REMEDIAL ACTION SELECTION/ DESIGN REPORT

CSX TRANSPORTATION, INC. GENESEE RIVER SITE ROCHESTER, MONROE COUNTY, NEW YORK

NYSDEC Case No. V00524-8
CSXT Project No. 0200358
AMEC Project No. 6-4300-8522

Submitted to:
CSX TRANSPORTATION, INC.
500 Water Street, J-275
Jacksonville, FL 32202

Submitted by:
AMEC Earth & Environmental, Inc.
Edison Plaza, 2nd Floor
155 Erie Boulevard
Schenectady, NY 12305

October 2, 2003

REMEDIAL ACTION SELECTION/ DESIGN REPORT

CSX TRANSPORTATION, INC. GENESEE RIVER SITE
ROCHESTER,
MONROE COUNTY, NEW YORK

NYSDEC Case No. V00524-8
CSXT Project No. 0200358
PROJECT 6-4300-8522

Submitted to:
CSX TRANSPORTATION
500 Water Street, J-275
Jacksonville, FL 32202

Submitted by:
AMEC Earth & Environmental, Inc.
Edison Plaza, 2nd Floor
155 Erie Boulevard
Schenectady, NY 12305

AMEC Project No. 6-4300-8522

October 2, 2003

Prepared by:

Kevin Curry
Project Engineer
AMEC Earth &
Environmental, Inc.

Marie Dowd, P.E.
Project Engineer
AMEC Earth &
Environmental, Inc.

Approved by:

Philip McQuiston, P.E.
Senior Project Engineer
AMEC Earth &
Environmental, Inc.

Timothy Ahrens, CHMM
Project Manager
AMEC Earth &
Environmental, Inc.

Table of Contents

FIGURES

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AMEC	AMEC Earth & Environmental, Inc.
AI	API Index
BP	Boiling Point
COC	Constituent of Concern
CSXT	CSX Transportation, Inc.
cy	Cubic yards
DWS	Drinking Water Standard
fps	Feet per second
FP	Flash Point
IGLD85	International Great Lakes Datum of 1985
IRM	Interim Remedial Measure
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and maintenance
ppb	Parts per billion
RG&E	Rochester Gas and Electric
RAO	Remedial Action Objective
SCG	New York State Department of Environmental Conservation's (NYSDEC) Short-term Concentration Guideline
SG	Specific Gravity
Shaw	Shaw Environmental and Infrastructure, Inc.
Tapecon	Tapecon, Inc.
TWA	Time-Weighted Average
TOGS 1.1.1	Division of Water Technical and Operational Guidance Series
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey

1.0 INTRODUCTION

The purpose of this Remedial Action Selection/Design Report is to present the approach for implementing a dredging action to address impacted sediments in the Genesee River at the CSX Transportation, Inc. (CSXT) River Street Derailment site in Rochester, New York. This Remedial Action Selection/Design Report has been prepared by AMEC Earth & Environmental, Inc. (AMEC), contracted by CSX Transportation, Inc. to provide design services for this project. This report has been prepared in accordance with a New York State Department of Environmental Conservation (NYSDEC) letter dated February 13, 2003 and letters from CSXT to the NYSDEC dated February 27, 2003, May 1, 2003, July 18, 2003, and July 29, 2003. The letters are included in Appendix 1.

1.1 Design Objectives

The objectives of this Remedial Action Selection/Design Report are:

- To present the design concepts and general objectives
- To provide the construction drawings
- To present the remediation plan for the site with the supporting details
- To provide the construction specifications.

Further details regarding a description of the project and the project objectives are contained in the Post-Interim Remedial Measures (Post-IRM) report, dated March 10, 2003, and the Dredging Work Plan, dated June 18, 2003, for the site.

1.2 Definition of Terms

Throughout this document, there are names of the parties that will be involved with the construction. For clarity, these terms are defined as follows: The term "Contractor" refers to the Contractor that will perform the remedial action construction work and includes any subcontractors, including the independent third-party licensed survey firm. "Client" refers to CSX Transportation, Inc. The term "Engineer" refers to the engineer or oversight firm working

on behalf of the Client to ensure the Contractor performs the work in accordance with the design documents.

1.3 Report Organization

The Remedial Action Selection/Remedial Design report is divided into eight sections. Section 2 contains the background information related to the project and information about the previous investigations at the site. Section 3 discusses the Remedial Action Selection process required in accordance with NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002. Section 4 discusses the project design elements. Section 5 discusses the permitting process required for the dredging action to be implemented. Section 6 discusses the construction sequence and schedule. Section 7 presents a summary of the remedial design. Section 8 provides a list of references used in the preparation of this report. Design details, construction drawings, construction specifications, and other supporting information are provided in the Appendices.

2.0 SITE BACKGROUND AND CURRENT CONDITIONS

This section provides a discussion of the site location and description, a summary of the site's use, a summary of the previous site investigations, and a description of the current site conditions.

2.1 Site Location and Description

The site is located adjacent to River Street in the City of Rochester, County of Monroe, State of New York, as shown on Figure 1. The derailment occurred along the CSXT railroad tracks adjacent to the Monroe County Public Boat Launch, where the tracks make a westward change in direction. Two diesel locomotive engines leading a 41-car train derailed. Three tank cars containing acetone (two cars) and methylene chloride (one car) derailed slightly northeast of the Tapecon, Inc. (Tapecon) manufacturing facility and approximately 100 feet to 150 feet from the Genesee River (the spill site). The area in which the acetone and methylene chloride were released is approximately one mile upstream from the mouth of the Genesee River.

2.2 Site History

On December 23, 2001 at 3:40 pm, the CSXT train derailed in Rochester, New York, north of the Latta Road and River Street intersection. The train consisted of 43 cars (including two diesel locomotive engines) traveling north from Kodak Park towards the Rochester Gas & Electric (RG&E) Russell Station when the accident occurred. Although the train consisted of 43 cars, only 28 derailed; those cars remaining on the tracks were carrying coal. A summary of cars involved in the accident is as follows:

- Two diesel locomotive engines (carrying approximately 4,000 gallons of diesel fuel)
- Two box cars (empty)
- Two jumbo hopper cars (carrying plastic pellets)
- Two acetone tanker cars (carrying approximately 20,000 gallons each)

- One methylene chloride car (carrying approximately 20,000 gallons)
- Twenty-one coal hopper cars (each carrying approximately 100 tons of bituminous coal).

As a result of the derailment, leaking acetone was ignited creating a large fire that engulfed several of the watercraft stored at this location and a two-story house owned by Mr. William Danis.

Each of the chemicals released has very different characteristics. A brief summary that can be used as a quick reference is included below:

- Diesel Fuel – insoluble liquid, brown, slightly viscous, 171°C -358°C (BP), <0.86 (SG), 52°C (FP), 932°C (AI), TWA 5 mg/m^3
- Acetone – C_3H_6O, soluble liquid, clear, 56°C (BP), 0.7910 (SG), -20°C FP, 465°C (AI), TWA 1,000 ppm
- Methylene Chloride – CH_2Cl_2, moderately soluble liquid, colorless, 40°C (BP), 1.33 (SG), 556°C (AI), TWA 25 ppm.

During the emergency response, the US Coast Guard (USCG) and US Coast Guard Auxiliary used manpower and equipment available to them to help fight the fire from the Genesee River, while the local fire department tended to the fires on land. In addition, the Coast Guard placed containment booms along the shoreline in the area where the spill had occurred. Immediately following the derailment, employees from a CSXT consulting firm worked with the US Coast Guard to take surface water samples from the Genesee River to monitor river quality. In general, the concentrations decreased greatly in the days following the initial release, to background levels by January 4, 2002.

2.3 Previous Investigation

Shaw Environmental and Infrastructure, Inc. (Shaw) of Latham, NY, conducted the original environmental response activities and subsequent sampling events on behalf of CSXT. CSXT

has contracted with AMEC to complete the activities related to the Genesee River and impacted sediments resulting from the December 23, 2001 derailment. Because of their previous involvement, Shaw's name will still remain in the report and several of their documents may be referenced.

2.3.1 River Description

The Genesee River is a navigational waterway maintained and monitored by the United States Army Corps of Engineers (USACE). Depositional sediment is removed from the channel every couple of years by the USACE and disposed of at a designated offshore area in Lake Ontario. The channel has a relatively flat bottom with sloped sides, which then level off as they approach the banks. Immediately adjacent to the site at the approximate channel midpoint, the river bottom elevation is 222 feet. As a result of Interim Remedial Measure (IRM) work conducted by CSXT, a sheet pile wall was installed along the river's edge between the site and river, which has a top elevation of 251 feet. The difference between these two elevations results in the river bottom being approximately 29 feet lower than the site. This information is based on a bathometric survey of the river completed in the fall of 2002 by Thew Associates of Canton, NY (Vertical and Horizontal Reference City of Rochester Datum). The USACE and NYSDEC reference the International Great Lakes Datum of 1985 (IGLD85) when conducting work on the Genesee River, which is 1.74 feet lower than the City of Rochester Datum. To prevent further confusion and to be consistent with the USACE and NYSDEC standards, all elevations in this design and all future work will be based on the IGLD85.

Although flow was not specifically monitored, a search of the US Geologic Survey (USGS) web site found that volumetric flow monitoring had been discontinued at the end of September 2001. However, while the monitoring station was operating, it documented river flow rates from 11,000 cfs during spring thaw and rain events down to 200 cfs during peak summer months. The RG&E Court St. Dam operator was contacted and has verified this information. Flow rates in the river within the impacted area are also dependent upon current weather conditions and Lake Ontario water elevations. Genesee River flow has been documented as switching directions and exhibiting large surges in this area due to northern winds and storms. Some large storms

will also produce significant waves in this portion of the river. A low lake elevation can increase flow rates by increasing the river's gradient, whereas the opposite is also true. Additional information on Genesee River flow rates has been obtained from the local USCG and USCG Auxiliary officers.

2.3.2 Surface Water

Water was sampled from the Genesee River on numerous occasions during the initial investigation and subsequent monitoring events in order to determine possible impacts of methylene chloride and acetone in the river. Surface samples were taken immediately in front of the site and downstream from the site at the Monroe County boat launch on December 24 and December 26, 2001. Shaw technicians began a coordinated sampling program at four locations, three times a day starting on December 27, 2001 through January 4, 2002. Although sampling immediately following the derailment stopped on January 4, 2002 due to concentrations decreasing to acceptable levels, additional monitoring events have been conducted in April, September, October, and December 2002 and May 2003.

2.3.3 Sampling Techniques

Water samples were collected using two different methods. Originally, water was collected using a peristaltic pump and tubing dropped to 20 feet. Water was placed directly into pre-cleaned jars preserved with hydrochloric acid (HCl). The jars were filled to a zero headspace capacity, sealed, and labeled by a Shaw technician. Due to inclement weather conditions, water in the collection tube froze on several occasions. As a result of the freezing, sampling was cumbersome and time consuming, so alternate methods were pursued.

Beginning on January 2, 2002, a horizontal water sampler was used for sampling on the Genesee River. The horizontal water sampler eliminated the problems associated with the collection tube freezing and allowed for more accurate drop depths of 20 feet. Jars were still

filled to zero headspace, sealed, labeled, and delivered to the laboratory daily. The horizontal sampler has been consistently used for water sampling since January 2, 2002.

2.3.4 Sampling Locations

Beginning on December 27, 2001 through January 4, 2002, samples were collected three times a day at each of the following designated locations, weather permitting. Four sampling locations were designated for repeated sampling throughout this time period:

- In front of the site (Middle)
- In front of the Coast Guard facility (Downstream)
- At the mouth of the Genesee River (Channel/Lake)
- 500 feet east of the mouth in Lake Ontario (Lake 500' East).

Samples were also collected periodically from an upstream (Upstream) location. These locations were also utilized during subsequent monitoring events. Samples were collected in the middle of the channel from a depth of 20 feet, near the sediment/water interface, and at the surface of the river. Weather conditions limited sampling activities at times. The Lake 500' East sample was not taken on several occasions due to rough water conditions. Sample locations were selected to monitor the downstream river water quality immediately after the spill. The sample on Lake Ontario (Lake 500' East) was taken to the east to compensate for longshore currents on the lake, which tend to go from west to east.

In an October 17, 2002 monitoring plan prepared by Shaw, sample locations and/or identifications were modified for future sampling events. Sampling locations Middle and Channel/Lake are now WS-2 and WS-3, respectively, and Middle has been relocated. It is now at the approximate middle of the channel immediately east of the property line that separates the Danis and Auxiliary Coast Guard's properties and is identified as WS-1. Also as a part of the monitoring plan, water samples are collected at three co-located sediment sampling locations. These locations may vary, but are always identified prior to sampling and are based on results obtained during prior sampling events.

2.3.5 Analytical Results

Analytical results from all surface water samples collected from December 24, 2001 through December 11, 2002 are summarized in Tables 4 through 8 of the March 10, 2003 Post IRM Report prepared by Shaw. Immediately following the spill, samples taken from the Genesee River showed impacts adjacent to the site and downstream towards the mouth of the river. Concentrations of acetone, which is miscible in water, were within the drinking water standard (DWS) of 50 ppb by December 27, 2001 and remained below this level, with the exception of December 30, 2001. DWSs are identified in the Division of Water Technical and Operational Guidance Series (TOGS 1.1.1), June 1998. A high level of variability was seen in the levels of methylene chloride during the sampling period. Several samples were below the methylene chloride DWS of 5 ppb (TOGS 1.1.1) and a general decreasing trend was observed; however, variability in the concentrations was also observed. The following paragraphs describe these results and are grouped by sampling location.

Middle (Adjacent to the Site)

Samples taken from the channel adjacent to the spill site (Middle) showed the highest concentrations of both acetone and methylene chloride. This result is expected considering the sampling site's proximity to the initial release of both chemicals. Concentrations in this area dropped considerably within three days of the spill. The results were within the DWS for both methylene chloride and acetone twice on December 27, 2001. However, variability continued throughout the sampling period. At least once on each day, methylene chloride was detected at levels exceeding the DWS. Acetone was detected above the standard once during this period, on December 30, 2001.

Downstream (Adjacent to the Coast Guard Building)

Samples collected at the Downstream location on December 24, 2001 were above the DWS. Samples collected subsequently at this location showed a much more consistent trend towards decreasing levels of acetone and methylene chloride as time progressed. Acetone results were below the drinking water standards on December 27, and remained so with one exception on

December 30, 2001. Methylene chloride results, while more variable, decreased significantly from the December 24, 2001 levels and did not exceed 20 ppb after December 27, 2001.

Channel/Lake (Mouth of the Genesee River)

Samples collected at the Channel/Lake location exhibited concentrations of methylene chloride and acetone above the DWS at various points throughout the initial monitoring. However, a decreasing trend in chemical concentrations was identified as time increased. Chemical concentrations were not significantly above the DWS and did not pose a risk to human health and the environment. Acetone remained below the DWS except for one occasion, December 30, 2001, when it was 52 ppb, slightly exceeding the 50 ppb DWS. Methylene chloride levels peaked at 41 ppb on December 27, 2001 and decreased afterward. Methylene chloride was subsequently detected, but at concentrations consistently below 20 ppb.

Lake 500' East (Lake Ontario east of the mouth of the Genesee River)

Samples from the Lake 500' East location were all below or only slightly above the DWS for acetone and methylene chloride. Acetone was never detected above the DWS, whereas methylene chloride was detected at levels between 5 and 22 ppb on several occasions.

Upstream Locations

Samples were collected upstream of the site to determine if the impacts had spread upriver and to assess what the background levels of acetone and methylene chloride were for the Genesee River. Samples were taken on six separate occasions, and only once did either chemical exceed the DWS. A sample taken late on December 26, 2001 had acetone recorded at 99 ppb and methylene chloride at 6.4 ppb. Based on subsequent research and investigation, these samples could represent background chemical impacts to the Genesee River and may not necessarily be related to the CSXT derailment.

Subsequent Sampling Events

Surface water samples for monitoring river conditions immediately following the release were taken up to January 4, 2002. This initial monitoring program ceased and a modified program was instituted. The modified program initially began using the same locations as those from initial sampling events. The locations have subsequently been modified as described in Section 2.3.4. Sampling frequency was also adjusted to reflect the significant decrease in chemical concentrations. Analytical results of samples collected during these sampling events have indicated concentrations of acetone to be either non-detect or below the established DWS. Methylene chloride has been detected at a minimal amount of locations during these events and concentrations have been above DWS. However, these detections have been limited to those areas immediately within the spill limits, are not greater than 2 ppb above the DWS, and can be explained because of the concentrations identified in the sediments. Although methylene chloride has been detected, it is confined to the area immediately within the plume limits and has not been detected above DWS at any downstream sampling locations.

2.3.6 Benthic Macroinvertebrate Study of the Lower Genesee

Shaw conducted a benthic macroinvertebrate study of the Genesee River on January 10, 2002 to determine if the chemical spill had impacted life on the river channel floor. This study consisted of collecting sediment at four locations in the Genesee River to study species diversity and richness and to determine if these communities were impacted by the spill. The results indicated that community richness and diversity were not affected by proximity to the spill. The changing river morphology and its intrinsic effects on the environment at the channel's bottom controlled species diversity and richness. Shaw provided this report under a previous cover.

2.3.7 River Sediment

Seven sampling events have been conducted in the Genesee River to determine the extent of impacts to the sediment and water. The most recent sediment sampling event was conducted

on May 6 through May 8, 2003. A complete, summarized table of results is presented in Appendix 2.

Results from the December 2002 sediment sampling event revealed that the methylene chloride concentrations have decreased significantly since the initial investigation conducted in the spring of 2002. Concentrations of methylene chloride and acetone continue to remain elevated in the area of the spill, but the footprint has not increased in size. Water samples collected at various locations have shown little to no impacts for either analyte.

Sampling Techniques

Sampling events I and II were conducted utilizing a slide hammer core sampler operated by Shaw employees. These events examined only the first 18 to 24 inches of sediment. Subsequent events (III – VII) were conducted using the services of vibracore subcontractors. This technique enabled deeper sediments to be evaluated. Four-inch-diameter vibracore samples were collected up to 9 feet below the river bottom and proved to be useful in evaluating sediment concentrations and geology.

The core barrel is constructed of either steel or aluminum and lined with a flexible plastic liner to ensure discrete sampling and prevent cross contamination with other locations. As the core barrel enters the sediment, a column of sediment is forced into the barrel, displacing the water column in the barrel through the top. Sample return will vary depending upon the sediment type and grain size. Sediment sampling locations are recorded using a global position navigational system, which increases the accuracy for re-sampling those locations during following events.

