove contaminated clothing; wash all exposed areas thoroughly with soap and water, taking care not to touch your face or other body parts. Apply calamine or other poison ivy lotion if the rash is mild. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity. Employees will be trained in the identification of these species and will be advised to wear protective clothing such as gloves and long sleeve shirts when working conditions permit. Employees should also consider applying barrier lotions (e.g., Ivy Block) to skin that has the potential to contact these species. Clorox Wipes, Dawn liquid soap and Technu can be used to decontaminate skin and reusable clothing to prevent exposure to poison ivy. Gloves should be worn when removing and decontaminating clothing potentially exposed to poison ivy.

### 3.2.5 Bloodborne Pathogens

Bloodborne pathogens enter the human body and blood circulation system through punctures, cuts or abrasions of the skin, or mucous membranes. They are not transmitted through ingestion (swallowing), through the lungs (breathing), or by contact with whole, healthy skin. However, under the principle of universal precautions, all blood should be considered infectious, and all skin and mucous membranes should be considered to have possible points of entry for pathogens.

There are a number of infections that are transmitted by insects and arthropods where the infection cycle includes the human blood system. Examples include malaria and Lyme disease, which are transmitted by mosquitoes and ticks, respectively. These diseases are serious, and the possibility for infection should be considered. However, these diseases cannot be transmitted through personal contact with human blood, and are not covered by the OSHA *Bloodborne Pathogen Standard*. Potential bloodborne pathogen exposure includes:

- Medical emergency response operations such as administering first aid or cardiopulmonary resuscitation (CPR)
- Contact with human wastes such as domestic sewage

Two primary bloodborne pathogens include Hepatitis B and Acquired Immune Deficiency Syndrome (AIDS).

To reduce the risk of contracting a bloodborne pathogen, take the following precautions:

- Avoid contact with blood and other bodily fluids.
- Use protective equipment when giving first aid/CPR, such as disposable gloves and breathing barriers.
- Thoroughly wash your hands with soap and water immediately after giving care.

When cleaning up blood or other bodily fluids:

- Clean up the spill immediately or as soon as possible after the spill occurs.
- Use disposable gloves and other PPE when cleaning spills.
- Wipe up the spill with paper towels or other absorbent materials.
- After the area has been wiped up, flood the area with a solution of one-quarter cup of liquid chlorine bleach to 1 gallon of fresh water and allow it to stand for at least 20 minutes.
- Dispose of the contaminated material used to clean up the spill in a labeled biohazard container.

The ESS should be notified of any potential contact with blood or bodily fluids resulting from first aid or CPR administered on the job.

### 3.3 PHYSICAL HAZARDS

Safety hazards specific to the 2008–2009 activities will be addressed in the Activity Hazard Analyses (AHA) in Appendix C. In addition to the AHAs, general work rules and other safety procedures are described in Section 9.1 of this SHSP.

### 3.3.1 Heavy Equipment Operations and Traffic Control Activities

The work activities planned for this project may present physical hazards that are inherent to working around heavy equipment (e.g., potential for “struck by,” “caught between,” noise). Working with and near heavy equipment poses many potential hazards that can result in serious physical harm.

The following precautions will be taken to help prevent injuries and accidents:

- Prior to the start of on-site equipment operations, all personnel will be briefed on the potential hazards posed by these operations.
- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked and maintained in good working order throughout the duration of field activities. Heavy Equipment Inspection Forms are provided in Appendix D.
- While equipment is in operation, all personnel not directly required in the area will keep a safe distance.
- Personnel directly involved in the activity will avoid moving in the path of operating equipment. Areas blinded from the operator’s vision will be avoided. Spotters will be used when personnel may be in areas where the operator’s view is obstructed.
- Additional riders will not be allowed on equipment unless it is specifically designed for that purpose and has seats with seat belts.
- Personnel needing to enter the heavy equipment exclusion zone will get the attention (make eye contact) of the operator and signal their intentions. The operator will secure the equipment (e.g., bucket grounded) and motion to the personnel desiring entrance. At that point, entrance is authorized.
- Construction and heavy equipment will be provided with the necessary safety equipment including seat belts, roll-over protection, overhead protection, emergency shut-off during roll-over, backup warning lights, and audible alarms.
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment or vehicle.
- The heavy equipment operator will perform checks and document inspections at the beginning of each shift to assure that parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use.
- The immediate area of the heavy equipment activities should be checked for any electrical wires. A minimum safe distance of 10 feet shall be maintained from power lines rated 50 kilovolts (kV) or less. The minimum safe distance may be calculated as follows: minimum safe distance = 10 ft + 0.4 in for each 1 kV of lines rated over 50 kV or twice the length of the line insulator (but never less than 10 feet).
- Field support vehicles will be equipped with a first-aid kit and appropriate fire extinguisher.
- Heavy equipment operators must be trained and qualified in the operation of the equipment.

If any unauthorized individual does enter the construction area, work shall cease until the person has been escorted out of the area.

### 3.3.2 Cranes

Crane lifts will be in accordance with OSHA and TtEC Procedure CP-13, Critical Lifts. The following start-up inspection will be conducted:

- All control mechanisms for maladjustment that could interfere with proper operation.
- All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
- All operator aids, motion and load limiting devices, and other safety devices for malfunction and inaccuracy of settings.
- All chords and lacing.
- All hydraulic and pneumatic systems – with particular emphasis given to those which flex in normal operation of the crane.
- Hooks and lattices for deformation, chemical damage, cracks, and wear.
- Rope for proper spooling onto the drum(s) and sheave(s) and rope reeving for compliance with crane manufacturer's specifications.
- Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
- Hydraulic system for proper oil level.
- Tires for recommended inflation pressure (mobile cranes).
- Wedges and supports for looseness or dislocation (climbing tower cranes).
- Braces and guys supporting crane masts.
- Anchor bolt base connections for looseness or loss of reload (tower cranes and derricks).
- Derrick mast fittings and connections for compliance with manufacturer's recommendations.

Prior to use of a crane at the site a Critical Lift Plan will be prepared, if required. This plan will specify the exact size and weight of the load to be lifted and all crane and rigging components that add to the weight. The manufacturer's maximum load limits for the entire range of the lift, as listed in the load charts, will also be specified. Additionally, if the crane is set on a barge (i.e., on the water) list should also be taken into account. The plan will specify the lift geometry and procedures, including the crane position, height of the lift, the load radius, and the boom length and angle for the entire lift range. The crane operator, lift supervisor, and rigger will be designated in the plan and their qualifications stated.

The critical lift plan will include a rigging plan that shows the lift points and describes rigging procedures and hardware requirements. The plan will describe the ground conditions, outrigger or crawler track requirements and, if necessary, the design of mats to achieve a level, stable foundation of sufficient bearing capacity for the lift. For lifting cranes or derricks, the plan will describe the operating base (platform) condition. Environmental conditions under which lift operations will be stopped will be listed in the plan. Coordination and communication

requirements for the lift operations will also be specified. For tandem or tailing crane lifts, the plan will specify the make and model of the cranes; the line, boom, and swing speeds; as well as requirements for an equalizer beam.

### **3.3.3 Lifting/Rigging**

Mobilization/demobilization activities will likely require some lifting/rigging activities as well as building construction. Personnel will follow the procedures listed below when performing a lift as well as the requirements in TtEC's Construction Procedure CP-13, Critical Lifts.

- The equipment used for lifting should be positioned as near as possible to the load, while maintaining a safe operating distance. The operator shall verify that the load line is vertical and over the load's center of gravity prior to lifting the load to ensure that the load does not drift when lifted.
- The immediate area of the lift should be checked for any electrical wires. A minimum safe distance of 10 feet shall be maintained from power lines rated 50 kV or less. The minimum safe distance may be calculated as follows: minimum safe distance = 10 ft + 0.4 in for each 1 kV of lines rated over 50 kV or twice the length of the line insulator (but never less than 10 feet).
- The swing area of the lifting equipment is barricaded to protect personnel in the immediate area.
- Loads are not lifted over personnel.
- All loose load objects are secured or removed.
- Tag lines are used to control loads except where their use will create a hazard.
- The equipment performing the lift is not subjected to sudden lifting, stopping, or impact loading.
- Riding on loads, hooks, buckets, material hoists, or other material hoisting equipment not meant for personnel use is absolutely prohibited.
- Rigging attachment points are as specified by the equipment vendor, if applicable, or as specified in the Critical Lift Plan.
- Softeners are used at contact points between rigging and load as necessary to avoid damage to the load or the rigging.
- Environmental conditions under which lifting operations should not be performed, such as wind, precipitation, reduced visibility, etc., should be established and communicated to project personnel during the Site Specific Briefing and Daily Tailgate Briefings.
- Prior to performing any lift, the Lift Supervisor should give consideration to a contingency plan should conditions prohibit the load from being placed in its intended position. Contingency plans could include placement back in its original position or an alternate temporary location, and should include ensuring that adequate cribbing, dunnage, or tie downs are provided for the alternate location.
- The Lift Supervisor shall determine that the foundation or supports to receive any load have been reviewed for stability and strength prior to performing the lift.

- Prior to placement of any load in storage or otherwise temporarily staged prior to placement in its final, designed location, consideration shall be given to any access requirements, maintenance activities, ability to perform future lifting or handling, and construction activities to be performed in the vicinity of the stored or staged load.
- Certification of all lift accessories, including the results of proof tests for custom designed accessories, shall be available at the onsite project offices and maintained in a file as part of the project filing system.
- The total weight of the load to be lifted, including all lifting beams, rigging, hooks and attachments, shall be determined before a safe lift can be planned.
- The determination of the exact location of the center of gravity of the load is critical in ensuring that the load is rigged in a stable configuration. The location of the attachments of the rigging to the load should be above the center of gravity where possible. Where the location of attachments is below the center of gravity, extreme care must be taken to ensure stability of the load. Special precautions shall be taken in the selection of sling lengths and attachment configurations to ensure that the load is stable. Rigging of loads in this configuration should only be performed by personnel with extensive experience in rigging.
- Consideration shall be made in any lifting operation for the possibility of a load becoming unstable during lifts intended only to reposition a load, such as uprighting or turning a load over. The center of gravity shall be calculated for the load in all positions anticipated in order to ensure stability.
- The load shall be safely rigged within the rated capacity of all rigging equipment.
- Sling capacities shall be reduced from their full rated capacities based on sling configuration (vertical, choker, or basket hitch) and sling leg angle, as well as based on sling condition. Only personnel with extensive experience in rigging should be given the authority to determine the capacity of slings showing signs of wear or other deterioration.
- Custom designed grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125 percent of their rated load.

### **3.3.4 Sheet Pile Driving**

Site personnel will follow the procedures specified in 29 CFR 1926.603:

- Overhead protection, which will not obscure the vision of the operator, shall be provided.
- Stop blocks shall be provided for the leads to prevent the hammer from being raised against the head block.
- A blocking device, capable of safely supporting the weight of the hammer, shall be provided for placement in the leads under the hammer at all times while employees are working under the hammer.
- Guards shall be provided across the top of the head block to prevent the cable from jumping out of the sheaves.

- When the leads must be inclined in the driving of batter piles, provisions shall be made to stabilize the leads.
- Fixed leads shall be provided with ladder, and adequate rings, or similar attachment points, so that the loft worker may engage his safety belt lanyard to the leads. If the leads are provided with loft platforms(s), such platform(s) shall be protected by standard guardrails.
- Steam hose leading to a steam hammer or jet pipe shall be securely attached to the hammer with an adequate length of at least 1/4-inch-diameter chain or cable to prevent whipping in the event the joint at the hammer is broken. Air hammer hoses shall be provided with the same protection as required for steam lines.
- Safety chains, or equivalent means, shall be provided for each hose connection to prevent the line from thrashing around in case the coupling becomes disconnected.
- Steam line controls shall consist of two shutoff valves, one of which shall be a quick-acting lever type within easy reach of the hammer operator.
- Guys, outriggers, thrustouts, or counterbalances shall be provided as necessary to maintain stability of pile driver rigs.
- Pile driving from barges and floats. Barges or floats supporting pile driving operations shall meet the applicable requirements of 29 CFR 1926.605.
- Engineers and winchmen shall accept signals only from the designated signalmen.
- All employees shall be kept clear when piling is being hoisted into the leads.
- When piles are being driven in an excavated pit, the walls of the pit shall be sloped to the angle of repose or sheet-piled and braced.
- When steel tube piles are being "blown out," employees shall be kept well beyond the range of falling materials.
- When it is necessary to cut off the tops of driven piles, pile driving operations shall be suspended except where the cutting operations are located at least twice the length of the longest pile from the driver.
- When driving jacked piles, all access pits shall be provided with ladders and bulkheaded curbs to prevent material from falling into the pit.

### **3.3.5 Fall Protection**

Fall protection (i.e., personal fall arrest systems and guard rails) will be required for the crew during the building construction and sheet pile installation. The use of PPE or alternate, approved methods to prevent falls is required for all personnel working at heights at or greater than, 6 feet above a lower level or surface (including water). Personal flotation devices (PFDs) are required on all boats, barges, and structures where the edges are unprotected or guard rails are less than 3 feet above the walking surface. Personal fall arrest systems shall meet the criteria specified in 29 CFR 1926.502(d) and ESH 3-8, Fall Protection.

Personal fall arrest systems shall meet the following criteria when stopping a fall:

- Limit maximum arresting force on an employee to 1,800 pounds when using a body harness.
- Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet. Make sure to consider the elongation of the shock absorber lanyard when calculating the free fall distance.
- Have sufficient strength to withstand twice the maximum fall arrest force of an employee free falling a distance 6 feet or the free fall distance permitted by the system, whichever is less.
- Body belts are prohibited for the protection against free-fall type hazards.
- Anchorage points (tie offs) for fall arrest systems must be approved or fit an approved engineered model. Anchorage points to which personal fall arrest equipment is attached shall be capable of supporting 5,000 pounds (static load to failure) per person.
- Only locking snaphooks that require two separate forces to open the gate for disengagement are permitted. Non-locking snaphooks (i.e., single-action snaphooks) are prohibited. Locking snaphooks shall be connected to compatible hardware.
- Do not attach two snaphooks together, back onto its own lanyard, directly to a horizontal lifeline, or to a webbing loop/lanyard. Do not attach two or more snaphooks to one D-ring. Do not attach a snaphook to a D-ring, eyebolt, rebar or other attachment point that has improper dimensions in relation to the snaphook dimensions. Snaphooks may be attached to D-bolts, D-rings/brackets, or anchorage connectors.
- Do not use a steel cable lanyard unless it is a retracting lanyard. Shock-absorbing lanyards are required for fall arrest, and the maximum length of the lanyard is 4 feet. Shock-absorbing lanyards must be replaced after being shock loaded and stressed.
- Connect the lanyard so as to limit the potential free fall to as short a distance as possible. Free fall distances shall not exceed 6 feet.
- Lifeline capacity shall be 5,000 pounds static load or two times the maximum fall arrest force per person applied to the center of the lifeline between two fixed anchorages.
- Rope diameters selected for use with a rope grab type fall protection system must meet the grab manufacturer's specifications. Rope grabs must be automatic operating and have no manual feature to move down the line unless it is fail-safe.
- Self-retracting lifelines that automatically limit free fall distances to 2 feet or less shall have components capable of withstanding a minimum static load of 3,000 pounds.
- Personal fall arrest systems shall not be attached to guardrail systems.
- All fall arrest equipment must be inspected prior to putting it into service.

Guardrail systems and their use shall comply with 29 CFR 1926.502(b) and the following provisions:

- Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches plus or minus 3 inches above the walking/working level.

- Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches high.
- Midrails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.
- Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.
- Intermediate members (such as balusters), when used between posts, shall be not more than 19 inches apart.
- Other structural members (such as additional midrails and architectural panels) shall be installed such that there are no openings in the guardrail system that are more than 19 inches wide.
- Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds applied within 2 inches of the top edge, in any outward or downward direction, at any point along the top edge.
- Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail or other member.
- Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.
- The ends of all top rails and midrails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.
- Steel banding and plastic banding shall not be used as top rails or midrails.
- Top rails and midrails shall be at least 1/4-inch (0.6 cm) nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than 6-foot intervals with high-visibility material.

### **3.3.6 Work on or Around Water**

The majority of the marine survey work will be conducted on or around water. This presents hazards unique to this environment, and will be thoroughly addressed in all AHAs that apply. In preparing the AHAs, consideration will be given to the elements of TtEC Environmental, Health and Safety Program EHS 6-6, Boating, and any applicable U.S. Coast Guard regulations. Personnel performing marine surveys shall receive boating safety training/briefing from the Handbook of Wisconsin Boating Laws and Responsibilities (Appendix E). More extensive information on working on or around water will be provided in the AHAs in the Site Specific Health and Safety Plans. For more extensive information on working on or around water, refer to the AHAs in Appendix C of this SHSP.

### **3.3.7 Earthwork/Excavation Hazards**

Requirements of OSHA 29 CFR 1926.652 and the following safety procedures will be followed during all earthwork and excavation activities as well as the procedures outlined in TtEC's

Environmental, Health and Safety Procedure EHS 6-3, Excavation and Trenching, EHS 3-15 Underground Utilities, and the guidelines listed in TtEC's Construction Site Guidelines CSP-102, Site Earthwork:

- Surfaces surrounding open trenches and excavations shall have all surface hazards removed.
- All utilities shall be located and cleared prior to initiating digging. Public or facility utility groups shall be utilized where possible for this purpose. In the absence of either, the ESS shall specify the procedures to be used to clear utilities in consultation with the project PESH and Project Manager. When the excavation is open, utilities shall be supported and protected from damage. Clearance and support methods shall be documented on the daily inspection checklist.
- Stairways, ladders, or ramps shall be provided as means of egress in all trenches 4 feet or more in depth. Travel distance shall be no more than 25 feet between means of exit.
- No employee shall be permitted under loads being lifted or under loads being unloaded from vehicles.
- When vehicles and machinery are operating adjacent to excavations, warning systems such as stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.
- Scaling or barricades shall be used to prevent rock and soils from falling on employees.
- Excavated and loose materials should be kept at least 3 feet from the edge of excavations, but at a minimum of 2 feet from the edge of the excavation in accordance with OSHA requirements.
- Walkways or bridges with standard railing shall be provided at points employees are to cross over excavations or trenches.
- Barriers (e.g., orange safety fence, barricades, chainlink fence) shall be provided to prevent personnel from inadvertently falling into an excavation if the excavation will remain open for more than 24 hours.
- Employees shall not work in excavations in which water has, or is, accumulating without the use of additional protection such as special support systems or water removal.
- Water removal shall be monitored by a competent person.
- Barriers such as ditches and dikes shall be used to divert runoff from excavations.
- Atmospheric testing shall be done prior to employees entering excavations 4 feet or greater in depth.
- Inspections shall be performed daily on all excavations, adjacent areas, and protective systems before personnel enter the trench. The checklist provided in Attachment A of EHS 6-3 or equivalent shall be used.
- All sloping and benching shall be done in accordance with 29 CFR 1926.652, Appendix B. Selection of the sloping method and evaluation of surface surcharge loads shall be made by a competent person familiar with the requirements contained therein. Sloping and benching methods and specifications shall be listed on the daily inspection checklist.

### **3.3.8 Underground Utilities**

Whenever intrusive activities are conducted during the project, whether land or water based, the threat of contact with underground utilities exists. This would include utilities such as water, electrical, gas, sewage, etc. Before the execution of any intrusive activities (or any type of marine activity), an assessment of the presence of underground utilities will be made. All steps will be taken to locate underground utilities as per TtEC Procedure EHS 3-15, Underground Utilities. This will include white lining the area of intrusive activities, calling the Wisconsin One-Call System (811, 800-242-8511, 414-259-1181, emergency only – 877-500-9592), and having utilities located.

### **3.3.9 Hot Work (torching, welding, cutting)**

All welding and hot work creating a spark will be conducted in accordance with TtECs Welding and Hot Work Program, EHS 6-5. This includes, but is not limited to, hot work permit issuance, use of a fire watch, keeping of a properly rated fire extinguisher at the work area, keeping all combustible materials 50 feet from the hot work area, or placing barriers between combustibles and the hot work area. Prior to any hot work, notify the ESS and request a Hot Work Permit.

### **3.3.10 Heat/Cold Stress**

#### **3.3.10.1 Heat Stress**

There is a potential for heat stress and related injuries during work activities. Specific potential hazards include:

- Heat rash
- Heat cramps
- Fainting
- Heat exhaustion
- Heat stroke

Sweating does not cool the body unless the sweat evaporates. Heat stress related problems include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. Heat rash occurs because sweat is not evaporating, causing irritation and vesicular inflammation. Standing erect and immobile in the heat allows blood to pool in the lower extremities. As a result, blood does not return to the heart to be pumped back to the brain, and fainting may occur. Heat cramps are painful spasms of the muscles due to excessive water and salt loss from profuse sweating. Similarly, heat exhaustion occurs due to the large fluid and salt loss from profuse sweating. Heat exhaustion is characterized by clammy and moist skin, nausea, dizziness, headaches, and low blood pressure.

Heat stroke occurs when the body's temperature regulatory system has failed. Skin is hot, dry, red, and spotted. The affected person may be mentally confused or delirious, and convulsions may occur. A person exhibiting signs of heat stroke should be removed from the work area and moved to a shaded area immediately. The injured person should be soaked with water and fanned to promote evaporation. Medical attention must be obtained immediately. **EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.**

Early symptoms of heat stress related problems include the following:

- Decline in task performance
- Lack of coordination
- Decline in alertness
- Unsteady walk
- Excessive fatigue
- Muscle cramps
- Dizziness

Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illnesses. To avoid heat stress, the following steps, as necessary, will be implemented at the Lower Fox River site:

- Adjust work schedules.
  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.
  - Perform work during cooler hours of the day, if possible, or at night if adequate lighting can be provided.
- Perform physiological monitoring.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, e.g., 8 fluid ounces (0.23 liter) of water must be ingested for approximately every 8 ounces (0.23 kilogram [kg]) of weight loss. The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature at 50° to 60°F (10°-16.6°C).
  - Provide small disposable cups that hold about 4 ounces (0.1 liter).
  - Have workers drink 16 ounces (0.5 liter) of fluid, preferably water or dilute drinks, before beginning work.
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat-related illnesses.
- Rotate personnel and alternate job functions.

- Utilize cooling vests when impermeable clothing is worn.

Additional procedures to be followed are provided in EHS Program, Temperature Extremes, EHS 4-6.

### 3.3.10.2 Cold Stress

Exposure to low temperatures presents a risk to employee safety and health through the direct effect of the low temperature on the body and collateral effects such as slipping on ice, decreased dexterity, and reduced dependability of equipment. Work conducted in the winter months can become a hazard for field personnel due to cold exposure. All personnel must exercise increased care when working in cold environments to prevent accidents that may result from the cold. The effects of cold exposure include frostbite and hypothermia. Wind increases the impact of cold on a person's body. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite. Recognition of the symptoms of cold-related illnesses will be discussed during the health and safety briefing conducted prior to the onset of site activities.

Hypothermia is a life-threatening condition in which the core body temperature falls below 95°F. Hypothermia can occur at temperatures above freezing particularly when the skin or clothing becomes wet. During exposure to cold, maximum shivering occurs when the core temperature falls to 95°F. As hypothermia progresses, depression of the central nervous system becomes increasingly more severe (Table 3-2). This accounts for the progressive signs and symptoms ranging from sluggishness and slurred speech to disorientation and eventually unconsciousness.

<b>Site Health and Safety Plan</b> <b>Volume I</b> <b>Lower Fox River (OUs 2-5)</b> <b>Table 3-2</b> <b>Progressive Clinical Symptoms of Hypothermia</b>	
Core Temperature F°	Clinical Signs
95°	Maximum shivering
87°-89°	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated
84°-86°	Progressive loss of consciousness; muscular rigidity; respiratory rate decreases
79°	Victim rarely conscious
70°-72°	Maximum risk of ventricular fibrillation

Frostbite is both the general and medical term given to areas of cold injury. Unlike hypothermia, frostbite rarely occurs unless environmental temperatures are less than freezing and usually less than 20°F. Frostbite injuries occur most commonly on the distal parts of the body (nose, earlobes, hands, and feet) that are subject to intense vasoconstriction. The three general categories of frostbite are:

- *Frostnip* – A whitened area of the skin which is slightly burning or painful.
- *Superficial frostbite* – Waxy, white skin with a firm sensation but with some resiliency. Symptomatically feels “warm” to the victim with a notable cessation of pain.

- *Deep frostbite* – Tissue damage deeper than the skin, at times, down to the bone. The skin is cold, numb, and hard.

In preventing cold stress, the ESS must consider factors relating both to the worker and the environment. Training, medical screening, establishment of administrative controls, selecting proper work clothing, and wind-chill monitoring all contribute to the prevention of hypothermia and frostbite.

- Recognizing the early signs and symptoms of cold stress can help prevent serious injury. Thus, workers will be trained to recognize the symptoms of hypothermia and frostbite and have appropriate first-aid instruction. When the air temperature is below 50°F, the ESS will inform workers of the proper clothing requirements and any work practices that are in effect to reduce cold exposure.
- Cold injuries and illnesses recognition and prevention measures will be emphasized during daily safety briefings when the potential for cold injuries and illnesses exists.
- Work will cease under unusually hazardous conditions.
- Phenothiazine (a sedative) and beta blocker drug use will be prohibited.
- A heated area will be available on site.
- Temperature will be recorded daily on site.
- Warm beverages will be available on site.
- The ESS will establish a work/rest schedule based upon worker monitoring. At the first sign of uncontrollable shivering, the worker will be rested in a heated shelter. Work will be stopped when the air temperature reaches 0°F.
- Workers will be encouraged to layer clothing when air temperature is below 50°F. Clothing that has a high insulation value will be worn under protective garments. Insulated gloves will be worn when the wind chill index is below 32°F. Insulating dry clothes will be available.

Additional procedures to be followed are provided in EHS Program, Temperature Extremes, EHS 4-6.

### **3.3.11 Noise**

Noise is a potential hazard associated with the operation of heavy equipment, operation of the treatment process equipment, motors, pumps, and dredges. Suspected high noise operations will be evaluated and monitored to determine if hearing protective devices should be worn. A general field rule is to wear hearing protection if you cannot hear normal conversation within an arm length of the person talking. Hearing protection must be worn if noise levels are above the following:

- 85 dBA – 8-hour time weighted average (TWA)
- 100 dBA – 15 minute short-term exposure limit (STEL)
- 140 dBA – instantaneous noise

Additional details on monitoring and hearing protection requirements are in EHS 4-4, Hearing Conservation, and HSG1-5, Noise Monitoring.

### 3.3.12 Hand and Power Tools

Tools are such a common part of construction work that hazards are often unrecognized. Workers must learn to recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent injuries from those hazards. To prevent accidents resulting from the use of hand and power-operated hand tools, the following safe work practices will be implemented and enforced.

Broken, defective, burned, or mushroomed tools will not be used. They will be reported and turned in for replacement. The proper tool and equipment will be selected and used for each task. For example, a wrench will not be used as a hammer or a screwdriver as a chisel. Leaving tools on scaffolds, ladders, or any overhead working surface is not allowed. Racks, bins, hooks, or other suitable storage space must be provided to permit convenient arrangement of tools. The practice of throwing tools from one location to another, from one employee to another, or dropping them to lower levels will be prohibited. When it is necessary to pass tools or material under the above conditions, suitable containers and/or ropes must be used.

Wooden tool handles must be sound, smooth, and in good condition and securely fastened to the tool. Sharp-edged or pointed tools will never be carried in employee's pockets. Only non-sparking tools will be used in locations where sources of ignition may cause a fire or explosion. Tools requiring heat treating will be tempered, formed, dressed, and sharpened by workmen experienced in these operations.

Tools designed to accommodate guards must be equipped with such guards when in use. All rotating, reciprocating, or moving parts of equipment (belts, gears, shafts, flywheels) must be guarded to prevent contact by employees using such equipment. All hand-held power tools (i.e., circular saws, chain saws, and percussion tools) without a positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when pressure is released. A positive "on-off" control must be provided on platen sanders, grinders with wheels 2 inches in diameter or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws, and jigsaws with blade shanks one-quarter-inch wide or less. A momentary contact "on-off" control must be provided on all hand-held powered drills, tapers, fasteners, drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter. Besides safety hazards, the use of power tools sometimes creates potential health hazards as well. The use of jackhammering and chiseling equipment often results in silica and nuisance dust exposures that can be controlled by wetting the work surfaces.

In addition to dust hazards, the hand vibration inherent in the use of some power tools may result in a restriction of blood flow to the hands and fingers, causing numbness and tingling. If workers consistently experience these symptoms after the use of power tools, they will contact their supervisor so that steps may be taken to prevent further harm to the nerves and blood vessels in their hands. The use of a different tool, changes to the offending tool to reduce vibrations, and/or the use of gloves are recommended to prevent vibration.

**Electric tools** – Electric tools present several dangers to the user; the most serious is the possibility of electrocution. The following safe work procedures for electric tools must be implemented and enforced:

- Have a three-wire cord with ground and be grounded, or
- Be double insulated, or

- Be powered by a low-voltage isolation transformer.

Never remove the third prong from the plug. Electrical tools will not be used in damp or wet locations and will always be used within their design limitations. A ground fault circuit interrupter (GFCI) must be used or the tool must be double insulated to protect the worker from electrical shock hazards. Implementing requirements of EHS 3-10, Assured Equipment Grounding, and HSG3-1, Assured Equipment Grounding, will be followed.

**Powered Abrasive Wheel Tools** – Power abrasive wheel tools present a special safety problem because they may release fragments. The following safe work procedures for powered abrasive wheel tools need to be implemented and enforced. Portable grinding tools must be equipped with safety guards to protect workers from fragments as well as the moving wheel surface. Inspecting and sound or ring testing abrasive wheels prior to mounting is required to ensure that they are free from cracks or defects. Checking to ensure that the abrasive wheel RPM rating is appropriate for the tool will also help prevent wheel failures. The following work rules are appropriate when using a power grinder:

- Always use eye protection and a face shield.
- Turn off the power when not in use.
- Never clamp a hand-held grinder in a vise.
- To prevent the wheel from cracking, the user will ensure that it fits freely on the spindle.
- Grinding wheel users will never stand directly in front of the wheel during start-up because there is always a possibility that the wheel may disintegrate (explode) when accelerating at full speed.

**Pneumatic Tools** – Pneumatic tools are powered by compressed air and include chippers, drills, jackhammers, and sanders. The following safe work procedures for pneumatic tools must be implemented and enforced. Pneumatic tools that shoot nails, rivets, or staples that operate at pressures more than 100 lb./in<sup>2</sup> must be equipped with a special device to keep fasteners from being ejected unless the muzzle is pressed against the work surface. Safety lashing will be installed at connections between tool and hose at all quick makeup type connections. All hoses exceeding one-half-inch inside diameter must have a safety device at the supply source or branch line to reduce pressure in the event of hose failure. Eye protection is required for employees working with pneumatic tools.

Airless spray guns that atomize paints and fluids at high pressures (1,000 lbs./in<sup>2</sup> or more) must be equipped with automatic or visual manual safety devices that will prevent pulling the trigger until the safety device is manually released. Workers operating a jackhammer are required to wear safety glasses, safety footwear, and hearing protection. Compressed air guns will never be pointed toward anyone. A safety clip or retainer must be installed to prevent attachments from being unintentionally shot from the barrel of the tool.

**Liquid-Fueled Tools** – Liquid-filled tools are usually powered by gasoline. Vapors that can burn or explode and give off dangerous exhaust gases are the most serious hazards associated with liquid-filled tools. The following safe work procedures for liquid-filled tools need to be implemented and enforced at the site.

Gas or fuel will be handled, transported, and stored in UL's National Fire Protection Association (NFPA) approved flammable liquid containers. These containers, also known as safety cans, are

no more than 5 gallons in capacity and have a spring-closing lid and spout cover that will safely relieve internal pressure when subjected to fire exposure. Type 2 cans are preferred. Before refilling the tank for a fuel-powered tool, the user must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapors. Effective ventilation and/or PPE are necessary when using a fuel-powered tool inside a closed area. Fire extinguishers must be readily available in the work area.

***Powder-Actuated Tools*** – Powder-actuated tools operate like a loaded gun and will be treated with the same respect and precautions. Only assigned, trained, and qualified operators will operate powder actuated tools. The following safe work practices and procedures for powder-actuated tools will be implemented and enforced. All powder-actuated tools must meet American National Standards Institute (ANSI) A10.3 requirements for design, operation, and maintenance. Powder-actuated tools must never be used in an explosive or flammable atmosphere. Before using a powder-actuated tool, the worker will inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions.

Never point the tool at anyone. Do not load a tool unless it is being used immediately. Never leave a loaded tool unattended, especially where it would be available to unauthorized persons. Suitable eye and face protection is essential when using a powder-actuated tool. In case of misfire, the operator will hold the tool in the operating position for at least 30 seconds, then attempt to operate the tool for a second time. If the tool misfires again, wait another 30 seconds (still holding the tool in the operating position) and then proceed to remove the explosive load from the tool in accordance with the manufacturer's instructions.

If the tool develops a defect during use, it will be tagged and taken out of service immediately until it is properly repaired. Warning signs will be posted within the area of operation of any powder-actuated tool. Powder-actuated tool operators must be certified by the tool supplier.

### **3.3.13 Slips, Trips, and Falls**

Working on wet surfaces in boats as well as uneven terrain presents a walking/working surface that can lead to difficult footing and overall balance. Boat decks will pose slip, trip, and fall hazards due to slippery surfaces that may be covered by or wet from rain. Slips, trips, and falls are a leading cause of injuries in this work setting; therefore, a concerted effort to identify, control, and eliminate these hazards and the measures needed to reduce or eliminate the possibility of injury will be communicated to all site personnel.

Site personnel will be instructed to look for these potential safety hazards and immediately inform the ESS or the Construction Manager about any new hazards. If the hazard cannot be immediately removed, action must be taken to warn site workers about the hazard. Proper housekeeping (e.g., tools, equipment, and material will be picked up and stored) must be maintained onsite, particularly in pedestrian traffic routes and adjacent to office and decontamination areas. Voids and transition areas along high foot traffic areas will be covered to prevent injury. The use of PPE or alternate, approved methods to prevent falls is required for all personnel working at heights at or greater than 6 feet above a lower level or surface (including water). PFDs are required on all boats, barges, and structures where the edges are unprotected or guard rails are less than 3 feet above the walking surface.

### 3.3.14 Manual Lifting

Manual lifting may be required. Failure to follow proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted time, and long treatment and recovery periods. Basic lifting and material handling techniques will be reviewed with all personnel prior to the on-site activities. All tasks will be evaluated onsite prior to commencement or during activities in order to evaluate the potential for injury. Controls may include engineering controls, reducing weight of objects that are carried, reducing distance of carrying, or reducing loss potential by rotating workers.

Tetra Tech's EHS policy states that individual employees are not to lift loads greater than 50 pounds. The following procedure should be used to lift anything, particularly heavier loads, safely:

- Make sure the path of travel is clear.
- Size up the load as to its weight, size and shape.
- Place the feet about a foot apart and close to the object for good balance.
- Bend the knees to a comfortable position and get a good handhold.
- Using both leg and back muscles, lift the load straight up, smoothly and evenly. Pushing with the legs, keep the load close to the body.
- Lift the object into carrying position, avoiding twisting movements until the lift is completed.
- Turn the body with changes of foot position. Do not twist at the waist when lifting.
- Using both leg and back muscles, comfortably lower the load by bending the knees. When the load is securely in place, release the grip. Setting down the load is just as important as picking it up.

The same steps apply to team lifting, with the emphasis on coordination. All should start and finish the lift action at the same time and perform turning movements together.

#### 4.0 ACTIVITY HAZARD ANALYSES

AHA is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control and mitigate those hazards. AHAs follow the guidance of the TtEC Corporate Program EHS 3-5. AHAs are developed for all activities and will be used to train workers in proper safety procedures during phase preparatory meetings.

AHAs for the 2008–2009 site activities are included in Appendix C of this SHSP. AHAs have been developed for the following phases of work:

- Mobilization/demobilization (including setup of temporary support trailers)
- Clearing and grading
- Land surveying
- Marine surveying
- Construction of haul roads
- Sheetpile installation
- Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall
- Debris removal
- Construction of personnel and equipment decontamination facilities
- Installation of perimeter fencing (6-foot chainlink), signage, and gatehouse
- Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers
- Installation of the dewatering and water treatment equipment.
- Layout and placement of the dredge lines and booster stations
- Dredging TSCA and non-TSCA material
- Dewatering operations
- Transportation and disposal
- Wastewater treatment plant operations
- Sampling (sediments and process operations)
- Laboratory analysis

## **5.0 PERSONAL PROTECTIVE EQUIPMENT**

The PPE specified in Table 5-1 represents the initial level of PPE selection for each activity required by 29 CFR 1910.132. Specific information on the selection rationale for each activity can be found in the AHAs for these plans. PPE selection shall be made by the ESS and approved by the PESM. Additional tasks not included in Table 5-1 shall be reviewed by the ESS and PESM. Any additional PPE requirements will be incorporated into the SHSP by completing the FCR form found in Appendix A. All FCR forms and PPE selection will require approval by the PESM. Modifications for initial PPE selection may also be made by the ESS in consultation with the PESM using the same form. A written justification for downgrade will be provided to the PESM for approval on a field change request form.

### **5.1 UPGRADE CONDITIONS**

Due to the nature of the activities, it is not anticipated that upgrading to Level C or B will be required during the Lower Fox River site activities. Level D or modified Level D is anticipated for all site work, but the ESS has the responsibility for monitoring site and work conditions and deciding the appropriate level of protection based on indications of potential exposure.

### **5.2 HAZARD ASSESSMENT FOR SELECTION OF PERSONAL PROTECTIVE EQUIPMENT**

The initial levels of protection were selected by performing a hazard assessment taking into consideration the following:

- Potential site physical hazards present or suspected
- Work operations to be performed
- Potential routes of exposure
- Characteristics, capabilities and limitations of PPE, and any hazards that the PPE presents or magnifies

**Site Health and Safety Plan  
Lower Fox River (OUs 2 through 5)  
Volume I  
Table 5-1  
Personal Protective Equipment Selection**

<b>Task</b>	<b>Head</b>	<b>Eye/Face</b>	<b>Feet</b>	<b>Hands</b>	<b>Body</b>	<b>Hearing</b>	<b>Respirator</b>
Mobilization/ Demobilization (including setup of temporary support trailers)	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Clearing and grading	HH	SG, PFS if using chain saw	STB	LWG as needed	Work Clothes, high visibility vest, chaps if using chain saw	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Land surveying	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Construction of haul roads	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Sheetpile installation	HH	SG	STB	LWG	Work Clothes, high visibility vest, PFD if on or near water, fall protection as required	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Dredging	HH	SG	STB	LWG	Work Clothes, high visibility vest, PFD if on or near water	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Debris removal	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.

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**Site Health and Safety Plan  
Lower Fox River (OUs 2 through 5)  
Volume I  
Table 5-1  
Personal Protective Equipment Selection**

<b>Task</b>	<b>Head</b>	<b>Eye/Face</b>	<b>Feet</b>	<b>Hands</b>	<b>Body</b>	<b>Hearing</b>	<b>Respirator</b>
Placement of clean fill and/or dredged sand behind the sheetpile wall	HH	SG	STB	LWG	Work Clothes, high visibility vest, PFD if on or near water	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Construction of personnel and equipment decontamination facilities	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest, fall protection as required	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Installation of perimeter fencing (6' chainlink), signage, and gatehouse	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest, fall protection as required	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Installation of the dewatering and water treatment equipment.	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Layout and placement of the dredge lines and booster stations	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest, PFD if on or near water	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.

5-3

**Site Health and Safety Plan  
Lower Fox River (OUs 2 through 5)  
Volume I  
Table 5-1  
Personal Protective Equipment Selection**

<b>Task</b>	<b>Head</b>	<b>Eye/Face</b>	<b>Feet</b>	<b>Hands</b>	<b>Body</b>	<b>Hearing</b>	<b>Respirator</b>
Dredging TSCA and non-TSCA material	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest, PFD if on or near water	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Dewatering Operations	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Transportation and Disposal	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Wastewater Treatment Plant Operations	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Sampling (Sediments and Process Operations)	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest, PFD if on or near water	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Laboratory Analysis	HH	SG	STB	LWG as needed	Work Clothes, high visibility vest	EP as needed around power tools and heavy equipment	No Respiratory Protection Required.
Notes:	EP – Ear Plugs HH – Hard Hat			LWG – Leather Work Gloves PFD – Personal Flotation Device		PFS – Plastic Face Shield SG – Safety Glasses STB – Safety Toed Boots	

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## **6.0 AIR MONITORING**

The following sections contain information describing the types, frequency, and location of real time air monitoring to evaluate potential worker exposures. Air monitoring for community protection will be addressed in the Community HASP.

### **6.1 INSTRUMENTATION**

The following monitoring instruments will be available for use during remediation operations as necessary:

- Dust Meter, MiniRAM or equivalent, aerosol dust monitor.

The dust meter will be used to assess the respirable dust concentrations in the worker breathing zone during dewatering activities and T&D activities. There is minimal to no contact using proposed methods to dredge contaminated sediments, and therefore inhalation of PCBs is not considered a risk. There is minimal to no inhalation risk during sampling of PCB-contaminated material since the sediments will be wet and will not produce a dust. The Site-Specific Health and Safety Plan lists the response measures if action levels are exceeded.

### **6.2 REAL-TIME AIR MONITORING**

Routine air monitoring will be performed by the ESS for dust disturbing activities and during activities requiring handling dry PCB-containing materials. A calibrated aerosol dust monitor will be used to monitor dust levels in personnel breathing zones. A background reading must be obtained from a clean area prior to taking readings with the instruments in any area where measurable airborne contaminants may be present.

### **6.3 FREQUENCY AND LOCATION OF MONITORING**

Tables 6-1 and 6-2 present a breakdown of each main activity and provide the instrumentation, frequency, and location of the real time monitoring for the site. Note that a background reading must be established prior to taking readings with the instruments.

### **6.4 DATA QUALITY ASSURANCE**

#### **6.4.1 Calibration**

Monitoring instrument calibration will be documented and included in a dedicated safety and health log book or on separate calibration pages. All monitoring instruments must be calibrated before and after each shift's use of the equipment. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

#### **6.4.2 Operations**

All instruments will be operated in accordance with the manufacturer's specifications. Manufacturer's literature, including an operations manual for each piece of monitoring equipment, will be maintained on-site by the ESS for reference.

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**Table 6-1**  
**Real Time Air Monitoring Action Levels**

<b>Air Monitoring Instrument</b>	<b>Monitoring Location</b>	<b>Action Level</b>	<b>Site Action</b>	<b>Reason</b>
MiniRAM or equivalent	Worker Breathing Zone during activities which may generate dust (i.e., earthwork)	<2.5 mg/m <sup>3</sup>	No respiratory protection is necessary. Continue work.	½ TLV for dust.
		>2.5mg/m <sup>3</sup>	Use dust suppression techniques (i.e., water truck to dampen dry areas). See Section 6.5.	½ TLV for dust.
MiniRAM or equivalent	Worker Breathing Zone during activities which may generate PCB-contaminated dust (i.e., dewatering activities and T&D)	<2.0 mg/m <sup>3</sup>	No respiratory protection is necessary. Continue work.	Calculated based upon quantitative risk assessment (see Section 4.0 of the <i>Community HASP</i> )
		>2.0 mg/m <sup>3</sup>	Use dust suppression techniques or reevaluate work practices to minimize dust generation	Calculated based upon quantitative risk assessment (see Section 4.0 of the <i>Community HASP</i> )

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Lower Fox River (OUs 2-5)  
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Table 6-2  
Frequency and Location of Air Monitoring**

Activity	Air Monitoring Instrument	Frequency and Location
Background readings	MiniRAM or equivalent	Two weeks prior to mobilization and a minimum of twice per day when tasks covered by this plan are performed (e.g., at the beginning and end of work activities); taken upwind and down wind from the site of activity, at the area of activity, and in the worker breathing zone.
Activities which may generate dust (i.e., earthwork)	MiniRAM or equivalent	<p>In the breathing zone, initially at a minimum, every hour. The frequency may decrease to every 2 hour if results are consistent after the first week of operations.</p> <p>If readings are measured at a level of <math>&gt;2.5 \text{ mg/m}^3</math>, take an additional reading and document the measurement. Continue to take readings. Document the measurement every 15 minutes. If readings stay above <math>2.5 \text{ mg/m}^3</math>, use dust suppression techniques.</p>
Activities which may generate PCB-contaminated dust (i.e., dewatering activities and T&D)	MiniRAM or equivalent	<p>In the breathing zone, initially at a minimum, every 30 minutes. The frequency may decrease to every 1 hour if results are consistent after the first few weeks of operations.</p> <p>If readings are measured at a level of <math>&gt;2.0 \text{ mg/m}^3</math>, take an additional reading and document the measurement. Continue to take readings. Document the measurement every 15 minutes. If readings stay above <math>2.0 \text{ mg/m}^3</math>, use dust suppression techniques or reevaluate work practices to minimize dust generation.</p>

### **6.4.3 Data Review**

The ESS will interpret all monitoring data based on action levels listed in Tables 6-1 and 6-2 of and his/her professional judgment. The ESS shall review the data with the PESM to evaluate the potential for worker exposure and upgrades/downgrades in PPE. The previous days monitoring results will be discussed with all site personnel at the tailgate safety meeting prior to commencing work activities for that day.

### **6.5 DUST CONTROL PLAN**

Dust levels for this project should be kept to below the respirable dust action levels. If fugitive dust levels exceed these requirements, the following dust suppression techniques may be employed to reduce the levels:

- Reduce equipment/vehicle speeds.
- Apply water to traffic areas.
- Apply dust suppressants.
- Cover stockpiles with tarps.

Water used for dust suppression will be clean, non-hazardous, and free of salt, oil, and other deleterious materials. Construction water that has been treated to remove contaminants may also be used for dust control. A dedicated water truck will be used to spray water on travel areas. Enough water should be applied to lower fugitive dust levels, but not so much as to create nuisance conditions (e.g., ponding). Dust suppressants may be added if the CM determines it is necessary in order to reduce fugitive dust levels.

## 7.0 ZONES, PROTECTION, AND COMMUNICATION

### 7.1 SITE ZONE

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It will include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones will be established on the work site when operations begin. A map showing these zones will be developed onsite and posted in the field office. All maps will be posted at the site and used during initial site-specific training.

The majority of this project is a hazardous waste remediation project, and any person working in an area where the potential for exposure to site contaminants exists will only be allowed access after providing the ESS with evidence of proper training and medical documentation.

The zones are based upon current knowledge of proposed site activities. It is possible that the zone configurations may be altered due to work plan revisions. Should this occur, the site zones will be adjusted accordingly, and documented through use of a change request form.

The following will be used for guidance in revising these preliminary zone designations, if necessary.

**Support Zone** – The SZ is an uncontaminated area (trailers, offices, etc.) that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

**Contamination Reduction Zone** – The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools, and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

**Exclusion Zone** – All activities that may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an EZ. For some portions of this project, the EZ may be the area where decontamination activities will occur. This zone will be clearly delineated by cones, tapes, or other means. The ESS may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ will be determined by the site ESS allowing adequate space for the activity to be completed, field members, and emergency equipment. Site personnel and visitors shall sign in and out of the EZ and CRZ daily.

### 7.2 CONTAMINATION CONTROL

Decontamination areas will be established for the following activities.

#### 7.2.1 Personnel Decontamination Station

Personnel hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure of off-site areas to contaminants from the site. The dewatering operations as well

as T&D is the primary activity where the possibility of worker exposure to PCBs exists. A personnel decontamination station will be constructed adjacent to these operations. In addition, a personnel decontamination station will be set up when the potential for contact with PCBs exists. Personnel will wash hands and face after leaving the contamination reduction zone with soap and water or waterless hand cleaner.

### **7.2.2 Minimization of Contact with Contaminants**

During completion of all site activities, personnel should attempt to minimize contact with contaminated materials. This involves a conscientious effort to keep “clean” during site activities. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations. When the potential for contact with PCB contaminated sediments exists, personnel will wear appropriate PPE described in Section 5.0 to minimize if not prevent exposure.

### **7.2.3 Personnel Dry Decontamination Sequence**

When decontamination of Tyvek or poly protective clothing is needed, a dry decon will be used whenever possible.

1. Perform dry decon if contact with contaminants occurred.
2. Employees shall carefully remove all gross contamination and debris from their protective clothing.
3. Remove gloves without touching outside surface of gloves and dispose.
4. Wash hands and face thoroughly.

### **7.2.4 Heavy Equipment Decontamination**

The following procedure will be used by TtEC personnel for the decontamination of equipment that has come in contact with the contaminated sediments:

- Remove gross contamination from equipment by manually scraping, working from top to bottom.
- Remove remaining contamination with a pressure washer/steam cleaner. Decon water should be collected for treatment by the water treatment system.
- Inspect equipment to verify that all visible contaminated material has been removed

Heavy equipment that has come in contact with contaminated sediments will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the ESS or his designee. If heavy equipment has been in contact with contaminated sediments having > 50 ppm PCBs, wipe samples will also be required to verify cleanliness.

## **7.3 COMMUNICATION**

The following communications equipment shall be specified as appropriate:

- Two-way radios are used as appropriate by field teams performing work on the water for communication with the U.S. Coast Guard.
- Telephones – Site personnel will have cell phones for communication with emergency support services/facilities.

- Hand Signals – Hand signals will be used by field teams along with the buddy system. They will be known by the entire field team before operations commence and their use will be covered during site-specific training. Typical hand signals are the following:

**SIGNAL**

Hand gripping throat

Grip on a partner's wrist or placement of both hands around a partner's waist.

Hands on top of head

Hands raised above head

Thumbs up

Thumbs down

**MEANING**

Out of air, can't breathe

Leave the area immediately, no debate.

Need general assistance

Need immediate assistance

Okay, I'm all right, I understand.

No, negative.

## **8.0 MEDICAL SURVEILLANCE PROCEDURES**

All personnel performing fieldwork where potential exposure to contaminants exists are required to have passed a medical surveillance examination in accordance with 29 CFR 1910.120(f).

The TtEC Corporate Medical Surveillance Program is described in detail in EHS 4-5 of the Health and Safety Program. The Corporate Medical Consultant is WorkCare in Anaheim, California. Doctor Greeney may be consulted for injury diagnosis and treatment. He may be reached at 800-455-6155.

### **8.1 MEDICAL SURVEILLANCE REQUIREMENTS**

Proof of a current physician's certification for hazardous waste site work must be provided to the ESS before an individual can work in designated EZs at the site. The certification must be based on a physical examination conducted in accordance with 29 CFR 1910.120 and 29 CFR 1910.134, and signed by the physician. The examination will be repeated annually and upon termination of hazardous waste work. Medical surveillance requirements for individuals performing certain limited on-site tasks where the potential for contaminant exposure does not exist may be waived at the discretion of the PESM and ESS.

Alternative medical monitoring frequencies may be approved by the TtEC CMC for employees whose respirator use is less than 30 days per year. This is consistent with applicable OSHA standards and the TtEC Medical Surveillance Program (EHS 4-5). All medical program certification documents must indicate with a specific statement that the employee is certified to work on hazardous waste sites and wear PPE, and has been evaluated per the requirements of 29 CFR 1910.120 and 29 CFR 1910.134.

Additional medical testing may be required by the PESM in consultation with the CMC and the ESS if an overexposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance. Any personnel not involved with direct cleanup activities at the site will not require medical surveillance.

### **8.2 MEDICAL DATA SHEET**

A medical data sheet is provided in Appendix A. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. It is intended to provide basic information that would be useful to professional medical personnel if medical treatment or transport to emergency medical facilities is required. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

### **8.3 SUBCONTRACTOR MEDICAL SURVEILLANCE AND QUALIFICATIONS**

All subcontractor employers participating in hazardous waste operations or emergency response (or if required by subcontract) will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards.

#### **8.3.1 Hazardous Waste Operations and Emergency Response**

Subcontractor personnel expected to participate in on-site hazardous waste operations or emergency response (or if required by subcontract) are required to have a current medical

qualification for performing this work. Medical qualification shall consist of a qualified physician's written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee's assigned work. **The physician's written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response.** Documentation of employee medical qualification (e.g., physician's written opinion) will be submitted to TtEC. These records must also be maintained at the site by the Subcontractor and made available for inspection by TtEC, the client, or regulatory agencies such as OSHA.

## **9.0 SAFETY CONSIDERATIONS**

### **9.1 GENERAL HEALTH AND SAFETY WORK RULES**

A list of work rules and general safe work practices has been included in this plan from the TtEC Health and Safety Program, EHS 3-6. At a minimum, the work rules and general site work practices will be reviewed with site personnel during their initial site briefing. A copy of the program and work rules / general safe work practices will be present and available for reference by all site personnel for the duration of all on-site activities.

### **9.2 GENERAL CONSTRUCTION HAZARDS**

The following are lists of applicable safety considerations for the major tasks. Further information is provided in the specific AHA in the Site-Specific Health and Safety Plans and the specific TtEC Health and Safety Program sections.

- Injury from working with, or around heavy equipment
- Exposure to site contaminants
- Working on/and around water
- Slips/trips/falls.

### **9.3 HIGH LOSS POTENTIAL HAZARDS**

The following activities projected to be conducted at this job site are those deemed to present the greatest “high loss potential” hazards:

- Injury from working with, or around heavy equipment
- Exposure to site contaminants
- Working on/and around water
- Slips/trips/falls.

The basic hazards posed by these operations and the control measures to reduce or eliminate the hazards are described in the AHAs in Appendix C of the Site-Specific Health and Safety Plans.

## **10.0 EMERGENCY RESPONSE AND CONTINGENCY PLAN**

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff are essential. Specific elements of emergency support procedures are addressed and include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, accident/incident reporting, and emergency site evacuation procedures.

### **10.1 RESPONSIBILITIES**

#### **10.1.1 Project Environmental and Safety Manager (PESM)**

The PESM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The PESM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

#### **10.1.2 Environmental and Safety Supervisor (ESS)/Emergency Coordinator (EC)**

The EC shall make contact with Emergency Response personnel prior to beginning work onsite. In these contacts the EC will inform them about the nature and duration of work expected on the site and possible health or safety effects of emergencies. EC shall telephone 911 to report any emergency occurrence (personal injury, environmental spill, etc.) and identify hospital routes prior to beginning work on site. The EC shall make necessary arrangements to be prepared for any emergencies that could occur. The EC shall implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

The ESS is required to immediately notify the PESM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the PESM can notify OSHA within the required time frame. The PESM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of \$500 within 24 hours.

#### **10.1.3 Construction Manager (CM)**

The CM is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The CM also serves as the alternate Emergency Coordinator.

#### **10.1.4 Site Personnel**

The contents and requirements of the project-specific Emergency Response/Contingency Plan will be reviewed, at a minimum, with all on-site personnel during their initial briefing and during daily briefings as necessary. Site personnel are responsible for knowing how to initiate emergency response actions and their respective responsibilities in the event the Emergency Response/Contingency Plan must be implemented. Personnel are expected to notify the EC of situations that could constitute a site emergency or result in the occurrence of a site emergency.

## **10.2 COMMUNICATION**

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

### **10.2.1 Cell Phone/Radio Communication**

Cell phones and radios will be the primary sources of communication in the field. The locations of cell phones will be with supervising personnel. Site radios will also be used by field personnel for communication. VHF radios will be used for communication with the U.S. Coast Guard.

### **10.2.2 Hand Signals**

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 7.3, Communication.

### **10.2.3 Audio Signals**

Audio signals will be utilized in the event of an emergency or a need to evacuate the site. Three bursts will be sounded on an air horn or vehicle horn to obtain the attention of site personnel. Site personnel should then follow the procedures listed in Section 10.8, Emergency Site Evacuation Route and Procedures.

## **10.3 LOCAL EMERGENCY SUPPORT UNITS**

In order to be able to deal with any emergency that might occur during activities at the site, an emergency telephone number list (Tables 10-1 and 10-2) will be posted in the field office and placed in all on-site vehicles. Since the Lower Fox River site covers a large area, several hospitals and WorkCare facilities have been identified for use during site activities. Hospital location maps are provided in Appendix F for non-emergency trips to the hospital. The WorkCare facilities that can be used for non-emergency treatment is also listed in Table 10-1 and the location map is provided in Appendix F. Specific directions for each facility could not be developed since the workers will not be working in one location. TtEC personnel will identify and drive the routes to the hospitals and WorkCare facilities to verify the directions are correct and easy to follow. For procedures to follow in the event of an injured worker, refer to ZIP Bulletin No. 108 – Injured Worker Case Management (Appendix F) and Section 10.7. Contact WorkCare as soon as possible.

## **10.4 PRE-EMERGENCY PLANNING**

TtEC will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat the injured individual(s). TtEC personnel will make a site visit to the clinic and discuss treatment options with the physician. Instructions for finding the hospital and emergency phone numbers will be posted conspicuously in the site office and in each site vehicle. TtEC will also communicate directly with the local fire departments to determine whether they have the facilities and personnel needed to respond to a fire or hazardous material spill during project activities.

<b>Site Health and Safety Plan</b> <b>Volume I</b> <b>Lower Fox River (OUs 2 through 5)</b> <b>Table 10-1</b> <b>Emergency (and Non-Emergency) Telephone Numbers</b>				
EMERGENCY CONTACT	LOCATION	PHONE NUMBER	OUs	NOTIFIED
<b>HOSPITALS</b>				
Bellin Hospital	744 S. Webster Avenue Green Bay, WI 54301	911 or 920-433-3500	2,3,4,5	
St. Vincent Hospital	835 S. Van Buren Street Green Bay, WI 54301	911 or 920-433-0111	3,4,5	
<b>WorkCare Facilities</b>				
Theda Care at Work Contact: Mary Schrader or Cheryl Marx	2009 Memorial Drive Appleton, WI 54915	920-380-4999	2,3	
Prevea Workmed Voyager Contact: Debbie	3021 Voyager Drive Green Bay, WI 54311	920-496-4760	3,4,5	
<b>Fire Department/EMS</b>				
Green Bay Fire Department	501 S. Washington Street Green Bay, WI 54301	911 or 920-448-3280	3,4,5	
Ashwaubenon Fire and Rescue	2155 Holmgren Way Green Bay, WI 54304	911 or 920-492-2312	3,4,5	
De Pere Fire/EMS	400 Lewis Street De Pere, WI 54115	911 or 920-339-4087	2,3	
Wrightstown Fire Department	961 Broadway Street Wrightstown, WI 54180	911 or 920-532-4556	2,3	
Kaukauna Fire Department	206 West 3 <sup>rd</sup> Street Kaukauna, WI 54130	911 or 920-766-6320	2	
Kimberly Fire Department	515 W. Kimberly Avenue Kimberly, WI 54136	911 or 920-788-9805	2	
<b>Police</b>				
Brown County Sheriff's Department	300 East Walnut Street Green Bay, WI 54301	911 or 920-448-4219	2,3,4,5	
Green Bay Police Department	307 South Adams Street Green Bay, WI 54301	911 or 920-448-3200	2,3,4,5	
<b>U.S. Coast Guard</b>				
Station Green Bay	P.O. Box 8486 Green Bay, WI 54308	920-435-7042 VHF Radio Channel 16 for distress calls	2,3,4,5	
<b>Poison Control Center</b>				
Poison Control Center		800-222-1222		
<b>Hazardous Materials Spill Response Units</b>				
<b>Fire Department/EMS</b>				
Appleton Fire Department	700 N Drew St Appleton, WI 54911	911 or 920-832-5813	2	
Green Bay Fire Department	501 S. Washington Street Green Bay, WI 54301	911 or 920-448-3280	3,4,5	
Ashwaubenon Fire and Rescue	2155 Holmgren Way Green Bay, WI 54304	911 or 920-492-2312	3,4,5	

<b>Site Health and Safety Plan</b>				
<b>Volume I</b>				
<b>Lower Fox River (OUs 2 through 5)</b>				
<b>Table 10-1</b>				
<b>Emergency (and Non-Emergency) Telephone Numbers</b>				
<b>EMERGENCY CONTACT</b>	<b>LOCATION</b>	<b>PHONE NUMBER</b>	<b>OUs</b>	<b>NOTIFIED</b>
De Pere Fire/EMS	400 Lewis Street De Pere, WI 54115	911 or 920-339-4087	2,3	
Wrightstown Fire Department	961 Broadway Street Wrightstown, WI 54180	911 or 920-532-4556	2,3	
Kaukauna Fire Department	206 West 3 <sup>rd</sup> Street Kaukauna, WI 54130	911 or 920-766-6320	2	
Kimberly Fire Department	515 W. Kimberly Avenue Kimberly, WI 54136	911 or 920-788-9805	2	
CHEMTREC <sup>1</sup> Chemical Transportation Emergency Center	1300 Wilson Boulevard Arlington, VA 22209	800-424-9300 (703-741-5525)		
National Response Center <sup>2</sup>	United States Coast Guard (G-OPF) 2100 2 <sup>nd</sup> Street, Southwest – Room 2611 Washington, DC 20593-0001 USA	800-424-8802 (202-267-2675)		

Notes:

- CHEMTREC® (Chemical Transportation Emergency Center) is a public service of the Chemical Manufacturers Association. However, CHEMTREC is not intended nor equipped to function as a general information source.
  - CHEMTREC® DEALS ONLY WITH CHEMICAL TRANSPORTATION EMERGENCIES!
  - In the event of chemical transportation emergency, CHEMTREC® provides immediate advice for those at the scene of emergencies, then promptly contacts the shipper of the chemicals for more detailed assistance and appropriate follow-up.
  - OPERATES AROUND THE CLOCK – 24 HOURS A DAY, 7 DAYS A WEEK TO RECEIVE EMERGENCY CALLS. IN CASE OF CHEMICAL TRANSPORTATION EMERGENCIES, CALL ONE OF THE FOLLOWING NUMBERS:
    - Continental United States: (800) 424-9300 direct dial, toll free (WATS) number
    - Outside of Continental USA: (703) 527-3887 (This number may be called collect)
  - CHEMTREC® provides hazard information warnings and guidance when given the NAME OF THE PRODUCT and the NATURE OF THE PROBLEM. For more detailed assistance, provide the following information:
  - Name of caller and call-back number; Location of problem; Shipper or manufacturer; Container type; Rail car or truck number; Carrier name; Consignee; Local conditions.
- The National Response Center (NRC) maintains a 24 hours per day, 7 days a week, 365 days a year Operation Center where all information is received via the toll-free number, entered directly into an on-line data base system, and electronically disseminated as part of the National Response System. Once contacted, the NRC Duty Officer will guide the caller through a detailed series of questions based on the Standard Report Form to gather as much information as possible concerning the spill or release. The information is immediately entered into the Incident Reporting Information System (IRIS) and based on several pre-established criteria including material involved, mode of transportation, injuries, damage, and fatalities, select federal agency notification will take place within 15 minutes of receipt. When any of the following incidents occur, the NRC should immediately be contacted by the responsible party via the toll free number. If you see or discover and oil spill or release of chemicals and are NOT the responsible party, you should contact the NRC with whatever information you have.

**Chemical Releases**

The Comprehensive Environmental Response, Compensation, and Liability Act requires that all releases of hazardous substances exceeding reportable quantities be reported by the responsible party to the National Response Center. Title 40 of the Code of Federal Regulations Part 302 promulgates reportable quantities and reporting criteria. All the Extremely Hazardous Chemicals (EHC) that overlaps with the CERCLA listed chemicals table (40CFR Part 302.4) should be reported to NRC.

**Other Releases**

Discharges from a hazardous waste treatment or storage facility must be reported by the emergency coordinator at the facility. Abandoned dump or waste sites should be reported by anyone having knowledge of such a site.

<b>Site Health and Safety Plan Core Requirements Lower Fox River (OUs 2 through 5) Table 10-2 Site Contact Numbers</b>	
<b>CONTACT</b>	<b>PHONE NUMBER</b>
Project Manager– Ray Mangrum	C (713) 876-8528
CM – Mike Estess	C (803) 646-0938
PESM – Grey Coppi	(973) 630-8101      C (215) 327-0751
Phil Bartley (Director, EHS Services, TtEC)	(509) 372-5818      C (509) 521-4898
Medical Consultant (Dr. Greeney)	(800) 455-6155
ESS/EC – Bill Welch	C (330) 208-5630
Regulatory Specialist – Lee Dixon	(617) 457-8258

## 10.5 EMERGENCY DRILLS

### 10.5.1 General Site Emergencies

A general site emergency drill will be conducted during the first two weeks of site activities to test the site emergency systems. In addition or as part of the general site emergency drill, if work is being performed on water, an onboard fire drill should be performed.

The drill(s) will simulate emergency situations and evacuation scenarios that might occur onsite, and may include a mock spill responses and cleanup. Local outside emergency responders may participate.

A critique of the drill(s) according to TtEC Procedure EHS 2-1 will be conducted.

### 10.5.2 Marine Emergencies

A person overboard or rescue drills will be conducted during the first two weeks of site activities. This would involve locations on the water and immediately adjacent to water, such as piers, docks, and bulkheads.

On all vessels that have a regular crew, or on which people are quartered, the following drills will be held at least once (unless the vessel is required, under U.S. Coast Guard regulations, to be drilled more frequently): abandon ship/boat drills, fire drills, and person overboard or rescue drills.

Drills will include, where appropriate, how to handle a dewatering pump or pipe rupture, or failure within the hull (proper shutdown procedures, system containment, etc.) and how to handle leaks or failures of the hull or portions of it (what compartments to secure, how to handle power losses, pulling spuds to move to shallow water, etc.).

Emergency lighting and power systems will be operated and inspected weekly to ensure proper operation. Internal combustion engine driven emergency generators will be operated under load for at least a 2-hour check during this project. Storage batteries for emergency lighting and power systems will be tested at least once during this project.

Marine drills will also be critiqued, which will include any deficiencies noted and the associated corrective actions taken.

## 10.6 EMERGENCY MEDICAL TREATMENT

The procedures and rules in this SHSP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the ESS immediately. The first-aid equipment will be available on site at the following locations:

First Aid Kit with Inventory Sheet:	Support Zone/Field Team Vehicle
Automatic Electronic Defibrillator:	Support Zone
ANSI Approved Emergency Eye Wash:	Support Zone/ Field Team Vehicle

At a minimum, two first aid/CPR trained persons will be assigned to each shift. During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

When personnel are transported to the hospital, the ESS will provide a copy of the Medical Data Sheet to the paramedics and treating physician.

Only in **non-emergency** situations will an injured person be transported to the hospital by means other than an ambulance.

## 10.7 EMERGENCY AND NON-EMERGENCY RESPONSE

### 10.7.1 Emergency Response

Some physical signs/symptoms that require emergency medical treatment and a call to 911 include chest pain, difficulty breathing, uncontrolled bleeding, bone fracture, loss of consciousness, severe head injury, poisoning, shock, loss of limb, and sudden and prolonged dizziness. In an emergency situation:

Call 911 for initial employee evaluation and transport to the hospital. A designated TtEC employee shall accompany the injured worker to the hospital.

Administer first aid to minimize the injury effects.

Call WorkCare at 1-800-455-6155 for a triage call/discussion with an Occupational Health Nurse or physician. Mention ASAP that the call is regarding an emergency injury. The Occupational Health Nurse will assist the supervisor to determine the best treatment plan.

Provide the following information to WorkCare:

- Name of Supervisor calling
- Phone number
- Location calling fro.
- Name of individual injured and social security number
- Date and type of injury

During WorkCare off-hours, dial the 800 number and identify yourself. A WorkCare health care representative will call you back shortly. Do not delay treatment while awaiting a return phone call.

Call the PESM, Project Manager, and client.

### **10.7.2 Serious Injury to Personnel on the Water**

A significant amount of work at the site is performed on or from watercraft, and it is possible that an employee may become sick or injured while located on a watercraft in the harbor. In the event that an employee becomes disabled while on a vessel, then the following procedures should be followed:

Call 911 (if cell phones work) otherwise contact the U.S. Coast Guard (Distress Channel 16 – VHF Radio) for initial employee evaluation and transport to the hospital. A designated TtEC employee shall accompany the injured worker to the hospital.

**IMPORTANT:** The logistics of the rescue must be communicated to the emergency responders.

If the watercraft on which the person is located can maneuver to a shoreline rendezvous point, then the location must be provided to the emergency responders. Shoreline meeting point locations to be used in emergencies must be planned in advance by project management personnel, as they may vary depending on the location of work. Each preset location will be visited prior to the beginning of activities to verify the appropriateness of the location.

If the injured employee cannot be transported on the watercraft where the incident occurred, or in the case of an immobile watercraft the employee can be transferred (if injuries allow) to another boat, then the employee should be transported to the pre-determined meeting point to rendezvous with the emergency responders.

If, in the judgment of the first aid/CPR competent person, the injured individual cannot be moved, the emergency responders will be transported by a site boat to the scene of the incident. If necessary, CPR and first aid will be administered while awaiting the arrival of the emergency response personnel.

Supervisory personnel will meet EMS personnel at the rendezvous point and direct them to the injured party. The rendezvous point should be coordinated with EMS during the initial mobilization activities.

The EMS personnel will evaluate the patient's condition.

If the condition of the patient is immediately life-threatening and waiting for the arrival of the emergency responders is not possible, then the project personnel will take the injured employee from the watercraft, transfer him/her to the workboat, and transport to shore. The project personnel will then rendezvous with EMS personnel at the on-shore location.

The site boat or other watercraft used in a rescue will be secured to the barge or other vessel prior to the removal of and placement of the injured person into the rescue boat.

### **10.7.3 Person in Water (Overboard)**

When working on vessels or near water, the possibility exists that a person could fall from the vessel or other location adjacent to water. Since no work on water is to be conducted by one person alone, there will typically be another person to act in the event of an overboard incident.

If there is occasion where a single person is working on, over, or adjacent to water, then the person must be equipped with a means of communication with another party (buddy system). Regular well-being checks should be made using this communication method. If a person does go overboard from a vessel or otherwise falls into a water body, then the following applies.

**10.7.3.1 Small Watercraft (on boats, skiffs, etc.)**

If a person goes overboard, yell “Man Overboard” and what side the person fell off, immediately stop the motor and throw the life ring (Type IV PFD) to the person. If the boat has traveled too far from the person, maneuver the boat closer before throwing the ring. The motor must be in neutral when person in the water is alongside the boat.

Instruct the person to hold the ring, and slowly bring the person to the side of the boat. Depending on the boat size and configuration, the person may be able to climb back into the boat with assistance. For smaller boats like johnboats, it is almost impossible to bring someone onboard without capsizing the boat. In this case have person hang onto boat and carefully maneuver the boat to the nearest shore.

If the person cannot get into the boat because of the boat limitations, injuries, or unconsciousness, then have the person stay with the boat, or have personnel hold that person alongside the boat until shoreline is reached or assistance arrives.

Notify other site vessels and emergency responders and the Coast Guard by VHF radio (if appropriate) and await assistance.

**10.7.3.2 Large Watercraft (barges, dredges, ships)**

If a person goes overboard, yell “Man Overboard” and the side the person fell off and immediately throw him/her a life ring (Type IV PFD).

Give the order to stop all engines.

Notify the captain or crewmember in charge and the land-based EC.

With assistance, use the rescue or lifesaving skiff to reach the person.

If the skiff is suitably configured, and assistance is available, the person may be able to be brought onto the skiff.

If the person cannot get into the boat because of the boat limitations, injuries, or unconsciousness, then have the person stay with the boat, or hold the person alongside so he/she does not drift away.