After the core is brought onto the boat deck, the plastic liner is removed from the barrel and placed into a holding tray. The core is logged for length, sediment type, and visual analysis of its general condition. The core is then divided into 1-foot sections, and a sample for chemical analysis is collected from the top, middle, and bottom sections and labeled according to its depth within the core.

Sampling Locations

Sampling locations have varied during each sampling event; however, some locations have remained consistent throughout several of the events. The two original events were used to define the most extreme limits of the plume. Subsequent events have been conducted to create a detailed delineation of the plume both laterally and vertically. They have also been used to monitor the plume size and possible effects of natural attenuation. Sampling locations were identified on Figure 12 of the March 10, 2003 Shaw Post IRM Report.

2.4 Current Site Conditions

Several sediment sampling events and a final delineation have been conducted. Phase VII data, in conjunction with the previous six events, was used to determine the final plume extents and as the basis for establishing dredging limits. A summary table of sediment sample results is presented in Appendix 2. Sample data indicates that the plume begins at the approximate shoreline of city property and extends into the navigational channel. Drawing C-1 (Appendix 9) depicts the established plume limits.

3.0 REMEDIAL ACTION SELECTION

3.1 Purpose

This section presents background information regarding the remedial action selection. Information from the remedial investigation is used to develop remedial goals and remedial action objectives to assist in the remedial action alternatives screening process. A list of applicable remedial action alternatives is then developed and screened to choose the most appropriate remedial action alternative. The selected remedial action alternative and the justification for its selection are then described in further detail.

3.2 Remedial Goals and Remedial Action Objectives

This section develops remedial goals and remedial action objectives to assist in the screening process. This process first consists of identifying the following:

- Media of concern
- Remedial action objectives
- Volumes or areas of media.

Media of concern considered in the decision-making process are surface water and river sediments. Remedial Action Objectives (ROA) are media-specific goals for protecting human health and the environment. Specific ROA were developed that achieve the long-term goals of protecting human health and the environment, preventing or minimizing exposure to constituents of concern (COCs) (methylene chloride and acetone), and complying with applicable local, state, and federal laws:

- Protect human health.
- Protect the environment.
- Remove sediments exceeding levels of 1,133 ppb for methylene chloride and 773 ppb for acetone, as mandated by NYSDEC.
- Minimize COC migration caused by resuspension of impacted sediments.

- Maintain navigation of this navigable waterway and perform remediation without impacting commercial transportation on the river, to the extent possible. Commercial transportation is believed to consist of a freight barge that delivers cement to Esroc Company (formerly Quikcrete) approximately every 2 weeks.
- Minimize time required for remediation to allow the USACE maintenance dredging operations to continue on schedule in the summer of 2004.
- Allow for open water or lake bottom disposal of dredging spoils from USACE maintenance dredging operations.

Drawing C-1 shows the limits of impacted sediments based on delineation sampling activities discussed earlier. Volume calculations were performed based on the area of impacted sediments and excavation depths. The volume of impacted sediments is conservatively estimated to be 3,000 cubic yards. Volume estimate calculations are presented in Appendix 3.

3.3 Screening of Potential Remedial Alternatives

This section describes the development and screening of potential remedial action alternatives that will lead to the successful remediation of impacted river sediments. Development of remedial action alternatives considered all technologies thought to be capable of achieving remediation of impacted river sediments. Media of concern considered in the decision-making process were surface water and river sediments.

The following remedial action alternatives were identified by AMEC as warranting consideration:

1. No action
2. Monitored Natural Attenuation
3. Enhanced Natural Attenuation
4. In-situ Stabilization
5. In-situ Remediation
6. Installation of a subaqueous cap to isolate the sediments (at existing elevations)
7. Dredging removal of impacted sediments.

Each technology was evaluated according to three screening criteria: effectiveness, implementability, and relative cost. The USEPA describes these screening criteria as follows:

- Effectiveness refers to three considerations: (1) the potential ability to restore the estimated area or volume of impacted material to site cleanup action levels; (2) the potential impacts to human health and the environment during remediation; and (3) the extent to which the technology is proven and reliable under site conditions.

- Implementability is considered in order to rule out technologies that are clearly ineffective or unworkable, either due to technical or administrative factors.

- Cost is evaluated in a relative sense (i.e., high, medium, or low) based on engineering judgment. The cost criterion typically plays a limited role in the screening evaluation.

Remedial action alternatives 1 (No action), 2 (Monitored Natural Attenuation), 3 (Enhanced Natural Attenuation), and 6 (Subaqueous Cap) were screened out because of implementability issues; they do not meet the NYSDEC mandate to remove the impacted sediments. Additionally, these alternatives fail to allow the USACE to use lake bottom disposal of dredging spoils. Remedial action alternative 4 (In-situ Stabilization) was screened out because of effectiveness issues; it is not a well-proven technology (and is potential reversible) and could potentially release substantial amounts COCs from sediments during the insitu mixing process. This alternative may also not allow for lake bottom disposal of USACE maintenance dredging sediments. Remedial action alternative 5 (In-situ Remediation) was screened out because of implementability issues; this alternative cannot be implemented in sufficient time to allow the USACE to proceed with the summer of 2004 dredging of the river channel.

Alternative 7 (Dredging) is the only one of the seven remedial action alternatives that satisfies each of the remedial action objectives and is the most appropriate alternative to address the COCs present. Therefore, it is recommended that alternative 7 (Dredging) be implemented over alternatives 1 through 6. Alternative 7 will most likely cause the short-term release of COCs from sediments during the remediation work, as will any alternatives that disturb sediments as part of the remediation process (e.g., alternatives 4 (In-situ Stabilization) and 5 (In-situ

Remediation)). The use of engineering controls (turbidity barrier, closed bucket, etc.) will help minimize the release of COCs during the remediation process. Alternative 7 will provide an effective, long-term remedy.

Three general dredging technologies are available to implement dredging: hydraulic, mechanical, and excavation in the dry area after dewatering. Hydraulic dredging disturbs sediments, creates a turbid environment, and produces significant quantities of waste water (approximately 10 times as much as mechanical dredging) and was therefore ruled out from further consideration. Dredging with dewatering, while it minimizes release of COCs, must be screened out because it would unacceptably block navigation of the river. This method would also require significantly more time to complete than other dredging technologies and therefore would interfere with river access for a greater period of time and be technically difficult. Mechanical dredging is the only dredging technology that remains viable.

Mechanical dredging consists of several general subcategories: mechanical excavation, vertical auger, and dredging with oversize casing. Vertical auger methods and dredging with oversize casing would unacceptably block navigation of the river and would require significantly more time to complete, similar to dredging with dewatering. Therefore, the preferred method for mechanical dredging is mechanical excavation. Mechanical excavation of sediments may be accomplished through the use of a hydraulic excavator with a lid (or environmental bucket), a crane with a closed clamshell (or environmental bucket), or other means. The exact method of mechanical excavation will be decided upon by the Contractor.

3.4 Support for Selected Remedy

3.4.1 Detailed Description of Remedial Action Alternative

Engineering controls will be implemented prior to the start of dredging operations to minimize the release of COCs and sediments to the river. A turbidity curtain system will be installed to fully enclose the dredging area prior to the start of sediment excavation. The turbidity curtain will extend from the water surface to the river bottom. Maximum effort will be made to accommodate river traffic. As such, reefing lines have been specified that allow the Contractor to raise the

curtain to aid in moving the curtain. Impervious sediment unloading and processing/stockpile areas will be constructed on shore for containing, handling, and processing sediments and construction water. Mechanical excavation of sediments may be performed from shore and/or from a barge. Mechanical excavation will proceed systematically either from the shore out to the center of the river or from the outer limits towards shore, working from upstream to downstream to ensure the maximum removal of impacted sediments. As a very conservative measure, sediments will be excavated to 4 feet below the river bottom. Isolated areas of sediments with higher COC concentrations will be over-excavated to provide additional COC removal. An estimated volume of 3,000 cubic yards (cy) of sediments is expected to be removed. Post-excavation end-point river sediment samples will be collected. If sample results exceed cleanup criteria, AMEC will evaluate the remaining impacts and determine the appropriate action.

Of all the dredging technologies, mechanical excavating presents the least disturbance of sediments. The dredging bucket will be closed during the transport of sediments from the river bottom through the water column to minimize the dissolution of COCs into river water. The turbidity curtain system will contain and settle the majority of suspended sediments and slow the transport of dissolved COCs. COCs dissolving into river water during dredging operations will dilute further with stagnant water contained within the turbidity curtain system. Diluted COCs will eventually volatilize from the river water surface or slowly move outside the turbidity curtain and further mix and dilute with passing fresh river water. Upstream and downsteam river water quality (turbidity and COC concentrations) will be monitored during dredging operations.

Sediments will be transported periodically to the impervious processing/stockpile area on shore. Sediments will be managed in this area to contain the sediments and any associated runoff. Stockpiled sediments will be covered overnight. Sediments will be processed so that they pass a paint-filter test and/or penetration test for transport. Processed sediments will then be sampled prior to transport to one of three landfills, as determined by sample analytical results and according to the disposal criteria established during the IRM. Construction water will be either treated and discharged onsite or containerized for offsite disposal. Water treated onsite will be discharged to one of two locations, either the Genesee River or Monroe County POTW. The discharge location will be determined by comparison of post-treatment sampling results to

NYSDEC Generic Effluent Criteria and POTW acceptance criteria. Water containerized for disposal will be transported offsite to a permitted disposal facility.

3.4.2 Consideration of the Seven Criteria and Remedial Action Objectives

Overall Protection of Public Health and the Environment

Any remedial alternative that requires disturbance of sediments (e.g., dredging, in-situ remediation, in-situ stabilization) will cause some amount of short-term risk because of the mitigatable, but not completely controllable, release of COCs during sediment disturbance. Of all remedial action alternatives that require disturbance of sediments, mechanical excavation will cause the least disturbance to sediments and least amount of short-term release of COCs to river water. The use of a turbidity curtain system will further mitigate the short-term risks. Predicted concentrations are far below acute toxicity to aquatic organisms and pose very low risks to humans. Short-term air impacts will be below SCG values at all potential receptors. Air and water modeling results (presented in the Appendix 4 and discussed in the next section) support these conclusions.

Mechanical excavation of sediments will provide adequate long-term protection to human health and the environment. The long-term risk would be reduced through sediment removal and offsite disposal. While it is not expected, should sediments exceeding cleanup standards remain after excavation, remaining sediments impacts exceeding the cleanup standards will be assessed to determine appropriate action. This could include natural attentuation of sediment impacts, capping in those areas to prevent contact with remaining impacted sediments, or other methods. Capping would occur only in the navigable channel at a level below the USACE maintenance dredge elevation of 221.3' IGLD85. Any remaining impacted sediments would be expected to attenuate with time through naturally occurring biodegradation processes.

Compliance with Standards, Criteria, and Guidance

Mechanical excavation of sediments will comply with most or all applicable standards, criteria, and guidance. Applicable standards are the New York State Department of Environmental

Conservation's (NYSDEC) Short-term Concentration Guideline for air concentrations, USEPA acute toxicity to aquatic organisms for water, and NYSDEC Sediment Guidance values.

Long-term Effectiveness and Permanence

As it will remove the impacted sediments, the mechanical excavation remedial action will provide a long-term and permanent remedy. If all post-excavation river sediment samples are below 1,133 ppb for methylene chloride and 773 ppb for acetone, no long-term risks will remain after remediation is completed. If one or more post-excavation river sediment samples (depending on concentrations) are above the cleanup standards, the potential use of subaqueous capping could serve as a long-term engineering control to minimize long-term risks over these limited areas. COCs below a cap would eventually naturally biodegrade to concentrations below cleanup criteria. Long-term institutional controls will not be required.

Reduction of Toxicity, Mobility, or Volume with Treatment

The excavated sediments (approximately 3,000 cy) will be landfilled. Water removed from the sediments will be treated or disposed of as construction water. The toxicity of landfilled sediments will remain the same. The mobility of sediment COCs will be temporarily increased during excavation and transport, but may be decreased by sediment treatment processes. The volume of sediment COCs will not be reduced through landfilling. COCs in water from the sediments will be reduced through treatment. Any impacted sediments remaining will not see an immediate reduction in toxicity or volume, but will see a reduction in mobility.

Short-Term Effectiveness

Impacts to the community should be minimal. Impacts to the river will be negligible as discussed previously. The remedial action will require intrusive activities involving the excavation of sediments, treatment of sediment water, and offsite disposal of sediments. The attainment of the remedial objectives should be complete within 3 months of the start of the work.

Implementability

Excavation of sediments is technically feasible. Dissolution of COCs from sediments during excavation can be mitigated, but not completely eliminated. Mechanical excavation is a straightforward technology and sufficient technical personnel are available who could plan and implement the excavation work. Mechanical excavation of sediments is administratively feasible. Excavation and acceptance of waste materials at an offsite disposal facility are straightforward procedures. Materials, services, and equipment required to implement this remedial action are readily available.

Cost

For evaluation purposes, no action and monitored natural attenuation are estimated to have the lowest remedial costs. Enhanced natural attenuation, in-situ stabilization, in-situ remediation, and installation of subaqueous cap are estimated to have medium remedial costs. Dredging of impacted sediments is estimated to have the highest remedial costs.

3.5 Modeling and Pilot Test Work

AMEC has completed work to support the selection of the most appropriate remedial action alternative to address impacted river sediments and aid in the design. AMEC completed a pilot test on river sediments to determine the most feasible means of processing dredged river sediments to pass the paint-filter and resistance to penetration tests prior to transport to a landfill. In addition, AMEC completed modeling work to quantify the impacts of dredging activities on air and river water quality. Methylene chloride was used as the constituent of concern for modeling because its concentration in sediments is much higher than that of acetone. Air and water modeling reports are included in Appendix 4. The pilot test report is included in Appendix 5.

AMEC modeled various realistic scenarios to quantify the impacts of dredging on river water quality. AMEC employed realistic scenarios to estimate methylene chloride concentrations that could be released to surrounding river water during dredging operations. The worst-case

scenario assumed that dredging occurred at the most impacted area (area of river bottom with the highest methylene chloride concentrations) with typical river conditions. This scenario is very conservative because it assumes that no containment system (turbidity curtain) is present. A turbidity curtain would slow the dispersion of methylene chloride in the river.

The predicted concentration at a distance of 1 meter from the dredging equipment is 0.818 ppm and decreases significantly with distance downstream. Even in this worst-case scenario, the predicted methylene chloride concentration at all locations is below the 100 ppm USEPA acute toxicity to aquatic organisms by several orders of magnitude. As further support, the peak concentrations of methylene chloride measured shortly after the derailment reached only 41 ppb. The results of the modeling also indicate that the risks of impacts to humans, via air or water pathways, are extremely low. With a turbidity curtain present, the concentrations of methylene chloride in river water are expected to be even lower than predicted concentrations.

AMEC modeled various realistic scenarios to quantify the impacts of work activities (excavation of sediments, exposure of sediments in a scow, transfer of sediments from scow to trucks, and sediment processing) on local air quality. As a worst-case scenario, air concentrations were modeled based on the excavation of sediments from the area of highest sediment impacts (approximately 100 cy). This worst-case condition represents only one-thirtieth ($1/30^{th}$) of the volume of sediments to be excavated. The results of air modeling predict that methylene chloride concentrations in air will be below the New York State Department of Environmental Conservation's Short-term Concentration Guideline (SCG). Dispersion modeling results indicate that air concentrations will be below the SCG value at all potential downwind receptors. As further support, excavation of impacted soils during the land-based portion of the remediation, where impacts were more recent, were successful in maintaining perimeter air quality. If exceedances do occur, the Contractor will be prepared to mitigate them through monitoring and engineering controls (e.g., limiting the amount of high-impact sediments excavated per day, use of tarps, foams).

AMEC has recently concluded pilot test work to determine the feasibility of various types of sediment treatments for achieving passing paint-filter and penetration test results to allow for transportation to landfills for disposal. Treatment options tested included dewatering (gravity

drainage, filter press, and centrifuge) and stabilization (Portland cement, lime kiln dust, cement kiln dust, and fly-ash). The results indicate that the dewatering methods investigated are not acceptable for achieving passing paint filter and penetration test results. Sediments processed by gravity drainage failed both the paint filter and penetration test, whereas those treated with a filter press or centrifuge yielded poor to mediocre results for the penetration test. Results for solidification methods indicated that lime kiln dust, cement kiln dust, and fly-ash failed the paint filter test at low concentrations and yielded poor to mediocre results for the penetration test at all concentrations. Only the use of Portland cement yielded both passing paint filter test and high resistance to penetration.

Although AMEC will recommend the addition of 5 to 10% Portland cement to process sediments to achieve passing paint filter and penetration test results, the exact means of processing sediments to achieve passing test results will be the responsibility of the Contractor. The pilot test results will be supplied to the Contractor to aid in the selection of an appropriate strategy to process sediments prior to transport to the landfill.

4.0 PROJECT DESIGN ELEMENTS

To address the impacted sediments, there are many design elements that must be developed to perform the work associated with the remedial action. This section includes a discussion of the project design elements that were developed during the design process. In addition, this section of the report presents the general approach to other elements of construction. These design elements are generally presented in the order in which they are likely to occur during construction.

4.1 Traffic Control

AMEC has reviewed the traffic routes to and from the site. Vehicle access to the site will not have an impact on the construction activities as the site is a commercial/industrial area and access is available. The Contractor will be responsible for providing traffic control, temporary fence, and gates. River access to the site will be obtained using the Monroe County public boat launch located adjacent to the CSX Swing Bridge abutment or Lake Ontario for larger vessels. As the Genesee River is used extensively, work on the river will have to account for recreational use and periodic traffic of commercial ships delivering materials to manufacturing facilities up-river. The design accounts for this river traffic and attempts to maintain, as much as feasible, navigation on the river during remediation. The design anticipates minimizing the duration of the disruption to the river by expediting remediation work and by limiting blockage of the river during construction. AMEC will obtain access and a joint permit for the project and assumes no other permits are required.

4.2 Erosion and Sediment Control

This section of the report addresses the erosion and sediment control devices that will be implemented on the upland work areas. This section does not address the river area of the project, which is addressed in the turbidity control section of the report.

One of the first elements of construction will be the installation of perimeter erosion and sediment control devices, if necessary. Perimeter erosion control features may include a stabilized

construction entrance, silt fence, hay bales, or (more likely) a physical barrier such as berms or jersey barriers surrounding the sediment processing and dewatering area, in addition to other erosion control elements. An erosion and sediment control permit will not be required for construction as no earth will be disturbed beyond the minimum area which requires a permit.

4.3 Sediment Processing/stockpile Area Construction

Excavated sediments will be stockpiled prior to processing and also while awaiting loading and transport for disposal. The volume of sediment to be disposed offsite is approximately 3,000 cy (Appendix 3). A temporary processing/stockpile pad will be constructed for processing and stockpiling the sediment and containing construction water. The storage pad will be constructed of an impervious surface consisting of concrete or asphalt and will have a containment curb around the perimeter. Water collected in a sump within the pad will be handled as construction water. Segregated bins will be constructed for stockpiling processed sediments awaiting transportation. Drawing C-2 shows the proposed location of the sediment processing/stockpile area and separate bins for segregating processed sediments awaiting transportation.

At the end of each day and during periods of rain, sediment piles will be covered to prevent the infiltration of storm water. Biosurfactants may also be utilized to minimize volatilization of COCs from excavated sediments, as necessary. The Contractor will be responsible for decontaminating any vehicles or equipment with the potential to transfer impacted sediments offsite (with the exception of the inside bed of loaded trucks) prior to leaving the site. All water from sediment handling/processing areas will be contained and handled as construction water. Construction water will be treated and sampled to confirm that it is below the standards for discharge to the Monroe County Pure Waters sanitary sewer system or NYSDEC Generic Effluent Criteria (included in Appendix 6) for river discharge. The Contractor also has the option of foregoing onsite treatment of construction water and disposing at an approved offsite facility. The Contractor will be required to provide any water storage necessary during construction using fractionalization tanks or other containers. The specifications include the required discharge procedures and standards.

At the completion of construction, the Contractor will be required to return the site to former conditions. This includes removal and disposal of the connecting portions of the haul road, removal and disposal of the above grade portions of the sediment unloading pad and decontamination pad, and removal of temporary fence and gates. The newly installed pavement at the sediment processing/stockpile pad will be pressure-washed and may remain at the completion of the project. AMEC will sample beneath the decontamination pad, sediment unloading pad, and sediment processing/stockpile pad to confirm that COCs did not penetrate the pads.

4.4 Sediment Processing and Disposal

Excavated sediment will be transported to the shore and unloaded. Any water within the transport vessel(s) will be contained and collected as construction water and pumped to a holding tank prior to unloading sediments. Unloading will take place within the turbidity curtain to capture minor amounts of sediments or water that may drip during unloading. A temporary, impervious, bermed sediment unloading pad will be constructed on land to contain any water or sediments that may drip during the unloading process. Water collected in a sump within the pad will be handled as construction water. Sediments will be transported via a temporary haul road to the sediment processing/stockpile area.

Based on the results of the pilot test, AMEC will recommend that the Contractor add 5 to 10% Portland cement to prepare sediments for transportation. After the addition of Portland cement, sediment will be stockpiled in approximately 100- to 400-cy piles in segregated bins. AMEC will collect one composite sample from each pile (if smaller than 100 cy) or one sample per 100 cy and analyze for methylene chloride, acetone, paint-filter test, and/or resistance to penetration test analysis at a NYSDEC-approved laboratory. AMEC will collect any waste classification samples required by the landfill(s) if this has not been completed prior to construction. The results of the analysis for each sediment pile will be used to determine the offsite disposal required for the sediments according to the disposal criteria established during the IRM.

4.5 Sediment Excavation

The sediment excavation design is intended to satisfy the following objectives:

- Protect human health.
- Protect the environment.
- Remove impacted sediments exceeding levels of 1,133-ppb methylene chloride and 773-ppb acetone, as mandated by NYSDEC.
- Minimize COC migration caused by resuspension of impacted sediments.
- Maintain, to the extent possible, navigation in the river.
- Minimize time required for remediation to allow the USACE maintenance dredging operations to continue on schedule for the summer of 2004.
- Allow for lake bottom disposal of dredging spoils from USACE maintenance dredging operations.

The sediment excavation design will also contain scheduling and operational specifications that meet the intent of all local, state, and federal regulatory requirements. Accommodation of vessel traffic and coordination with other activities occurring in the project area will be required. The Contractor will coordinate activities with the Esroc Company (formerly Quikcrete) and any other companies dependent on use of the river for transportation.

4.5.1 Sediment Excavation Limits

Sediment sampling was undertaken to supplement existing data and to further delineate the horizontal and vertical extent of COC concentrations in the sediments. Review of the data indicates that COC concentrations are spread out over an approximate 100- by 150-foot area extending from the shore into the river. Drawing C-3 presents the excavation limits. The entire area within the limits will be excavated to 4 feet below the river bottom. As shown on Drawing C-3, several areas with elevated COC concentrations will be over-excavated. The limits of dredging exceed the limits of the area to be remediated for the ease of construction, to accommodate reasonable standards of dredging control, and to ensure the majority of impacted sediments are removed.

4.5.2 Sediment Excavation Work

Engineering controls (e.g., turbidity curtain) will be implemented prior to the start of dredging operations to minimize the release of COCs and sediments to the river. Sediment excavation activities will proceed from either the shore out to the river center or from the center inward to the shore and from upstream to downstream. Sediment excavation may proceed from equipment staged on the shore or from a barge within the turbidity curtain. It is anticipated that sediment excavation will proceed at an approximate rate of 200 cy per work day. Sediment excavation will be performed using a closed bucket (e.g., closed clam shell bucket, environmental bucket). The primary purpose for this restriction is to minimize the amount of sediment suspension and COC dissolution during operations. Low-impact techniques will be utilized to further lower the potential for COC migration during dredging. Dredging using low-impact environmental techniques is a well-established practice, and numerous contractors are qualified to perform the work. The exact equipment utilized will be decided by the Contractor, with the stipulation that it meet the above provisions.

The entire area within the limits will be excavated to 4 feet below the river bottom, which is approximately 3 feet below the USACE dredging depth. Areas shown on Drawing C-3 with elevated COC concentrations will be over-excavated. The Engineer will collect post-excavation river sediment samples on a 50-foot grid or at a rate of 9 samples per acre. Samples will be analyzed for methylene chloride and acetone by USEPA method 8260. It is expected this excavation will remove all sediments exceeding the cleanup criteria, but if post-excavation river sediment samples exceed 1,133 ppb for methylene chloride or 773 ppb for acetone, AMEC will evaluate the remaining impacts and determine what action is necessary.

The Contractor will be responsible for determining appropriate spill-proof methods for the transport of dredged material from the excavation site to the sediment processing/stockpile area. Upland equipment utilized onsite will be subject to a 400 pounds per square foot uniform load limit in the vicinity of the existing shoreline sheet pile wall. Loads in excess of this limit must remain at least 50 feet back from the edge of the wall. The Contractor will be free to construct temporary load-bearing improvements to the wall, provided they meet the approval of the Engineer. The Contractor will be responsible for any placement of loads in excess of the

maximum specified limit. Excavation within 20 feet of the wall must proceed in a manner that limits exposure of the wall and will have to be backfilled with stone. The Contractor will be responsible for protecting the sheet pile wall and repairing any damage caused by its actions.

4.5.3 Turbidity Control

Turbidity curtains were determined to be the only implementable method (compared to structural solutions such as a sheet pile wall or cofferdam) because the river must remain open to vessel traffic. Advantages of the turbidity curtain system include its relative ease of construction, ability for adjustment, limited disturbance of bottom sediments during installation and removal, and reduced construction schedule and thus, impacts to ship traffic. It is recognized that the effectiveness of turbidity curtains is limited by environmental conditions such as currents; however, the conditions in the project area are sufficiently mild to allow a properly engineered system to perform adequately.

Control of turbidity during excavation operations will be accomplished with a system of inner and outer turbidity curtains. The turbidity curtain system will be installed prior to excavation work and will fully enclose the dredging area. The turbidity curtain will extend from the water surface to the river bottom. The turbidity curtain system will be movable to accommodate river traffic. Although a single curtain system would be effective, a two-curtain system will be employed to provide an extra measure of turbidity control and an additional safety factor because methylene chloride is an unusual sediment COC. Drawings C-1 and C-7 illustrate turbidity curtain layout and design details. The design for the turbidity curtain system is provided in Appendix 7.

Outer Curtain. The outer curtain shall be a SpillDam type II permeable curtain. This is a heavy-duty product designed to withstand wind, waves, and current. River velocity measurements were collected in May 2003 during sampling activities and the river current was found to consistently be approximately 1 foot per second. The turbidity curtain layout is designed to avoid 90-degree angles between the river flow and the curtain. This configuration optimizes curtain effectiveness. The outer curtain will require navigation markings in accordance with Coast Guard regulations. Markings are specified on Drawing C-7 and will be the responsibility of the Contractor.

Inner Curtains. The inner curtains shall be constructed of PVC, similar to the SpillDam 22-oz impermeable curtain, designed to withstand mild wind, waves, and current. The inner curtain will be deployed around the dredging area during dredge activities. The inner curtain must be adjustable to allow transport of scows or other equipment in and out of the work areas. However, all excavation must cease for a reasonable period as required to reduce turbidity prior to any required curtain openings. This inner silt curtain must also enclose all offloading operations undertaken to transport material to land. The inner curtains should be positioned a minimum of 10 feet from the dredge and barge equipment during dredging operations. Recommended details of the anchoring systems for the inner curtains may be found on Drawing C-7.

Operational Restrictions. It is recognized that the effectiveness of turbidity curtains decreases with increases in water currents. Consequently, dredge operations may be prohibited during flood periods or extreme weather. The Engineer will also perform turbidity monitoring to ensure the turbidity curtain is working properly during sediment excavation.

4.6 River Monitoring Program

The turbidity monitoring will be performed by the Engineer using turbidity measuring instruments that will provide real-time turbidity readings. These instruments will be used in an upstream/downstream arrangement and will be deployed in the zone where construction-related turbidity is most likely to be found. One background turbidity monitor will be located upstream of the site to provide background turbidity levels. A downstream monitor will be located approximately 300 feet downgradient of the turbidity curtain. The positions are detailed on Drawing C-1. A third monitoring point will be located between the inner and outer turbidity curtains.

AMEC will collect river water COC samples during dredging activities at a rate of one sample per day at the upstream and downstream locations. Samples will be collected 3 feet from the river bottom and analyzed for methylene chloride and acetone by USEPA method 8260. The upstream data will be used to establish background and the downstream data will be used to assess compliance. Methylene chloride will be compared to the 100-ppm USEPA acute toxicity

value. Additional sample collection may also be required during certain turbidity exceedances as discussed below.

In the event that turbidity readings inside the outer curtain exceed 50 NTUs or 50 percent more than the upstream turbidity value (whichever is greater), the Contractor will take immediate action to reduce the amount of sediment being suspended. Action will also be taken if readings outside the outer curtain exceed 40 NTUs or 20 percent more than the upstream turbidity value (whichever is greater). Action will also be taken if a visible turbidity plume attributable to remedial operations is observed more than 100 feet from the active operation and outside the outer turbidity curtain.

If immediate actions are not successful in reducing downstream turbidity to below these criteria within 60 minutes, as indicated by the monitoring instruments or by visual means, remedial operations shall cease. Water samples will then be collected outside the outer turbidity curtain at both the upstream and downstream monitoring station. These samples will be analyzed for methylene chloride and acetone by SW846 Method 8260. Methylene chloride will be compared to the 100-ppm USEPA acute toxicity value. Additional control measures will be evaluated by the Engineer and will be the responsibility of the Contractor to implement. Dredging activities can resume when the source of the problem has been corrected and downstream turbidity has been reduced below criteria.

5.0 PERMITTING

A Joint Permit Application will be submitted to obtain regulatory approval from NYSDEC Region 8 and the US Army Corps of Engineers, Buffalo District (hereafter USACE) for the proposed dredging activity. Federal approval by the USACE is applicable to this project in addition to State approval by NYSDEC because the proposed activity will occur within Navigable Waters of the United States. Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act apply federal-level jurisdiction for all regulated work within Waters of the United States and Navigable Waters of the United States, respectively.

This permitting approach was determined based on pre-application meetings or discussions among representatives of AMEC; Ms. Kimberly Merchant and Mr. David Pratt (NYSDEC Region 8); and Mr. Steve Metivier and Mr. Mike Asquith (USACE). The USACE and NYSDEC Region 8 will review the administrative and technical completeness of the Joint Permit Application. The USACE will also evaluate compliance of the proposed activity with elements of the US Army Corps New York Regional Conditions where deemed applicable. Because CSXT is conducting the proposed activities under NYSDEC's Voluntary Cleanup Program, an Environmental Assessment under the NYSDEC State Environmental Quality Review per 6NYCRR Part 617, is not anticipated to be required for this submission.

At a minimum, the Joint Permit Application will include the following major components:

- Joint Application for Permit Form
- Environmental Questionnaire
- Federal Consistency Assessment Form
- Site Plans

The distribution list of the completed Joint Permit Application will be as follows:

- US Army Corps, Buffalo District (2 copies)
- NYSDEC Region 8 (2 copies)

- NY Department of State, Division of Coastal Resources (1 copy)
- City of Rochester Local Waterfront Revitalization Program (1 copy).

6.0 CONSTRUCTION SEQUENCE AND SCHEDULE

This section includes a discussion of the sequence of construction and a proposed schedule for the remedial action. The schedule is extremely compressed to be consistent with the needs of NYSDEC and USACE. This construction sequence and schedule may change slightly based on the Contractor's methods, but is intended to help develop an understanding of the overall comprehensive design package.

6.1 Pre-Remediation Activities

Prior to construction, the Contractor will be required to provide the submittals and work plans required by the specifications and also to obtain any required local permits. All activities will be performed in accordance with the approved Work Plans.

6.2 Mobilization

The first element of construction will be mobilization. Mobilization will include establishment of the Engineer's and Contractor's office trailers as well as preliminary access and control facilities.

The next stage of construction will include the construction of water management facilities, the sediment unloading pad, sediment processing/stockpile pad, decontamination pad, and haul roads and the installation of the turbidity barrier.

6.3 River Area Excavation Sequence

Turbidity controls will be installed in the river. Sediment excavation activities will then proceed from the shore out to the river center or from the center to the shore and from upstream to downstream. When construction is complete, the turbidity controls will be removed and monitoring discontinued.

6.4 Post-Remediation Activities

When the site construction activities are completed, demobilization will occur. As part of demobilization, as-built drawings will be prepared and a final construction report will be provided to the NYSDEC. At the completion of demobilization, the ongoing monitoring programs will no longer be required.

6.5 Construction Schedule

AMEC has prepared a final schedule for the construction activities. The schedule, included as Appendix 8, is based on the anticipated construction sequence developed in this section. The schedule was developed using Microsoft Project, Version 4.0.

7.0 SUMMARY OF DESIGN

To provide a sound basis for preparation of the attached design, AMEC has performed regulatory reviews, product evaluations, industry standards reviews, design parameter analyses, and peer reviews. The drawings and specifications define the construction product. Project reviews have been performed throughout this design process to maintain quality control and to assure communication with the NYSDEC in order to provide a deliverable that meets the NYSDEC's expectations.

7.1 Design Submittal

The design submittal includes construction drawings and specifications for the Remedial Design at the Genesee River in Rochester, New York. This design report contains description of how the design has been developed and the process for the design, as well as the construction drawings and specifications.

7.1.1 Construction Drawings

Design drawings include the site drawings for the remedial action construction contract and are included in Appendix 9. The drawings present the layout of the project facilities showing location, dimensions, and alignment of components. Drawings are prepared to show the site, foundation plans, storage facilities, remediation activities, and remedial limits and details necessary to define and demonstrate the intended construction approach. Sizing of equipment and details are shown on the plans. The drawings are divided into four divisions, which include "T" or title drawing and "C" or civil engineering drawings. The drawings were developed on AutoCAD, Version 2000® and have been be prepared on "D" sized sheets (24 x 36 inches).

7.1.2 Construction Specifications

AMEC has prepared construction specifications for the remedial action. The specifications are based on the Construction Specification Institute format, which divides the project work into 17

divisions numbered from 00000 to 16000. Only the applicable divisions were utilized and include divisions 01000 and 02000. The specifications include all activities and components of the proposed work and are included in Appendix 10.

8.0 REFERENCES

1. New York State Department of Environmental Protection, 2002, *Draft DER-10 Technical Guidance for Site Investigation and Remediation,* December 25, 2002.

2. Shaw Infrastructure and Environmental, Monitoring Plan, October 17, 2002.

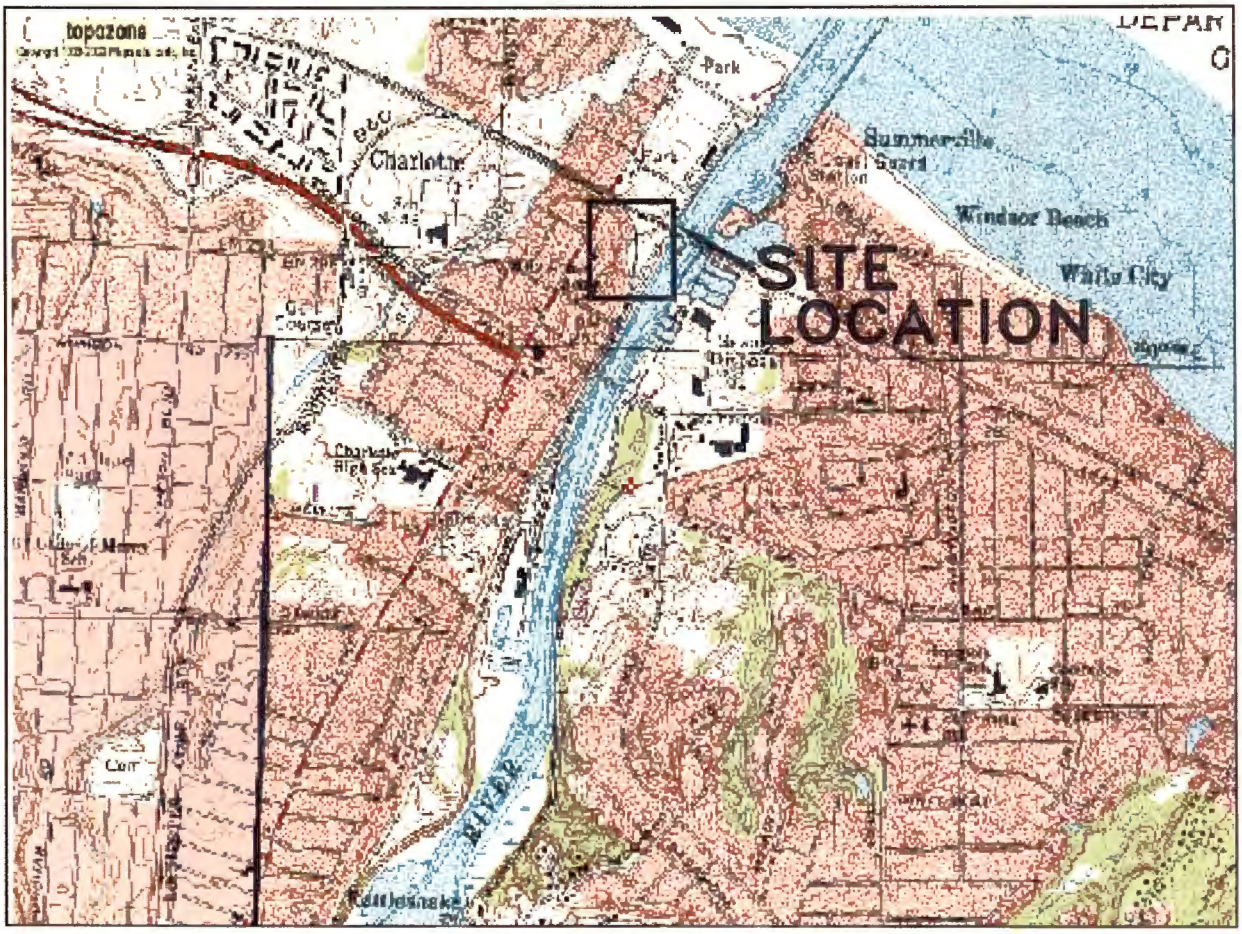
3. Shaw Infrastructure and Environmental, Post-IRM Report, March 10, 2003.