On large vessels so equipped, the person may be able to be winched back onto the vessel after a line and sling have been placed around and under their arms.

Await assistance.

**10.7.3.3 Land-Based Areas**

If a person goes into the water, yell “Man Overboard” and location where the person went overboard and throw him/her a life ring (Type IV PFD).

Notify the EC.

Depending on the configuration of the area, the person may, with the assistance of the life ring and line, be able to come to the shoreline and exit the water.

If the person cannot exit the water, with assistance, use the lifesaving skiff to reach the person.

Instruct the person to hold the ring, and slowly bring the person to the side of the skiff. Depending on the skiff size and configuration, the person may be able to climb into the skiff with assistance.

If the person cannot get into the skiff because of the skiff's limitations, injuries, or unconsciousness, then have the person stay with the boat, or hold them alongside so they do not drift away.

Await assistance.

#### **10.7.4 Non-Emergency Response**

In a non-emergency situation:

- Administer first aid to minimize the injury effects.
- Call WorkCare at 1-800-455-6155 for a triage call/discussion with an Occupational Health Nurse or physician. Mention ASAP that the call is regarding an injury. The Occupational Health Nurse will assist the supervisor to determine the best treatment plan.
- Provide the following information to WorkCare:
  - Name of Supervisor calling
  - Phone Number
  - Location calling from
  - Name of individual injured and social security number
  - Date and type of injury
- During WorkCare off-hours, dial the 800 number and identify yourself. A WorkCare health care representative will call you back shortly. Do not delay treatment while awaiting a return phone call.
- Call the PESM, Project Manager, and Client.
- Call the local WorkCare clinic (see Table 10-1) to notify them that you are bringing an injured worker to their clinic for evaluation.

You may transport the injured employee to the local clinic in a privately owned vehicle. A designated TtEC employee must accompany the injured worker to the local clinic.

#### **10.7.5 After Emergency and Non-emergency Treatment**

After emergency and non-emergency treatment:

- Obtain treatment and medical release records for the injured worker and forward to WorkCare.
- Contact TtEC worker's compensation carrier (ESIS at 1-866-615-5923) within 24 hours of injury.

- Seek ways to ensure the worker can work, including alternate work.
- Regularly follow up with WorkCare and ESIS case representatives.

### **10.8 EMERGENCY SITE EVACUATION ROUTES AND PROCEDURES**

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the EC also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including, but not limited to, fire or explosion, an air horn will be sounded on the site. The horn will sound for three blasts, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the designated rally point, which shall be determined upon arrival at the site.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the EC will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. Evacuation routes, meeting places, and location of emergency equipment and first aid supplies shall be discussed during the site-specific briefing.

### **10.9 FIRE PREVENTION AND PROTECTION**

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification to the local fire department. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- Smoking will be allowed only in designated areas appointed by CM.
- No hot work without a properly executed hot work permit.
- Shutting off engines to refuel.

- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers, and near all hot work activities.
- Monthly inspections of all fire extinguishers.
- Daily inspections of vessel fuel tanks and lines, and engines.

#### 10.10 CHEMICAL EXPOSURE

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the MSDS or recommended by the Corporate Medical Consultant will be followed, when necessary. Call 911 if required.

SKIN AND EYE CONTACT:	Use copious amounts of water. Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids, or hydrogen peroxide occurs.
INHALATION:	Move to fresh air. Decontaminate and transport to hospital or local medical provider.
INGESTION:	Decontaminate and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION:	Decontaminate and transport to emergency medical facility.

#### 10.11 ACCIDENT/INCIDENT REPORTING

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

1. Ray Mangrum, Project Manager (713) 876-8528.
2. Grey Coppi, CIH (973) 630-8101
3. Bill Welch, ESS (330) 208-5630
4. The employer of any injured worker who is not a TtEC employee

Incident reporting needs to occur to TtEC immediately to assure that any injury is properly managed. Written confirmation of verbal reports is to be submitted within 24 hours. The accident/incident report is found in the TtEC Corporate Health and Safety Program Section EHS 1-7. This report will be done by the employee(s) involved in the incident and the ESS, Construction Manager, or Project Manager. If the employee(s) involved is not a TtEC employee, his employer shall receive a copy of the report. Any major waterborne incident will be reported to the U.S. Coast Guard as well.

#### 10.12 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the ESS or designee will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries
- Potential for cold stress and cold-related injuries

- Treacherous weather-related working conditions (hail, rain, lightning, snow, ice, or high winds)
- Rough seas
- Limited visibility (fog)
- Potential for electrical storms
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided and acceptable weather conditions prevail. The ESS will determine the need to cease field operations, if necessary, in case of severe inclement weather conditions.

All subcontractors must work closely with site management in order to ensure that pre-planning for, and response to, severe weather conditions are adequate.

A detailed weather forecast will be obtained by the ESS for the area for the current and following day's weather forecast to determine the impending weather. The weather forecasts will be discussed at each morning's health and safety briefing.

#### **10.12.1 Thunder Storms, Squalls, and Short Duration Wind Storms**

The following actions should be taken to secure the site whenever there is a threatening storm that includes lightning or the chance of winds over 45 miles per hour:

- Secure all loose materials, supplies, and equipment.
- Employees working in high wind conditions must be protected from airborne contaminants and flying debris using engineering controls such as wetting of dry soil to prevent particle dispersion and securing all loose objects.
- Stop all work and bring all workers indoors when lightning is within view of the site. Work will not commence until 30 minutes after last sighting of the lightning.
- Reach equipment work will stop and be lowered and secured.
- In the event that lightning is encountered in the area, work will stop and the crew will follow the established procedure for taking shelter. The increased hazard of transporting crew members over water in small boats in these conditions will be addressed by having the crew sheltered on the spudded down, floating barge until the danger has passed. Evacuation of the crew from the floating plant will be at the discretion of the ESS and Construction Manager.
- Shut down and disconnect all electrical equipment in an orderly manner. The purpose is to protect the equipment from electrical surges and abrupt power loss.
- Anchor barges and other immovable watercraft with anchor and spuds. Evacuate barge and take shelter from the storm on shore. All other watercraft will return to shoreline locations.

#### **10.12.2 Special Marine Considerations**

Pre-planning and response to extreme weather conditions in a marine environment, especially for vessel operations, is very dependent on the specific operations being conducted and the particular

equipment involved. Therefore, in addition to the information in the above sections, there are additional severe weather elements, which must be considered for marine operations.

Special extreme weather considerations for marine activities are discussed below.

#### **10.12.2.1 High Winds**

Of particular concern during periods of high winds is: 1) the limited communications between persons on vessels to others via the two-way radios; and 2) the potential of strong winds knocking persons on small craft, rafts, and barges over. Sustained wind speeds of 20 knots will initiate the start of the appropriate precautions for suspending operations due to high winds. Should gale force winds (34–47 knots or 39–54 mph) be announced over the marine radio, all operations will cease work a minimum of 1 hour before the storm arrives, depending upon the work being performed.

Safety procedures for high-risk equipment (i.e., cranes, derricks, or barges) which may need special attention or which may be impacted by lower wind speeds should be established during mobilization activities and communicated to field personnel. All equipment will be lashed to the deck or placed in the storage area, all unnecessary boats and barges will be docked at a marina or removed from the water, and all personnel will be transported to shore. All rafts and johnboats will be removed from the water prior to gale force wind conditions. The watercraft must be equipped with sufficient weight trip anchors, and each anchor must have sufficient chain and line for anchoring. At a minimum, when mooring, one anchor will be put down for windy conditions. Should vessel captains or the ESS determine that additional anchoring/spudding/securing of the boats is needed, additional trip anchors/spuds or lines will be used. Some conditions may require a three-point anchoring system or a minimum of three spuds to secure the watercraft. If this requirement cannot be met, then the watercraft must be pulled from the water.

Should it be determined by the onboard personnel and the captain that the weather conditions being encountered on the watercraft are dangerous and are worsening, all operations will cease, all equipment will be lashed to the deck or placed in the storage area, and all personnel will be transported to shore.

Additionally, when operations are conducted to secure watercraft and other vessels for protection against weather events such as high winds, high tides, hurricanes, etc, a meeting will occur with all responsible parties to discuss proper docking and securing procedures. Provisions and assignments for monitoring the integrity of the secured/docked watercraft at regular intervals, including weekends and nights during the event, must be specified and approved by TtEC.

#### **10.12.2.2 Heavy Downpours and Snow Squalls**

In the event heavy downpours (where visibility is obscured) or snow squalls are forecasted or encountered, all operations will be suspended until the heavy rains or snow squalls end. Personnel may remain on the watercraft during heavy rain or snow squall events only when leaving poses greater danger. The watercraft will be left in place, secured by anchors. Should it be determined by the TtEC personnel and the captain that the weather conditions being encountered on the watercraft are dangerous and are worsening, all operations will cease, all equipment will be lashed to the deck or placed in the storage area, and all personnel will be transported to shore.

### **10.12.2.3 Snow, Ice, Hail**

In the event snow, ice, or hail is forecasted or encountered, work may continue after the watercraft(s) are cleared of ice and accumulated snow as needed. Ample amounts of sand and salt will be available and applied to the deck surfaces as needed. Should it be determined by the TtEC personnel onboard and the captain that the weather conditions being experienced on the watercraft are dangerous and are worsening, all operations will cease, all equipment will be lashed to the deck or placed in the storage area, and all personnel will be transported to shore.

### **10.12.2.4 Thunderstorms**

In the event a thunderstorm is forecasted, the ESS, or designee, will monitor the activity on the NWS local Doppler radar. Additionally, all site personnel will keep an “eye to the sky,” observing conditions. Operations will cease when it is determined that thunderstorm cells are within 5 miles of the site, based on NWS Doppler radar, or if lightning is observed from any location. All equipment will be lashed to the deck or placed in the storage area and all personnel will be transported to shore. Operations will be allowed to continue 30 minutes after the last lightning is observed, unless NWS local Doppler radar shows other storms approaching.

### **10.12.2.5 General**

- All vessels and personnel will maintain radio and cellular telephone communications/contact with the field office. Radio communication/contact will occur via the site marine radios. The channels to be used must be coordinated in advance.
- NOAA weather forecasts will be monitored daily by TtEC and subcontractor personnel for predicted inclement weather. Local weather forecasts will be discussed at the daily health and safety meeting.
- All personnel shall be aware of the forecast and keep an “eye to the sky.” Unpredicted storms may also occur without warning. The ESS will also monitor NWS Local Doppler radar as required, and vessel captains will monitor marine forecasts on the NWS radio frequencies.
- Work will be suspended when a sustained wind of 26 knots or 30 mph is encountered or in the event of gale-force winds (34–47 knots or 39–54 mph), per the ESS or Construction Manager.
- Use of any 12- to 16-foot aluminum-hulled tender boat during small craft advisories or greater warnings (18–33 knots or 20–38 mph) will not be allowed.

## **10.13 SPILL CONTROL AND RESPONSE**

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust, or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed of. An exclusion zone of 50–100 feet around the spill area should be established depending on the size of the spill.

The following steps should be taken by the Emergency Coordinator:

- Determine the nature, identity, and amounts of major spill components.
- Make sure all unnecessary persons are removed from the spill area.
- Notify the appropriate site response team and the PM and PESM. See Tables 10-1 and 10-2.
- Use proper PPE in consultation with the ESS.
- If a flammable liquid, gas, or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.).
- If possible, try to stop the leak with appropriate material.
- Remove all surrounding materials that can react or compound with the spill.
- Protect storm drains and sewer manholes by surrounding them with sorbent materials or berms.
- Attempt to divert spilled liquids from entering streams, surface waters, or drainage ditches using berms or sorbent materials.

Lee Dixon, CHMM, CPEA – Regulatory Specialist (617-457-8258) may be contacted for spill reporting information and assistance.

### **10.13.1 Notification Requirements**

If an on-site release requires notifications to state and federal regulatory agencies, the TtEC PM in coordination with the PESM will be responsible for making the notification. Table 10-3 presents the regulatory notification requirements and contact information in the event of release. In addition to the agency notification requirements in Table 10-3, if a notification is made there are additional reporting requirements that must be made. Coordinate with Lee Dixon and the PESM to meet these requirements.

**Site Health and Safety Plan  
Core Requirements  
Lower Fox River (OUs 2 through 5)**

**Table 10-3  
Release Notification Requirements and Contact Information**

<b>Contact</b>	<b>Phone Number</b>	<b>Time Frame</b>	<b>Release Notification Requirement</b>
National Response Center	1-800-424-8802	As soon as possible, but no later than 12 hours	<p>Transportation –related (including loading/unloading, and temporary storage) incidents involving hazardous materials (including hazardous wastes)</p> <ul style="list-style-type: none"> <li>• Hazardous Materials are listed under 49 CFR 172.101</li> <li>• As a direct result of hazardous material:                             <ul style="list-style-type: none"> <li>○ A person is killed,</li> <li>○ A person receives an injury requiring admittance to a hospital.</li> <li>○ The general public is evacuated for 1 hour or more;</li> <li>○ A major transportation artery or facility is closed or shut down for 1 hour or more</li> <li>○ The operational flight pattern or routine of an aircraft is altered.</li> </ul> </li> <li>• There has been a release of a marine pollutant in a quantity exceeding 119 gallons for liquids or 882 lbs. for solids</li> <li>• Release of a hazardous substance equal to exceeding the reportable quantity (see 40 CFR 302 – Table 302.4)</li> </ul>
National Response Center (or if direct notification to the NRC is not practical, reports can be made to the Coast Guard)	NRC: 1-800-424-8802  Coast Guard District 9: 216-902-6073	As soon as there is knowledge of the spill.	<p>Report oil spills into or upon the navigable waters of the United States or adjoining shorelines. Reportable discharges of oil include quantities that:</p> <ul style="list-style-type: none"> <li>• Violate applicable water quality standards</li> <li>• <u>Cause a film or sheen upon or discoloration of the surface of the water</u> or adjoining shorelines</li> <li>• Cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.</li> </ul>
EPA Regional Office Region V	77 West Jackson Blvd Chicago, IL 60604 312-353-2000	Immediate reporting	<ul style="list-style-type: none"> <li>• Spills of 10 pounds or more by weight of <u>PCBs (any concentration greater than 50 ppm)</u></li> <li>• Spills of 1 pound or more by weight of PCBs (i.e., Total volume spilled times concentration <math>\geq</math> 1 pound) are also reportable to the National Response Center.</li> </ul>
Wisconsin Emergency Management	1-800-943-0003	Immediate reporting	<p><u>All</u> discharges to the environment of a hazardous substance (including petroleum products such as diesel, gasoline, oil) <i>except</i> the following:</p> <ul style="list-style-type: none"> <li>• A discharge of gasoline or another petroleum product that is completely contained on an impervious surface.</li> <li>• A discharge of gasoline if &lt; 1 gallon is discharged onto a surface that is not impervious or runs off an impervious surface.</li> <li>• A discharge of a petroleum product other than gasoline if &lt; 5 gallons is discharged onto a surface that is not impervious or runs off an impervious surface.</li> <li>• A discharge of hazardous substances (e.g., PCBs) specifically listed in 40 CFR part 117 or 302 if the amount discharged in any 24 hour period is less than the RQ listed in 40 CFR part 117 or 302 (e.g., RQ for PCBs = 1 pound).</li> </ul>

### 10.13.2 Minor Spill Less than RQ

#### On Vessels:

- Contain the spill on the vessel and clean up with absorbents or absorbent pillows in order to prevent the spill from reaching the water. The EC will follow the notification procedures outlined above.

#### In the Water:

- Contain and cleanup the spill with an absorbent boom, absorbent pillows, or pads. The EC will follow the notification procedures outlined above.
- Note that an appearance of a “sheen” on the water surface from a release of oil or hazardous material constitutes an RQ (i.e., requires agency notification) in Wisconsin and to the NRC under federal requirements, regardless of the actual quantity of oil or hazardous material released.

#### On Land:

- Prevent the spill from reaching the water or storm drains using an earthen berm or other barrier in order to prevent the spill from reaching the water. Remediate spill area according to state and federal regulations. The EC will follow the notification procedures outlined above.

### 10.13.3 Large Spills Above the RQ

- Contain spill to the smallest area possible using booms, berms, or any other effective barrier. The EC will follow the notification procedures outlined above.
- In the event that additional emergency cleanup help is needed, TtEC will request assistance from off-site response contractors.
- TtEC will collect all material discharged including contaminated booms and absorbent materials. All residue discharged will be disposed of in accordance with all applicable waste federal and state regulations.
- All emergency equipment will be decontaminated prior to being placed back into routine service.
- Contaminated decontamination water, waste solutions, or residues generated from decontaminating the equipment will be collected and disposed of in compliance with all applicable state and federal regulations.
- TtEC will keep all records related to the spill of hazardous waste for a period of at least 3 years after the spill has been cleaned up or for longer periods of time, if required as part of any unresolved enforcement action.

## 10.14 UNDERGROUND UTILITIES

Underground utilities present a variety of hazards whenever intrusive activities are conducted. The possibility of the existence of underground utilities must be evaluated as early as possible in the planning phase of any intrusive activity. The requirements for conducting intrusive activities

relative to underground utilities are outlined in TtEC Procedure EHS 3-15, Underground Utilities. This procedure covers means for underground utility identification, location, protection, and avoidance, as well as emergency response procedures.

In the event that encountering or contacting an underground utility occurs, it is imperative that the appropriate actions are taken to minimize damage to the utility, prevent personal injury, and minimize indirect effects. Response measures to be followed in the event of underground utility contact/near contact are outlined below.

#### **10.14.1 Encountering Underground Utilities**

It is possible that underground utilities will be encountered in locations that have previously been “cleared” of having underground utilities by the locating service, or are found outside of the area which has been marked as having underground utilities. In either case, if this occurs, the following applies:

- Intrusive activities must be stopped immediately.
- The One-Call agency (i.e., Wisconsin One-Call (811, 800-242-8511, 414-259-1181, or emergency only 877-500-9592) or private location service must be contacted immediately.
- The PM, PESM, and client must be notified.
- No further intrusive activities may be conducted until:
  - The One-Call agency/private location service and/or the subject utility owner visit the site.
  - Identification of the utility owner and the type of material/energy being conveyed by the utility has been made.
  - The orientation and depth of the subject utility have been determined and suitably marked.
- An Incident Report and Investigation form must be completed per EHS 1-7. The report should be accompanied by photographs clearly showing the marking(s) and the actual location with a distance gauge to document how far off the mark the utility was encountered.

Note: Overhead utilities height clearance data will need to be received for transport up/down river.

#### **10.14.2 Contacting Underground Utilities**

If excavation or other equipment being used for intrusive activities makes contact with an underground utility, the following guidelines apply:

- Intrusive activities must be stopped immediately.
- Observe the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, scratched coatings, cathodic protection compromise, material leakage, obvious electrical energy.
- Move all personnel to the evacuation meeting point as described in the SHSP. EXCEPTION: If an electrical line has been contacted and it is your belief that equipment

(such as an excavator) is electrically energized, do not approach the equipment. Order the operator to remain in the equipment until emergency personnel can de-energize the source (unless the equipment is on fire, at which time the operator should jump off of the vehicle and shuffle along the ground to a safe area). Shuffling is required because current flows outward through the soil in a ripple pattern called a power gradient, creating a pattern of high and low potential. Shuffling decreases the chance that these gradients could be bridged, causing current to flow through the body, resulting in electrocution.

- Secure the area to prevent the public from entering.
- Contact emergency responders as specified in the SSHP.
- The One-Call agency or, if known, the utility owner must be contacted immediately.
- The PM, PESM, and client must be notified.
- No further intrusive activities may be conducted until:
  - The utility owner inspects the scene and after repairs, verifies that all danger has passed.
  - The orientation and depth of the subject utility has been determined and suitably marked.
  - Permission from the emergency responders to resume work has been given.
- An Incident Report and Investigation form must be completed per EHS 1-7. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.
- State and local regulations must be reviewed to determine if reporting to any additional agencies is required.
- Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on site:

- First aid kit
- Automatic Electronic Defibrillator (AED)
- ANSI-approved eye wash with capability of 15-minutes non-stop operation
- Fire extinguisher (one per trailer/vehicle, and trailer)
- Spill control equipment if hazardous or petroleum-based materials are used to include, but not limited to, absorbent booms, absorbent pads, and absorbent material, scoop or shovel, and disposal container.

### **10.14.3 Marine Emergency Equipment**

- All watercraft > 25 feet having gasoline or liquid petroleum gas power plants or equipment in cabins, compartments, or confined spaces, shall be equipped with a built-in automatic CO<sub>2</sub> or other equally effective type of fire extinguishing system.
- Each watercraft shall carry UL-approved fire extinguishers (only needed if they have an engine) for use in gasoline, oil, and grease fires. Each fire extinguisher shall be inspected by the owner/operator monthly to ensure that it is sufficiently charged and that the

nozzles are free and clear. Discharged fire extinguishers shall be replaced or recharged immediately. Extinguisher requirements are as follows:

<b>Length of Watercraft</b>	<b>Extinguisher Type</b>	<b>Number Required</b>
26 feet or less	1-A:10-B:C	1
26 feet or more	1-A:10-B:C	2

- All watercraft shall carry at least one air horn or similar sound-signaling device.
- All watercraft shall carry non-pyrotechnic visual distress signals. Non-pyrotechnic visual distress signals include an orange distress flag and a flashlight or other electric distress light. No single signaling device is ideal under all conditions and for all purposes.
- All powered watercraft shall carry a tool kit sufficient for the watercraft operator to troubleshoot common mechanical problems such as fouled spark plugs, flooded carburetor, electrical shorts, etc. Watercraft operated in remote areas shall also carry appropriate spare parts (propellers, shear pins, patch kits, air pumps, etc.). The tool kit shall be maintained by the watercraft operator, and expended supplies shall be replaced immediately.
- Emergency cutting equipment shall be provided in accessible positions on all towing vessels for freeing lines in an emergency.
- All controls requiring operation in cases of emergency—such as boiler stops, safety valves, power switches, fuel valves, alarms, and fire extinguishing systems—shall be located so that they are protected against accidental operation but are readily accessible in an emergency.
- General alarm systems shall be installed and maintained on all vessels where it is possible for either a passenger or crewman to be out of sight or hearing from any other person. Where general alarm systems are used, they shall be operated from the primary electrical system with standby batteries on trickle charge that will automatically furnish the required energy during an electrical system failure.
- A sufficient number of signaling devices shall be placed on each deck so that they can be distinctly heard above the normal background noise at any point on the deck.
- Smoke alarms are required for all living quarters of a vessel; smoke alarms, if wired, should use the same electrical system as that of the electrical alarms.
- All doors shall be capable of being opened from either side and provided with positive means to secure them in both the open and closed position.
- Escape hatches and emergency exits shall be marked on both sides with letters, at least 2.5 cm (1 in) high, stating “EMERGENCY EXIT - KEEP CLEAR.”
- Each prime mover (engine, turbine, motor) driving a dredge pump shall be capable of being stopped by controls remote from the prime mover locations.

- Where appropriate, vessels should have watertight compartments readily identified and properly maintained in a watertight condition (i.e., sealable doors in place and fully functional) and all penetrations maintained in a watertight condition.
- For watercraft > 25 feet, a shutoff valve shall be installed at the fuel tank connection; arrangements shall be made for operating this valve from outside the compartment in which the tank is located and from outside the engine compartment and outside the house bulkheads at or above the weather deck of the vessel.
- A shutoff valve shall be installed at the engine end of the fuel line unless the length of the supply pipe is 1.8 m (6 feet) or less. Arrangement shall be made for operating this valve from outside the house bulkheads, at or above the weather deck on the vessel.
- Fuel and lubricant containers and tanks shall be diked or curbed to contain the tank contents in case of leakage in accordance with NAVFAC DM-22, Petroleum Fuel Facilities. In lieu of a dike or curb, other means complying with U.S. Coast Guard requirements in 46 CFR Parts 64, Marine Portable Tanks, and 98.30, Handling and Storage of Portable Tanks, may be used.
- Fuel oil transfers for barges shall be in accordance with the provisions of U.S. Coast Guard regulations, 46 CFR and 33 CFR Parts 155 and/or 156. For uninspected vessels, U.S. Coast Guard regulations in 33 CFR 156.120 and 33 CFR 155.320 for fuel coupling devices and fuel oil discharge containment apply. Venting fuel tanks is necessary when using the couplings prescribed by 33 CFR 156.120(1) or (2).
- All vessels need anchors.
- If vessels are operating at night need navigation lights.

#### 10.14.4 Lifesaving Skiffs

1. At least one lifesaving skiff (a powered johnboat or other smaller boat used in emergencies) shall be immediately available at locations where employees are working over or adjacent to water (based on an assessment by the ESS).
2. OSHA has established the following criteria for determining when a lifesaving skiff is to be considered as being immediately available:
  - The skiff must be in the water or capable of being quickly launched by one person.
  - There must be at least one person present and specifically designated to respond to water emergencies and operate the skiff at all times when there are employees above water.
  - When the operator is on break another operator must be designated to provide the requisite coverage while employees are above water.
  - The designated operator must either man the skiff at all times or remain in the immediate area such that the operator can quickly reach the skiff and get underway.
  - The skiff operator may be assigned other tasks provided the tasks do not interfere with the operator's ability to quickly reach the skiff and get underway.

- The communication system, such as a walkie-talkie, must be used to inform the skiff operator of an emergency and to inform the operator where the skiff is needed.
- The skiff must be equipped with both a motor and oars as a secondary means of propulsion:
  - a. Personnel trained in launching and operating the skiff shall be readily available during working hours. Lifesaving personnel shall perform a lifesaving drill before the initiation of work at the site and periodically thereafter as specified by the ESS (but at least monthly or whenever new personnel are involved).
  - b. Skiffs shall be kept afloat or ready for instant launching.
  - c. Required equipment must be on board and meet or exceed U.S. Coast Guard requirements. Skiffs shall be equipped as follows:
    - Four oars (two if the skiff is motor powered)
    - Oarlocks attached to gunwales or the oars
    - One ball-pointed boat hook
    - One life ring with at least 70 feet (21 meters) of 3/8 (1 centimeter) solid braid polypropylene line, or equivalent, attached
    - PFDs in number equaling the skiff rating for the maximum number of personnel allowed onboard
- In locations where waters are rough, swift, or where manually operated boats are not practical, a powerboat suitable for the waters shall be provided and equipped for lifesaving.
- Skiffs shall have flotation tanks or buoyant material capable of floating the boat and its equipment and the crew.
- On vessels (e.g., skiffs) without permanently mounted navigation lights, portable battery-operated navigation lights will be available and used for night operations.
- According to OSHA's directive relative to the number of skiffs required and the appropriate maximum response time, the following factors must be evaluated:
  - The number of work locations where there is a danger of falling into water
  - The distance to each of those locations
  - Water temperature
  - Currents
  - Other hazards such as, but not limited to, rapids, dams, and water intakes
- In addition to the proceeding, the employer is required to comply with all other applicable standards including, but not limited to, the requirements that the injured employee is promptly treated by medical personnel or an employee certified in first aid. This could mean that medical treatment might have to begin in the lifesaving skiff.

### **10.14.5 Flotation Devices**

#### **10.14.5.1 Personal**

- A U.S. Coast Guard approved Type II or Type III PFD shall be provided to and properly worn by all persons in the following circumstances:
  - On all watercraft, including barges, floating plants, powered and non-powered vessels and boats, floating work platforms, floating pipelines, pontoons, etc.
  - On structures extending over or next to water except where guardrails or safety nets are provided for employees.
  - Any work on or within 10 feet of water where falling into the water is a potential hazard.
  - Wherever there is a drowning hazard.
- PFDs are required for all marine work.

#### **10.14.5.2 Life Rings - Watercraft**

Each watercraft shall be equipped with at least one Type IV PFD, designed to be thrown to a person in the water, and grasped and held by the user until rescued. A life ring and horse-shoe buoy are two common examples of a Type IV PFD. All Type IV PFDs must be approved by the ESS prior to use. Life rings (rope attachment not required) and ring buoys (rope attachment required) shall conform to the requirements of 46 CFR 160 (U.S. Coast Guard approval) and shall have at least 70 feet (21 meters) of 3/8 inch (1 centimeter) solid braid polypropylene line, or equivalent, attached. Throw bags may be used in addition to life rings or ring buoys.

Life rings or ring buoys shall be readily available and shall be provided as follows:

- A minimum of one on each vessel.
- A minimum of one on all motor boats up to 40 feet (12 meters) in length and at least two for motor boats 40 feet (12 meters) in length or longer.
- A minimum of two on any other piece or group of floating plant up to 100 feet (30 meters) in length and one additional for each increase in length of 100 feet (30 meters) or fraction thereof.
- Life rings will be required when working on-shore alongside water.

### **10.15 POSTINGS**

The following information shall be posted at the site:

- Emergency telephone numbers
- Emergency VHF channels
- Emergency evacuation routes and staging area
- Route to hospital/WorkCare clinic

### **10.16 RESTORATION AND SALVAGE**

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers
- Refilling medical supplies
- Recharging eyewashes and/or showers
- Replenishing spill control supplies
- Replace life rings
- Replacing used air horns

## **11.0 TRAINING**

### **11.1 GENERAL HEALTH AND SAFETY TRAINING**

Project personnel shall receive site training during initial site visit including review of this SHSP. This training will address the duties the employees are expected to perform. In addition, site employees will review and sign off on TtEC's Project Rules Handbook for general health and safety procedures.

### **11.2 HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE TRAINING**

Employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120, 29 CFR 1926.65 (or if required by subcontract). At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements will not be allowed to engage in hazardous waste operations or emergency response activities.

### **11.3 INITIAL TRAINING**

General site workers engaged in hazardous waste operations shall, at the time of job assignments, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

### **11.4 THREE-DAY ACTUAL FIELD EXPERIENCE**

General site workers for hazardous waste operations shall have received 3 days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor, and the employer shall provide documentation that this training has been completed. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment.

### **11.5 REFRESHER TRAINING**

General site workers shall receive 8 hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

### **11.6 SITE-SPECIFIC HEALTH AND SAFETY TRAINING**

Prior to beginning any construction activities, TtEC will schedule a site-specific training with all personnel who work on the site. This meeting will be documented and signed by all parties attending the training. As work progresses, additional training may be required for new worker(s) entering the site. Personnel who have not received the site-specific training will not be allowed unescorted into the construction zone.

### **11.7 ON-SITE SAFETY BRIEFINGS**

Project personnel and visitors will be given on-site health and safety briefings by the CM or ESS to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. Prior to starting any new activity, a training session using the AHA will be held for workers involved in the activity. A copy of the attendance sheet for these daily briefings is included in Appendix A.

### **11.8 FIRST AID AND CPR**

The ESS will identify those individuals requiring first aid and CPR training in order to ensure that emergency medical treatment is available during field activities. It is expected that a minimum of two field personnel on-site at any one time will have first aid, CPR training, and bloodborne pathogen training. The training will be consistent with the requirements of the American Red Cross Association; OSHA 29 CFR 1910.1030, Bloodborne Pathogen Standard; and EHS 4-1.

### **11.9 HAZARD COMMUNICATION**

Hazard communication training will be provided and documented in accordance with the requirements contained in the TtEC Health and Safety Program, EHS 4-2, a copy of which will be maintained on site. This training will be included, at a minimum, during the initial site briefing and additionally during daily site safety briefings as necessary or indicated.

### **11.10 TSCA AND PCB AWARENESS**

TSCA and PCB awareness training will be conducted to ensure that all site workers understand and comply with the regulations (i.e., TSCA) for working with PCBs.

## **12.0 LOGS, REPORTS AND RECORDKEEPING**

The following is a summary of required health and safety logs, reports, and recordkeeping.

### **12.1 FIELD CHANGE REQUEST**

FCRs are to be completed for initiating a change to the SHSP. The PESM, Project Manager, or designee approval is required. The original will be kept in the project file. Approved changes will be reviewed with affected field personnel at a safety briefing. An FCR form is provided in Appendix A.

### **12.2 MEDICAL AND TRAINING RECORDS**

Copies or verification of training (40 hour, 8 hour, supervisor, site-specific training, and documentation of 3-day on-the-job training) and medical clearance for hazardous waste site work will be maintained on-site by the ESS. Records for all subcontractor employees will also be kept on site. All employee medical records will be maintained by the Corporate Medical Consultant in accordance with TtEC Health and Safety Program, EHS 1-8.

### **12.3 ON-SITE LOG AND VISITOR LOG**

The CM or designee will keep each day a log of personnel on site. Additionally, all visitors will be required to sign in on the daily visitor log. This log shall include the personnel visiting the site, their affiliation, date, arrival and departure time, and purpose of their visit.

### **12.4 WEEKLY SAFETY REPORTS**

The ESS shall complete and submit weekly/monthly safety reports to the PESM. The report is provided in Appendix A.

### **12.5 EHS INSPECTIONS**

TtEC will perform weekly EHS inspections to assess site conditions and verify they are in compliance with all applicable laws and regulations. The ESS or designee will perform the weekly inspections. The Project Manager or designee will perform the monthly inspection. If the project duration extends over 3 months, the PESM will perform a quarterly inspection.

### **12.6 ACCIDENT/INCIDENT REPORTS**

Incident reporting to TtEC needs to occur immediately to assure that any injury is properly managed. The incident reporting and investigation during site work will follow TtEC Health and Safety Program, Section EHS 1-7. Written confirmation of verbal reports is to be submitted within 24 hours.

### **12.7 HAZARD COMMUNICATION PROGRAM/MSDS**

The hazard communication program will be maintained onsite and training on the program information and requirements will be provided in accordance with 29 CFR 1910.1200 and 1926.59, *Hazard Communication*, 1910.1201, *Retention of DOT Markings, Placards and Labels*, and TtEC Health and Safety Program, EHS 4-2.

MSDSs will be obtained for applicable substances and included in the site hazard communication file. A copy of the MSDS will be obtained and maintained in the file for all chemicals to which the requirements apply; this will apply to both TtEC personnel and any subcontractors for which TtEC has responsibility and/or oversight responsibilities. All chemical

containers will be properly labeled in accordance with the requirements of the applicable standards.









#### **14.0 REFERENCES**

ACGIH (American Conference of Governmental Industrial Hygienists). 2007. Threshold limit values for chemical substances and physical agents in the work environment and biological exposure indices. Cincinnati, Ohio.

OSHA (U.S. Department of Labor, Occupational Safety & Health Administration). 2007. 29 CFR 1910, General Industry, and 29 CFR 1926, Construction Industry Standards.

TtEC (Tetra Tech EC, Inc.). TtEC Health and Safety Program.

**APPENDIX A**  
**HEALTH AND SAFETY FORMS**

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**TETRA TECH EC  
SSHP FIELD CHANGE REQUEST FORM**

**PROJECT:**

**TASK OR PHASE:** \_\_\_\_\_

**PROJECT LOCATION:** \_\_\_\_\_

**DESCRIPTION OF CHANGE:** \_\_\_\_\_

**REASON FOR CHANGE:** \_\_\_\_\_

**RECOMMENDED DISPOSITION:**

**PM:** \_\_\_\_\_  
Signature Date

**Construction Manager:** \_\_\_\_\_  
Signature Date

**ESS:** \_\_\_\_\_  
Signature Date

**PESM:** \_\_\_\_\_  
Signature Date

**DISTRIBUTION:** PESM \_\_\_\_\_  
ESS \_\_\_\_\_  
Construction Manager \_\_\_\_\_  
PM \_\_\_\_\_

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**TETRA TECH EC  
SSHP FIELD CHANGE DOCUMENTATION**

Field Change Number: \_\_\_\_\_

Date Effective: \_\_\_\_\_

Pen and ink changes to be made in the SSHP to alert the reader of this change:

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Reason for the change to be incorporated into the SSHP:

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**TEXT OF CHANGE TO BE INCORPORATED:**





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**TETRA TECH EC, INC.**

***MEDICAL DATA SHEET***

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The brief medical data sheet shall be completed on a voluntary basis by on-site personnel and will be kept in the Support Zone by the ESS as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required.

Project: \_\_\_\_\_

Name: \_\_\_\_\_ Home Telephone: \_\_\_\_\_

Address: \_\_\_\_\_

Age: \_\_\_\_\_ Height: \_\_\_\_\_ Weight: \_\_\_\_\_ Blood Type: \_\_\_\_\_

Name and Telephone Number of Emergency Contact: \_\_\_\_\_

Drug or Other Allergies: \_\_\_\_\_

Particular Sensitivities: \_\_\_\_\_

Do You Wear Contacts? \_\_\_\_\_

Provide A Check List Of Previous Illnesses: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

What Medications Are You Presently Using? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Do You Have Any Medical Restrictions? \_\_\_\_\_

\_\_\_\_\_

Name, Address, And Phone Number Of Personal Physician: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_





**AIR MONITORING:**

Real Time

Major Activity	Location(s)	Worker Occupation	FID/PID Range	CGI/O2 Range	PDM Range	Other

**PERSONAL AIR MONITORING**

Analyte	Activity Monitored	Occupation	Location	Result	Type of Sample*

**SUBCONTRACTORS ON SITE**

Company Name	Task or Function	Return to Site Next Week (Y/N)

\_\_\_\_\_  
**Health and Safety Officer - Signature**

\_\_\_\_\_  
**Date**



TETRA TECH EC, INC.

**EHS WEEKLY/MONTHLY CHECKLIST AND ACTION ITEM REPORT**

**Project:** \_\_\_\_\_  
\_\_\_\_\_

**Area of Inspection:** \_\_\_\_\_

**Inspection Type:**     Weekly     Monthly

**Inspector:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Time:** \_\_\_\_\_

<b>REQUIREMENTS</b>	<b>OBSERVATIONS (N/A if not applicable)</b>	<b>FINDING YES/NO</b>
<b>Work Conditions</b>		
1 Walking /Working Surfaces		
2 Aisles and Passageways		
3 Platforms/ Scaffolding		
4 Ladders		
5 Stairs		
6 Exits/Egress		
7 Roadways		
8 Ventilation		
9 Lighting		
10 Noise Exposure		
11 Ergonomics		
<b>Materials</b>		
1 Stacking and Storage		
2 Chemicals and Fuel		
3 Compressed Gases		
<b>Equipment</b>		
1 Hand / Portable Tools		
2 Machine, Tools, Guarding		

<b>REQUIREMENTS</b>	<b>OBSERVATIONS</b> (N/A if not applicable)	<b>FINDING</b> <b>YES/NO</b>
<b>3</b> Mobile/ Heavy Equipment a. Physical inspection of equipment b. Review of daily inspection reports c. Review of equipment deficiency correction logs/records		

REQUIREMENTS	OBSERVATIONS (N/A if not applicable)	FINDING YES/NO
4 Lifting Gear Equipment		
5 Materials Handling Equipment		
6 Mechanical Power Systems		
7 Hydraulic Power Systems		
8 Pneumatic Power Systems		
9 Electrical Power Systems		
10 Valves and Controls		
<b>Hazard Controls</b>		
1 Other Heavy Equipment		
2 Lock-Out Systems		
3 Signs and Tags		
4 Color Coding		
5 Materials Labeling		
6 Warning Systems		
<b>Emergency Systems</b>		
1 Emergency Instructions		
2 Fire Protection		
3 Eye Wash and Showers		
4 First Aid Kits/ Stations		
5 Emergency Rescue Equipment		
<b>Protective Equipment</b>		
1 Eye Protection		
2 Ear Protection		
3 Respiratory Protection		
4 Head Protection		
5 Hand Protection		
6 Foot Protection		
7 Body Protection		
8 Fall Protection		

REQUIREMENTS	OBSERVATIONS (N/A if not applicable)	FINDING YES/NO
<b>Hazardous Waste Storage Area(s)/Satellite Accumulation Areas<sup>1 2</sup></b>		
<b>1</b> Designated, secured area with “Hazardous Waste” signage. For SAA area is marked “SAA”. (SAA)		
<b>2</b> Containers:		
<b>a.</b> DOT-spec. containers (for wastes to go off-site only)		
<b>b.</b> Intact/in good condition (SAA)		
<b>c.</b> Waste compatible with containers (e.g., no evidence of corrosion, softening, bulging) (SAA)		
<b>d.</b> Marked “Hazardous Waste”/ visible Accumulation Date. <i>For SAA, marked “Hazardous Waste” or identify container contents and Accumulation date (SAA)</i>		
<b>e.</b> Securely closed and stored to prevent rupture/leaking, except when add/remove waste. (SAA)		
<b>f.</b> Labeled with EPA Id. No.		
<b>g.</b> For SAA only, Stored “at the point of generation” and meets quantity limits.		
<b>3</b> Reactive/ignitable wastes stored at least fifty (50) feet from property.		
<b>4</b> Liquid wastes within secondary containment.		
<b>5</b> Incompatible wastes separated by a dike, wall, berm or other device.		
<b>6</b> Stored for less than 90 days. <i>(CERCLA projects may have storage variance).</i> <sup>3</sup>		

1 For sites with multiple storage areas or Satellite Accumulation Areas (SAAs), indicate location where deficiencies are noted.

2 For SAAs, evaluate only rows marked with (SAA).

REQUIREMENTS	OBSERVATIONS (N/A if not applicable)	FINDING YES/NO
7 Container tracking log accurately reflects containers stored. (SAA)		
8 Area maintained in an orderly fashion and complies with state/EHS plan requirements. (SAA)		
<b>Hazardous Waste Tank Storage Area</b> ( <i>Daily inspection is being conducted and maintained on-site</i> )		
<b>Waste/Stockpiles - State Regulated Non-Hazardous Wastes</b> ( <i>Refer to PESM Checklists, if applicable</i> )		
<b>TSCA PCB Wastes – must be inspected at least every 30 days (GMP - weekly)</b> ( <i>Refer to PESM TSCA Checklist for inspection items</i> )		
<b>Point Source Discharges/ Air Emissions</b>		
1 Permit conditions are being met.		
2 Monitoring equipment is fully operational.		
3 Equipment calibrations and maintenance is up-to-date.		
4 Discharge sampling performed at required intervals.		
5 Review monitoring results ( <i>Report permit exceedences per EHS 1-7</i> )		
6 DMR and Plant Logs properly completed, signed, and submitted (if required).		
7 Fugitive Dust – Appropriate BMPs are instituted for fugitive dust emissions.		
<b>Stormwater Discharge Activities</b>		
1 SWPPP /Soil Plan reflects current activities.		

3 If stored on-site 75 or more days, TSD/transporter has been selected (EHS 1-4), pick-up date scheduled and PM/PESM are aware of 90-day limit.

REQUIREMENTS	OBSERVATIONS (N/A if not applicable)	FINDING YES/NO
2 Monitoring/sampling performed at required intervals.		
3 Review monitoring results <i>(Report permit exceedences per EHS 1-7)</i>		
4 BMPs in SWPPP/Soil Plan implemented.		
5 Visual observations indicate stormwater meets water quality criteria.		
6 Inspections conducted as required and documented. Corrective actions are implemented and documented.		
<b>Other Conditions or Work Practices</b>		
1		
2		
3		
4		

**- End of Checklist-**

***Monthly Inspections must be sent to PESM and Project Manager.***

Review previous week's/month's Action Item Report. Carry forward action items that have not been implemented. Note outstanding action items with an (F) in the "Action Item" column on this report. Note an (F) in the "Date Completed" column on previous week's/month's Action Item Report.

**Project:**

**Area of Inspection:**

**Inspection Type:**     Weekly     Monthly

**Date of Inspection:**

ACTION ITEM	RESPONSIBLE PARTY	SCHEDULE	DATE COMPLETED
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			

Reviewed by: \_\_\_\_\_

Construction Manager

\_\_\_\_\_ Date

cc: *Project Manager (monthly only)*

*PESM (monthly only)*

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**APPENDIX B**  
**BIOLOGICAL HAZARDS**



**MASSAUGA RATTLESNAKE**

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**APPENDIX C**  
**ACTIVITY HAZARD ANALYSES**

**ACTIVITY HAZARD ANALYSIS**

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: General Site Hazards		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. General Site Hazards	a. Back Injuries and Strains	a. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible.</li> <li>• Maintain work areas safe and orderly. Unloading areas should be on even terrain.</li> <li>• Watch and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>• Replace work boots when worn out or the tread on the sole does not provide traction.</li> <li>• Tools and supplies/equipment will be properly stored.</li> </ul>
	c. Dropped Objects	c. Dropped Objects <ul style="list-style-type: none"> <li>• Steel toe boots meeting ANSI Standard Z41 will be worn as directed.</li> <li>• Secure all radios, cell phones and equipment.</li> </ul>
	d. Noise	d. Noise <ul style="list-style-type: none"> <li>• Evaluate high noise operations to determine if hearing protective devices should be worn.</li> <li>• Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn during high noise operations.</li> <li>• All equipment will have manufacturer's required mufflers.</li> </ul>
	e. Heavy Equipment Operation	e. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Supervisors and operators will ensure that the procedures in Section 3.3.1 of this document and the equipment manufacturers' instructions and recommendations are followed consistently.</li> <li>• All equipment will be initially inspected to certify safe to use onsite and before each days use.</li> <li>• Equipment will have rollover protective structures and seat belts. Operators shall wear seat belts when operating equipment.</li> <li>• Unsafe equipment will be taken out of service, tagged and will not be used until repaired.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> </ul>

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• All slings chains and ropes will be rated for the load in which it is expected to lift.</li> <li>• Spills and absorbent materials will be readily available. Drip pans, polyethylene sheeting or other means will be used for secondary containment.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius. This area will be delineated with cones.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> <li>• A spotter will be used for backing up equipment in congested areas.</li> </ul>
	f. Temperature Extremes	f. Temperature Extremes <ul style="list-style-type: none"> <li>• Drink plenty of fluids.</li> <li>• Train personnel of signs/symptoms of heat/cold stress.</li> <li>• Monitor air temperatures when extreme weather conditions are present.</li> <li>• Stay in visual and verbal contact with your buddy.</li> <li>• Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.</li> </ul>
	g. Overhead Hazards	g. Overhead Hazards <ul style="list-style-type: none"> <li>• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1 when an overhead hazard exists.</li> <li>• All ground personnel will stay clear of suspended loads and equipment swing areas.</li> <li>• All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects.</li> <li>• All overhead hazards will be identified prior to commencing work operations.</li> </ul>
	h. Eye Injuries	h. Eye Injuries <ul style="list-style-type: none"> <li>• Safety glasses meeting ANSI Standard Z87 will be worn for all field operations where eye hazards exist.</li> <li>• A portable eye wash station will be located adjacent to work activities.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: General Site Hazards		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Sharp Objects/Punctures	i. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>• All hand and power tools will be maintained in a safe condition. When possible, blunt all sharp objects.</li> <li>• First aid kits will be available by the work area.</li> </ul>
	j. Fire	j. Fire <ul style="list-style-type: none"> <li>• Reference Section 10.9.</li> <li>• Only use NFPA-approved fuel cans with a pouring spout or funnel.</li> <li>• Smoking and open flames are not permitted in fueling areas.</li> <li>• A properly rated fire extinguisher will be located in the refueling area and on site trucks.</li> <li>• All gasoline-powered equipment will be grounded and bonded.</li> <li>• Equip all heavy equipment with 20A:B:C-type fire extinguishers.</li> <li>• Area(s) for personnel smoking will be designated.</li> </ul>
	k. Spills	k. Spills <ul style="list-style-type: none"> <li>• Reference Section 10.13.</li> <li>• Secondary Containment will be provided in storage areas.</li> <li>• Spill and absorbent materials will be readily available.</li> <li>• Absorbent materials will be used during transfer of fuel/oil.</li> <li>• Contain, control and clean up the spill and affected area (soil, water). Manage and dispose of spill material appropriately.</li> <li>• All waste materials generated will be contained in a seal-able container appropriate for the size of the spill.</li> <li>• Commercial spill kits are available.</li> <li>• Employees will be instructed on proper fueling techniques.</li> <li>• Fuel nozzles and hose will be secure in holder after use.</li> <li>• Fuel caps will be secured after fueling operations.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: General Site Hazards**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	l. Biological Hazards	l. Biological Hazards <ul style="list-style-type: none"> <li>• Follow and train personnel on the procedures outlined in Section 3.2.</li> <li>• Wear insect repellent and long sleeved shirts as needed. Wear light colored clothing to highlight ticks.</li> <li>• Follow procedures for tick bites. Perform self and buddy checks frequently throughout the day.</li> <li>• Be aware of poisonous plants; poison ivy blocking lotion will be used. See ZIP bulletins 181 and 210.</li> <li>• Approach debris, rock piles, and other snake habitats with caution.</li> <li>• If allergic to bees/wasps, ensure an epinephrine (MSDS needed onsite) kit is readily available and make sure the ESS is informed of the condition.</li> </ul>
	m. Hand and Power Tools	m. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference Section 3.3.12.</li> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, “mushroom” head).</li> <li>• Tools will be used in accordance with manufacturer’s instructions.</li> <li>• Modifications to tools are prohibited unless approved by the ESS.</li> <li>• GFCIs will be used with all electrical power tools.</li> </ul>
	n. Chemicals brought onsite	n. Chemicals brought onsite <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 4-2.</li> <li>• Identify all chemical hazards and receive training (Haz Com-Material Safety Data Sheets/MSDSs) regarding safe handling and storage of chemicals.</li> <li>• The ESS maintains copies of all MSDSs for chemicals that are onsite.</li> <li>• A portable 15 minute eye wash station will be located by the work area.</li> </ul>
	o. Struck By/Against	o. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within unloading and loading areas are accounted for and out of the way.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: General Site Hazards**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	<p>p. Adverse Weather</p>	<p>p. Adverse Weather</p> <ul style="list-style-type: none"> <li>• National weather forecasts will be monitored daily for predicted inclement weather. The field investigations lead will call for the local conditions and forecast each morning.</li> <li>• All personnel shall be aware of the forecast and keep an “eye to the sky.” Unforecasted storms may also occur without warning.</li> <li>• Work will be postponed in the event of very strong winds or at times of very poor visibility.</li> <li>• In the event of lightning in the area, work will cease at the direction of the TtEC Supervisor or ESS, and will not proceed further until return to work permit is issued.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Heavy Equipment</li> <li>2. Appropriate PPE</li> <li>3. Hand and Power Tools</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all heavy equipment prior to use.</li> <li>2. Inspect all hand and power tools prior to use.</li> <li>3. Inspect all PPE prior to use.</li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this HASP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Qualified operators will be used for heavy equipment and boat operation.</li> <li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>5. Instruct personnel of proper use of fire extinguishers.</li> <li>6. Personnel will be trained on the proper use of hand and power tools, including the steam cleaner.</li> </ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Mobilization/Demobilization**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Mobilization/Demobilization	a. Back Injuries and Strains	a. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible.</li> <li>• Maintain work areas safe and orderly. Unloading areas should be on even terrain.</li> <li>• Watch and prepare for uneven terrain, soft soils, stumps, and vegetation in walk areas.</li> <li>• Replace work boots when worn out or the tread on the sole does not provide traction.</li> <li>• Tools and supplies/equipment will be properly stored.</li> <li>• Only necessary personnel will be allowed in work and materials staging areas.</li> <li>• If work on flatbeds is required, be aware of fall potential, use caution when removing slings, tie-downs or any equipment/supplies to avoid loss of balance.</li> </ul>
	c. Dropped Objects	c. Dropped Objects <ul style="list-style-type: none"> <li>• Steel toe boots meeting ANSI Standard Z41 will be worn as directed.</li> <li>• Secure all radios, cell phones and equipment.</li> </ul>
	d. Noise	d. Noise <ul style="list-style-type: none"> <li>• Evaluate high noise operations to determine if hearing protective devices should be worn.</li> <li>• Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn during high noise operations.</li> <li>• All equipment will have manufacturer's required mufflers.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Mobilization/Demobilization**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	e. Heavy Equipment Operation	e. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Supervisors and operators will ensure that the procedures in Section 3.3.1 of this document and the equipment manufacturers’ instructions and recommendations are followed consistently.</li> <li>• All equipment will be initially inspected to certify safe to use onsite and before each days use.</li> <li>• Equipment will have rollover protective structures and seat belts. Operators shall wear seat belts when operating equipment.</li> <li>• Unsafe equipment will be taken out of service, tagged and will not be used until repaired.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• All slings chains and ropes will be rated for the load in which it is expected to lift.</li> <li>• Spills and absorbent materials will be readily available. Drip pans, polyethylene sheeting or other means will be used for secondary containment.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius. This area will be delineated with cones.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15 foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> <li>• A spotter will be used for backing up equipment in congested areas.</li> </ul>
	f. Equipment Rollover	f. Equipment Rollover <ul style="list-style-type: none"> <li>• Do not operate delivery equipment on grades which exceed the manufacturer’s recommendations.</li> <li>• Be aware of weather and road conditions.</li> <li>• A spotter will be used when unloading equipment/materials in high traffic areas.</li> <li>• Do not unload equipment/materials on unstable ground.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Mobilization/Demobilization		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	g. Sharp Objects/Punctures	g. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>All hand and power tools will be maintained in a safe condition. When possible, blunt all sharp objects.</li> <li>First aid kits will be available by the work area.</li> </ul>
	h. Vehicular Traffic	h. Vehicular Traffic <ul style="list-style-type: none"> <li>Spotters will be used when backing up trucks and heavy equipment.</li> <li>Trucks and heavy equipment will be equipped with back up alarms.</li> <li>Traffic cones and orange traffic vests will be used when working in areas of traffic, construction vehicles and near roadways. Implement traffic controls such as flag persons, warning devices, etc., as necessary.</li> <li>Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.</li> </ul>
	i. Overhead Hazards	i. Overhead Hazards <ul style="list-style-type: none"> <li>Personnel will be required to wear hard hats that meet ANSI Standard Z89.1 when an overhead hazard exists.</li> <li>All ground personnel will stay clear of suspended loads and equipment swing areas.</li> <li>All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects.</li> <li>All overhead hazards will be identified prior to commencing work operations. All ground personnel will stay clear of suspended loads and equipment swing areas.</li> <li>A 15-foot clearance from overhead power lines will be maintained at all times.</li> </ul>
	j. Eye Injuries	j. Eye Injuries <ul style="list-style-type: none"> <li>Safety glasses meeting ANSI Standard Z87 will be worn for all field operations where eye hazards exist.</li> <li>A portable eye wash station will be located adjacent to work activities.</li> </ul>
	k. Sharp Objects/Punctures	k. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>All hand and power tools will be maintained in a safe condition. When possible, blunt all sharp objects.</li> <li>First aid kits will be available by the work area.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Mobilization/Demobilization		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	l. Chemicals brought on site	l. Chemicals brought on site <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 4-2.</li> <li>• Identify all chemical hazards and receive training (Haz Com-Material Safety Data Sheets/MSDSs) regarding safe handling and storage of chemicals.</li> <li>• The ESS maintains copies of all MSDSs for chemicals that are on site.</li> <li>• A portable 15-minute eye wash station will be located by the work area.</li> </ul>
	m. Struck By/Against	m. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within unloading and loading areas are accounted for and out of the way.</li> </ul>
	n. Contact with Overhead Utilities	n. Contact with Overhead Utilities <ul style="list-style-type: none"> <li>• If equipment is being operated, delivered, or off loaded in an area with overhead utilities, a spotter must be used.</li> </ul>
	o. Connecting/Installing Utilities	o. Connecting/Installing Utilities <ul style="list-style-type: none"> <li>• Lockout/Tagout procedures will be used when installing/connecting utilities. Reference EHS Program EHS 6-4.</li> <li>• Electrical conditions will be made by a licensed electrician.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Heavy Equipment/Trucks</li> <li>2. Appropriate PPE</li> <li>3. Hand and Power Tools</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all heavy equipment and trucks daily and prior to use.</li> <li>2. Inspect all hand and power tools prior to use.</li> <li>3. Inspect all PPE prior to use.</li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this HASP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Qualified operators will be used for heavy equipment and trucks operation.</li> <li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>5. Instruct personnel of proper use of fire extinguishers.</li> <li>6. Personnel will be trained on the proper use of hand and power tools.</li> </ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Clearing and Grading**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Clearing	a. Cutting Trees	a. Cutting Trees <ul style="list-style-type: none"> <li>• Power Saw/Chain Saw</li> <li>• Operators shall be familiar with all safety devices on the saw.</li> <li>• The engine shall be started and operated only when all co-workers are clear of the saw.</li> <li>• The operator will shut off the saw when carrying it over slippery surfaces, through heavy brush, and when adjacent to personnel.</li> <li>• The saw may be carried while the motor is running (idle speed) for short distances (less than 50 feet) as long as it is carried so as to prevent contact with the chain or muffler.</li> <li>• The engine shall be stopped for all cleaning, refueling, adjustments and repairs to the saw or motor, except where manufacturer's procedures require otherwise.</li> <li>• Chopping tools that have loose or cracked heads or splintered handles shall not be used.</li> <li>• Chopping tools shall be swung away from the feet, legs, and body, using the minimum power practical for control.</li> <li>• Chopping tools shall not be driven as wedges or used to drive metal wedges.</li> <li>• Personal protective equipment.</li> <li>• Head protection shall be worn by workers engaged in tree operations, in accordance with ANSI Z89.1.</li> <li>• Eye and face protection shall comply with ANSI Z87.1.</li> <li>• Leg protection such as "Chain Saw Chaps" shall be worn while operating a chainsaw during ground operations.</li> <li>• Gasoline powered equipment shall be refueled only after the engine has stopped. Any spilled fuel shall be removed from the equipment before starting.</li> <li>• Gasoline powered equipment shall not be operated within 10 feet of any refueling operation or any area in which refueling has recently taken place.</li> <li>• Flammable liquids shall be stored, handled, and dispensed only from approved safety containers.</li> <li>• Smoking is prohibited when handling or working around any flammable liquid.</li> <li>• Workers wearing clothing on which flammable liquid has been spilled shall avoid open flame and other sources of ignition, and change the contaminated clothing as soon as possible.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Clearing and Grading**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	b. Brush Removal and Chipping of Brush	b. Brush Removal and Chipping of Brush <ul style="list-style-type: none"> <li>• Refer to EM 385-1-1, Chapter 31.D for additional chipping safety procedures.</li> <li>• Site personnel will wear gloves, plastic face shields, hard hats, and properly rated ear plugs or ear muffs along with other required PPE while operating the chipper.</li> <li>• Rotary drum and disk-type tree or brush chippers not equipped with a mechanical in-feed system shall be equipped with an in-feed hopper not less than 85 in. (the sum of the horizontal distance from the chipper blade out along the center of the chute to the end of the chute and the vertical distance from the chute down to the ground) and shall have sufficient height on its side members to prevent personnel from contacting the blades or knives of the machine during normal operations.</li> <li>• Rotary drum and disk-type tree or brush chippers not equipped with a mechanical in-feed system shall have a flexible antikickback device installed in the in-feed hopper for the purpose of protecting the operator and other persons in the machine area from the hazards of flying chips and debris.</li> <li>• Disk-type tree or brush chippers equipped with a mechanical in-feed system shall have a quick stop and reversing device on the in-feed: the activating mechanism for the quickstop and reversing device shall be located across from the top, along each side of, and as close as possible to the feed end of the in-feed hopper and within easy reach of the operator.</li> <li>• The feed chute or feed table of a chipper shall have sufficient height on its side members to prevent operator contact with the blades or knives during normal operation.</li> <li>• Brush chippers shall be equipped with an exhaust chute of sufficient length or design to prevent contact with the blade.</li> <li>• All workers feeding brush into chippers shall wear eye protectors; loose clothing or hair, gauntlet-type gloves, rings and watches shall not be worn by workers feeding the chipper.</li> <li>• Employees shall never place hands, arms, feet, legs or any other part of the body on the feed table when the chipper is in operation or the rotor is turning; push sticks – of material which can be consumed by the chipper – shall be used.</li> <li>• Brush chippers should be fed from the side of the feed table centerline, and the operator shall immediately turn away from the feed table when the brush is taken into the rotor or feed rollers.</li> <li>• Brush chippers shall be equipped with an emergency stop button that will be functionally checked before each use.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Clearing and Grading		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	c. Back Injuries and Strains	c. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	d. Slips/Trips/Falls	d. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible.</li> <li>• Maintain work areas safe and orderly. Unloading areas should be on even terrain.</li> <li>• Watch and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>• Replace work boots when worn out or the tread on the sole does not provide traction.</li> <li>• Tools and supplies/equipment will be properly stored.</li> <li>• Personnel will use care on or near any steep slopes.</li> <li>• Ensure proper footing when working in sloped areas.</li> </ul>
	e. Dropped Objects	e. Dropped Objects <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	f. Noise	f. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> <li>• Operators shall wear hearing protection at all times the chain saw is in operation.</li> <li>• Personnel within 15 feet of equipment when in operation shall wear hearing protection.</li> </ul>
	g. Sharp Objects/Punctures	g. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>• All hand and power tools will be maintained in a safe condition. When possible, blunt all sharp objects.</li> <li>• First aid kits will be available by the work area.</li> </ul>
	h. Eye Injuries	h. Eye Injuries <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> <li>• Safety glasses meeting ANSI Standard Z87 will be worn for all field operations where eye hazards exist. Plastic Face Shields will be worn when operating chain saws.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Clearing and Grading		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Caught In/Between	i. Caught In/Between <ul style="list-style-type: none"> <li>• Properly functioning safety devices/guards will be maintained on all equipment.</li> <li>• Loose clothing will be kept away from all operating equipment.</li> <li>• Personnel will never try to dislodge anything stuck in running equipment, without first shutting down the equipment, and personnel will be aware of stored energy in that equipment that could become activated when something stuck is removed.</li> </ul>
	j. Struck By/Crushed	j. Struck By/Crushed <ul style="list-style-type: none"> <li>• Qualified personnel shall be instructed on proper use of power/cutting devices.</li> <li>• All cutting devices will have a guard in place. Guards will be used in the correct manner according to manufacturer's specifications.</li> <li>• All equipment will be properly de-energized and locked-out prior to maintenance/repair/clearing of stuck debris.</li> <li>• Safety glasses will be worn at all times and face guards will be used with all brush cutters and chain saws.</li> <li>• Personnel will wear ANSI approved hard hats at all times during work.</li> <li>• Personnel will take care in handling all barbed wire and any debris or metal found.</li> </ul>
	k. Hand and Power Tools	k. Hand and Power Tools <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, "mushroom" head).</li> <li>• Personnel will wear chaps when using chain saws.</li> </ul>
2. Grading	a. Noise	a. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> <li>• Personnel within 15 feet of equipment when in operation shall wear hearing protection.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Clearing and Grading		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	b. Heavy Equipment Operation	b. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Refer to General Site Hazards</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> <li>• A spotter will be used for backing up equipment in congested areas.</li> </ul>
	c. Struck By/Crushed	c. Struck By/Crushed <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within unloading and loading areas are accounted for and out of the way.</li> <li>• Personnel will wear ANSI approved hard hats at all times during work.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Appropriate PPE 2. Hand and Power Tools 3. Portable Eyewash 4. First Aid Kits 5. 20A:B:C Fire Extinguisher 6. GFCI 7. Chipper	1. Inspect all hand and power tools prior to use. 2. Inspect all PPE prior to use. 3. Inspect portable eye washes and first aid kits weekly. 4. Inspect fire extinguishers weekly. 5. Check and test GFCIs weekly. 6. Inspect chipper daily and ensure it is in good operating condition.	1. All site personnel will read and comply with this HASP. 2. All site personnel will receive site specific training. 3. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training. 4. Instruct personnel of proper use of fire extinguishers. 5. Personnel will be trained on the proper use of hand and power tools. 6. Only qualified operators will use the chipper.