4. Genesee River Dredging Work Plan for CSXT Street Derailment Site, AMEC Earth & Environmental, Inc., June 18, 2003.

5. U.S. Environmental Protection Agency, 1994, Chemical Summary for Methylene Chloride (Dichloromethane), Office of Pollution Prevention and Toxics, August 1994.

6. U.S. Environmental Protection Agency, 1994, *Remediation Technologies Screening Matrix and Reference Guide*, Federal Remediation Technologies Roundtable, USEPA 542/B-94/013, NTIS PB95-104782, Washington, D.C., October 1994.

7. U.S. Environmental Protection Agency, 1988a, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA,* Interim Final, EPA/540/G-89/004, Office of Solid Waste and Emergency Response, (OSWER).



SOURCE: ROCHESTER, NEW YORK QUADRANGLE,
7.5 MINUTE TOPOGRAPHIC MAP, 1977

FIGURE 1

SITE LOCATION MAP
REMEDIAL DESIGN

CSXT GENESEE RIVER SITE
ROCHESTER, MONROE COUNTY, NY

amec
EARTH AND ENVIRONMENTAL, INC.
ONE PLYMOUTH MEETING, SUITE 850
PLYMOUTH MEETING, PA 19462-1308

APPENDIX 1

Correspondence

New York State Department of Environmental Conservation

Division of Environmental Remediation, Region 8

6274 East Avon-Lima Road, Avon, New York 14414-9519
Phone: (585) 226-5355 · **FAX:** (585) 226-8696

Website: www.dec.state.ny.us

February 13, 2003

Paul Kurzanski
CSX Transportation
500 Water Street, J-275
Jacksonville, FL 32203

Re: CSXT River Street Derailment Site #V00524-8
Rochester (C), Monroe (C)

Dear Mr. Kurzanski:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have received the January 15, 2003 "Estimated Methylene Chloride Cleanup Level Achievable with Environmental Dredging and Phase VI Sampling Results" report for the above referenced site.

Originally, the NYSDEC was seeking a 50 ppb methylene chloride sediment cleanup level. This was based on protection of surface water standards in Lake Ontario. However, CSXT has supplied evidence that the surface water at the spill area is not being significantly impacted by even the current contamination levels. Furthermore, CSXT's consultant claims that 50 ppb is technically unachievable. While there may be some merit to the claim that 50 ppb is not completely achievable, we do not agree with the January 15, 2003 report's statement that levels of up to 200,000 ppb may remain after valid efforts to dredge the contaminated sediments.

The Department has determined that CSXT's original proposed cleanup levels of 1,133 ppb for methylene chloride and 733 ppb for acetone are acceptable (these levels were calculated to be protective of aquatic receptors). However, in addition to the above:

- Regarding any area of the U.S. Army Corps of Engineers (USACE) navigation channel impacted with levels of methylene chloride and acetone by the spill (i.e. - above background levels): CSXT must dredge at least two feet below the USACE's planned dredging depth (or more if necessary to reach the above cleanup goals) in order to minimize the possibility of the USACE encountering contaminated sediments during their biennial dredging. This must take into account that the Federal navigation channel includes side slopes of 2:1.

- CSXT must continue to work cooperatively with the City of Rochester regarding the City's plans to dredge for boat slips along their River Street properties. This was discussed in our January 9, 2003 meeting. CSXT must actively address any methylene chloride or acetone contaminated sediments in the areas that the City needs to dredge in a manner consistent with the above stated requirements for the USACE navigational channel; specifically, CSXT must dredge to a depth below the City's planned dredging depth (or more if necessary to reach the above cleanup goals) in order to minimize the possibility of the City encountering contaminated sediments during their dredging project tentatively scheduled for summer 2003. Please provide me with an update on the progress of this work.

Given the possibility of cross-contamination, we would prefer that every effort be made to perform all the dredging at once.

In addition to the above dredging, CSXT must prepare a sediment management plan. The sediment management plan will need to outline procedures and provide assurances that CSXT will address any contaminated sediments that need to be disturbed in the future (by the USACE, the City of Rochester, etc.). This includes CSXT addressing dredging and proper disposal of sediments for the USACE should their "open lake disposal" option be abrogated due to contamination from the derailment. The sediment management plan will become a part of the Voluntary Cleanup Agreement. The sediment management plan will be in effect until CSXT can prove to the Department's satisfaction that the methylene chloride and acetone levels in the river sediments have reduced to background levels.

Please provide a work plan and schedule for the sediment dredging by February 28, 2003. Please also prepare a sediment management plan for our review. Furthermore, the USACE will need to be involved in the approval of this dredging, as well as to provide details of the navigational channel dredging areas. Our contact there is Steve Metivier at 716-879-4314. Please copy me on all correspondence with the USACE.

If you have any questions, please contact me.

Sincerely,

David G. Pratt, P.E.
Environmental Engineer 2

cc: Bart Putzig, NYSDEC
Frank Ricotta, NYSDEC
David Persson, NYSDEC
David Munro, NYSAG
David Napier, NYSDOH
Joseph Albert, MCHD
Steve Metivier, ACOE
Tim Ahrens, Shaw E&I
Tom Antonoff, Shaw E&I
Joe Biondolillo, City of Rochester

William Danis

CSX
TRANSPORTATION

Paul J. Kurzanski, REM
Director Environmental Remediation
Direct: (904) 359-3101
Fax: (904) 245-2826
E-mail: paul_kurzanski@csx.com

Environmental Department
500 Water Street, J275
Jacksonville, FL 32202

File: NY, Rochester – River Street
Project Number: 0200358

February 27, 2003

Mr. David G. Pratt, P.E.
Environmental Engineer
NYSDEC.
6274 East Avon-Lima Road
Avon, NY 14414-9519

Sediment Dredging - CSX Transportation, Inc.'s River Street Site, Rochester, New York, #V00524-8

Dear Mr. Pratt:

CSX Transportation, Inc. (CSXT) is in receipt of your letter, dated February 13, 2003 (received February 18, 2003) regarding the request for a work plan and schedule for sediment dredging by February 28, 2003.

Consistent with our on-going and often-stated commitment to work and cooperate with NYSDEC in addressing the material attributable to the December 23, 2001 derailment in the Charlotte section of Rochester, New York, CSXT will commit to dredge the impacted sediments from the navigation channel, adding to our prior commitment to work with the City of Rochester to address the impacted sediments in the proposed boat slip.

Upon the receipt of your letter, we instructed our consultants, Shaw Environmental (Shaw), to begin the work necessary to prepare a detailed work plan and schedule. It will take a minimum of twelve (12) weeks to develop such a detailed document. This schedule is based upon the following premises:

1) It is our belief and understanding that there is contamination in the river that is historic in nature and not attributable to the derailment. Accordingly, Shaw will simultaneously conduct detailed historical sediment investigation and plume delineation over the next eight (8) weeks. This will enable us to determine the extent of the contamination stemming from the December 23, 2001 derailment. While your letter states an "acceptable" cleanup target, we believe such a specific level may be impractical and not reflect the historic levels of material already impacting the sediment. The preparation of the work plan and schedule will take an additional four (4) weeks to complete.

2) At the same time, CSXT will continue its extensive biodegradation study to test our belief that monitored natural attenuation is an effective method of remediation for the impacted river sediments attributable to the December 23, 2001 derailment. We are disappointed by NYSDEC's apparent decision to request dredging without benefit of the final scientific results of the biodegradation study, after sharing with you the progress of attenuation to date, including results from our joint tests. These final results will be made available to you as soon as they are compiled.

3) The City of Rochester is planning to begin dredging work in the Genesee River this summer and we should coordinate schedules and investigate the possibility that these two efforts could be performed in a cooperative effort.

We will keep you fully advised of our progress during the process. Therefore, we are advising you by this letter that we are working in a most expeditious manner on this plan and schedule, but will not be able to do so in a thorough and complete manner prior to the date you requested. However, we want to make clear that we will fulfill our public stated commitment to continue to work with you on developing a dredging plan that addresses material attributable to the December 23, 2001 derailment and will be in contact with you shortly.

If you have any questions, please give me a call at (904) 359-3101

Very truly yours,

Paul J. Kurzanski
Director Environmental Remediation

Copy:
Mr. Timothy Ahrens, Shaw Environmental
Mr. John Casellini, CSXT
Mr. George Mackey, Hiscock Barclay Saperston & Day
Ms. Janet Scagnelli, CSXT
Mr. Robert Sullivan, CSXT

CSX
TRANSPORTATION

Paul J. Kurzanski, REM
Director Environmental Remediation
(904) 359-3101 (Direct)
(904) 245-2826 (FAX)
E-mail: paul_kurzanski@csx.com

File: Rochester, NY – River Street
Project Number: 0200358

May 1, 2003

Mr. David Pratt, PE
NYSDEC, Region 8
6274 East Avon-Lima Road
Avon, NY 14414

Dredging Work Plan Outline and Schedule Update for the River St. Derailment Site, Rochester, New York

Dear Mr. Pratt:

The purpose of this letter is to present you with a work plan outline that will be used for dredging activities in the Genesee River. As you will recall I responded to your February 13, 2003 letter in which you requested a work plan and schedule for dredging activities by February 28, 2003 with a letter dated February 27, 2003. In my letter I requested additional time (12 weeks) to properly prepare such a document.

At the time of our original correspondence Shaw E&I was CSXT's primary consultant for the River St. project. Approximately two weeks after my February 27, 2003 letter the second of two Shaw mangers from the project resigned to pursue a career with another company. After careful evaluation of the River St. project CSXT determined that it should be transitioned from Shaw to AMEC E&E where Tom Antonoff and Tim Ahrens had been hired.

I would also like to make you aware that we will be handling the on-land and on-water operations separately due to the different remedial stages and focus of each affected area. From this point forward deliverables sent to your attention will be area specific and titled accordingly (River St. and Genesee River).

Below you will find the outline and associated schedule for the dredging work plan. My intent is to keep you aware of our progress and CSXT's commitment to resolving the impending issues associated with the December 23, 2001 Derailment.

If you have any questions, please give me a call at (904) 359-3101 or call Tim Ahrens or Tom Antonoff of AMEC Consulting at (518) 372-0905.

Very truly yours,

Paul J. Kurzanski
Director Environmental Remediation

Genesee River Work Plan

Introduction

- Site Location
- Derailment Incident

Investigative Work To Date

- River Description – Shape of channel, currents and sediment description.
- Surface Water – Briefly describe sampling events and results.
- Sediment – Briefly describe sampling events and results.
- Delineation – Provide what is believed to be the estimated delineation to date.

Dredging Synopsis

- Purpose of Dredging – Why dredging is performed.
- Technology Involved – Description of a typical dredging project.
- Release Controls – The various types of controls available and their effectiveness.
- Summary – Dredging VOCs is not a common practice and why it is necessary to prepare properly.

Scope of Work

- Historical Sampling / Historical Research – Describe an additional sediment sampling event for the historical evaluation of acetone and methylene chloride, ensuring that there are no previous releases resulting in an increased plume.
- Technology Evaluation – Describe the efforts required to evaluate all available technologies due to the dredging of VOCs not being a common practice.
- Pilot Test – Describe the skeleton operations of a pilot test used for evaluating the effectiveness of dredging and the potential for impacts being released to the environment.
- Present Remedial Approach – The preparation and presentation of an additional document to all involved parties detailing the preferred remedial approach.
- Engineering Design and Specifications – Describe the engineering design process.
- Work with Army Corp for Permits – Detail the process involved in working with the USACE and obtaining their permission and permits.
- H&S – Develop a new health and safety plan and establish a modified community-monitoring plan due to the change in physical conditions.

Continued Monitoring - Reiterate the previously submitted Shaw E&I monitoring plan and CSX's commitment to continue it until remediation begins.

Communications – Detail the involvement of CSXT with the community, COR, NYSDEC, MCDOH, NYSDOH, USACE. Also propose the joint efforts of CSXT and COR to achieve a common goal through meetings and planning sessions.

Schedule – Briefly describe the anticipated schedule and provide a Gantt chart.

Below is a brief schedule of events required to complete work leading up to and including the dredging work plan. Each task identified below has an associated date that is either the month it will be conducted or the anticipated month for delivery. This schedule is broad however; a detailed Gantt chart with dates and durations will be submitted as part of the work plan. Please also recognize that any dredging work required close to the western banks of the River which may be required in order to facilitate the City's development plans may be addressed on a separate, accelerated schedule. The schedule below is intended to address the deeper sediments in the navigable channel of the Genesee River.

Phase VII River Sampling Plan	April '03
Phase VII River Sampling Event	May '03
Analysis of Phase VII Results	May '03
Phase VII Sediment Report	June '03
Dredging Work Plan	May '03
NYSDEC Review of DWP	June '03
Review of Shaw NA Study	May '03
Work with Army Corp	Various Dates
Historical Review of Genesee River	June '03
Final Plume Delineation (1,100 ppb)	June '03
Dredging Technology Evaluation	June '03
Pilot Test	July / August '03
Present Remedial Approach	September '03
DEC Review of Remedial Approach	October '03
Engineering Design and Specifications	January '04
Obtain Permits	January '04
Dredging HASP	January '04
Dredging CAMP	January '04

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 8
6274 East Avon-Lima Road, Avon, New York 14414-9519
Phone: (585) 226-5355 • **FAX:** (585) 226-8696
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

July 29, 2003

Paul Kurzanski
CSX Transportation
500 Water Street, J-275
Jacksonville, FL 32203

Re: CSXT River Street Derailment Site #V00524-8
Rochester (C), Monroe (C)

Dear Mr. Kurzanski:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have received the June 18, 2003 "Genesee River Dredging Work Plan." The work plan is approved, however, we offer the following comment:

The time frame for selection of a dredging technology is excessive. CSXT has had a year and a half to examine dredging technologies. CSXT has known since at least February 2003 that they were required to dredge the sediments. Please expedite the schedule presented in the work plan.

We have also enclosed a copy of the City of Rochester's comment letter regarding the dredging work plan. If you have any questions, please contact me.

Sincerely,

David G. Pratt, P.E.
Environmental Engineer 2

Enclosure

cc: Bart Putzig, NYSDEC
Frank Ricotta, NYSDEC
Dixon Rollins, NYSDEC
David Persson, NYSDEC
David Munro, NYSAG
Matt Forcucci, NYSDOH
Joseph Albert, MCHD
Joe Biondolillo, City of Rochester
Tim Ahrens, AMEC
William Danis

City of Rochester

FAX (585) 428-6010
TDD/Voice 232-3260

Department of Environmental Services

Office of the Commissioner
Division of Environmental Quality
30 Church Street, Rm 300B

Rochester, New York 14614-1278
Tel#: (585) 428-6294

July 18, 2003

Mr. David Pratt, P.E.
Division of Environmental Remediation, Region 8
New York State Department of Environmental Conservation
6274 East Avon-Lima Road
Avon, New York 14414

Re: CSXT River Street Derailment
Rochester, NY

Dear Mr. Pratt:

Thank you for opportunity for the City of Rochester (City) to provide comments to the New York State Department of Environmental Conservation (NYSDEC) regarding the Genesee River Dredging Work Plan (Work Plan) prepared by AMEC E&E (AMEC) on behalf of CSX Transportation (CSXT).

It is disappointing that nineteen (19) months after the CSXT River Street derailment which resulted in significant contamination of Genesee River Sediments, that the CSXT Work Plan does not include the selection of a specific remedy to remediate contaminated sediments. According to the AMEC cover letter, the selection of a specific remedy has been delayed in part since CSXT and AMEC have not been successful in finding dredging case studies that involve the dredging of volatile organic compounds (VOCs) such as methylene chloride in sediments. As you know, the City recently provided CSXT and AMEC with information regarding the dredging of high levels of VOCs in sediments at the Occidental Chemical site located at the Port of Tacoma, WA. It is anticipated that this new information will assist CSXT and AMEC in developing a specific dredging work plan to address Genesee River sediment contamination.

If you have any questions, please contact me at (585) 428-6649.