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Land Surveying**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Land Surveying	a. Back Injuries and Strains	a. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible. Look for depressions and obstructions.</li> <li>• Be conscious of potential footing hazards when walking on slopes or in areas with potential footing hazards.</li> <li>• Maintain awareness, especially in areas where topography varies, and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>• Maintain work areas safe and orderly. Unloading areas should be on even terrain.</li> <li>• Watch and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>• Replace work boots when worn out or the tread on the sole does not provide traction.</li> <li>• Tools and supplies/equipment will be properly stored to maintain safe and orderly work areas.</li> </ul>
	c. Temperature Extremes	c. Temperature Extremes <ul style="list-style-type: none"> <li>• Drink plenty of fluids.</li> <li>• Train personnel of signs/symptoms of heat/cold stress.</li> <li>• Monitor air temperatures when extreme weather conditions are present.</li> <li>• Stay in visual and verbal contact with your buddy.</li> <li>• Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm/cool rest areas, protective clothing, and minimize exposure time.</li> <li>• If a potential for cold stress exists, workers will bring extra clothing, and food.</li> <li>• Equipment and vehicles will offer protection from wind and rain and have heaters or air conditioning.</li> <li>• If hypothermia symptoms or cold stress symptoms are observed (slurred speech, changes in skin color, shivering,) the victim will be taken to a heated location to warm up.</li> <li>• If heat stress symptoms are observed (lack of coordination, decline in alertness, unsteady walk, excessive fatigue, muscle cramps) the victim will be taken to a cooled location to cool off.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Land Surveying		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	d. Exposure to poisonous plants	d. Exposure to poisonous plants <ul style="list-style-type: none"> <li>• Maintain awareness of presence of poisonous plants.</li> <li>• Use of barrier protection lotions (Ivy Block, etc.) to protect against poison ivy exposure as needed. Wash exposed areas (e.g., Clorox wipes, Dawn dish soap, or Technu) immediately.</li> <li>• Long pants and leather boots should be worn. While working in tall, dense vegetation, long sleeve shirts should be worn to protect against exposure.</li> <li>• When handling plants, leather gloves should be worn.</li> </ul>
	e. Punctures/Cuts from Plants	e. Punctures/Cuts from Plants <ul style="list-style-type: none"> <li>• Wear leather (minimum) or cut resistant work gloves when handling plants that may cause the possibility of lacerations or other injury.</li> <li>• Wear long pants at all times to avoid lacerations and other injury. Long sleeved shirt should also be worn to protect arms when needed.</li> <li>• Look carefully for injurious vegetation before reaching into any area or before handling any plants. Examples may include yucca and prickly cactus, thistles, and branches.</li> </ul>
	f. Exposure to insects/ticks	f. Exposure to insects/ticks <ul style="list-style-type: none"> <li>• In the event of poisonous bites, contact the emergency response personnel immediately.</li> <li>• Insect repellent must be made available to all workers to prevent exposure to mosquito bites. Insect repellent should be applied according to manufacturer instructions.</li> <li>• Work activities should be avoided during dusk and dawn, when insects carrying virus are most active (i.e. mosquitoes carrying West Niles virus). If work is conducted during this time, long sleeves and pants must be worn, in combination with insect repellent.</li> <li>• Perform tick self-inspection upon exiting wooded or tall grass areas.</li> <li>• Field personnel should look carefully for insects and spiders before stepping into any area or before placing hands near the ground.</li> <li>• Field personnel should be cautious and avoid contact by looking ahead to where they will be walking, standing, sitting, leaning, grabbing, lifting, or reaching.</li> <li>• If allergic to bees/wasps, ensure an epinephrine (MSDS needed on site) kit is readily available and make sure the ESS is informed of the condition.</li> </ul>
	g. Exposure to snakes/animals	g. Exposure to snakes/animals <ul style="list-style-type: none"> <li>• Refer to Section 3.2.2.</li> <li>• Substantial footwear (boots) and long pants should be worn to protect from bites.</li> <li>• Approach debris, rock piles, and other snake habitats with caution.</li> <li>• Look carefully for snakes and animals before stepping into any area or before placing hands near the ground. Visual scans should be made periodically during the day.</li> </ul>

<b>Project: Lower Fox River OUs 2 through 5, Volume I Activities</b>		<b>Location: Brown, Outagamie, and Winnebago Counties, Wisconsin</b>
<b>Activity: Land Surveying</b>		
<b>MAJOR STEPS</b>	<b>POTENTIAL HAZARDS</b>	<b>PROTECTIVE MEASURES/CONTROLS</b>
	h. Adverse Weather	h. Adverse Weather <ul style="list-style-type: none"> <li>• National weather forecasts will be monitored daily for predicted inclement weather. The field investigations lead will call for the local conditions and forecast each morning.</li> <li>• All personnel shall be aware of the forecast and keep an “eye to the sky”. Unforecasted storms may also occur without warning.</li> <li>• Work will be postponed in the event of very strong winds or at times of very poor visibility.</li> <li>• In the event of lightning in the area, work will cease at the direction of the TtEC Supervisor or ESS, and will not proceed further until return to work permit is issued.</li> </ul>
<b>EQUIPMENT USED</b>	<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>
1. Appropriate PPE 2. Portable Eyewash 3. First Aid Kits	1. Inspect all PPE prior to use. 2. Inspect portable eye washes and first aid kits weekly.	1. All site personnel will read and comply with this SHSP. 2. All site personnel will receive site specific training. 3. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Marine Surveys**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Setup/install a RTK GPS base station on land.	Struck by motorized, non-motorized and congested pedestrian traffic	<ul style="list-style-type: none"> <li>• Field personnel will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.</li> <li>• Wear safety vest when traffic is present.</li> </ul>
	Failure to inspect equipment properly could cause workers to use defective or unsafe equipment causing injury to workers and possible damage to the equipment or the environment.	<ul style="list-style-type: none"> <li>• Verify that equipment is inspected per manufacturer's recommendation each day before use, and there is an owner/operator's manual available.</li> </ul>
	Noise exposure	<ul style="list-style-type: none"> <li>• Hearing protection is required if working around equipment or tools that produce levels at/or above 85db. (As a rule of thumb, if you have to shout within 3' to be heard, hearing protection is required.)</li> </ul>
	Adverse weather. High winds and rain and/or snow storms, high water flow in river. Struck by lightning	<ul style="list-style-type: none"> <li>• If adverse weather is affecting crew's safety, work will be halted until conditions improve. (i.e., wind, snow, rain etc.)</li> <li>• Area is prone to windstorms during the spring, when this work is anticipated to occur.</li> <li>• If road conditions are too bad to access the work site, the work will be postponed until conditions improve.</li> <li>• In the case of extreme weather, vessel operations may be delayed.</li> <li>• At no time will personnel and equipment enter the river, if the flow rate exceeds 1,500 cubic feet per second (CFS).</li> <li>• Follow the 10-second rule (time between lightning strike and thunder) for shutdown of operations. Immediately suspend operations when lightning is in the immediate vicinity and seek shelter. Work will not commence until there are no lightning strikes at least 30 minutes after the last lightning strike.</li> </ul>
	Temperature Extremes	<ul style="list-style-type: none"> <li>• Drink plenty of fluids.</li> <li>• Train personnel of signs/symptoms of heat/cold stress.</li> <li>• Monitor air temperatures when extreme weather conditions are present.</li> <li>• Stay in visual and verbal contact with your buddy.</li> <li>• Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.</li> <li>• If a potential for cold stress exists, workers will bring extra clothing, and food.</li> <li>• Equipment and vehicles will offer protection from wind and rain and have heaters or air conditioning.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Marine Surveys**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• If hypothermia symptoms or cold stress symptoms are observed (slurred speech, changes in skin color, shivering,) the victim will be taken to a heated location to warm up.</li> <li>• If heat stress symptoms are observed (lack of coordination, decline in alertness, unsteady walk, excessive fatigue, muscle cramps) the victim will be taken to a cooled location to cool off.</li> </ul>
	Exposure to poisonous plants	<ul style="list-style-type: none"> <li>• Maintain awareness of presence of poisonous plants.</li> <li>• Use of barrier protection lotions (Ivy Block, etc.) to protect against poison ivy exposure as needed. Wash exposed areas (e.g., Clorox wipes, Dawn dish soap, or Technu) immediately.</li> <li>• Long pants and leather boots should be worn. While working in tall, dense vegetation, long sleeve shirts should be worn to protect against exposure.</li> <li>• When handling plants, leather gloves should be worn.</li> </ul>
	Punctures/Cuts from Plants	<ul style="list-style-type: none"> <li>• Wear leather (minimum) or cut resistant work gloves when handling plants that may cause the possibility of lacerations or other injury.</li> <li>• Wear long pants at all times to avoid lacerations and other injury. Long sleeved shirt should also be worn to protect arms when needed.</li> <li>• Look carefully for injurious vegetation before reaching into any area or before handling any plants. Examples may include yucca and prickly cactus, thistles, and branches.</li> </ul>
	Exposure to insects/ticks	<ul style="list-style-type: none"> <li>• In the event of poisonous bites, contact the emergency response personnel immediately.</li> <li>• Insect repellent must be made available to all workers to prevent exposure to mosquito bites. Insect repellent should be applied according to manufacturer instructions.</li> <li>• Work activities should be avoided during dusk and dawn, when insects carrying virus are most active (i.e. mosquitoes carrying West Niles virus). If work is conducted during this time, long sleeves and pants must be worn, in combination with insect repellent.</li> <li>• Perform tick self-inspection upon exiting wooded or tall grass areas.</li> <li>• Field personnel should look carefully for insects and spiders before stepping into any area or before placing hands near the ground.</li> <li>• Field personnel should be cautious and avoid contact by looking ahead to where they will be walking, standing, sitting, leaning, grabbing, lifting, or reaching.</li> </ul>
	Exposure to snakes/animals	<ul style="list-style-type: none"> <li>• Substantial footwear (boots) and long pants should be worn to protect from bites.</li> <li>• Look carefully for snakes and animals before stepping into any area or before placing hands near the ground. Visual scans should be made periodically during the day.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Marine Surveys		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	Unstable/ Irregular walking surface. Slips/Trips/Falls	<ul style="list-style-type: none"> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible. Look for depressions and obstructions.</li> <li>• Be conscious of potential footing hazards when walking on slopes or in areas with potential footing hazards.</li> <li>• Maintain awareness, especially in areas where topography varies, and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>• Tools and supplies/equipment will be properly stored to maintain safe and orderly work areas.</li> </ul>
2. Conducting bathymetric surveys and geophysical surveys (sub-bottom profiling, GPR etc.) from small boat.	Working around water and in small boat. Falling into Water other boat traffic interactions (large wakes)	<ul style="list-style-type: none"> <li>• Coast Guard approved flotation equipment, PFD's Type I, II, or selected Type III (i.e., Mustang Survival work suits &amp; Jackets, at discretion ESS) will be worn when in boat or on the dock, in areas without adequate safety rails (&lt;3-ft).</li> <li>• Survey vessels will display day-shapes to communicate to boat traffic that there is gear in the water (i.e., towfish or other instrumentation), and that the survey vessel has limited maneuverability.</li> <li>• Survey vessels will monitor VHF Channel 16</li> <li>• Survey vessels will avoid operating in shipping channels as much as is practicable, and will be aware of the possibility of large ship wakes.</li> <li>• Set of oars and emergency horn shall be available in the boat prior to operation.</li> <li>• No standing or leaning over edge in small boats.</li> <li>• Comply with Coast Guard right-of-way rules.</li> <li>• Use horn to signal or warn other boats as appropriate.</li> <li>• Suspend work during bad weather or poor visibility.</li> <li>• Have experienced boat crews operate vessel</li> <li>• Ensure boat manufactures recommendation for operation and load limits are followed.</li> <li>• At least one US Coast Guard approved lifesling attached to approximately 100 feet of rope will be located on the boat. The hydrographic and geophysical crew vehicle will also have a rescue throw rope.</li> </ul>
	Insufficient information/inadequate training to perform the marine surveys. High potential for injury to untrained personnel	<p>Training will consist of:</p> <ul style="list-style-type: none"> <li>• Pre-Activity briefing covering this SHSP. Also daily briefing.</li> <li>• Ensure that all operators are trained prior to using equipment. This training will include operator's manual review and actual operation.</li> <li>• Crew familiarization with tasks and H&amp;S controls addressed in this SHSP.</li> <li>• Personnel shall receive boating safety training/briefing from the Handbook of Wisconsin Boating Laws and Responsibilities. (See Appendix E)</li> <li>• Emergency response requirements in this SHSP.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Marine Surveys		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• At least two members of each field crew (survey boat) shall be CPR/First Aid Trained.</li> <li>• An AED shall be kept on the boats, will be operating and close by should it be needed.</li> </ul>
	Failure to inspect equipment properly could cause workers to use defective or unsafe equipment causing injury to workers and possible damage to the equipment or the environment.	<ul style="list-style-type: none"> <li>• Verify that equipment is inspected per manufactures recommendation each day before use, and there is an owner/operator's manual available.</li> </ul>
	Adverse weather. High winds and rain and/or snow storms, high water flow in river. Struck by lightning	<ul style="list-style-type: none"> <li>• If adverse weather is affecting crew's safety, work will be halted until conditions improve. (i.e., wind, snow, rain etc.)</li> <li>• Area is prone to windstorms during the spring, when this work is anticipated to occur.</li> <li>• If road conditions are too bad to access the work site, the work will be postponed until conditions improve.</li> <li>• In the case of extreme weather, vessel operations may be delayed.</li> <li>• At no time will personnel and equipment enter the river, if the flow rate exceeds 1,500 CFS.</li> <li>• Follow the 10-second rule (time between lightning strike and thunder) for shutdown of operations. Immediately suspend operations when lightning is in the immediate vicinity and seek shelter.</li> </ul>
	Fueling boat	<ul style="list-style-type: none"> <li>• Check the entire fuel system for leaks. Tighten connections frequently. Engine vibration can loosen them.</li> <li>• Turn off all engines and electrical equipment; shut off all fuel valves; and close all windows, doors and openings.</li> <li>• Try to fuel in daylight. If light is required, use a flashlight or a light that is spark-proof.</li> <li>• Never smoke or strike a match while fueling or when near a fueling dock.</li> <li>• When filling a tank or gas can, follow these guidelines: <ul style="list-style-type: none"> <li>• Remove portable tanks from the vessel.</li> <li>• Touch the fuel pipe or tank with the spout to prevent buildup of static electricity.</li> <li>• Never fill a tank to the brim. Leave room for gas to expand.</li> <li>• After fueling, put the fill cap on tightly to prevent vapors from escaping.</li> <li>• Immediately wipe up any spilled gas.</li> <li>• Air out the rag after using it. Never throw it in the vessel or the water.</li> </ul> </li> <li>• Store gas onboard in a safety-approved storage tank, away from the engine in an area of good ventilation.</li> <li>• Refueling should be performed on land as often as possible (i.e. @ auto gas station, not</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Marine Surveys		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>via gas cans).</li> <li>Funnels will be used when filling gas tanks from portable gas cans.</li> <li>Sorbent pads will be placed under and/or around item being fueled to capture any spills.</li> <li>To the extent possible fuel all systems before launching the boat so that on water refueling is kept to a minimum.</li> </ul>
	Chemicals brought on site	<ul style="list-style-type: none"> <li>Reference EHS Program EHS 4-2.</li> <li>Identify all chemical hazards and receive training (Haz Com-Material Safety Data Sheets/MSDS) regarding safe handling and storage of chemicals.</li> <li>The ESS maintains copies of all MSDS for chemicals that are on site.</li> <li>A portable 15-minute eye wash station will be located by the work area.</li> </ul>
	Boating activities	<ul style="list-style-type: none"> <li>Boat Captains shall be USCG licensed</li> <li>Prior to placing boats, survey equipment and personnel on the river, the river's flow rate will be assessed. At no time will personnel and equipment enter the river, if the flow rate exceeds 1,500 cubic feet per second (as measured by the nearby USGS flow monitoring station).</li> <li>Debris may present a significant hazard to personnel during survey activities. During cold weather (&lt;40° F) blanket shall be on the survey vessel and the vessel will be kept warm, in the event that personnel get wet.</li> <li>Due to the potential for limited rescue capability and other emergency impedances, activities on the river will be limited to one half hour before sunrise to one half hour after sunset. Personnel should allow sufficient time to shutdown operations at the end of each day to ensure personnel are off of the river by the specified time.</li> <li>Survey Boats shall have adequate lights (navigation and "head lights" / spot lights for safe operation during dawn/dusk and after dark if necessary.</li> <li>Boat launches with adequate lighting will be used to the greatest extent possible</li> <li>If working in the vicinity of the De Pere Dam additional precautions will be taken to insure safe boat operations are conducted. This will include use of one or several of the following safety precautions; inclusion of an auxiliary motor (i.e. "kicker" motor) on the survey vessel, use of a tagline(s) to the river back, use of one or several points of anchor, installation of a cable which would prevent the survey boat and/or crew from passing over the dam.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Marine Surveys		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	Failure to have proper medical supplies, emergency supplies, and PFDs during emergency could result in inadequate treatment of personnel or potentially increase injuries.	<ul style="list-style-type: none"> <li>• Ensure that PFDs are available for each person and in good usable condition.</li> <li>• First-aid kit and supplies are available.</li> <li>• Oars, emergency horn, life ring, fire extinguisher are available. (Fire extinguisher shall be at least a 10lb. ABC type.)</li> <li>• Cell phone is available and working for emergency notifications.</li> </ul>
	Back Injuries and Strains	<ul style="list-style-type: none"> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	Communication	<ul style="list-style-type: none"> <li>• Field personnel will use cellular telephones with adequate coverage to communicate with individuals off site.</li> <li>• Field personnel will use two-way radios with adequate coverage to communicate with the Coast Guard off site.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Boats</li> <li>2. Appropriate PPE</li> <li>3. Hand and Power Tools</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all boats daily.</li> <li>2. Inspect all hand and power tools prior to use.</li> <li>3. Inspect all PPE prior to use.</li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this SHSP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Qualified operators will be used for heavy equipment and boat operation.</li> <li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>5. Instruct personnel of proper use of fire extinguishers.</li> <li>6. Personnel will be trained on the proper use of hand and power tools, including the steam cleaner.</li> </ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Construct Haul Roads**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Construct Haul Road	a. Noise	a. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards</li> </ul>
	b. Heavy Equipment Operation	b. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius. This area will be delineated with cones.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15 foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	c. Struck By/Against	c. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> </ul>
	d. Equipment Rollover	d. Equipment Rollover <ul style="list-style-type: none"> <li>• Equipment will have rollover protective structures and seat belts.</li> <li>• Operators will wear seat belts when operating equipment.</li> <li>• Do not operate equipment on grades which exceed the manufacturer's recommendations.</li> <li>• Be aware of weather and road conditions.</li> <li>• A spotter will be used when loading equipment in high traffic areas.</li> <li>• Do not load equipment on unstable ground.</li> <li>• Run articulated equipment up and down slopes – not at an angle.</li> </ul>
	e. Caught In/Between	e. Caught In/Between <ul style="list-style-type: none"> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within loading areas are accounted for and out of the way.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Construct Haul Roads**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	f. Vehicular Traffic	f. Vehicular Traffic <ul style="list-style-type: none"> <li>• Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.</li> <li>• Establish one-way (if possible) traffic routes for loaded trucks, so that they can keep the same path while moving dirt.</li> <li>• Traffic control patterns may be modified based on changed conditions (as observed) due to weather or due to modified operations at the site.</li> </ul>
	g. Struck by Heavy Equipment/Vehicles	g. Struck by Heavy Equipment/Vehicles <ul style="list-style-type: none"> <li>• Speed limit for traffic is 15 mph for all areas of the site.</li> <li>• Trucks shall slow down before approaching loading/unloading area.</li> <li>• Operators will remain in truck when being loaded.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment without making eye contact with the operator.</li> <li>• Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. Equipment operators will confirm that eye contact has been made by stopping operation and clearly showing their hands are off the controls.</li> <li>• Be aware of heavy equipment operations.</li> <li>• Keep out of the swing radius of heavy equipment.</li> <li>• Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times.</li> <li>• Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone.</li> <li>• Ground personnel will not stand directly behind heavy equipment when it is in operation.</li> <li>• Loaded trucks have right of way.</li> <li>• Leave ½ truck length between the truck being loaded and the next truck in line.</li> </ul>
	h. Unstable Soils	h. Unstable Soils <ul style="list-style-type: none"> <li>• Prior to beginning construction in an area, evaluate and locate areas with unstable soils.</li> <li>• Notify all personnel of areas with unstable soils. Do not run high pressure equipment (i.e., articulating trucks) in these areas until soils have been stabilized.</li> <li>• Build roads suitable to handle equipment traffic prior to beginning dirt/stone hauling.</li> <li>• During hauling operations, keep soft areas/ruts filled and compacted. Do not allow off-road trucks to continually run over ruts.</li> <li>• Off-road trucks should vary their path on the haul roads.</li> </ul>

<b>Project: Lower Fox River OUs 2 through 5, Volume I Activities</b>		<b>Location: Brown, Outagamie, and Winnebago Counties, Wisconsin</b>
<b>Activity: Construct Haul Roads</b>		
<b>MAJOR STEPS</b>	<b>POTENTIAL HAZARDS</b>	<b>PROTECTIVE MEASURES/CONTROLS</b>
	i. Rollovers	i. Rollovers <ul style="list-style-type: none"> <li>• Equipment will have rollover protective structures and seat belts.</li> <li>• Operators will wear seat belts when operating equipment.</li> <li>• Equipment will not be operated on grades which exceed manufacturer's recommendations.</li> <li>• Run articulated equipment (i.e., rollers, trucks) up and down slopes – not at an angle.</li> </ul>
<b>EQUIPMENT USED</b>	<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>
1. Heavy Equipment/Trucks 2. Appropriate PPE 3. Portable Eyewash 4. First Aid Kits 5. 20A:B:C Fire Extinguisher	1. Inspect all vehicles daily. 2. Inspect all heavy equipment prior to use. 3. Inspect all PPE prior to use. 4. Inspect portable eye washes and first aid kits weekly. 5. Inspect fire extinguishers weekly.	1. All site personnel will read and comply with this HASP. 2. All site personnel will receive site specific training. 3. Qualified operators will be used for heavy equipment operation. 4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training. 5. Instruct personnel of proper use of fire extinguishers.

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Sheet Pile Wall Installation**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. False Work and Temporary Bracing Installation	a. Noise	a. Noise <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	b. Dropped Objects	b. Dropped Objects <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• A security zone will be established around the crane. No personnel will enter this area when the crane is in operation.</li> <li>• No person will stand under an unsecured load.</li> </ul>
	c. Crane Operations	c. Crane Operations <ul style="list-style-type: none"> <li>• Only qualified persons will operate equipment.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• High Visibility safety vests will be worn in all work areas.</li> <li>• All heavy equipment will be equipped with backup alarms.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• All vehicles will be equipped with rear-view mirrors on both sides of cab.</li> <li>• Only one spotter will be used to communicate with the crane operator.</li> <li>• All cranes are to have swing protection demarcated and only authorized personnel will be allowed in this area during a lift.</li> <li>• Operators will be aware of their surroundings at all times.</li> <li>• Perform vehicle walk around before operating.</li> <li>• Operators will honk their horn twice before starting equipment or initiating operations after the equipment has set idle for a long period of time.</li> <li>• Do not work at wind speeds or weight loads above those recommended in the operator's manual.</li> <li>• All cranes to be outfitted with anti-two-block protection.</li> <li>• All cranes must have annual inspection reviewed before use; daily inspections and competent person named for conducting inspections; load chart available, operator must know how to read a load chart and be deemed competent by TtEC.</li> <li>• All bolts are to be fully hand torqued and 100% installed before crane (rigging) is released.</li> <li>• Ensure outriggers are fully extended and ground surface is able to support the crane during lift operations. Use equipment mats to provide additional stability if necessary.</li> <li>• List should be taken into account when cranes are mounted to barges.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Sheet Pile Wall Installation**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	d. Lifting/Rigging	d. Lifting/Rigging <ul style="list-style-type: none"> <li>• The equipment used for lifting should be positioned as near as possible to the load, while maintaining a safe operating distance. The operator shall verify that the load line is vertical and over the load's center of gravity prior to lifting the load to ensure that the load does not drift when lifted.</li> <li>• All overhead hazards will be identified prior to commencing work operations. A minimum safe distance of 15 feet shall be maintained from power lines rated 50 kV or less.</li> <li>• The swing area of the lifting equipment is barricaded to protect personnel in the immediate area.</li> <li>• All rigging will be tagged with its lifting capacity.</li> <li>• All chokers, slings and lifting gear shall be inspected daily (both nylon and steel) and shall be free from defects prior to use.</li> <li>• Loads are not lifted over personnel.</li> <li>• All loose load objects are secured or removed.</li> <li>• Tag lines are used to control loads except where their use will create a hazard.</li> <li>• The equipment performing the lift is not subjected to sudden lifting, stopping or impact loading.</li> <li>• Riding on loads, hooks, buckets, material hoists, or other material hoisting equipment not meant for personnel use is absolutely prohibited.</li> <li>• The total weight of the load to be lifted, including all lifting beams, rigging, hooks and attachments, shall be determined before a safe lift can be planned.</li> <li>• The determination of the exact location of the center of gravity of the load is critical in ensuring that the load is rigged in a stable configuration. The location of the attachments of the rigging to the load should be above the center of gravity where possible.</li> <li>• The load shall be safely rigged within the rated capacity of all rigging equipment.</li> <li>• Custom designed grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125% of their rated load.</li> </ul>
	e. Overhead Hazards	e. Overhead Hazards <ul style="list-style-type: none"> <li>• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1 when an overhead hazard exists.</li> <li>• All ground personnel will stay clear of suspended loads and equipment swing areas.</li> <li>• All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects.</li> <li>• All overhead hazards will be identified prior to commencing work operations.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sheet Pile Wall Installation		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• A 15-foot clearance will be maintained at all times.</li> </ul>
	f. Eye Injuries	f. Eye Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	g. Slips/Trips/Falls	g. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards</li> <li>• Personnel will immediately communicate slip/trip/fall hazards to employees and supervisors.</li> <li>• Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified.</li> <li>• Fall protection (e.g., guardrails or personal fall protection system) is required when working 6' above the ground.</li> <li>• Personnel will be trained to use and inspect fall protection systems.</li> <li>• All lifelines / harnesses / and lanyards shall be inspected and in acceptable working condition prior to use.</li> <li>• Personal fall arrest systems shall meet the criteria specified in 29 CFR 1926.502(d) and guardrail systems and their use shall comply with 29 CFR 1926.502(b). Refer to Section 3.3.5.</li> <li>• Ensure that loads are properly distributed in all small boats.</li> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type I, III or V Life Preservers at all times while on the water.</li> <li>• Personnel will use care when exiting entering the craft from the water and ensure they have solid footing before climbing in/out</li> <li>• Personnel will ensure that they are in no more than one foot of water when entering/exiting the craft, unless the personnel are in waders.</li> <li>• The following procedure will be used when launching/docking any water craft <ul style="list-style-type: none"> <li>❖ Personnel shall know the weight of the water craft and motor prior to launching docking</li> <li>❖ Boat motor will be pulled up before it contacts the river bottom</li> <li>❖ Personnel will take note of wind speed and direction, current and tidal height before shutting off/turning on the boat motor</li> <li>❖ All personnel will carefully exit the water craft</li> <li>❖ No personnel shall lift in excess of 50 pounds</li> <li>❖ Personnel will remove/put in any small boat to the edge of the water with minimal dragging of the boat across the dry land.</li> <li>❖ Mechanical devices will be used in lieu of manual labor to remove from/put into the water; water craft in excess of 300 pounds weight for boat and motor.</li> </ul> </li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sheet Pile Wall Installation		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>❖ A light duty trailer can be used in lieu of manual lifting, if a light duty trailer is used personnel must lift up the front of the boat, manually with a minimum of two people.</li> <li>• Any hoisting device used to pull up/let down the boat will be: properly maintained and serviced according to manufacturer's specifications; capable of lifting the weight of the load being hoisted; checked before each hoist and operated by qualified knowledgeable personnel.</li> </ul>
	h. Working Over Water	h. Working Over Water <ul style="list-style-type: none"> <li>• Personnel working over water will be required to wear PFDs when not in equipment.</li> </ul>
	i. Struck By/Against	i. Struck By/Against <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Caution will be used offloading the boat from the trailer-clear the area of all non-essential personnel.</li> <li>• All boats will be securely anchored or docked-docked boats will be positioned with minimum 2 lines.</li> <li>• Ensure the boat is properly secured to the boat trailer before transporting.</li> <li>• Ensure there is sufficient room to drive through when trailering the boat on narrow streets.</li> <li>• Watch for (know their locations or mark with buoys) objects hidden under water at higher tides i.e. pilings, islands, anchor lines.</li> <li>• Caution will be used offloading the boat-personnel will ensure the boat is securely docked before embarking. All supply transfer work will be done only when boats are docked fore and aft.</li> <li>• All boats will be securely anchored or docked-docked boats will be positioned with minimum 2 lines.</li> <li>• Never pitchpole or broach any waves.</li> <li>• Ensure the air horn on each boat used is in proper working order.</li> <li>• Ladders will be free of ice and snow before climbing.</li> <li>• Personnel will understand and review hand signals.</li> <li>• Only one spotter will be used with each piece of equipment.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel on the barge are accounted for and out of the way.</li> <li>• All cranes are to have swing protection demarcated.</li> <li>• Only operator shall be on crane during operation.</li> <li>• No personnel will be allowed to walk or do any work under any loads being picked.</li> <li>• Personnel will be aware of overhead operations.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<p>equipment and must not approach heavy equipment with out making eye contact with the operator.</p> <ul style="list-style-type: none"> <li>• All cranes are to have swing protection demarcated and only authorized personnel will be allowed in this area during a lift.</li> <li>• Operators will be aware of their surroundings at all times.</li> <li>• Operators will honk their horn twice before starting equipment or initiating operations after the equipment has set idle for a long period of time.</li> <li>• Do not work at wind speeds or weight loads above those recommended in the operator’s manual.</li> <li>• Tag lines will be used during the picking and setting of the anchors. Use tag lines to minimize swinging of objects being moved. Tag lines are used to control loads except where their use will create a hazard.</li> <li>• Barge will be spudded in place. All personnel not associated with the spud operation will stay a minimum of 20 feet out of the spud dropping area.</li> <li>• Only qualified personnel will drop the spud/operate the winch. The operator will be seated in the winch operators chair and will not operate the winch until given the all clear that personnel are out of the spud drop areas.</li> <li>• The wheels of the spuds are located below deck and therefore do not pose a struck by/caught in hazard.</li> <li>• All winch cables will be clearly marked and/or cordoned off- 90% of the cables are covered by metal plating, the +/- 10 % that are exposed are demarcated by yellow paint on the barge deck. Personnel will not be allowed in this demarcated area when the spuds are being dropped.</li> <li>• The spud winch is located in the barge house on deck. When this winch is in operation the water tight door to this house will be closed and a sign posted –DO NO ENTER.</li> </ul>
	j. Man Overboard/Drowning	<p>j. Man Overboard/Drowning</p> <ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• As per OSHA requirements (29 CFR 1926.501(b)(1)) and EM 385-1-1 Section 19.A.07, guardrails are required on working platforms for barges that are 6 feet or more above the water.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• A Coast Guard approved Type IV flotation device (life ring) will be maintained on each barge.</li> <li>• Water craft will not be used without shore support personnel with rescue skiff available</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<p>onshore.</p> <ul style="list-style-type: none"> <li>• All persons on board will remain seated/standing securely whenever a water craft is moving.</li> <li>• Maximum weight capacity for water craft will not be exceeded.</li> <li>• Barges will be equipped with perimeter guardrails.</li> <li>• Water craft will be operated with a minimum of two personnel on board.</li> <li>• Water craft will not be used without shore support personnel.</li> <li>• A line extended from the water craft to the shore will always be available, so that shore personnel are able to retrieve water craft remotely in the event of an emergency.</li> <li>• Personnel on board water craft must be in constant radio contact with shore personnel.</li> <li>• Non slip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways.</li> <li>• All barge deck obstructions will be removed if possible, if not possible to remove them they shall be clearly marked with yellow paint.</li> </ul>
	k. Sinking Boat/Barge Damage	<p>k. Sinking Boat/Barge Damage</p> <ul style="list-style-type: none"> <li>• All water craft not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS).</li> <li>• A pre-use inspection of any rented vessel shall be completed, including a video documentation of pre-use conditions.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• Tide tables will be consulted and times of high tide, when it is most safe to move barges, will be identified.</li> <li>• In the event a barge or boat becomes grounded at times of low tide, no attempt will be made to move the barge until enough water returns to refloat it.</li> <li>• The 35-ton crane will be set on mats with outriggers fully extended on Mats for stability.</li> <li>• The crane will be anchored to the deck by means of four chain binders of sufficient size and strength to stabilize the crane. These will be secured to anchor points on the barge deck.</li> <li>• The Marine Survey will be done in floating plant mode and will include the Crane matting and binder system.</li> <li>• The Marine Survey will be done by competent/qualified person and shall include stability calculations for crane lifts.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sheet Pile Wall Installation		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>The crane operator and Project Engineer will fully understand the stability calculations and adhere to them.</li> <li>Load test will be performed prior to cranes initial use and a lift plan will be developed prior to the pile driving.</li> <li>The provisions of EM 385-1-1 Section 16 Marine Floating Plants and CFR 29 1926 and 1910 Subparts N as well as 29 CFR 1926.603 shall be followed.</li> </ul>
	i. Water Craft Taking On Water	i. Water Craft Taking On Water <ul style="list-style-type: none"> <li>All personnel will ensure the water craft has a working plug firmly in place prior to launch</li> <li>The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>Tide tables will be consulted and times of high tide, when it is most safe to launch/dock, will be identified.</li> <li>All water craft will have a bailing device on board in case of leaks.</li> <li>If the water craft begins to take on water for any reason it shall be brought in to the nearest safe docking facility as soon as possible and the ESS immediately called.</li> <li>Any water craft which is damaged in any way or has taken on water will be inspected by the ESS or designee prior to the craft being launched.</li> </ul>
	m. Water Craft Operation Risks	m. Water Craft Operation Risks <ul style="list-style-type: none"> <li>All barge and boat pilots shall be familiar with the "Rules of the Road" that regulate movement of boat traffic within the harbor.</li> <li>Barge will be equipped with day markers and proper lighting-if moored at night.</li> <li>Charts of the study areas, with depths for mean low water, will be obtained and water craft pilots will be familiar with their use.</li> <li>Locations of rocks, ledges and manmade subsurface obstructions will be noted within the work area. These will be given a wide berth.</li> <li>All harbor boating regulations will be strictly observed; prudent speed limits will be followed at all times.</li> <li>All water craft must have required Coast Guard approved lighting and signaling devices.</li> <li>Reference the Offshore Work AHA for boating applications.</li> </ul>
	n. Equipment Lost Overboard/Crushed	n. Equipment Lost Overboard/Crushed <ul style="list-style-type: none"> <li>Instruments shall not be placed near the moon pool or edge of the barge/boat when not in use/not secured.</li> <li>Equipment will be secured to the deck or to personnel when appropriate. Secure all radios and cell phones.</li> <li>Instruments will be kept clear of all tooling lay down areas. Good housekeeping will be</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sheet Pile Wall Installation		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin						
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS						
		critical on the barge/boat. <ul style="list-style-type: none"> <li>All small equipment will have a backup tie line attached to the vessel if they are used at or over the edge of the vessel.</li> </ul>						
	o. Emergencies: Fire, Weather, and Medical/Spills/Releases	o. <u>Emergencies</u> : Fire, Weather, and Medical/Spills/Releases <ul style="list-style-type: none"> <li>Fire extinguishers will be carried on all launches, barges, and motorboats. Minimum number and rating are as follows: <table border="0"> <tr> <td style="text-align: center;"><u>Length</u></td> <td style="text-align: center;"><u>Extinguisher</u></td> </tr> <tr> <td style="text-align: center;">26 feet or less</td> <td style="text-align: center;">one 1-A: 10-B:C</td> </tr> <tr> <td style="text-align: center;">26 feet or more</td> <td style="text-align: center;">two 1-A: 10-B:C</td> </tr> </table> </li> <li>Barge/open boat workers shall be evacuated to shore or secure location by tenderboat when lightning is spotted or threatens the area.</li> <li>Medical emergencies will be handled as they are onshore except when low or no water renders a boat evacuation impossible.</li> <li>Booms shall be placed in the water around the perimeter of the barge to prevent any fuel or hydraulic spills from spreading.</li> <li>Personnel shall evacuate the boat/barge if a fire can not be contained with one 10 LB fire extinguisher</li> <li>Spill kits shall be maintained onboard barges to keep any hydrocarbon spill from reaching the water.</li> </ul>	<u>Length</u>	<u>Extinguisher</u>	26 feet or less	one 1-A: 10-B:C	26 feet or more	two 1-A: 10-B:C
<u>Length</u>	<u>Extinguisher</u>							
26 feet or less	one 1-A: 10-B:C							
26 feet or more	two 1-A: 10-B:C							
2. Sheet Pile Installation	a. Slips/Trips/Falls	a. Slips/Trips/Falls <ul style="list-style-type: none"> <li>Reference General Site Hazards</li> <li>Personnel will immediately communicate slip/trip/fall hazards to employees and supervisors.</li> <li>Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified.</li> <li>Fall protection (e.g., guardrails or personal fall protection system) is required when working 6' above the ground.</li> <li>Personnel will be trained to use and inspect fall protection systems.</li> <li>All lifelines / harnesses / and lanyards shall be inspected and in acceptable working condition prior to use.</li> <li>Personal fall arrest systems shall meet the criteria specified in 29 CFR 1926.502(d) and guardrail systems and their use shall comply with 29 CFR 1926.502(b). Refer to Section 3.3.5.</li> </ul>						

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sheet Pile Wall Installation		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	b. Dropped Objects	b. Dropped Objects <ul style="list-style-type: none"> <li>• Steel toe boots meeting ANSI Standard Z41 will be worn.</li> <li>• A security zone will be established around the crane. No personnel will enter this area when the crane is in operation.</li> <li>• No person will stand under an unsecured load.</li> </ul>
	c. Struck By/Against	c. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• Only one spotter will be used with each piece of equipment. Spotter will ensure he has eye contact with the crane operator and the power pak operator.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel on the barge are accounted for and out of the way.</li> <li>• Only operator shall be on crane during operation.</li> <li>• No personnel will be allowed to walk or do any work under any loads being picked.</li> <li>• Personnel will be aware of overhead operations.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment with out making eye contact with the operator.</li> <li>• Operators will be aware of their surroundings at all times.</li> <li>• Operators will honk their horn twice before starting equipment or initiating operations after the equipment has set idle for a long period of time.</li> <li>• Do not work at wind speeds or weight loads above those recommended in the operator's manual.</li> <li>• Tag lines will be used during the picking and setting of the anchors. Use tag lines to minimize swinging of objects being moved. Tag lines are used to control loads except where their use will create a hazard.</li> <li>• Swing radius of the crane will be demarcated with caution tape or cones. Extreme caution shall be exercised when working in the proximity to the crane aboard the barge. No one shall enter the swing radius while the crane is working. All personnel shall contact the crane operator before entering the swing area when the machine is not working in order to guarantee a safe passage.</li> <li>• Hand signals will be reviewed prior to the start of work.</li> <li>• The power pak operator and crane operator will have a clear visual field of the pile.</li> <li>• Piles will be initially lifted using the crane and a chain choke. The chain will be properly rated and designed especially for Pile picks. Proper rigging of the choke will be done a minimum of 10 feet from the top of the pile.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Sheet Pile Wall Installation**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• The crane will lift the pile with the aid of a spotter and the piles will be lifted to upright position and placed in the location where it is to be driven-operator will ensure the piles are securely in the soil before releasing tension on the choker.</li> <li>• Personnel who remove the choker will not stand under any load nor the block of the crane.</li> <li>• Crane will be equipped with a vibratory hammer, with wood boot, which holds the piles in place (using the wood boot grappler attachment)-operator will ensure the piles are securely gripped before proceeding. The piles may then be pushed or vibrated into the sediment based on the type of sediment encountered.</li> <li>• No visitors will be allowed on the barge.</li> <li>• No personnel are permitted up on/or near the Crane when pile driving operations are occurring.</li> <li>• Overhead protection, which will not obscure the vision of the operator, shall be provided.</li> <li>• Personnel will be aware of pinch points-no personnel will put their hands or any body part between any moving object and a stationary object.</li> <li>• Barge will be spudded in place. All personnel not associated with the spud operation will stay a minimum of 20 feet out of the spud dropping area.</li> <li>• Only qualified personnel will drop the spud/operate the winch. The operator will be seated in the winch operators chair and will not operate the winch until given the all clear that personnel are out of the spud drop areas.</li> <li>• The wheels of the spuds are located below deck and therefore do not pose a struck by/caught in hazard.</li> <li>• All winch cables will be clearly marked and/or cordoned off- 90% of the cables are covered by metal plating, the +/- 10 % that are exposed are demarcated by yellow paint on the barge deck. Personnel will not be allowed in this demarcated area when the spuds are being dropped.</li> <li>• The spud winch is located in the barge house on deck. When this winch is in operation the water tight door to this house will be closed and a sign posted –DO NO ENTER.</li> <li>• Guards shall be provided on all sheaves to prevent cables from jumping out of sheaves.</li> <li>• Guys, outriggers, thrustouts, or counterbalances shall be provided as necessary to maintain stability of pile driver rigs.</li> <li>• Keep access steps and ladders free from oil.</li> <li>• Work taking place above 6 feet requires fall protection.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	d. Man Overboard/Drowning	d. Man Overboard/Drowning <ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• As per OSHA requirements (29 CFR 1926.501(b)(1)) and EM 385-1-1 Section 19.A.07, guardrails are required on working platforms for barges that are 6 feet or more above the water.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• A Coast Guard approved Type IV flotation device (life ring) will be maintained on each barge.</li> <li>• Water craft will not be used without shore support personnel with rescue skiff available onshore.</li> <li>• All persons on board will remain seated/standing securely whenever a water craft is moving.</li> <li>• Maximum weight capacity for water craft will not be exceeded.</li> <li>• Barges will be equipped with perimeter guardrails.</li> <li>• Water craft will be operated with a minimum of two personnel on board.</li> <li>• Water craft will not be used without shore support personnel.</li> <li>• A line extended from the water craft to the shore will always be available, so that shore personnel are able to retrieve water craft remotely in the event of an emergency.</li> <li>• Personnel on board water craft must be in constant radio contact with shore personnel.</li> <li>• Non slip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways.</li> <li>• All barge deck obstructions will be removed if possible, if not possible to remove them they shall be clearly marked with yellow paint.</li> </ul>
	e. Sinking Boat/Barge Damage	e. Sinking Boat/Barge Damage <ul style="list-style-type: none"> <li>• All water craft not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS).</li> <li>• A pre-use inspection of any rented vessel shall be completed, including a video documentation of pre-use conditions.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• Tide tables will be consulted and times of high tide, when it is most safe to move barges,</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<p>will be identified.</p> <ul style="list-style-type: none"> <li>• In the event a barge or boat becomes grounded at times of low tide, no attempt will be made to move the barge until enough water returns to refloat it.</li> <li>• The crane will be set on mats with outriggers fully extended on mats for stability.</li> <li>• The crane will be anchored to the deck by means of four chain binders of sufficient size and strength to stabilize the crane. These will be secured to anchor points on the barge deck.</li> <li>• The crane operator and Project Engineer will fully understand the stability calculations and adhere to them.</li> <li>• Load test will be performed prior to cranes initial use and a lift plan will be developed prior to the pile driving.</li> <li>• The provisions of EM 385-1-1 Section 16 Marine Floating Plants and CFR 29 1926 and 1910 Subparts N as well as 29 CFR 1926.603 shall be followed.</li> </ul>
	f. Water Craft Taking On Water	<p>f. Water Craft Taking On Water</p> <ul style="list-style-type: none"> <li>• All personnel will ensure the water craft has a working plug firmly in place prior to launch.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• Tide tables will be consulted and times of high tide, when it is most safe to launch/dock, will be identified.</li> <li>• All water craft will have a bailing device on board in case of leaks.</li> <li>• If the water craft begins to take on water for any reason it shall be brought in to the nearest safe docking facility as soon as possible and the ESS immediately called.</li> <li>• Any water craft which is damaged in any way or has taken on water will be inspected by the ESS or designee prior to the craft being launched.</li> </ul>
	g. Hot Work	<p>g. Hot Work</p> <ul style="list-style-type: none"> <li>• A Hot Work Permit will be issued prior to all chop saw cutting, burning, grinding or any other activities that will cause sparks while working.</li> <li>• A 20 lb. ABC type fire extinguisher will readily available within 50' of all Hot Work Permit Operations.</li> <li>• Workers performing hot work will wear appropriate PPE as specified in the Hot Work Permit.</li> <li>• Oxygen and acetylene cylinders and hoses will be stored properly (i.e., secured and separated appropriately) and maintained in good condition.</li> <li>• Only qualified workers will perform hot work. Workers will inspect their PPE and equipment prior to performing hot work.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS						
	h. Water Craft Operation Risks	h. Water Craft Operation Risks <ul style="list-style-type: none"> <li>• All barge and boat pilots shall be familiar with the “Rules of the Road” that regulate movement of boat traffic within the harbor.</li> <li>• Barge will be equipped with day markers and proper lighting-if moored at night.</li> <li>• Charts of the study areas, with depths for mean low water, will be obtained and water craft pilots will be familiar with their use.</li> <li>• Locations of rocks, ledges and manmade subsurface obstructions will be noted within the work area. These will be given a wide berth.</li> <li>• All boating regulations will be strictly observed; prudent speed limits will be followed at all times.</li> <li>• All water craft must have required Coast Guard approved lighting and signaling devices.</li> </ul>						
	i. Flying Objects and Debris	i. Flying Objects and Debris <ul style="list-style-type: none"> <li>• ANSI approved safety glasses will be worn at all times while on the water.</li> <li>• All objects pulled up from the water will be brought aboard slowly to check for contamination or entanglement.</li> </ul>						
	j. Equipment Lost Overboard/Crushed	j. Equipment Lost Overboard/Crushed <ul style="list-style-type: none"> <li>• Instruments shall not be placed near the moon pool or edge of the barge/boat when not in use/not secured.</li> <li>• Equipment will be secured to the deck or to personnel when appropriate. Secure all radios and cell phones.</li> <li>• Instruments will be kept clear of all tooling lay down areas. Good housekeeping will be critical on the barge/boat.</li> <li>• All small equipment will have a backup tie line attached to the vessel if they are used at or over the edge of the vessel.</li> </ul>						
	k. <u>Emergencies: Fire, Weather, and Medical/Spills/Releases</u>	k. <u>Emergencies: Fire, Weather, and Medical/Spills/Releases</u> <ul style="list-style-type: none"> <li>• Fire extinguishers will be carried on all launches, barges, and motorboats. Minimum number and rating are as follows:               <table style="margin-left: 40px; border: none;"> <tr> <td style="text-align: center;"><u>Length</u></td> <td style="text-align: center;"><u>Extinguisher</u></td> </tr> <tr> <td style="text-align: center;">26 feet or less</td> <td style="text-align: center;">one 1-A: 10-B:C</td> </tr> <tr> <td style="text-align: center;">26 feet or more</td> <td style="text-align: center;">two 1-A: 10-B:C</td> </tr> </table> </li> <li>• Barge/open boat workers shall be evacuated to shore or secure location by tenderboat when lightning is spotted or threatens the area.</li> <li>• Medical emergencies will be handled as they are onshore except when low or no water renders a boat evacuation impossible.</li> <li>• Booms shall be placed in the water around the perimeter of the barge to prevent any fuel or</li> </ul>	<u>Length</u>	<u>Extinguisher</u>	26 feet or less	one 1-A: 10-B:C	26 feet or more	two 1-A: 10-B:C
<u>Length</u>	<u>Extinguisher</u>							
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**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		hydraulic spills from spreading. <ul style="list-style-type: none"> <li>• Personnel shall evacuate the boat/barge if a fire can not be contained with one 10 LB fire extinguisher.</li> <li>• Spill kits shall be maintained onboard barges to keep any hydrocarbon spill from reaching the water.</li> </ul>
	l. Water Jetting	l. Water Jetting <ul style="list-style-type: none"> <li>• Stop jetting at the specified distance (typically 3 feet) above the final pile tip elevation.</li> <li>• Drive piles the specified remaining distance (typically at least 3 feet) to the required resistance.</li> <li>• Water jetting may affect nearby structures by undermining and should normally not be performed in clay or silt soil.</li> <li>• Check resistance of nearby piles.</li> </ul>
	m. Back Injuries	m. Back Injuries <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	n. Hand and Power Tools	n. Hand and Power Tools <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	o. Working Over Water	o. Working Over Water <ul style="list-style-type: none"> <li>• Personnel working over water will be required to wear PFDs when not in equipment.</li> </ul>
	p. Overhead Hazards	p. Overhead Hazards <ul style="list-style-type: none"> <li>• Personnel will be required to wear hard hats that meet ANSI Standard Z-89-1.</li> <li>• Personnel will not stand under any suspended load.</li> <li>• Personnel will be aware of other personnel working on crane in area.</li> </ul>
	q. Eye Injury	q. Eye Injury <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
3. Tieback System Installation	a. Hot Work	a. Hot Work <ul style="list-style-type: none"> <li>• A Hot Work Permit will be issued prior to all chop saw cutting, burning, grinding or any other activities that will cause sparks while working.</li> <li>• A 20 lb. ABC type fire extinguisher will readily available within 50' of all Hot Work Permit Operations.</li> <li>• Workers performing hot work will wear appropriate PPE as specified in the Hot Work Permit.</li> <li>• Oxygen and acetylene cylinders and hoses will be stored properly (i.e., secured and separated appropriately) and maintained in good condition.</li> <li>• Only qualified workers will perform hot work. Workers will inspect their PPE and equipment prior to performing hot work.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	b. Fall into Excavation	b. Fall into Excavation <ul style="list-style-type: none"> <li>• Do not leave excavations open overnight whenever possible fill them.</li> <li>• Install open trench warning devices/barricades.</li> <li>• If deemed necessary, use the benching and sloping methods to prevent cave-ins (29 CFR 1926.652, Appendix B).</li> <li>• If necessary, stairways, ladders, or ramps shall be provided as means of egress in all trenches 4 feet or more in depth. Travel distance shall be no more than 25 feet between means of exit.</li> <li>• Protective systems are required on all excavations over 5 feet in depth or in excavations less than 5 feet when examination of the ground by a competent person reveals conditions that may result in cave-ins (29 CFR 1926.652, Appendices C &amp; D).</li> </ul>
	c. Heavy Equipment Operation	c. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius. This area will be delineated with cones.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15 foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	d. Noise	d. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	e. Overhead Hazards	e. Overhead Hazards <ul style="list-style-type: none"> <li>• Personnel will be required to wear hard hats that meet ANSI Standard Z-89-1.</li> <li>• Personnel will not stand under any suspended load.</li> <li>• Personnel will be aware of other personnel working on crane in area.</li> </ul>
	f. Working Over Water	f. Working Over Water <ul style="list-style-type: none"> <li>• Personnel working over water will be required to wear PFDs when not in equipment.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sheet Pile Wall Installation**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	g. Eye Injury	g. Eye Injury • Refer to General Site Hazards.
	h. Back Injuries	h. Back Injuries • Refer to General Site Hazards.
	i. Hand and Power Tools	i. Hand and Power Tools • Refer to General Site Hazards.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Crane/Vibratory Hammer</li> <li>2. Excavator</li> <li>3. Fire Extinguishers</li> <li>4. Spill Control Materials</li> <li>5. Appropriate PPE</li> <li>6. Portable Eyewash</li> <li>7. First Aid Kits</li> <li>8. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Daily inspections of all equipment will be conducted and documented before use.</li> <li>2. Daily inspection of all mechanical equipment on deck.</li> <li>3. Monthly inspections will be performed.</li> <li>4. Daily safety inspection of spill control materials will be conducted.</li> <li>5. Daily maintenance (fueling, oil, grease) will be conducted.</li> <li>6. Daily inspections for oil/grease buildup will be conducted.</li> <li>7. Daily inspections will be made.</li> <li>8. Daily inspections will be required before operation</li> <li>9. Initial review/training prior to commencement of field activities.</li> <li>10. Inspect all PPE prior to use.</li> <li>11. Inspect portable eye washes and first aid kits weekly.</li> <li>12. Inspect fire extinguishers weekly.</li> <li>13. Check and Test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this HASP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Only a qualified operator will be allowed to run the crane and drive the piles.</li> <li>4. Personnel will be trained in inspection checklist use.</li> <li>5. Personnel will be given instructions on proper use of fire extinguishers.</li> <li>6. Personnel will be given training on how to respond to spilled materials.</li> <li>7. Operators/pilots will be trained in engine maintenance.</li> <li>8. Requirements for housekeeping will be reviewed.</li> <li>9. Operators will be trained in proper use of these safety systems.</li> <li>10. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>11. Instruct personnel of proper use of fire extinguishers.</li> </ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Dredging around sheet piles	a. Noise	a. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards</li> </ul>
	b. Heavy Equipment Operation	b. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	c. Equipment Rollover	c. Equipment Rollover <ul style="list-style-type: none"> <li>• Equipment will have rollover protective structures and seat belts.</li> <li>• Operators will wear seat belts when operating equipment.</li> <li>• Do not operate equipment on grades which exceed the manufacturer's recommendations.</li> <li>• Be aware of weather and road conditions.</li> <li>• A spotter will be used when loading equipment in high traffic areas.</li> <li>• Do not load equipment on unstable ground.</li> <li>• Run articulated equipment up and down slopes – not at an angle.</li> </ul>
	d. Caught In/Between	d. Caught In/Between <ul style="list-style-type: none"> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within loading areas are accounted for and out of the way.</li> </ul>
	e. Vehicular Traffic	e. Vehicular Traffic <ul style="list-style-type: none"> <li>• Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.</li> <li>• Establish one-way (if possible) traffic routes for loaded trucks, so that they can keep the same path while moving dirt.</li> <li>• Traffic control patterns may be modified based on changed conditions (as observed) due to weather or due to modified operations at the site.</li> </ul>

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	f. Struck by Heavy Equipment/ Vehicles	f. Struck by Heavy Equipment/Vehicles <ul style="list-style-type: none"> <li>• Speed limit for traffic is 15 mph for all areas of the site.</li> <li>• Trucks shall slow down before approaching loading/unloading area.</li> <li>• Operators will remain in truck when being loaded.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment without making eye contact with the operator.</li> <li>• Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. Equipment operators will confirm that eye contact has been made by stopping operation and clearly showing their hands are off the controls.</li> <li>• Be aware of heavy equipment operations.</li> <li>• Keep out of the swing radius of heavy equipment.</li> <li>• Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times.</li> <li>• Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone.</li> <li>• Ground personnel will not stand directly behind heavy equipment when it is in operation.</li> <li>• Loaded trucks have right of way.</li> <li>• Leave ½ truck length between the truck being loaded and the next truck in line.</li> </ul>
	g. Overhead Hazards	g. Overhead Hazards <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	h. Eye Injury	h. Eye Injury <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	i. Slips/Trips/Falls	i. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas in a safe and orderly condition.</li> <li>• Watch for uneven terrain or rocks in walk areas.</li> <li>• Identify any other tripping hazards and remove them if at all possible.</li> </ul>
	j. Working Over Water	j. Working Over Water <ul style="list-style-type: none"> <li>• Personnel working over water will be required to wear PFDs when not in equipment.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	k. Man Overboard/Drowning	k. Man Overboard/Drowning <ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• As per OSHA requirements (29 CFR 1926.501(b)(1)) and EM 385-1-1 Section 19.A.07, guardrails are required on working platforms for barges that are 6 feet or more above the water.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• A Coast Guard approved Type IV flotation device (life ring) will be maintained on each barge.</li> <li>• Water craft will not be used without shore support personnel with rescue skiff available onshore.</li> <li>• All persons on board will remain seated/standing securely whenever a water craft is moving.</li> <li>• Maximum weight capacity for water craft will not be exceeded.</li> <li>• Barges will be equipped with perimeter guardrails.</li> <li>• Water craft will be operated with a minimum of two personnel on board.</li> <li>• Water craft will not be used without shore support personnel.</li> <li>• A line extended from the water craft to the shore will always be available, so that shore personnel are able to retrieve water craft remotely in the event of an emergency.</li> <li>• Personnel on board water craft must be in constant radio contact with shore personnel.</li> <li>• Non slip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways.</li> <li>• All barge deck obstructions will be removed if possible, if not possible to remove them they shall be clearly marked with yellow paint.</li> </ul>
	l. Sinking Boat/Barge Damage	l. Sinking Boat/Barge Damage <ul style="list-style-type: none"> <li>• All water craft not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS).</li> <li>• A pre-use inspection of any rented vessel shall be completed, including a video documentation of pre-use conditions.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• Tide tables will be consulted and times of high tide, when it is most safe to move barges,</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<p>will be identified.</p> <ul style="list-style-type: none"> <li>• In the event a barge or boat becomes grounded at times of low tide, no attempt will be made to move the barge until enough water returns to refloat it.</li> <li>• The 35 ton crane will be set on mats with outriggers fully extended on Mats for stability.</li> <li>• The crane will be anchored to the deck by means of four chain binders of sufficient size and strength to stabilize the crane. These will be secured to anchor points on the barge deck.</li> <li>• The Marine Survey will be done in floating plant mode and will include the Crane matting and binder system.</li> <li>• The Marine Survey will be done by competent/qualified person and shall include stability calculations for crane lifts.</li> <li>• The crane operator and Project Engineer will fully understand the stability calculations and adhere to them.</li> <li>• Load test will be performed prior to cranes initial use and a lift plan will be developed prior to the pile driving.</li> <li>• The provisions of EM 385-1-1 Section 16 Marine Floating Plants and CFR 29 1926 and 1910 Subparts N as well as 29 CFR 1926.603 shall be followed.</li> </ul>
	<p>m. Water Craft Taking On Water</p>	<p>m. Water Craft Taking On Water</p> <ul style="list-style-type: none"> <li>• All personnel will ensure the water craft has a working plug firmly in place prior to launch.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• Tide tables will be consulted and times of high tide, when it is most safe to launch/dock, will be identified.</li> <li>• All water craft will have a bailing device on board in case of leaks</li> <li>• If the water craft begins to take on water for any reason it shall be brought in to the nearest safe docking facility as soon as possible and the ESS immediately called</li> <li>• Any water craft which is damaged in any way or has taken on water will be inspected by the ESS or designee prior to the craft being launched.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS						
	n. Water Craft Operation Risks	n. Water Craft Operation Risks <ul style="list-style-type: none"> <li>• All barge and boat pilots shall be familiar with the “Rules of the Road” that regulate movement of boat traffic within the harbor.</li> <li>• Barge will be equipped with day markers and proper lighting-if moored at night.</li> <li>• Charts of the study areas, with depths for mean low water, will be obtained and water craft pilots will be familiar with their use.</li> <li>• Locations of rocks, ledges and manmade subsurface obstructions will be noted within the work area. These will be given a wide berth.</li> <li>• All harbor boating regulations will be strictly observed; prudent speed limits will be followed at all times.</li> <li>• All water craft must have required Coast Guard approved lighting and signaling devices.</li> <li>• Reference the Offshore Work AHA for boating applications.</li> </ul>						
	o. Equipment Lost Overboard/Crushed	o. Equipment Lost Overboard/Crushed <ul style="list-style-type: none"> <li>• Instruments shall not be placed near the moon pool or edge of the barge/boat when not in use/not secured.</li> <li>• Equipment will be secured to the deck or to personnel when appropriate. Secure all radios and cell phones.</li> <li>• Instruments will be kept clear of all tooling lay down areas. Good housekeeping will be critical on the barge/boat.</li> <li>• All small equipment will have a backup tie line attached to the vessel if they are used at or over the edge of the vessel.</li> </ul>						
	p. Emergencies: Fire, Weather, and Medical/Spills/Releases	p. Emergencies: Fire, Weather, and Medical/Spills/Releases <ul style="list-style-type: none"> <li>• Fire extinguishers will be carried on all launches, barges, and motorboats. Minimum number and rating are as follows:               <table style="margin-left: 40px; border: none;"> <tr> <td style="text-align: center;"><u>Length</u></td> <td style="text-align: center;"><u>Extinguisher</u></td> </tr> <tr> <td style="text-align: center;">26 feet or less</td> <td style="text-align: center;">one 1-A: 10-B:C</td> </tr> <tr> <td style="text-align: center;">26 feet or more</td> <td style="text-align: center;">two 1-A: 10-B:C</td> </tr> </table> </li> <li>• Barge/open boat workers shall be evacuated to shore or secure location by tenderboat when lightning is spotted or threatens the area.</li> <li>• Medical emergencies will be handled as they are onshore except when low or no water renders a boat evacuation impossible.</li> <li>• Booms shall be placed in the water around the perimeter of the barge to prevent any fuel or hydraulic spills from spreading.</li> <li>• Personnel shall evacuate the boat/barge if a fire can not be contained with one 10 LB fire extinguisher.</li> </ul>	<u>Length</u>	<u>Extinguisher</u>	26 feet or less	one 1-A: 10-B:C	26 feet or more	two 1-A: 10-B:C
<u>Length</u>	<u>Extinguisher</u>							
26 feet or less	one 1-A: 10-B:C							
26 feet or more	two 1-A: 10-B:C							

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• Spill kits shall be maintained onboard barges to keep any hydrocarbon spill from reaching the water.</li> </ul>
	q. Unstable Soils	q. Unstable Soils <ul style="list-style-type: none"> <li>• Prior to beginning construction in an area, evaluate and locate areas with unstable soils.</li> <li>• Notify all personnel of areas with unstable soils. Do not run high pressure equipment (i.e., articulating trucks) in these areas until soils have been stabilized.</li> <li>• Build roads suitable to handle equipment traffic prior to beginning dirt/stone hauling.</li> <li>• During hauling operations, keep soft areas/ruts filled and compacted. Do not allow off-road trucks to continually run over ruts.</li> <li>• Off-road trucks should vary their path on the haul roads.</li> </ul>
	r. Struck By/Against	r. Struck By/Against <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> <li>• Personnel will not stand under any suspended loads.</li> <li>• Only qualified dredge personnel will be used.</li> <li>• Personnel will avoid placing themselves between heavy equipment/dredge bucket/dredge and stationary objects and on the blind sides of heavy equipment.</li> <li>• Operations will be suspended and the Dredge secured during all severe weather.</li> <li>• Ensure correct position/distance relative to other operations of other activities.</li> </ul>
2. Placement of clean fill and/or dredged sand behind the sheetpile wall	a. Slips/Trips/Falls	a. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas in a safe and orderly condition.</li> <li>• Unloading area of the clamshell will be demarcated and all personnel are strictly forbidden from entering this area during dredging</li> <li>• Extreme caution will be used when disconnecting straps, tie-downs or other hold down devices.</li> <li>• Identify any other tripping hazards and remove them if at all possible.</li> </ul>
	b. Noise	b. Noise <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	c. Heavy Equipment Operation	c. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	d. Overhead Hazards	d. Overhead Hazards <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	e. Eye Injury	e. Eye Injury <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Safety glasses that meet ANSI Standard Z-87 will be worn.</li> </ul>
	f. Unstable Soils	f. Unstable Soils <ul style="list-style-type: none"> <li>• Prior to beginning construction in an area, evaluate and locate areas with unstable soils.</li> <li>• Notify all personnel of areas with unstable soils. Do not run high pressure equipment (i.e., articulating trucks) in these areas until soils have been stabilized.</li> <li>• Build roads suitable to handle equipment traffic prior to beginning dirt/stone hauling.</li> <li>• During hauling operations, keep soft areas/ruts filled and compacted. Do not allow off-road trucks to continually run over ruts.</li> <li>• Off-road trucks should vary their path on the haul roads.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	g. Struck By/Against	g. Struck By/Against <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> <li>• Personnel will not stand under any suspended loads.</li> <li>• All power tools used will have appropriated guards.</li> <li>• Operations will be suspended during all severe weather.</li> <li>• Ensure correct position/distance relative to other operations of other activities.</li> </ul>
	h. Man Overboard/Drowning	h. Man Overboard/Drowning <ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• As per OSHA requirements (29 CFR 1926.501(b)(1)) and EM 385-1-1 Section 19.A.07, guardrails are required on working platforms for barges that are 6 feet or more above the water.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• A Coast Guard approved Type IV flotation device (life ring) will be maintained on each barge.</li> <li>• Water craft will not be used without shore support personnel with rescue skiff available onshore.</li> <li>• All persons on board will remain seated/standing securely whenever a water craft is moving,</li> <li>• Maximum weight capacity for water craft will not be exceeded.</li> <li>• Barges will be equipped with perimeter guardrails.</li> <li>• Water craft will be operated with a minimum of two personnel on board.</li> <li>• Water craft will not be used without shore support personnel.</li> <li>• A line extended from the water craft to the shore will always be available, so that shore personnel are able to retrieve water craft remotely in the event of an emergency.</li> <li>• Personnel on board water craft must be in constant radio contact with shore personnel.</li> <li>• Non slip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways.</li> <li>• All barge deck obstructions will be removed if possible, if not possible to remove them they shall be clearly marked with yellow paint.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Sinking Boat/Barge Damage	i. Sinking Boat/Barge Damage <ul style="list-style-type: none"> <li>• All water craft not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS).</li> <li>• A pre-use inspection of any rented vessel shall be completed, including a video documentation of pre-use conditions.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• Tide tables will be consulted and times of high tide, when it is most safe to move barges, will be identified.</li> <li>• In the event a barge or boat becomes grounded at times of low tide, no attempt will be made to move the barge until enough water returns to refloat it.</li> <li>• The 35-ton crane will be set on mats with outriggers fully extended on Mats for stability.</li> <li>• The crane will be anchored to the deck by means of four chain binders of sufficient size and strength to stabilize the crane. These will be secured to anchor points on the barge deck.</li> <li>• The Marine Survey will be done in floating plant mode and will include the Crane matting and binder system.</li> <li>• The Marine Survey will be done by competent/qualified person and shall include stability calculations for crane lifts.</li> <li>• The crane operator and Project engineer will fully understand the stability calculations and adhere to them.</li> <li>• Load test will be performed prior to cranes initial use and a lift plan will be developed prior to the pile driving.</li> <li>• The provisions of EM 385-1-1 Section 16 Marine Floating Plants and CFR 29 1926 and 1910 Subparts N as well as 29 CFR 1926.603 shall be followed.</li> </ul>
	j. Water Craft Taking On Water	j. Water Craft Taking On Water <ul style="list-style-type: none"> <li>• All personnel will ensure the water craft has a working plug firmly in place prior to launch.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• Tide tables will be consulted and times of high tide, when it is most safe to launch/dock, will be identified.</li> <li>• All water craft will have a bailing device on board in case of leaks</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS						
		<ul style="list-style-type: none"> <li>• If the water craft begins to take on water for any reason it shall be brought in to the nearest safe docking facility as soon as possible and the ESS immediately called.</li> <li>• Any water craft which is damaged in any way or has taken on water will be inspected by the ESS or designee prior to the craft being launched.</li> </ul>						
	k. Water Craft Operation Risks	<p>k. Water Craft Operation Risks</p> <ul style="list-style-type: none"> <li>• All barge and boat pilots shall be familiar with the “Rules of the Road” that regulate movement of boat traffic within the harbor.</li> <li>• Barge will be equipped with day markers and proper lighting-if moored at night.</li> <li>• Charts of the study areas, with depths for mean low water, will be obtained and water craft pilots will be familiar with their use.</li> <li>• Locations of rocks, ledges and manmade subsurface obstructions will be noted within the work area. These will be given a wide berth.</li> <li>• All harbor boating regulations will be strictly observed; prudent speed limits will be followed at all times.</li> <li>• All water craft must have required Coast Guard approved lighting and signaling devices.</li> <li>• Reference the Offshore Work AHA for boating applications.</li> </ul>						
	l. Equipment Lost Overboard/Crushed	<p>l. Equipment Lost Overboard/Crushed</p> <ul style="list-style-type: none"> <li>• Instruments shall not be placed near the moon pool or edge of the barge/boat when not in use/not secured.</li> <li>• Equipment will be secured to the deck or to personnel when appropriate. Secure all radios and cell phones.</li> <li>• Instruments will be kept clear of all tooling lay down areas. Good housekeeping will be critical on the barge/boat.</li> <li>• All small equipment will have a backup tie line attached to the vessel if they are used at or over the edge of the vessel.</li> </ul>						
	m. Emergencies: Fire, Weather, and Medical/Spills/Releases	<p>m. Emergencies: Fire, Weather, and Medical/Spills/Releases</p> <ul style="list-style-type: none"> <li>• Fire extinguishers will be carried on all launches, barges, and motorboats. Minimum number and rating are as follows: <table style="margin-left: 40px; border: none;"> <tr> <td style="text-align: center;"><u>Length</u></td> <td style="text-align: center;"><u>Extinguisher</u></td> </tr> <tr> <td style="text-align: center;">26 feet or less</td> <td style="text-align: center;">one 1-A: 10-B:C</td> </tr> <tr> <td style="text-align: center;">26 feet or more</td> <td style="text-align: center;">two 1-A: 10-B:C</td> </tr> </table> </li> <li>• Barge/open boat workers shall be evacuated to shore or secure location by tenderboat when lightning is spotted or threatens the area.</li> <li>• Medical emergencies will be handled as they are onshore except when low or no water renders a boat evacuation impossible.</li> </ul>	<u>Length</u>	<u>Extinguisher</u>	26 feet or less	one 1-A: 10-B:C	26 feet or more	two 1-A: 10-B:C
<u>Length</u>	<u>Extinguisher</u>							
26 feet or less	one 1-A: 10-B:C							
26 feet or more	two 1-A: 10-B:C							

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging and placement of clean fill and/or dredged sand behind the sheetpile wall**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• Booms shall be placed in the water around the perimeter of the barge to prevent any fuel or hydraulic spills from spreading.</li> <li>• Personnel shall evacuate the boat/barge if a fire can not be contained with one 10 LB fire extinguisher.</li> <li>• Spill kits shall be maintained onboard barges to keep any hydrocarbon spill from reaching the water.</li> </ul>
	n. Working Over Water	n. Working Over Water <ul style="list-style-type: none"> <li>• Personnel working over water will be required to wear PFDs when not in equipment.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Heavy Equipment/Trucks 2. Dredge/Excavator 3. Spill Control Measures 4. Appropriate PPE 5. Portable Eyewash 6. First Aid Kits 7. 20A:B:C Fire Extinguisher	a. Inspect all vehicles/equipment daily. b. Daily inspections will be conducted unless damage is suspected. c. Monthly inspections will be performed. d. Daily safety inspection of spill control materials will be conducted. e. Daily maintenance (fueling, oil, grease) will be conducted. f. Daily inspections for oil/grease buildup will be conducted. g. Pre and Post Calibrations h. Initial review/training prior to commencement of field activities. i. Inspect all PPE prior to use. j. Inspect portable eye washes and first aid kits weekly. k. Inspect fire extinguishers weekly.	1. All site personnel will read and comply with this HASP. 2. All site personnel will receive site specific training. 3. Personnel will be trained in inspection checklist use. 4. Personnel will be given instructions on proper use of fire extinguishers. 5. Personnel will be given training on how to respond to spilled materials. 6. Operators/pilots will be trained in engine maintenance. 7. Requirements for housekeeping will be reviewed. 8. Only Qualified, trained individuals will use the equipment. 9. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Debris Removal		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Debris Removal	a. Back Injuries and Strains	a. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible.</li> <li>• Maintain work areas safe and orderly. Unloading areas should be on even terrain.</li> <li>• Watch and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>• Replace work boots when worn out or the tread on the sole does not provide traction.</li> <li>• Tools and supplies/equipment will be properly stored.</li> <li>• Personnel will use care on or near any steep slopes.</li> <li>• Ensure proper footing when working in sloped areas.</li> </ul>
	c. Dropped Objects	c. Dropped Objects <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> <li>• A security zone will be established around the excavator removing the debris. No personnel will enter this area when the excavator is in operation.</li> <li>• No person will stand under an unsecured load.</li> </ul>
	d. Noise	d. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> <li>• Personnel within 15 feet of equipment when in operation shall wear hearing protection.</li> </ul>
	e. Sharp Objects/Punctures	e. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>• All hand and power tools will be maintained in a safe condition. When possible, blunt all sharp objects.</li> <li>• First aid kits will be available by the work area.</li> <li>• Personnel will take care in handling all barbed wire and any debris or metal found.</li> </ul>
	f. Eye Injuries	f. Eye Injuries <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> <li>• Safety glasses meeting ANSI Standard Z87 will be worn for all field operations where</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Debris Removal**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		eye hazards exist.
	g. Struck By/Against	g. Struck By/Against <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> <li>• Personnel will not stand under any suspended loads.</li> <li>• All power tools used will have appropriated guards.</li> <li>• Operations will be suspended during all severe weather.</li> <li>• Ensure correct position/distance relative to other operations of other activities.</li> </ul>
	h. Heavy Equipment Operation	h. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius. This area will be delineated with cones.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	i. Equipment Rollover	i. Equipment Rollover <ul style="list-style-type: none"> <li>• Equipment will have rollover protective structures and seat belts.</li> <li>• Operators will wear seat belts when operating equipment.</li> <li>• Do not operate equipment on grades which exceed the manufacturer's recommendations.</li> <li>• Be aware of weather and road conditions.</li> <li>• A spotter will be used when loading equipment in high traffic areas.</li> <li>• Do not load equipment on unstable ground.</li> <li>• Run articulated equipment up and down slopes – not at an angle.</li> </ul>
	j. Caught In/Between	j. Caught In/Between <ul style="list-style-type: none"> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within loading areas are accounted for and out of the way.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Debris Removal		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	k. Vehicular Traffic	k. Vehicular Traffic <ul style="list-style-type: none"> <li>• Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.</li> <li>• Establish one-way (if possible) traffic routes for loaded trucks, so that they can keep the same path while moving dirt.</li> <li>• Traffic control patterns may be modified based on changed conditions (as observed) due to weather or due to modified operations at the site.</li> </ul>
	l. Struck by Heavy Equipment/ Vehicles	l. Struck by Heavy Equipment/Vehicles <ul style="list-style-type: none"> <li>• Speed limit for traffic is 15 mph for all areas of the site.</li> <li>• Trucks shall slow down before approaching loading/unloading area.</li> <li>• Operators will remain in truck when being loaded.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment without making eye contact with the operator.</li> <li>• Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. Equipment operators will confirm that eye contact has been made by stopping operation and clearly showing their hands are off the controls.</li> <li>• Be aware of heavy equipment operations.</li> <li>• Keep out of the swing radius of heavy equipment.</li> <li>• Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times.</li> <li>• Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone.</li> <li>• Ground personnel will not stand directly behind heavy equipment when it is in operation.</li> <li>• Loaded trucks have right of way.</li> <li>• Leave ½ truck length between the truck being loaded and the next truck in line.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Debris Removal**

<b>EQUIPMENT USED</b>	<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>
<ol style="list-style-type: none"> <li>1. Appropriate PPE</li> <li>2. Hand and Power Tools</li> <li>3. Portable Eyewash</li> <li>4. First Aid Kits</li> <li>5. 20A:B:C Fire Extinguisher</li> <li>6. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all hand and power tools prior to use.</li> <li>2. Inspect all PPE prior to use.</li> <li>3. Inspect portable eye washes and first aid kits weekly.</li> <li>4. Inspect fire extinguishers weekly.</li> <li>5. Check and Test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this HASP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>4. Instruct personnel of proper use of fire extinguishers.</li> <li>5. Personnel will be trained on the proper use of hand and power tools.</li> </ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Construction of Personnel and Equipment Decontamination Facilities**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Construction of Personnel and Equipment Decontamination Facilities	a. Back Injuries and Strains	1. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	2. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.</li> </ul>
	c. Dropped Objects	3. Dropped Objects <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	d. Noise	4. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	e. Eye Injuries	5. Eye Injuries <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	f. Sharp Objects/Punctures	6. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>• First aid kits will be available by the work area.</li> </ul>
	g. Hand and Power Tools	7. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference Section 3.3.12.</li> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, "mushroom" head).</li> <li>• Tools will be used in accordance with manufacturer's instructions.</li> <li>• Modifications to tools are prohibited unless approved by the ESS.</li> <li>• GFCIs will be used with all electrical power tools.</li> </ul>
	h. Overhead Utilities	8. Overhead Utilities <ul style="list-style-type: none"> <li>• All overhead utilities will be identified prior to equipment operations; equipment will be equipped with GFCI; all equipment will stay a minimum of 15 feet from energized electrical lines (50 kV). This distance will increase .4 inches for each 1 kV above 50 kV.</li> </ul>

	<p>i. Lifting/Rigging</p>	<p>9. Lifting/Rigging</p> <ul style="list-style-type: none"> <li>• The equipment used for lifting should be positioned as near as possible to the load, while maintaining a safe operating distance. The operator shall verify that the load line is vertical and over the load's center of gravity prior to lifting the load to ensure that the load does not drift when lifted.</li> <li>• All overhead hazards will be identified prior to commencing work operations. A minimum safe distance of 15 feet shall be maintained from power lines rated 50 kV or less.</li> <li>• The swing area of the lifting equipment is barricaded to protect personnel in the immediate area.</li> <li>• All rigging will be tagged with its lifting capacity.</li> <li>• All chokers, slings and lifting gear shall be inspected daily (both nylon and steel) and shall be free from defects prior to use.</li> <li>• Loads are not lifted over personnel.</li> <li>• All loose load objects are secured or removed.</li> <li>• Tag lines are used to control loads except where their use will create a hazard.</li> <li>• The equipment performing the lift is not subjected to sudden lifting, stopping or impact loading.</li> <li>• Riding on loads, hooks, buckets, material hoists, or other material hoisting equipment not meant for personnel use is absolutely prohibited.</li> <li>• The total weight of the load to be lifted, including all lifting beams, rigging, hooks and attachments, shall be determined before a safe lift can be planned.</li> <li>• The determination of the exact location of the center of gravity of the load is critical in ensuring that the load is rigged in a stable configuration. The location of the attachments of the rigging to the load should be above the center of gravity where possible.</li> <li>• The load shall be safely rigged within the rated capacity of all rigging equipment.</li> <li>• Custom designed grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125% of their rated load.</li> </ul>
	<p>p. Struck By/Against</p>	<p>p. Struck By/Against</p> <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel are accounted for and out of the way before performing a lift.</li> <li>• Only operator shall be on crane during operation.</li> <li>• No personnel will be allowed to walk or do any work under any loads being picked.</li> <li>• Personnel will be aware of overhead operations.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
Activity: Construction of Personnel and Equipment Decontamination Facilities		
		<ul style="list-style-type: none"> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment without making eye contact with the operator.</li> <li>• All cranes are to have swing protection demarcated and only authorized personnel will be allowed in this area during a lift.</li> <li>• Operators will be aware of their surroundings at all times.</li> <li>• Operators will honk their horn twice before starting equipment or initiating operations after the equipment has set idle for a long period of time.</li> <li>• Do not work at wind speeds or weight loads above those recommended in the operator's manual.</li> <li>• Tag lines are used to control loads except where their use will create a hazard.</li> </ul>
	j. Connecting/Installing Utilities	10. Connecting/Installing Utilities <ul style="list-style-type: none"> <li>• Lockout/Tagout procedures will be used when installing/connecting utilities. Reference EHS Program EHS 6-4.</li> <li>• Electrical conditions will be made by a licensed electrician.</li> </ul>
	k. Electrocutation	11. Electrocutation <ul style="list-style-type: none"> <li>• Do not use unit near any power lines or where water can come in contact with electrical power.</li> <li>• Reference TtEC Program EHS 3-10 for electrical considerations.</li> <li>• All electrical wiring and hookups will be completed by a licensed electrician. Lockout/Tagout will be utilized to make sure lines are not hot prior to beginning work on them and making connections. Reference EHS Program EHS 6-4 for Lockout/Tagout procedures.</li> <li>• The ESS is responsible for providing the training required in the procedure EHS-6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>• The ESS shall also implement lockout/tagout procedures as required.</li> </ul>
2. System Start-Up	a. Back Injuries	1. Back Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.</li> </ul>
	b. Slips/Trips/Falls	2. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.</li> </ul>

<b>Project: Lower Fox River OUs 2 through 5, Volume I Activities</b>		<b>Location: Brown, Outagamie, and Winnebago Counties, Wisconsin</b>
<b>Activity: Construction of Personnel and Equipment Decontamination Facilities</b>		
	c. Spills	3. Spills <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	d. Dropped Objects	4. Dropped Objects <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Steel toe boots meeting ANSI Standard Z41 will be worn during all site activities.</li> </ul>
	e. Struck By/Against	5. Struck By/Against <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Verify all personnel are out of the way before starting the system up.</li> </ul>
	f. Sharp Objects/Punctures	6. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Use hand tools properly and wear appropriate protective equipment, cut resistant work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.</li> </ul>
	g. Hand and Power Tools	7. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturers instructions.</li> </ul>
	h. Eye Injuries	8. Eye Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Safety glasses meeting ANSI Standard Z87 will be worn.</li> </ul>
	i. Electrocution	9. Electrocution <ul style="list-style-type: none"> <li>• Do not use unit near any power lines or where water can come in contact with electrical power.</li> <li>• Reference EHS Program EHS 3-10 for electrical considerations.</li> <li>• All electrical wiring and hookups will be completed by a licensed electrician. Lockout/Tagout will be utilized to make sure lines are not hot prior to beginning work on them and making connections. Reference EHS Program EHS 6-4 for lockout/tagout procedures.</li> <li>• The ESS is responsible for providing the training required in the procedure EHS-6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>• The ESS shall also implement lockout/tagout procedures as required.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Activity: Construction of Personnel and Equipment Decontamination Facilities**

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Heavy Equipment</li> <li>2. Hand and Power Tools</li> <li>3. Appropriate PPE</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Hand and power tools will be inspected to ensure they are in good condition prior to each day's use.</li> <li>2. PPE will be inspected before and after each use.</li> <li>3. Periodic inspections pursuant to EHS Program EHS 3-3, Inspections, shall be completed during the monthly inspections by the ESS, PESM or other qualified personnel to ensure that the lockout tagout program is being effectively implemented. As a minimum the following shall be done:               <ul style="list-style-type: none"> <li>• Existing lockouts will be reviewed for effectiveness;</li> <li>• Permits for each existing lockouts shall be reviewed for adequacy;</li> <li>• Incident reports and past permits shall be reviewed to determine if deficiencies in the program exist;</li> <li>• Corrections to the system will be made as warranted; and</li> <li>• Results will be logged in the health and safety logbook.</li> </ul> </li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect Fire Extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Authorized Employees shall receive training in the following prior to being allowed to use lockout/tagout procedures:               <ul style="list-style-type: none"> <li>• Recognition of hazardous energy sources;</li> <li>• Types and magnitudes of energies available at the site;</li> <li>• Methods and means needed for energy isolation and control; and</li> <li>• The requirements of this procedure and 29 CFR 1910.147.</li> </ul> </li> <li>2. Affected Employees shall be instructed in the following:               <ul style="list-style-type: none"> <li>• Purpose of the lockout tagout program;</li> <li>• Use and requirements of this procedure and 29 CFR 1910.147;</li> <li>• Prohibitions of restarting or tampering with equipment that has been locked out; and</li> <li>• Prohibitions of tampering with locks and tags installed on equipment.</li> </ul> </li> <li>3. All site personnel will read and comply with this HASCP.</li> <li>4. All site personnel will receive site specific training.</li> <li>5. Only qualified electricians will install electrical wiring and hookups.</li> <li>6. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>7. Instruct personnel of proper use of fire extinguishers.</li> <li>8. Personnel will be trained on the proper use of hand and power tools, including the pipe welding machine.</li> <li>9. Training on lockout/tagout procedures are listed in EHS Program EHS 6-4.</li> </ol>

Project: Lower Fox River OUs 2 through 5, Volume I Activities		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
Activity: Installation of perimeter fencing (6' chainlink), signage, and gatehouse		
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
2. Install Perimeter Security Fencing/Signage, and gatehouse	a. Back Injuries and Strains	a. Back Injuries and Strains <ul style="list-style-type: none"> <li>Refer to General Site Hazards.</li> <li>An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>Reference General Site Hazards.</li> <li>Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible.</li> <li>Watch and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>Replace work boots when worn out or the tread on the sole does not provide traction.</li> </ul>
	c. Dropped Objects	c. Dropped Objects <ul style="list-style-type: none"> <li>Reference General Site Hazards.</li> <li>Steel toe boots meeting ANSI Standard Z41 will be worn during all site activities.</li> </ul>
	d. Eye Injuries	d. Eye Injuries <ul style="list-style-type: none"> <li>Reference General Site Hazards.</li> <li>Safety glasses meeting ANSI Standard Z87 will be worn.</li> </ul>
	e. Sharp Objects/Punctures	e. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>Refer to General Site Hazards.</li> <li>Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> </ul>
	f. Hand and Power Tools	f. Hand and Power Tools <ul style="list-style-type: none"> <li>Refer Section 3.3.12.</li> <li>The proper tools will be used for each task.</li> <li>All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, "mushroom" head).</li> <li>Tools will be used in accordance with manufacturer's instructions.</li> <li>Modifications to tools are prohibited unless approved by the ESS.</li> <li>GFCIs will be used with all electrical power tools.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Activity: Installation of perimeter fencing (6' chainlink), signage, and gatehouse**

<b>EQUIPMENT USED</b>	<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>
<ol style="list-style-type: none"><li>1. Heavy Equipment/Trucks</li><li>2. Appropriate PPE</li><li>3. Hand and Power Tools</li><li>4. Portable Eyewash</li><li>5. First Aid Kits</li><li>6. 20A:B:C Fire Extinguisher</li><li>7. GFCI</li></ol>	<ol style="list-style-type: none"><li>1. Inspect all heavy equipment and trucks daily and prior to use.</li><li>2. Inspect all hand and power tools prior to use.</li><li>3. Inspect all PPE prior to use.</li><li>4. Inspect portable eye washes and first aid kits weekly.</li><li>5. Inspect fire extinguishers weekly.</li><li>6. Check and test GFCIs weekly.</li></ol>	<ol style="list-style-type: none"><li>1. All site personnel will read and comply with this HASP.</li><li>2. All site personnel will receive site specific training.</li><li>3. Qualified operators will be used for heavy equipment and trucks operation.</li><li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li><li>5. Instruct personnel of proper use of fire extinguishers.</li><li>6. Personnel will be trained on the proper use of hand and power tools.</li></ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers	a. Back Injuries and Strains	a. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Refer to General Hazards</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Refer to General Hazards</li> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible.</li> <li>• Maintain work areas safe and orderly. Unloading areas should be on even terrain.</li> <li>• Watch and prepare for uneven terrain, stumps, and vegetation in walk areas.</li> <li>• Tools and supplies/equipment will be properly stored.</li> </ul>
	c. Dropped Objects	c. Dropped Objects <ul style="list-style-type: none"> <li>• Steel toe boots meeting ANSI Standard Z41 will be worn as directed.</li> </ul>
	d. Noise	d. Noise <ul style="list-style-type: none"> <li>• Refer to General Hazards</li> </ul>
	e. Heavy Equipment Operation	e. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Supervisors and operators will ensure that the procedures in Section 3.3.1 of this document and the equipment manufacturers' instructions and recommendations are followed consistently.</li> <li>• All equipment will be initially inspected to certify safe to use onsite and before each days use.</li> <li>• Equipment will have rollover protective structures and seat belts. Operators shall wear seat belts when operating equipment.</li> <li>• Unsafe equipment will be taken out of service, tagged and will not be used until repaired.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• All slings chains and ropes will be rated for the load in which it is expected to lift.</li> <li>• Spills and absorbent materials will be readily available. Drip pans, polyethylene sheeting or other means will be used for secondary containment.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Activity: Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<p>not be approached on blind sides.</p> <ul style="list-style-type: none"> <li>• Avoid equipment swing radius. This area will be delineated with cones.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> <li>• A spotter will be used for backing up equipment in congested areas.</li> </ul>
	<p>f. Crane Operations</p>	<p>f. Crane Operations</p> <ul style="list-style-type: none"> <li>• Only qualified persons will operate equipment.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• High visibility safety vests will be worn in all work areas.</li> <li>• All heavy equipment will be equipped with backup alarms.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• All vehicles will be equipped with rear-view mirrors on both sides of cab.</li> <li>• Only one spotter will be used to communicate with the crane operator.</li> <li>• All cranes are to have swing protection demarcated and only authorized personnel will be allowed in this area during a lift.</li> <li>• Operators will be aware of their surroundings at all times.</li> <li>• Perform vehicle walk around before operating.</li> <li>• Operators will honk their horn twice before starting equipment or initiating operations after the equipment has set idle for a long period of time.</li> <li>• Do not work at wind speeds or weight loads above those recommended in the operator's manual.</li> <li>• All cranes to be outfitted with anti-two-block protection.</li> <li>• All cranes must have annual inspection reviewed before use; daily inspections and competent person named for conducting inspections; load chart available, operator must know how to read a load chart and be deemed competent by TtEC.</li> <li>• All bolts are to be fully hand torqued and 100% installed before crane (rigging) is released.</li> <li>• Ensure outriggers are fully extended and ground surface is able to support the crane during lift operations. Use equipment mats to provide additional stability if necessary.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Activity: Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	g. Struck By/Against	g. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• Only one spotter will be used with each piece of equipment. Spotter will ensure he has eye contact with the crane operator.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel are accounted for and out of the way.</li> <li>• Only operator shall be on crane during operation.</li> <li>• No personnel will be allowed to walk or do any work under any loads being picked.</li> <li>• Personnel will be aware of overhead operations.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment with out making eye contact with the operator.</li> <li>• Operators will be aware of their surroundings at all times.</li> <li>• Operators will honk their horn twice before starting equipment or initiating operations after the equipment has set idle for a long period of time.</li> <li>• Do not work at wind speeds or weight loads above those recommended in the operator’s manual.</li> <li>• Use tag lines to minimize swinging of objects being moved. Tag lines are used to control loads except where their use will create a hazard.</li> <li>• Swing radius of the crane will be demarcated with caution tape or cones. Extreme caution shall be exercised when working in the proximity to the crane. No one shall enter the swing radius while the crane is working. All personnel shall contact the crane operator before entering the swing area when the machine is not working in order to guarantee a safe passage.</li> <li>• Hand signals will be reviewed prior to the start of work.</li> <li>• The crane operator will have a clear visual field of the object being lifted.</li> <li>• Personnel who remove the choker will not stand under any load nor the block of the crane.</li> <li>• Overhead protection, which will not obscure the vision of the operator, shall be provided.</li> <li>• Personnel will be aware of pinch points; no personnel will put their hands or any body part between any moving object and a stationary object.</li> <li>• Guards shall be provided on all sheaves to prevent cables from jumping out of sheaves.</li> <li>• Guys, outriggers, thrustouts, or counterbalances shall be provided as necessary to maintain stability of pile driver rigs.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Activity: Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• Keep access steps and ladders free from oil.</li> <li>• Work taking place above 6 feet requires fall protection.</li> </ul>
	<p>h. Lifting/Rigging</p>	<p>h. Lifting/Rigging</p> <ul style="list-style-type: none"> <li>• The equipment used for lifting should be positioned as near as possible to the load, while maintaining a safe operating distance. The operator shall verify that the load line is vertical and over the load's center of gravity prior to lifting the load to ensure that the load does not drift when lifted.</li> <li>• All overhead hazards will be identified prior to commencing work operations. A minimum safe distance of 15 feet shall be maintained from power lines rated 50 kV or less.</li> <li>• The swing area of the lifting equipment is barricaded to protect personnel in the immediate area.</li> <li>• All rigging will be tagged with its lifting capacity.</li> <li>• All chokers, slings and lifting gear shall be inspected daily (both nylon and steel) and shall be free from defects prior to use.</li> <li>• Loads are not lifted over personnel.</li> <li>• All loose load objects are secured or removed.</li> <li>• Tag lines are used to control loads except where their use will create a hazard.</li> <li>• The equipment performing the lift is not subjected to sudden lifting, stopping or impact loading.</li> <li>• Riding on loads, hooks, buckets, material hoists, or other material hoisting equipment not meant for personnel use is absolutely prohibited.</li> <li>• The total weight of the load to be lifted, including all lifting beams, rigging, hooks and attachments, shall be determined before a safe lift can be planned.</li> <li>• The determination of the exact location of the center of gravity of the load is critical in ensuring that the load is rigged in a stable configuration. The location of the attachments of the rigging to the load should be above the center of gravity where possible.</li> <li>• The load shall be safely rigged within the rated capacity of all rigging equipment.</li> <li>• Custom designed grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125% of their rated load.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Overhead Hazards	i. Overhead Hazards <ul style="list-style-type: none"> <li>• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1 when an overhead hazard exists.</li> <li>• All ground personnel will stay clear of suspended loads and equipment swing areas.</li> <li>• All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects.</li> <li>• All overhead hazards will be identified prior to commencing work operations.</li> <li>• A 15-foot clearance will be maintained at all times.</li> </ul>
	j. Vehicular/Heavy Equipment Traffic	j. Vehicular/Heavy Equipment Traffic <ul style="list-style-type: none"> <li>• Only qualified persons will operate equipment.</li> <li>• Eye contact with operators will be made before approaching equipment.</li> <li>• High visibility safety vests will be worn at all times on site.</li> <li>• All heavy equipment will be equipped with backup alarms.</li> <li>• All heavy equipment will be restricted to speeds of 15 MPH while on site.</li> <li>• Personnel will be aware of their surroundings at all times, operators and personnel on ground.</li> <li>• All vehicles will be equipped with rear-view mirrors on both sides of cab.</li> <li>• A spotter will be used while backing up delivery trucks.</li> <li>• All cranes are to have swing areas demarcated, on all 4 sides of the crane.</li> <li>• Only authorized personnel will be allowed in work areas.</li> <li>• Operators will be aware of their surroundings at all times.</li> </ul>
	k. Eye Injuries	k. Eye Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards</li> </ul>
	l. Slips/Trips/Falls	l. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards</li> <li>• Personnel will immediately communicate slip/trip/fall hazards to employees and supervisors.</li> <li>• Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified.</li> <li>• Fall protection (e.g., guardrails or personal fall protection system) is required when working 6' above the ground.</li> <li>• Personnel will be trained to use and inspect fall protection systems.</li> <li>• All lifelines / harnesses / and lanyards shall be inspected and in acceptable working condition prior to use.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• Personal fall arrest systems shall meet the criteria specified in 29 CFR 1926.502(d) and guardrail systems and their use shall comply with 29 CFR 1926.502(b). Refer to Section 3.3.5.</li> <li>• Ensure that loads are properly distributed in all small boats.</li> </ul>
	m. Spills	m. Spills <ul style="list-style-type: none"> <li>• Refer to General Site Hazards</li> </ul>
	n. Hand and Power Tools	n. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference Section 3.3.12.</li> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, “mushroom” head).</li> <li>• Tools will be used in accordance with manufacturer’s instructions.</li> <li>• Modifications to tools are prohibited unless approved by the ESS.</li> <li>• GFCIs will be used with all electrical power tools.</li> </ul>
	o. Fall into Excavation	o. Fall into Excavation <ul style="list-style-type: none"> <li>• Do not leave excavations open overnight whenever possible fill them.</li> <li>• Install open trench warning devices/barricades.</li> <li>• If deemed necessary, use the benching and sloping methods to prevent cave-ins (29 CFR 1926.652, Appendix B).</li> <li>• If necessary, stairways, ladders, or ramps shall be provided as means of egress in all trenches 4 feet or more in depth. Travel distance shall be no more than 25 feet between means of exit.</li> <li>• Protective systems are required on all excavations over 5 feet in depth or in excavations less than 5 feet when examination of the ground by a competent person reveals conditions that may result in cave-ins (29 CFR 1926.652, Appendices C &amp; D).</li> </ul>
	p. Sharp Objects/Cut By	p. Sharp Objects/Cut By <ul style="list-style-type: none"> <li>• Cut resistant work gloves will be worn when handling sharp objects and structural steel.</li> <li>• All hand and power tools will be maintained in safe condition, with proper guards in place.</li> <li>• Personnel will be aware of sharp edges on all steel members.</li> <li>• The same worker will not hold or be leaning against the material being cut while cutting it.</li> <li>• The material being cut will not be leaning against the worker while it is being cut.</li> <li>• All cutting blades will have guards securely in place.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<ul style="list-style-type: none"> <li>• All miscellaneous debris will be thrown away in a trash barrel or dumpster on site.</li> </ul>
	q. Impalement	q. Impalement <ul style="list-style-type: none"> <li>• All miscellaneous debris will be thrown away in a trash barrel or dumpster on site.</li> <li>• All exposed rebar sticking up will have caps placed on them.</li> </ul>
	r. Hot Work	r. Hot Work <ul style="list-style-type: none"> <li>• A Hot Work Permit will be issued prior to all chop saw cutting, burning, grinding or any other activities that will cause sparks while working.</li> <li>• A 20 lb. ABC type fire extinguisher will readily available within 50' of all Hot Work Permit Operations.</li> <li>• Workers performing hot work will wear appropriate PPE as specified in the Hot Work Permit.</li> <li>• Oxygen and acetylene cylinders and hoses will be stored properly (i.e., secured and separated appropriately) and maintained in good condition.</li> <li>• Only qualified workers will perform hot work. Workers will inspect their PPE and equipment prior to performing hot work.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Crane</li> <li>2. Manlifts/Scissor Lifts</li> <li>3. Fire Extinguishers</li> <li>4. Spill Control Materials</li> <li>5. Appropriate PPE</li> <li>6. Portable Eyewash</li> <li>7. First Aid Kits</li> <li>8. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Daily inspections of all equipment will be conducted and documented before use.</li> <li>2. Daily safety inspection of spill control materials will be conducted.</li> <li>3. Daily maintenance (fueling, oil, grease) will be conducted.</li> <li>4. Daily inspections for oil/grease buildup will be conducted.</li> <li>5. Daily inspections will be made.</li> <li>6. Daily inspections will be required before operation</li> <li>7. Initial review/training prior to commencement of field activities.</li> <li>8. Inspect all PPE prior to use.</li> <li>9. Inspect portable eye washes and first aid kits weekly.</li> <li>10. Inspect fire extinguishers weekly.</li> <li>11. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this HASP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Only a qualified operator will be allowed to operate the crane and manlifts/scissor lifts.</li> <li>4. Personnel will be trained in inspection checklist use.</li> <li>5. Personnel will be given instructions on proper use of fire extinguishers.</li> <li>6. Personnel will be given training on how to respond to spilled materials.</li> <li>7. Operators/pilots will be trained in engine maintenance.</li> <li>8. Requirements for housekeeping will be reviewed.</li> <li>9. Operators will be trained in proper use of these safety systems.</li> <li>10. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>11. Instruct personnel of proper use of fire extinguishers.</li> </ol>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Installation of Dewatering and Water Treatment Equipment		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Installation of Dewatering and Water Treatment Equipment	a. Back Injuries and Strains	1. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Slips/Trips/Falls	2. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.</li> </ul>
	c. Dropped Objects	3. Dropped Objects <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	d. Noise	4. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	e. Eye Injuries	5. Eye Injuries <ul style="list-style-type: none"> <li>• Refer to General Site Hazards.</li> </ul>
	f. Sharp Objects/Punctures	6. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>• First aid kits will be available by the work area.</li> </ul>
	g. Hand and Power Tools	7. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference Section 3.3.12.</li> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, "mushroom" head).</li> <li>• Tools will be used in accordance with manufacturer's instructions.</li> <li>• Modifications to tools are prohibited unless approved by the ESS.</li> <li>• GFCIs will be used with all electrical power tools.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Installation of Dewatering and Water Treatment Equipment**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	h. Overhead Utilities	8. Overhead Utilities <ul style="list-style-type: none"> <li>• All overhead utilities will be identified prior to equipment operations; equipment will be equipped with GFCI; all equipment will stay a minimum of 15 feet from energized electrical lines (50 kV). This distance will increase .4 inches for each 1 kV above 50 kV.</li> </ul>
	i. Lifting/Rigging	9. Lifting/Rigging <ul style="list-style-type: none"> <li>• The equipment used for lifting should be positioned as near as possible to the load, while maintaining a safe operating distance. The operator shall verify that the load line is vertical and over the load's center of gravity prior to lifting the load to ensure that the load does not drift when lifted.</li> <li>• All overhead hazards will be identified prior to commencing work operations. A minimum safe distance of 15 feet shall be maintained from power lines rated 50 kV or less.</li> <li>• The swing area of the lifting equipment is barricaded to protect personnel in the immediate area.</li> <li>• All rigging will be tagged with its lifting capacity.</li> <li>• All chokers, slings and lifting gear shall be inspected daily (both nylon and steel) and shall be free from defects prior to use.</li> <li>• Loads are not lifted over personnel.</li> <li>• All loose load objects are secured or removed.</li> <li>• Tag lines are used to control loads except where their use will create a hazard.</li> <li>• The equipment performing the lift is not subjected to sudden lifting, stopping or impact loading.</li> <li>• Riding on loads, hooks, buckets, material hoists, or other material hoisting equipment not meant for personnel use is absolutely prohibited.</li> <li>• The total weight of the load to be lifted, including all lifting beams, rigging, hooks and attachments, shall be determined before a safe lift can be planned.</li> <li>• The determination of the exact location of the center of gravity of the load is critical in ensuring that the load is rigged in a stable configuration. The location of the attachments of the rigging to the load should be above the center of gravity where possible.</li> <li>• The load shall be safely rigged within the rated capacity of all rigging equipment.</li> <li>• Custom designed grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125% of their rated load.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Installation of Dewatering and Water Treatment Equipment		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	q. Struck By/Against	q. Struck By/Against <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel are accounted for and out of the way before performing a lift.</li> <li>• Only operator shall be on crane during operation.</li> <li>• No personnel will be allowed to walk or do any work under any loads being picked.</li> <li>• Personnel will be aware of overhead operations.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment with out making eye contact with the operator.</li> <li>• All cranes are to have swing protection demarcated and only authorized personnel will be allowed in this area during a lift.</li> <li>• Operators will be aware of their surroundings at all times.</li> <li>• Operators will honk their horn twice before starting equipment or initiating operations after the equipment has set idle for a long period of time.</li> <li>• Do not work at wind speeds or weight loads above those recommended in the operator's manual.</li> <li>• Tag lines are used to control loads except where their use will create a hazard.</li> </ul>
	j. Connecting/Installing Utilities	10. Connecting/Installing Utilities <ul style="list-style-type: none"> <li>• Lockout/Tagout procedures will be used when installing/connecting utilities. Reference EHS Program EHS 6-4.</li> <li>• Electrical conditions will be made by a licensed electrician.</li> </ul>
	k. Electrocution	11. Electrocution <ul style="list-style-type: none"> <li>• Do not use unit near any power lines or where water can come in contact with electrical power.</li> <li>• Reference TtEC Program EHS 3-10 for electrical considerations.</li> <li>• All electrical wiring and hookups will be completed by a licensed electrician. Lockout/Tagout will be utilized to make sure lines are not hot prior to beginning work on them and making connections. Reference EHS Program EHS 6-4 for Lockout/Tagout procedures.</li> <li>• The ESS is responsible for providing the training required in the procedure EHS-6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>• The ESS shall also implement lockout/tagout procedures as required.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Installation of Dewatering and Water Treatment Equipment**

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Heavy Equipment</li> <li>2. Hand and Power Tools</li> <li>3. Appropriate PPE</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Hand and power tools will be inspected to ensure they are in good condition prior to each day's use.</li> <li>2. PPE will be inspected before and after each use.</li> <li>3. Periodic inspections pursuant to EHS Program EHS 3-3, Inspections, shall be completed during the monthly inspections by the ESS, PESM or other qualified personnel to ensure that the lockout tagout program is being effectively implemented. As a minimum the following shall be done: <ul style="list-style-type: none"> <li>• Existing lockouts will be reviewed for effectiveness;</li> <li>• Permits for each existing lockouts shall be reviewed for adequacy;</li> <li>• Incident reports and past permits shall be reviewed to determine if deficiencies in the program exist;</li> <li>• Corrections to the system will be made as warranted; and</li> <li>• Results will be logged in the health and safety logbook.</li> </ul> </li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Authorized Employees shall receive training in the following prior to being allowed to use lockout/tagout procedures: <ul style="list-style-type: none"> <li>• Recognition of hazardous energy sources;</li> <li>• Types and magnitudes of energies available at the site;</li> <li>• Methods and means needed for energy isolation and control; and</li> <li>• The requirements of this procedure and 29 CFR 1910.147.</li> </ul> </li> <li>2. Affected Employees shall be instructed in the following: <ul style="list-style-type: none"> <li>• Purpose of the lockout tagout program;</li> <li>• Use and requirements of this procedure and 29 CFR 1910.147;</li> <li>• Prohibitions of restarting or tampering with equipment that has been locked out; and</li> <li>• Prohibitions of tampering with locks and tags installed on equipment.</li> </ul> </li> <li>3. All site personnel will read and comply with this HASP.</li> <li>4. All site personnel will receive site specific training.</li> <li>5. Only qualified electricians will install electrical wiring and hookups.</li> <li>6. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>7. Instruct personnel of proper use of fire extinguishers.</li> <li>8. Personnel will be trained on the proper use of hand and power tools, including the pipe welding machine.</li> <li>9. Training on lockout/tagout procedures are listed in EHS Program EHS 6-4.</li> </ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Layout and Placement of Dredge Lines and Booster Stations**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Boat Launching/Docking and Boarding Boat/Float	a. Slips/Trips/Falls	a. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Ensure that loads are properly distributed in all small boats.</li> <li>• Boats must be secured to bank or dock before loading.</li> <li>• Keep boats will organized, to eliminate trip hazards.</li> <li>• Personnel will ascertain the stability of the deck surfaces of the derelict vessels on a vessel by vessel basis before going on board. The use of planks/plywood/ladders and deck stabilization devices will be available and used on a vessel by vessel basis.</li> <li>• Any vessel deemed unsafe by the attendant, inspector, ESS, or pilot of the tender boat will not be boarded.</li> <li>• All means of boat access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• Never exceed boats rated capacity for weight and number of persons.</li> <li>• Do not disembark until boat is secured.</li> </ul>
	b. Boat Operations	b. Boat Operations <ul style="list-style-type: none"> <li>• Spotters will be used when backing up trucks and moving equipment.</li> <li>• When off loading a boat, never back the vehicle so far into the water that the back tail pipe is under water.</li> <li>• Ensure you have sufficient power to pull the boat out of the water once it is tailored.</li> <li>• Provide radio for communication.</li> <li>• Assure fuel tank has sufficient gas before departure.</li> </ul>
	c. Dropped Objects	c. Dropped Objects <ul style="list-style-type: none"> <li>• Ensure the drain plug is tightly secured in the boat.</li> <li>• Secure all radios, cell phones and equipment.</li> </ul>
	d. Struck By/Against	d. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• Keep hands inside boat when approaching dock.</li> <li>• Caution will be used offloading the boat from the trailer-clear the area of all non-essential personnel.</li> <li>• All boats will be securely anchored or docked-docked boats will be positioned with minimum 2 lines.</li> <li>• Ensure the boat is properly secured to the boat trailer before transporting.</li> <li>• Ensure there is sufficient room to drive through when trailering the boat on narrow streets.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Layout and Placement of Dredge Lines and Booster Stations**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
2. Crane Assisted Barge Launching	a. Crane Inspection	a. Crane Inspection <ul style="list-style-type: none"> <li>• All cranes must have annual inspection reviewed before use; daily inspections and competent person named for conducting inspections; load chart available, operator must know how to read a load chart and be deemed competent by TtEC.</li> <li>• All cranes to be outfitted with anti-two-block protection.</li> </ul>
	b. Contact with objects in boom radius – overhead utilities	b. Contact with objects in boom radius – overhead utilities. <ul style="list-style-type: none"> <li>• Set crane up in an area free of overhead obstacles including overhead utilities. Minimum distance between crane and 50 kV power lines is 15 feet. This distance increases if the lines are over 50 kV.</li> </ul>
	c. Traffic control	c. Traffic Control <ul style="list-style-type: none"> <li>• If possible, establish one-way traffic routes for trucks bringing in barges.</li> <li>• Traffic cones and orange traffic vests will be used when working in areas of traffic, construction vehicles and near roadways. Implement traffic controls such as flag persons, warning devices, etc., as necessary.</li> <li>• Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.</li> <li>• Spotters will be used when backing up trucks and heavy equipment.</li> </ul>
	d. Pinched, caught between, struck by	d. Pinched, Caught Between, Struck By <ul style="list-style-type: none"> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within unloading and loading areas are accounted for and out of the way.</li> <li>• All cranes are to have swing protection demarcated.</li> <li>• Only operator shall be on crane during operation.</li> </ul>
	e. Overhead Hazards	e. Overhead Hazards <ul style="list-style-type: none"> <li>• No personnel will be allowed to walk or do any work under any loads being picked.</li> <li>• Personnel will be aware of overhead operations. Unauthorized personnel will not be in the swing radius.</li> </ul>
	f. Unstable Ground	f. Unstable Ground <ul style="list-style-type: none"> <li>• Set crane up on even terrain. Ground should be stable enough to support the weight of the crane and loads during lifting.</li> <li>• If necessary, use crane mats to provide additional ground stability.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Layout and Placement of Dredge Lines and Booster Stations**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	g. Rigging/Lifting	g. Rigging/Lifting <ul style="list-style-type: none"> <li>• All rigging hardware will be selected and placed in to use by a competent person.</li> <li>• All rigging hardware shall be of sufficient capacity in the configuration of use, suitable for the lift.</li> <li>• All rigging will be tagged with its lifting capacity.</li> <li>• All chokers, slings and lifting gear shall be inspected daily (both nylon and steel) and shall be free from defects prior to use.</li> </ul>
	h. Struck by/Overhead Hazards	h. Struck By/Overhead Hazards <ul style="list-style-type: none"> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within unloading and loading areas are accounted for and out of the way.</li> <li>• All cranes are to have swing protection demarcated.</li> <li>• Only operator shall be on crane during operation.</li> <li>• No personnel will be allowed to walk or do any work under any loads being picked.</li> <li>• Personnel will be aware of overhead operations. Unauthorized personnel will not be in the swing radius.</li> <li>• Tag lines will be used during the picking and setting of the barges. Use tag lines to minimize swinging of objects being moved.</li> <li>• Crane will honk horn prior to starting any lift to warn ground personnel.</li> </ul>
	i. Water Craft Operations	i. Water Craft Operations <ul style="list-style-type: none"> <li>• All barge and tenderboat pilots shall be familiar with the “Rules of the Road” that regulate movement of boat traffic within the harbor.</li> <li>• All persons on board will remain seated/standing securely whenever a watercraft is moving.</li> <li>• Maximum weight capacity for watercraft will not be exceeded.</li> <li>• Watch for other boats in area, avoid close calls or collisions.</li> <li>• Watch for wake from other boats.</li> <li>• Ensure that loads are properly distributed in all small boats.</li> </ul>
	j. Man Overboard/Drowning	j. Man Overboard/Drowning <ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• Watercraft will not be used without shore support personnel.</li> <li>• Personnel on board watercraft must be in constant radio contact with shore personnel.</li> <li>• Personnel will ascertain the stability of the deck surfaces of the derelict vessels on a vessel by vessel basis before going on board. The use of planks/plywood/ladders/picks and deck</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Layout and Placement of Dredge Lines and Booster Stations**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		stabilization devices will be available and used on a vessel by vessel basis. <ul style="list-style-type: none"> <li>• Any vessel deemed unsafe by the attendant, inspector, ESS, or pilot of the tender boat will not be boarded.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• Maximum weight capacity for barge will not be exceeded.</li> </ul>
	k. Falling Overboard and/or Standing	k. Falling Overboard and/or Standing <ul style="list-style-type: none"> <li>• All personnel shall wear USCG Approved Type III Live Preservers at all times while on water.</li> <li>• All PFDs will be properly worn, snug, and fully zippered/buttoned.</li> <li>• A USCG Approved Type IV flotation device (life ring) with 70 feet of line will be maintained on each tender boat.</li> <li>• Personnel will ascertain the stability of the deck surfaces of the derelict vessels on a vessel by vessel basis before going on board. The use of planks/plywood/ladders/picks and deck stabilization devices will be available and used on a vessel by vessel basis.</li> <li>• Any vessel deemed unsafe by the attendant, inspector, ESS, or pilot of the tender boat will not be boarded.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• Maximum weight capacity for barge will not be exceeded.</li> <li>• Personnel on barges must be in constant radio contact with shore personnel.</li> </ul>
	l. Hand Tools	l. Hand Tools <ul style="list-style-type: none"> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, “mushroom” head).</li> <li>• Tools will be used in accordance with manufacturer’s instructions.</li> <li>• Modifications to tools are prohibited unless approved by the ESS.</li> </ul>
	m. Equipment Lost Overboard/crushed	a. Equipment Lost Overboard/crushed <ul style="list-style-type: none"> <li>• Instruments shall not be placed near edge of the barge when not in use/not secured.</li> <li>• Equipment will be secured to the deck or to personnel when appropriate. Secure all radios and cell phones.</li> <li>• Instruments will be kept clear of all tooling lay down areas. Good housekeeping will be critical on the boat.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Layout and Placement of Dredge Lines and Booster Stations		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
3. Layout and Placement of Dredge Lines and Booster Stations	a. Falling Overboard and/or Standing	a. Falling Overboard and/or Standing <ul style="list-style-type: none"> <li>• Watch personnel position while lifting sounding pole.</li> <li>• All persons on board will remain seated/standing securely whenever a watercraft is moving.</li> <li>• Maximum weight capacity for watercraft will not be exceeded.</li> <li>• Watercraft will not be used without shore support personnel with rescue skiff available onshore.</li> <li>• Personnel on board watercraft must be in constant radio contact with shore personnel.</li> </ul>
	b. Man Overboard/Drowning	b. Man Overboard/ Drowning <ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• All barges shall be equipped with a guardrail of wood, pipe, or steel around the entire perimeter of the barge.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• A Coast Guard approved Type IV flotation device (life ring) will be maintained on each barge.</li> <li>• Watercraft will not be used without shore support personnel with rescue skiff available onshore.</li> </ul>
	c. Struck By/Against	c. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• Watch for other boats in area, avoid close calls or collisions.</li> <li>• Watch for wake from other boats.</li> <li>• Watch for (know their locations or mark with buoys) objects hidden under water at higher tides i.e. pilings, islands, anchor lines.</li> <li>• Caution will be used offloading the boat-personnel will ensure the boat is securely docked before embarking. All supply transfer work will be done only when boats are docked fore and aft.</li> <li>• All boats will be securely anchored or docked-docked boats will be positioned with minimum 2 lines.</li> <li>• Never pitchpole or broach any waves.</li> <li>• Ensure the air horn on each boat used is in proper working order.</li> <li>• Ladders will be free of ice and snow before climbing.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Layout and Placement of Dredge Lines and Booster Stations		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	d. Hand Tools	d. Hand Tools <ul style="list-style-type: none"> <li>• Reference Section 3.3.12.</li> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, “mushroom” head).</li> <li>• Tools will be used in accordance with manufacturer’s instructions.</li> <li>• Modifications to tools are prohibited unless approved by the ESS.</li> <li>• GFCIs will be used with all electrical power tools.</li> <li>• Personnel welding HDPE pipe will wear leather gloves or heat resistant gloves. Care will be taken when handling the heating iron.</li> </ul>
	e. Back Injuries and Strains	e. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS’s judgment due to individual’s stature and lifting ability.</b></li> </ul>
	f. Severe Weather	f. Severe Weather <ul style="list-style-type: none"> <li>• National weather forecasts will be monitored daily for predicted inclement weather, such as thunderstorms. Each Supervisor will check on the local conditions and forecast each morning.</li> <li>• Personnel working in an exposed marine location shall monitor the NOAA marine weather broadcasts.</li> <li>• All personnel shall be aware of the forecast and keep an “eye to the sky”. Unforecasted storms may also occur without warning.</li> <li>• Work will be postponed in the event of very strong winds, high seas or at times of very poor visibility.</li> <li>• In the event of lightning in the area, work will cease at the direction of the TtEC Supervisor or ESS, and will not proceed further until return to work permit is issued.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Layout and Placement of Dredge Lines and Booster Stations**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	g. Sinking Boat/Barge Damage	g. Sinking Boat/Barge Damage <ul style="list-style-type: none"> <li>• All watercraft not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS).</li> <li>• A pre-use inspection of any rented vessel shall be completed, including picture documentation of pre-use conditions.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• In the event a barge or boat becomes grounded at times of low tide, no attempt will be made to move the barge or boat until enough water returns to refloat it.</li> </ul>
	h. Watercraft Operation	h. Watercraft Operations <ul style="list-style-type: none"> <li>• All tenderboat pilots shall be familiar with the “Rules of the Road” that regulate movement of boat traffic within the harbor.</li> <li>• Boat Operators must hold Boater Safety certification.</li> <li>• Kill switch tether must be used.</li> <li>• Charts of the work areas, with depths for mean low water, will be obtained and watercraft pilots will be familiar with their use.</li> <li>• Locations of rocks, ledges and manmade subsurface obstructions will be noted within the study area. These will be given a wide berth.</li> <li>• All offshore boating regulations will be strictly observed; prudent speed limits observed.</li> <li>• All watercraft (including pipelines, barges, moored boats, etc.) must have required Coast Guard approved lighting and/or signaling devices.</li> </ul>
	i. Flying objects and debris	i. Flying objects and debris <ul style="list-style-type: none"> <li>• ANSI approved Safety glasses will be worn at all times while on the water.</li> <li>• All objects pulled up from the water will be brought aboard slowly to check for contamination or entanglement.</li> </ul>
	j. Equipment Lost Overboard/crushed	j. Equipment Lost Overboard/crushed <ul style="list-style-type: none"> <li>• Instruments shall not be placed near the edge of the boat when not in use/not secured.</li> <li>• Equipment will be secured to the deck or to personnel when appropriate. Secure all radios and cell phones.</li> <li>• Instruments will be kept clear of all tooling lay down areas. Good housekeeping will be critical on the boat.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Layout and Placement of Dredge Lines and Booster Stations**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS						
	k. <u>Emergencies</u> : Fire, Weather and Medical /Spills/Releases	k. Emergencies: Fire, Weather and Medical /Spills/Releases <ul style="list-style-type: none"> <li>• Fire extinguishers will be carried on all launches, barges, and motorboats. Minimum number and rating are as follows: <table style="margin-left: 20px; border: none;"> <tr> <td style="padding-right: 20px;">Length</td> <td>Extinguisher</td> </tr> <tr> <td style="padding-right: 20px;">26 feet or less</td> <td>one 1-A: 10-B:C</td> </tr> <tr> <td style="padding-right: 20px;">26 feet or more</td> <td>two 1-A: 10-B:C</td> </tr> </table> </li> <li>• Open boat workers shall be evacuated to shore or secure location by tenderboat when lightning is spotted or threatens the area.</li> <li>• Medical emergencies will be handled as they are onshore except when low or no water renders a boat evacuation impossible.</li> <li>• Booms shall be available to prevent any fuel or hydraulic spills from spreading.</li> <li>• Personnel shall evacuate the boat/barge if a fire can not be contained with one 10 LB fire extinguisher</li> </ul>	Length	Extinguisher	26 feet or less	one 1-A: 10-B:C	26 feet or more	two 1-A: 10-B:C
Length	Extinguisher							
26 feet or less	one 1-A: 10-B:C							
26 feet or more	two 1-A: 10-B:C							
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS						
<ol style="list-style-type: none"> <li>1. Boats</li> <li>2. Appropriate PPE</li> <li>3. Hand and Power Tools</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all boats daily.</li> <li>2. Inspect all hand and power tools prior to use.</li> <li>3. Inspect all PPE prior to use.</li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCI's weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this SHSP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Qualified operators will be used for heavy equipment and boat operation.</li> <li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>5. Instruct personnel of proper use of fire extinguishers.</li> <li>6. Personnel will be trained on the proper use of hand and power tools, including the steam cleaner.</li> </ol>						

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Dredging TSCA and non-TSCA sediments		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Dredge Operations	a. Noise	a. Noise <ul style="list-style-type: none"> <li>• Refer to General Site Hazards</li> </ul>
	b. Heavy Equipment Operation	b. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	c. Falling Overboard and/or Standing	c. Falling Overboard and/or Standing <ul style="list-style-type: none"> <li>• Watch personnel position while lifting sounding pole.</li> <li>• All persons on board will remain seated/standing securely whenever a watercraft is moving.</li> <li>• Maximum weight capacity for watercraft will not be exceeded.</li> <li>• Watercraft will not be used without shore support personnel with rescue skiff available onshore.</li> <li>• Personnel on board watercraft must be in constant radio contact with shore personnel.</li> </ul>
	d. Man Overboard/Drowning	d. Man Overboard/ Drowning <ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• All barges shall be equipped with a guardrail of wood, pipe, or steel around the entire perimeter of the barge.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• A Coast Guard approved Type IV flotation device (life ring) will be maintained on each barge.</li> <li>• Watercraft will not be used without shore support personnel with rescue skiff available onshore.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Dredging TSCA and non-TSCA sediments		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	e. Struck By/Against	e. Struck By/Against <ul style="list-style-type: none"> <li>• Personnel will understand and review hand signals.</li> <li>• Watch for other boats in area, avoid close calls or collisions.</li> <li>• Watch for wake from other boats.</li> <li>• Watch for (know their locations or mark with buoys) objects hidden under water at higher tides i.e. pilings, islands, anchor lines.</li> <li>• Caution will be used offloading the boat-personnel will ensure the boat is securely docked before embarking. All supply transfer work will be done only when boats are docked fore and aft.</li> <li>• All boats will be securely anchored or docked-docked boats will be positioned with minimum 2 lines.</li> <li>• Never pitchpole or broach any waves.</li> <li>• Ensure the air horn on each boat used is in proper working order.</li> <li>• Ladders will be free of ice and snow before climbing.</li> </ul>
	f. Sinking Boat/Barge Damage	f. Sinking Boat/Barge Damage <ul style="list-style-type: none"> <li>• All watercraft not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS).</li> <li>• A pre-use inspection of any rented vessel shall be completed, including picture documentation of pre-use conditions.</li> <li>• The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>• In the event a barge or boat becomes grounded at times of low tide, no attempt will be made to move the barge or boat until enough water returns to refloat it.</li> </ul>
	g. Watercraft Operation	g. Watercraft Operations <ul style="list-style-type: none"> <li>• All tenderboat pilots shall be familiar with the “Rules of the Road” that regulate movement of boat traffic within the harbor.</li> <li>• Boat Operators must hold Boater Safety certification.</li> <li>• Kill switch tether must be used.</li> <li>• Charts of the work areas, with depths for mean low water, will be obtained and watercraft pilots will be familiar with their use.</li> <li>• Locations of rocks, ledges and manmade subsurface obstructions will be noted within the study area. These will be given a wide berth.</li> <li>• All offshore boating regulations will be strictly observed; prudent speed limits observed.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Dredging TSCA and non-TSCA sediments		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin						
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS						
		<ul style="list-style-type: none"> <li>All watercraft (including pipelines, barges, moored boats, etc.) must have required Coast Guard approved lighting and/or signaling devices.</li> </ul>						
	h. Equipment Lost Overboard/Crushed	h. Equipment Lost Overboard/Crushed <ul style="list-style-type: none"> <li>Instruments shall not be placed near the edge of the boat when not in use/not secured.</li> <li>Equipment will be secured to the deck or to personnel when appropriate. Secure all radios and cell phones.</li> <li>Instruments will be kept clear of all tooling lay down areas. Good housekeeping will be critical on the boat.</li> </ul>						
	i. Emergencies: Fire, Weather and Medical /Spills/Releases	i. Emergencies: Fire, Weather and Medical /Spills/Releases <ul style="list-style-type: none"> <li>Fire extinguishers will be carried on all launches, barges, and motorboats. Minimum number and rating are as follows:               <table border="0" style="margin-left: 40px;"> <tr> <td style="padding-right: 20px;">Length</td> <td>Extinguisher</td> </tr> <tr> <td>26 feet or less</td> <td>one 1-A: 10-B:C</td> </tr> <tr> <td>26 feet or more</td> <td>two 1-A: 10-B:C</td> </tr> </table> </li> <li>Open boat workers shall be evacuated to shore or secure location by tenderboat when lightning is spotted or threatens the area.</li> <li>Medical emergencies will be handled as they are onshore except when low or no water renders a boat evacuation impossible.</li> <li>Booms shall be available to prevent any fuel or hydraulic spills from spreading.</li> <li>Personnel shall evacuate the boat/barge if a fire can not be contained with one 10 LB fire extinguisher.</li> </ul>	Length	Extinguisher	26 feet or less	one 1-A: 10-B:C	26 feet or more	two 1-A: 10-B:C
Length	Extinguisher							
26 feet or less	one 1-A: 10-B:C							
26 feet or more	two 1-A: 10-B:C							
	j. Overhead Hazards	j. Overhead Hazards <ul style="list-style-type: none"> <li>Reference General Site Hazards.</li> </ul>						
	k. Eye Injury	k. Eye Injury <ul style="list-style-type: none"> <li>Reference General Site Hazards.</li> </ul>						
	l. Slips/Trips/Falls	l. Slips/Trips/Falls <ul style="list-style-type: none"> <li>Reference General Site Hazards.</li> <li>Maintain work areas in a safe and orderly condition.</li> <li>Watch for uneven terrain or rocks in walk areas.</li> <li>Identify any other tripping hazards and remove them if at all possible.</li> </ul>						

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Dredging TSCA and non-TSCA sediments		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
2. Shut Down Dredge Operations	a. Slips/Trips/Falls	a. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas in a safe and orderly condition.</li> <li>• Unloading areas should be on even terrain.</li> <li>• Watch for uneven terrain or rocks in walk areas.</li> <li>• Extreme caution will be used when disconnecting straps, tie-downs or other equipment hold down devices.</li> <li>• Identify any other tripping hazards and remove them if at all possible.</li> <li>• If work on flatbeds is required, be aware of fall potential, use caution when removing slings, tie-downs or any equipment/supplies to avoid loss of balance.</li> </ul>
	b. Dropped Objects	b. Dropped Objects <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	c. Noise	c. Noise <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	d. Heavy Equipment Operation	d. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	e. Overhead Hazards	e. Overhead Hazards <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	f. Eye Injury	f. Eye Injury <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> </ul>
	g. Exposure to Site Contaminants (PCBs)	g. Exposure to Site Contaminants (PCBs) <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• When dredging production stops for a longer period, the sediment residues on the dredge will be hosed down by using a hose with medium water pressure on it.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Dredging TSCA and non-TSCA sediments**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	h. Struck By/Against	h. Struck By/Against <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Personnel will understand and review hand signals.</li> <li>• All machines will be equipped with backup alarms.</li> <li>• Only essential people will be allowed in the unloading area.</li> <li>• Personnel will not stand under any suspended loads.</li> <li>• Only qualified dredge personnel will be used.</li> <li>• All power tools used will have appropriated guards.</li> <li>• Personnel will avoid placing themselves between heavy equipment/dredge bucket and stationary objects.</li> <li>• Operations will be suspended and the Dredge secured during all severe weather.</li> <li>• Ensure correct position relative to other operations of other activities.</li> <li>• Ensure all body parts are kept from between the templates when they are being set.</li> </ul>
	i. Security issues	i. Security issues <ul style="list-style-type: none"> <li>• Cabin of dredge must be locked at the end of each shift</li> <li>• Dredge will be securely positioned prior to the end of each days activities</li> </ul>
	j. Miscellaneous	j. Miscellaneous <ul style="list-style-type: none"> <li>• All heavy, over-the-side work shall be done with the aid of a winch.</li> <li>• Oil, mud, and grease will be prevented from building up on walking surfaces.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Heavy Equipment/Trucks 2. Dredge/Excavator 3. Spill Control Measures 4. Appropriate PPE 5. Portable Eyewash 6. First Aid Kits 7. 20A:B:C Fire Extinguisher	1. Inspect all vehicles/equipment daily. 2. Daily inspections will be conducted unless damage is suspected. 3. Monthly inspections will be performed. 4. Daily safety inspection of spill control materials will be conducted. 5. Daily maintenance (fueling, oil, grease) will be conducted. 6. Daily inspections for oil/grease buildup will be conducted. 7. Pre and Post Calibrations 8. Initial review/training prior to commencement of field activities. 9. Inspect all PPE prior to use. 10. Inspect portable eye washes and first aid kits weekly. 11. Inspect fire extinguishers weekly.	1. All site personnel will read and comply with this HASP. 2. All site personnel will receive site specific training. 3. Personnel will be trained in inspection checklist use. 4. Personnel will be given instructions on proper use of fire extinguishers. 5. Personnel will be given training on how to respond to spilled materials. 6. Operators/pilots will be trained in engine maintenance. 7. Requirements for housekeeping will be reviewed. 8. Only Qualified, trained individuals will use the equipment. 9. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Dewatering Operations		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. System Start-Up	a. Back Injuries	a. Back Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.</li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.</li> </ul>
	c. Spills	c. Spills <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Secondary containment will be used during system start up to prevent spills of contaminated sediments onto ground surface.</li> </ul>
	d. Dropped Objects	d. Dropped Objects <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Steel toe boots meeting ANSI Standard Z41 will be worn during all site activities.</li> </ul>
	e. Sharp Objects/Punctures	e. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Use hand tools properly and wear appropriate protective equipment, cut resistant work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.</li> </ul>
	f. Hand and Power Tools	f. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturers instructions.</li> </ul>
	g. Eye Injuries	g. Eye Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Safety glasses meeting ANSI Standard Z87 will be worn.</li> </ul>
	h. Chemical Exposure	h. Chemical Exposure <ul style="list-style-type: none"> <li>• Appropriate protective clothing will be worn; skin will be rinsed with water if contact with hazardous material occurs; a portable eye wash station will be located by work area; conduct hazard communication training for decontamination and sample preservation chemicals. Air monitoring in accordance with Tables 6-1 and 6-2 will be conducted.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Dewatering Operations		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Electrocutation	i. Electrocutation <ul style="list-style-type: none"> <li>Do not use unit near any power lines or where water can come in contact with electrical power.</li> <li>Reference EHS Program EHS 3-10 for electrical considerations.</li> <li>All electrical wiring and hookups will be completed by a licensed electrician. Lockout/Tagout will be utilized to make sure lines are not hot prior to beginning work on them and making connections. Reference EHS Program EHS 6-4 for lockout/tagout procedures.</li> <li>The ESS is responsible for providing the training required in the procedure EHS-6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>The ESS shall also implement lockout/tagout procedures as required.</li> </ul>
2. Dewatering Operations	a. Exposure to Site Contaminants (PCBs)	a. Exposure to Site Contaminants (PCBs) <ul style="list-style-type: none"> <li>Personnel will take care to minimize contact with contaminated media. This involves a conscientious effort to keep "clean" during site activities.</li> <li>When the potential for contact with contaminated media exists, personnel will wear appropriate PPE described in Table 5-1 to minimize if not prevent exposure.</li> <li>Air monitoring will be performed as specified in Section 6. Personnel will follow those response procedures detailed in Section 6 as appropriate to the results of the air monitoring.</li> <li>Personnel will wash hands and face after leaving the contamination reduction zone with soap and water or waterless hand cleaner.</li> </ul>
	b. Lockout/Tagout (Release of Hazardous Energy)	b. Lockout/Tagout (Release of Hazardous Energy) <ul style="list-style-type: none"> <li>Reference EHS Program EHS 6-4.</li> <li>Reference 29 CFR 1910.147, Control of Hazardous Energy (Lockout/Tagout).</li> <li>The ESS is responsible for providing the training required in the procedure EHS Program EHS 6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>The ESS shall also implement lockout/tagout procedures as required.</li> </ul>
	c. Lockout/Tagout (Tags without Locks)	c. Lockout/Tagout (Tags without Locks) <ul style="list-style-type: none"> <li>The use of tags without locks is prohibited, except in those cases where it is physically impossible to attach a locking device to an isolation point. In this case, follow steps in EHS Program EHS 6-4.</li> <li>Employees shall be warned not to tamper with the tag or isolation point.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Dewatering Operations		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	d. Lockout/Tagout (Failure to Clear Locks)	d. Lockout/Tagout (Failure to Clear Locks) <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 6-4.</li> <li>• Supervisor will attempt to contact person who applied lock and resolve issue.</li> <li>• If person cannot be contacted, supervisor will investigate the situation and determine that removal of the lock will not create a hazard in the work zone.</li> <li>• The supervisor will then verify that the work zone is clear, and blocking devices have been removed and the system has been restored to the normal configuration.</li> <li>• The supervisor will then cut the lock off and restore energy to the system.</li> <li>• A written incident and investigation report per EHS Program EHS 1-7, Incident Reporting and Investigating, shall be prepared by the supervisor stating the reason for cutting the lock, why the lock was not removed, and the procedure used to ensure the safety of personnel in the area.</li> <li>• The individual whose lock was cut off must be notified ASAP.</li> </ul>
	e. Fire and Explosion	e. Fire <ul style="list-style-type: none"> <li>• Reference General Site Hazards and Section 10.9.</li> <li>• Equip all heavy equipment with 20A:B:C-type fire extinguishers.</li> <li>• Area(s) for personnel smoking will be designated.</li> <li>• Flammable liquids and gases will be stored away from oxidizers.</li> <li>• No hot work without properly executed work permit.</li> </ul>
	f. Spills	f. Spills <ul style="list-style-type: none"> <li>• Reference General Site Hazards, Section 10.13, and the Contingency Plan.</li> <li>• Secondary Containment will be provided in storage areas.</li> <li>• Spill and absorbent materials will be readily available.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Dewatering Operations**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Heavy Equipment</li> <li>2. Hand and Power Tools</li> <li>3. Appropriate PPE</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Hand and power tools will be inspected to ensure they are in good condition prior to each day's use.</li> <li>2. PPE will be inspected before and after each use.</li> <li>3. Periodic inspections pursuant to EHS Program EHS 3-3, Inspections, shall be completed during the monthly inspections by the ESS, PESM or other qualified personnel to ensure that the lockout tagout program is being effectively implemented. As a minimum the following shall be done:               <ul style="list-style-type: none"> <li>• Existing lockouts will be reviewed for effectiveness;</li> <li>• Permits for each existing lockouts shall be reviewed for adequacy;</li> <li>• Incident reports and past permits shall be reviewed to determine if deficiencies in the program exist;</li> <li>• Corrections to the system will be made as warranted; and</li> <li>• Results will be logged in the health and safety logbook.</li> </ul> </li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Authorized Employees shall receive training in the following prior to being allowed to use lockout/tagout procedures:               <ul style="list-style-type: none"> <li>• Recognition of hazardous energy sources;</li> <li>• Types and magnitudes of energies available at the site;</li> <li>• Methods and means needed for energy isolation and control; and</li> <li>• The requirements of this procedure and 29 CFR 1910.147.</li> </ul> </li> <li>2. Affected Employees shall be instructed in the following:               <ul style="list-style-type: none"> <li>• Purpose of the lockout tagout program;</li> <li>• Use and requirements of this procedure and 29 CFR 1910.147;</li> <li>• Prohibitions of restarting or tampering with equipment that has been locked out; and</li> <li>• Prohibitions of tampering with locks and tags installed on equipment.</li> </ul> </li> <li>3. All site personnel will read and comply with this HASP.</li> <li>4. All site personnel will receive site specific training.</li> <li>5. Only qualified electricians will install electrical wiring and hookups.</li> <li>6. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>7. Instruct personnel of proper use of fire extinguishers.</li> <li>8. Personnel will be trained on the proper use of hand and power tools, including the pipe welding machine.</li> <li>9. Training on lockout/tagout procedures are listed in EHS Program EHS 6-4.</li> </ol>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Loading Trucks for T&D		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Loading Trucks for T&D	a. Heavy Equipment Operation	a. Heavy Equipment Operation <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Only operators trained and experienced with the specific equipment will operate that equipment.</li> <li>• Equipment will have guards, canopies or grills to protect from flying objects.</li> <li>• Ground personnel will stay clear of all suspended loads.</li> <li>• Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.</li> <li>• Avoid equipment swing radius. This area will be delineated with cones.</li> <li>• Know hand signals.</li> <li>• All equipment will be equipped with backup alarms.</li> <li>• The use of headphones for entertainment purposes is prohibited.</li> <li>• A 15-foot minimum safe separation distance will be maintained between equipment and overhead utility lines.</li> <li>• Equipment will be shut down before and during fueling operations.</li> </ul>
	b. Struck by Heavy Equipment/Vehicles	b. Struck by Heavy Equipment/Vehicles <ul style="list-style-type: none"> <li>• Speed limit for traffic is 15 mph for all areas of the site.</li> <li>• Trucks shall slow down before approaching loading/unloading area.</li> <li>• Operators will remain in truck when being loaded.</li> <li>• On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment without making eye contact with the operator.</li> <li>• Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. Equipment operators will confirm that eye contact had been made by stopping operation and clearly showing their hands are off the controls.</li> <li>• Be aware of heavy equipment operations.</li> <li>• Keep out of the swing radius of heavy equipment.</li> <li>• Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times.</li> <li>• Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone.</li> <li>• Ground personnel will not stand directly behind heavy equipment when it is in operation.</li> <li>• Loaded trucks have right of way.</li> <li>• Leave ½ truck length between the truck being loaded and the next truck in line.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Loading Trucks for T&D		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	c. Equipment Rollover	c. Equipment Rollover <ul style="list-style-type: none"> <li>• Equipment will have rollover protective structures and seat belts.</li> <li>• Operators will wear seat belts when operating equipment.</li> <li>• Do not operate equipment on grades which exceed the manufacturer's recommendations.</li> <li>• Be aware of weather and road conditions.</li> <li>• A spotter will be used when loading equipment in high traffic areas.</li> <li>• Do not load equipment on unstable ground.</li> <li>• Run articulated equipment up and down slopes – not at an angle.</li> </ul>
	d. Contact with Overhead Utilities	d. Contact with Overhead Utilities <ul style="list-style-type: none"> <li>• If equipment is being operated or loaded in an area with overhead utilities, a spotter must be used.</li> </ul>
	e. Fall into Excavation	e. Fall into Excavation <ul style="list-style-type: none"> <li>• Install open trench warning devices/barricades.</li> </ul>
	f. Caught In/Between	f. Caught In/Between <ul style="list-style-type: none"> <li>• Do not allow personnel between a moving object and a stationary object.</li> <li>• Ensure all personnel within loading areas are accounted for and out of the way.</li> </ul>
	g. Vehicular Traffic	g. Vehicular Traffic <ul style="list-style-type: none"> <li>• Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.</li> <li>• Establish one-way (if possible) traffic routes for loaded trucks, so that they can keep the same path.</li> <li>• Traffic control patterns may be modified based on changed conditions (as observed) due to weather or due to modified operations at the site.</li> </ul>
	h. Spread of PCB Contaminated Media Off-site	i. Spread of PCB Contaminated Media Off-site <ul style="list-style-type: none"> <li>• Once loaded, trucks will be processed through a decontamination pad where an automated spray will be used to remove loose material from the wheels.</li> <li>• As necessary, a power washer will be used to wash the exterior of the loaded trucks.</li> <li>• Lined trucks and secure covers will be used to minimize the potential for loss of contaminated sediment is spilled on public roads.</li> <li>• All trucks will be inspected prior to leaving the site to ensure no gross contamination on the trucks.</li> <li>• Once the trucks have left the site, the hauling company is responsible for responding to and cleaning up any material released during transportation to the disposal facility. Prior to selecting waste hauling vendors, TtEC will require each vendor to provide information about their emergency response plan for spill cleanup. For haulers transporting DOT</li> </ul>

<b>Project: Lower Fox River OUs 2 through 5, Volume I Activities</b>		<b>Location: Brown, Outagamie, and Winnebago Counties, Wisconsin</b>
<b>Activity: Loading Trucks for T&amp;D</b>		
<b>MAJOR STEPS</b>	<b>POTENTIAL HAZARDS</b>	<b>PROTECTIVE MEASURES/CONTROLS</b>
		regulated shipments of PCB-contaminated sediments or debris (i.e., loads containing equal to or more than 1 pound of PCBs), TtEC shall require the transporters to confirm their company has prepared a DOT Hazardous Materials Security Plan.
<b>EQUIPMENT USED</b>	<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>
<ol style="list-style-type: none"> <li>1. Heavy Equipment</li> <li>2. Appropriate PPE</li> <li>3. Portable Eyewash</li> <li>4. First Aid Kits</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all heavy equipment prior to use.</li> <li>2. Inspect all PPE prior to use.</li> <li>3. Inspect portable eye washes and first aid kits weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this HASCP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Qualified operators will be used for heavy equipment operation.</li> <li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> </ol>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Wastewater Treatment Plant Operations		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. System Start-Up	a. Back Injuries	a. Back Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.</li> </ul>
	b. Slips/Trips/Falls	b. Slips/Trips/Falls <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.</li> </ul>
	c. Spills	c. Spills <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Secondary containment will be used during system start up to prevent spills of contaminated sediments onto ground surface.</li> </ul>
	d. Dropped Objects	d. Dropped Objects <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Steel toe boots meeting ANSI Standard Z41 will be worn during all site activities.</li> </ul>
	e. Sharp Objects/Punctures	e. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Use hand tools properly and wear appropriate protective equipment, cut resistant work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.</li> </ul>
	f. Hand and Power Tools	f. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturers instructions.</li> </ul>
	g. Eye Injuries	g. Eye Injuries <ul style="list-style-type: none"> <li>• Reference General Site Hazards.</li> <li>• Safety glasses meeting ANSI Standard Z87 will be worn.</li> </ul>
	h. Chemical Exposure	h. Chemical Exposure <ul style="list-style-type: none"> <li>• Appropriate protective clothing will be worn; skin will be rinsed with water if contact with hazardous material occurs; a portable eye wash station will be located by work area; conduct hazard communication training for decontamination and sample preservation chemicals.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Wastewater Treatment Plant Operations**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Electrocution	i. Electrocution <ul style="list-style-type: none"> <li>• Do not use unit near any power lines or where water can come in contact with electrical power.</li> <li>• Reference EHS Program EHS 3-10 for electrical considerations.</li> <li>• All electrical wiring and hookups will be completed by a licensed electrician. Lockout/Tagout will be utilized to make sure lines are not hot prior to beginning work on them and making connections. Reference EHS Program EHS 6-4 for lockout/tagout procedures.</li> <li>• The ESS is responsible for providing the training required in the procedure EHS-6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>• The ESS shall also implement lockout/tagout procedures as required.</li> </ul>
2. Wastewater Treatment Plant Operations	a. Exposure to Site Contaminants (PCBs)	a. Exposure to Site Contaminants (PCBs) <ul style="list-style-type: none"> <li>• Personnel will take care to minimize contact with contaminated media. This involves a conscientious effort to keep “clean” during site activities.</li> <li>• When the potential for contact with contaminated media exists, personnel will wear appropriate PPE described in Table 5-1 to minimize if not prevent exposure.</li> <li>• Personnel will wash hands and face after leaving the contamination reduction zone with soap and water or waterless hand cleaner.</li> </ul>
	b. Lockout/Tagout (Release of Hazardous Energy)	b. Lockout/Tagout (Release of Hazardous Energy) <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 6-4.</li> <li>• Reference 29 CFR 1910.147, Control of Hazardous Energy (Lockout/Tagout).</li> <li>• The ESS is responsible for providing the training required in the procedure EHS Program EHS 6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>• The ESS shall also implement lockout/tagout procedures as required.</li> </ul>
	c. Lockout/Tagout (Tags without Locks)	c. Lockout/Tagout (Tags without Locks) <ul style="list-style-type: none"> <li>• The use of tags without locks is prohibited, except in those cases where it is physically impossible to attach a locking device to an isolation point. In this case, follow steps in EHS Program EHS 6-4.</li> <li>• Employees shall be warned not to tamper with the tag or isolation point.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Wastewater Treatment Plant Operations		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	d. Lockout/Tagout (Failure to Clear Locks)	d. Lockout/Tagout (Failure to Clear Locks) <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 6-4.</li> <li>• Supervisor will attempt to contact person who applied lock and resolve issue.</li> <li>• If person cannot be contacted, supervisor will investigate the situation and determine that removal of the lock will not create a hazard in the work zone.</li> <li>• The supervisor will then verify that the work zone is clear, and blocking devices have been removed and the system has been restored to the normal configuration.</li> <li>• The supervisor will then cut the lock off and restore energy to the system.</li> <li>• A written incident and investigation report per EHS Program EHS 1-7, Incident Reporting and Investigating, shall be prepared by the supervisor stating the reason for cutting the lock, why the lock was not removed, and the procedure used to ensure the safety of personnel in the area.</li> <li>• The individual whose lock was cut off must be notified ASAP.</li> </ul>
	e. Fire and Explosion	e. Fire <ul style="list-style-type: none"> <li>• Reference General Site Hazards and Section 10.9.</li> <li>• Equip all heavy equipment with 20A:B:C-type fire extinguishers.</li> <li>• Area(s) for personnel smoking will be designated.</li> <li>• Flammable liquids and gases will be stored away from oxidizers.</li> <li>• No hot work without properly executed work permit.</li> </ul>
	f. Spills	f. Spills <ul style="list-style-type: none"> <li>• Reference General Site Hazards, Section 10.13, and the Contingency Plan.</li> <li>• Secondary Containment will be provided in storage areas.</li> <li>• Spill and absorbent materials will be readily available.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities**  
**Activity: Wastewater Treatment Plant Operations**

**Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Heavy Equipment</li> <li>2. Hand and Power Tools</li> <li>3. Appropriate PPE</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Hand and power tools will be inspected to ensure they are in good condition prior to each day's use.</li> <li>2. PPE will be inspected before and after each use.</li> <li>3. Periodic inspections pursuant to EHS Program EHS 3-3, Inspections, shall be completed during the monthly inspections by the ESS, PESM or other qualified personnel to ensure that the lockout tagout program is being effectively implemented. As a minimum the following shall be done: <ul style="list-style-type: none"> <li>• Existing lockouts will be reviewed for effectiveness;</li> <li>• Permits for each existing lockouts shall be reviewed for adequacy;</li> <li>• Incident reports and past permits shall be reviewed to determine if deficiencies in the program exist;</li> <li>• Corrections to the system will be made as warranted; and</li> <li>• Results will be logged in the health and safety logbook.</li> </ul> </li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Authorized Employees shall receive training in the following prior to being allowed to use lockout/tagout procedures: <ul style="list-style-type: none"> <li>• Recognition of hazardous energy sources;</li> <li>• Types and magnitudes of energies available at the site;</li> <li>• Methods and means needed for energy isolation and control; and</li> <li>• The requirements of this procedure and 29 CFR 1910.147.</li> </ul> </li> <li>2. Affected Employees shall be instructed in the following: <ul style="list-style-type: none"> <li>• Purpose of the lockout tagout program;</li> <li>• Use and requirements of this procedure and 29 CFR 1910.147;</li> <li>• Prohibitions of restarting or tampering with equipment that has been locked out; and</li> <li>• Prohibitions of tampering with locks and tags installed on equipment.</li> </ul> </li> <li>3. All site personnel will read and comply with this HASCP.</li> <li>4. All site personnel will receive site specific training.</li> <li>5. Only qualified electricians will install electrical wiring and hookups.</li> <li>6. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>7. Instruct personnel of proper use of fire extinguishers.</li> <li>8. Personnel will be trained on the proper use of hand and power tools, including the pipe welding machine.</li> <li>9. Training on lockout/tagout procedures are listed in EHS Program EHS 6-4.</li> </ol>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Sampling (Sediment And Process Operations)**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
3. Sediment sampling from small boat.	a. Working around water and in small boat. Falling into water other boat traffic interactions (large wakes)	<ul style="list-style-type: none"> <li>• Coast Guard approved flotation equipment, PFDs Type I, II, or selected Type III (i.e., Mustang Survival work suits &amp; Jackets, at discretion ESS) will be worn when in boat or on the dock, in areas without adequate safety rails (&lt;3-ft).</li> <li>• Survey vessels will display day-shapes to communicate to boat traffic that there is gear in the water (i.e., towfish or other instrumentation), and that the survey vessel has limited maneuverability.</li> <li>• Survey vessels will monitor VHF Channel 16.</li> <li>• Survey vessels will avoid operating in shipping channels as much as is practicable, and will be aware of the possibility of large ship wakes.</li> <li>• Set of oars and emergency horn shall be available in the boat prior to operation.</li> <li>• No standing or leaning over edge in small boats.</li> <li>• Comply with Coast Guard right-of-way rules.</li> <li>• Use horn to signal or warn other boats as appropriate.</li> <li>• Suspend work during bad weather or poor visibility.</li> <li>• Have experienced boat crews operate vessel</li> <li>• Ensure boat manufactures recommendation for operation and load limits are followed.</li> <li>• At least one US Coast Guard approved lifesling attached to approximately 100 feet of rope will be located on the boat. The hydrographic and geophysical crew vehicle will also have a rescue throw rope.</li> </ul>
	b. Exposure to Site Contaminants (PCBs)	<ul style="list-style-type: none"> <li>• Personnel will take care to minimize contact with contaminated media. This involves a conscientious effort to keep “clean” during site activities.</li> <li>• When the potential for contact with contaminated media exists, personnel will wear appropriate PPE described in Table 5-1 to minimize if not prevent exposure.</li> <li>• Personnel will wash hands and face after leaving the contamination reduction zone with soap and water or waterless hand cleaner.</li> </ul>
	c. Adverse weather. High winds and rain and/or snow storms, high water flow in river. Struck by lightning	<ul style="list-style-type: none"> <li>• If adverse weather is affecting crew’s safety, work will be halted until conditions improve. (i.e., wind, snow, rain etc.)</li> <li>• Area is prone to windstorms during the spring, when this work is anticipated to occur.</li> <li>• If road conditions are too bad to access the work site, the work will be postponed until conditions improve.</li> <li>• In the case of extreme weather, vessel operations may be delayed.</li> <li>• At no time will personnel and equipment enter the river, if the flow rate exceeds 1,500 CFS.</li> <li>• Follow the 10-second rule (time between lightning strike and thunder) for shutdown of operations. Immediately suspend operations when lightning is in the immediate vicinity and seek shelter.</li> </ul>