Sincerely,

Joseph J. Biondolillo
Sr. Environmental Special

cc: Paul Kurzanski, CSXT
Tim Aherns, Shaw
Joseph Albert, MCDOH
Linda Kingsley, City of Rochester
Edward Doherty, City of Rochester
Donald Crumb, City of Rochester
William Price, City of Rochester
Mark Gregor, City of Rochester
Gregory R. Senecal, LaBella

C:\MyFiles\CSX\CSXT44.wpd

APPENDIX 2

Sediment Sample Results Summary Table

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
SS-1 Top	03/19/2002	38	B	10	B	0.8
SS-1 Bottom	03/19/2002	28	B	9	B	
SS-2 Top	03/19/2002	48	B	13	B	0.75
SS-2 Bottom	03/19/2002	20	BJ	8	B	
SS-3 Top	03/19/2002	59	B	49	B	1.8
SS-3 Bottom	03/19/2002	37	B	8	B	
SS-4 Top	03/19/2002	23	BJ	11	B	1.05
SS-4 Bottom	03/19/2002	17	BJ	15	B	
SS-4A Bottom	04/04/2002	48		35	B	0.75
SS-5 Top	03/19/2002	ND		7,800		1.15
SS-5 Bottom DL	03/19/2002	49	B	30,000		
SS-5A Top	04/04/2002	300,000		5,400,000	B	1.67
SS-5A Middle	04/04/2002	ND		330,000	B	
SS-5A BottomDL	04/04/2002	36,000	U	440,000	BD	
SS-5A 1'	05/29/2002	1,515,152	U	770,000		5'
SS-5A 2'	05/29/2002	1,244,338	U	2,500,000		
SS-5A 3'	05/29/2002	360,000	U	8,800,000	BD	
SS-5A 4' DL	05/29/2002	91,000	D	1,400,000	BD	
SS-5A 5'	05/29/2002	1,600	J	15,000	B	
SS-5A 1'	09/18/2002	62		18	U	6'
SS-5A 3'	09/18/2002	226		45		
SS-5A 6'	09/18/2002	225		17.2	U	
SS-5A 1'	10/24/2002	91		3,800		6'
SS-5A 3'	10/24/2002	35		1,100		
SS-5A 6'	10/24/2002	29		590		
SS-5A 1'	05/07/2003	94		7		8
SS-5A 3'	05/07/2003	86	B	64		
SS-5A 7.5'	05/07/2003	76		26		
SS-6 Top	03/19/2002	35		22	B	0.92
SS-6 Bottom	03/19/2002	49		20	B	
SS-6A Bottom	04/04/2002	60		240	B	0.75
SS-7 Top	03/19/2002	35		22	B	0.95
SS-7 Bottom	03/19/2002	56		18	B	
SS-8 Top	03/19/2002	19	J	11	B	0.8
SS-8 Bottom	03/19/2002	34		15	B	
SS-9 Top	03/19/2002	15	J	82	B	0.55
SS-9 Bottom	03/19/2002	81	J	10	B	
SS-10 Top	03/19/2002	22	J	18	B	0.75
SS-10 Bottom	03/19/2002	21	J	11	B	
SS-11 Top DL	03/19/2002	0		12,000,000		0.57
SS-11 Bottom	03/19/2002	ND		11,000,000		
SS-11A Top	04/04/2002	26,000		800,000	BE	1.08
SS-11A Bottom	04/04/2002	25,000		1,100,000	BE	
SS-11 A 1'	05/29/2002	772,034	U	920,000		7'
SS-11 A 2'	05/29/2002	1,444,586	U	1,400,000		

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
SS-11 A 3'	05/29/2002	3,125	U	22,000	B	
SS-11 A 4'	05/29/2002	3,125	U	4,000	B	
SS-11 A 5'	05/29/2002	520	J	5,600	B	
SS-11 A 6'	05/29/2002	1,354	U	1,400		
SS-11 A 7'	05/29/2002	6,329	U	3,400		
SS-11A 1'	09/18/2002	64		18.5	U	10'
SS-11A 3'	09/18/2002	47		16.8	U	
SS-11A 4'	09/18/2002	36.9	U	18.5	U	
SS-11A 5'	09/18/2002	34		16.9	U	
SS-11A 7'	09/18/2002	28.6	U	14.3	U	
SS-11A 10'	09/18/2002	35		17.5	U	
SS-11A 1'	10/24/2002	65		1,800		5.5'
SS-11A 3'	10/24/2002	30,000	U	2,400,000		
SS-11A 4'	10/24/2002	14,000	U	1,700,000		
SS-11A 1'	12/11/2002	30,000	U	2,100,000		4'
SS-11A 2.5'	12/11/2002	28,000	U	1,400,000		
SS-11A 4'	12/11/2002	340	U	32,000		
SS-11A 1'	05/07/2003	460,000	U	4,000,000		9.5
SS-11A 4'	05/07/2003	170		900		
SS-11A 9'	05/07/2003	55	B	51		
SS-12 Top	03/19/2002	ND		180	B	1.05
SS-12 Bottom	03/19/2002	35	B	31	B	
SS-12A Top	04/04/2002	26		10	B	1.08
SS-12A Bottom	04/04/2002	41		33	B	
SS-13 Top	03/19/2002	ND		30	B	1.2
SS-13 Bottom	03/19/2002	150	B	52	B	
SS-15 Bottom	04/04/2002	ND		750,000	B	0.8
SS-15 1'	10/24/2002	32		170		5
SS-15 3'	10/24/2002	33		3,300		
SS-15 5'	10/24/2002	27		2,000		
SS-15 1'	05/07/2003	42,000	U	1,100,000	E	10
SS-15 1' DL	05/07/2003	110,000	U	560,000		
SS-15 5'	05/07/2003	160		230		
SS-15 9.5'	05/07/2003	98		36		
SS-15A 1'	05/29/2002	141,808	U	330,000		7'
SS-15A 2'	05/29/2002	736,941	U	770,000		
SS-15A 3' DL	05/29/2002	6,900	U	100,000	BE	
SS-15A 4'	05/29/2002	3,125	U	5,900	B	
SS-15A 5'	05/29/2002	3,125	U	2,900	B	
SS-15A 6'	05/29/2002	750		326	U	
SS-15A 7'	05/29/2002	696	U	400		
SS-16 Top	04/04/2002	ND		30,000	B	1.5
SS-16 Middle	04/04/2002	ND		56,000	BE	
SS-16 Bottom	04/04/2002	ND		2,400,000	BE	
SS-16 A 1'	05/29/2002	270		250		7'

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
SS-16A 2'	05/29/2002	70,490	U	130,000		
SS-16A 3'	05/29/2002	3,125	U	3,900	B	
SS-16 A 4'	05/29/2002	3,125	U	2,000	B	
SS-16 A 5'	05/29/2002	31	B	44	B	
SS-16 A 6'	05/29/2002	150		290		
SS-16 A 7'	05/29/2002	120		59	U	
SS-16A 1'	05/07/2003	63	B	29		9
SS-16A 4'	05/07/2003	30	B	14	B	
SS-16A 8.5'	05/07/2003	83	B	47		
SS-17 Top	04/04/2002	120		38	B	1.42
SS-17 Bottom	04/04/2002	54	B	50	B	
SS-18 Top	04/04/2002	57		49	B	1.12
SS-18 Bottom	04/04/2002	39	B	32	B	
SS-19 Bottom	04/04/2002	ND		960,000	B	0.71
SS-19 A 1'	05/29/2002	7,545,575	U	10,000,000		5'
SS-19 A 2'	05/29/2002	680,846	U	640,000		
SS-19A 3' DL	05/29/2002	6,600	D	53,000	BD	
SS-19A 4' DL	05/29/2002	15,000	D	100,000	BD	
SS-19A 5'	05/29/2002	3,125	U	3,700	B	
SS-19A 1'	10/24/2002	3,300	U	1,100,000		5
SS-19A 2.5'	10/24/2002	33,000	U	5,000,000		
SS-19A 5'	10/24/2002	2,700	U	2,900,000		
SS-19A 1'	12/11/2002	28,000	U	2,200,000		4.5'
SS-19A 2.5'	12/11/2002	330	U	45,000		
SS-19A 4.5'	12/11/2002	76		10,000		
SS-19A 1'	05/07/2003	1,100,000	U	15,000,000		6.5
SS-19A 3'	05/07/2003	20,000	U	190,000		
SS-19A 6"	05/07/2003	67	U	1,600	E	
SS-19A 6'DL	05/07/2003	3,125	U	2,200	D	
SS-20 Top	04/04/2002	25		14	B	1.25
SS-21 Top	04/04/2002	67		35	B	
SS-22 Top	04/04/2002	33		19		1.16
SS-23 Top	04/04/2002	ND		14,000,000	B	1.04
SS-23 BottomDL	04/04/2002	370,000	D	7,000,000	BD	
SS-23 A 1'	05/29/2002	163	U	82	U	6'
SS-23 A 2'	05/29/2002	127	U	63	U	
SS-23 A 3'	05/29/2002	38	B	47	B	
SS-23 A 4'	05/29/2002	28	B	91	B	
SS-23 A 5'	05/29/2002	41	B	44	B	
SS-23 A 6'	05/29/2002	77		34	U	
SS-24 Top	04/04/2002	ND		58,000	B	1
SS-24 BottomRE	04/04/2002	ND		770,000	BD	
SS-24 1'	05/07/2003	400,000	U	3,800,000		7
SS-24 3'	05/07/2003	3,125	U	19,000		
SS-24 6.5'	05/07/2003	17	BJ	21		

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
SS-24 A 1'	05/29/2002	781,152	U	690,000		7'
SS-24 A 2'	05/29/2002	1,275	U	2,200		
SS-24 A 3'	05/29/2002	3,125	U	4,200	B	
SS-24 A 4'	05/29/2002	3,125	U	1,100	B	
SS-24 A 5'	05/29/2002	3,125	U	1,600	B	
SS-24 A 6'	05/29/2002	1,130	U	760		
SS-24 A 7'	05/29/2002	108	U	110		
SS-24A 1'	10/25/2002	67		320		4.5
SS-24A 2.5'	10/25/2002	32		76	J	
SS-24A 4.5'	10/25/2002	39		700		
SS-24A 1'	05/07/2003	93	B	14	B	6.5
SS-24A 3'	05/07/2003	28		6		
SS-24A 6'	05/07/2003	17	BJ	38		
SS-25 Top	04/04/2002	60		23	B	1.08
SS-25 Bottom	04/04/2002	35		32	B	
SS-26 Top	04/04/2002	8,600	U	9,500	BD	1
SS-26 Bottom	04/04/2002	51	B	97	B	
SS-26 1'	05/07/2003	42		19		6.5
SS-26 3'	05/07/2003	35	B	25	B	
SS-26 6'	05/07/2003	28	B	30		
SS-27 Top	04/04/2002	50		64	B	1.25
SS-27 Bottom	04/04/2002	30	B	70	B	
SS-27 1'	05/07/2003	21	BJ	10	B	8.5
SS-27 4'	05/07/2003	14	BJ	7	B	
SS-27 8'	05/07/2003	25	B	27		
SS-28 Top	04/04/2002	17	J	14	B	1.04
SS-29 Top	04/05/2002	51		250	B	1.13
SS-29 Bottom	04/04/2002	89	B	64	B	
SS-29 1'	05/07/2003	74	B	23		9
SS-29 1' RI	05/07/2003	42		11		
SS-29 4'	05/07/2003	69	B	16	B	
SS-29 8.5'	05/07/2003	22	BJ	50		
SS-30 Top	04/05/2002	45		22	B	1.16
SS-31 Bottom	04/05/2002	55		82	B	0.75
SS-40 1'	05/29/2002	145	U	73	U	5'
SS-40 2'	05/29/2002	121	U	60	U	
SS-40 3'	05/29/2002	54	B	16	B	
SS-40 4'	05/29/2002	46	B	13	B	
SS-40 5'	05/29/2002	14	BJ	24	B	
SS-42 1'	09/18/2002	105		18.2	U	4'
SS-42 2.5'	09/18/2002	39.1	U	19.5	U	
SS-42 4'	09/18/2002	27.4	U	13.7	U	
SS-43 1'	09/18/2002	200		19.9	U	9'
SS-43 4'	09/18/2002	40		17.6	U	
SS-43 6'	09/18/2002	65		17.9	U	

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
SS-43 9'	09/18/2002	32.2	U	16.1	U	
SS-43 1'	12/11/2002	93		17	J	10'
SS-43 4'	12/11/2002	57		16	J	
SS-43 7'	12/11/2002	86		17	J	
SS-43 10'	12/11/2002	97		19	J	
SS-43 1'	05/07/2003	19	J	13		6.25
SS-43 3'	05/07/2003	40		12		
SS-43 6'	05/07/2003	22	BJ	9	B	
SS-43 6' DUP	05/07/2003	17	J	12		
SS-44 1'	09/18/2002	43		16.8	U	9'
SS-44 4'	09/18/2002	34.9	U	17.4	U	
SS-44 7'	09/18/2002	35		17.2	U	
SS-44 9'	09/18/2002	61		19.3	U	
SS-45 1'	09/18/2002	747,116	U	750,000		6'
SS-45 4'	09/18/2002	1,333	U	3,400		
SS-45 6'	09/18/2002	106.3	U	81		
SS-45 1'	10/24/2002	30		220		5
SS-45 3'	10/24/2002	58		56	J	
SS-45 5'	10/24/2002	50		46	J	
SS-45 1'	05/07/2003	20,000	U	300,000		6.5
SS-45 3'	05/07/2003	3,125	U	4,100		
SS-45 6'	05/07/2003	53	B	43		
SS-46 1'	09/18/2002	115		19.9	U	10'
SS-46 3'	09/18/2002	37.6	U	18.8	U	
SS-46 5'	09/18/2002	32.6	U	16.3	U	
SS-46 7'	09/18/2002	69		14.6	U	
SS-46 9.5'	09/18/2002	320		20.6	U	
SS-46 1'	12/11/2002	80		20	J	7'
SS-46 3.5'	12/11/2002	90		18	J	
SS-46 7'	12/11/2002	13		240		
SS-47 1'	09/18/2002	36		16.2	U	7'
SS-47 2'	09/18/2002	45		18	U	
SS-47 5'	09/18/2002	32.9	U	16.4	U	
SS-47 7'	09/18/2002	28.8	U	14.4	U	
SS-48 1'	09/18/2002	157		19.5	U	9'
SS-48 2'	09/18/2002	32		16.1	U	
SS-48 4'	09/18/2002	32	U	15.4	U	
SS-48 6'	09/18/2002	33.8	U	16.9	U	
SS-48 9'	09/18/2002	28.8	U	14.4	U	
SS-49 1'	09/18/2002	35.3	U	17.7	U	6'
SS-49 3'	09/18/2002	36.5	U	18.2	U	
SS-49 6'	09/18/2002	41		18.9	U	
SS-50 1'	09/18/2002	131		18.1	U	4'
SS-50 2'	09/18/2002	41		18.4	U	
SS-50 4'	09/18/2002	65		18.6	U	

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
SS-51 1'	09/18/2002	34.7	U	17.4	U	7'
SS-51 3'	09/18/2002	38		16.5	U	
SS-51 5'	09/18/2002	29.7	U	14.9	U	
SS-51 6.5'	09/18/2002	30.7	U	15.4	U	
SS-52 1'	09/18/2002	78		18.3	U	7'
SS-52 2'	09/18/2002	35.7	U	17.9	U	
SS-52 5'	09/18/2002	31.2	U	15.6	U	
SS-52 7'	09/18/2002	30.4	U	15.2	U	
SS-52 1'	05/07/2003	57	B	8	B	8.5
SS-52 4'	05/07/2003	28	B	6	U	
SS-52 8'	05/07/2003	16	BJ	16		
SS-53 1'	09/18/2002	60		17.8	U	7.5'
SS-53 3'	09/18/2002	169		18.3	U	
SS-53 5'	09/18/2002	30.4	U	15.2	U	
SS-53 7.5'	09/18/2002	29	U	14.5	U	
SS-54 1'	09/17/2002	182		20	U	5'
SS-54 3'	09/17/2002	39		16.7	U	
SS-54 5'	09/17/2002	33		14.8	U	
SS-54 1'	05/07/2003	46	B	8		7.5
SS-54 3'	05/07/2003	51	B	9	B	
SS-54 7'	05/07/2003	16	J	22		
SS-54 8'	05/07/2003	15	BJ	50	B	
SS-55 1'	09/17/2002	46		17.6	U	8'
SS-55 3'	09/17/2002	67		17.7	U	
SS-55 5'	09/17/2002	32		15.6	U	
SS-55 8'	09/17/2002	30.3	U	15.2	U	
SS-56 1'	09/17/2002	96		19.8	U	7'
SS-56 3'	09/17/2002	38		17.1	U	
SS-56 5'	09/17/2002	40		16.7	U	
SS-56 7'	09/17/2002	28.6	U	14.3	U	
SS-57 1'	09/17/2002	226		19.7	U	4'
SS-57 3'	09/17/2002	37.9	U	18.9	U	
SS-57 4'	09/17/2002	28.7	U	14.3	U	
SS-58 1'	09/17/2002	34		16.3	U	7'
SS-58 2'	09/17/2002	84		19	U	
SS-58 4'	09/17/2002	94		19.2	U	
SS-58 7'	09/17/2002	48		17	U	
SS-59 1'	10/25/2002	76		420		7
SS-59 4'	10/25/2002	100		7,300		
SS-59 7'	10/25/2002	56		290		
SS-60 1'	10/25/2002	100		620		4
SS-60 2.5'	10/25/2002	2,500	U	1,000,000		
SS-60 4'	10/25/2002	2,900	U	350,000		
SS-61 1'	10/25/2002	3,200	U	390,000		4
SS-61 2.5'	10/25/2002	2,900	U	2,000,000		

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
SS-61 4'	10/25/2002	32		12,000		
SS-62 1'	10/25/2002	130		950		5
SS-62 3'	10/25/2002	96		1,400		
SS-62 5'	10/25/2002	41		730		
SS-62 1'	05/07/2003	64	B	7	U	8.5
SS-62 3'	05/07/2003	40	B	10		
SS-62 8'	05/07/2003	20	J	38		
SS-63 1'	10/25/2002	3,200	U	280,000		4
SS-63 2.5'	10/25/2002	2,800	U	6,600,000		
SS-63 4'	10/25/2002	2,800	U	2,700,000		
SS-63 1'	12/11/2002	66		19	J	7.5'
SS-63 3.5'	12/11/2002	14	U	20	J	
SS-63 7'	12/11/2002	11	U	44	J	
SS-63 1'	05/07/2003	39	B	10		6.5
SS-63 3'	05/07/2003	49	B	20		
SS-63 6'	05/07/2003	16	J	47		
SS-64 1'	10/25/2002	3,200	U	370,000		4
SS-64 2.5'	10/25/2002	3,000	U	2,300,000		
SS-64 4'	10/25/2002	170		100,000		
SS-65 1'	12/11/2002	100		21	J	6'
SS-65 3'	12/11/2002	14	U	23	J	
SS-65 6'	12/11/2002	29		67		
SS-66 1'	12/11/2002	68		19	J	6'
SS-66 3'	12/11/2002	42		85		
SS-66 6'	12/11/2002	310		83		
SS-67 1'	12/11/2002	18		14	J	8'
SS-67 4'	12/11/2002	79		18	J	
SS-67 8'	12/11/2002	12		46		
SS-68 1'	12/11/2002	53		18	J	3.5'
SS-68 2'	12/11/2002	100		20	J	
SS-68 3.5'	12/11/2002	61		19	J	
SS-69 1'	05/07/2003	32	B	27	B	5.75
SS-69 3'	05/07/2003	26		30		
SS-69 5'	05/07/2003	25	B	24	B	
SS-70 1'	05/07/2003	49		15		3
SS-70 3'	05/07/2003	42	B	14	B	
SS-70 3' RI	05/07/2003	33		13		
SS-71 1'	05/07/2003	51		12		10
SS-71 5'	05/07/2003	32	B	15	B	
SS-71 9.5'	05/07/2003	13	J	9		
SS-72 1.5'	05/07/2003	56		12		
SS-72 3'	05/07/2003	34	B	9	B	
WS-1 1'	05/06/2003	74	B	11	B	6.5
WS-1 3'	05/06/2003	60	B	12		
WS-1 6'	05/06/2003	18	BJ	48		

CSXT Genesee River Site
Sediment Sample Results Summary Table (by sample location)

Sample ID	Sample Date	Acetone (ppb)		Methylene Chloride (ppb)		Core Length (ft)
WS-2 1'	05/06/2003	54	B	14		7.5
WS-2 3'	05/06/2003	49	B	11	B	
WS-2 7'	05/06/2003	96	B	64		

Notes:
B=Analyte found in blank
D=Dilution
E= Analyte exceeded the calibration range
J= Estimated Result

APPENDIX 3

Sediment Excavation Volume Estimate

Volume Estimate Procedure

The volume estimate was calculated using Land Development Desktop 3. Surface layers were created for the existing contours and the proposed excavation bottom contours and the volume between the surfaces was calculated via both the grid and composite methods. Volume was calculated between these surfaces for the area within the limits of excavation (2053 cy). The volume was also calculated for the area within the daylight line (2829 cy). The results page from Land Development Desktop 3 is attached. If the maximum allowance for excavation (0.5') is used the maximum excavation volume could be 3183 cy (2829 cy x 4.5'/4').