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	d. Fueling boat	<ul style="list-style-type: none"> <li>• Check the entire fuel system for leaks. Tighten connections frequently. Engine vibration can loosen them.</li> <li>• Turn off all engines and electrical equipment; shut off all fuel valves; and close all windows, doors and openings.</li> <li>• Try to fuel in daylight. If light is required, use a flashlight or a light that is spark-proof.</li> <li>• Never smoke or strike a match while fueling or when near a fueling dock.</li> <li>• When filling a tank or gas can, follow these guidelines:</li> <li>• Remove portable tanks from the vessel.</li> <li>• Touch the fuel pipe or tank with the spout to prevent buildup of static electricity.</li> <li>• Never fill a tank to the brim. Leave room for gas to expand.</li> <li>• After fueling, put the fill cap on tightly to prevent vapors from escaping.</li> <li>• Immediately wipe up any spilled gas.</li> <li>• Air out the rag after using it. Never throw it in the vessel or the water.</li> <li>• Store gas onboard in a safety-approved storage tank, away from the engine in an area of good ventilation.</li> <li>• Refueling should be performed on land as often as possible (i.e., at auto gas station, not via gas cans).</li> <li>• Funnels will be used when filling gas tanks from portable gas cans.</li> <li>• Sorbent pads will be placed under and/or around item being fueled to capture any spills.</li> <li>• To the extent possible fuel all systems before launching the boat so that on water refueling is kept to a minimum.</li> </ul>
	e. Chemicals brought on site	<ul style="list-style-type: none"> <li>• Reference EHS Program EHS 4-2.</li> <li>• Identify all chemical hazards and receive training (Haz Com-Material Safety Data Sheets/MSDS) regarding safe handling and storage of chemicals.</li> <li>• The ESS maintains copies of all MSDS for chemicals that are on site.</li> <li>• A portable 15 minute eye wash station will be located by the work area.</li> </ul>
	f. Boating activities	<ul style="list-style-type: none"> <li>• Boat Captains shall be USCG licensed</li> <li>• Prior to placing boats, survey equipment and personnel on the river, the river's flow rate will be assessed. At no time will personnel and equipment enter the river, if the flow rate exceeds 1,500 cubic feet per second (as measured by the nearby USGS flow monitoring station).</li> <li>• Debris may present a significant hazard to personnel during survey activities. During cold weather (&lt;40° F) blanket shall be on the survey vessel and the vessel will be kept warm, in the event that personnel get wet.</li> <li>• Due to the potential for limited rescue capability and other emergency impedances, activities on the river will be limited to one half hour before sunrise to one half hour after sunset.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sampling (Sediment And Process Operations)		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<p>Personnel should allow sufficient time to shutdown operations at the end of each day to ensure personnel are off of the river by the specified time.</p> <ul style="list-style-type: none"> <li>• Survey Boats shall have adequate lights (navigation and “head lights” / spot lights for safe operation during dawn/dusk and after dark if necessary.</li> <li>• Boat launches with adequate lighting will be used to the greatest extent possible</li> <li>• If working in the vicinity of the De Pere Dam additional precautions will be taken to insure safe boat operations are conducted. This will include use of one or several of the following safety precautions; inclusion of an auxiliary motor (i.e. “kicker” motor) on the survey vessel, use of a tagline(s) to the river bank, use of one or several points of anchor, installation of a cable which would prevent the survey boat and/or crew from passing over the dam.</li> </ul>
	g. Man Overboard/Drowning	<ul style="list-style-type: none"> <li>• All personnel shall wear United States Coast Guard (USCG) Approved Type III Life Preservers at all times while on the water.</li> <li>• As per OSHA requirements (29 CFR 1926.501(b)(1)) and EM 385-1-1 Section 19.A.07, guardrails are required on working platforms for barges that are 6 feet or more above the water.</li> <li>• All means of barge access shall be properly secured, guarded, and maintained free of slipping and tripping hazards.</li> <li>• A Coast Guard approved Type IV flotation device (life ring) will be maintained on each barge.</li> <li>• Water craft will not be used without shore support personnel with rescue skiff available onshore.</li> <li>• All persons on board will remain seated/standing securely whenever a water craft is moving.</li> <li>• Maximum weight capacity for water craft will not be exceeded.</li> <li>• Barges will be equipped with perimeter guardrails.</li> <li>• Water craft will be operated with a minimum of two personnel on board.</li> <li>• Water craft will not be used without shore support personnel.</li> <li>• A line extended from the water craft to the shore will always be available, so that shore personnel are able to retrieve water craft remotely in the event of an emergency.</li> <li>• Personnel on board water craft must be in constant radio contact with shore personnel.</li> <li>• Non slip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways.</li> <li>• All barge deck obstructions will be removed if possible, if not possible to remove them they shall be clearly marked with yellow paint.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sampling (Sediment And Process Operations)		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	h. Sinking Boat	<ul style="list-style-type: none"> <li>All water craft not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS).</li> <li>A pre-use inspection of any rented vessel shall be completed, including a video documentation of pre-use conditions.</li> <li>The load ratings of barges and tenderboats will be strictly adhered to; overloading of vessels is prohibited.</li> <li>Tide tables will be consulted and times of high tide, when it is most safe to move barges, will be identified.</li> <li>In the event a boat becomes grounded at times of low tide, no attempt will be made to move the barge until enough water returns to refloat it.</li> </ul>
	i. Failure to have proper medical supplies, emergency supplies, and PFDs during emergency could result in inadequate treatment of personnel or potentially increase injuries.	<ul style="list-style-type: none"> <li>Ensure that PFD's are available for each person and in good usable condition.</li> <li>First-aid kit and supplies are available.</li> <li>Oars, emergency horn, life ring, fire extinguisher are available. (Fire extinguisher shall be at least a 10lb. ABC type).</li> <li>Cell phone is available and working for emergency notifications.</li> </ul>
	j. Back Injuries and Strains	<ul style="list-style-type: none"> <li>Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	k. Communication	<ul style="list-style-type: none"> <li>Field personnel will use cellular telephones with adequate coverage to communicate with individuals off site.</li> <li>Field personnel will use two-way radios with adequate coverage to communicate with the Coast Guard off site.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sampling (Sediment And Process Operations)		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
4. Sampling during Process Operations	a. Exposure to Site Contaminants (PCBs)	a. Exposure to Site Contaminants (PCBs) <ul style="list-style-type: none"> <li>• Personnel will take care to minimize contact with contaminated media. This involves a conscientious effort to keep "clean" during site activities.</li> <li>• When the potential for contact with contaminated media exists, personnel will wear appropriate PPE described in Table 5-1 to minimize if not prevent exposure.</li> <li>• Personnel will wash hands and face after leaving the contamination reduction zone with soap and water or waterless hand cleaner.</li> </ul>
	b. Eye Injuries	b. Eye Injuries <ul style="list-style-type: none"> <li>• Safety glasses or goggles meeting ANSI Standard Z87 will be worn for all field operations where eye hazards exist.</li> <li>• A portable eye wash station will be located adjacent to work activities.</li> </ul>
	c. Lockout/Tagout (Release of Hazardous Energy)	c. Lockout/Tagout (Release of Hazardous Energy) <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 6-4.</li> <li>• Reference 29 CFR 1910.147, Control of Hazardous Energy (Lockout/Tagout).</li> <li>• The ESS is responsible for providing the training required in the procedure EHS Program EHS 6-4 to supervisors and craft employees, and conducting periodic inspections to ensure this procedure is effectively implemented.</li> <li>• The ESS shall also implement lockout/tagout procedures as required.</li> </ul>
	d. Lockout/Tagout (Tags without Locks)	d. Lockout/Tagout (Tags without Locks) <ul style="list-style-type: none"> <li>• The use of tags without locks is prohibited, except in those cases where it is physically impossible to attach a locking device to an isolation point. In this case, follow steps in EHS Program EHS 6-4.</li> <li>• Employees shall be warned not to tamper with the tag or isolation point.</li> </ul>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Sampling (Sediment And Process Operations)		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	e. Lockout/Tagout (Failure to Clear Locks)	e. Lockout/Tagout (Failure to Clear Locks) <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 6-4.</li> <li>• Supervisor will attempt to contact person who applied lock and resolve issue.</li> <li>• If person cannot be contacted, supervisor will investigate the situation and determine that removal of the lock will not create a hazard in the work zone.</li> <li>• The supervisor will then verify that the work zone is clear, and blocking devices have been removed and the system has been restored to the normal configuration.</li> <li>• The supervisor will then cut the lock off and restore energy to the system.</li> <li>• A written incident and investigation report per EHS Program EHS 1-7, Incident Reporting and Investigating, shall be prepared by the supervisor stating the reason for cutting the lock, why the lock was not removed, and the procedure used to ensure the safety of personnel in the area.</li> <li>• The individual whose lock was cut off must be notified ASAP.</li> </ul>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Boats</li> <li>2. Appropriate PPE</li> <li>3. Hand and Power Tools</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all boats daily.</li> <li>2. Inspect all hand and power tools prior to use.</li> <li>3. Inspect all PPE prior to use.</li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this SHSP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Qualified operators will be used for heavy equipment and boat operation.</li> <li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>5. Instruct personnel of proper use of fire extinguishers.</li> <li>6. Personnel will be trained on the proper use of hand and power tools, including the steam cleaner.</li> </ol>

Project: Lower Fox River OUs 2 through 5, Volume I Activities Activity: Laboratory Analysis		Location: Brown, Outagamie, and Winnebago Counties, Wisconsin
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Laboratory Analysis	a. Back Injuries and Strains	a. Back Injuries and Strains <ul style="list-style-type: none"> <li>• Procedures in Section 3.3.14 will be followed.</li> <li>• Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc).</li> <li>• Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available.</li> <li>• An individual will not lift loads greater than 50 pounds. <b>This amount may be lowered by ESS's judgment due to individual's stature and lifting ability.</b></li> </ul>
	b. Electrical Hazards	b. Electrical Hazards <ul style="list-style-type: none"> <li>• Extension cords are allowed for temporary use provided the weight of the cord is adequate for the load applied. Check to be sure the extension cord is three pronged and that no cords are frayed.</li> <li>• Multiplug devices are allowed provided they are UL listed with a built-in circuit breaker and used in accordance with their intended use.</li> <li>• Fuses must be appropriately rated for each appliance.</li> <li>• Electrical equipment must not be used in the vicinity of flammable or explosive gases.</li> <li>• Electrical equipment must not be used where it may get wet. Equipment that has been wet must never be switched on until the equipment has been tested.</li> <li>• Ensure adequate electrical service is provided in the laboratory to minimize the need for permanent use of extension cords.</li> <li>• Circuit breakers that service laboratory equipment should be identified as such.</li> <li>• Outlets located near sinks or other sources of water should be on a ground fault circuit or otherwise ground fault protected.</li> </ul>
	c. Exposure to Site Contaminants (PCBs) and fumes during heating/processing samples	c. Exposure to Site Contaminants (PCBs) <ul style="list-style-type: none"> <li>• Personnel will take care to minimize contact with contaminated media. This involves a conscientious effort to keep "clean" during site activities.</li> <li>• When the potential for contact with contaminated media exists, personnel will wear appropriate PPE to minimize if not prevent exposure. Standard PPE requirements will be identified and posted for additional chemicals used to process the samples. All laboratory analysis personnel will be trained in the appropriate PPE requirements for their task.</li> <li>• Use proper pipetting or transfer techniques for removal of sample to new vial or container.</li> <li>• Personnel will wash hands and face after leaving the contamination reduction zone with soap and water or waterless hand cleaner.</li> <li>• Whenever heat or chemicals are added to the sample, this will be done under a fume hood to prevent exposure via inhalation. Chemicals that must be used under the hood will be</li> </ul>

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		<p>identified and all laboratory personnel will be informed of this requirement.</p> <ul style="list-style-type: none"> <li>• If operations in the lab involve chemicals which present an inhalation exposure hazard, a fume hood must be available for use.</li> <li>• Fume hood work should be placed approximately 6 inches into the hood, i.e., not right at the front edge. Fume hoods should not be strictly used for storage of chemicals.</li> <li>• Laboratory refrigerators and freezers are not allowed to be used for the storage of food or drink. Ice machines and microwave ovens are not to be used for human use.</li> <li>• Wastes should be removed from the laboratory in a timely manner.</li> <li>• All wastes must be labeled with a hazardous waste label and stored according to the hazards associated with the waste. Abbreviations or trade names must not be used to identify contents. Common chemical or IUPAC nomenclature must be used. Label every constituent added to the container, especially with heavy metals in the parts per million range.</li> <li>• Waste containers must be capped at all times unless material is being added.</li> <li>• Waste containers must be compatible with contents. For example do not use metal containers to store acids or glass containers for hydrofluoric acid mixtures.</li> <li>• All waste must be stored in a secondary container.</li> <li>• Do not fill liquid waste containers over 90% full.</li> </ul>
	d. Slips/Trips/Falls	<p>d. Slips/Trips/Falls</p> <ul style="list-style-type: none"> <li>• Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible.</li> <li>• Maintain work areas safe and orderly.</li> <li>• Cables must not be run across the floor in such a way as to cause a tripping hazard or to be susceptible to damage from passing traffic. If it is necessary to run cables across walkways, they must be covered with cable protectors.</li> <li>• Tools and supplies/equipment will be properly stored.</li> <li>• Housekeeping must be maintained so that the aisles are clear to allow for emergency egress. Storage is not permitted in exit ways (hallways).</li> <li>• Floors should be in good repair i.e., no tripping hazards caused by cracks, holes, protrusions, missing tiles, etc.</li> <li>• Excess or surplus equipment should be disposed of or relocated to a storage location. When transferring equipment for disposal be sure hazardous materials are removed prior to transfer.</li> <li>• If operations cause floors to be wet or slippery, mats to help prevent slippage should be used.</li> </ul>

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	e. Eye Injuries	e. Eye Injuries <ul style="list-style-type: none"> <li>• Safety glasses with side shields or goggles meeting ANSI Standard Z87 will be worn for all laboratory operations where eye hazards exist.</li> <li>• A 15 minute eye wash station and personnel shower will be located in the laboratory. These should be inspected every 6 months.</li> <li>• Shields should be used when conducting experiments that could explode.</li> </ul>
	f. Gas Cylinders Hazards	f. Gas Cylinders Hazards <ul style="list-style-type: none"> <li>• Leakage or escape of flammable gases can produce a serious explosive hazard in the laboratory. Gas cylinders, control valves, and pressure regulators and gauges should all be used carefully and according to the manufacturer's recommendations. Broken or damaged equipment should not be used but must be replaced. Only equipment that is appropriate i.e. specially designed for use with toxic, explosive or corrosive gases may be used.</li> <li>• Gases can be reactive and highly toxic – leaking gas can react with its surroundings (i.e., equipment, chemicals, skin). There should be regular checks for leaks especially in joints pressure. Prior to introducing a flammable gas into a reaction vessel, the equipment must be purged of oxygen by evacuation or by flushing with inert gas. Naked flames or other sources of ignition must be rigorously excluded from the vicinity.</li> <li>• Inert gases such as nitrogen, carbon dioxide, and argon can cause asphyxiation if released in quantity. Exhaust lines must be properly vented e.g., to a fume hood.</li> <li>• Containers that receive the gases can explode if not rated to accept the pressure. Receiving containers must be capable of accepting the gas at the required operating pressure.</li> <li>• Gas cylinders should not be stored in laboratories unless they are being used.</li> <li>• Caps should be kept on the cylinders when not in use.</li> <li>• Cylinders need to be individually restrained by chains at approximately two thirds height from the floor.</li> <li>• Regulators should be replaced or recertified on a regular basis. Regulator types are matched to the type of cylinder and gas being used. Contact the gas supplier with questions.</li> <li>• Gas cylinders must be labeled with the contents. Unknown gas cylinders are very hazardous and expensive to dispose of.</li> <li>• Gas supply lines need to be compatible with the gas being used. The suppliers can provide information about proper line material. The lines also must be rated to handle the pressures used.</li> <li>• Some gas companies will accept their cylinders back empty or partially full. Companies such as this should be used to minimize chemical waste.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Laboratory Analysis**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	g. Sharp Objects/Punctures	g. Sharp Objects/Punctures <ul style="list-style-type: none"> <li>• Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with.</li> <li>• All hand and power tools will be maintained in a safe condition. When possible, blunt all sharp objects.</li> <li>• First aid kits will be available by the work area.</li> <li>• All belts, blades or other moving parts on equipment should be guarded or otherwise protected.</li> <li>• Check for sharp edges or points sticking out on equipment, furniture etc. that could cause struck by hazards.</li> </ul>
	h. Spills	h. Spills <ul style="list-style-type: none"> <li>• Reference Section 10.13 and the Contingency Plan.</li> <li>• Secondary Containment will be provided in storage areas.</li> <li>• Spill and absorbent materials will be readily available.</li> <li>• Absorbent materials will be used during transfer of fuel/oil.</li> <li>• Contain, control and clean up the spill and affected area (soil, water). Manage and dispose of spill material appropriately.</li> <li>• All waste materials generated will be contained in a seal-able container appropriate for the size of the spill.</li> <li>• Whenever possible chemicals should not be stored above eye level and liquids should be stored in secondary containers.</li> <li>• Whenever possible all shelves used to store liquid chemicals should have a lip.</li> </ul>
	i. Fire Hazards	i. Fire Hazards <ul style="list-style-type: none"> <li>• Fire extinguishers should be located nearby and visible from the hallway. They should be inspected monthly to ensure it is charged and not damaged.</li> <li>• If there are smoke detectors or sprinklers in the lab, make sure that nothing is stored near them that would interfere with their intended operation.</li> <li>• Flammables should be stored in flammable storage cabinets wherever possible and always kept away from open flames.</li> <li>• Ensure combustibles are not stored near hot surfaces or equipment.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Laboratory Analysis**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	j. Hand and Power Tools	j. Hand and Power Tools <ul style="list-style-type: none"> <li>• Reference Section 3.3.12.</li> <li>• The proper tools will be used for each task.</li> <li>• All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, “mushroom” head).</li> <li>• Tools will be used in accordance with manufacturer’s instructions.</li> <li>• Modifications to tools are prohibited unless approved by the ESS.</li> <li>• GFCIs will be used with all electrical power tools.</li> </ul>
	k. Chemicals brought on site	k. Chemicals brought on site <ul style="list-style-type: none"> <li>• Reference EHS Program EHS 4-2.</li> <li>• Identify all chemical hazards, PPE requirements, plus special safety procedures, and receive training (Haz Com-Material Safety Data Sheets/MSDSs) regarding safe handling and storage of chemicals.</li> <li>• Store chemicals by hazard class. Remove chemicals in accordance with hazardous waste requirements prior to their expiration date. Pay close attention to special storage requirements such as refrigeration, dry atmospheres etc.</li> <li>• Flammable/combustibles may not be stored in refrigerators or freezers that are not lab safe or explosion proof. Regular refrigerators and freezers should bear the caution statement prohibiting storage of these materials.</li> <li>• All chemical containers must be labeled and the labels must be securely affixed to the container. Reaction flasks must be labeled as well. Abbreviations or trade names should not be used to label containers. Common chemical or IUPAC nomenclature should be used.</li> <li>• Quantities of chemicals kept in the lab should not be excessive. Outdated chemicals should be disposed of.</li> <li>• The ESS maintains copies of all MSDS for chemicals that are on site.</li> <li>• A 15-minute eye wash station and personnel shower will be located by the laboratory area. These should be inspected every 6 months.</li> </ul>

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Laboratory Analysis**

**Project: Lower Fox River OUs 2 through 5, Volume I Activities** **Location: Brown, Outagamie, and Winnebago Counties, Wisconsin**  
**Activity: Laboratory Analysis**

<b>EQUIPMENT USED</b>	<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>
<ol style="list-style-type: none"> <li>1. Heavy Equipment</li> <li>2. Appropriate PPE</li> <li>3. Hand and Power Tools</li> <li>4. Portable Eyewash</li> <li>5. First Aid Kits</li> <li>6. 20A:B:C Fire Extinguisher</li> <li>7. GFCI</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect all heavy equipment prior to use.</li> <li>2. Inspect all hand and power tools prior to use.</li> <li>3. Inspect all PPE prior to use.</li> <li>4. Inspect portable eye washes and first aid kits weekly.</li> <li>5. Inspect fire extinguishers weekly.</li> <li>6. Check and test GFCIs weekly.</li> </ol>	<ol style="list-style-type: none"> <li>1. All site personnel will read and comply with this SHSP.</li> <li>2. All site personnel will receive site specific training.</li> <li>3. Qualified operators will be used for heavy equipment and boat operation.</li> <li>4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training.</li> <li>5. Instruct personnel of proper use of fire extinguishers.</li> <li>6. Personnel will be trained on the proper use of hand and power tools, including the steam cleaner.</li> </ol>

---

**APPENDIX D**  
**HEAVY EQUIPMENT INSPECTION FORMS**

**TETRA TECH EC, INC**  
**EQUIPMENT TRANSFER/RELEASE FORM**

TtEC Asset #: \_\_\_\_\_ Meter/Mileage: \_\_\_\_\_

Description: \_\_\_\_\_

Year/Make/Model: \_\_\_\_\_ S/N: \_\_\_\_\_

Project Releasing Equipment: \_\_\_\_\_

Date Released from Project: \_\_\_\_\_ Released to: \_\_\_\_\_

Manuals shipped with equipment: \_\_\_\_\_

Transportation Charge No.: \_\_\_\_\_ G/L \_\_\_\_\_

GENERAL CONDITION:

Check appropriate boxes: \_\_\_\_\_ No repairs needed \_\_\_\_\_ Repairs needed

Describe: \_\_\_\_\_

Check appropriate column and describe correction needed.

	Condition Good	Correction Needed (description)
Steering System	_____	_____
Air System	_____	_____
Hydraulic System	_____	_____
Brake System	_____	_____
Drive Sys. (engine/trans/diff)	_____	_____
Exhaust System	_____	_____
Undercarriage/tires	_____	_____
Glass	_____	_____
Instrumentation	_____	_____
Controls	_____	_____
Fluid Levels/Leaks	_____	_____
Service Sticker Update	_____	_____
Body (doors/panels/tinwork)	_____	_____
Safety System (b/u alarm, extinguisher, s. belts, mirrors)	_____	_____
Cab Systems (heat, a/c, wipers, horn)	_____	_____

I certify that the above listed equipment is in good working order, all defects and damages have been noted above, and has been properly maintained, and deconned/cleaned prior to demobilization.

Signature \_\_\_\_\_ Date \_\_\_\_\_ Print Name \_\_\_\_\_ Title \_\_\_\_\_

Receiving Project concurrence of conditions.

---

---

Signature

Date

Print Name

Title

If Receiving Project does not concur with the above report, note findings, sign and forward to the Equipment Yard.



Equipment/Vehicle Inspection Report

Date: \_\_\_\_\_ Unit Number: \_\_\_\_\_ Description: \_\_\_\_\_

Miles/ Hours: \_\_\_\_\_ MEG: \_\_\_\_\_

Unit to be taken from: \_\_\_\_\_ to: \_\_\_\_\_

	Good	Satisfactory	Repair Req.	N/A		Good	Satisfactory	Repair Req.	N/A
1. Tires _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16. Interior	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Brakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17. Glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Steering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	18. Wipers/Review Mirrors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Undercarriage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	19. Heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Suspension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20. Safety Equipment/Belts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Engine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	21. Lights/Turn Signals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Drive Train	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	22. Mounted Equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Fuel System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	23. Mounted Attachments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Cooling System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24. Blade/Bucket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Electrical System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	25. Boom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Exhaust System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	26. Outriggers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Hydraulic System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	27. Fire Ext./First Aid Kit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Transmission	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	28. Horn/Backup Alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Clutch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	29. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note percentage of tread usefulness

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Inspected By: \_\_\_\_\_

DISTRIBUTION: (1) Sent with equipment (2) Tetra Tech FW, Inc. Equipment Department (3) Receiving Copy (4) Originator's Copy

EQUIPMENT TRANSFER REPORT MUST ACCOMPANY THIS FORM



TETRA TECH EC, INC.

DAILY EQUIPMENT INSPECTION

EQUIP. NO. TYPE
MANUFACTURER MODEL
PROJECT DATE
ENGINE HRS/MILEAGE SHIFT

Check appropriate column and describe correction needed.

Table with 3 columns: Component Name, Condition Good, Correction Needed. Rows include Steering, Service Brakes, Emergency Brakes, Retarder, Transmission, Controls, Hydraulic Leaks, Exhaust System, Warning Gauges, Windshield, Lights, Mirrors, Seat and Seat Belts, Tires/Tread, Regular Horn, Back-up Alarm, Steps, Hand-holds, Fire Extinguisher, Rollover Cage, Oil Level, Other.

Remarks:

Signed Operator

Repairs or adjustments completed:
Date:

Signed Equipment Supervisor/Mechanic

---

**APPENDIX E**

**HANDBOOK OF WISCONSIN BOATING LAWS AND RESPONSIBILITIES**

# *the* **HANDBOOK!**



## **OF WISCONSIN BOATING LAWS AND RESPONSIBILITIES**

Approved by



2008 Edition

# BOAT WISCONSIN

## *A Course on Responsible Boating*

*Boater education certification is required by law for anyone born on or after 01/01/1989 to operate a motorboat on Wisconsin's waterways. Even if it's not required for you, becoming certified may save you money on boat insurance. You have **two** ways to be certified.*

### **1.** *Over the Internet ...*

Learn what you need to be a safe boat operator online! The complete course with exciting visuals awaits you on the Internet. Interactive graphics help you learn and retain information on how to boat safely in Wisconsin. Successfully complete the online test and you will receive a Wisconsin Department of Natural Resources boater education certificate by mail.

**Start today at [www.boat-ed.com/wi](http://www.boat-ed.com/wi)**

### **2.** *In a classroom ...*

Share the learning experience with other interested students and a qualified instructor. Wisconsin Department of Natural Resources can help you find a classroom course in your area.

**Call 888-936-7463 for information or visit [dnr.wi.gov](http://dnr.wi.gov)**

## ***Safer Boating Through Partnerships***

### **UNITED STATES POWER SQUADRONS**

Be a Smart Boater ... Increase your Boating Skills! DNR-certified classes offered throughout the state. For more information, call 1-888-FOR-USPS or visit our website at [www.USPS.org](http://www.USPS.org).



### **UNITED STATES COAST GUARD AUXILIARY**

Helping Wisconsin Boaters ... by providing boating courses, courtesy vessel examinations, and surface and air operations. For more information, call the CG Info line at 1-800-368-5647 or visit our website at [www.cgaux.org](http://www.cgaux.org).



---



*the*  
**HANDBOOK!**

---

OF  
**WISCONSIN  
BOATING LAWS**  
AND  
**RESPONSIBILITIES**

This handbook includes a summary of Wisconsin boating laws. For a complete set of what is legal when boating in Wisconsin, see the Wisconsin Statutes and Regulations and federal laws.

- ◆ To stay up-to-date on Wisconsin boating laws:
  - Call the Wisconsin Department of Natural Resources at **1-888-936-7463**
  - Or visit our website at **[dnr.wi.gov](http://dnr.wi.gov)**
- ◆ For federal boating laws, visit the U.S. Coast Guard's website at **[www.uscgboating.org](http://www.uscgboating.org)**

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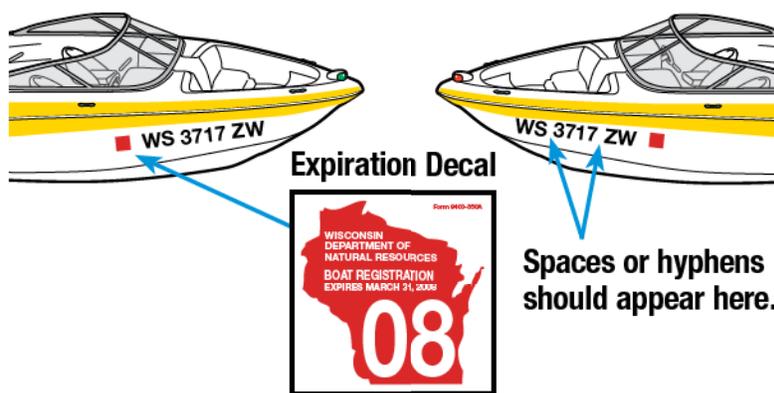
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All operators are required to obey laws that regulate your vessel's registration and operation.

## Registering Your Vessel

- ◆ You must have a Wisconsin Certificate of Number (registration) and expiration decals to operate a recreational vessel legally. Exceptions to the requirement to register a recreational vessel include:
  - Sailboats 12 feet of length or less and not equipped with a motor and sailboards
  - Manually propelled vessels that are not equipped with a motor or sail
  - Vessels registered in another state and using Wisconsin waters for less than 60 consecutive days
- ◆ The Certificate of Number is obtained by submitting the proper application and fee to the Wisconsin Department of Natural Resources (DNR).
- ◆ *The Certificate of Number (registration card) must be on board and available for inspection by an enforcement officer whenever the vessel is operated.*
- ◆ If your vessel requires registration, it is illegal to operate it or allow others to operate your vessel unless it is registered and numbered properly.



### For More Information on Registering ...

- Call Wisconsin DNR at **1-888-936-7463**
- Visit the Wisconsin DNR website at **[dnr.wi.gov](http://dnr.wi.gov)**

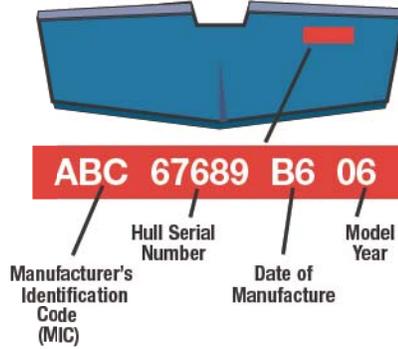


## Other Facts About Titling and Registration

- ◆ **Titling:** Only vessels 16 feet or more in length require a Certificate of Title.
- ◆ **Expiration:** Registration is valid for three years, beginning on April 1 and expiring on March 31 at the end of each three-year period. No vessel may be operated after March 31 without renewing the registration.
- ◆ **Duplicates:** If a Certificate of Number is lost or destroyed, the vessel owner must apply to the Department of Natural Resources (DNR) to replace it with a duplicate Certificate of Number.
- ◆ **Buying or Selling a Vessel:** Transfer of ownership of a vessel terminates the Certificate of Number and title.
  - The “buyer” must apply for a new registration and/or title on forms furnished by the DNR. The previous owner’s Certificate of Number and title must accompany the application.
  - Upon receipt of the required fee and application, the DNR will issue a new Certificate of Number and/or title.
  - After applying, the “buyer” may operate the vessel if a copy of the application is carried on board.
  - It is unlawful to transfer the number designated by the DNR from one vessel to another.
- ◆ **Changes Requiring Notification:** The owner of a registered vessel must notify the DNR within 15 days of the occurrence of any of the following events.
  - The owner changes his or her address.
  - The owner transfers all or any part of his or her interest in the vessel.
  - The vessel is destroyed or abandoned.
- ◆ **Documented Vessels:** Larger recreational vessels owned by U.S. citizens may (at the option of the owner) be documented by the U.S. Coast Guard. Call the USCG at **1-800-799-8362** for more information. Documented vessels also must be registered in Wisconsin.
  - The expiration decals must be displayed on either side of the vessel’s name on the transom, but it is not required to display the registration number.
  - If the expiration decals are not displayed beside the vessel’s name, then the registration number and decals must be displayed as they are for undocumented vessels.

## Hull Identification Number

- ◆ The Hull Identification Number (HIN) is a unique, 12-digit number assigned by the manufacturer to vessels built after 1972.
- ◆ Hull Identification Numbers:
  - Distinguish one vessel from another.
  - Are engraved in the fiberglass or on a metal plate permanently attached to the transom.
- ◆ You should write down your HIN and put it in a place separate from your vessel in case warranty problems arise or your vessel is stolen.
- ◆ If a vessel has no HIN, or if the manufacturer's HIN has been removed, obliterated, or altered, the condition must be noted in the application for Certificate of Title and the DNR will assign a HIN to the vessel.



## Who May Operate

- ◆ It is illegal for a parent or guardian to allow a child to operate in violation of the requirements below.
- ◆ Individuals who are required to complete a boater safety course before operating a vessel must carry the course certificate on board.

## Motorboats (Other Than a Personal Watercraft)

- ◆ **A person under the age of 10** may not operate a motorboat.
- ◆ **A person 10 or 11 years old** may operate a motorboat *only if* accompanied by a parent, guardian, or a person at least 18 years old who is designated by the parent or guardian.
- ◆ **A person born on or after January 1, 1989 and ...**
  - **12-15 years old** may operate a motorboat *only if*:
    - Accompanied by a parent, guardian, or a person at least 18 years old who is designated by the parent or guardian *or ...*
    - He or she has completed a boating safety course that is accepted by the Wisconsin DNR.
  - **16 years old or older** may operate a motorboat *only if* he or she has completed a boating safety course that is accepted by the Wisconsin DNR.

## Personal Watercraft (PWC)

- ◆ **A person under the age of 12** may not operate a PWC.
- ◆ **A person born on or after January 1, 1989 and ...**
  - **12-15 years old** may operate a PWC *only if* he or she has completed a boating safety course that is accepted by the Wisconsin DNR. (Parental supervision is not a substitute for a boating safety course certificate as with other motorboats.)
  - **16 years old or older** may operate a PWC *only if* he or she has completed a boating safety course that is accepted by the Wisconsin Department of Natural Resources.
- ◆ **A person under 16 years old** may not rent or lease a PWC.

## Local Regulations

Many local waterways in Wisconsin have specific equipment requirements, operational restrictions, and restrictions on certain activities in addition to those covered in this handbook. Be sure to check with the local boat patrol or municipality for additional regulations before you go boating.

## Enforcement

Wisconsin conservation wardens, county sheriffs, and municipal police enforce the boating laws of Wisconsin. U.S. Coast Guard officers also patrol and have enforcement authority on federally controlled waters.



- ◆ Officers have the authority to stop and board your vessel in order to check for compliance with state and federal laws.
- ◆ It is illegal to refuse to follow the directive of a person with law enforcement authority.
  - A vessel operator who has received a visual or audible signal from a patrol boat must reduce speed to “slow, no wake” speed and give way to the patrol boat.
  - A vessel operator must stop when requested or signaled to do so by a law enforcement officer or a patrol boat.



# Required Equipment



When preparing to go out, the operator must check that the legally required equipment is on board.

## Personal Flotation Devices (PFDs)

- ◆ All vessels must have at least one Type I, II, III, or V PFD (life jacket) for each person on board.
- ◆ In addition to the requirement for life jackets, one Type IV U.S. Coast Guard–approved PFD must be on board vessels 16 feet or longer (except canoes and kayaks) and immediately available.
- ◆ Federal law requires children under the age of 13 to *wear* a USCG–approved PFD while underway in an open vessel on federally controlled waters.
- ◆ Sailboarders and windsurfers are exempt from PFD requirements but are encouraged to wear a PFD.
- ◆ Every person on board a personal watercraft must *wear* a USCG–approved Type I, II, III, or V PFD.
- ◆ Besides being USCG–approved, all PFDs must be:
  - *In good and serviceable condition.*
  - *Readily accessible*, which means you are able to put the PFD on quickly in an emergency.
  - *Of the proper size for the intended wearer.* Sizing for PFDs is based on body weight and chest size.



### TYPE I: Offshore Life Jackets

These vests are geared for rough or remote waters, provide the most buoyancy, and will turn most unconscious persons face up.



### TYPE II: Near-Shore Vests

These vests are good for calm waters and may not turn some unconscious wearers face up.



### TYPE III: Flotation Aids

These vests or full-sleeved jackets are good for calm waters and will not turn most unconscious persons face up.



### TYPE IV: Throwable Devices

These cushions and ring buoys are designed to be thrown to someone in trouble and are not designed to be worn.



### TYPE V: Special-Use Devices

To be acceptable, these PFDs must be worn whenever the vessel is underway.

## Sound-Producing Devices

In periods of reduced visibility or whenever a vessel operator needs to signal his or her intentions or position, a sound-producing device is essential.

- ◆ Although not required on state waters, sound-producing devices are required on federally controlled waters. The requirements are:
  - Vessels less than 65.6 feet in length, which includes PWCs, are required to carry on board a whistle or horn or some other means to make an efficient sound signal audible for at least one-half mile.
  - Vessels that are 65.6 feet or more in length are required to carry on board a whistle or horn, *and* a bell that are audible for at least one mile.
- ◆ No vessel may be equipped with a siren, except vessels used by law enforcement officers.

## Fire Extinguishers

- ◆ All vessels are required to have a Type B fire extinguisher(s) on board if one or more of the following conditions exist:
  - Inboard/outboard or inboard engine
  - Closed compartments
  - Closed living spaces
  - Closed storage compartments in which flammable or combustible materials may be stored
  - Permanently installed fuel tanks
- ◆ Approved types of fire extinguishers are identified by the following marking on the label—“Marine Type USCG Approved”—followed by the type and size symbols and the approval number.

### Fire Extinguisher Requirements

Classification type & size	Foam minimum gallons	Carbon Dioxide minimum pounds	Dry Chemical minimum pounds
B-I	1¼	4	2
B-II	2½	15	10
		<b>Without</b>	<b>With</b>
<b>Length of Vessel</b>		<b>Fixed System</b>	<b>Fixed System*</b>
Less than 26 ft.		one B-I	None
26 ft. to less than 40 ft.		two B-I <i>or</i> one B-II	one B-I
40 ft. to less than 65 ft.		three B-I <i>or</i> one B-II and one B-I	two B-I <i>or</i> one B-II

\* refers to a permanently installed fire extinguisher system

## Navigation Lights

The required navigation lights must be displayed between sunset and sunrise and during periods of restricted visibility.

### Power-Driven Vessels When Underway

**If less than 65.6 feet long**, these vessels must exhibit the lights as shown in illustration 1. Remember, power-driven vessels include sailboats operating under engine power. The required lights are:

- ◆ Red and green sidelights visible from a distance of at least two miles away—or if less than 39.4 feet long, at least one mile away—on a dark, clear night.
- ◆ An all-round white light or both a masthead light and a sternlight. These lights must be visible from a distance of at least two miles away on a dark, clear night. The all-round white light (or the masthead light) must be at least 3.3 feet higher than the sidelights.

### Unpowered Vessels When Underway

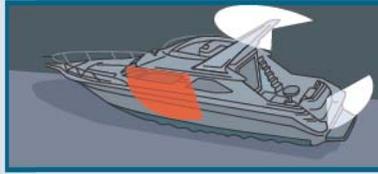
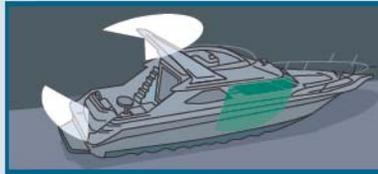
Unpowered vessels are sailboats or vessels that are paddled, poled, or rowed.

- ◆ **If less than 65.6 feet long**, these vessels must exhibit the lights as shown in illustration 2. The required lights are:
  - Red and green sidelights visible from at least two miles away—or if less than 39.4 feet long, at least one mile away.
  - A sternlight visible from at least two miles away.
- ◆ **If less than 23.0 feet long**, these vessels should:
  - If practical, exhibit the same lights as required for unpowered vessels less than 65.6 feet in length.
  - If not practical, have on hand at least one lantern or flashlight shining a white light as in illustration 3.

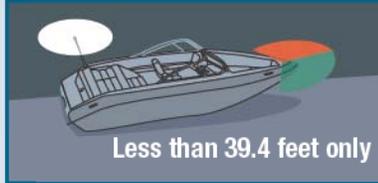
### All Vessels When Not Underway

**All vessels** are required to display a white light visible in all directions whenever they are moored or anchored outside a designated mooring area between sunset and sunrise.

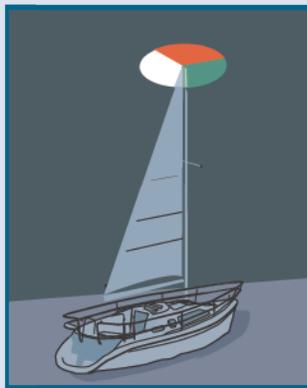
## 1. Power-Driven Vessels Less Than 65.6 Feet



*The masthead light and sternlight may be combined as an all-round white light on vessels less than 39.4 feet long.*

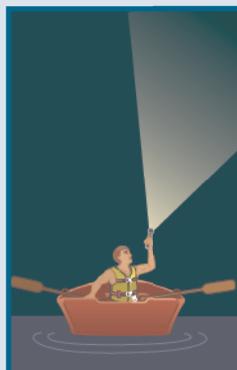


## 2. Unpowered Vessels Less Than 65.6 Feet



*An alternative to the sidelights and sternlight is a combination red, green, and white light, which must be exhibited near the top of the mast.*

## 3. Unpowered Vessels Less Than 23.0 Feet



*Vessel operators should never leave shore without a flashlight. Even if you plan to return before dark, unforeseen developments might delay your return past nightfall.*

## Boat Battery

It is unlawful to operate a motorized vessel equipped with a storage battery unless the battery is secured against shifting. The battery must be equipped with nonconductive terminal shields to prevent accidental shorting. Both positive and negative terminals must be covered. A covered battery box with a strap is best.

## Ventilation Systems

The purpose of ventilation systems is to avoid explosions by removing flammable gases.

- ◆ All gasoline-powered vessels, constructed in a way that would entrap fumes, must have at least two ventilation ducts fitted with cowls to remove the fumes.
- ◆ If your vessel is equipped with a power ventilation system, turn it on for at least four minutes after fueling and before starting your engine.
- ◆ If your vessel is not equipped with a power ventilation system (for example, a personal watercraft), open the engine compartment and sniff for gasoline fumes before starting the engine.

## Backfire Flame Arrestors

Backfire flame arrestors are designed to prevent the ignition of gasoline vapors in case the engine backfires.

- ◆ All powerboats (except outboards) that are fueled with gasoline must have an approved backfire flame arrestor on each carburetor.
- ◆ Backfire flame arrestors must be:
  - In good and serviceable condition *and ...*
  - U.S. Coast Guard–approved (must comply with SAE J-1928 or UL 1111 standards).
- ◆ Periodically clean the flame arrestor and check for damage.

## Mufflers and Noise Level Limits

- ◆ The exhaust of every internal combustion engine on any vessel must be effectively muffled. That is, the engine's exhaust must be muffled or suppressed at all times so as not to create excessive noise.
- ◆ It is unlawful to operate a vessel that exceeds a noise level of 86 dBA.

## Visual Distress Signals (VDSs)

Visual Distress Signals (VDSs) allow vessel operators to signal for help in the event of an emergency.

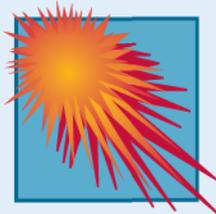
- ◆ Vessels on federally controlled waters must be equipped with visual distress signals.
- ◆ An operator who observes another vessel or operator displaying one of these distress symbols must stop and render aid. It is prohibited to display visual distress signals unless assistance is needed.

VDSs are classified as day signals (visible in bright sunlight), night signals (visible at night), or both day and night signals. VDSs are either pyrotechnic (smoke and flames) or non-pyrotechnic (non-combustible).

### Pyrotechnic Visual Distress Signals



**Orange Smoke**  
*Day Signal*

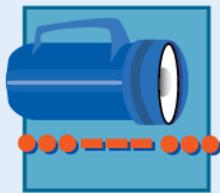


**Red Meteor**  
*Day and Night Signal*



**Red Flare**  
*Day and Night Signal*

### Non-Pyrotechnic Visual Distress Signals



**Electric Light**  
*Night Signal*



**Orange Flag**  
*Day Signal*



**Arm Signal**  
*Although this signal does not meet VDS equipment requirements, wave your arms to summon help if you do not have other distress signals on board.*

### Federally Controlled Waters

Vessels must observe federal requirements on these waters:

- Coastal waters
- The Great Lakes (including Lake Michigan and Lake Superior)
- Territorial seas
- Waters which are two miles wide or wider and are connected directly to one of the above

In addition to the laws mentioned previously, here are some other Wisconsin regulations that apply when vessel operators are on the water.

## Unlawful Operation

Wisconsin law states that these dangerous operating practices are illegal.

- ◆ **Negligent or Reckless Operation** of a vessel or the reckless manipulation of water skis, a surfboard, or a similar device is operating in a manner that causes danger to the life, limb, or property of any person. Examples of negligent or reckless operation are:
  - Jumping the wake of any vessel that is towing a skier, tuber, wakeboarder, etc.
  - Operating a vessel within any area marked off or set aside as a prohibited area or a swim area
  - Weaving your vessel through congested waterway traffic
  - Operating a vessel in a manner to create hazardous wave or wake conditions while approaching or passing another boat
  - Steering toward another object or person in the water and swerving at the last possible moment in order to avoid collision
  - Chasing, harassing, or disturbing wildlife with your vessel
- ◆ **Riding on Bow or Gunwales** is allowing passengers to ride on the bow decking, gunwales, seat backs, or any other position where there is a danger of falling overboard.



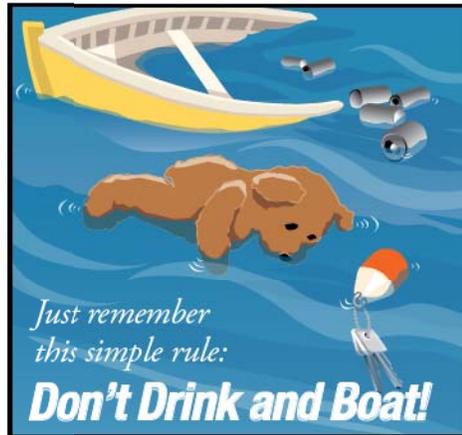
- ◆ **Overloading** is defined as operating a vessel that has been loaded beyond the recommended capacity shown on the capacity plate installed by the vessel manufacturer. The operator must limit the vessel's load to the total weight or maximum number of persons shown on the capacity plate, whichever is more restrictive.
- ◆ **Improper Speed or Distance** is not maintaining a proper speed and/or distance while operating a vessel. Specifically, it is illegal to:
  - Operate a vessel at a distance from other vessels or at a speed that exceeds safe and reasonable limits given the waterway traffic, marked speed limits, weather, and other boating conditions
  - Exceed the speeds posted or charted in any specific zone or area
  - Operate a vessel repeatedly in a circuitous manner within 200 feet of another vessel or person in the water
  - Operate a vessel within 100 feet of any dock, raft, pier, or restricted area at greater than "slow, no wake" speed
  - Operate a vessel at greater than "slow, no wake" speed on lakes that are 50 acres or less and have public access, unless such lakes serve as thoroughfares between two or more navigable lakes

**"No Wake Speed"** means a speed at which a vessel moves as slowly as possible while still maintaining steerage control

- Operate within 100 feet of a swimmer
- ◆ **Unsafe Condition** is placing or leaving in public waters any vessel that is not safe to operate. Law enforcement officers may instruct the operator to take immediate corrective action or return to mooring if any of the following "unsafe conditions" exist
  - The vessel is overloaded.
  - There are insufficient personal flotation devices, fire extinguishers, backfire flame arrestors, ventilation or navigation lights.
  - The vessel is leaking fuel or has fuel in the bilges.

## Alcohol and Drugs

Wisconsin law prohibits operating a motorboat or manipulating water skis or similar devices while under the influence of alcohol or drugs. Alcohol and drugs cause impaired balance, blurred vision, poor coordination, impaired judgment and slow reaction time.



- ◆ Anyone who operates or attempts to operate a vessel is deemed to have given consent to an alcohol and/or drug test.
- ◆ It is illegal for a person to operate a motorboat or use water skis, a surfboard, or other device if he or she:
  - Is under the influence of an intoxicant or a controlled substance *or ...*
  - Has a blood alcohol concentration of 0.08% or greater.

## Obstructing Navigation

It is illegal to:

- ◆ Operate any vessel in such a way that it will interfere unnecessarily with the safe navigation of other vessels.
- ◆ Anchor a vessel in the traveled portion of a river or channel that will prevent or interfere with any other vessel passing through the same area.
- ◆ Moor or attach a vessel to a buoy (other than a mooring buoy), beacon, light, or any other navigational aid placed on public waters by proper authorities.
- ◆ Move, displace, tamper with, damage, or destroy any navigational aid.
- ◆ Obstruct a pier, wharf, boat ramp, or access to any facility.

## Homeland Security Restrictions

- ◆ Violators of the restrictions below can expect a quick and severe response.
  - Do not approach within 100 yards and slow to minimum speed within 500 yards of any U.S. Naval vessel. If you need to pass within 100 yards of a U.S. Naval vessel for safe passage, you must contact the U.S. Naval vessel or the U.S. Coast Guard escort vessel on VHF-FM channel 16.
  - Observe and avoid all security zones. Avoid commercial port operation areas, especially those that involve military, cruise-line, or petroleum facilities.
  - Observe and avoid other restricted areas near dams, power plants, etc.
  - Do not stop or anchor beneath bridges or in the channel.
- ◆ Keep a sharp eye out for anything that looks peculiar or out of the ordinary. Report all activities that seem suspicious to the local authorities, the U.S. Coast Guard, or the port or marina security.

## Boating Accidents

- ◆ An operator involved in a boating accident must:
  - Stop his or her vessel *immediately* at the scene of the accident *and ...*
  - Assist anyone injured or in danger from the accident, unless doing so would seriously endanger his or her own vessel or passengers *and ...*
  - Give, in writing, his or her name, address, and vessel identification to anyone injured and to the owner of any property damaged by the accident.
- ◆ A vessel operator is required to make an oral and written report whenever a boating accident results in:
  - Loss of life or disappearance of a person *or ...*
  - Injury to any person *or ...*
  - Property damage in excess of \$2,000.
- ◆ Oral reports must be made immediately to a DNR conservation warden or a local law enforcement officer.
- ◆ A written report must be submitted within 10 days on a DNR *Form 4100-20* to DNR-Boat Safety, Box 7921, Madison, WI 52707.

## Diving Activities

### Diver-Down Flag

Persons scuba diving, skin diving, snorkeling, or underwater spearfishing must display a diver-down flag unless within 150 feet of shore.

- ◆ A diver must stay within 150 feet of the flag. Unless there is an emergency, a diver may not surface more than 50 feet from the flag. It is unlawful to display a diver-down flag when not diving.
- ◆ Vessels not engaged in diving operations must stay at least 100 feet from any displayed diver down flag. The diver down flags are:



**Divers Flag**

A rectangular red flag, at least 12 x 15 inches with a three-inch white diagonal stripe, mounted on a float or buoy to be clearly visible



**Alfa Flag**

A blue and white International Code Flag A (or Alfa flag), usually flown from a vessel and used on federally controlled waters

### Diving Wisconsin's Historic Shipwrecks

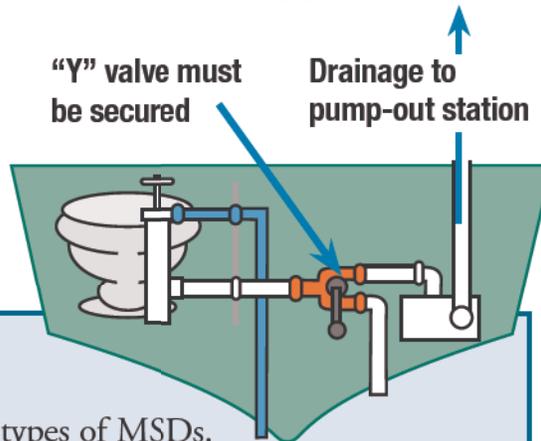
The Wisconsin Historical Society has published information about many historic shipwreck sites in Wisconsin waters, some of which are marked by seasonal mooring buoys. Damaging or removing material from a wreck site not only diminishes the enjoyment for future visitors, it is also a crime that can result in fines, imprisonment, and the loss of a diver's gear, boat, trailer, and vehicle.

## Discharge of Waste

It is unlawful to place, leave, or discharge waste or waste containers into or near any Wisconsin waters.

- ◆ Every vessel with an installed toilet must have an operable marine sanitation device (MSD).
- ◆ All installed marine sanitation devices must be U.S. Coast Guard–certified and working properly.

### Typical Marine Sanitation Device



### Types of MSDs

There are three types of MSDs.

- ◆ Types I and II MSDs are usually found on large vessels. Waste is treated with special chemicals to kill bacteria before the waste is discharged. Types I and II MSDs with "Y" valves that would direct the waste overboard must be secured so that the valve cannot be opened. This can be done by placing a lock or non-reusable seal on the "Y" valve or by taking the handle off the "Y" valve in a closed position.
- ◆ Type III MSDs provide no treatment and are either holding tanks or portable toilets. Collected waste should be taken ashore and disposed of in a pump-out station or onshore toilet.

## Discharge of Trash

It is illegal to dump refuse, garbage, or plastics into any state or federally controlled waters.

- ◆ You must store trash in a container while on board and place it in a proper receptacle on shore.
- ◆ If boating on federally controlled waters and your vessel is 26 feet or longer, you must display a Garbage Disposal Placard that is at least 4 x 9 inches and notifies passengers and crew about discharge restrictions.

## Discharge of Oil and Other Hazardous Substances

- ◆ You are not allowed to discharge oil or hazardous substances into the water.
- ◆ You are not allowed to dump oil into the bilge of the vessel without means for proper disposal.

If your vessel discharges oil or hazardous substances into the water, immediately call the U.S. Coast Guard at **1-800-424-8802**.



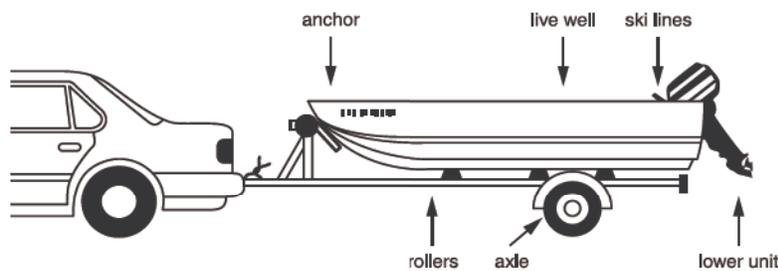
- ◆ You must dispose of oil waste at an approved reception facility. On recreational vessels, a bucket or bailer is adequate for temporary storage prior to disposing of the oil waste at an approved facility.
- ◆ If boating on federally controlled waters and your vessel is 26 feet or longer, you must display a 5 x 8-inch placard made of durable material, fixed in a conspicuous place in the machinery spaces or at the bilge pump control station, stating the Federal Water Pollution Control Act's law.

## Aquatic Nuisance Species

Introducing non-native species into Wisconsin waters can upset the balance of the ecosystem. Aquatic nuisance species, such as zebra mussels, Eurasian milfoil, and hydrilla, are most often spread between waterways by hitching a ride on vessels and trailers. When transplanted into new waters, these organisms proliferate, displacing native species and damaging the water resource.



- ◆ Wisconsin law prohibits launching a vessel, a trailer, or any boating equipment if there are any aquatic plants or zebra mussels attached.
- ◆ To help prevent spreading aquatic nuisance species:
  - Inspect your vessel and trailer, and remove any plants and animals you see before leaving the area. Be sure to check the locations labeled below.



- Drain water from your outboard or lower unit, live well, and bilge on land before leaving the area.
- Dispose of your bait properly on land. Never release live bait into a body of water or release aquatic animals from one body of water into another.
- Destroy any remaining nuisance species by:
  - Rinsing your vessel and equipment with hot water (at least 104° Fahrenheit) especially if moored for more than a day *or ...*
  - Air drying your vessel and equipment for at least five days.
- If you think you have found a zebra mussel, save it and contact your nearest Wisconsin Department of Natural Resources office.

For more information on aquatic nuisance species found in Wisconsin, visit <http://dnr.wi.gov/invasives/>



## Specifically for PWCs



PWC operators must obey laws that apply to other vessels as well as obey additional requirements that apply specifically to the operation of personal watercraft.

### Requirements Specific to PWCs

- ◆ Every person on board a PWC must *wear* a U.S. Coast Guard–approved Type I, II, III, or V PFD.
- ◆ If the PWC is equipped with a lanyard-type ignition safety switch, the lanyard must be attached to the person, clothing, or PFD of the operator.
- ◆ A PWC may not be operated between sunset and sunrise.
- ◆ A PWC operator must always face forward.
- ◆ A PWC may not be operated faster than “slow, no wake speed” within:
  - 100 feet of any other vessel
  - 100 feet of a dock, pier, raft, or restricted area
  - 200 feet of shore on any lake
- ◆ There are minimum age and boater education requirements for operators of PWCs. See page 8.
- ◆ A PWC must be operated in a responsible manner. Maneuvers that endanger people or property are prohibited, including:
  - Jumping a wake with a PWC within 100 feet of another vessel
  - Operating within 100 feet of a vessel that is towing a skier, tuber, or wakeboarder, or operating within 100 feet of the tow rope or person being towed
  - Weaving a PWC through congested waterway traffic
  - Steering toward another object or person in the water and swerving at the last possible moment in order to avoid collision
  - Chasing, harassing, or disturbing wildlife with a PWC



Vessel operators towing a person(s) on water skis, a surfboard, or any other device have additional laws.

### Requirements for Towing Skiers

- ◆ A person may not be towed behind a vessel between sunset and sunrise.
- ◆ When a vessel is towing a person on water skis, a surfboard, or other device, the operator must have a competent person on board to act as an observer.
- ◆ A PWC operator may not tow a person on water skis or other devices unless the PWC is designed and recommended by the manufacturer to accommodate at least three people.
- ◆ Those towing skiers on water skis, a surfboard, or similar devices and those being towed must act in a safe and prudent manner.
  - Vessels towing persons may not come within 100 feet of other vessels, persons in the water, a swimming area, or a public boat landing.
  - Persons being towed behind a vessel on water skis, a surfboard, or other device, or their towing rope, may not come within 100 feet of a PWC.

### Avoid Propeller Strike Injuries!

Most propeller strike accidents result from operator error. Victims include swimmers, scuba divers, fallen water-skiers, and boat operators or passengers. Most propeller accidents can be prevented by following basic safe boating practices.

- Maintain a proper lookout. The primary cause of propeller strike accidents is operator inattention.
- Make sure the engine is off so that the propeller is not rotating when passengers are boarding or leaving a boat.
- Never start a boat with the engine in gear.
- Slow down when approaching congested areas and anchorages. In congested areas, always be alert for swimmers and divers.

Before going out on the water, take steps to make the outing safe and enjoyable.

## Vessel Capacity

- ◆ Always check the capacity plate, which is usually found near the operator's position or on the vessel's transom. This plate indicates the maximum weight capacity and maximum number of people that the vessel can carry safely.
- ◆ PWCs and some other vessels are not required to have a capacity plate. Follow the recommended capacity in the owner's manual and on the manufacturer's warning decal.

MAXIMUM CAPACITIES
7 PERSONS OR 1050 LBS. 1400 LBS. PERSONS, MOTORS, GEAR 130 H. P. MOTOR
THIS BOAT COMPLIES WITH U.S. COAST GUARD SAFETY STANDARDS IN EFFECT ON THE DATE OF CERTIFICATION ABC BOATS XYZ MANUFACTURING, INC. ANYWHERE, USA 99999

## Trailing Your Vessel Safely

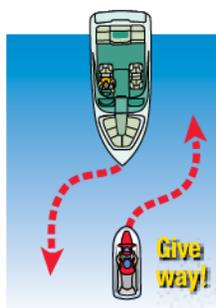
- ◆ **Before leaving home:**
  - Secure and evenly distribute all gear in the vessel.
  - Properly secure the vessel with tie-down straps.
  - Tilt and secure the engine to increase clearance.
  - Crisscross the safety chains when attaching them.
  - Test the trailer brakes and lights.
- ◆ **Launching your vessel from a trailer:**
  - Prepare your vessel well away from the boat ramp.
  - Back the vessel into the water until the engine's lower unit can be submerged while on the trailer.
  - Warm up the engine. Back the trailer further until the vessel floats, and back slowly off the trailer.
- ◆ **Retrieving your vessel:**
  - Back the trailer into the water so that two-thirds of the rollers or bunks are submerged.
  - Move the vessel onto the trailer far enough to attach the winch line to the bow eye of the vessel. Finish pulling it onto the trailer by cranking the winch.
  - Tow the vessel off the ramp out of the way of others. While at the ramp area, remove all weeds from the vessel, remove the drain plug, and drain live wells.

Safe navigation on Wisconsin waterways is everyone's responsibility. All operators are equally responsible for taking action necessary to avoid collisions.

## Navigation Rules

There are two terms that help explain these rules.

- ◆ **Stand-on vessel:** The vessel that should maintain its course and speed
- ◆ **Give-way vessel:** The vessel that must take early and substantial action to avoid collision by stopping, slowing down, or changing course



Power vs. Power

### Meeting Head-On

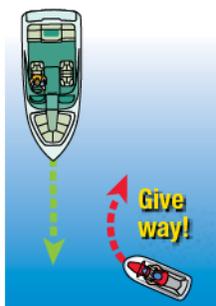
#### Power vs. Power:

Neither vessel is the stand-on vessel. Both vessels should keep to their right.

**Power vs. Sail:** The powerboat is the give-way vessel.



Power vs. Sail



Power vs. Power

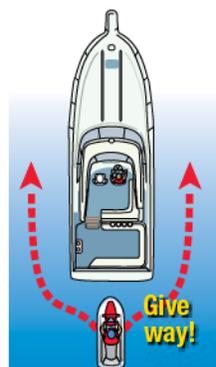
### Crossing Situations

**Power vs. Power:** The vessel on the left is the give-way vessel. The vessel on the right is the stand-on vessel.

**Power vs. Sail:** The powerboat is the give-way vessel.



Power vs. Sail

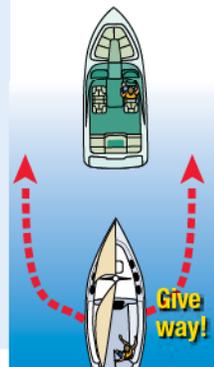


Power vs. Power

### Overtaking

**Power vs. Power:** The vessel that is overtaking another vessel is the give-way vessel.

**Power vs. Sail:** The vessel that is overtaking another vessel is the give-way vessel.



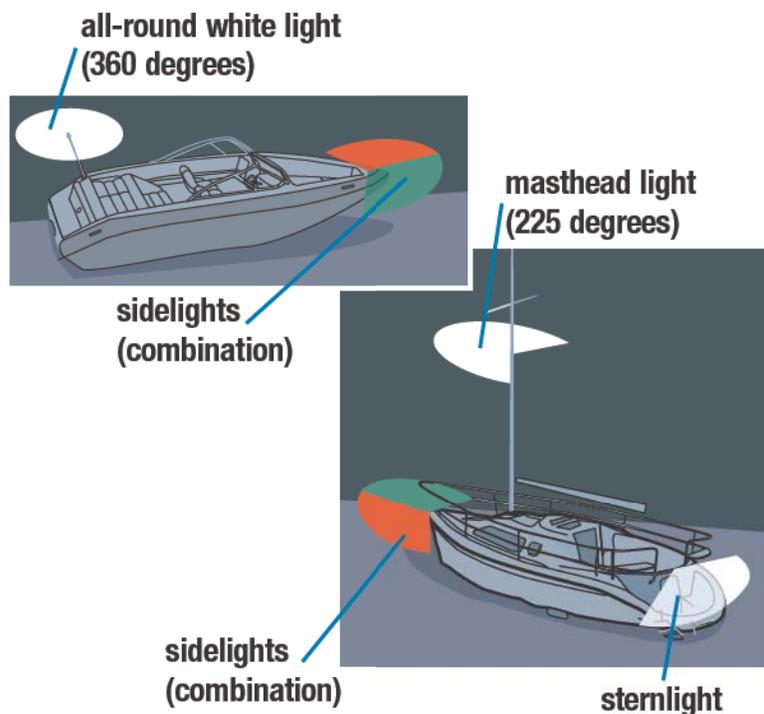
Power vs. Sail

Note: Powered vessels and sailing vessels should give way to unpowered vessels.

## Nighttime Navigation

Be on the lookout for the lights of other vessels when boating at night. Several types of lights serve as navigational aids at night. There are four common navigation lights.

- ◆ **Sidelights:** These red and green lights are called sidelights (also called combination lights) because they are visible to another vessel approaching from the side or head-on. The red light indicates a vessel's port (left) side; the green indicates a vessel's starboard (right) side.
- ◆ **Sternlight:** This white light is seen from behind the vessel.
- ◆ **Masthead Light:** This white light shines forward and to both sides and is required on all power-driven vessels. A masthead light must be displayed by all vessels when under engine power. The absence of this light indicates a sailboat under sail.
- ◆ **All-Round White Light:** On power-driven vessels less than 39.4 feet in length, this light may be used to combine a masthead light and sternlight into a single white light that can be seen by other vessels from any direction. This light serves as an anchor light when sidelights are extinguished.





## Encountering Vessels at Night

When you see a white and a green light, you are the stand-on vessel. However, remain alert in case the other vessel operator does not see you or does not know the navigation rules.



When you see only a white light, you are overtaking another vessel. It is the stand-on vessel whether it is underway or anchored. You may go around it on either side.



When you see a red and a white light, you must give way to the other vessel! Slow down and allow the vessel to pass, or pass to the right behind the vessel.

## Encountering a Sailboat at Night

When you see **only a green light** or **only a red light**, you are approaching a sailboat under sail and you must give way. The sailboat under sail is always the stand-on vessel unless it is overtaking another vessel.



## Non-Lateral Markers

Non-lateral markers are navigational aids that give information other than the edges of safe water areas. The most common are regulatory markers which are white and use orange markings and black lettering. These markers are found on lakes and rivers.



### Information

Squares indicate where to find food, supplies, repairs, etc. and give directions and other information.



### Controlled

Circles indicate a controlled area such as speed limit, no fishing or anchoring, ski only or no skiing, or “slow, no wake.”



### Exclusion

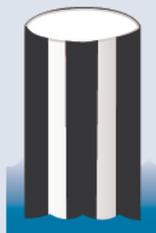
Crossed diamonds indicate areas off-limits to all vessels such as swimming areas, dams, and spillways.



### Danger

Diamonds warn of dangers such as rocks, shoals, construction, dams, or stumps. Always proceed with caution.

## Other Non-Lateral Markers

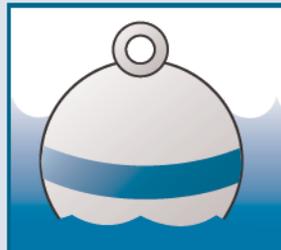


### Inland Waters Obstruction Markers

are white with black vertical stripes and indicate an obstruction to navigation. You should not pass between these buoys and the nearest shore.

### Mooring Buoys

are white with a blue horizontal band and are found in marinas and other areas where vessels are allowed to anchor.



## Boating Emergencies

A safe boater knows how to prevent and respond to boating emergencies.

### Falling Overboard

- ◆ **To prevent persons from falling overboard:**
  - Don't sit on the gunwale, bow, seat backs, motor cover, or any other area not designed for seating.
  - Don't sit on pedestal seats when underway at greater than idle speed.
  - On fishing boats with carpeted decks (such as bass boats), don't sit or stand on the deck when the boat is moving faster than idle speed.
  - Don't stand up in or lean out from the boat.
  - Don't move about the boat when underway.
- ◆ **If someone on your boat falls overboard:**
  - Reduce speed and toss the victim a throwable PFD.
  - Turn your boat around and slowly pull alongside the victim, approaching the victim from downwind or into the current, whichever is stronger.
  - Turn off the engine. Pull the victim on board over the stern, keeping the weight in the boat balanced.

### Capsizing or Swamping

- ◆ **To reduce the risk of capsizing or swamping:**
  - Don't overload your boat. Balance the load.
  - Slow your boat appropriately when turning.
  - Secure the anchor line to the bow, never to the stern.
  - Don't boat in rough water or in bad weather.
- ◆ **If you capsize or swamp your boat, or if you have fallen overboard and can't get back in:**
  - Stay with the boat.
  - Try to reboard or climb onto it in order to get as much of your body out of the cold water as possible.
- ◆ **If the boat sinks or floats away, don't panic.**
  - If wearing a PFD, remain calm and await help.
  - If you aren't wearing a PFD, look around for one or for other buoyant items to use as a flotation device.
  - In cold water, float rather than tread.

## Hypothermia

- ◆ **If you are boating in cold water:**
  - Dress in several layers of clothing under your PFD or wear a wetsuit or dry suit.
  - Learn to recognize the symptoms of hypothermia. Symptoms begin with shivering and bluish lips and nails, and progress to a coma and, ultimately, death.
- ◆ **To reduce the effects of hypothermia:**
  - Put on a PFD if not wearing one. It helps you to float without excessive movement and insulates your body.
  - Get as much of your body out of the water as possible.
  - Don't take your clothes off unless necessary—clothes can help you float and provide insulation.
  - Don't thrash or move about. Excess motion consumes energy and increases loss of body heat.
  - Draw your knees to your chest and your arms to your sides, protecting the major areas of heat loss.
  - If others are in the water with you, huddle together with your arms around their shoulders.

## Carbon Monoxide Poisoning

Carbon monoxide is an invisible, odorless, tasteless gas that can be deadly. To prevent carbon monoxide poisoning, keep air flowing through the boat and take extreme caution when running a generator at a dock or at anchor.

- ◆ Whenever people are using a swim platform or are in the water close to the stern, turn off all gasoline-powered generators with transom exhaust ports.
- ◆ Swimmers should never enter the cavity between the swim platform and the stern of the boat.
- ◆ When boating, be careful running downwind as exhaust gases may blow back on board. On cabin cruisers, be aware that exhaust gases can blow back into the stern when traveling into the wind.





## Reference Location: Kenosha, Wisconsin

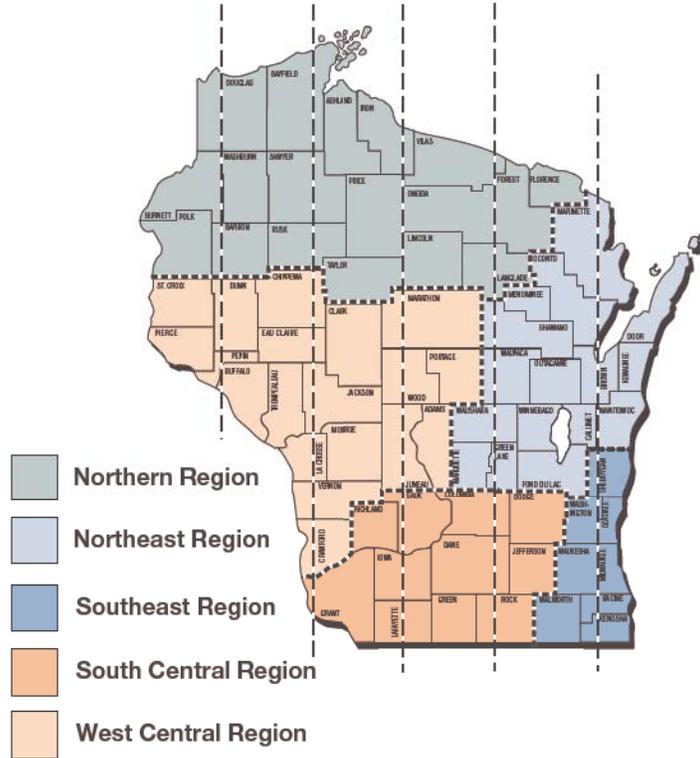
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	A.M.	P.M.																							
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31	7:07	5:03			6:35	7:17			5:17	8:22	5:17	8:33	5:43	8:12	6:16	7:26			7:24	5:45					

Times for Zone A. See map on next page.

Source: U.S. Naval Observatory, <http://aa.usno.navy.mil>

**Use this map to adjust sunrise/sunset times:**

Zone F	Zone E	Zone D	Zone C	Zone B	Zone A
+ 20 min.	+ 16 min.	+ 12 min.	+ 8 min.	+ 4 min.	in table



REGION DNR OFFICE COVERAGE

**Boating Safety Instructors and Boating Ambassadors** are people like you who want to make a difference on the lakes in their community.



**A Boating Safety Instructor:**

- ◆ Is a certified volunteer instructor whose main responsibility is to teach boating safety education classes in their community.
- ◆ As the name “volunteer” would imply, the compensation for instructors is in the satisfaction of knowing that what you are doing is important, that your contribution may save lives and positively influence the attitudes and actions of those who share or will share Wisconsin waterways with you.

Are you interested in getting involved with your community? Contact your local Recreational Safety Warden (see back cover for contact information) to learn more about this program.

# Wisconsin Required Equipment Checklist

 Unpowered Boat	PWC	Boat Less Than 16 Ft.	Boat 16 Ft. to Less Than 26 Ft.
Boater Safety Course Certificate On Board	✓ <sup>1</sup>	✓ <sup>1</sup>	✓ <sup>1</sup>
Certificate of Number On Board	✓	✓	✓
Expiration Decals Displayed	✓	✓	✓
PFDs: Type I, II, III, or V	✓	✓ <sup>2</sup>	✓ <sup>3</sup>
PFD: Type IV			✓
Type B-I Fire Extinguisher	✓	✓	✓
Ignition Safety Switch	✓		
Backfire Flame Arrestor	✓	✓ <sup>4</sup>	✓ <sup>4</sup>
Ventilation System	✓	✓	✓
Muffler	✓	✓	✓
Horn, Whistle, or Bell	✓ <sup>5</sup>	✓ <sup>5</sup>	✓ <sup>5</sup>
Daytime Visual Distress Signals			✓ <sup>5</sup>
Nighttime Visual Distress Signals	N/A	✓ <sup>5</sup>	✓ <sup>5</sup>
Navigation Lights	✓	N/A	✓

Numbers correspond with the chart above.

1. Applicable if born on or after January 1, 1989. See page 8 for details.
2. Those on PWCs must *wear* a PFD at all times.
3. Those under the age of 13 years must *wear* a PFD when on federally controlled waters.
4. Required on inboard and stern drives only.
5. Required when operating on federally controlled waters.

Note: Some items are not applicable to personal watercraft (PWCs) because PWCs are not allowed to operate between sunset and sunrise.

# WISCONSIN DEPARTMENT OF NATURAL RESOURCES

## Northeast Region

2984 Shawano Ave.  
Box 10448  
Green Bay, WI 54307  
920-662-5100

## Northern Region

107 Sutliff Ave.  
Box 818  
Rhinelander, WI 54501  
715-365-8900

## Northern Region

810 W. Maple St.  
Spooner, WI 54801  
715-635-2101

## Southeast Region

2300 N. Dr. Martin Luther  
King Jr. Dr.  
Milwaukee, WI 53212  
414-263-8500

## South Central Region

3911 Fish Hatchery Rd.  
Fitchburg, WI 53711  
608-275-3266

## West Central Region

1300 W. Clairemont Ave.  
Box 4001  
Eau Claire, WI 54702  
715-839-3700

## *Find out about...*

- online boat license renewal
- fishing and hunting permits
- places to boat, fish, and hunt
- education and outdoor programs
- state parks, trails, and campgrounds



*Everything you  
need to know  
about boating in  
Wisconsin is just  
a click away!*

Visit our website:  
**[dnr.wi.gov](http://dnr.wi.gov)**



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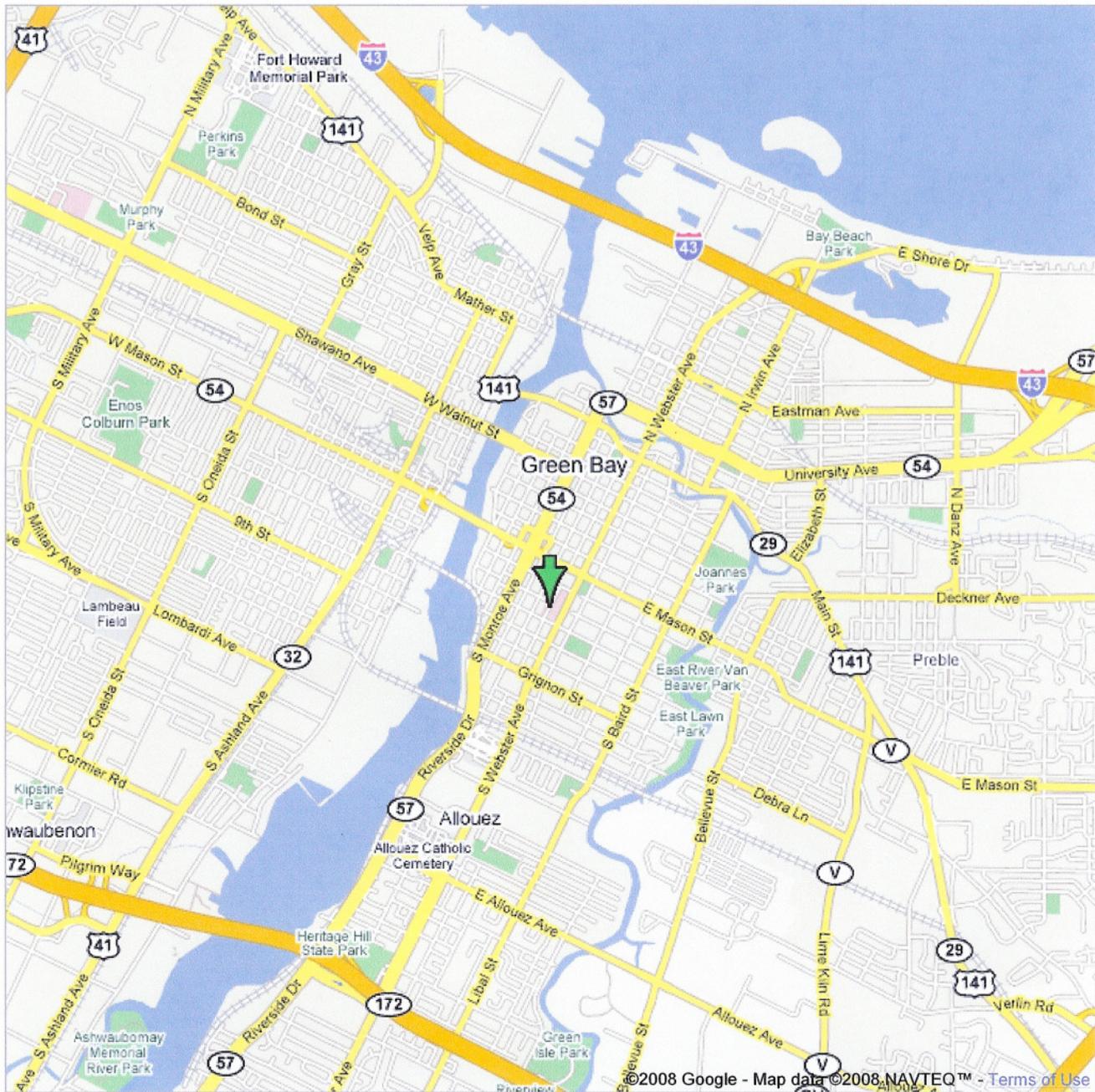
**APPENDIX F**

**HOSPITAL AND WORKCARE FACILITY LOCATION MAPS**



Address **835 S Van Buren St**  
**Green Bay, WI 54301**

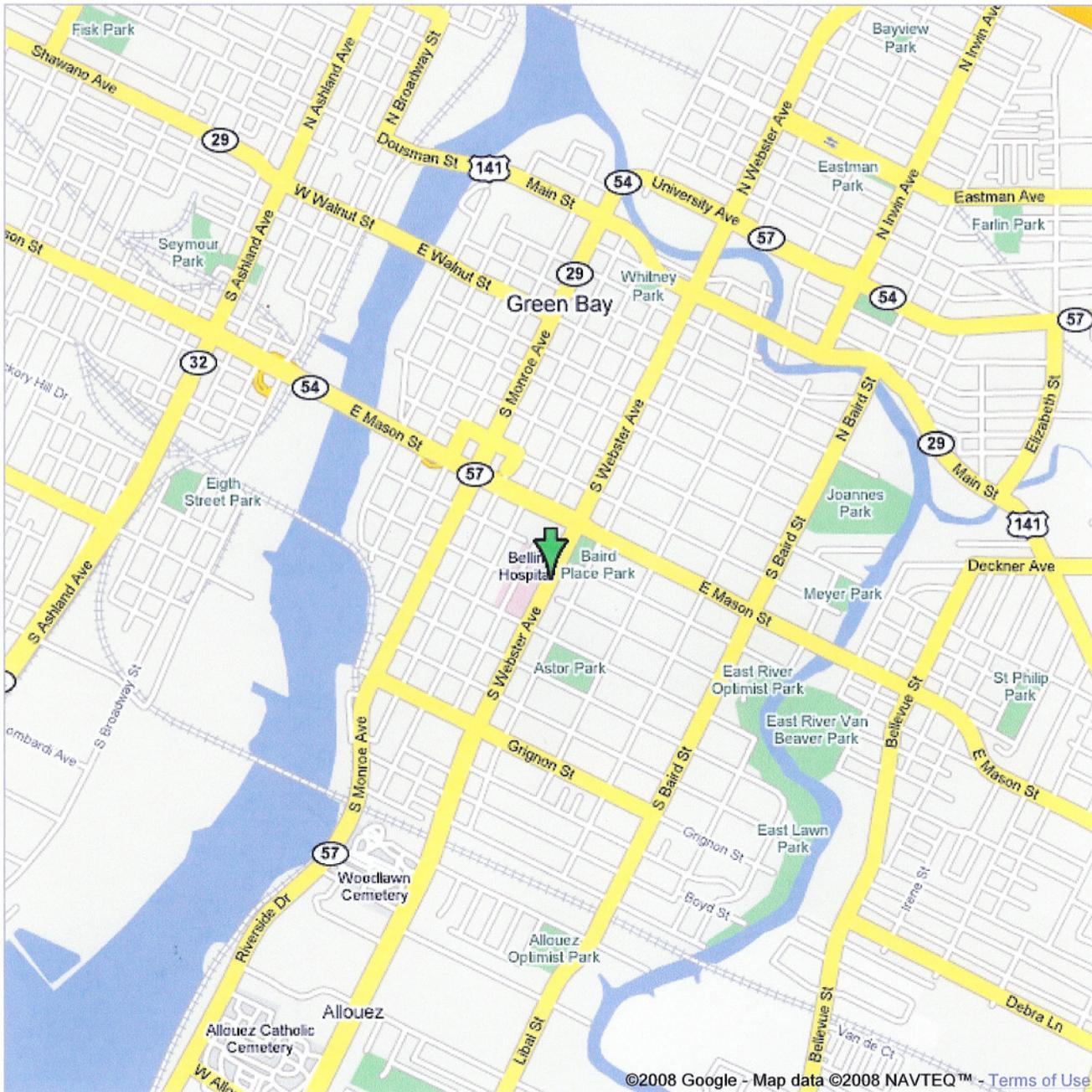
Notes Saint Vincent Hospital  
Green Bay, WI  
Phone (920) 433-0111





Address **744 S Webster Ave**  
**Green Bay, WI 54301**

Notes **Bellin Hospital**  
**Green Bay, WI**  
**Phone (920) 433-3500**



**ATTACHMENT E-2**  
**CONTINGENCY PLAN**

**CONTINGENCY PLAN**

**VOLUME I**

**At the**

**LOWER FOX RIVER  
OPERABLE UNITS 2 THROUGH 5**

**In**

**Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Prepared for:**

**Appleton Papers Inc.  
Georgia-Pacific Consumer Products LP  
NCR Corporation  
CBC Coatings, Inc.  
U. S. Paper Mills Corporation**

**For Submittal to:**

**Wisconsin Department of Natural Resources  
U.S. Environmental Protection Agency**

**Prepared by:**

**Tetra Tech EC, Inc.  
Anchor Environmental  
J. F. Brennan  
Boskalis Dolman**

**June 2008**

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## Acronyms and Abbreviations

ACP	Access Control Personnel
ACS	Access Control Station
AED	Automatic Electronic Defibrillator
AHA	Activity Hazard Analysis
CM	Construction Manager
CPR	cardiopulmonary resuscitation
DOT	U.S. Department of Transportation
EC	Emergency Coordinators
EHS	Environmental, Health and Safety
EPA	Environmental Protection Agency
ER	emergency response
ESS	Environmental Safety Supervisor
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NRC	National Response Center
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCB	polychlorinated biphenyl
PEL	Permissible Exposure Limit
PESM	Project Environmental and Safety Manager
PM	Project Manager
PPE	personal protective equipment
PRT	Project Response Team
RQ	reportable quantity
SHSP	Site-Specific Health & Safety Plan
Tetra Tech	Tetra Tech EC, Inc.
WDNR	Wisconsin Department of Natural Resources

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## 1.0 INTRODUCTION

This Contingency Plan has been developed to define the procedures in order to minimize hazards to human health and the environment to be followed in the event of a fire, explosion, and spills of hazardous substances to the environment during the implementation of the Phase 2A activities at the Lower Fox River Operable Units (OUs) 2 through 5. This project has many hazards due to the nature of the activities being performed and due to existing site conditions (as well as changing site conditions due to the work activities). Emergencies that may occur include the following:

- Personnel injuries or other medical emergencies/incidents
- Natural disasters such as severe weather, flood, volcanic fallout, or earthquakes
- Fire or explosion
- Spills of hazardous substances
- Unauthorized entry, trespass, or site intruders
- Potential bomb threats or other terrorist related incidents
- Needs for personnel rescue operations
- Emergencies related to hazardous materials that are stored and used on site or hazardous wastes, which could under certain circumstances, pose a chemical, fire, spill, or explosion hazard

This Plan functions as an administrative tool for managing events and emergencies to safeguard human health and the environment for emergency preparedness and response purposes. The Plan addresses the minimum requirements outlined in the Administrative Order of Consent:

- Description of actions to be taken in response to fires or explosions (Section 8.4), or any unplanned sudden or non-sudden release of hazardous substances or toxic constituents to air, soil, or surface water on site (Section 9.0)
- An up-to-date list of names, addresses, and telephone numbers of primary and alternate Emergency Coordinators (ECs), who have the responsibility for responding in the event of an emergency by implementing this Plan (refer to Tables 7-1 and 7-2)
- Descriptions of arrangements agreed to by local police and fire departments, hospitals, contractors, and emergency response teams to coordinate emergency response services (Section 7.0)
- A list of emergency response (including first aid) and decontamination equipment, as well as location, description, and outline of capabilities where this equipment is required (Section 11.0)

## 1.1 SCOPE AND EMERGENCY CLASSIFICATIONS

This Plan applies to all personnel working at the Lower Fox River OUs 2 through 5 site including approved visitors and subcontractors. This Plan meets the requirements for emergency response and notification in accordance with the U.S. Environmental Protection Agency (USEPA), the Wisconsin Department of Natural Resources (WDNR), U.S. Department of Transportation (DOT), and the Federal Occupational Safety and Health Administration (OSHA).

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It is anticipated (per potential hazards identified during project planning) that most site emergencies would result in the use of two classifications:

**Event.** For the purposes of this project, an event is:

- A minor injury or illness not requiring emergency response from local emergency response agencies
- Spills of hazardous substances to the environment (less than the reportable quantity [RQ]) resulting from site activities, including spills or releases from previous operations at the site of which site employees have become aware, and can be contained and cleaned up without assistance from local emergency response agencies
- A property, vehicle, or equipment damage case that results in minor damage not requiring local emergency response agencies
- A “near miss” or an event that has a reasonable probability of resulting in one of the outcomes described above if the circumstances were different and for which modifications to management programs shall reduce the probability of occurrence or the severity of the outcome

**Emergency.** An emergency shall be declared when events occur that represent a significant degradation in the level of safety or a threat to human health or the environment and that require time-sensitive / urgent response efforts and assistance from outside agencies. For the purpose of this Plan, an emergency is identified as an unexpected sudden situation requiring prompt action by specially trained personnel in order to prevent or mitigate severe injury to individuals, adverse impacts to the environment, or major damage to property.

Examples of some plausible emergencies include:

- Discovery of hazardous material contamination from past facility operations that is causing or may reasonably be expected to cause uncontrolled personnel exposure exceeding Permissible Exposure Limits (PELs)
- A spill of a hazardous substance to the environment that exceeds the RQ or is otherwise unable to be controlled adequately or safely by site personnel and site resources
- A person trapped in debris, at heights, in confined spaces, or in a hazardous atmosphere, requiring rescue
- An off-site hazardous material event not associated with the site activities that is observed to have or is predicted to have an impact on this site such that protective actions are required to protect workers
- An occurrence that causes or may reasonably be expected to cause significant structural damage, with confirmed or suspected personnel injury, death, or degradation in health and safety
- Any site evacuation in response to an actual occurrence that requires time-urgent response by specialist personnel or mutual aid groups not normally assigned to the site (e.g., fire department)

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The plan prescribes preparedness, prevention, and response for plausible site emergencies including:

- Medical Emergencies (Section 8.2)
- Natural Emergencies such as Earthquakes or Severe Weather (Section 8.3)
- Fires and Explosions (Section 8.4)
- Unauthorized Entry, Trespass or Site Intruders (Section 8.5)
- Threat of Terrorist Activities (Section 8.6)
- Personnel Rescue (Section 8.7)
- Confined Space Rescue (Section 8.7.1)
- Spills of hazardous substances to the environment (Section 9.0)

Non-emergencies involving incidental response to minor incidents do not have the severity or damage potential of emergencies and can be controlled by site employees with basic first aid training or additional training for site-specific incidents such as small spill containment and clean-up.

Project emergencies involve further escalation of risks that potentially require outside assistance to respond and manage the emergency due to impact on site personnel, structures, site evacuation, off-site property, public, and the environment.

## **1.2 MAINTENANCE**

The Project Manager (PM) has overall responsibility for ensuring this Plan is in place and implemented.

This Plan and contained procedures shall be reviewed and updated as required as the project transitions. At a minimum this Plan shall be reviewed on an annual cycle or immediately if implementation, audit, or change in site conditions or response to an emergency or drill demonstrates a need for revision. Revised copies of this Plan will be provided to emergency responders (e.g., local fire departments, local police or county sheriff, and local hospitals) by return receipt, certified mail.

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## **2.0 SITE DESCRIPTION**

The project study area includes the Lower Fox River and Green Bay aquatic systems. Approximately 270,000 people live in the communities along the river. The Lower Fox River is located in northeastern Wisconsin within the eastern ridges and lowlands of the state. The Lower Fox River is defined as the 39-mile portion of the Fox River, beginning at the outlet of Lake Winnebago and terminating at the mouth of the river into Green Bay, Lake Michigan. The river flows north and drains approximately 6,330 square miles, making it a primary tributary to Green Bay and a part of the Great Lakes system. Green Bay is a freshwater system approximately 120 miles long that drains into Lake Michigan, and is located on the state border between Wisconsin and Michigan along a northeast-to-southwest-trending axis. The bay portion of the site includes all of Green Bay from the city of Green Bay to the point where Green Bay enters Lake Michigan. The site has been divided into five discrete OUs by WDNR and USEPA. The river and the bay OUs are:

- OU 1 – Little Lake Butte des Morts
- OU 2 – Appleton to Little Rapids
- OU 3 – Little Rapids to De Pere
- OU 4 – De Pere to Green Bay
- OU 5 – Green Bay

The river has 12 dams and includes the highest concentration of pulp and paper mills in the world. During the 1950s and 1960s, these mills routinely used polychlorinated biphenyls (PCBs) in their operations, which ultimately contaminated the river.

Two facilities will be established as part of the remedial action. The former Shell site will be used for support facilities, dewatering operations, wastewater treatment operations, and material handling. A second upland facility will be necessary to support the capping and cover material placement south of the De Pere Dam. This site will be used for staging of sand and armored cap material.

### **2.1 ACCESS/EGRESS AND UTILITIES**

There is limited public access to the site due to access controls in place, including fences and locking gates. Access controls to the facility minimize the possibility of uncontrolled access to the site. A site layout map has been developed for the former Shell site and is provided in the Volume I Work Plan. However, it has not been finalized. Once finalized, this site layout map will be revised to show the roadways, gates, emergency evacuation routes, as well as utilities such as power and water.

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### **3.0 EMERGENCY MANAGEMENT ORGANIZATION AND RESPONSIBILITIES**

The following sections describe the roles and responsibilities of key project personnel in relation to emergency responses. Contact information is summarized in Tables 7-1 and 7-2.

#### **3.1 PROJECT MANAGER**

The Tetra Tech EC, Inc. (Tetra Tech) PM has overall responsibility for the maintenance, implementation and enforcement of this Plan and ensures that all project personnel implement this Plan. Additionally, the PM shall:

- Identify the EC and alternates.
- Ensure that resources are available for proper training of emergency response personnel and that appropriate emergency response equipment is available.
- Ensure that this plan is rehearsed as necessary.

#### **3.2 CONSTRUCTION MANAGER**

The Tetra Tech Construction Manager (CM) is responsible for managing the work execution by the subcontractors, craft workers, and suppliers to achieve conformance with the project plans and procedures. The CM will have direct responsibility for the implementation of this Plan through project operations including project implementation and staff direction. Additionally, the CM shall:

- Serve as the alternate EC and have the ability and authority to commit resources to manage an emergency event and mitigate consequences to workers, the public, and the environment.
- Designate and coordinate response actions, as appropriate or necessary, including assistance of the Project Response Team (PRT).
- Contact/activate the Emergency Response (ER) personnel/agencies, as necessary.

The Environmental Safety Supervisor (ESS) will serve as the EC and the CM as the alternate EC. The EC is responsible for:

- Implementing this Plan utilizing available resources and experts as needed
- Providing, when necessary, information about the nature and duration of work expected on the site, types of contaminants or hazards, possible health or safety effects, and anticipated emergency conditions to emergency services personnel (e.g., fire department, police, hospital, emergency response)
- Determining the content and frequency of drills
- Reviewing this Plan whenever audit, implementation, site conditions, personnel, or management identifies need or opportunity for improvement
- Ensuring that this Plan is critiqued after actual implementation or drills
- Coordinating responses during an emergency

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The EC shall have a detailed understanding of response actions to secure and control emergencies, evacuation of on-site and off-site individuals and disaster planning.

The EC will be contacted for all emergencies and events on site. The EC phone numbers and home addresses will be maintained at the on-site office trailer, dewatering building, and wastewater treatment plant. The EC will activate the emergency response, as appropriate, and request assistance from the PRT and other site personnel as required.

The EC determines and directs the level of response required including the implementation of emergency evacuation and disaster recovery. The EC is responsible for ensuring that appropriate project personnel are contacted and kept informed. Follow-up coordination will be conducted as needed including assisting the PM with regulatory agency notification, incident documentation, review for process improvements, and adequacy of training or review of emergency response mechanisms.

The EC will be the primary point of contact for outside response authorities. The EC will maintain coordination with the local response agencies (local fire departments, local fire department HAZMAT team, etc.) prior to their arrival and during the response.

The EC will assume control of all emergency events upon arrival at the scene. The EC will relinquish control of emergency scene only to more highly trained or specially trained responders upon their arrival as appropriate (i.e., confined space rescue or fire). The EC will have competency in the following areas:

- Know how to implement this Plan and other applicable project plans.
- Know and understand the hazards and risks associated with project activities and specific site areas and equipment.
- Know and utilize PRT members as necessary, for incident and emergency response.
- Know the state and local agencies available for emergency response and their capabilities.

### **3.3 ACCESS CONTROL PERSONNEL**

At the main entrance of the former Shell Site, a security guard booth (i.e., Access Control Station [ACS]) will be constructed and staffed by local personnel to restrict access to the site. The ACS is the initial contact and communications center for site emergencies. Access Control Personnel (ACP) will be trained to immediately respond as directed and as outlined in this Plan. Their responsibilities will include:

- Monitoring of the site radio and telephone communications for emergencies
- Notifying the EC and Project Manager in the event of access by unauthorized person(s)
- Notifying emergency response units as directed by the EC and directing the units to appropriate location(s)
- Controlling access to the site and maintaining a log of authorized site visitors

### **3.4 ENVIRONMENTAL SAFETY SUPERVISOR**

The site ESS is Mr. Bill Welch who will provide pre-emergency task analyses prior to initiating field activities and at each new and discernible feature of work, and functions as the health and safety as well as environmental compliance lead for the project. The ESS reports through the

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project organization to both the CM and the Project Environmental and Safety Manager (PESM). The ESS is responsible for:

- Confirming the posting of emergency telephone numbers
- Maintaining and posting site maps marked with evacuation routes and on-site location of emergency response equipment and supplies
- Maintaining inventories of on-site emergency response equipment and supplies and capabilities
- Reviewing emergency response plan(s) and in the event of a plan failure, submitting revision comments to the EC, PM, and PESH
- Providing assistance to the EC during an emergency event
- Providing, in the event that an emergency or incident involves the exposure of project personnel to hazardous or toxic materials, Material Safety Data Sheets (MSDSs) to emergency personnel to accompany the worker to the medical facility
- Inspecting and evaluating hazardous substance storage and handling operations
- Understanding and implementing requirements of the Site-Specific Health and Safety Plans (SHSPs)
- Maintaining a log of incident communications
- Documenting accurately and completely all emergency notifications

### **3.5 PROJECT RESPONSE TEAM**

The PRT consists of the PM, CM/EC, and ESS who have specialized training, experience, knowledge, and skills in initial emergency response, safety, environmental compliance, waste management, and construction. They will assist the EC to provide both guidance and applied field response to incidents and emergencies, as required or indicated.

### **3.6 PROJECT ENVIRONMENTAL AND SAFETY MANAGER**

The PESH is a Tetra Tech senior specialist assigned to assist the PM in the development of the project-specific Environmental, Health and Safety (EHS) plans and in the implementation of EHS programs. The PESH has approval authority for EHS issues and reports to both the Project and the Tetra Tech Director of EHS Services. The PESH shall:

- Assist in the development, implementation, oversight, and enforcement of project ESQ plans
- Review incident reports and results of inspections
- Conduct periodic (e.g., quarterly) inspections
- Assist in major incident investigations
- Perform audits and assessments to determine that project ESQ plans are being fully implemented

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### **3.7 SITE PERSONNEL**

All site personnel are responsible for understanding how to respond in the event of an incident or emergency. These actions are addressed in this Plan and discussed in site orientation training. Site personnel are expected to notify their supervisor of impending or actual incidents and emergencies and to cooperate fully with the requirements of this document. Information obtained shall be immediately communicated to the EC. All employees shall participate in site-specific safety orientation. All other personnel entering the site (e.g., visitors, vendors) will be given a modified briefing on this Plan. Modified details will be determined by the visitor's status (escorted or unescorted access) and the stated reason for site access.

Emergency preparedness, prevention, and response are core elements included in the site-specific safety orientation curriculum.

### **3.8 PROJECT FIRST AID/CPR RESPONDERS**

Minor first aid and medical response stabilization will be available on site. Various project personnel are required to have up-to-date first aid and cardiopulmonary resuscitation (CPR) training. A list of First Aid and CPR trained personnel will be maintained in the project files. Off-site medical care will be used if the medical injuries or illnesses require further evaluation or treatment. The routes to the nearest hospital (and alternate) will be posted in the office trailer, dewatering building, wastewater treatment plant, and elsewhere as required.

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## **4.0 EMERGENCY MANAGEMENT**

### **4.1 GOALS AND OBJECTIVES**

The primary objective of this Plan is to ensure consistent implementation of emergency response during the life of the project, and includes:

- Pre-emergency planning, including the identification of hazards and threats and hazard mitigation
- Actions to take in the event of an emergency
- Identification of personnel and maintenance of resources needed for an effective response

### **4.2 PRE-EMERGENCY PLANNING**

Pre-emergency planning will be conducted to identify potential hazards and threats, define hazard mitigation strategies, and prescribe the appropriate response(s) as discussed within this Plan. Reviewing the hazards at each level or stage of the project or task is critical to effective pre-emergency planning. Additionally, the SHSP and Activity Hazard Analysis (AHA) developed for on-site activities identify, evaluate, and propose the appropriate hazard controls.

Pre-emergency protective actions assure worker safety is implemented consistently across the project. Some of these protective actions include:

- Use of administrative controls, including development and implementation of task- or area-oriented work plans, such as AHAs, to be used in the field which are based on actual site conditions and hazards of the work area
- Use of engineering controls
- Use of qualified and trained personnel
- Use of readily available spill containment and clean-up materials and emergency equipment

All site personnel shall be trained to applicable requirements of this Plan during site orientation training and shall be provided with updates as the Plan is updated or changed.

The procedure for assessing chemical hazards in the workplace during an emergency or incident (including the need for evacuation) includes the determination of the hazardous properties of released materials by the following:

- Reviewing MSDSs for commercial chemical products or materials
- Reading container labels
- Process knowledge
- Sampling and analysis (if needed)

Determination of potential danger to human health and the environment during an emergency shall include evaluation of the following factors:

- Proximity of the emergency location to other hazardous sources
- Compatibility with other materials

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- Potential routes for hazardous run-off or exposure
  - Environmental conditions and transport mechanisms for airborne releases (for example, wind speed, wind direction, temperature)
  - Delineation of hazard boundaries
  - Amount, concentration, or rate of release of material

The initial assessment of chemicals and hazardous materials in the workplace will be made for contingency planning purposes. In the event of an actual emergency, the EC will evaluate the above factors and determine a suitable response.

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## **5.0 FIRE PREVENTION AND PROTECTION**

The primary protective measures implemented to manage the threat of fire or explosion during project implementation include:

- Project plans and procedures, SHSP, AHAs, etc.
- This Plan
- Employee awareness and training
- Safe work practices including selection of the appropriate tools for the task
- Proper use, storage, and labeling of flammable liquids and gases
- Appropriate postings in areas where flammable liquids and gases are used or stored
- Fire extinguishers readily accessible in the work area
- MSDSs available *on site* for flammable materials in the workplace
- Hot Work Permits for cutting, welding or other spark-producing activities and fire watch (if required). Hot Work Permits must be obtained through the ESS.

### **5.1 HOUSEKEEPING**

- Work areas shall be kept reasonably clean.
- Trash, refuse, and scrap materials shall be removed and placed in the proper containers for disposal.
- Containers shall be provided for the collection and separation of waste, trash, oily or used rags, and other refuse.
- Containers will be marked as to their contents.
- Containers shall be appropriate for the material being placed in them and shall have appropriate lids.
- If hot work is performed, combustible materials will be removed or protected from a radius of 50 feet from the hot work area, and the area will be clear of flammable vapors and dusts.
- Compressed gas cylinders will be stored and handled properly in accordance with the SHSP.

### **5.2 MATERIAL STORAGE, HANDLING & USE**

- Materials shall be stored, handled, or stockpiled with due regard to their fire characteristics.
- Cabinets for storage of flammable materials shall be appropriately labeled to indicate the flammables storage.
- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

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- Portable fuel tanks (if used), not exceeding 660 gallons, shall be provided with emergency venting and other devices, as required by chapters II and III of *The Flammable and Combustible Liquids Code*, NFPA 30-2000.
  - Leakage or spillage of flammable or combustible liquids shall be contained, cleaned up, and disposed of promptly and safely.
  - Flammable liquids may be used only where there are no open flames or other sources of ignition within 50 feet of the operation, unless conditions warrant greater clearance.
  - Tank trucks shall comply with the requirements covered in the *Standard for Tank Vehicles for Flammable and Combustible Liquids*, NFPA No. 385—2000.
  - A Hot Work Permit system will be used for welding, cutting, grinding, and related activities that pose a potential ignition source hazard.

### **5.3 MAJOR WORKPLACE FIRE HAZARDS**

The major fire hazards in the workplace are:

- Small quantities (i.e., a few gallons or less) of flammable materials stored in flammable cabinets
- Portable gas cans that may be in service and used during work hours
- Flammable gases (oxygen and acetylene)
- Fuel tanks on heavy equipment
- Flammable waste in waste accumulation areas (e.g., waste aerosol cans)
- Propane gas for forklifts, space heaters, steam cleaners, etc.
- Combustible materials stored close to heaters in office areas or in hot work zones

Personnel are required to handle fire hazards in accordance with site practices. Small quantities of flammable materials are required to be stored in Flammable Storage Cabinets, and cabinets will be available for use at the site. Periodically, the site ESS will inspect these cabinets to ensure rated storage capacities are not exceeded.

Portable flammable liquid containers shall be approved by Underwriters Laboratories and will be clearly labeled to identify contents. Containers of gasoline and diesel shall be of steel construction.

Flammable gases shall be stored in bottle racks when not in service. In-service bottles shall be appropriately secured in the service vehicles or to weld carts. Empty bottles shall be stored in bottle racks and properly secured.

Heavy equipment refueling (diesel and/or gasoline) will be conducted using a delivery truck equipped with the required protective equipment and/or having bulk storage on site. Bulk storage containers will be stored in secondary containment that meets 110 percent of the largest container, or double-walled storage tanks may be used instead of secondary containment. A properly rated fire extinguisher will be located adjacent to the fuel storage facility. The tank and containment will be inspected regularly (i.e., during the weekly EHS Inspections or monthly if double-walled tanks are used) to verify that the tank is in good condition and that rainwater is emptied from the containment area. MSDSs for on-site fuels will be made available to all site

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personnel. When refueling, personnel will place a drip pan or spill pads underneath the pump to catch any spillage or overflow. Smaller equipment will be driven off site for fueling at a service station.

#### **5.4 POTENTIAL IGNITION SOURCES AND HAZARDS**

Potential ignition sources at the site are minimized to the extent practical. Primary sources of ignition are grinding operations, welding and hot cutting operations, and personnel smoking.

Fire hazards are controlled through the use of engineering and administrative controls. Engineered controls include use of Flammable Storage Cabinets, use of internally grounded fill nozzles on the fuel tank pumps, use of fire-resistant materials under welding, cutting, grinding areas, and the use of fire rated materials or distance to separate flammable gases. Portable battery-powered lighting equipment, used in connection with the storage, handling, or use of flammable gases or liquids, shall be of the type approved for the hazardous locations/material.

Administrative controls that are utilized include use of Hot Work Permits with a fire-watch, and good housekeeping. Smoking is prohibited except in approved areas designated by the CM and ESS. Areas with operations that constitute a fire hazard shall be conspicuously posted with signs stating "No Smoking or Open Flame." Laydown areas shall be regularly inspected for fire hazards, and hazards shall be removed as appropriate.

Equipment fueling shall be performed per manufacturers' recommendations with special care taken to prevent splashing or otherwise allowing fuel to come into contact with hot surfaces, such as mufflers or exhaust pipes. Fuel delivery trucks and bulk fuel storage areas will be posted with conspicuous and legible signs prohibiting smoking in the vicinity and during refueling. Grounding and bonding will be utilized during dispensing of fuels.

Electrical wiring and equipment for light, heat, or power purposes shall be installed in compliance with the requirements of current electrical codes.

Equipment powered by internal combustion engines shall be located so that the exhausts are away from combustible materials.

Open yard storage of combustible materials shall be stockpiled with due regard to the stability of piles and in no case higher than 20 feet.

#### **5.5 ACTIONS TO PREVENT SPREAD OF FIRE**

Actions to prevent the spread of fires include:

- Prompt notification
- Accessible fire extinguishers of the correct type and size within a work area or piece of equipment (incipient-stage use)
- Fire-fighting services are provided by the local fire department
- Collecting and properly containing released material(s)
- Segregated storage of flammable materials

#### **5.6 SITE FIRE EXTINGUISHING EQUIPMENT**

All on-site fire extinguishing equipment is expected to be used only for the control or extinguishing of early-stage or incipient-stage fire situations. Incipient fires are those that have

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just begun and are small enough not to reduce visibility, create a smoke inhalation hazard, or pose high-temperature risks. Fire control or extinguishing efforts should be conducted to aid escape, extinguish burning clothing, and stop a small fire. All fire extinguishing training procedures should be followed to minimize additional risks. The local fire department will be called to respond to and control the situation for any fires beyond the incipient stage.

Portable fire extinguishers are located throughout the active project work areas, in hot work areas, and on operating equipment, and are inspected on a regular basis.

As part of the design of the former Shell site a fire protection system will be constructed for the facility. Currently, there are no on-site fire hydrants. This will be addressed as part of the design of the facility.

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## 6.0 TRAINING

Site personnel will receive awareness training to ensure understanding of those elements of this Plan that are pertinent to their correct and timely actions. This training will be given initially and refresher training shall be conducted at least annually (if the project duration exceeds one year). Training initially will be given during the site orientation training.

A few of the pertinent elements of the required training for site personnel are as follows:

- Responsibilities for reporting of events or accidents
- Spill notification requirements
- Location of the assembly areas/staging area
- Sound of the evacuation alarm
- Initial actions to take when the evacuation alarm sounds

Additional emergency or awareness training that may occur is as follows:

- Subject-Specific Training Classes (as necessary for site personnel)
- Supervisors and safety representatives are currently trained on first aid, CPR, and blood-borne pathogen precautions
- Fire extinguisher usage for incipient fires
- Hazardous material and hazardous waste awareness-level and function-specific training

In addition to the above training, site personnel also will be trained on the following topics:

- An understanding of the types of activities in their work area(s) that pose a significant potential risk in case of an incident or accident and potential outcomes of those events
- How to recognize that a potentially hazardous event is occurring and the hazards that could be encountered during an incident or accident
- The appropriate actions to take to mitigate the potential hazards that may occur from an incident or accident
- Understanding of roles/functions in an incident or emergency, with a primary focus on personal safety and safety of others through prompt notification, securing of operations (if possible), proper evacuation (if necessary), and appropriate measures for control, containment, and clean-up dependent on the type of incident/emergency
- As appropriate for type of work area and potential incident/emergency, the use of equipment for response to, and control of, incidents/emergencies (e.g., fire extinguishers, spill control equipment)
- The ability to recognize and report when additional resources may be necessary to more effectively mitigate or control an event

The PRT is comprised of the PM, the CM, and the ESS, all of whom have specialized training, experience, and skills in health and safety, environmental compliance, engineering, and construction, who can supervise and coordinate a response to assist the EC in the event of an emergency.

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## **6.1 RESPIRATORY PROTECTION**

Employees who may use respiratory protection shall be properly trained, medically reviewed, and fit tested.

## **6.2 CONFINED SPACE**

**There is no confined space entry allowed on this project at the present time.** No person will enter or break the plane of any confined space for any reason unless confined space procedures are developed, personnel are trained, and an AHA has been developed and put into place with the proper monitoring and supervision.

Confined spaces present at the site include, but may not be limited to:

- Wastewater treatment storage and process tanks
- Stormwater and sanitary sewers and manholes
- Pits or vaults (if present)
- A covered roll-off box

Should the need for confined space entry be required, this Plan will be amended to include confined space entry requirements. Personnel who perform confined space entry must be trained. Should a person not adhere to the “no entry” requirement and become trapped, any rescue response would be performed by the local fire department. No confined space rescue equipment is being maintained on the site and no person is authorized to enter a confined space for rescue purposes.

## **6.3 REFRESHER TRAINING**

All project staff shall receive refreshers of required training as required or indicated. Training may include formal classroom training, tabletop simulations, and emergency response drills (discussed in following section).

## **6.4 TRAINING RECORDS**

The ESS will ensure that applicable training records are kept for site personnel. Examples of applicable training records are:

- Employee orientation and attendance records
- Contingency Plan training documentation
- First Aid/CPR documentation
- Hazardous materials and waste management training as well as function-specific training
- OSHA HAZWOPER training, medical clearance, and fit test results
- Specialized training (mobile equipment, fall protection, etc.)

## **6.5 DRILLS**

This Plan will be tested periodically. Drills shall be used to ensure site and emergency response support organizations have a clear understanding of their roles and responsibilities, and to ensure required capabilities are available and operable. Emergency drills shall be planned and documented to test the total system or components of the system. A drill will be conducted at

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project startup and as needed should conditions change. The procedures will be critiqued (both in drills and after actual or perceived emergencies) to verify that the procedures work; if the procedures do not work, the Plan will be modified. The critique should include:

- The date of the drill or plan activation
- A chronological summary of the incident or exercise
- Description of activities taken or decisions made by site personnel
- Types of monitoring performed during the event
- Injuries, illnesses, or potential exposures during the emergency
- Deficiencies noted and recommended corrective action

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## 7.0 NOTIFICATIONS AND LINES OF COMMUNICATION

### 7.1 ON-SITE COMMUNICATION AND NOTIFICATIONS

Tables 7-1 and 7-2 lists applicable site contact information. In the event of an imminent or actual emergency situation, site personnel discovering the emergency situation shall immediately notify the EC. The EC shall then notify all site personnel by voice, radio, or telephone. Personnel shall be informed about the hazard and the appropriate response. The EC shall communicate emergency status (i.e., to be on heightened awareness, proceed to assembly areas, or to evacuate the facility and report to the staging area).

Should a project worker be the first to observe an emergency, the worker shall notify his/her supervisor by the best means available and take appropriate action(s). The appropriate action(s) shall be commensurate with the degree of hazard associated with the emergency situation and the emergency response training of the individual. The supervisor shall immediately notify the EC and ensure that the work crews are accounted for and evacuated if necessary.

Of prime concern during any emergency is clear communication regarding the nature of the emergency such as: location of incident, type of incident (fire, explosion, injury [if any]), number of affected personnel or potentially impacted site and off-site personnel, and any current or planned activities in progress to mitigate the emergency. The proper information regarding the nature of the incident is paramount in order to get the proper level and type of emergency response. The ACP when directed by the EC will assist in contacting the off-site emergency responders and reporting the conditions (e.g., fire, hazardous releases).

The primary form of communication at the project site during an emergency between field groups and the EC is by via two-way radios. The EC and ESS shall be accessible by telephone (land and cellular) or radio. The emergency telephone list shall also have the off-site emergency phone numbers of key site personnel and emergency responders. If the EC will be off site, the alternate EC will be designated and on-call.

Routine activities require project management personnel, the EC, ACP, and other project personnel (teams) to carry two-way radios. A radio unit is also located in the ACS. In the event of an emergency, everyone will be instructed to “**clear the channel except for emergency use only.**” Evacuation notices and information will be broadcast over the radio at the site.

Cellular phones are located in the project office trailer and the ACS. Emergency contact phone numbers are posted at the ACS and office trailer, as well as in other buildings.

The EC shall immediately notify the CM, PM, and PESM for any major incidents:

- Evacuations of any part of the site
- Local medical response for project personnel
- Fatalities or hospitalization of project personnel
- Fire department response for rescue or to extinguish fire
- Hazardous materials team response
- Notification of regulatory agencies

**Contingency Plan  
Volume 1  
Lower Fox River (OUs 2-5)**

**Table 7-1  
Emergency (and Non-Emergency) Telephone Numbers**

<b>EMERGENCY CONTACT</b>	<b>LOCATION</b>	<b>PHONE NUMBER</b>	<b>OUs</b>	<b>NOTIFIED</b>
<b>HOSPITALS</b>				
Bellin Hospital	744 S. Webster Avenue Green Bay, WI 54301	911 or 920-433-3500	2,3,4,5	
St. Vincent Hospital	835 S. Van Buren Street Green Bay, WI 54301	911 or 920-433-0111	3,4,5	
<b>Work Care Facilities</b>				
Theda Care at Work Contact: Mary Schrader or Cheryl Marx	2009 Memorial Drive Appleton, WI 54915	920-380-4999	2,3	
Prevea Workmed Voyager Contact: Debbie	3021 Voyager Drive Green Bay, WI 54311	920-496-4760	3,4,5	
<b>Fire Department/EMS</b>				
Green Bay Fire Department	501 S. Washington Street Green Bay, WI 54301	911 or 920-448-3280	3,4,5	
Ashwaubenon Fire and Rescue	2155 Holmgren Way Green Bay, WI 54304	911 or 920-492-2312	3,4,5	
De Pere Fire/EMS	400 Lewis Street De Pere, WI 54115	911 or 920-339-4087	2,3	
Wrightstown Fire Department	961 Broadway Street Wrightstown, WI 54180	911 or 920-532-4556	2,3	
Kaukauna Fire Department	206 West 3 <sup>rd</sup> Street Kaukauna, WI 54130	911 or 920-766-6320	2	
Kimberly Fire Department	515 W. Kimberly Avenue Kimberly, WI 54136	911 or 920-788-9805	2	
<b>Police</b>				
Brown County Sheriff's Department	300 East Walnut Street Green Bay, WI 54301	911 or 920-448-4219	2,3,4,5	
Green Bay Police Department	307 South Adams Street Green Bay, WI 54301	911 or 920-448-3200	2,3,4,5	
<b>U.S. Coast Guard</b>				
Station Green Bay	P.O. Box 8486 Green Bay, WI 54308	920-435-7042 VHF Radio Channel 16 for distress calls	2,3,4,5	
<b>Poison Control Center</b>				
Poison Control Center		800-222-1222		
<b>Hazardous Materials Spill Response Units</b>				
<b>Fire Department/EMS</b>				
Appleton Fire Department	700 N Drew St Appleton, WI 54911	911 or 920-832-5813	2	
Green Bay Fire Department	501 S. Washington Street Green Bay, WI 54301	911 or 920-448-3280	3,4,5	
Ashwaubenon Fire and Rescue	2155 Holmgren Way Green Bay, WI 54304	911 or 920-492-2312	3,4,5	

**Contingency Plan  
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Lower Fox River (OUs 2-5)**

**Table 7-1  
Emergency (and Non-Emergency) Telephone Numbers**

<b>EMERGENCY CONTACT</b>	<b>LOCATION</b>	<b>PHONE NUMBER</b>	<b>OUs</b>	<b>NOTIFIED</b>
De Pere Fire/EMS	400 Lewis Street De Pere, WI 54115	911 or 920-339-4087	2,3	
Wrightstown Fire Department	961 Broadway Street Wrightstown, WI 54180	911 or 920-532-4556	2,3	
Kaukauna Fire Department	206 West 3 <sup>rd</sup> Street Kaukauna, WI 54130	911 or 920-766-6320	2	
Kimberly Fire Department	515 W. Kimberly Avenue Kimberly, WI 54136	911 or 920-788-9805	2	
CHEMTREC <sup>1</sup> Chemical Transportation Emergency Center	1300 Wilson Boulevard Arlington, VA 22209	800-424-9300 (703-741-5525)		
National Response Center <sup>2</sup>	United States Coast Guard (G-OPF) 2100 2 <sup>nd</sup> Street, Southwest – Room 2611 Washington, DC 20593-0001 USA	800-424-8802 (202-267-2675)		

**Notes:**

1. CHEMTREC® (Chemical Transportation Emergency Center) is a public service of the Chemical Manufacturers Association. However, CHEMTREC® is not intended nor equipped to function as a general information source.
  - CHEMTREC® DEALS ONLY WITH CHEMICAL TRANSPORTATION EMERGENCIES!
  - In the event of chemical transportation emergency, CHEMTREC® provides immediate advice for those at the scene of emergencies, then promptly contacts the shipper of the chemicals for more detailed assistance and appropriate follow-up.
  - OPERATES AROUND THE CLOCK – 24 HOURS A DAY, 7 DAYS A WEEK TO RECEIVE EMERGENCY CALLS. IN CASE OF CHEMICAL TRANSPORTATION EMERGENCIES, CALL ONE OF THE FOLLOWING NUMBERS:
    - Continental United States: (800) 424-9300 direct dial, toll free (WATS) number
    - Outside of Continental USA: (703) 527-3887 (This number may be called collect.)
  - CHEMTREC® provides hazard information warnings and guidance when given the NAME OF THE PRODUCT and the NATURE OF THE PROBLEM. For more detailed assistance, provide the following information:
    - Name of caller and call-back number; Location of problem; Shipper or manufacturer; Container type; Rail car or truck number; Carrier name; Consignee; Local conditions.
2. The National Response Center (NRC) maintains a 24-hour-per-day, 7-day-a-week, 365-day-a-year Operation Center where all information is received via the toll-free number, entered directly into an on-line data base system, and electronically disseminated as part of the National Response System. Once contacted, the NRC Duty Officer will guide the caller through a detailed series of questions based on the Standard Report Form to gather as much information as possible concerning the spill or release. The information is immediately entered into the Incident Reporting Information System (IRIS) and based on several pre-established criteria including material involved, mode of transportation, injuries, damage, and fatalities, select federal agency notification will take place within 15 minutes of receipt. When any of the following incidents occur, the NRC should immediately be contacted by the responsible party via the toll free number. If you see or discover an oil spill or release of chemicals and are NOT the responsible party, you should contact the NRC with whatever information you have.

**Chemical Releases**

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that all releases of hazardous substances exceeding reportable quantities be reported by the responsible party to the National Response Center. Title 40 of the Code of Federal Regulations Part 302 promulgates reportable quantities and reporting criteria. All the Extremely Hazardous Chemicals (EHC) that overlap with the CERCLA listed chemicals table (40 CFR 302.4) should be reported to NRC.

**Other Releases**

Discharges from a hazardous waste treatment or storage facility must be reported by the emergency coordinator at the facility. Abandoned dump or waste sites should be reported by anyone having knowledge of such a site.

**Contingency Plan  
Volume I  
Lower Fox River (OUs 2 through 5)  
Table 7-2  
Site Contact Numbers**

CONTACT	PHONE NUMBER
Project Manager– Ray Mangrum	C (713) 876-8528
CM/Alternate EC – Mike Estess	C (803) 646-0938
ESS/EC – Bill Welch	C (330) 208-5630
PESM – Grey Coppi	(973) 630-8101      C (215) 327-0751
Tetra Tech Director EHS Services - Phil Bartley	(509) 372-5818      C (509) 521-4898
Medical Consultant (Dr. Greaney)	(800) 455-6155

- Other emergency situations requiring outside notification/response
- Injury-free event with significant damage to property, equipment, or the community (fire, explosion, release, damage > \$2,000, or that generates media or law enforcement activity)

Tetra Tech will notify the PESM within 24 hours of the following:

- All injuries
- Industrial illnesses
- Injury-free events
- Property damage incidents

## **7.2 MEDICAL SUPPORT AND FACILITIES**

First Aid/CPR trained personnel will administer minor first aid on site. Non-emergency medical treatment will be provided at local urgent care/occupational medicine providers. Medical emergencies requiring additional evaluation/treatment will be provided by local emergency services, which can be contacted by calling 911. The nearest hospital with emergency services and the nearest Work Care facility will be identified for site personnel prior to the start of work activities. The Work Care facility will be used for illnesses or injuries that are not life threatening, but require medical care. Local emergency service providers (including medical facilities and fire departments) will render emergency response assistance for the project site. Victims of serious injuries shall be transported by ambulance to the primary or secondary emergency medical facility.

Tetra Tech shall ensure that specific employees on site hold current cardiopulmonary resuscitation (CPR) certifications, including Automatic Electronic Defibrillator (AED) training and first aid training as specified by corporate training requirements. First aid kits shall be located on site for minor injuries. AEDs will be available in the Support Zone. All injuries and near misses shall be reported promptly to the Tetra Tech ESS for evaluation and proper case management through WorkCare (Tetra Tech’s corporate medical consultant).

Location maps to the emergency medical facilities (hospital) and Work Care facility are given in Appendix A. The closest emergency medical facility and Work Care facility will be posted in the office trailer (or in site vehicles or site boats if no office trailer is located nearby), the ACS, and other buildings on site. Directions to the closest facility will be determined and posted along with the location maps.

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### **7.3 OUTSIDE RESPONDERS**

Depending on the nature of the emergency, the EC may determine that it is necessary to contact outside emergency responders and/or 911 (police, fire department, ambulance service). Organizations and project personnel will be contacted by the EC as site events require and allow.

Location maps for the local fire departments are provided in Appendix B. Additional supporting stations are also available to respond if necessary for services such as hazardous material responses or rescue operations.

Emergencies require an increased alert status for on-site personnel and off-site authorities. Other organizations and project personnel will be contacted by the EC as site events require and allow. Emergency contact numbers are posted in the office trailer, the ACS, and the other buildings on site.

### **7.4 INCIDENTS REQUIRING REGULATORY AGENCY REPORTING**

There are mandatory notification requirements for certain types of hazardous substance spills to the environment. A spill is defined as an unanticipated release of a hazardous substance, including oils, to the environment. This includes releases to soil, water, and air. The State of Wisconsin guidelines will be used to determine reportable quantities for releases as noted in Table 7-3. If it involves PCBs, the spill or release may require notification to EPA and in some instances, a direct phone call to the EPA Region 5 Administrator. The Regulatory Specialist will assist the EC, CM, and PM to determine reporting requirements. Should a reportable spill/emission occur, site personnel are required to immediately notify the onsite EC and CM. The PM or designee will be responsible for notifying the regulatory agencies identified in Table 7-3.

To the best of his/her ability, the person notifying the regulatory agencies should be able to provide the following information:

- Location of the spill
- The substance spilled
- Quantity spilled
- Concentration of the spilled substance
- Responsible entity for the spilled the substance
- Status of spill clean-up
- Any resource damages immediately discernible (e.g., dead fish or oiled birds)
- Contact information (name and phone number of person reporting spill)

**Contingency Plan  
Volume I  
Lower Fox River (OUs 2 through 5)  
Table 7-3**

**Release Notification Requirements and Contact Information**

<b>Contact</b>	<b>Phone Number</b>	<b>Time Frame</b>	<b>Release Notification Requirement</b>
National Response Center	1-800-424-8802	As soon as possible, but no later than 12 hours	Transportation –related (including loading/unloading, and temporary storage) incidents involving hazardous materials (including hazardous wastes) <ul style="list-style-type: none"> <li>• Hazardous Materials are listed under 49 CFR 172.101</li> <li>• As a direct result of hazardous material               <ul style="list-style-type: none"> <li>○ A person is killed,</li> <li>○ A person receives an injury requiring admittance to a hospital.</li> <li>○ The general public is evacuated for 1 hour or more;</li> <li>○ A major transportation artery or facility is closed or shut down for 1 hour or more</li> <li>○ The operational flight pattern or routine of an aircraft is altered</li> </ul> </li> <li>• There has been a release of a marine pollutant in a quantity exceeding 119 gallons for liquids or 882 pounds for solids</li> <li>• Release of a hazardous substance equal to or exceeding the reportable quantity (see 40 CFR 302 – Table 302.4)</li> </ul>
National Response Center (or if direct notification to the NRC is not practical, reports can be made to the Coast Guard)	NRC: 1-800-424-8802  Coast Guard District 9: 216-902-6073	As soon as there is knowledge of the spill.	Report <u>oil</u> spills into or upon the navigable waters of the United States or adjoining shorelines. Reportable discharges of oil include quantities that: <ul style="list-style-type: none"> <li>• Violate applicable water quality standards</li> <li>• <u>Cause a film or sheen upon or discoloration of the surface of the water</u> or adjoining shorelines</li> <li>• Cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines</li> </ul>
EPA Regional Office Region V	77 West Jackson Blvd Chicago, IL 60604 312-353-2000	Immediate reporting	<ul style="list-style-type: none"> <li>• Spills of 10 pounds or more by weight of <u>PCBs (any concentration greater than 50 ppm)</u></li> <li>• Spills of 1 pound or more by weight of PCBs (i.e., total volume spilled times concentration <math>\geq</math> 1 pound) are also reportable to the National Response Center</li> </ul>
Wisconsin Emergency Management	1-800-943-0003	Immediate reporting	<u>All</u> discharges to the environment of a hazardous substance (including petroleum products such as diesel, gasoline, oil) <i>except</i> the following: <ul style="list-style-type: none"> <li>• A discharge of gasoline or another petroleum product that is completely contained on an impervious surface</li> <li>• A discharge of gasoline if &lt; 1 gallon is discharged onto a surface that is not impervious or runs off an impervious surface</li> <li>• A discharge of a petroleum product other than gasoline if &lt; 5 gallons is discharged onto a surface that is not impervious or runs off an impervious surface</li> <li>• A discharge of hazardous substances (e.g., PCBs) specifically listed in 40 CFR 117 or 302 if the amount discharged in any 24-hour period is less than the RQ listed in 40 CFR 117 or 302 (e.g., RQ for PCBs = 1 pound)</li> </ul>

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## 7.5 INCIDENTS REQUIRING NRC NOTIFICATION

If the EC determines that the emergency situation could threaten human health or the environment outside the facility, the PM will be notified and the NRC at **1-800-424-8802** shall be contacted (if applicable). The NRC must be notified for hazardous substance or hazardous material releases that exceed the hazardous substance RQ. Reports to the NRC must include the following information:

- Name and telephone number of the reporter
- Name and address of the facility
- Time and type of incident (for example, release, fire)
- Name and quantity of material(s) involved, to the extent known

## 7.6 NOTIFICATION TO OSHA

Injuries, accidents, and incidents that require OSHA notification within **8 hours** include:

- A death
- A probable death
- The in-patient hospitalization of two or more employees within 8 hours

The following information shall be provided to OSHA within **30 days** concerning any accident involving a fatality or hospitalization of two or more employees:

- Name of the work place
- Location of the incident
- Time and date of the incident
- Number of fatalities or hospitalized employees
- Contact person
- Phone number
- Brief description of the incident

The EC shall notify the ESS of the above injuries/illnesses/fatalities as soon as possible. The ESS shall immediately notify the PESM and Tetra Tech's Director of EHS Services.

## 7.7 PUBLIC NOTIFICATION

While it is unlikely that the project will experience an emergency requiring evacuation of adjacent properties, such an emergency is possible. If it occurs, the PM with assistance from the EC will work with Tetra Tech's Public Information Officer and the regulatory agencies to determine the appropriate actions. The EC will implement the evacuation. The Public Information Officer will work with the news media, outside businesses, and company public relations officers to assure the notification of potentially impacted neighbor(s). Responsible risk assessment and prevailing weather conditions will determine which neighbors will be evacuated. Examples of incidents potentially impacting the adjacent public include:

- Fire or explosion
- Large chemical release

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## 8.0 EMERGENCY RESPONSE

### 8.1 GENERAL

In the event of an incident or emergency the site personnel shall immediately:

- Note the current wind direction, speed, abnormal noise, odors, and observable smoke conditions on site.
- Contact the EC and provide all requested information. Bomb alerts, terrorist actions, or certain other risks may require controlled response or release of information. Site personnel will follow the directions outlined by the EC.
- Promptly notify the EC or designee of the location of any injured or missing personnel. The EC will notify the PM and the ESS of the emergency.
- Keep EC informed of the evacuation status, if required, and any other related information.
- Be prepared to implement all possible directions, including:
  1. Notify additional Tetra Tech contacts, if directed by the EC.
  2. Activate the emergency alarms and appropriate alert status.
  3. Make emergency announcements over the radio (remembering to speak slowly and clearly).
  4. Clear the gate area and entry roadway for exiting site workers and responding emergency vehicles.
  5. Print out and/or assemble list of visitors, truck drivers, and contractors.
  6. Control site and gate access from non-required personnel and the media.
  7. The ACP, in conjunction with the EC, will coordinate an escort for any incoming emergency vehicles directly to the location of the emergency and arrange to unlock gates for alternate evacuation routes, as needed.
  8. Gate control during emergencies may be assigned to a trained employee if additional assistance is needed. The assigned employee must understand this Plan and associated activities (e.g., gate control, emergency alarm/air horn activation, radio announcements, response contacts, and the conditions under which to evacuate).
- The EC will inform site personnel when the emergency situation is terminated and instruct ACP to make an “All Clear” radio announcement for the site.
- **OR** call **9-1-1** to request assistance for any of the following emergencies:
  1. Medical injuries (heart attack, loss of breathing, electrical burns, chemical inhalation, broken bones, etc.)
  2. Severe fire or explosion
  3. Personnel rescue
  4. Releases of chemicals or wastes

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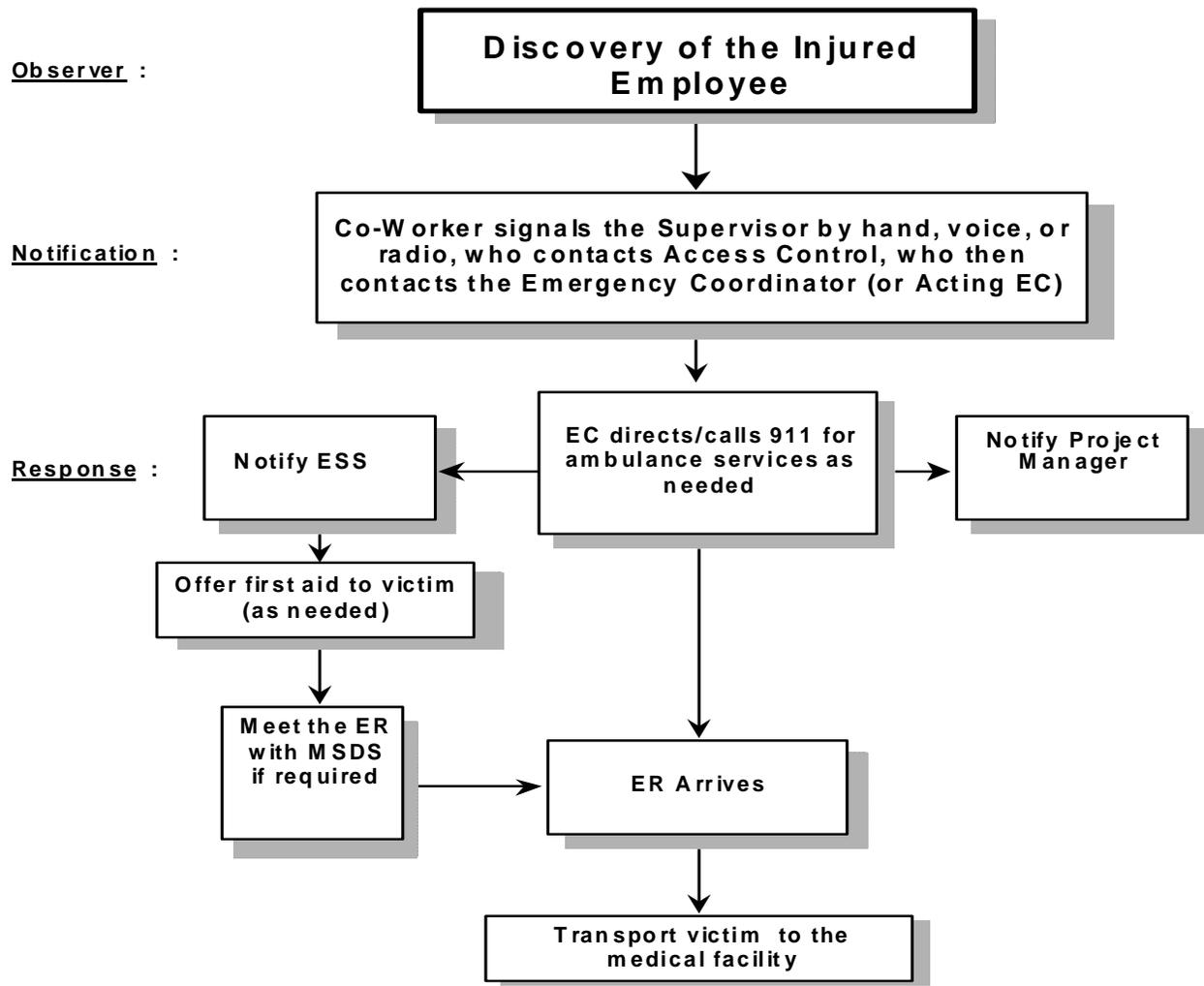
## 8.2 MEDICAL EMERGENCY AND NON-EMERGENCY RESPONSE

### 8.2.1 Emergency Response

Some physical signs/symptoms that require emergency medical treatment and a call to 911 include: chest pain, difficulty breathing, uncontrolled bleeding, bone fracture, loss of consciousness, severe head injury, poisoning, shock, loss of limb, and sudden and prolonged dizziness.

In cases of personal injury at the site, the following response actions shall be undertaken (refer to Figure 8-1):

- The injured employee is discovered and the EC is signaled by the best means available (e.g., air horn, hand signal, voice, or radio) that an injury has occurred.
- The EC will evaluate extent of injuries reported and dispatch first-aid-trained personnel or direct site personnel to contact the emergency response organization for ambulance services if needed, and shall notify the PM and the CM.
- Call 911 for initial employee evaluation and transport to the hospital. A designated Tetra Tech employee shall accompany the injured worker to the hospital. If the incident involves exposure to a hazardous substance (or chemical) the ESS shall provide a copy of the relevant MSDS to travel with the victim to the hospital. Also some decontamination may be required depending on victim's exposure.
- Administer first aid to minimize the injury effects.
- **Call WorkCare at 1-800-455-6155** for a triage call/discussion with an Occupational Health Nurse or physician. Mention as soon as possible that the call is regarding an emergency injury. The Occupational Health Nurse will assist the supervisor in determining the best treatment plan.
- Provide the following information to WorkCare:
  - Name of Supervisor calling
  - Phone number
  - Location calling from
  - Name of individual injured and Social Security number
  - Date and type of injury
- During WorkCare off-hours, dial the 800 number and identify yourself. A WorkCare health care representative will call you back shortly. Do not delay treatment while awaiting a return phone call.
- The CM is responsible for making certain that an incident report is completed within 24 hours of the incident and is submitted to the PM and the PESM. The ESS will assist in the incident report preparation. The PESM will distribute the report within Tetra Tech for further review, action, and trending.



**EC Directs Critique and Initiates Reporting to Tetra Tech (and OSHA, if required)**

**Figure 8-1.** Injury or Medical Emergency Flow Chart

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## 8.2.2 Non-Emergency Response

In a non-emergency situation:

- The injured employee is discovered and the EC is signaled by the best means available (e.g., air horn, hand signal, voice, or radio) that an injury has occurred.
- The EC will evaluate extent of injuries reported and dispatch first-aid-trained personnel or direct site personnel to contact the emergency response origination for ambulance services if needed, and shall notify the PM and CM.
- Administer first aid to minimize the injury effects.
- Call WorkCare at 1-800-455-6155 for a triage call/discussion with an Occupational Health Nurse or physician. Mention as soon as possible that the call is regarding an injury. The Occupational Health Nurse will assist the supervisor in determining the best treatment plan.
- Provide the following information to WorkCare:
  - Name of Supervisor calling
  - Phone number
  - Location calling from
  - Name of individual injured and Social Security number
  - Date and type of injury
- During WorkCare off-hours, dial the 800 number and identify yourself. A WorkCare health care representative will call you back shortly. Do not delay treatment while awaiting a return phone call.
- Call the local WorkCare clinic (360-891-4900) to notify that you are bringing an injured worker to the clinic for evaluation.
- You may transport the injured employee to the local clinic in a privately owned vehicle. A designated Tetra Tech employee must accompany the injured worker to the local clinic.
- The CM is responsible for making certain that an incident report is completed within 24 hours of the incident and is submitted to the PM and the PESM. The ESS will assist in the incident report preparation. The PESM will distribute the report within Tetra Tech for further review, action and trending.

## 8.2.3 After Emergency and Non-Emergency Treatment

After emergency and non-emergency treatment:

- Obtain treatment and medical release records for the injured worker and forward to WorkCare.
- Contact Tetra Tech worker's compensation carrier (ESIS at 1-866-615-5923) within 24 hours of injury.
- Seek ways to ensure the worker can work, including alternate work.
- Regularly follow up with WorkCare and ESIS case representatives.

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### **8.3 SEVERE WEATHER EVENT OR NATURAL DISASTER**

Response to an emergency event caused by severe weather or natural disaster (tornadoes, floods, damaging winds, etc.) shall be carried out under the direction of the EC. The EC shall notify the PM and CM immediately. Refer to Figure 8-2 for a summary of emergency response procedures.

Depending on the nature of the event, emergency response and support services (fire, ambulance, or police) may respond via a priority basis. Hospitals, schools, nursing homes, etc., will receive a higher priority and quicker response. The project site must prepare as if it may **not** receive any emergency response services for up to three days. Other emergencies will be responded to based on the actual/potential damage(s) or in a similar fashion as a fire, tornado, or earthquake.

All U.S. Weather Service-declared Watch, Warning, or Emergency announcements, emergency alarms, weather or natural conditions shall be promptly relayed to all personnel.

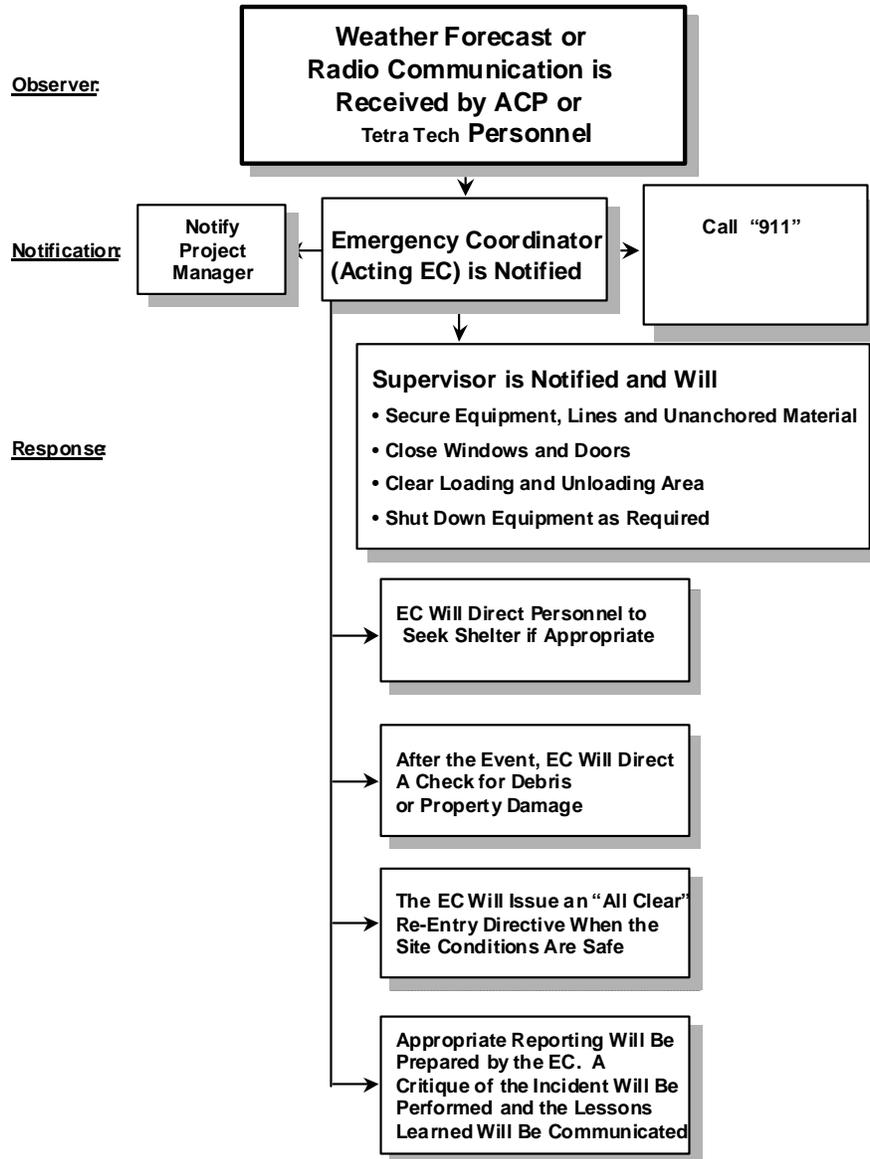
### **8.4 FIRE OR EXPLOSION**

The extent of each employee's emergency response training shall be factored into the appropriate response activities. Project personnel receive specific emergency response training, including response to fires, explosions, and spills, as part of their introductory and annual review of required training.