Site Volume Table: Unadjusted

Cut cu.yds	Fill cu.yds	Net cu.yds	Method
Site: Genesee River Final			
Stratum: fg to existing channel	**existing channel bottom**		**finished grade**
2813	0	2813	(C) Grid
2830	1	2829	(C) Composite
Stratum: fg to existing channel no slopes	**existing channel bottom**		**finished grade no slopes**
1994	0	1994	(C) Grid
2053	0	2053	(C) Composite

APPENDIX 4

Air and Water Modeling

ESTIMATION OF AIR QUALITY IMPACTS OF DREDGING THE GENESSEE RIVER

Emissions of methylene chloride from the sediment dredging and dewatering activities have been estimated in order to model their potential impact upon air quality in the area. Emissions of methylene chloride were estimated for four separate activities associated with the removal of impacted sediment from the river bed, including the actual dredging, the exposure of the sediment to atmosphere on the barge, the transfer of sediment from the barge to the process area and the dewatering of the sediment pile. Air quality modeling was then conducted to assess the impact of these emissions on ambient air in the surrounding area.

Emission Estimates

Worst-case air emissions would be expected to occur from the dredging of sediment from the hot spot in the north area of the impacted sediment. Two sampling locations, SS-11 A and SS-19 A, have consistently demonstrated among the highest concentrations of methylene chloride in the river bed, with concentrations ranging up to 15,000 mg/kg in the top one foot.

Emissions estimates were derived in accordance with EPA Air/Superfund National Technical Guidance documents (U.S. EPA 1993, U.S. EPA 1996)

Worst-case emission rate calculations are based on the assumption that one quarter of the top 4 feet of the hot spot area would be dredged during a single day. Based on an estimated dredging rate of 25 yd^3/hour, this would take approximately 1 hour. Less impacted sediment would be dredged from surrounding areas during the remaining hours of the workday, filling the scow with a total of 200 yd^3 dredged sediment.

Multiple sampling events at these two locations have generated concentration data over a wide range for each depth sampled. This may indicate some non-homogeneity of the methylene chloride, so that sampling at slightly different spots does not result in the same concentrations for the location. There also may have been changes in the depth profile with time. The total loading of methylene chloride in the top four feet of the sediment was therefore calculated using the average concentrations for each depth interval from 1 to 4 feet. Using this approach, it was estimated that the top 4 feet of the hot spot contains 264 kg of methylene chloride.

Finally, it was assumed that the dredging operation would be conducted in the spring or fall, with an average temperature of 60°F.

Dredging

Emissions from dredging were calculated using the following equation:

$$X = 0.72(K_d t)^{1/2}$$

Where X = fraction of pollutant that is emitted during dredging operation
K_d = contaminant volatilization constant, and
T = time in seconds

The pollution volatilization constant is determined using:

$Kd = H\ D_e\ pi^2\ /4\ l^2$

Where H = Henry's Law constant
D_e = effective diffusivity of the contaminant in sediment air pores
pi = 3.1419
L = depth of excavation

The effective diffusivity is estimated using the equation:

$$De = [K_{eq}*D_a*(E_a^{10/3})/E_T^2)+D_w(E_W^{10/3})/E_T^2]/[p_{sed}*k_d + EW + E_a k_{eq}]$$

Where
D_a = diffusivity of compound in air
E_a = air-filled porosity of sediment
E_T = total porosity of sediment
D_W= diffusivity of contaminant in water
p_{sed} = sediment/water bulk density
K_d = distribution coefficient

The distribution coefficient, kd, was estimated as follows:

$k_d = 0.63*X_{oc}*K_{ow}$
Where

K_{ow} = Octanol-water partition coefficient,
0.63 = Empirical constant
Xoc = weight fraction of organic carbon in the sediment

The organic carbon value used was the average of measurements taken in the summer of 2003 from sediments upstream of the impacted areas.

Emissions from the dredging operation at the hot spot were calculated to be 0.0097g/sec for a period of approximately 1 hour. Dredging emissions on the average for the entire program are estimated at 0.00766 g/sec.

Scow Emissions
The dredged material will be placed in a scow with no overflow permitted. It is assumed that the material as dredged will be approximately 45% water, 55% sediment, as was determined for sediment samples collected for the treatability studies. The scow will be loaded during one workday and then unloaded on the following day.

It was assumed that the scow would be filled with the material from the ¼ of the top 4 feet of the hot spot plus dredged material from surrounding areas with lower concentrations of methylene chloride. Emissions were calculated based on a maximum concentration of methylene chloride in the non-hot spot sediment of 500,000 ug/kg. Since the overall average concentration for the impacted sediment that will be dredged is 228,000 ug/kg, this is a conservative estimate.

Equations in EPA guidance for volatile emissions from pooled aqueous-phase contaminants were used to calculate the emissions flux from the scow. It was assumed that the scow would be approximately 50ft by 30 ft in dimension.
The methylene chloride emissions were calculated using:

$F_i = K_i C_{li} 1*10^4$

Where:

F_i = maximum flux of component, g/m2-sec

K_i = overall mass transfer coefficient of i, cm/sec

C_{li} - liquid-phase concentration of i, g/cm3

The liquid phase concentration of methylene chloride was calculated using the soil/water partition coefficient, k_p calculated as follows:

Koc=Kp/foc
Where:
Koc = organic carbon partition coefficient
foc = fraction of organic carbon in soil (measured average of 0.013)
kp = soil water partition coefficient = conc. in soil/conc in water

The overall mass transfer coefficient for the methylene chloride was calculated using:

$1/K = 1/k_{iL} + RT/Hi\ k_{iG}$

Where
k_{iL} = liquid phase mass transfer coefficient of methylene chloride
R = ideal gas constant
T = average system temperature
H = Henry's law constant for methylene chloride
k_{iG} = gas phase mass transfer coefficient

The liquid phase mass transfer coefficient for methylene chloride was calculated using:

$K_{iL} = (MW_{O2}/MW_i)^{0.5} (T/298) (K_{L,\ O2})$

Where:
Mw_{O2}, MW_i = molecular weight of oxygen gas, (32), and methylene chloride, (85)
T = average system temperature
k_L, O2 = liquid phase mass transfer coefficient of oxygen

The gas phase mass transfer coefficient was estimated using:

$K_{iG} = MW_{H2O}/MW_i^{0.335} (T/298)^{1.005} k_{G,H20}$

Where

$K_{G,H2O}$ = gas phase mass transfer coefficient of water vapor
MWH2O, MWi = molecular weight of water(18) and methylene chloride(85)
T = Average system absolute temperature

Scow emissions for the worst case were estimated to be 0.00612 g/m^2-sec, or 0.851 g/sec for a scow with a length of 50 feet and a width of 30 feet. The project average emissions from the scow are estimated to be 0.291 g/sec.

Unloading of scow:
Since the material held on the scow without overflow will remain as a fully saturated sediment, its removal from the scow can be compared to a second dredge operation. Using the same equations a previously applied, emissions from the unloading operation of the worst case load were estimated at .00663 g/sec. Average unloading emissions were estimated at 0.00225 g/sec.

Dewatering
Sediment dewatering would begin as soon as the material was unloaded from the scow and water allowed to drain from the solid material. The fraction of methylene chloride that would be emitted over the short term from dewatering operations in the absence of any controls were estimated using:

$X= 0.0068*P^{0.95}/ [1+0.0068*P^{0.95}]$

Where
P = vapor pressure of methylene chloride
X = fraction of pollutant that is emitted.

For methylene chloride, this equation predicts that 64.7% of the total loading will be lost during dewatering.

Taking into account the losses of methylene chloride from emissions during dredging, while on the scow and during unloading, a predicted emission rate for 2 days dewatering of the worst case scow load would be 0.431 g/sec. If the pile was dewatered for a total of 5 days, the average emission rate would be 0.172 g/sec. Average dewatering emissions are predicted to be 0.147g/sec for 2 day dewatering and 0.0590 g/sec for 5 day dewatering. Control measures could significantly reduce the emission rates for dewatering. Copies of the spreadsheet calculations for these emission estimates are included at the end of this document.

Air Dispersion Modeling Study

The following sections provide the approach and methods used to evaluate the potential for emissions from sediment dredging and dewatering operations to exceed the New York State Department of Environmental Conservation's (NYSDEC) Short-terms Concentration Guideline (SCG) for methylene chloride.

Approach and Methods

For this assessment, the EPA-approved dispersion model, ISCST3, was used to estimate the worst-case short-term potential air concentrations of methylene chloride resulting from the proposed sediment operations. The ISCST3 model is a steady-state

Gaussian dispersion model that uses site-specific, user-supplied input such as emission rates, emission source characteristics, hourly meteorological data, and receptor locations to estimate maximum ground level concentrations of airborne substances at specified receptor locations. The maximum ground level concentrations computed with the ISCST3 model result from the proposed dredging, short-term barge or scow dredge spoil storage and transfer, and dewatering operations only and do not include "background" levels.

The emissions estimates for the proposed dredging, short-term barge or scow dredge spoil storage and transfer, and dewatering operations derived above were used as input to the dispersion model. In addition, 5 years (1987-1991) of hourly surface meteorological observations from the Rochester airport were used as input to the model. Concurrent upper air meteorological data from Buffalo airport were also used as model input. The model was run in "regulatory default" mode using rural dispersion coefficients.

Model receptor locations were established on a 100m x 100m Cartesian grid. In addition, six discrete receptors were located in the vicinity of the restaurant located east of the proposed sediment processing area. A total of 186 receptors were evaluated.

Two area sources of emissions were used in the model. The first emission source consists of the combined emissions from the proposed hot spot sediment dredging, the barge short-term barge or scow dredge spoil storage, and transfer of the dredge material from the barge or scow to trucks. The second emission source is the dewatering operations that will occur in the dredge spoil processing area. The emission source locations are shown in Figure 1. The model was run twice, once to assess a 2-day dewatering time and second time to assess a 5-day dewatering time.

Emissions were assumed to occur concurrently throughout the day[1]. In addition, because the schedule for the dredging operation has not yet been finalized, the model was programmed to evaluate every day of the year. Model output is maximum 1-hour concentrations at each receptor location. The model input files are provided at the end of this document.

Air Dispersion Modeling Results

Figures 1 and 2 summarize the results of the dispersion modeling assuming a 2-day and 5-day dewatering operation, respectively. As shown in Figure 1, the predicted worst case 1-hour concentration of methylene chloride resulting from the emissions from the scow should not exceed the NYSDEC SCG of 14,000 ug/m^3. The maximum concentration predicted in close proximity to the scow was approximately 13,000 ug/m3. Figure 1 also shows that air concentrations resulting from dewatering operation are not predicted to exceed the SCG.

Figure 2 illustrates the results of the dispersion modeling assuming a 5-day dewatering program. The predicted air concentrations of methylene chloride proximate to the scow

[1] Although dredging and transfer operations will cease during non-worker hours, emission from the short-term barge storage and the dewatering operations are assumed to continue (i.e., these emission sources are not covered).

would not exceed the SCG in this case either. Similar to 2-day dewatering, the predicted levels of methylene chloride in the dewatering area are less than the SCG using the 5-day dewatering time.

In no instances do the predicted levels of airborne methylene chloride exceed the SCG at the restaurant, regardless of the dewatering time.

References

U.S. EPA 1993. Air/Superfund National Guidance Technical Guidance Series: Models for Estimating Air Emission Rates from Superfund Remedial Actions. EPA-451/R-93-001. March 1993

U.S. EPA 1996. Air/Superfund National Guidance Technical Guidance Series: Guideline for Predictive Baseline Emissions Estimation for Superfund Sites. EPA-451/R-96-001.November 1995

ISCST3 Input File – 2 Day Dewatering Operation

```
**BEE-Line Software: BEEST for Windows (Version 8.98) data input file
** Model: ISCST3     File Creation Date: 08/15/2003  Time: 2:48:47 PM
NO ECHO


CO STARTING
CO TITLEONE CSX - Genesee River Dredge Project
CO TITLETWO Preremedial Air Dispersion Modeling  2-day dewatering
CO MODELOPT DFAULT CONC RURAL
CO AVERTIME 1
CO POLLUTID OTHER
CO TERRHGTS ELEV
CO RUNORNOT RUN
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
SO LOCATION SCOW AREA 1407643.13 1186280.5 0.
SO SRCPARAM SCOW 6.080681E-03 1.524 15.24 9.14 28.
SO LOCATION DEWATER AREA 1407602.75 1187076.63 1.524
SO SRCPARAM DEWATER 5.099378E-03 1.8288 9.14 9.14 23.
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE ELEVUNIT METERS
RE GRIDCART Grid_1 STA
RE GRIDCART Grid_1 XYINC 1407144.25 12 100 1186074.13 15 100
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
```

```
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 END
RE DISCCART 1407860.88 1186985.5 4.8
RE DISCCART 1407837.5 1186939.88 4.8
RE DISCCART 1407819.88 1186902.13 4.8
RE DISCCART 1407862.25 1186903.63 4.8
RE DISCCART 1407871.38 1186925.25 4.8
RE DISCCART 1407894.13 1186967.63 4.8
RE FINISHED

ME STARTING
ME INPUTFIL "D:\Beework\Rochester MC\8791roch.asc"
ME ANEMHGHT 6.7
ME SURFDATA  14768 1987 ROCHESTER,NY 43.117 77.667
ME UAIRDATA  14733 1987 BUFFALO,NY 42.933 78.733
ME FINISHED

OU STARTING
OU RECTABLE 1 FIRST SECOND
OU PLOTFILE 1 ALL FIRST "D:\Beework\Rochester MC\CSX Genesee Dredge 2-day dewater
rev_87_OTHER.GRF" 30
OU PLOTFILE 1 ALL SECOND "D:\Beework\Rochester MC\CSX Genesee Dredge 2-day
dewater rev_87_OTHER.GRF" 30
OU FINISHED
```

ISCST3 Input File – 5 Day Dewatering Operation

```
**BEE-Line Software: BEEST for Windows (Version 8.98) data input file
** Model: ISCST3     File Creation Date: 08/15/2003  Time: 2:37:55 PM
NO ECHO


CO STARTING
CO TITLEONE CSX - Genesee River Dredge Project
CO TITLETWO Preremedial Air Dispersion Modeling  5-day dewatering
CO MODELOPT DFAULT CONC RURAL
CO AVERTIME 1 8 ANNUAL
CO POLLUTID OTHER
CO TERRHGTS ELEV
CO RUNORNOT RUN
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
SO LOCATION SCOW AREA 1407643.13 1186280.5 0.
SO SRCPARAM SCOW 6.188367E-03 1.524 15.24 9.14 208.
SO LOCATION DEWATER AREA 1407602.75 1187076.63 1.524
SO SRCPARAM DEWATER 3.172148E-03 1.8288 9.14 9.14 23.
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE ELEVUNIT METERS
RE GRIDCART Grid_1 STA
RE GRIDCART Grid_1 XYINC 1407144.25 12 100 1186074.13 15 100
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  1 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  2 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  3 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  4 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  5 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  6 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  7 4.6 4.6 4.6
```

```
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  8 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  9 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  10 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  11 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  12 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  13 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  14 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 ELEV  15 4.6 4.6 4.6
RE GRIDCART Grid_1 END
RE DISCCART 1407860.88 1186985.5 4.8
RE DISCCART 1407837.5 1186939.88 4.8
RE DISCCART 1407819.88 1186902.13 4.8
RE DISCCART 1407862.25 1186903.63 4.8
RE DISCCART 1407871.38 1186925.25 4.8
RE DISCCART 1407894.13 1186967.63 4.8
RE FINISHED

ME STARTING
ME INPUTFIL "D:\Beework\Rochester MC\8791roch.asc"
ME ANEMHGHT 6.7
ME SURFDATA  14768 1987 ROCHESTER,NY 43.117 77.667
ME UAIRDATA  14733 1987 BUFFALO,NY 42.933 78.733
ME FINISHED

OU STARTING
OU RECTABLE 1 FIRST SECOND
OU RECTABLE 8 FIRST SECOND
OU PLOTFILE 1 ALL FIRST "D:\Beework\Rochester MC\CSX Genesee Dredge 5-day dewater
rev_87_OTHER.GRF" 30
OU PLOTFILE 1 ALL SECOND "D:\Beework\Rochester MC\CSX Genesee Dredge 5-day
dewater rev_87_OTHER.GRF" 30
```

```
OU PLOTFILE 8 ALL FIRST "D:\Beework\Rochester MC\CSX Genesee Dredge 5-day dewater
rev_87_OTHER.GRF" 30
OU PLOTFILE 8 ALL SECOND "D:\Beework\Rochester MC\CSX Genesee Dredge 5-day
dewater rev_87_OTHER.GRF" 30
OU PLOTFILE ANNUAL ALL "D:\Beework\Rochester MC\CSX Genesee Dredge 5-day dewater
rev_87_OTHER.GRF" 30
OU FINISHED
```