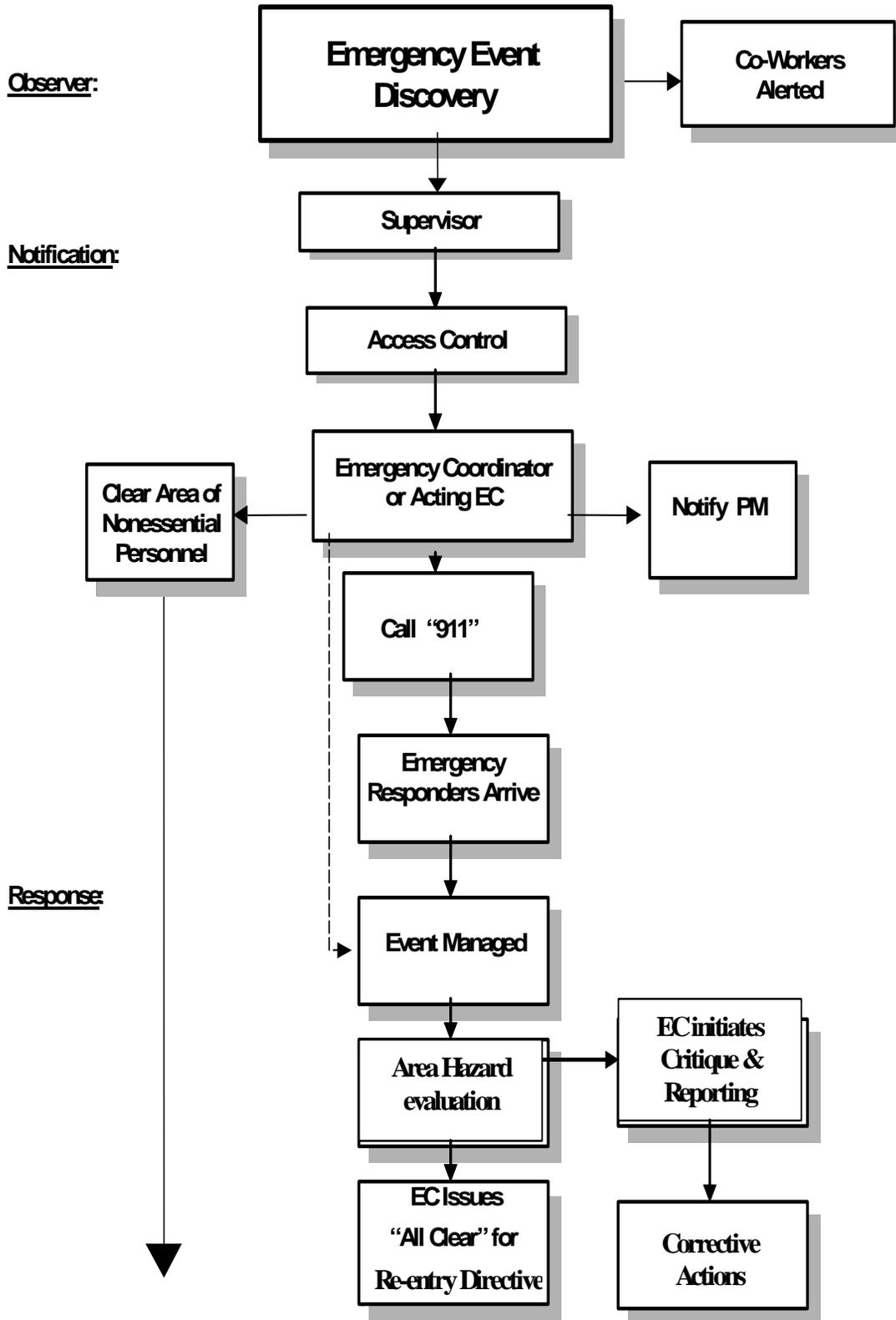
If safe to do so, trained project personnel shall use fire extinguishers available on site to control or extinguish a small localized fire; remove or isolate flammable or other hazardous materials that may contribute to the fire; and contain or recover spilled materials. The EC shall assess the hazard associated with the emergency situation and shall determine the appropriate response. The EC's initial response to an emergency shall be the protection and safety of human health.

The general response to a fire or explosion is as follows (refer to Figure 8-3):

- The discoverer of the fire or explosion shall notify his/her immediate supervisor. The supervisor will then notify the EC. Attempts to extinguish a fire or otherwise respond to the emergency shall then be made if it can be accomplished safely; otherwise, withdraw to the designated assembly area and wait for directions.
- The EC shall notify PM, CM, and other appropriate personnel of the emergency situation and the response needed, which could include verbal instructions or alarm patterns.
- Work in the affected area shall be shut down. Non-essential personnel shall be removed from the affected area.
- A head count of workers will be taken for employee accountability and to determine if any rescue or recovery operations are necessary.
- Established emergency procedures shall be followed if the unit requires evacuation or if personnel require medical treatment.



**Figure 8-2.** Weather Events and Natural Disasters Emergency Response Flow Chart



**Figure 8-3.** Fire or Explosion Emergency Flow Chart

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- The area where a fire or explosion has occurred will be protected from entry and disturbance to allow for investigations and evaluations to determine if area is safe to return to work.
  - After the fire has been extinguished and no further threat to human health exists, the “All Clear” signal shall be given by the EC. Equipment employed during the emergency shall be cleaned, inspected, and placed back into standby status for future use.

### **8.5 UNAUTHORIZED ENTRY, TRESPASS OR SITE INTRUDERS**

Site personnel shall report observation of unauthorized entries or trespassing to their supervisor or, if not available, the EC. In the event of vandalism, the person discovering the vandalism shall report it immediately to his/her supervisor. The supervisor shall report the vandalism to the EC, and he shall report it to the PM. The police shall be called to report the damage. The CM with the ESS shall investigate the damages and ensure that the area or equipment is safe to use. If the area or equipment is deemed unsafe, an evaluation shall be made to ensure that personnel on the property are properly protected. The CM or designee shall complete an incident report. Refer to Figure 8-4.

### **8.6 BOMB THREATS OR TERRORIST ACTIVITIES**

Bomb threats or terrorist activities will be evaluated based on the information collected while yielding maximum protection to the staff. Area-specific evacuation or total evacuation decisions will be evaluated. Refer to Figure 8-5.

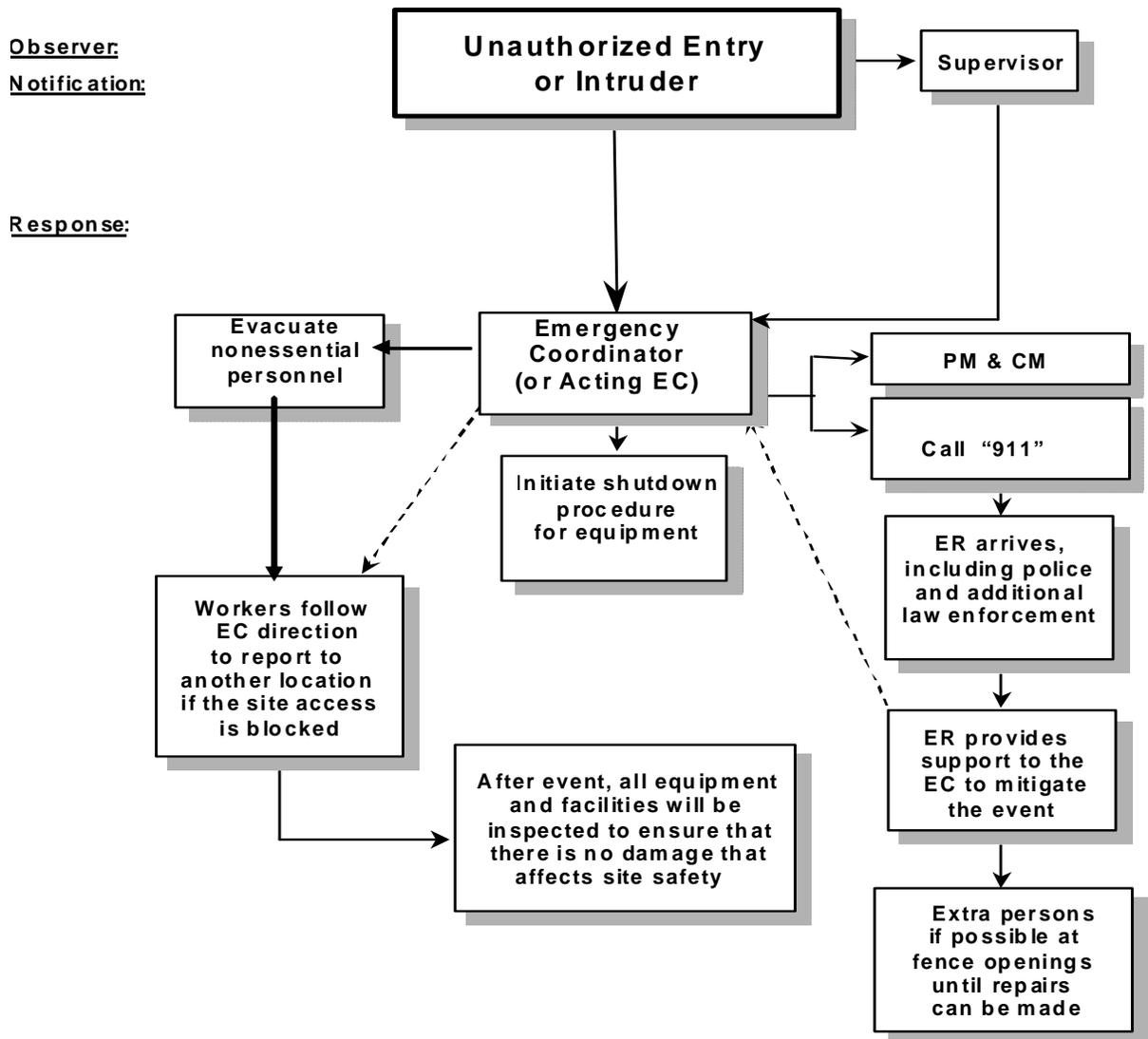
The person receiving the bomb threat on the telephone shall:

- Remain calm.
- Listen without interrupting the caller. If possible, keep the caller talking.
- Obtain as much information as possible, for example:
  - When is the bomb going to go off?
  - Where is it located?
  - What kind of bomb?
  - Where is the caller located?
  - How does the caller know about the bomb?
  - What is the caller’s name and address?
- Keep the line open and notify supervision.
- Write down details about the call that can be remembered (sex, estimated age of caller, voice quality, accent, speech impediments, and background noise).

The EC shall:

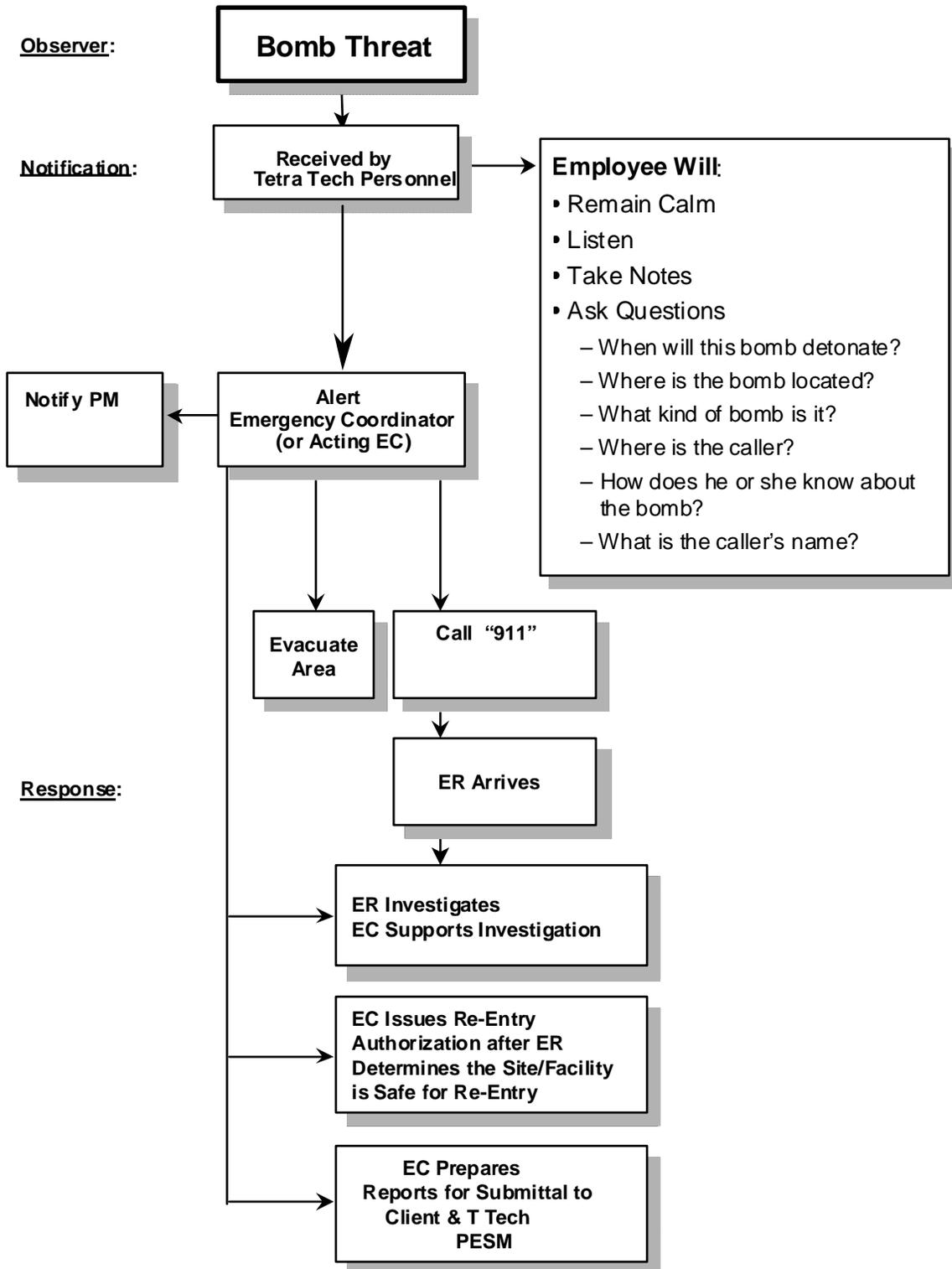
- Evacuate the facility.
- Direct or call “911.”
- Notify PM and CM.
- Direct employees to immediately evacuate the area.

- 
- Cooperate with investigators.
  - Support the Emergency Response investigation by police and other responding agency personnel as needed.
  - Issue an “All Clear” re-entry direction after the emergency response team completes its investigation and communicates that the site is safe and re-entry is appropriate.



**The EC Conducts a Critique with Interested Parties, Communicates Lessons Learned, and Initiates Appropriate Reporting**

**Figure 8-4.** Unauthorized Entry, Trespass, or Site Intruder Emergency Response Flow Chart



**Figure 8-5.** Bomb Threat Flow Chart

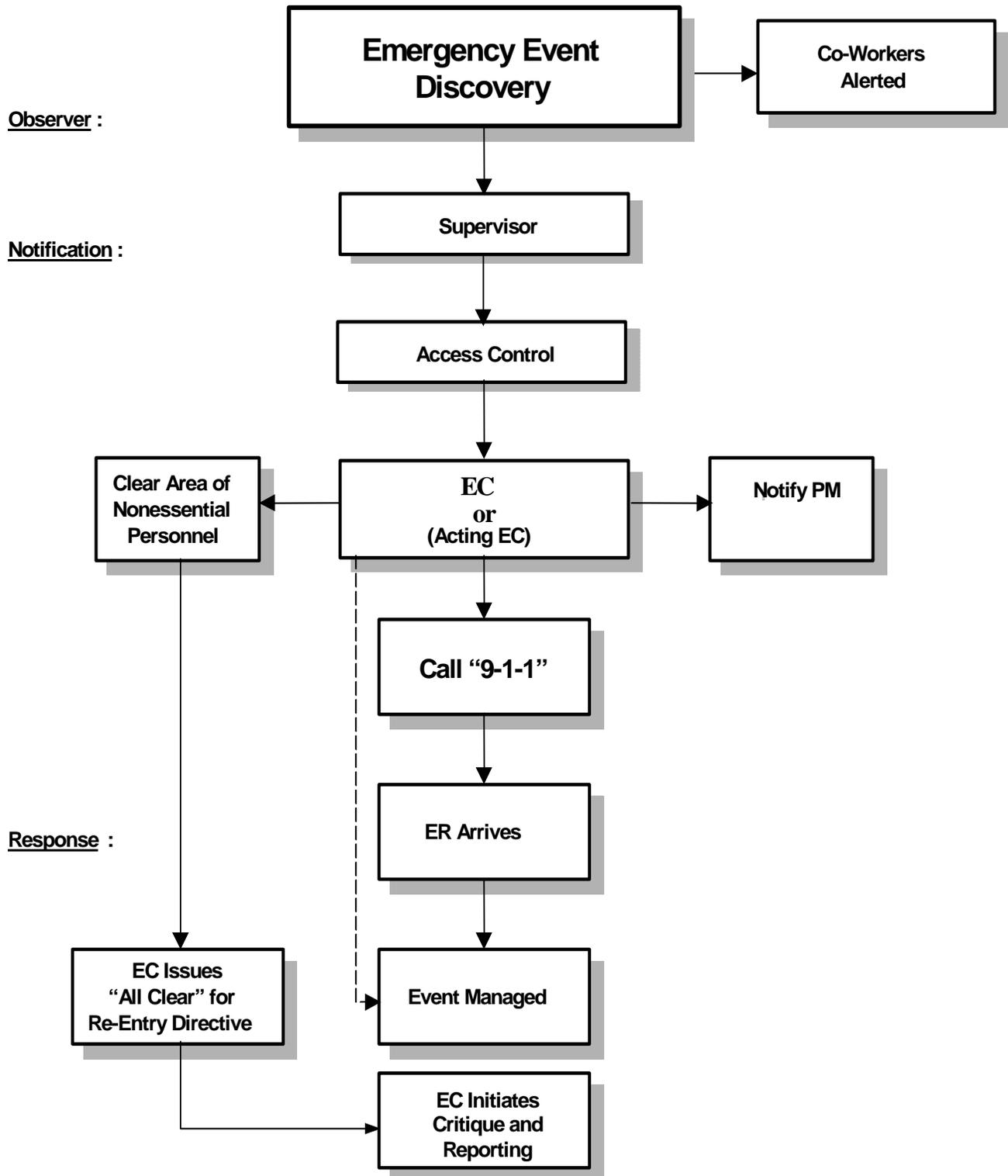
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## **8.7 PERSONNEL RESCUE**

Successful personnel rescue relies on prompt notification. At no time should a rescue attempt be made if the rescuer could become in danger himself/herself and at no time shall an employee enter a confined space to attempt a rescue unless specifically approved in an AHA after training and using the appropriate equipment and monitoring requirements. Training must include recognition and anticipation of hazardous areas and situations. Capable and trained site workers under the supervision of the EC and CM can conduct limited rescue of personnel if deemed safe and if approved by this Plan. If not deemed safe, not approved by this Plan, or if additional equipment and resources are necessary, the local fire department will be contacted to provide this assistance. Refer to Figure 8-6.

### **8.7.1 Confined Space Rescue**

No Tetra Tech personnel are currently permitted to enter any confined space on this project. Confined spaces at this site may include, but are not limited to: wastewater treatment storage and process tanks; stormwater and sanitary sewers and manholes; some pits or vaults that could be encountered; and covered roll-off boxes. All work will be engineered to avoid entry into these spaces to conduct the required work. Entry is defined as the act of a person passing through an opening into a confined space whereby any part of the body breaks the plane of the opening. This NO ENTRY policy will be clearly communicated to all persons working on this project. If a person is found to be in a confined space and that person is unable to exit, Tetra Tech will not attempt a rescue. In an emergency involving a confined space, the local fire department will be called upon to provide a confined space rescue.



**Figure 8-6.** Other Emergency Response Flow Chart

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## 9.0 CHEMICAL SPILLS, HAZARDOUS WASTE AND MATERIAL RELEASES

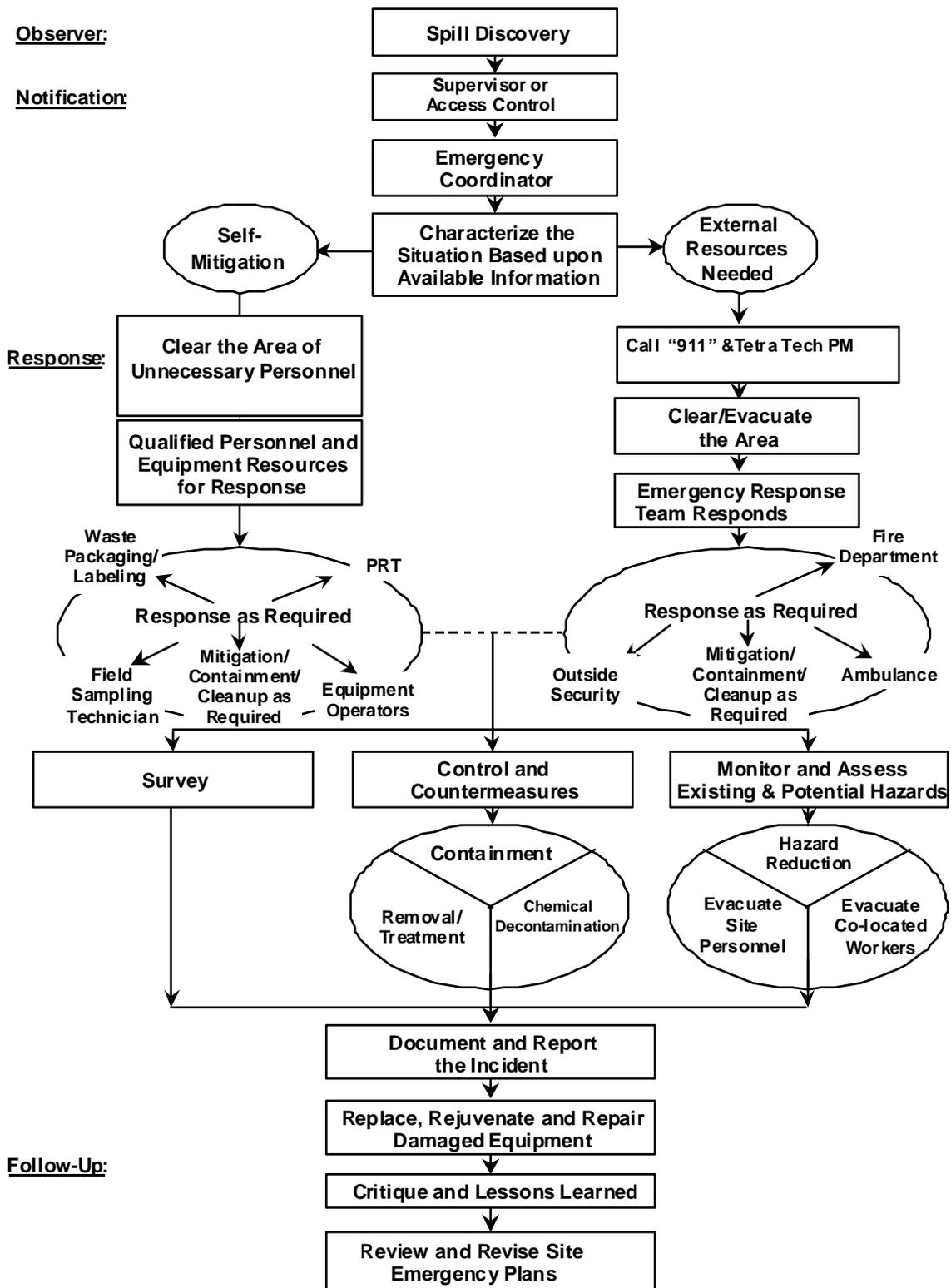
A spill is defined as an unanticipated release of a hazardous substance, including oils, to the environment. This includes releases to soil, water, and air. Spills can potentially occur when transporting, storing, or handling hazardous substances. Common hazardous substances anticipated to be handled at the project site include:

- **Gasoline** – project vehicles, generators, portable fuel containers
- **Diesel** – project vehicles and heavy equipment, generators, portable fuel containers
- **Used oil and oil products** – project vehicles and heavy equipment, used oil storage areas
- **Remediation wastes** – sediment and debris containing PCBs that are handled during dredging, pumping, dewatering, staging, and off-site transportation activities

All employees have received hazardous material training and hazardous waste awareness level training for their work place as a portion of their Hazard Communication training. MSDSs are available for the chemicals in the work area and can be found in the ESS's office. Employees are trained to clean up small spills in accordance with their Hazard Communication training. Refer to Figure 9-1 for a summary of spill/release response procedures.

- Any spill or air emission release, regardless of amount, should be reported **immediately** to immediate Supervisor. The Supervisor reports the spill or release to the EC and the EC works with the Regulatory Specialist. The Regulatory Specialist assists the EC in determining reportability of the spill, safety concerns for the clean-up crew, and waste disposal. The information reported to the Supervisor and up the chain must include: the location of the spill or release; what was spilled or released; how much was spilled or released and/or the duration of the release; and the receptor for the release (soil, secondary containment, concrete, stormwater, etc.).
- The safe clean-up of spills and releases depends on the material or waste spilled, the amount released, and conditions of the area (hot surfaces, containment, other materials present, ventilation, etc.).
- After notification to their Supervisor, properly trained site personnel will handle “small” spills not requiring additional personnel. In all cases, the ESS must be notified of any spill clean-up in progress in order to ensure and document proper clean-up, notification of personnel, and waste management/disposal.
- If site crews are unable to effectively handle a large spill, such as from transformer failures, large-volume fuel oil spill, oil spill impacting surface waters, etc., the spill will be immediately reportable to the NRC and State as listed in Table 7-3 above.

To prepare for releases of oil (including hydraulic oil), fuel, and other petroleum product spills, spill response materials are located in areas where there are potential points of release such as refueling or active work areas. The spill materials are maintained regularly and provide the basic personal protective equipment (PPE) and spill containment equipment (absorbents, booms, containers, equipment, etc.) for an immediate response. Other appropriate storage locations on site will contain additional spill and emergency response equipment.



**Figure 9-1.** Hazardous Material or Waste Release Emergency Response Flow Chart

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The emergency equipment list for the site is shown in Table 11-1. In the event of a spill, site personnel shall:

- Alert co-workers.
- Inform their supervisor immediately.
- Follow instruction(s) from the EC or designated EC to clear the affected area.
- Stop the release if it can be safely accomplished (upright a leaking drum, shut off a valve or hose, etc.).
- Remove surrounding materials that could be reactive with the released material and review MSDSs and other information as needed to address this issue.
- Use hand tools and absorbent pads, booms, earth, sandbags, sand, kitty litter, and other inert materials to contain, divert, and clean up a spill.
- If the spill reaches or is probable to reach a stormwater runoff system, take measures necessary to intercept this material.
- Place clean-up materials and containment in appropriate containers for safe retention and final disposition.
- Some special spill and material release conditions and appropriate emergency response actions are identified below:
  - Toxic fumes or vapors – If the spill or material release could result in the emission of vapors or fumes that pose a threat to facility personnel or to persons in the surrounding area, evacuation shall be initiated for facility personnel and the people in the affected surrounding area. The EC shall notify the PM and ESS, and contact appropriate outside authorities to request assistance in the evacuation of people in the surrounding area when appropriate. Personnel shall not be allowed in the affected area until the problem has subsided and it is determined that it is safe to re-enter the area. Evacuation is covered further in Section 10.0.
  - Large-quantity spills – Spills that occur are expected to be small and should be contained and controlled by site personnel. However, when external support is required to mitigate or clean up a spill, the EC (or designee) shall mobilize additional response support by contacting the appropriate agencies.

Authorities and agencies shall be appropriately notified of RQ spills or air emissions as directed by the ESS. Internal notification and client notification shall follow the standard prescribed in the Tetra Tech Incident Reporting and Investigation Procedure, EHS 1-7 (Incident Reporting & Investigation).

If work operations are stopped in response to a release, fire, or explosion, personnel shall monitor for leaks, pressure buildup, or other equipment failures. If an abnormal condition is observed, appropriate action shall be taken by operations personnel to terminate or minimize the amount of material being released. After the emergency, arrangements shall be made for the safe treatment, storage, or disposal of recovered waste, contaminated soil, surface water, or other contaminated material resulting from the emergency. The EC shall notify the PM and ESS and

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oversee the management and handling of contaminated materials, which shall include the following:

- Identification of released materials to assure that they are compatible with other stored materials and with the containers or tanks in which they shall be stored
- Clean-up, packaging, characterization, and labeling of the material
- Storage of the material
- Proper treatment or disposal of the material (in permitted facilities)

If the ESS determines that contaminated water, materials, or soil is to be sent off site for treatment and disposal, only EPA-approved and permitted facilities, which are also Tetra Tech approved, shall be used. Methods used to store and treat released materials due to an emergency shall be determined on a case-by-case basis.

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## 10.0 EMERGENCY EVACUATION AND SHELTER

Small or limited hazard incidents may not require a complete evacuation. Limited evacuations or shelter in place procedures may require that only adjacent work areas evacuate to their designated assembly area. Depending on the situation, shelter in place procedures may be utilized to prevent exposure to transient outside contaminants. This may include closing windows, loading bays and doors. Proper considerations are needed prior to turning off any ventilation systems.

The assembly points must **not** be at risk or involved in the emergency situation. If the assembly points are at risk, supervisors shall direct personnel to proceed to an alternate location and inform the EC.

During an emergency, protective actions that may be taken to ensure worker safety include evacuation or shelter. In some instances, evacuation may be limited to evacuation of a particular work area or crew only; in other instances, evacuation of the site may be necessary.

The Project Site Evacuation Area for all emergencies that require full site evacuation will be field determined based upon the locations they are working. All site personnel and visitors will be informed of the Project Site Evacuation Area during site-specific training. The Site Evacuation Area is the most commonly known location by all personnel and visible to incoming emergency response crews. The distance away from most hazards and typical prevailing winds should protect the Evacuation Area. If a site evacuation is announced and the Evacuation Area is at risk, supervisors will instruct personnel to proceed to an alternate evacuation area as designated by the EC. In the event that a particular work area must be evacuated in an emergency, but that emergency does not affect the entire site, there are designated Assembly Points to which workers will evacuate. The workers who evacuate a work area will, unless otherwise instructed, proceed to the main Assembly Point and await further instruction. A head count will be done at the main Assembly Point before proceeding to the Evacuation Area. Other intermediate Assembly Points may be designated on individual AHAs along with instructions, including alternate evacuation routes, in the event of an emergency, as needed. For each of the facilities established, a map will be developed and posted that shows the main site Assembly Point, main Evacuation Area, and Evacuation Routes.

In the event of a severe weather event (e.g., lightning, tornado), personnel will be alerted where to take shelter. Workers will be informed using word-of-mouth and two-way radios. Supervisors and the EC will perform an accountability check of on-site personnel.

In the event that all personnel cannot be accounted for, the EC will take appropriate actions, including searching for missing personnel. Any search or recovery plans shall include contingency planning to ensure safety of personnel. If necessary, 9-1-1 may be contacted for situations where an incident is deemed unsafe (e.g., fire, earthquake-damaged building, or structure collapse).

The EC evacuates the project work area whenever it is believed that the health and welfare of personnel in the area are being threatened due to chemical release(s), fire, or a natural disaster, such as a tornado. In the event that the EC determines that evacuation of personnel is required, the following actions are taken:

- An air horn blast shall be sounded (5 – 10 seconds) by EC and by supervisory personnel in major work areas. Air horns are located at ACS and at control/support zones of each

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major work area. The evacuation signal shall be repeated every 15 – 20 seconds until site personnel start to respond. Further instructions shall be broadcast over the internal site work area via two-way radios and by word-of-mouth. For those areas of the facility where the air horn cannot be heard, supervisors will monitor radios and advise personnel in their area of any emergency.

- Personnel in work areas being evacuated should safely stop work operations, place equipment/tools in a safe shutdown condition, and immediately proceed to their respective assembly point. Directions for alternate routes of evacuation and assembly shall be broadcast over the internal, work area radio frequency or by word-of-mouth, as necessary, or if the designated assembly point or evacuation routes to the evacuation area are deemed unsafe.
- The crew/area supervisor will conduct an attendance check at that time for personnel under his/her direction. Any discrepancy in number or identity of personnel will immediately be conveyed to EC.
- After this initial attendance check, personnel will proceed directly to the main plant Evacuation Area.
- The EC, using the day's Site Access Log and daily sign-in briefing sheet as an accountability roster, will then perform a follow-up accountability check. Unaccounted-for personnel will be reported to the EC. The EC shall attempt to reconcile the accountability check.
- During an evacuation, attempts shall be made to locate unaccounted personnel as long as such attempts do not endanger the lives of others by re-entry into the emergency area.
- Personnel who are assigned to look for unaccounted personnel or perform limited emergency response duties will be designated by the EC.
- Personnel without specific emergency response assignments shall remain in their designated assembly areas.
- General re-entry into the work area shall be allowed only after the EC announces "*all clear*" and provides re-entry instructions.
- If necessitated by the emergency event, personnel will be notified by radio or word-of-mouth to "shelter." Personnel will move to or stay within designated areas for an accountability check.

During a "shelter" event, attempts shall be made to locate unaccounted personnel as long as such attempts do not endanger the life of others.

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## **11.0 ESSENTIAL EMERGENCY EQUIPMENT AND SUPPLIES**

A supply of dedicated or easily accessible emergency equipment is maintained on site for response to a variety of minor emergencies including spills and releases, fires, explosions, and injuries. Supplies include: portable fire extinguishers and equipment; spill response materials; tools and support materials; PPE; alarm and communication equipment; and decontamination equipment. This equipment shall be maintained at the site for use in emergencies. Tetra Tech has established accounts with local vendors to support immediate replenishment of depleted supplies.

In addition to dedicated emergency equipment that is stored on site and available for use in an emergency, active work areas as well as areas where oil or fuel is handled or stored have emergency equipment such as fire extinguishers and oil spill kits or materials staged for use. Fire extinguishers are located in work areas and flammable material storage areas in accordance with National Fire Protection Association (NFPA) requirements. These kits and equipment are inspected regularly. Some emergency equipment is dedicated for emergency response, meaning it is not available for use in routine work operations; some emergency response equipment (e.g., water truck) is in use during work but in an emergency can be made available for use. Due to the nature of work at the site, active work locations often change. New work areas are evaluated for the type and quantity of emergency response equipment that must be located, and the necessary equipment is then staged conspicuously and inspected regularly.

Table 11-1 lists of the examples types of emergency equipment maintained on site in accordance with EPA, OSHA, and WDNR requirements, which are briefly described in the following sections. This table will be revised and amended as appropriate during site activities. The list includes a description of the equipment, its location, and its capabilities. The following sections discuss the basic types of emergency equipment available. A map depicting the location of emergency spill response equipment will be developed for both the former Shell site and the other upland facility.

### **11.1 SPILL CONTAINMENT AND CLEAN-UP**

Various chemical and oil spill containment materials, such as absorbent booms, socks, pads, and kitty litter, as well as tools and equipment are available for use in cleaning up small spills of hazardous materials, substances, and wastes known to be present on site. Spill kits are located in areas where oil and petroleum products are stored, on all boats > 25 feet, and in hazardous waste storage areas. Additionally, spill kits are staged in various areas on site where active work is being performed. The spill kit locations change as work locations change. Examples of this type of equipment are provided in Table 11-1.

### **11.2 PERSONAL PROTECTIVE EQUIPMENT**

PPE use is addressed in detail in the SHSP. PPE is designed to provide physical and chemical barriers for the head, body, hands, feet, and respiratory protection. PPE is maintained to respond to anticipated chemical releases on site and for use in work areas where a higher level of protection is necessary based on site conditions (dusts, work with chemicals, etc.). Examples of this type of equipment are provided in Table 11-1.

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### **11.3 EMERGENCY EYEWASH/SHOWER AND DECONTAMINATION**

Emergency eyewash units and emergency showers will be located in specific work areas in accordance with OSHA standards as necessary based on need. Specific AHAs for those activities/areas identify the need for staging these items. All units must be accessible and operational. Emergency eyewash units and showers will be used to decontaminate personnel in the event of chemical exposure. Additionally, other materials are available for the setup and staging for decontamination (personnel and equipment) in the event that it is necessary.

### **11.4 FIRE EXTINGUISHERS AND EQUIPMENT**

Portable fire extinguishers are located in active work areas and hazardous material storage areas that contain flammable materials, including hazardous wastes, in accordance with NFPA and OSHA standards. Additionally, heavy mobile equipment (i.e., excavators, dozers) carry portable fire extinguishers. Additional fire extinguishers of several types are available and on hand at Supply and Supply Storage in the event of a small fire on site. The type of fire extinguisher used for fire fighting depends on the type of material (i.e., ordinary combustibles, oil or grease, combustible metal, or energized equipment). If performing hot work, a 20-lb. or larger dry chemical extinguisher will be present in the hot work area and a fire watch will be provided for a minimum of 30 minutes after completion of the hot work.

### **11.5 CONFINED SPACE ENTRY AND RESCUE EQUIPMENT**

No persons are presently allowed to enter a confined space on this project. Should a person not adhere to the site rules on confined spaces and be unable to get out of a confined space, the local fire department provides the only on-site confined space rescue support using its own equipment.

### **11.6 PERSONNEL FALL PROTECTION RESCUE EQUIPMENT**

Personnel fall protection rescue equipment, including ladders, harnesses, lifelines, and retrieval systems, are routinely used, available, and stored on site. All rescues must be planned, coordinated, and directed by the EC; however, the local fire department provides the primary rescue support such as high angle rescue, live electrical, or structure collapse.

### **11.7 WEATHER INFORMATION AND TRACKING**

Local weather conditions will affect the drift and dispersion of chemical releases or smoke. The proximity to buildings and equipment will affect immediate area wind patterns and turbulence. Steam release, smoke, flags, survey tape, or blowing leaves can help determine the direction of the wind. The National Weather Service Website will be routinely checked to determine wind speed, direction, rainfall, or severe weather hazards expected.

<b>Table 11-1. List of Emergency Response and Decontamination Equipment on Site</b>				
<b>GEAR</b>	<b>EXAMPLES OF EQUIPMENT TYPES</b>	<b>USE &amp; CAPABILITY</b>	<b>LIMITATIONS</b>	<b>LOCATIONS</b>
<b>Personal Protective Equipment</b>				
Body Protection – Outer Wear	Dupont Nexgen Coverall NG 122S 002500 (various sizes) or equivalent	Spills of Gasoline (less than 5 gallon), Diesel, Used oil, Hydraulic fluid, PCBs	Permeable to liquids and vapors; intended for protection from contact with soil, dusts, and light, incidental contact with the materials listed or contact with contaminated soils; Health & Safety to determine adequacy of this ensemble at the time of response.	Supply Conex near Tetra Tech field office
Body Protection – Inner Liner with Outer Wear Above	Dupont Tyvek, polypropylene 543253, 543254, 543255 or equivalent (various sizes)	Use as inner layer	Permeable to liquids and vapors; intended for protection from contact with soil, dusts, and light, incidental contact with the materials listed or contact with contaminated soils; Health & Safety to determine adequacy of this ensemble at the time of response.	Supply Conex near Tetra Tech field office
Body Protection – Outer Wear	Dupont Saranex 44428 (various sizes) or equivalent	PCB spill response	Impermeable ensemble – presents potential heat stress concerns. Must be inspected prior to and during use for evidence of cuts, abrasions, or other wear that may affect permeability.	Supply Conex near Tetra Tech field office
Body Protection – From Flame or Torch Weld	Flame-Retardant Coveralls. Orange jumpsuits or equivalent	Torch cutting or spot welding	Does not offer chemical protection	Supply Conex near Tetra Tech field office
Hand Protection – Chemical	N-Dex Nitrile Gloves or equivalent	Gasoline, Diesel, Used oil, Hydraulic fluid, PCBs	No limitations for expected on-site materials	Supply Conex near Tetra Tech field office
Hand Protection – Chemical	Ansell Sol-vex 37-175, CE0493 or equivalent	Gasoline, Diesel, Used oil, Hydraulic fluid, PCBs	No limitations for expected on-site materials	Supply Conex near Tetra Tech field office
Hand Protection – Chemical	PVC Rubber Industrial Work Gloves – Posigrip RN78477 or equivalent	Gasoline, Diesel, Used oil, Hydraulic fluid, PCBs	Not suitable for gross clean-up of gasoline – use of nitrile glove for gasoline is recommended.	Supply Conex near Tetra Tech field office
Respiratory Protection – air-purifying respirator	North 760008A Full face, negative pressure (various sizes) or equivalent	Used in areas with respiratory hazards. Provides eye protection	Not for use in an Immediately Dangerous to Life or Health (IDLH) or oxygen-deficient environment, requires fit test and medical clearance. Must be used with appropriate cartridge. Not for use for potential exposure above the Protection Factor of 50.	Supply Conex near Tetra Tech field office
Respiratory Protection – air-purifying	North 770030S Half mask, negative pressure (various sizes) or equivalent	Used in areas with respiratory hazards.	Not for use in an IDLH or oxygen deficient environment, requires fit test and medical clearance. Must be used with appropriate cartridge. Not for use	Supply Conex near Tetra Tech field office

<b>Table 11-1. List of Emergency Response and Decontamination Equipment on Site</b>				
<b>GEAR</b>	<b>EXAMPLES OF EQUIPMENT TYPES</b>	<b>USE &amp; CAPABILITY</b>	<b>LIMITATIONS</b>	<b>LOCATIONS</b>
respirator			for potential exposure above the Protection Factor of 10.	
Respiratory Protection – Cartridges	North 7583P100 HEPA / Organic stack (negative pressure respirator) or equivalent	Respirable dusts, diesel, gasoline, solvent, PCBs	Not for use in an IDLH environment	Supply Conex near Tetra Tech field office
Respiratory Protection – Cartridges	North 7580P100 HEPA (negative pressure respirator) or equivalent	Respirable dusts	Not for use in an IDLH environment	Supply Conex near Tetra Tech field office
Respiratory Protection – Cartridges	3M R012 PAPR HEPA or equivalent	Respirable dusts, PCBs	Not for use in an IDLH environment	Supply Conex near Tetra Tech field office
Rain or Splash Suits	Lacrosse PVC / poly (size L, XL, 2X, 3X) or equivalent	Outdoor rain protection, diesel or gasoline splash	Not to be worn without Tyvek or Saranex layer underneath suit in areas where Tyvek or Saranex is required	Supply Conex near Tetra Tech field office
Foot Protection – Work boots	Ranger Rubber boot (steel toe and shank) [size 6-15] or equivalent	Gasoline, Diesel, Used oil, Hydraulic fluid, PCBs	May require disposal if not properly decontaminated or if not wearing over-booties to protect the primary boot; primary example – PCB clean-up	Supply Conex near Tetra Tech field office
Foot Protection - Overshoes	M-Wear Disposable yellow rubber boot covers, slip-on, natural rubber or equivalent	PCBs – primary use; also for gasoline, diesel, and used oil	May degrade if extended contact occurs with gasoline, diesel, used oil, hydraulic fluid	Supply Conex near TtEC field office
Eye Protection - Goggles	American All Safe Company 2-11 Monogoggle or equivalent	Offers some protection from splashes to eyes and flying debris to eyes	Fogs up easily. Should be used in conjunction with face shield for maximum protection	Supply Conex near Tetra Tech field office
Eye Protection – Face Shields	Bullard 840MG Flat Acetate Shield or equivalent	Helps protect against splash hazards and flying debris	Should be worn with protective eyewear or goggles for maximum protection	Supply Conex near Tetra Tech field office
<b>Spill Clean-up Materials</b>				
Sorbent Booms	Sorbent Products, Inc. ENV810 Polypropylene Boom 8' X 10' or equivalent	Oil spills on water, floats	Use limited to oil. Does not absorb other liquids. Does not offer complete protection for blocking drains unless used with other material to dike, but helps	Supply Conex near Tetra Tech field office
Sorbent Pads	Absorbent pads 16'' X 20'', SPC100, 954570 or equivalent	Oil and grease spills on land or on puddles	Use limited to oil. Does not absorb other liquids. Good for small spill clean-ups only	Supply Conex near Tetra Tech field office
Sorbent Granular	NAPA Diatomite, Kitty Litter, or equivalent	Oil, grease, water and other liquids – absorbs well and can be placed easily over large area	Not to be used for spills in water or in puddles – soaks up water, sinks	Supply Conex near Tetra Tech field office
Sorbent Socks	Moltan Sock Absorber or Equivalent	Oil spill on land	Oil (including PCB oil) only.	Supply Conex near

<b>Table 11-1. List of Emergency Response and Decontamination Equipment on Site</b>				
<b>GEAR</b>	<b>EXAMPLES OF EQUIPMENT TYPES</b>	<b>USE &amp; CAPABILITY</b>	<b>LIMITATIONS</b>	<b>LOCATIONS</b>
				Tetra Tech field office
<b>Alarm Systems and Emergency Communications</b>				
Emergency Notification – Employees, On Site	Site Radios	Notification and Communication	May not work well at opposite ends of the site or in some buildings	ACS, PM, CM, ESS, Operator and labor crew teams (1 per team min.)
Emergency Notification – Off Site/On Site	Cellular Phones	Notification and Communication	Limited to use at Access Control and Supervisory Personnel	ACS, PM, CM, ESS
Emergency Notification – Localized areas on site	Air Horns	Notification and Warning System for Evacuation	Localized Use, can't reach all areas of the site, vehicle horns to be used in lieu of air horns if the air horns are not available	ACS, CM, ESS, 1 per team
<b>Fire Extinguishing Systems</b>				
Fire Extinguishers – Portable	Dry Chem, Purple-K, Type ABC	Class A (ordinary materials), class B (oils and grease), class C (energized electrical fire)	Not for use on Class D metal fires. Limited size of fire they can be used on and incipient stage only	Active Work Areas, Building 428, Office, and Supply Conex (CM will maintain list of locations and inspections)
Fire Extinguishers – Portable	Type A Water Filled	Class A (ordinary materials)	Not for use on class B, C, or D fires	Active work areas on site (CM will maintain list of locations and inspections)
<b>Decontamination Equipment</b>				
Equipment Decon (and Spill Response) – Support Equipment	Polyethylene bags, 6-mil, large size	For use in containerizing spill clean-up materials and used PPE waste from spill or from decon	Weight limit. Not for use with liquids or sharp objects that can pierce the bag. Some waste bags may require additional containerization after clean-up depending on the material.	Supply Conex near Tetra Tech field office and Building 428
Personnel Decon – Eyewash	Portable eyewash stations	Flushing of eyes in case of contact with chemical or splash of chemical	Must be cleaned and inspected on routine schedule. Emergency use may require assistance of second person.	Active work locations where chemical hazards

<b>Table 11-1. List of Emergency Response and Decontamination Equipment on Site</b>				
<b>GEAR</b>	<b>EXAMPLES OF EQUIPMENT TYPES</b>	<b>USE &amp; CAPABILITY</b>	<b>LIMITATIONS</b>	<b>LOCATIONS</b>
				exist and Building 428
Equipment Decon – Support Equipment	Kiddie Pool	For use as boot wash or personnel decontamination, or as secondary containment	Limited size. Plastic. Can break easily. Set on hard even surface.	Supply Conex near Tetra Tech field office
Equipment Decon – Support Equipment	Scrub Brush	For use in boot wash or personnel or small equipment decontamination	N/A	Supply Conex near Tetra Tech field office
Equipment Decon – Support Equipment	Detergent	For use in boot wash or personnel, equipment decontamination	N/A	Supply Conex near Tetra Tech field office
Personnel Decon – Showers	Shower stations	Removal of chemicals on clothing and skin in emergency	Personnel decontamination facility will be located in the Processing Plant. Person must be transferred to this building to take shower.	Processing Plant
<b>Direct Reading Monitoring Equipment</b>				
Hazardous Atmosphere	RAE Systems Photo-ionization device (PID) MiniRAE 2000 or equivalent	Indication of relative organic vapor concentration for spills involving fuels	Will not measure methane; unable to identify specific compounds	Tetra Tech Safety Office
Hazardous Atmosphere	MSA Solaris 10047228 O <sub>2</sub> , LEL, H <sub>2</sub> S, CO Monitor or equivalent	Low oxygen concentrations can result in erroneous flammability / explosivity readings	Monitoring for oxygen level; lower explosive limit (flammability of vapor –e.g., from fuel spills, measure oxygen in ambient air; carbon monoxide (from events involving combustion),	Tetra Tech Safety Office
Hazardous Atmosphere	RKI Instruments O <sub>2</sub> , LEL, H <sub>2</sub> S, CO Monitor Eagle 4-Gas Monitor or equivalent	Monitoring for oxygen level; lower explosive limit (flammability); hydrogen sulfide; carbon monoxide (from events involving combustion)	Low oxygen concentrations can result in erroneous flammability / explosivity readings	Tetra Tech Safety Office

**Notes:**

Locations of spill kits for use on small petroleum spills (diesel, gasoline, hydraulic fluid, etc.) are subject to change in response to the daily schedule and crew locations. Typical contents of these small spill kits are listed below. Those items shown in *italics* are supplied in spill kits where warranted due to potential chemical hazards in that area.

**Typical Contents:**

- 2 face shields
- 10 oil absorbent towels
- 1 bag absorbent (granular, dehydrated clay)
- 1 plastic shovel
- 1 roll of Caution Tape
- 1 boom – absorbent for acids, caustics, and solvents

**Contents (cont.):**

- 1 boom – water, grease solvent
- 4 Ansell Solvex gloves
- 2 Tyvek suits (size 3X)
- 1 roll duct tape
- 2 *Saranex Suits*
- 2 *pair rubber overshoes*

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## **12.0 POST-EMERGENCY EQUIPMENT MAINTENANCE**

After an emergency, the equipment used during the event shall be cleaned or replaced, readied, and inspected for its intended use before operations are resumed in the affected areas of the facility. The type of cleaning, maintenance, or replacement necessary shall be determined on a case-by-case basis. Primarily, cleaning shall consist of wiping off equipment with disposable cloths until no residual waste material can be seen or flushing with an appropriate solvent (normally water) until clean. If a solvent other than water is used, a water flush may follow. Should sampling be necessary to ensure residues are removed; a sample of the solvent rinse water shall be collected and analyzed. Analytical parameters shall be based on process knowledge of the materials and equipment involved.

Fire extinguishers are refilled and depleted stocks of neutralizing materials, protective clothing, and safety equipment are refilled, replenished, and cleaned as necessary to be readied for future service. The ESS is responsible for inspecting the supply of emergency equipment and the CM is responsible for assuring that adequate supply is maintained. Operations shall resume after post-emergency critical equipment maintenance has been performed.

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### **13.0 ASSESSMENT, REPORTING, CRITIQUE AND FEEDBACK**

Once an emergency situation is brought under control, a full review of the incident is conducted to determine the course of action necessary to remedy the effects and to prevent event recurrence. It is the responsibility of the EC to convene a meeting of the emergency participants within seven working days. The PM or designee shall invite the client and local emergency response agencies to provide input and to participate in a detailed evaluation.

The critique shall review:

- Overall strategy and tactics employed
- Effectiveness of response elements
- Successful operations and identification of problems
- Establishment of root cause or plan or procedure failure(s)
- Review of lessons learned
- Suggestion of improvements and amendments to the Plan and the SHSP
- Conclusion with the communication of lessons-learned information to Tetra Tech personnel

The EC shall prepare a written summary of the critique and assessment within 30 days of the incident. The PM shall distribute the written summary to the client. The client may forward copies of the written summary to local emergency response agencies.

Needed corrective actions shall be entered into the project's non-conformance tracking system and shall be scheduled and tracked through closure.

Changes made to the Plan as a result of the critique and lessons learned shall be documented and communicated to site personnel.

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## **14.0 DOCUMENTS AND RECORDS**

The emergency management program shall be documented to demonstrate conformance with the requirements of this Plan. Project records are maintained in a formal document control system.

Emergency readiness assurance shall include assessments and documentation to ensure that stated emergency capabilities are sufficient to implement this Plan.

Program documentation includes the following:

- Emergency drill records
- Incident reports, critiques, and corrective action reports
- External reports for emergency incidents
- Plan revision records

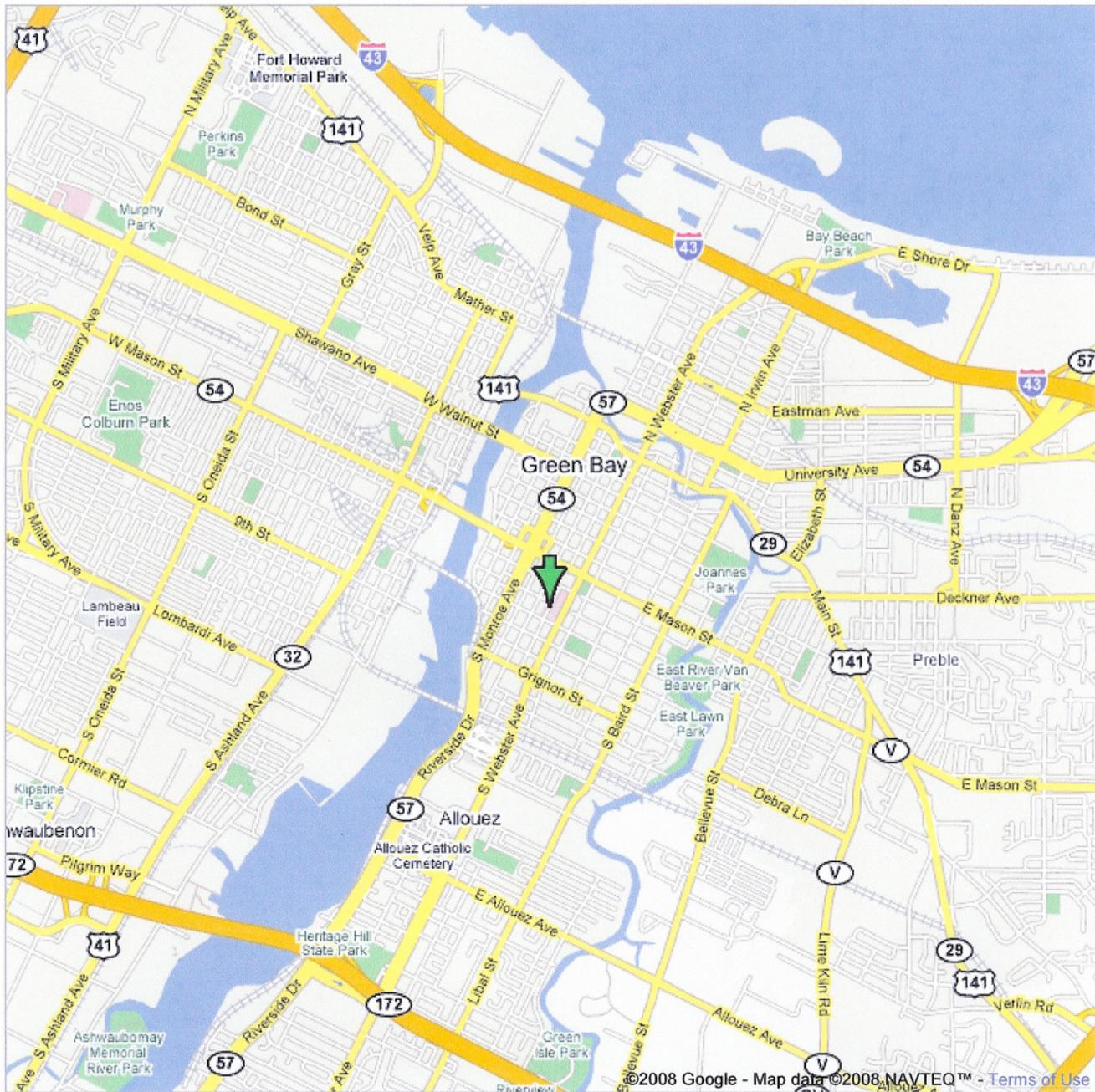
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**APPENDIX A**  
**HOSPITAL LOCATION MAPS**



Address **835 S Van Buren St**  
**Green Bay, WI 54301**

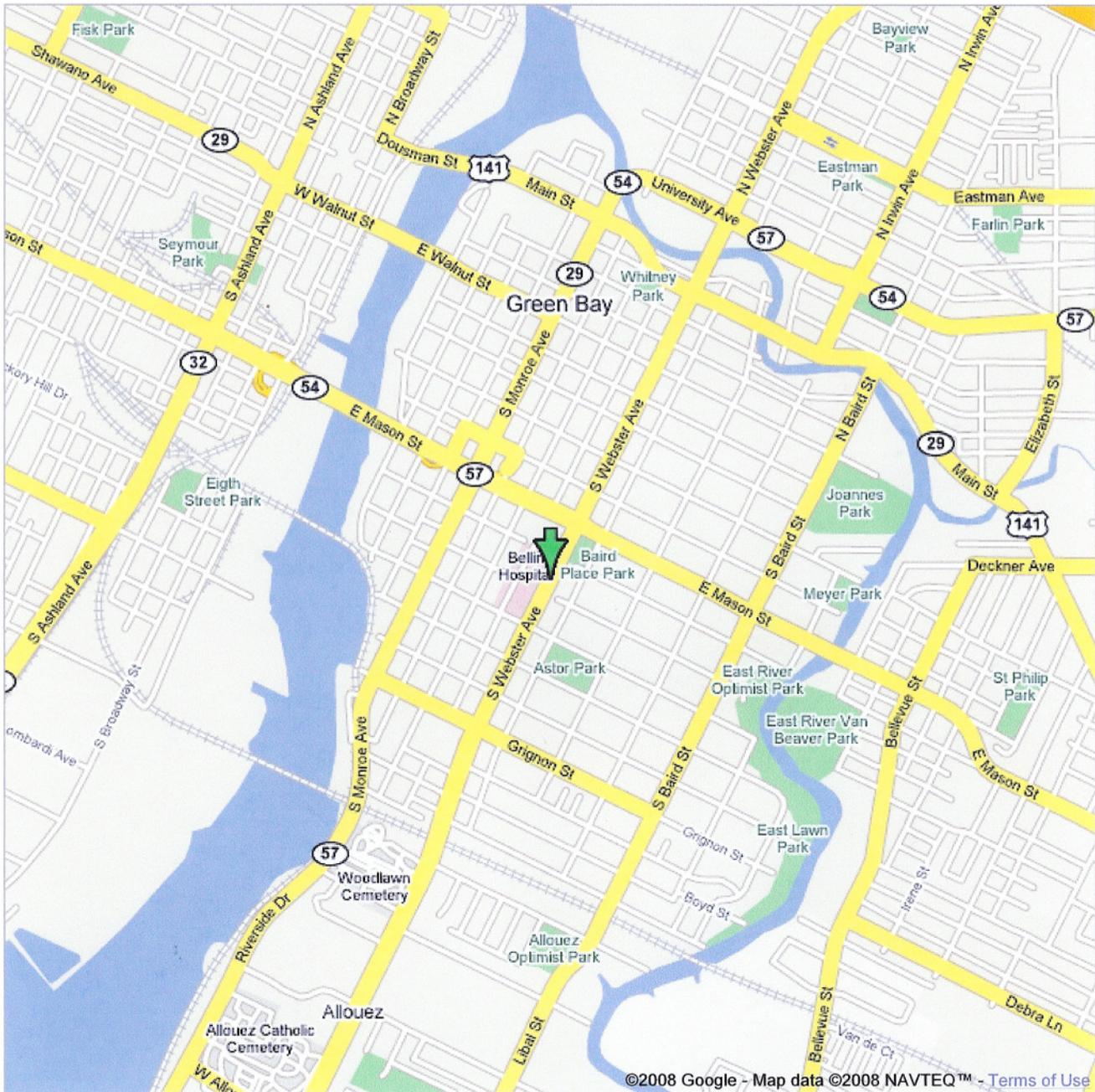
Notes Saint Vincent Hospital  
Green Bay, WI  
Phone (920) 433-0111





Address **744 S Webster Ave**  
**Green Bay, WI 54301**

Notes **Bellin Hospital**  
**Green Bay, WI**  
**Phone (920) 433-3500**



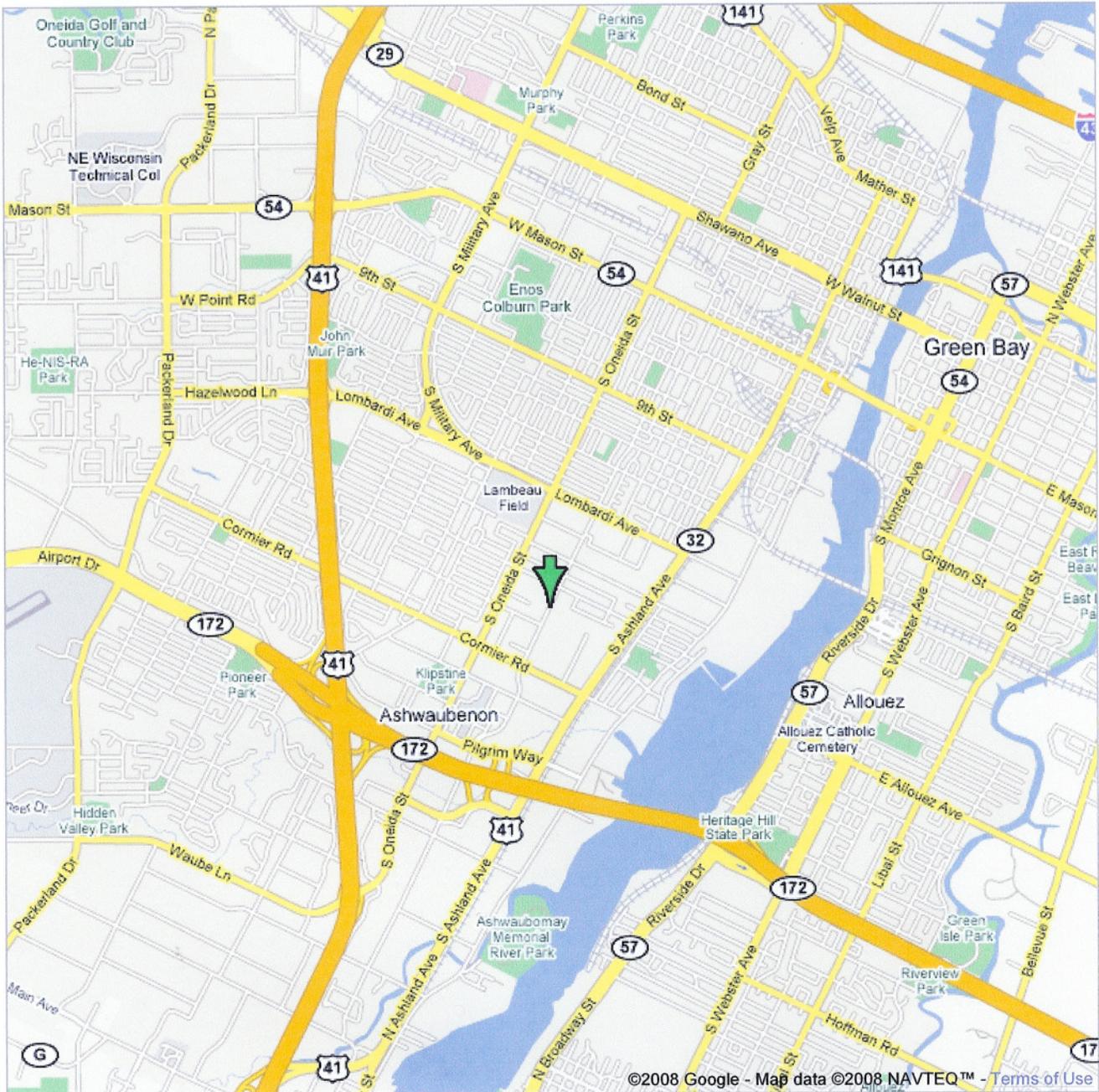
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**APPENDIX B**  
**FIRE DEPARTMENT LOCATION MAPS**



Address **2155 Holmgren Way**  
**Green Bay, WI 54304**

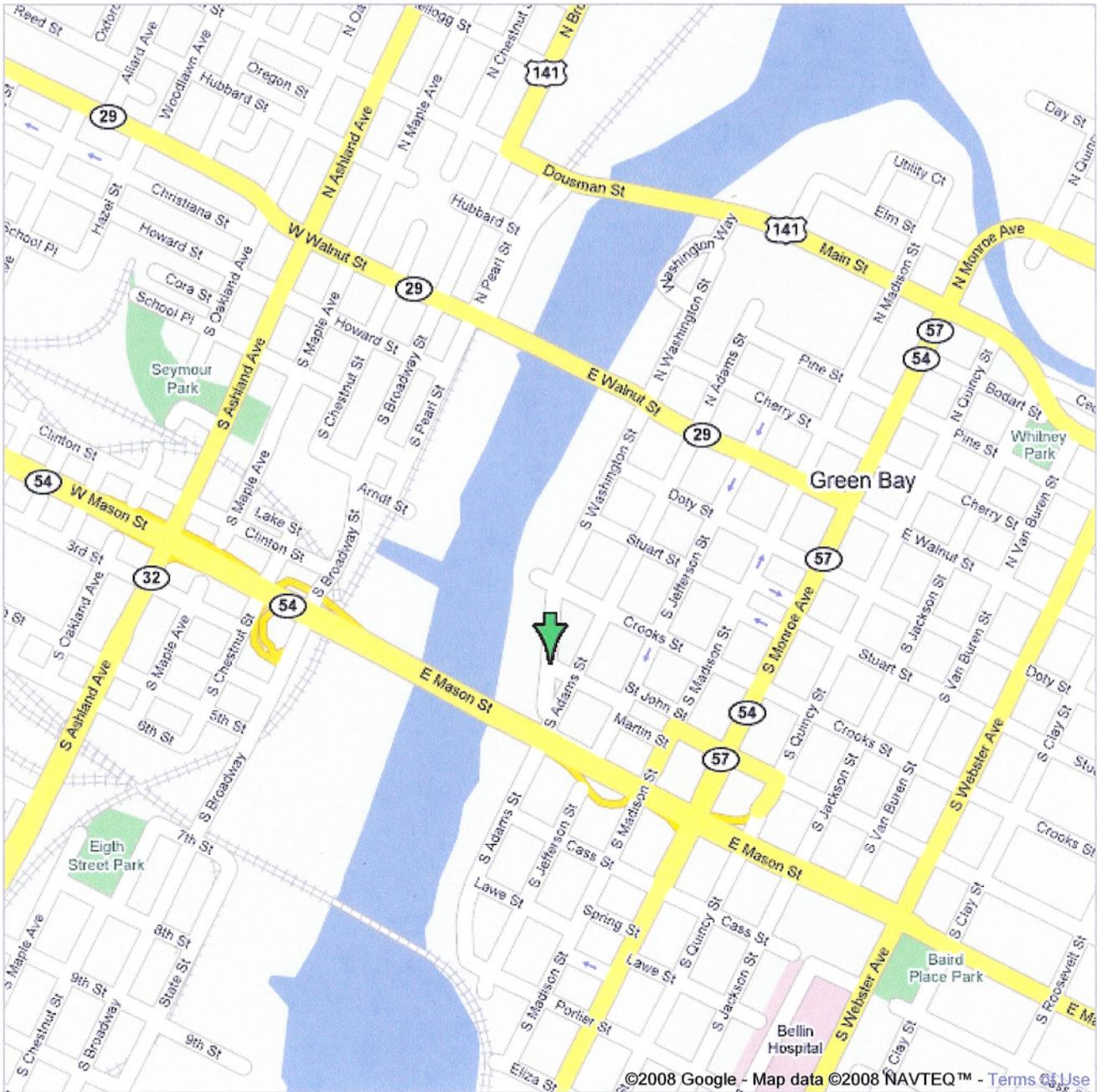
Notes Ashwaubenon Fire / Rescue  
Operable Unit 4 and 5 Location





Address **501 S Washington St**  
**Green Bay, WI 54301**

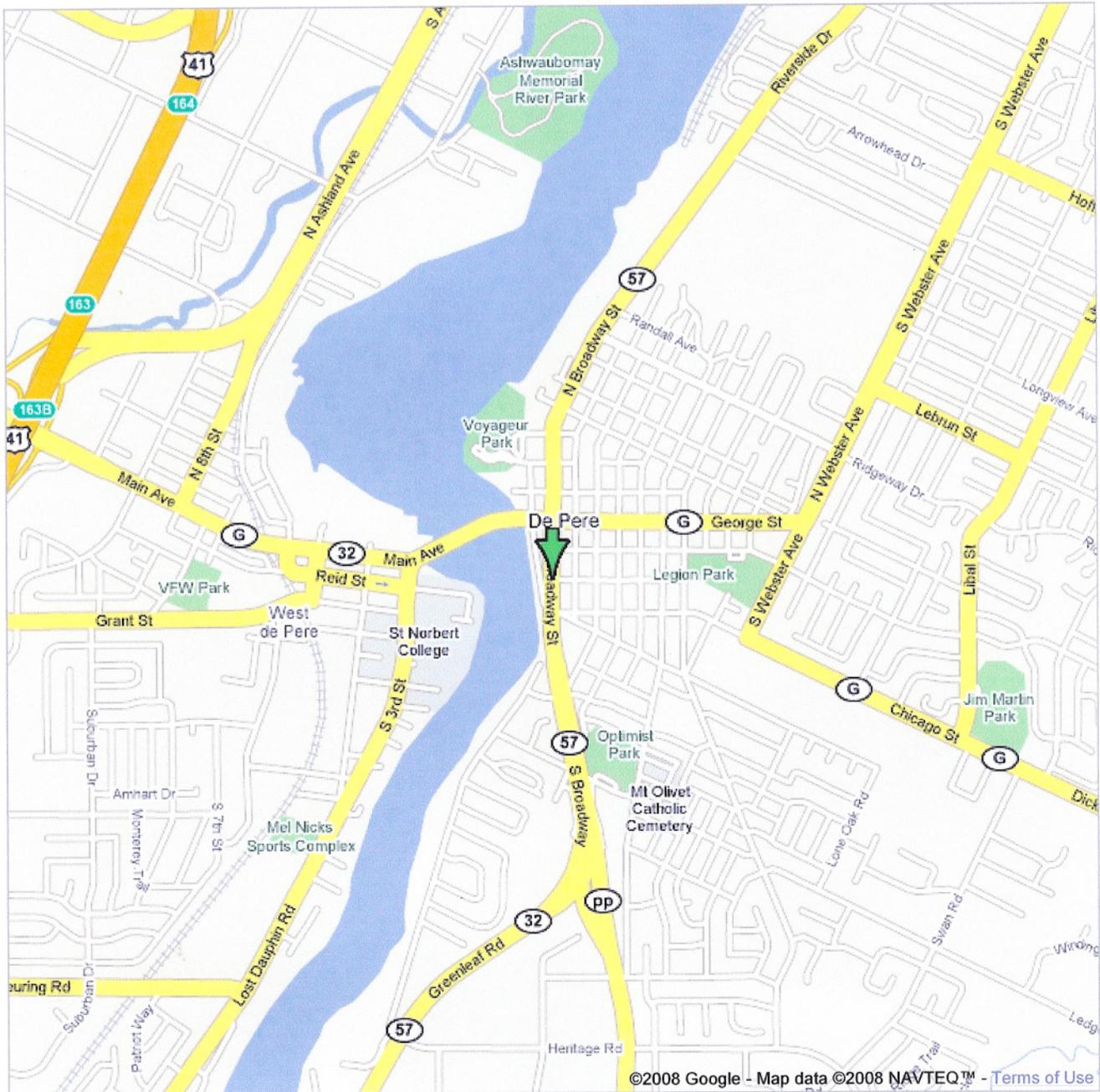
Notes Green Bay, WI Fire Department /  
EMS  
Operable Unit 5 Location