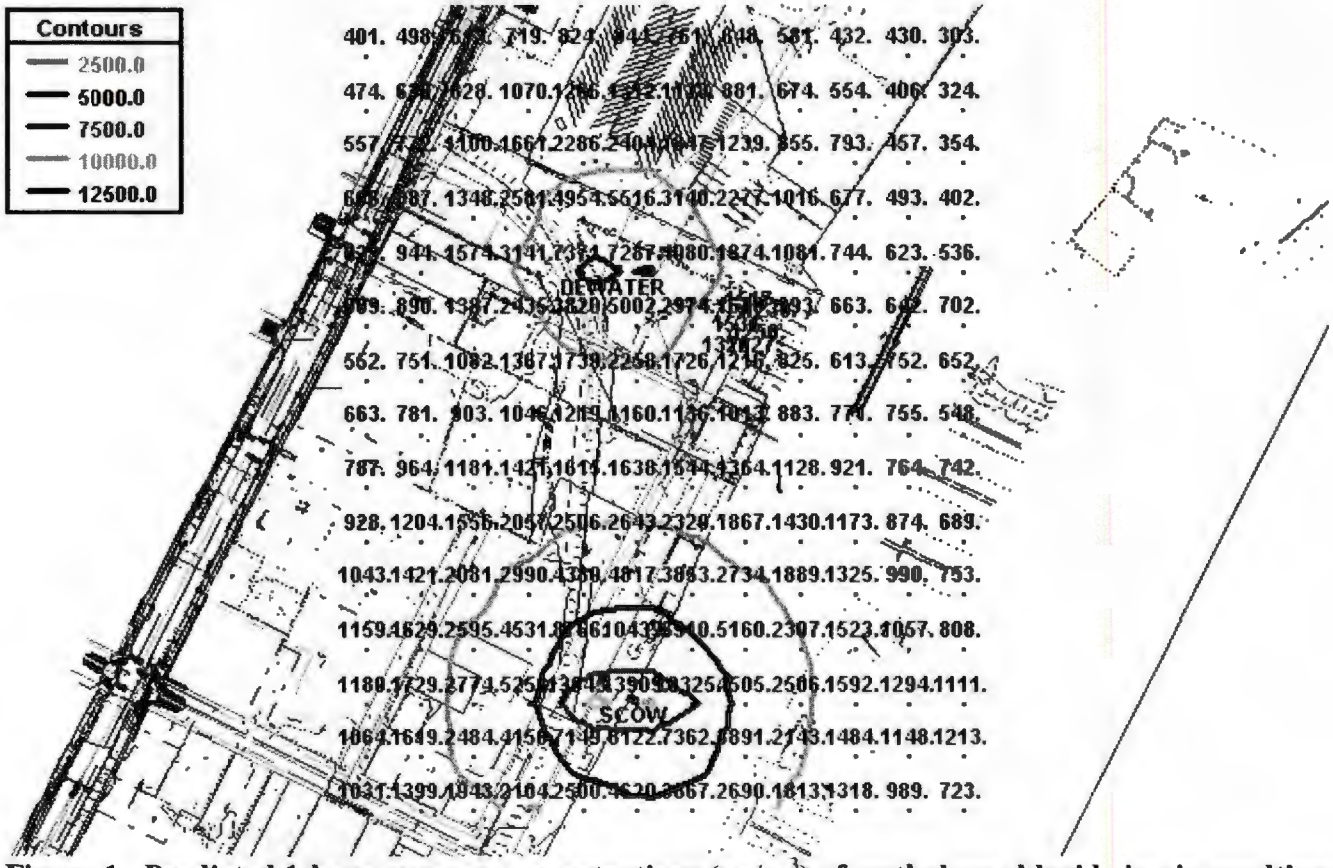


Figure 1. Predicted 1-hour average concentrations (ug/m^3) of methylene chloride in air resulting from Genesee River sediment removal and dewatering operations (1/4 hot spot removal with 2-day dewatering time)

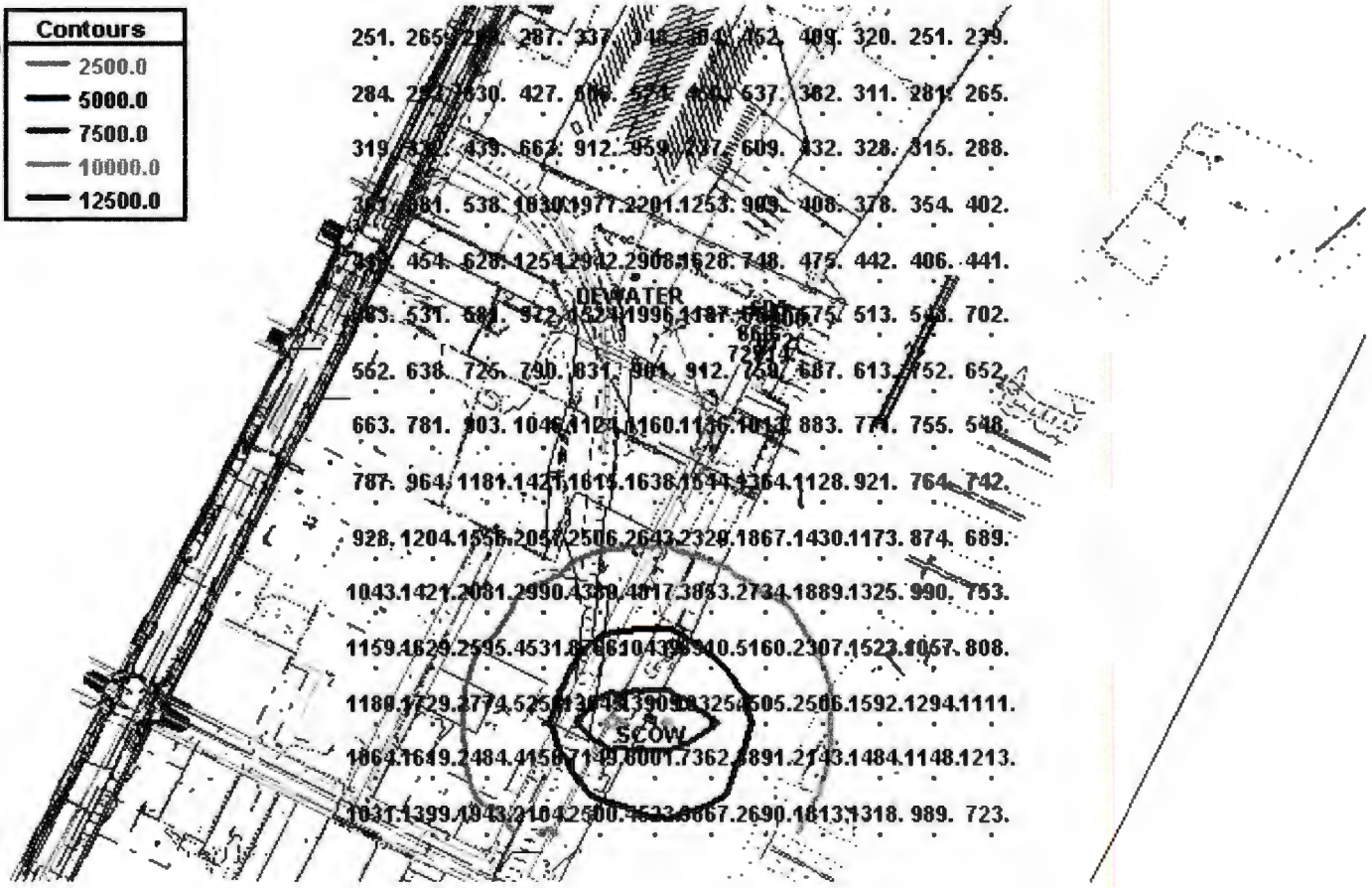


Figure 2. Predicted 1-hour average concentrations (ug/m^3) of methylene chloride in air resulting from Genesee River sediment removal and dewatering operations (1/4 hot spot removal with 5-day dewatering time)

Emission Estimates for Dredging of Sediment Contaminated with Methylene Chloride

EPA 451/R-93-001
Dredging
Equations 4-11 through 4-17
Distribution coefficient
$k_d = 0.63*X_{oc}*K_{ow}$

K_{ow}	Octanol-water partition coefficient,	19.953	19.95262315
0.63	Empirical constant		
Xoc	weight fraction of organic carbon in the sediment, 0.013 average		

k_d = 0.1633905

Effective diffusivity, De
$De = [K_{eq}*D_a*(E_a^{10/3})/E_T^2)+D_w(E_w^{10/3})/E_T^2]/[p_{sed}*k_d + EW + E_a k_{eq}]$

Da= diffusivity of compound in air		0.117		
Keq = H =	dimensionless	3.19E-03	atm-m3/mole =	0.130465545 dimensionless
Ea= air filled porosity of sediment			0	
E_T = total porosity of sediment			0.5	default value for mechanical dredge
Dw =	Diffusivity in water	1.17E-05		
Ew = volumetric water content, =Et-Ea			0.5	
psed= sediment/water bulk density			1.1	as dredged (As sampled on the bottom, would be 1.85)
kd = distribution coefficient		0.1633905		

numerator	4.64E-06
denominator	6.80E-01
De	6.83E-06

then $Kd = H D_e pi^2 /4 l^2$ pollution volatilization constant
l= depth of excavation, cm

Kd= 2.44E-09 1 ft excavation
Kd= 1.50E-10 4 ft excavatiov
6.56E-11 6 ft
Kd= 2.37697E-11 10 ft excavation

Check validityof equation:

$H^*D_e t/L2 < 0.25$ assume 8 hour workday

4.11E-07 valid

$X= 0.72(K_d t)^{1/2}$

t = time in seconds assume 20 days, 8 hours = 576000 seconds

X = 4.43E-03 fraction , average 6 ft excavation

Average Releases During Dredging

mass released **4.41E+00** kg, assuming total mass is 997 kg , dredging for 20 days

over 20 days, average 6 ft excavatioı **20 days=** **576,000 seconds** **7.66E-03 g/sec**

Average emission rate from dredging: **7.66E-03 g/sec**

Worst case, short term release:

excavation of 26 cubic yards (1/4) of top 4 ft of hot spot (north region, 0-4 ft) in one hour, containing 66 kg of methylene chloride (assumes 200 cubic yards/day, rate of 25 cubic yards/hr

Xwc= 5.29E-04 **3600 Seconds**

3.49E-02 kg in one hour

Worst case, 1 hour **9.70E-03 g/sec**

Mass lost during dredging of hot spot = 3.49E+01 grams

Removal from Scow: comparable to second dredge operatio

Assume scow filled with hot spot material plus additional sediment with average concentration 500,000 or less
Losses during sitting on scow = 73 kg; amount left = 114kg
Scow will be filled to 3.6 ft, assuming 50x30 ft scow, 200 cubic yards
$De = [K_{eq}*D_a*(E_a^{10/3})/E_T^2)+D_w(E_w^{10/3})/E_T^2]/[\rho_{sed}*k_d + EW + E_a k_{eq}]$

Da= diffusivity of compound in air	0.117		
Keq = H =	3.19E-03	atm-m3/mole =	0.130465545 dimensionless
Ea= air filled porosity of sediment	0		
E_T = total porosity of sediment	0.5		
Dw = Diffusivity in water	1.17E-05		
Ew = volumetric water content, =Et-Ea	0.5		
psed= sediment/water bulk density	1.1		
kd = distribution coefficient	0.1633905		

numerator	4.64E-06
denominator	6.80E-01
De	6.83E-06

then $Kd = H\ D_e\ pi^2\ /4\ l^2$ pollution volatilization constant
l= depth of excavation, cm
Barge will be filled to 3.6 ft 200 cubic yards = 5400 cubic feet 5400/1500= 3.6 ft depth= 109 cm
area of scow = 30*50=1500 sq ft

Kd= 1.85E-10 3.6 ft excavation

Check validityof equation:
$H*D_e t/L2 < 0.25$ assume 8 hour workday
4.11E-07 valid

X= $0.72(K_d t)^{1/2}$
t = time in seconds assume 1 day, 8 hours 28800 seconds
X = 1.66E-03 fraction
1.66E-03

Worst case 1.91E-01 kg methylene chloride, over 1 day, 8 hours **average emission, g/sec= 6.63E-03**
Average load 6.48E-02 **2.25E-03**

Short Term Dewatering
for worst case load from scow - 1/4 of hot spot plus less impacted sedimer

X= $0.0068*P^{0.95}/ [1+0.0068*P^{0.95}]$

P = vapor pressure = 362 mm Hg

269.633061 $=P^{0.95}$

X = 0.647080183

64.71% emitted during dewatering, 116kg in sediment remaining after scow emissions

74 kg emitted during dewatering

432000 seconds for dewatering (5 days)

0.172255 g/sec, 5 day total dewatering of worst case loa

172800 seconds

0.430638 g/sec 2 day dewatering

Short Term Dewatering
for average case load from scow

X= $0.0068*P^{0.95}/ [1+0.0068*P^{0.95}]$

P = vapor pressure = 362 mm Hg

269.633061 $=P^{0.95}$

X = 0.647080183

64.71% emitted during dewatering

25 kg emitted during dewatering

432000 seconds for dewatering (5 days)

0.059016 g/sec, 5 day total dewatering of average loa

172800 seconds

0.14754 g/sec 2 day dewatering average loa

Calculations for Mass of Methylene Chloride in Sediments

Volume of sediment in top 4 ft of hot spot	2828	cubuc feet
	105	cubic yars
	80.05	cubic meters
	8.01E+07	cc
mass of sediment (assume 70% solids	1.48E+08	g
for density of 1.85g/cc)		
average concentration	1.78E+03	mg/kg
Amount of methylene chloride	2.64E+08	mg
in top 4 ft of hot spot	**2.64E+02**	kg
in 1/4 of hot spot	**6.59E+01**	

Assume 26 cubic yards of this is on barge with 174 cubic yards of sediment at average concentration of 500mg/kg

Additonal sediment	133	cubic meters of sediment at 500 mg/kg
	1.33E+08	cc
mass of additional sediment (assume 70% solids	2.46E+08	g
Assume average conc. additional sediment	5.00E+02	mg/kg
Amount of methylene chloride	1.23E+08	mg
from additional 174 cubic yards	**1.23E+02**	kg from 95 cubic yards of sediment at 200 mg/kg

Total mass on barge **1.89E+02 kg**

Average concentration in sediments on barge: 6.67E-07 mg/kg

Average Concentration of Methylene chloride in Total Impacted Area

3000 cubic yards	2294	cubic meters
mass 1.85 g/cc		
	2.29E+09	cc
	4243900000	g
	4243900	kg
total MeCl2	967	kg (B. Jacobs)
conc	0.000227856	kg/kg
	0.227856453	g/kg
	227856	ug/kg

08/29/2003

Average scow load

200	cubic yards
153	cubic meters
1.53E+08	cc
2.83E+08	grams
2.83E+05	kg sediment
6.45E+10	ug methylene chloride
6.45E+01	kg methylene chloride in average scow load

Calculations of Emissions from Sediment while on the Scow

Equations from EPA 451/R-96-001
Part 3 - Gaseous emissions from aqueous-phase contaminants pooled at soil surfaces

Calculate losses from sediment/water on barge (losses are driven by the average concentration of methylene chloride in the sediment and the area of the barge)

$F_i = K_i C_{il} 1*10^4$

F_i = maximum flux of component, g/m2-sec

K_i = overall mass transfer coefficient of i, cm/sec

C_{il} - liquid-phase concentration of i, g/cm3

$1/K = 1/k_{iL} + RT/Hi\ k_{iG}$

K = overall mass transfer coefficient

k_{il} = liquid mass phase transfer coefficient

R = 8.2E-5 atm-m3/mole oK

T = average system absolute temperature

H = Henry's Law Constant, atm-m^3/mole

k_{iG} = gas phase mass transfer coefficient cm/sec

Estimation of liquid phase mass transfer coefficient K_{iL}

$K_{iL} = (MW_{O2}/MW_i)^{0.5} (T/298) (K_{L,\ O2})$

$K_{L,\ O2}$ = 0.002 cm/s at 298°K

$K_{iG} = MW_{H2O}/MW^{)0.335} (T/298)^{1.005} k_{GH20}$

K_{gH2O} 0.833 cm/s

		$(MW_{O2}/Mw\ K_{iL}$		$(MW_{H2O}/Mwi)^{.335}$		K_{iG}	
Methylene chloride	85	0.613572	1.19E-03	0.594512	0.969649966	0.480198653	assume 60$_o$ C (289K)

08/29/2003

Dredging only 1/4 of hot spot area, 26 cubic yards; rest of scow filled with 176 cubic yards at 500 mg/kg
Average concentration = 670 mg/kg

Need to calculate aqueous phase concentration (data for dry weight concentration represents total in solid and aqueous phase)
Average concentration for load - 26 cubic yds at 1,780 mg/kg and 176 cubic yards at 500 mg/kg = **667**
Koc=Kp/foc
Koc = organic carbon partition coefficient
foc = fraction of organic carbon in soil (measured average of 0.013)
kp = soil water partition coefficient = conc. in soil/conc in water

	K_{oc}	$K_{oc}f_{oc}=K_p$	Total conc, dry wt, mg/kg	Actual Water conc, mg/l	Actual Soil conc mg/kg
Methylene chloride	2.10E+01	2.73E-01	6.67E+02	5.24E+02	1.43E+02

$K_{iL} = (MW_{O2}/MW_i)^{0.5}\ (T/298)\ (K_{L,\ O2})$
K_L, O2 = 0.002 cm/s at 298°K

$K_{iG} = MW_{H2O}/MW)^{0.335}\ (T/298)^{1.005}\ k_{gH20}$
K_{gH20} 0.833 cm/s

		$(MW_{O2}/Mw$	K_{iL}	$(MW_{H2O}/Mwi)^{.335}$		KiG
Methylene chloride	85	0.613572	1.19E-03	0.594512	0.969649966	0.480198653