Address **400 Lewis St**  
**De Pere, WI 54115**

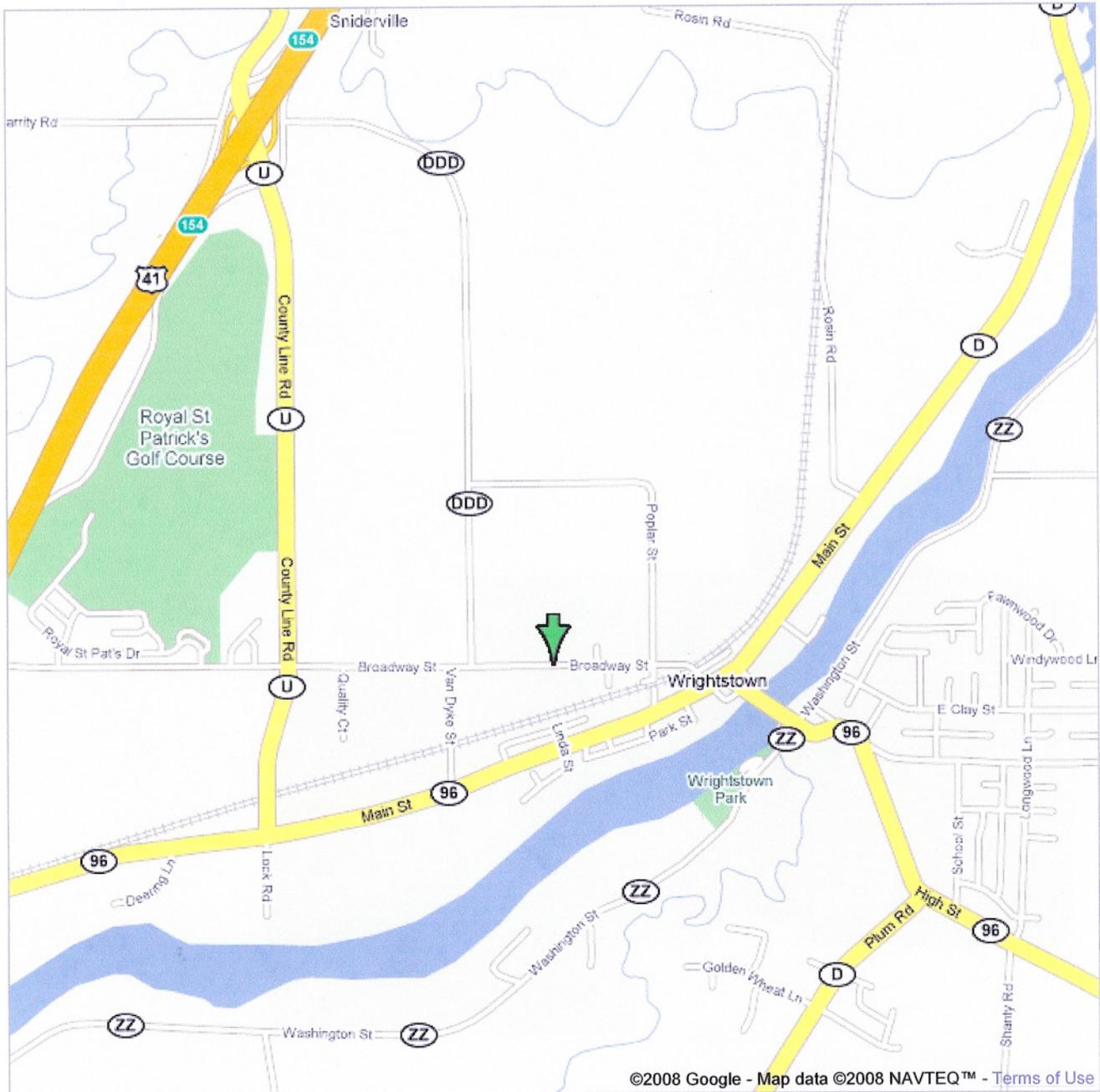
Notes De Pere, WI Fire Department /  
EMS  
Operable Unit 3 Location





Address **961 Broadway St**  
**Wrightstown, WI 54180**

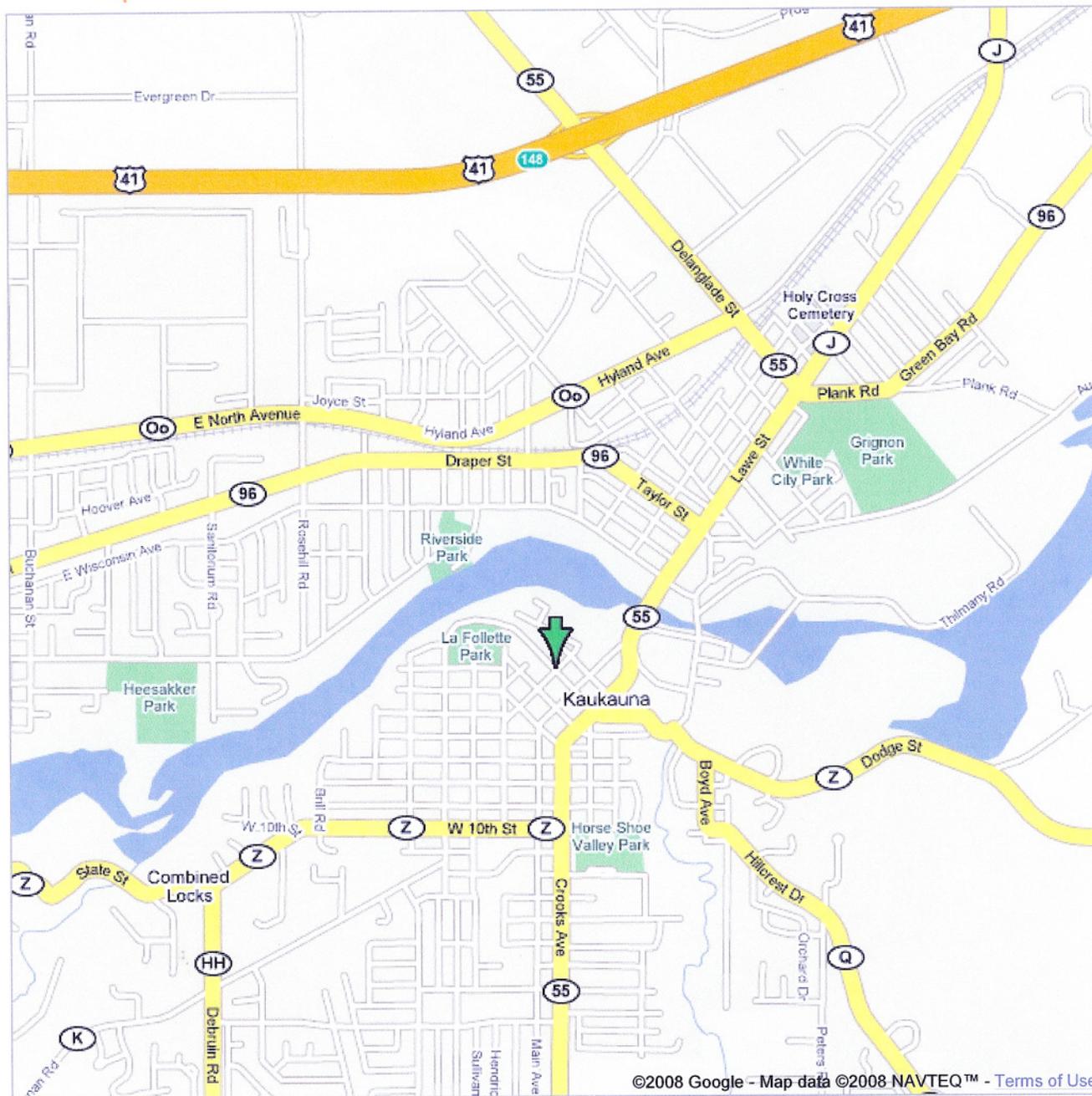
Notes Wrightstown, WI Fire  
Department / EMS  
Operable Unit 2 Northern  
Location





Address **206 W 3rd St**  
**Kaukauna, WI 54130**

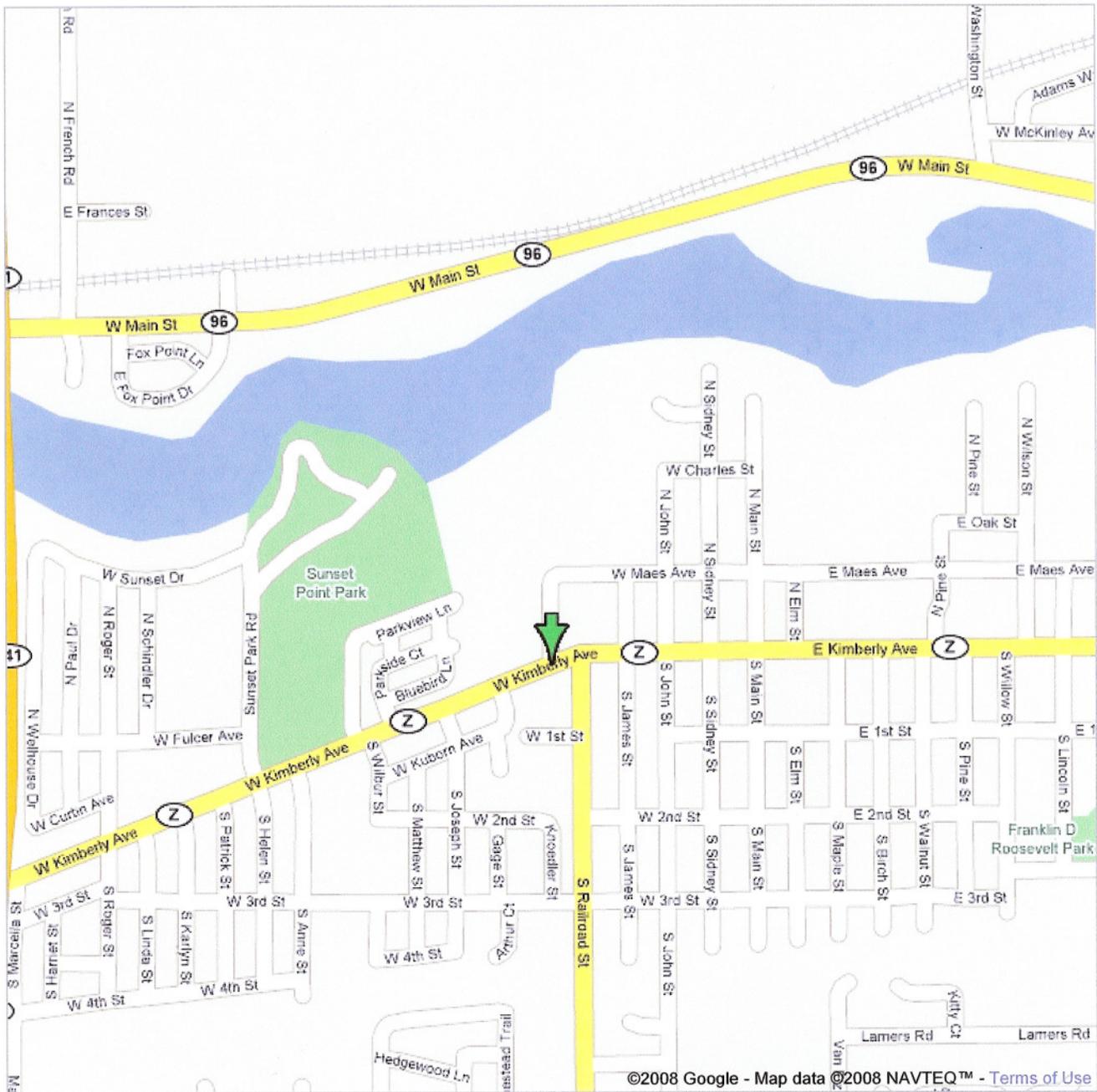
Notes KauKauna Fire Department / EM:  
South Operable Unit 2 Location





Address **515 W Kimberly Ave**  
**Kimberly, WI 54136**

Notes Kimberly Fire Station  
South Operable Unit 2 Location



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**APPENDIX F**  
**COMMUNITY PROTECTION PLAN**

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**COMMUNITY HEALTH AND SAFETY PLAN  
VOLUME I**

**at the**

**LOWER FOX RIVER  
OPERABLE UNITS 2 THROUGH 5**

**in**

**Brown, Outagamie, and Winnebago Counties, Wisconsin**

**Prepared for:**

**Appleton Papers Inc.  
Georgia-Pacific Consumer Products LP  
NCR Corporation**

**For Submittal to:**

**Wisconsin Department of Natural Resources  
U.S. Environmental Protection Agency**

**Prepared by:**

**Tetra Tech EC, Inc.  
Anchor Environmental  
J. F. Brennan  
Boskalis Dolman**

**June 2008**

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## **1.0 INTRODUCTION**

Tetra Tech EC, Inc. (TtEC), has been contracted to perform the remediation of polychlorinated biphenyl (PCB)-contaminated sediments in the Lower Fox River, Operable Units (OUs) 2 through 5. Previous industrial and commercial operations along the Lower Fox River have resulted in the contamination of these sediments. The remediation activities proposed for these operable units will result in the disturbance of the contaminated sediments and may create the potential for airborne transport of contaminants and their subsequent inhalation by off-site members of the public.

This Community Health and Safety Plan (CHASP) describes the potential inhalation health and safety hazards that may impact the surrounding communities during the implementation of the remedial activities, and describes monitoring activities and mitigation/control measures to ensure the protection of the public during these activities. Each of the remedial activities was evaluated to determine if the identified hazards could potentially impact the community during implementation and if so, procedures or protective measures were identified to eliminate or mitigate these hazards.

### **1.1 SITE LOCATION, HISTORY, AND CURRENT CONDITIONS**

#### **1.1.1 Site Location**

The Fox River has 12 dams and has the highest concentration of pulp and paper mills in the world. During the 1950s and 1960s, these mills routinely used PCBs in their operations which, upon release or discharge, ultimately contaminated the river.

The project study area includes the Lower Fox River and Green Bay aquatic systems. Approximately 270,000 people live in the communities along the river. The Lower Fox River is located in northeastern Wisconsin within the eastern ridges and lowlands of the state. The Lower Fox River is defined as the 39-mile portion of the river, beginning at the outlet of Lake Winnebago and terminating at the mouth of the river into Green Bay, Lake Michigan. The river flows north and drains approximately 6,330 square miles, making it a primary tributary to Green Bay and a part of the Great Lakes System. Green Bay is a freshwater system approximately 120 miles long which drains into Lake Michigan, and is located on the state border between Wisconsin and Michigan along a northeast- to southwest-trending axis. The bay portion of the site includes all of Green Bay from the city of Green Bay to the point where Green Bay enters Lake Michigan. The site has been divided into five discrete OUs by the Wisconsin Department of Natural Resources (WDNR) and the United States Environmental Protection Agency (USEPA). The river and the bay operable units are:

- OU 1 – Little Lake Butte des Morts
- OU 2 – Appleton to Little Rapids
- OU 3 – Little Rapids to De Pere
- OU 4 – De Pere to Green Bay
- OU 5 – Green Bay

#### **1.1.2 Site History**

Historical discharges of PCBs from municipal, industrial, and agricultural sources in the Lower Fox River region have degraded sediment and water quality and adversely impacted the ecology

of the river and bay. PCBs in the Lower Fox River pose the major potential threat to human health and ecological receptors due to their tendency to absorb to sediments, persist in the environment, and bioaccumulate in aquatic organisms. Contaminated sediments acting as “sinks” for PCBs and other contaminants are also subject to physical and chemical processes that affect the overlying water column and adjoining water bodies in natural (uncontrolled) environments. For example, PCBs from sediment in the Lower Fox River are discharged into Green Bay at the mouth of the river through sediment transport and PCB dissolution in the water column.

## **1.2 PROPOSED REMEDIAL ACTIVITIES**

This CHASP has been developed to address potential public health concerns associated with implementing the 2008–2009 activities at the Lower Fox River. The 2008 activities are the upfront activities that must be completed prior to beginning dredging operations:

- Perform Phase I Environmental Site Assessment at the former Shell property;
- Site Preparation of former Shell property including:
  - Clearing and grading
  - Land surveying
  - Construction of haul roads
  - Installation of sheetpiling along the shoreline (approximately 1,500 linear feet)
  - Dredging on either side of the sheetpiling wall
  - Debris removal
  - Placement of clean fill and/or dredged sand suitable for reuse (as available) behind the sheetpiling wall
  - Mobilization and setup of temporary support trailers
  - Construction of personnel and equipment decontamination facilities
  - Preparation of site to allow for storage of materials and large pieces of equipment
  - Installation of perimeter fencing (6’ chainlink), signage, and gatehouse
- Construction of Sediment Processing Building, Support Facilities Building, Water Treatment Building, Maintenance and Storage Building, and Material Storage Covers
- Installation of the dewatering and water treatment facilities (The majority of the equipment will be installed in 2008; however, some long-lead time items will not be available until 2009)
- Establishing stockpile areas for processed sand, gravel, and for cover materials storage
- Layout and placement of the dredge lines and booster stations

A second up-river facility (at a location to be determined) will be established later in the project to provide cover materials storage and loading in that area of the river. The site selection process is currently progress. The same types of activities listed above are expected to be performed at this facility.

As the majority of Toxic Substances Control (TSCA) material is overlain by non-TSCA material in the area between the De Pere Dam and the former Shell property, it is anticipated that minimal TSCA dredging will be conducted in 2009. The 2009 activities include full-scale dredging operations in two areas:

- The first area is adjacent to the former Shell property. The 12” hydraulic dredge will be operated within a 6,000’ radius of the former Shell property, removing non-TSCA sediment without the need for booster pumps.

- The two 8” dredges will be deployed above the Little Rapids Dam in OU 2 in Area DD to dredge non-TSCA material. It is anticipated that these dredges will be capable of removing contaminated sediment from the area south of Booster Station 8 through Booster Station 5.

However, a small quantity of TSCA material will be removed in the immediate vicinity of the installed sheetpiling wall at the former Shell property. Contrary to the general sequencing of TSCA and non-TSCA sediment removal for the remainder of the project, this 2009 TSCA dredging will be conducted at the beginning of the season to allow the sheetpiling to be installed and fill operations behind the wall to begin. As this material will be dredged by the 12” dredge (while the two 8” dredges are still mobilizing to their location in OU 2), there will be no crossover between non-TSCA and TSCA material at the dewatering plant. The dredge, dewatering plant, and water treatment plant will be flushed clean prior to processing the non-TSCA material.

## **2.0 POTENTIAL PUBLIC HEALTH AND SAFETY HAZARDS**

### **2.1 AIR QUALITY**

Public air quality may be impacted by some of the remediation-related activities that will be performed on the Lower Fox River. Only those activities that actually disturb or involve the handling of significant quantities of the dry contaminated sediments are likely to pose a potential impact to public air quality. Pre-design activities (e.g., marine surveys, archaeological surveys, sample collection, and geotechnical investigations) will involve minimal disturbance or no contact with contaminated sediments, and therefore will not generate or release enough contaminated material to potentially pose a threat to the public via inhalation of airborne pollutants. Additionally, the preparation and construction of the former Shell property for site operations (i.e., support facilities, dewatering and water treatment operations, and material handling), the layout of the dredge area, capping, and long-term monitoring and maintenance activities will involve minimal disturbance or no contact with contaminated sediments. As such, these activities are not expected to pose a potential exposure concern with respect to the public. There is little or no potential for airborne dispersion of sediments using the proposed methods to dredge contaminated sediments, and therefore public exposure to PCBs resulting from this dredging does not pose a risk. The principal activities that will disturb large quantities of the contaminated sediments that may potentially lead to a public exposure to airborne pollutants are the dewatering operations and loading dewatered sediments into trucks for off-site disposal.

Air monitoring, application of engineering controls, and adherence to standard safety procedures will be used to protect nearby communities. In addition, a Site-Specific Health and Safety Plan will be developed that is tailored to the work to be performed that will address worker hazards and mitigation methods. Perimeter air monitoring requirements are discussed in Section 3.0. In addition to perimeter air monitoring, the following procedures will be implemented to reduce, if not eliminate, the potential for public exposure to contaminated media:

- The majority of dewatering and water treatment operations will be housed within enclosed buildings.
- Hydraulic dredging will eliminate the potential for generation of air pollution during transfer to the upland processing facility. In addition, this type of dredge minimizes safety impacts to public or project personnel as it does not require the use of underwater cables to advance.
- All contaminated sediment dredged from the site will be transferred via an enclosed pipeline.

### **2.2 NOISE**

As discussed in the BODR (Section 3.6.5), noise emanating from industrial operations and other activities is generally regulated at the local level. Noise is regulated in the City of Green Bay under City Code Chapter 27, Subchapter II, Section 27.201, Regulation of Noise. Brown County regulates noise under County Code Chapter 39, Section 39.01, Regulation of Noise. A review of these two ordinances indicates that the noise control requirements are essentially the same with set noise levels based on zoning and time of day with special exemptions for construction sites. Table 2-1 shows the residential, commercial, and industrial requirements for noise control during daytime and nighttime hours as specified by the City of Green Bay and Brown County Codes.

**Table 2-1. Maximum Permissible Sound Pressure Within and Between Zones**

Octave Band Center	Within Residential (dBA)		Within Commercial (dBA)		Within Industrial (dBA)		Industrial into Commercial (dBA)		Industrial into Residential (dBA)		Commercial into Residential (dBA)	
	7 AM to 10 PM Day	10 PM to 7 AM Night	7 AM to 10 PM Day	10 PM to 7 AM Night	7 AM to 10 PM Day	10 PM to 7 AM Night	7 AM to 10 PM Day	10 PM to 7 AM Night	7 AM to 10 PM Day	10 PM to 7 AM Night	7 AM to 10 PM Day	10 PM to 7 AM Night
31.5	70	69	80	72	86	81	80	75	79	74	75	72
63	69	68	79	71	85	80	79	74	78	73	74	71
125	64	62	73	66	80	75	74	69	73	68	69	65
250	58	54	65	60	75	70	69	64	67	63	64	57
500	52	48	59	54	69	64	63	58	61	57	58	51
1000	47	42	53	49	63	58	57	52	55	51	52	45
2000	42	36	47	44	58	53	52	47	50	46	47	39
4000	38	31	42	40	54	49	48	43	46	42	43	34
8000	35	29	40	37	51	46	45	40	43	39	40	32
A-Scale Levels	57	52	63	58	72	67	66	61	64	60	61	55

Dredging operations will generally be conducted 24 hours per day and 5 days per week (having the possibility of working 6 days per week). This work approach will minimize noise pollution on the weekends (i.e., Saturdays and Sundays) when most families are at home. However, nighttime operations could adversely impact residences along the river. Since dredging is a construction activity that is exempt from the noise regulations during the day but not at night or all day on Sunday (paragraph 7[a]), the nighttime residential limit of 52 dBA would apply at those locations.

To ensure that the noise levels do not exceed these limits during implementation of the site activities, several best management practices have been developed to reduce noise pollution:

- All dredge equipment will be equipped with hospital grade mufflers.
- All booster pumps will be equipped with a residential-grade silencer located in the self-contained unit.
- The majority of dewatering and water treatment operations will be housed within enclosed buildings that will limit noise levels outside the structures.

At the onset of full dredging activities, a noise survey will be conducted to determine the effectiveness of these measures and to identify any other areas or operations for which additional mitigation measures may be necessary.

**2.3 LIGHT**

The only site remediation activities anticipated to result in light pollution are dredging operations. Dredging operations will generally be conducted 24 hours per day and 5 days per week. A certain lighting standard is required to maintain worker and operational safety; however, the quantity of lights will be minimized to the greatest extent possible. Excessive lighting will not be permitted, and all lights will be consciously directed away from adjacent residential areas. In addition, when determining placement and direction of lights, site personnel also will consider the reflectivity of the light off the water.

## 2.4 NAVIGATION

The only site remediation activities anticipated to result in potential navigational impacts to the community on the Lower Fox River are the dredging operations. Dredging operations will generally be conducted 24 hours per day and 5 days per week (with the possibility of working 6 days per week). This work approach would allow for site personnel to be off the Fox River during peak times for recreational boaters (i.e., Saturdays and Sundays).

Marine facilities will be properly marked and secured to mitigate potential risks to the public from contact with pipelines, booster stations, and vessels. The dredge pipeline marking system to be implemented on the Lower Fox River was designed to allow for high visibility of dangerous areas on the river for the benefit of boaters operating at high speeds. The system will consist of a series of different colored waterway markers:

- Warning Buoys – white stick buoys with black and orange reflective markings stating “Danger Pipeline”
- Pipeline Delineators – orange delineators with reflective tape and an approximate 18” diameter
- Floating & Shoreline Signage – signs reading “Danger Pipeline” with reflective tape and mooring lights
- Designated Crossing Channel Buoys – navigational markers consisting of one red buoy and one green buoy with red and green blinking lights respectively

The warning buoys will be staggered at a distance of approximately 500 feet either side of the dredge pipeline to allow boaters sufficient time to slow down prior to striking the pipeline. Warning buoys will be spaced every 1,000 feet on the same side of the pipeline and every 500 feet when considering buoys on opposing sides. The pipeline delineators will be secured to the pipeline and spaced every 300 feet, providing warning to vessels that may be operating in close proximity to the dredge pipeline. Navigational markers will be placed to designate areas where the dredge pipeline has been securely anchored to the river bottom to provide for safe passage. Both the warning buoys and designated crossing channel buoys will be equipped with mooring lights to better identify the markers during low visibility periods.

## 2.5 OTHER

In addition to the potential public health and safety hazards identified above, the mitigation measures described below will also be implemented to protect the public from potential exposure during on-site activities.

### 2.5.1 Site Security

The onshore facilities (i.e., support facilities, dewatering and water treatment operations, and material handling) will include perimeter fencing and a manned gatehouse to restrict access and provide for public safety.

### 2.5.2 Spill Prevention When Transporting to Disposal Facility

Trucks will follow a one-way route or circuit through the facility to be loaded with dewatered sediment and debris. They will enter the former Shell property from State Street and enter the processing plant from the south end of the western side where they will be loaded. Once loaded, they will be processed through a decontamination pad where an automated spray will be used to remove loose material from the wheels. As necessary, a power washer will be used to wash the exterior of the loaded trucks. Lined trucks with secure covers will be used to minimize the

potential for loss of contaminated sediment into the air or by spillage onto public roads. All loaded trucks will be inspected prior to leaving the site to ensure that there is no gross contamination on the trucks. Trucks will exit on the north end of the facility back onto State Street. The second facility will be set up similar to the former Shell property facility; the trucks will access the site via a one-way route, once loaded will go through a decontamination pad, and will be inspected prior to exiting the site.

Once the trucks have left the site, the hauling company will be responsible for responding to and cleaning up any material released during transportation en route to the disposal facility. Prior to selecting waste hauling vendors, TtEC will require each vendor to provide information about their emergency response plan for spill cleanup. For haulers transporting DOT-regulated shipments of PCB-contaminated sediments or debris (i.e., loads containing equal to or more than 1 pound of PCBs), TtEC shall require the transporters to confirm that their company has prepared a DOT Hazardous Materials Security Plan.

### 3.0 PERIMETER AIR MONITORING OBJECTIVES

The purpose of the perimeter air monitoring is to ensure that members of the general public are not exposed to hazardous airborne contaminants originating from the site remediation activities at concentrations above the action levels provided in this CHASP. Perimeter air monitoring is designed to accomplish the following objectives:

- Protect human health from exposure to unacceptable risk levels of PCBs resulting from former site activities
- Minimize risk of community exposure to contaminants resulting from remediation work performed at the site
- Demonstrate compliance with applicable National Ambient Air Quality Standards (NAAQS)
- Determine the need for, and evaluate the effectiveness of, vapor and/or dust emission controls
- Monitor and document ambient air quality at project perimeter locations during remediation activities to prevent elevated off-site exposures
- Establish/foster community confidence that their health and safety is being protected
- Reduce potential liabilities due to remedial activities
- Evaluate the monitoring data to evaluate exposure risks at the project perimeter
- Verify real-time air monitoring data through the collection of confirmatory samples
- Complete a Perimeter Air Monitoring Report to document the results and evaluate the indicated level of exposure risk

### 3.1 PREVIOUS PERIMETER AIR MONITORING RESULTS

Air monitoring for PCBs and other constituents was conducted during a series of previous sediment dredging and material handling actions for the Fox River Project. These monitoring activities, as described in the BODR, were (in chronological order):

- **Deposit N Demonstration Project (1998–1999):** Real-time air monitoring was performed for particulates on all four sides of the on-shore treatment facility where mechanical presses were operated and sediment loading occurred. The monitoring results showed no exceedances of the particulate threshold of 96 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) that was established for this demonstration effort (Foth & Van Dyke, 2001).
- **SMU 56/57 Demonstration Project (1999):** Ambient air sampling for PCBs was conducted in 1999 at several locations both adjacent to and more distant from the sediment handling operations associated with this demonstration. Elevated concentrations of PCBs above baseline levels were primarily associated with the air monitoring stations that were within 250 feet of the sediment handling operations. Samples collected at monitoring stations located farther away from the sources indicated concentrations that approached the background level of PCBs in the regional ambient air. Three air monitoring stations also were located near the landfill area, at distances ranging from 840 to 1,240 feet from the active landfill site. All of the samples collected from the landfill-related monitoring stations had measured concentrations at or below background levels (WDNR, 2000). Based on these results, ambient air monitoring was not required during the follow-on SMU 56/57 actions in 2000.
- **OU 1 Dredging Project (2004):** Four ambient air monitoring stations were located around the sediment dewatering and load out pad, with the closest monitor having been placed

approximately 100 feet from the active operations. PCBs were not detected in the air at any of the stations (Foth & Van Dyke, 2005).

- **OU 1 Dredging Project (2005):** Four ambient air monitoring stations were located around the sediment dewatering and load out pad, with the closest monitor having been placed approximately 100 feet from the active operations. PCBs were not detected in the air at any of the stations (Foth & Van Dyke, 2006).
- **OU 1 Dredging Project (2006):** Four ambient air monitoring stations were located around the sediment dewatering and load out pad, with the closest monitor having been placed approximately 100 feet from the active operations. PCBs were not detected in the air at any of the stations (Foth, 2007).
- **OU 1 Dredging Project (2007):** Four ambient air monitoring stations were located around the sediment dewatering and load out pad, with the closest monitor having been placed approximately 100 feet from the active operations. Concentrations of PCBs in the air ranging from 0.0007 to 0.0012  $\mu\text{g}/\text{m}^3$  were detected. The values detected during 2007 were well below the 12  $\mu\text{g}/\text{m}^3$  24-hour average standard listed in WDNR NR 445.07. (*Note: These results are currently DRAFT and preliminary. These data have not undergone QA procedures and should not be viewed as final.*)
- **Phase 1 (OU 4A) Dredging Project (2007):** Four high-volume air samplers were located adjacent to the sediment dewatering and load out pad. The exact positions of these units were determined based on the location of residential receptors, site topography, site operations, and prevailing wind directions. Concentrations of PCBs in the air ranging from 0.0002 to 0.0236  $\mu\text{g}/\text{m}^3$  were detected. The values were, again, well below the 24-hour average standard listed in WDNR NR 445.07 of 12  $\mu\text{g}/\text{m}^3$ . (*Note: These results are currently DRAFT and preliminary. These data have not undergone QA procedures and should not be viewed as final.*)

This prior sampling provides a solid foundation for establishing the air quality monitoring strategy and air monitoring program OUs 2 through 5. Using this information, TtEC has developed preliminary air monitoring action levels (see Section 4.0) and a process to ensure the surrounding community is protected from both the short term day-to-day exposures to air emissions and the lower level exposures that may occur over the longer duration of the remediation (see Section 5.0).

## **4.0 TARGET PARAMETERS AND PRELIMINARY ACTION LEVELS**

This section describes the conceptual model for how members of the public may be exposed to the target parameter contaminants in the sediment that may be emitted during remediation activities and identifies how site-specific air monitoring preliminary action levels were developed to ensure the protection of the public from these emissions. In addition, a tiered set of responses is described for managing and controlling remediation emissions and public exposure. The immediacy and scope of the responses were specified to be in proportion to the indicated immediacy and level of health threat to the public. These preliminary action levels will be refined, as needed, over the course of the remediation as new information or new circumstances come to light.

### **4.1 TARGET PARAMETERS**

The primary chemical of concern identified in the Record of Decision (ROD) for the sediments in OUs 2 through 5 is PCBs. PCB remediation goals have been established in terms of Total PCBs, as measured by the sum of the detected Aroclors (EPA/WDNR, 2007). The PCBs present in the sediments have been identified as the relatively more highly chlorinated Aroclors (primarily the very low volatility Aroclors 1242 and 1254 based on the data collected for the Final BODR). As such, the potential off-site inhalation exposures to the public that would be of potential concern would be due to PCBs associated with sediment-related dust or particulates. The RODs for these OUs have also identified arsenic, lead, and mercury as metals of potential concern (Shaw, 2006 – Table 3-7). The Final Baseline Human Health and Ecological Risk Assessment (RETEC, 2002) indicated that the arsenic measured in the sediments was present at levels that were consistent with background levels. As such, action levels for metals were only needed for the monitoring of lead and mercury.

### **4.2 CONCEPTUAL EXPOSURE MODEL**

#### **4.2.1 Mechanism of Contaminant Transport**

Wind-borne dust is the primary transport pathway of concern with regards to potential inhalation exposure hazards to the public relative to the planned sediment dredging, capping, and processing activities associated with the remediation plans for OUs 2 through 5. The sediment handling and processing activities to be performed include de-sanding, dewatering and shipment for disposal, and the treatment of the water extracted from the sediments. These sediment management processes could generate small quantities of fugitive dust from the sediment material as it dries and is handled. These processes will be monitored and controlled to prevent or limit the amount of dust that is generated and the amount that could be carried off-site by the wind to public areas. At various times, these operations may be performed relatively close to locations where public exposure is possible and probable. These areas could be the location of residences, or commercial or industrial facilities (depending on the exact location and phase of the remedial activity being performed). Off-site residences represent the public areas where the greatest potential exposure could occur (in terms of the frequency and duration of the potential exposure), and where the most susceptible members of the public (i.e., the very young or old, or the infirm) may be present.

#### **4.2.2 Duration of Exposure**

The nature of the exposure at an off-site public location can be:

- Sub-chronic, or shorter-term, (typically occurring for a few months or a year), or
- Chronic, or longer-term, (typically occurring for several years).

This depends on whether the location of the exposure point is close to a remedial operation that is only active and acting as a source of emissions to the air for a short period of time (e.g., a location of spot dredging action) or a remedial operation that is active and acting as a source of emissions to the air for the majority of the project duration (e.g., a de-sanding or dewatering facility). Very short-term, or acute exposures (typically on the order of a few minutes or hours) are not typically a public protection concern for these identified target parameters since:

1. Adverse health effects from the inhalation of these constituents are associated with much higher concentrations than are reasonably generated in an open air setting by remediation-related dust emissions; and
2. Natural atmospheric dispersion and particulate settling (by gravity, rain, or through contact with buildings and structures) prevent high dust concentrations from persisting in the ambient air.

### 4.2.3 Exposure Point Concentrations

The exposure point concentration of a remediation-related chemical in the air at an off-site location where a member of the public may inhale it is conceptually made up of two components:

1. The concentration of that chemical that is typically present in the outdoor air that is unrelated to the remediation activities (i.e., the baseline ambient air concentration or “background”); and
2. The concentration of that chemical that is present due to the transport and dispersion of dust from the remediation operations.

These two components may be represented mathematically as:

$$C_{iExpPoint} = (C_{iBaseline} + C_{iRemediation}) \quad \text{Eqn. 4-1}$$

Where:

- |                    |   |  |
|--------------------|---|--|
| $C_{iExpPoint}$    | = | The total concentration of chemical of concern “i” at a potential public exposure point location;  |
| $C_{iBaseline}$    | = | The baseline or background concentration of chemical of concern “i” in the ambient air due to sources unrelated to the remediation activities; and |
| $C_{iRemediation}$ | = | The concentration of chemical of concern “i” in the ambient air due to emissions from the remediation activities.                                  |

To be protective of the public, the total ambient concentrations of the chemicals highlighted in the RODs for potential health hazards must be kept below an appropriate risk-based concentration threshold at the point of exposure. These thresholds may be chemical-specific concentration limits (e.g., specifically for PCBs or mercury) that are established to prevent non-cancer health endpoints to members of the public or potential cancer endpoints due to prolonged inhalation. These thresholds also may be concentration limits on total dust or particulates that are established to be protective of a number of constituents of the dust, assuming these are present in the dust in proportion to their presence in the sediment itself. Risk-based concentration thresholds ( $C_{iRiskThreshold}$ ) would be established for either chronic exposure ( $C_{iRiskThresholdChronic}$ ) or sub-chronic exposure ( $C_{iRiskThresholdSub-Chronic}$ ), depending on the exposure characteristics of the public areas and the planned duration of the remediation activities in that area.

This approach to limiting the airborne concentrations is represented mathematically as:

$$C_{iExpPoint} < C_{iRiskThreshold} \quad \text{Eqn. 4-2}$$

Substituting in the earlier relationship from Equation 4-1:

$$(C_{iBaseline} + C_{iRemediation}) < C_{iRiskThreshold} \quad \text{Eqn. 4-3}$$

As can be seen, the concentration of chemical of concern “i” in the ambient air at the potential exposure point due to the remediation activities must be limited to the difference between the appropriate risk-based concentration threshold and the baseline or background concentration:

$$C_{iRemediation} < ( C_{iRiskThreshold} - C_{iBaseline} ) \quad \text{Eqn. 4-4}$$

For chronic or longer-term exposures, the contribution to the exposure point concentration for the remediation source should be limited to:

$$C_{iRemediationChronic} < ( C_{iRiskThresholdChronic} - C_{iBaseline} ) \quad \text{Eqn. 4-5}$$

For sub-chronic or somewhat shorter-term exposures, the contribution to the exposure point concentration for the remediation source should be limited to:

$$C_{iRemediationSub-Chronic} < ( C_{iRiskThresholdSub-Chronic} - C_{iBaseline} ) \quad \text{Eqn. 4-6}$$

#### 4.2.4 Monitoring Station Concentrations

As it would be intrusive to the public and prohibitive on many levels to attempt to monitor all potential public exposure points, monitoring stations will be established at selected locations near the remediation operations that are indicated to be the greatest potential sources of dust emissions. These monitoring stations will be located close to the boundary of the nearest down-wind off-site areas with identified public exposure points.

If the monitoring station is located relatively close to the potential public exposure point, little change in the airborne concentration of the sediment-related dust or its constituent chemicals would be expected to occur between the monitoring station and the potential public exposure point. Whereas, if the potential public exposure point is located relatively farther down-wind from the monitoring station, some reduction in the airborne concentration would be expected between the monitoring station and the exposure point due to dispersion and particulate scavenging. This relationship was tested as part of the SMU 56/57 Demonstration Project Air Monitoring (WDNR, 1999 – Table EV-3). The monitoring results, shown in Table 4-1, showed a relatively rapid drop-off in the measured PCB concentrations in air with distance from the remediation sources.

**Table 4-1.** Measured Reduction in PCB Airborne Concentration with Distance from the Remediation-Related Emission Source from the SMU 56/57 Demonstration Project Air Monitoring

72-Hour Average PCB Concentration	Distance	Distance
(ng/m <sup>3</sup> )	(km)	(m)
14.8	0.00	0.00
4.20	0.14	140
10.1	0.20	200
1.70	0.29	290
0.60	0.29	290
~0.45 (half of SQL)	0.63	630
0.60	0.65	650
0.50	0.74	740
0.10 (estimated)	0.80	800
0.40	0.91	910
0.2 (estimated)	0.98	980
0.30	1.07	1,070
0.2 (estimated)	1.14	1,140
0.30	1.24	1,240
0.2 (estimated)	1.34	1,340
0.2 (estimated)	1.92	1,920
0.3 (estimated)	1.98	1,980
0.2 (estimated)	2.01	2,010
0.1 (estimated)	2.75	2,750
0.2 (estimated)	3.72	3,720

This concentration reduction data reflected a rapid reduction in concentration with distance from the source out to a distance of about 0.6 km (600 m or 1,970 ft) to 0.7 km (700 m or 2,300 ft), followed by little additional reduction in concentration for greater distances. This data was fit to an equation of the form:

$$C_{\text{Distance}} = [ 1 / ( \beta \times \text{Distance} ) ] \quad \text{Eqn. 4-7}$$

using a reciprocal transformation with no intercept. The value of the parameter  $\beta$  was found to be 2.62. The R Square value for this regression was 0.73, indicating a reasonably good fit to the data.

This relationship was then divided by the concentration of PCBs that was measured at the source during this monitoring (i.e., 14.8 ng/m<sup>3</sup>):

$$C_{\text{Distance}} / C_{\text{Source}} = [ 1 / ( C_{\text{Source}} \times ( \beta \times \text{Distance} ) ) ] \quad \text{Eqn. 4-8}$$

The ratio of  $C_{\text{Distance}} / C_{\text{Source}}$  can be re-interpreted as  $C_{i_{\text{RemediationExposurePoint}}} / C_{i_{\text{RemediationSource}}}$  and defined as a Dispersion Reduction Fraction (DRF):

Where:

- DRF = The Dispersion Reduction Fraction which equals  $C_{i\text{RemediationExposurePoint}} / C_{i\text{RemediationSource}}$ ;
- $C_{i\text{RemediationExposurePoint}}$  = The concentration of the chemical of concern “i” in the air at a potential public exposure point located at some distance “Distance” down-wind of the remediation source;
- $C_{i\text{RemediationSource}}$  = The concentration of the chemical of concern “i” in the air in the immediate proximity of the remediation source;
- Distance = The distance in the down-wind direction between the remediation source area and the potential public exposure location.

The regression results for the 72-hour average PCB monitoring data were used to quantify the relationship of Equation 4-8:

$$DRF_{72\text{-hour}} = [ 1 / ( 14.8 \times 2.62 \times \text{Distance} ) ] \quad \text{Eqn. 4-9}$$

or

$$DRF_{72\text{-hour}} = [ 1 / ( 38.8 \times \text{Distance} ) ] \quad \text{Eqn. 4-10}$$

This results in the following representative values of DRF72-hour for relatively short distances (< 0.30 km or 300 m):

**Table 4-2.** Values of the Dispersion Reduction Fraction for a Range of Distances Between the Remediation Source and the Potential Public Exposure Point

Distance (km)	Distance (feet)	DRF <sub>72-hour</sub>
0.05	164	0.52
0.10	328	0.26
0.25	820	0.10
0.30	984	0.086

There is some uncertainty associated with the DRF since it is based on limited sampling data relative to a past operation with relatively little variation in operational and meteorological conditions. Under long-term operations, a wider range of emissions and transport behavior may be expected due to more extreme weather and operational differences that could result in a somewhat different concentration reduction relationship.

Using this DRF relationship and the assumption that the monitoring station is located near the remediation source, the concentration of PCBs or dust measured at a monitoring station may be used to estimate the exposure point concentration component due to that remediation source at a down-wind location some distance away. This may be represented mathematically as:

$$C_{i\text{RemediationExpPoint}} / C_{i\text{MonitoringStation}} = DRF \quad \text{Eqn. 4-11}$$

$$C_{i\text{MonitoringStation}} = C_{i\text{RemediationExpPoint}} / DRF \quad \text{Eqn. 4-12}$$

$$C_{i\text{MonitoringStation}} = C_{i\text{RemediationSource}} = C_{i\text{RemediationExposurePoint}} / DRF \quad \text{Eqn. 4-13}$$

If the appropriate risk-based concentration threshold at the point of exposure reduced by the local baseline concentration is used as the exposure point concentration limit, the monitoring station limit to ensure protectiveness becomes:

$$C_{i\text{MonitoringStationMAX}} = C_{i\text{RemediationSourceMAX}} = ( C_{i\text{RiskThreshold}} - C_{i\text{Baseline}} ) / \text{DRF} \quad \text{Eqn. 4-14}$$

As can be seen, a monitoring station concentration limit may be identified which is linked to a specified risk-based ambient air concentration and which considers the duration of exposure, the local background levels, and the spatial relationship between the source area and the potentially exposed member of the public. These monitoring station concentration limits can then be used to develop site-specific, tailored air monitoring station action levels.

### 4.3 DEVELOPMENT OF RISK-BASED MONITORING STATION CONCENTRATION LIMITS

The sequential quantitative development process described in Equations 4-1 through 4-14 above was applied in step-wise fashion to develop risk-based monitoring station concentration limits for the target parameters. This process is summarized below.

#### 4.3.1 Ambient Air Risk Thresholds [ $C_{i\text{RiskThreshold}}$ ]

A number of federal and state regulatory agencies publish chemical-specific ambient air concentrations that are calculated to be protective of members of the public in a particular exposure setting assuming exposure parameters linked to that setting. These threshold concentrations assume a target excess cancer risk limit or non-cancer hazard threshold (depending on the type of health effects associated with inhalation exposure to the particular chemical) and the inhalation toxicity (i.e., dose-response) information. The published threshold concentration values are most often calculated to apply to residential or industrial exposures, both of which could be applicable public exposures for this project. Residential threshold concentrations are generally more stringent than the industrial threshold concentrations as they tend to assume more hours of exposure each day, more years of exposure per person, and exposure to younger children (and not just adults).

The WDNR has not published such thresholds. However, concentrations published by other agencies and values adopted previously for past remedial actions for the Fox River Project were considered to be applicable to the development of action levels for the Community Protection Plan.

The USEPA Region 6 Human Health Medium-Specific Screening Levels for Ambient Air (last updated on 3/8/08) were derived to apply to chronic, continuous residential exposure and a target excess lifetime cancer risk level of  $1 \times 10^{-6}$  for carcinogens (e.g., PCBs) or a target hazard threshold of 1 for non-carcinogens (e.g., mercury). The values presented in Table 4-3 were published by USEPA Region 6 for the residential and industrial exposure settings for the target parameters, or were calculated for these exposure settings for the target parameters using the same USEPA Region 6 relationships with alternate exposure parameters (USEPA, 2007, 2008):

**Table 4-3.** Calculated Risk-Based Ambient Air Concentrations for the Target Parameters for Various Public Concentrations for the Target Parameters

(Reflecting a target excess lifetime cancer risk level of $1 \times 10^{-6}$ for carcinogens or a target hazard threshold of 1 for non-carcinogens)							
	MSL Value	MSL Value	Receptor Type	Exposure Setting	Exposure Frequency	Exposure Duration	Basis of Assumed Toxicology
	( $\mu\text{g}/\text{m}^3$ )	( $\text{ng}/\text{m}^3$ )	---	---	(days/year)	(years)	---
PCBs	0.0034	3.4	Child/ Adult	Residential / Chronic	350	30	Aroclor 1254
PCBs	0.0043	4.3	Adult	Residential / Chronic	350	30	Aroclor 1254
PCBs	0.0072	7.2	Adult	Industrial / Chronic	250	25	Aroclor 1254
PCBs	0.055	55	Child	Residential / Sub-Chronic	350	1	Aroclor 1254
PCBs	0.13	130	Adult	Residential / Sub-Chronic	350	1	Aroclor 1254
Mercury	0.47	470	Child	Residential	350	1	Mercury and Compounds
Mercury	1.1	1100	Adult	Residential	350	30	Mercury and Compounds
Mercury	1.5	1500	Adult	Industrial	250	25	Mercury and Compounds
Lead	No values calculated due to lack of toxicity values – See below						

For PCBs, the toxicity values appropriate for Aroclor 1242 and 1254 were used in the risk-based calculations. In addition, it should be noted that the “Ambient Level of Concern” that was established for the SMU 56/57 Demonstration Project Air Monitoring was  $100 \text{ ng}/\text{m}^3$  (WDNR, 1999 – Page 50). This Ambient Level of Concern was reported to have been established for the public relative to a target excess cancer risk goal of  $1 \times 10^{-5}$ . This value can be seen to be approximately the risk-based sub-chronic concentration calculated for the child and adult residents for a more stringent target risk goal of  $1 \times 10^{-6}$ . For consistency, the same Ambient Level of Concern was adopted as the  $C_{\text{RiskThreshold}}$  for PCBs for use in developing the action levels for monitoring the level of PCBs to which the public may be exposed during the period of the anticipated remediation operations.

In order to be protective for potential inhalation exposures to mercury by both a child and adult resident in the public or an industrial worker, the lowest risk-based concentration calculated for the three potentially exposed groups (i.e.,  $470 \text{ ng}/\text{m}^3$ ) was adopted as the  $C_{\text{RiskThreshold}}$  for inorganic mercury compounds for use in developing the action levels. This value was adopted as the  $C_{\text{RiskThreshold}}$  for mercury for use in developing the action for monitoring the level of total dust to which the public may be exposed.

The risks due to exposure to lead are not calculated using the exposure x toxicity approach, but instead are calculated using biokinetic models that project the dispersion of lead taken into the body via various routes to the various organs and systems within the body. As such, developing an estimate of the airborne concentration of lead that may be inhaled under various exposure scenarios is much less straight-forward than was done above for PCBs and mercury. An appropriate indicator

of this threshold level for lead is the Quarterly Average NAAQS of  $1.5 \mu\text{g}/\text{m}^3$ , or  $1,500 \text{ ng}/\text{m}^3$  of lead. This value was adopted as the  $C_{\text{RiskThreshold}}$  for lead for use in developing the action levels for monitoring the level of lead to which the public may be exposed.

#### 4.3.2 Ambient Air Background Concentrations [ $C_{\text{Baseline}}$ ]

Background levels of PCBs in the ambient air were measured as part of the SMU 56/57 Demonstration Project Air Monitoring Program (WDNR, 1999 – Page 50). The measured values ranged from  $0.3$  to  $1.6 \text{ ng}/\text{m}^3$ . The highest PCBs reading from the WUATM monitoring station in Green Bay over the period 1991 to the present (WDNR, 1999 – Page 29) was  $2.1 \text{ ng}/\text{m}^3$ . The average value for the SMU 56/57 Demonstration Project Air Monitoring,  $0.95 \text{ ng}/\text{m}^3$ , was adopted as the  $C_{\text{Baseline}}$  for PCBs for use in developing the action levels for total dust.

No site-specific measurement results were available for the background concentrations of mercury or lead in the absence of the remediation operations. Characteristic background levels were identified in the Agency for Toxic Substances & Disease Registry (ATSDR) Toxicological Profiles for Mercury and Lead. ATSDR reports ambient air concentrations of mercury to average between  $10$  and  $20 \text{ ng}/\text{m}^3$ , with the higher concentrations being associated with industrialized areas (ATSDR, 1999). Concentrations of mercury over lakes in Wisconsin averaged  $2 \text{ ng}/\text{m}^3$  (ATSDR, 1999). ATSDR reports ambient air concentrations of lead of approximately  $1$  to  $2 \text{ ng}/\text{m}^3$  in U.S. National Parks in the 1980s (ATSDR, 2007a). Over the years, ambient air lead levels have fallen due to the reduction of lead emissions from gasoline. A more recent national average lead concentration was reported as  $40 \text{ ng}/\text{m}^3$  (ATSDR, 2007a). Consequently, it was assumed at this time that the background concentrations of mercury and lead in the ambient air were  $2 \text{ ng}/\text{m}^3$  and  $40 \text{ ng}/\text{m}^3$ , respectively, for purposes of developing the action levels for total dust for this phase of the project.

#### 4.3.3 Ambient Air Concentration Contributions of the Target Parameters at the Exposure Point from Remediation [ $C_{\text{Remediation}}$ ]

The maximum allowable concentration of a chemical of concern “i” in the ambient air at the public exposure point due to the remediation activities was seen to be given in Equation 4-4 by:

$$C_{\text{RemediationExposurePoint}} < ( C_{\text{RiskThreshold}} - C_{\text{Baseline}} ) \quad \text{Eqn. 4-4}$$

Using the values identified in Sections 4.3.1 and 4.3.2, the values of  $C_{\text{RemediationExposurePoint}}$  reflecting sub-chronic public exposures can be calculated for the target parameters:

$$C_{\text{RemediationExposurePoint for PCBs}} < ( C_{\text{PCBsRiskThreshold}} - C_{\text{PCBsBaseline}} ) = (100 - 0.95) \text{ ng}/\text{m}^3 = 99 \text{ ng}/\text{m}^3$$

$$C_{\text{RemediationExposurePoint for Mercury}} < ( C_{\text{HgRiskThreshold}} - C_{\text{HgBaseline}} ) = (470 - 2.0) \text{ ng}/\text{m}^3 = 468 \text{ ng}/\text{m}^3$$

$$C_{\text{RemediationExposurePoint for Lead}} < ( C_{\text{LeadRiskThreshold}} - C_{\text{LeadBaseline}} ) = (1,500 - 40) \text{ ng}/\text{m}^3 = 1,460 \text{ ng}/\text{m}^3$$

#### 4.3.4 Ambient Air Concentrations of Total Dust at the Exposure Point from Remediation [ $C_{\text{DustRemediation}}$ ]

If one knows or can assume that the dust at an exposure point came from a remediation operation and that the composition of the dust matches the composition of the sediment being handled or processed at that location, an ambient air concentration of a chemical of concern can be converted into an equivalent total dust concentration. This may be expressed as:

$$C_{\text{RemediationExposurePoint for Dust}} = C_{\text{RemediationExposurePoint}} / C_{\text{Sediment}} \quad \text{Eqn. 4-15}$$

This relationship assumes that the distribution of PCBs or the other target parameters is the same in the sediment as in the airborne dust. The strength of this assumption depends on the sizes of the dust particles that the target parameters are associated with and the size of the particles that are emitted and are transported from the remediation operations.

The Final Baseline Human Health and Ecological Risk Assessment (RETEC, 2002) summarized the overall sediment quality data for a number of chemical constituents as shown in Table 4-4.

**Table 4-4.** Summary of the Average Sediment Concentrations of the Target Parameters in Operable Units 2 through 4

Target Parameter	Average Concentration in the Sediment (mg/kg)
PCBs	500
Mercury	1.84
Lead	121.7

Combining the results from the Equation 4-4 calculations with these average sediment concentrations yields the following corresponding total dust limits at the exposure point:

$$\begin{aligned} C_{\text{RemediationExposurePoint for Dust (PCBs)}} &= (99 \text{ ngPCBs/m}^3 \text{ air} \times 1,000 \text{ } \mu\text{g/mg}) / (500 \text{ mgPCBs/kgDust}) \\ &= 200 \text{ } \mu\text{g/m}^3 \text{ of total dust} \end{aligned}$$

$$\begin{aligned} C_{\text{RemediationExposurePoint for Dust (Hg)}} &= (468 \text{ ngHg/m}^3 \text{ air} \times 1,000 \text{ } \mu\text{g/mg}) / (1.84 \text{ mgHg/kgDust}) \\ &= 250,000 \text{ } \mu\text{g/m}^3 \text{ of total dust} \end{aligned}$$

$$\begin{aligned} C_{\text{RemediationExposurePoint for Dust (Lead)}} &= (1,460 \text{ ngLead/m}^3 \text{ air} \times 1,000 \text{ } \mu\text{g/mg}) / (121.7 \text{ mgLead/kgDust}) \\ &= 12,000 \text{ } \mu\text{g/m}^3 \text{ of total dust} \end{aligned}$$

The lowest total dust concentration calculated is seen to be 200  $\mu\text{g/m}^3$  of total dust based on the noted average PCB content of the sediment. Should remediation operations be conducted in areas with a characteristic sediment PCB concentration, the total dust limit should be adjusted accordingly.

#### 4.3.5 Ambient Air Concentration Contributions of the Target Parameters and Total Dust at the Monitoring Station from Remediation [ $C_{\text{MonitoringStation}}$ ]

Applying Equation 4-13 would allow a maximum concentration at the monitoring station to be calculated that would be linked to the nearest down-wind public exposure point through the identified site-specific transport and dispersion measurements.

$$C_{\text{MonitoringStation}} = C_{\text{RemediationExposurePoint}} / \text{DRF} \quad \text{Eqn. 4-13}$$

As the locations of the monitoring stations have not yet been identified relative to the closest potential points of public exposure, the effect of the distance between the remediation source and the potential public receptors was addressed parametrically as shown in Table 4-5.

**Table 4-5.** Application of the Dispersion Reduction Fraction to Translate Exposure Point Concentration Limits into Monitoring Station Concentration Limits

	$C_{i\text{MonitoringStation}}$			$C_{\text{TotalDustMonitoringStation}}$		
	PCBs (ng/m <sup>3</sup> )	Mercury (ng/m <sup>3</sup> )	Lead (ng/m <sup>3</sup> )	Based on PCBs (µg/m <sup>3</sup> )	Based on Mercury (µg/m <sup>3</sup> )	Based on Lead (µg/m <sup>3</sup> )
DRF <sub>72-hour</sub> = 1 (Dist = 0 ft)	99	468	1,460	200	250,000	12,000
DRF <sub>72-hour</sub> = 0.85 (Dist = 100 ft)	120	550	1,700	240	290,000	14,000
DRF <sub>72-hour</sub> = 0.17 (Dist = 500 ft)	580	2,800	8,600	1,200	1,500,000	71,000

Actual distances from the remediation source to probable public exposure points (and the associated DRFs) should be applied when these locations have been established. This development indicates that the total dust monitoring station concentration limit would be protective with respect to all of the target parameters if the back-calculated values associated with PCBs (i.e., 200 ng/m<sup>3</sup> for a DRF = 1) are used. Once again, when remediation operations will be conducted in areas that are characterized by a sediment PCB concentration that is different than that assumed above, the total dust monitoring station concentration limit should be adjusted accordingly.

#### 4.3.6 Ambient Air Concentration Limits at the Monitoring Station That Are Protective for Shorter Duration Remediation Operations

The monitoring station concentration limits developed above represent average risk-based concentration limits associated with chronic or sub-chronic exposure (on the order of one or more years). As such, exposure to these levels of PCBs in the air for a period of days or weeks would be associated with much lower levels of risk.

Shorter duration (acute) exposures to relatively low airborne concentrations of the target parameters have not been linked to significant adverse health effects. As such, very little information is available with respect to establishing a public health-protective exposure point concentration for a carcinogenic substance like PCBs for exposure durations much less than a lifetime. For many chemicals, shorter duration exposures have been shown to translate into higher concentration limits if a constant target level of risk is specified.

A quantitative definitive confirmation of this generality cannot currently be developed with the available studies for the target parameters. However, an indication of the scale of this relationship may be seen by examining the set of Minimal Risk Levels (MRLs) published by the ATSDR for PCBs (ATSDR, 2007b):

- With respect to oral exposures to Aroclor 1254, the Intermediate MRL (associated with exposure durations between 14 days and 1 year) was 50 percent higher than the Chronic MRL (associated with exposure durations greater than 1 year). Acute MRLs are applicable to exposure durations less than 14 days. A comparatively higher MRL indicates that a higher level of exposure is required to lead to adverse health effects than for the case of a lower MDL.

- No inhalation-based MRLs are listed for PCBs.
- An examination of all of the ATSDR chemicals that had multiple exposure duration inhalation-related MRLs led to the identification of the following ratios: Acute to Intermediate MRLs, Intermediate to Chronic MRLs, and composite Acute to Chronic MRLs (as shown in Table 4-6).

**Table 4-6.** Ratios of the Acute, Intermediate and Chronic ATSDR Minimum Risk Levels

Chemical	Ratio of Acute MRL to Intermediate MRL	Ratio of Intermediate MRL to Chronic MRL	Ratio of Acute MRL to Chronic MRL
Acetone	2	1	2
Acrolein	75	-	-
Ammonia	-	-	17
Benzene	1.5	2	3
Bromomethane	1	10	10
Carbon Tetrachloride	-	1	-
Chlordane	-	10	-
Chlorine	35	40	1400
Chloroform	2	3	6
Chloromethane	2.5	4	10
1,4-Dichlorobenzene	10	20	200
Dichlorvos	6.7	5	33
Disulfoton	30	-	-
Ethylbenzene	14	2.3	32
Formaldehyde	1.3	3.7	4.8
Guthion	2	1	2
Hexachloropentadiene	-	50	-
Hexachloroethane	1	-	-
Hexamethylene Diisocyanate	-	3	-
Malathion	10	-	-
MTBE	2.8	1	2.8
Methylene Chloride	2	1	2
Nickel		2.2	
Propylene Glycol Dinitrate	75	1	75
Sulfur Mustard	35	-	-
Tetrachloroethylene	-	-	5
Titanium Tetrachloride	-	100	-
Toluene	-	-	12
TCE	20	-	-
Uranium Salts	-	1.3	-
Vinyl Chloride	16	-	-
Xylenes	3.3	12	40
1,1,1-TCA	2.8	-	-
1,2-Dichloroethene (trans)	1	-	-
1,2-Dichloropropane	7.1	-	-
1,3-Dichloropropene	-	1.1	-
1,4-Dioxane	2	1	2
2-Butoxyethanol	2	15	30
Average	13.4	11.6	92.9

It can be seen that the average chemical-specific ratio of the Acute MRL to the Intermediate MRL and the chemical-specific ratio of the Intermediate MRL to the Chronic MRL is approximately 10 in consideration of all of the listed chemicals with inhalation-related MRLs. It also can be seen that

the average chemical-specific ratio of the Acute MRL to the Chronic MRL was slightly less than 100 in consideration of all of the listed chemicals with inhalation-related MRLs. Only three metals were represented in Table 4-6, and they had highly variable chemical-specific ratios of their Intermediate MRL to their Chronic MRL. While not conclusive, this evaluation would support the assumption that an airborne concentration that is protective of intermediate duration exposures (e.g., over weeks and months) may well be up to an order of magnitude higher than an airborne concentration that is protective of chronic or sub-chronic exposures. Airborne levels for public protection during acute exposures (< 2 weeks) would be expected to be even higher.

Base on this evaluation, the previously calculated risk-based monitoring station concentration limits may be increased by a factor of 10 and still be protective of the public for short to intermediate duration operations on the order of a month or less. A factor of 10 also matches the safety factor that is commonly used to extrapolate from chronic to acute toxicity values. This factor of 10 is reflected in the action levels presented in Table 4-7.

**Table 4-7.** Action Levels for Short to Intermediate Duration Remediation Operations to Be Applied at Monitoring Stations

	PCBs ( $\mu\text{g}/\text{m}^3$ )	Mercury ( $\mu\text{g}/\text{m}^3$ )	Lead ( $\mu\text{g}/\text{m}^3$ )	Total Dust (Based on PCBs) ( $\text{mg}/\text{m}^3$ )	Based on Mercury ( $\text{mg}/\text{m}^3$ )	Based on Lead ( $\text{mg}/\text{m}^3$ )
DRF <sub>72-hour</sub> = 1 (Dist = 0 ft)	1.0	4.7	15	2.0	2,500	120
DRF <sub>72-hour</sub> = 0.85 (Dist = 100 ft)	1.2	5.5	17	2.4	2,900	140
DRF <sub>72-hour</sub> = 0.17 (Dist = 500 ft)	5.8	28	86	12	15,000	710

Time trends in the monitoring results also can be used to calculate and evaluate the level of long-term or chronic risk to members of the public. The tracking of cumulative risk would typically show that occasional exceedances of the action limits does not result in a chronic risk problem and provide the information needed to address and community or regulatory concerns.

#### 4.4 TIERED RESPONSES TO MONITORING RESULTS

The calculated distance-dependent, risk-based monitoring station action levels were calculated to be applicable to nearly continuous public exposure for a period of up to approximately a year. They represent the average concentration of PCBs that would be linked to the target cancer risk level or target hazard threshold if a member of the public inhaled air with that concentration nearly continuously throughout the exposure period. As such, these action limits should be viewed as the average target concentrations to be maintained to ensure protectiveness of the public. Short duration excursions of the measured airborne concentrations above these action levels should not be viewed as an immediate or an imminent health risk. Comparisons of the measured PCB and total dust concentrations at the monitoring stations to these action levels should guide ongoing site operations and maintain public protectiveness.

Emissions of particulate dust (containing PCBs and possibly other constituents) from remedial operations will fluctuate over time. It is likely that emissions may drop to very low levels during some intervals, and remediation activities may generate greater emissions for short periods of time on other occasions. In recognition of this variability and the fact that the calculated risk-based

concentrations should be viewed as average target concentrations to be maintained, the response matrix presented in Table 4-8 was established.

**Table 4-8.** Recommended Responses to Comparisons of Monitoring Station Results to the Identified Action Levels

Monitored Result for PCBs or Total Dust	Appropriate Monitoring Time Period	Recommended Response If Action Level Is Exceeded Over the Specified Monitoring Time Period
< Action Level	Single 72-Hour Average Measurement	<ul style="list-style-type: none"> <li>▪ Continue to monitor</li> <li>▪ Document actions and findings</li> </ul>
Action Level to 2 x Action Level	Single 72-Hour Average Measurement	<ul style="list-style-type: none"> <li>▪ Implement first tier of contingency plan to reduce emissions and maintain public protectiveness, including:               <ul style="list-style-type: none"> <li>- Evaluate operations for that monitoring time period with respect to emission levels and identify cause(s) of the increased emissions</li> <li>- Check on the effectiveness of ongoing emission prevention and mitigation measures</li> <li>- Check prevailing wind direction and determine if public exposure is occurring in the down-wind direction within the assumed distance</li> </ul> </li> <li>▪ Document actions and findings</li> </ul>
2 x Action Level to 10 x Action Level	Weekly Average Measurement	<ul style="list-style-type: none"> <li>▪ Implement second tier of contingency plan to reduce emissions and maintain public protectiveness, including:               <ul style="list-style-type: none"> <li>- Inspect operations with respect to emission levels and identify cause(s) of the increased emissions</li> <li>- Verify the effectiveness of ongoing emission prevention and mitigation measures</li> <li>- Take immediate steps to reduce emissions or restore emission controls to design effectiveness</li> <li>- Verify that off-site transport to the nearest public exposure location(s) down-wind of the source is occurring through special monitoring</li> <li>- Implement first tier of contingency plan to reduce emissions and maintain public protectiveness</li> <li>- Reduce laboratory turnaround time to 24 hours and increase the frequency of monitoring at the source</li> </ul> </li> <li>▪ Document actions and findings</li> </ul>
> 10 x Action Level	Weekly Average Measurement	<ul style="list-style-type: none"> <li>▪ Implement final tier of contingency plan to reduce emissions and maintain public protectiveness, including:               <ul style="list-style-type: none"> <li>- Stop work if conditions do not improve</li> <li>- Resume normal monitoring or the first or second tier responses, depending on how much and how fast conditions improve</li> </ul> </li> <li>▪ Document actions and findings</li> </ul>

#### **4.5 SUMMARY**

This section described the conceptual model for how members of the public may be exposed to the target parameter contaminants in the sediment that may be emitted during remediation activities and identified how site-specific air monitoring action levels were developed to ensure the protection of the public from these emissions. The action levels will be:

- Protective of either residential and non-residential members of the public in consideration of their frequency and duration of exposure to the released target parameters;
- Tailored to reflect the spatial and wind-direction relationship between the remediation sources and the locations of potential public exposure;
- Account for background levels of the target parameters in the ambient air; and
- Account for varying sediment contaminant levels in different areas being remediated.

A tiered set of responses to manage and control remediation emissions and public exposure also was described. The immediacy and scope of the responses were specified to be in proportion to the indicated immediacy and level of health threat to the public.

## **5.0 AIR QUALITY MANAGEMENT PROCESS**

TtEC has developed a proven process to ensure the members of the public in areas near remediation operations are protected from both day-to-day exposures to airborne releases and over the longer period of remediation activities. This process is summarized in the sections that follow.

### **5.1 IDENTIFY EMISSION SOURCES**

The first step is to identify and characterize the air emission sources that could impact the public which may be associated with the OUs 2 through 5 remediation process. This step will involve evaluating the outdoor sources (i.e., emissions from sand storage areas, debris processing area, equipment staging area, storm water retention basin, and other potential outdoor sources), indoor sources (i.e., de-sanding, dewatering, filter cake management, water treatment, truck loading, and other potential indoor sources), and other potential sources (i.e., truck transport, dredges, slurry transport, other holding ponds). To evaluate these sources, TtEC will review site plans, process designs and operating plans for emission point and area sources, and emission controls to identify locations and emission stack heights.

### **5.2 IDENTIFY POTENTIAL PUBLIC EXPOSURE POINTS**

TtEC will identify the down-wind potential public exposure points nearest to the primary source areas. These exposure points could include commercial/industrial facilities, residences, and sensitive receptors (e.g., child care facilities, schools, hospitals, nursing homes).

### **5.3 IDENTIFY POSSIBLE MONITORING STATION LOCATIONS**

TtEC will identify candidate locations for monitoring stations near the primary sources and/or near the sensitive receptors to allow a confirmation of modeling projections in consideration of such factors as location, access, power, and security.

### **5.4 PERFORM SHORT-RANGE AIR MODELING**

TtEC will perform short-range air dispersion modeling for the area encompassed by the sources and the near-field receptors that will:

- Quantitatively characterize the emission sources.
- Establish appropriate sample averaging time (e.g., 24-hour vs. 72-hour). The determination will be based upon the ability to meet the project-specific data quality objectives (e.g., detection limits) with the sample collection time and preferences to be consistent with other related air monitoring efforts.
- Establish the appropriate simulation period.
- Obtain applicable meteorological data.
- Select the appropriate air model (e.g., AIRMOD or ISC).
- Develop a modeling protocol and regulator approval of model.
- Set up the model.
- Evaluate the trial runs of model.
- Revise the inputs and perform production runs.
- Document results.

### **5.5 DETERMINE MONITORING STATION EQUIPMENT AND SAMPLERS**

Based upon the results of the short-range air dispersion modeling, TtEC will specify the sampling equipment and supporting systems needed for the monitoring stations. This will include steps to:

- Determine sampling and analytical methods for constituents such as PCBs, lead, and mercury in ambient air;
- Determine if there is a need for site-specific wind speed, direction and temperature measurement;
- Determine how the monitoring equipment will be operated and by whom, and specify equipment to start/stop and control/record sampler operation;
- Develop the equipment list;
- Line up analytical services and sampling media supplies;
- Establish the data QA/QC requirements;
- Define the baseline monitoring program duration and frequency in consultation with risk assessment experts and regulatory agencies; and
- Prepare a Sampling and Analysis Plan (SAP) (draft, review, comment response, final) and develop internal Standard Operating Procedures (SOPs) for ambient air monitoring and sampling operations.

#### **5.6 INSTALL AND TEST THE MONITORING STATIONS**

TtEC will arrange for sampling sites to be prepped and set up with platforms, power and communication infrastructure, security (if necessary), and access and will procure, arrange and ship/deliver monitoring and sampling equipment to the monitoring station locations. Technicians will install and wire up equipment at prepared sites, install timer/data logger programs, check out operation, and perform initial equipment calibrations. The technicians will train site operators in routine sampler operation, flow checks and data recording, sample media installation and recovery, media handling, chain of custody requirements, and shipping to analytical labs.

#### **5.7 PERFORM BASELINE AIR MONITORING**

TtEC will perform baseline air monitoring prior to the start of remediation activity. At the same time, TtEC will set up a database for management of sample data, a data reporting structure and formats, and data QC checking procedures (including schedules and procedures for equipment maintenance, calibrations, and audit checks).

#### **5.8 REFINE DRAFT ACTION LEVELS**

TtEC will refine the current preliminary action levels (presented in Section 4.0) based upon the new site-specific information gathered in the previous steps.

#### **5.9 DEVELOP PERIMETER AIR MONITORING TRACKING TOOL**

TtEC will create a software tool (e.g., an Excel workbook) for tracking monitoring results for each monitoring station that:

- Plots concentration trends vs. risk-based exposure budgets;
- Tracks projected exposures vs. exposure budgets for key receptor locations;
- Generates warning “flags” when monitoring results indicate a condition that may require corrective action;

- Reports suggested response actions for the flagged conditions (reflective of a tiered response framework matched to the urgency of the potential risks to the public); and
- Reports results in very near real-time to the WDNR and the public.

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