Caclualtion of overall mass transfer coefficient

$1/K = 1/k_{iL} + RT/Hi\ k_{iG}$

	H	$1/K_i$	K_i	aq conc, g/cm3	Fi g/m2-sec
Methylene	3.19E-03	8.56E+02	1.17E-03	5.24E-04	**6.12E-03**

Area of scow = 50*30
1500 ft sq
139 mj2

Emissions:	**0.851**	**g/sec**	**while on boat, mixture of 1/4 of top 4 ft of hot spot sediment with sediment at 500,000mg/kg or less**
over 24 hours:	**73.53**	**kg**	**loss**
Started with	**66**	kg from 1/4 of hot spot	
	123	kg from additional dredge material	
amount left=	**115**	**kg**	

Emissions from scow with sediment at average concentration

	K_{oc}	$K_{oc}f_{oc}=K_p$	Total conc, dry wt, mg/kg	Actual Water conc, mg/l	Actual Soil conc mg/kg
Methylene chloride	2.10E+01	2.73E-01	2.28E+02	1.79E+02	4.89E+01

$K_{iL} = (MW_{O2}/MW_i)^{0.5}$ (T/298) ($K_{L,\ O2}$)

K_L, O2 = 0.002 cm/s at 298°K

$K_{iG} = MW_{H2O}/MW^{)0.335}$ $(T/298)^{1.005}$ k_{gH20}

K_{gH2O} 0.833 cm/s

		$(MW_{O2}/Mw$	K_{iL}	$(MW_{H2O}/Mwi)^{.335}$	·	KiG
Methylene chloride	85	0.613572	1.19E-03	0.594512	0.969649966	0.480198653

Caclualtion of overall mass transfer coefficient

$1/K_i = 1/k_{iL} + RT/Hi\ k_{iG}$

	H	$1/K_i$	K_i	aq conc, g/cm3	Fi g/m2-sec
Methylene	3.19E-03	8.56E+02	1.17E-03	1.79E-04	**2.09E-03**

Area of scow = 50*30

1500 ft sq

139 mj2

Emissions:	**0.291**	**g/sec**	**while on boat, sediment at average concentration of 228 mg/kg**
over 24 hours:	**25.1**	**kg**	**loss**
Started with	**64.5**	**kg**	
amount left=	**39.4**	**kg**	

ESTIMATION OF METHYLENE CHLORIDE CONCENTRATIONS IN THE GENESEE RIVER

The objectives of this screening level evaluation were to estimate potential methylene chloride concentrations down-stream of the proposed dredging area and assess the potential impact on ecological and human receptors. Concentrations of methylene chloride in the river were estimated by solving a two dimensional version of the advection-dispersion equation that accounts for the downstream migration of a solute with the bulk flow of the river, mixing across and along the length of the river, and volatilization of the solute from surface water to air.

The migration of suspended solids was not incorporated into this exercise for two reasons. First, the dredging plan calls for the use of a silt curtain that is anticipated to substantially control the migration of suspended solids. In addition, methylene chloride has a relatively low organic carbon partition coefficient, and therefore sorption to suspended sediments or solids is not expected to be a significant fate and transport pathway. Based on its relatively high solubility and vapor pressure, the most significant fate pathways for methylene chloride in the river are advection, dispersion and volatilization.

Advection-Dispersion Equation

In general, the advection dispersion equation is derived by equating the change in mass in a control volume to the sum of the net flux through the control volume plus sources and sinks. This study uses a two dimensional form of the advection dispersion equation to solve for concentration at any distance downstream from the source and any distance lateral to the source. This approach assumes the river is well mixed vertically, and all concentration results should be interpreted as vertically averaged. This assumption was made because dredging activities will tend to mix water vertically in the source area, and vertical mixing within rivers due to natural dispersion processes is usually complete within a distance of several river depths (USGS, 1996). In addition, this study assumes the source of methylene chloride would be continuous. The following equation describes the chemical concentration C for a longitudinal distance x and transverse distance y from a vertical line of origin:

$$C(x,y) = \frac{q}{h(4\pi V x D'_L)^{1/2}} \exp - \left\{ \frac{V(y-y_1)^2}{4D_L x} + K\frac{x}{V} \right\} \qquad \text{(Huber, 1993)}$$

q = the mass rate of injection
h = the depth of injection (length of the line source)
V = x velocity or average stream velocity
x = longitudinal distance from the line source
D'_L *= depth averaged dispersion coefficient
D_L = transverse dispersion coefficient
$y-y_1$ = transverse distance from the line source
K = first order decay coefficient

* The depth averaged dispersion coefficient and the transverse diffusion coefficient are assumed to be equal.

Source Term

The source term is the rate at which methylene chloride is released into the river from the dredging site. To calculate a release rate, it is assumed that the maximum rate of dredging is 200 cubic yards in one eight-hour day, or 25 cubic yards per hour (yd^3/hr), and the dredging process will remove sediment to a depth of four feet in each area. It was assumed that the worst-case scenario would include dredging the area of highest concentration near sample locations SS-19 and SS-11. The area around these points was assumed to be 707 square feet (based on contoured iso-concentration lines). Based on a 4-foot excavation depth the volume of sediments in the "hot spot" is estimated to be 105 yd^3. Based on the average concentration of methylene chloride in the top four feet of sediment in this area (1,778,420) micrograms per kilogram or ug/kg) and a bulk density of 1.8 kilograms per liter, the approximate mass of methylene chloride in the hot spot is 264 kg. Assuming a dredging rate of 25 yd^3/hr, the hot spot could be removed in slightly more than 4 hours. Based on these assumptions, the maximum rate of methylene chloride removal from the river via dredging would be approximately 63 kg per hour. Realistically, the majority of the methylene chloride will be contained within the dredge apparatus, and if it were released to the water column, the silt curtain would further limit migration of dissolved methylene chloride. As a worst-case scenario, it was assumed that the rate of release to the river would not exceed 10% of overall rate of mass removal. This results in a release rate of roughly 6.3 kg of methylene chloride per hour.

Volatilization Rate

The volatilization rate K is defined as:

$$K = F_{dw}\frac{V_v}{Z_w}$$ (USACE, 2000)

where F_{dw} is a dimensionless ratio reflecting how the chemical partitions between solid matter and water, V_v is a volatilization transfer coefficient, and Z_w is the depth of the water column. This investigation does not take into account partitioning of methylene chloride to sediment, so F_{dw} is assumed to be one. The volatilization transfer coefficient is dependent on the molecular weight of the chemical, the wind velocity, temperature, and a dimensionless Henry's coefficient specific to the chemical in question. Based on a molecular weight of 84.3 grams per mole, wind velocity of 4.28 meters per second (average from Rochester Airport), air temperature of 25 degrees Celsius, and dimensionless Henry's Law Coefficient of 0.1304, the volatilization rate was calculated to be 0.0041 1/hr. This is equivalent to a half-life of approximately 7 days. This value is consistent with published values for volatilization of methylene chloride from ponds and rivers (Merlin, 1992, Zoetman, 1980)

Dispersion Coefficients

This investigation takes into consideration the effects of longitudinal and transverse dispersion as the methylene chloride migrates down stream. The Genesee River is

assumed to be a relatively straight channel, with a constant depth and a constant width. For straight channels, the transverse dispersion coefficient D_t can be defined as:

$D_t = 0.15du*$ (Hemond and Levy, 2000)

where d is the stream depth and u* is the shear velocity. Shear velocity causes turbulence and is related to the shear force per unit area exerted by the water flow on the river channel. Shear velocity u* is defined as follows:

$u* = \sqrt{gdS}$ (Hemond and Levy, 2000)

where g is the acceleration due to gravity, d is the river depth, and S is the slope of the channel. The slope of the channel was estimated to be approximately 2.4 x 10^{-4} for the reach from Rattlesnake Point to the mouth of the Genesee River, based on USGS and Army Corps of Engineers topographic information. The depth of the river is assumed to be 6.4 meters (21 ft) based on the US Army Engineer dredging depth for Rochester Harbor (USACE, 2002). It follows that the shear velocity is 0.12 meters per second and the transverse dispersion coefficient is 0.11 m^2/s

The longitudinal dispersion coefficient D_L can be estimated from the stream velocity, width, depth and the shear velocity using the following equation:

$$D_L = \frac{0.011 V^2 w^2}{du*}$$ (Fischer, 1997)

where V is the average stream velocity, w is the width of the channel, d is the stream depth, and u* is the shear velocity. The average stream velocity used in this investigation (0.082 m/s or 0.27 feet per second) was based on a dye tracer study conducted on the reach of the Genesee River from Kodak Park to the Stutson Street Bridge (USGS, 1966). River flow during this study was estimated to be from 590 to 650 cubic feet per second. The average width of the river was assumed to be 91.4 m or 300 ft. Based on these values the longitudinal dispersion coefficient is estimated to be 8.05 m^2/s. In most natural streams, however, longitudinal dispersion does not need to be explicitly considered if the following is satisfied:

$$\frac{4KD_L}{V^2} \leq 0.1$$ (Huber, 1993)

where K is the first order decay coefficient, D_L is the Longitudinal dispersion coefficient, and V is the average stream velocity. Based on the above-described estimates of velocity, longitudinal dispersion and the methylene chloride volatilization rate, it is evident that longitudinal dispersion can be ignored ($4KD_L / V^2$=0.005), and therefore is not incorporated into the advection-dispersion equation.

If a river velocity of 1 ft/s was used, rather than the USGS value presented above, the longitudinal dispersion coefficient would be 111.2 m^2/s, based on the Fischer equation. Under this scenario longitudinal dispersion does not need to be explicitly considered, since 4KDL / V^2 also equals 0.005 in this case. Even though higher velocity

measurements have been made in the river, the USGS derived velocity of 0.082 m/s (0.27 ft/s) was conservatively used because it represents an average river velocity under relatively low flow conditions.

Advection Dispersion Analysis

Using the release rate, depth, advection, dispersion and volatilization parameters defined above, the concentration of methylene chloride was estimated down river from the potential release site. Concentrations were estimated along the river for distance of 1600 meters, which is the approximate distance from the proposed dredging site to Lake Ontario, and across the river assuming a width of 91 meters. Figure 1 shows a general decrease in methylene chloride concentrations with increasing longitudinal and transverse distance from the source area. Note the x-axis on this figure is not to scale. Concentrations range from 0.818 milligrams per liter (mg/L) at a distance of 1 meter downstream from the source to 0.02 mg/L at the end of the West Pier at Lake Ontario. Concentrations of methylene chloride may be higher than this in the immediate vicinity surrounding the dredging area (within 1-3 feet), but the duration of these higher concentration events would most likely be very short.

Assessment of Potential Toxicity to Aquatic Organisms

Methylene chloride reportedly has a low acute toxicity to aquatic organisms (USEPA, 1994), with "lethal concentrations generally greater than 100 mg/L". Review of more recent data (USEPA, 2003) does not provide evidence of greater toxicity than that from the 1994 report. The following table from the USEPA Chemical Summary for Methylene Chloride summarizes toxicity values for various aquatic organisms.

Species	Test	Condition	Concentration (mg/L)
Fathead minnow	96 hour LC50	Flowthrough	193
Bluegill	96 hour LC50	Static	220
Guppy	14-day LC50		294
Green Algae	Cell multiplication inhibition test and mortality	Static	1,450

Predicted concentrations of methylene chloride at all locations in the Genesee River are well below the acute toxicity values summarized above. Even if a much higher release rate were used, dissolved concentrations of methylene chloride would remain well below 100 mg/L. For example, if the release rate were increased to 50 kg/hr, the dissolved concentration of methylene chloride one meter from the source would still be below 10 mg/L. Based on these results, it is highly unlikely that dredging of sediments in the Genesee River will result in methylene chloride concentrations in the river reaching values toxic to aquatic organisms.

Assessment of Potential Toxicity to Human Receptors

As shown above, some methlyene chloride is likely to be released from the sediment to the surface water as a result of dredging. Although dilution of the methylene chloride in

river water occurs quickly, causing the concentration to drop off quickly, the potential exists that human receptors could be exposed to the methlyene chloride in downstream surface water while the dredging operation occurs. As such, an assessment of potential health risks is provided to determine whether the proposed dredging operation may pose a significant human health threat. In addition, to direct contact with the water, a screening level assessment of potential emissions of methylene chloride from water to the overlying air is also provided.

The reach of the Genesee River downstream of the proposed dredging operation is not used as a public drinking water source. Additionally, there is no public swimming access to the river below the dredging operation. Nevertheless, it is possible that the downstream reach of the river could be used for recreational swimming. As a result, the health risk assessment provided below is a conservative evaluation of a hypothetical child receptor swimming in the river.

The proposed dredging operation is anticipated to last for 20 days. Although unlikely, this assessment assumes that a child (ages 1-6 years) swims in the downstream portion of the river every day of the 20-day dredging operation. While swimming, the child is assumed to be exposed to the methylene chloride in the water through dermal contact and incidental ingestion of surface water (EPA, 1989).

Tables 1 and 2 summarize the exposure parameters that are used to compute the child receptor's hypothetical exposure to methylene chloride in water via the oral and the dermal contact exposure pathways, respectively. For both routes of exposure, the US EPA default exposure parameters are used.

Because the exposure duration is limited by the duration of the dredging project (20 days), after which the concentration of methylene chloride will likely be less than the drinking water standard of 5 ug/l, the exposure was assessed as an acute exposure event. EPA's Integrated Risk Information System (IRIS) does not list an acute RfD for methylene chloride. However, the Agency for Toxic Substances and Disease Registry (ATSDR) publishes an acute oral Minimal Risk Level (MRL) for methlyene chloride. The acute oral MRL for methylene chloride in ATSDR (2000) is 0.2 mg/kg-d. ATSDR (2000) defines the MRL as "an estimate of daily human exposure to a hazardous substance that is likely to be without an appreciable risk of adverse noncancer health effects over a specified route and duration of exposure." The acute oral MRL is used to assess both the oral and dermal pathways for potential non-cancer effects. No change to the acute oral MRL is required for use in the dermal assessment because the oral absorption of methlyene chloride in dilute aqueous solutions is nearly complete (98%) (ATSDR, 2000). As such, no modification due to differences in oral administered dose versus absorbed dose is needed.

Tables 3 and 4 show the exposure and hazard quotient calculations for the oral and dermal pathways, respectively. For both routes of exposure, two concentration terms are assessed. The first is a worst-case average concentration for the downstream reach of the river (0.021 ug/l). The second concentration term (0.818 ug/l) is the overall maximum predicted concentration immediately downstream of the dredging operation (1 meter downstream). Both concentration values are conservative in that they assume that the "hotspot" will be excavated for 20 straight days. It is more likely the hot spot is removed in one day, and the other 19 days are spent removing sediment containing much lower concentrations of methlyene chloride. As such, concentrations of methlyene

chloride in the river each day of the 20 day dredging operation is likely to be lower than that used for the risk assessment. Although swimming is not likely to occur within 1 meter of the dredging operation, the maximum concentration of methylene chloride predicted immediately downstream of the dredging operation is used as an absolute upper-bound estimate of potential exposure.

As shown on Tables 3 and 4, the average predicted concentration results in an oral and dermal non-cancer hazard quotient of 0.0004 and 0.0009, respectively. Combined, this results in a non-cancer hazard index of 0.001, which is well below 1.0. Similarly, the overall maximum predicted concentration results in an oral and dermal non-cancer hazard quotient of 0.02 and 0.04, respectively. Combined, this results in a non-cancer hazard index of 0.06, which is also well below 1.0.

Methylene chloride is listed by EPA as a probable human carcinogen. To assess the potential incremental cancer risk from swimming, the same worst-case scenarios are used. The EPA's IRIS (http://www.epa.gov/iris) does list an oral cancer slope factor (CSF) for methylene chloride, 7.5×10^{-3} per mg/kg-d. This CSF is used in Table 5 and 6 to estimate the potential risks to the hypothetical exposure surface water via swimming. As shown in Tables 5 and 6, the maximum average predicted concentration results in an increased lifetime cancer risk for the dermal and oral exposure pathways of 5×10^{-10} and 1×10^{-9}, respectively. Combined, this results in a potential risk level of 1.5×10^{-9}. Similarly, the overall maximum predicted concentration results in a dermal and oral increased lifetime cancer risk of 2×10^{-8} and 4×10^{-8}. Combined, this results in a potential risk level of 6×10^{-8}. Both combined risk levels, 1.5×10^{-9} and 6×10^{-8}, are well below the National Contingency Plan risk range of 1×10^{-4} to 1×10^{-6}.

In addition to the quantitative assessment of risk shown above, a screening-level evaluation was performed to assess volatilization of methylene chloride from the river downstream of the dredging operation. The source of methlyene chloride emissions assessed here is the dissolved phase in river water resulting from the disturbance of sediments during the dredging operation.

Using a two-phase model that assumes a well-mixed flowing river (Thibodeaux, 1996), the mass of methylene chloride emitted to the overlying air was computed. Emissions are estimated using the following equation:

$$W_{AO} = \left({}^{1}K_{A2} \times a_v\right) V\left(x_a - 0\right)$$

where W_{AO} is the molar flow rate of methlyene chloride from the water surface, ${}^{1}K_{A2}$ is the "natural" overall liquid phase desorption mass transfer coefficient which accounts for both the turbulence of the stream and the wind surface behavior of the overlying air, a_v is the interfacial surface area per unit volume, V is the volume of the surface water in the downstream portion of the river, and x_a is the mole fraction concentration of methylene chloride in the surface water downstream of the dredging operation.

This calculation assumes that the time for water passing the dredge site to enter the lake downstream is 5 hours, the mass of methylene chloride emitted to the overlying air is about 0.5g, which equates to an emission rate of 2.5×10^{-5}g/s. This emission rate is

based on the average worse case concentration of methylene chloride (0.021 mg/l) in the water column predicted using the models described above.

A concentration in air was computed using a simple box model and the computed emission rate. Assuming a wind speed of 4.8 m/s, a box length of 1600 m (length of river from dredging operation to the lake) and a box height of 2.5 m, the approximate predicted air concentration is 0.0013 micrograms per cubic meter methylene chloride (ug/m^3). This predicted concentration is well below the NYSDEC Short-term (1-hour average) Concentration Guideline (SCG) of 14,000 ug/m^3. Given that the dredging operation is a transient, short-term event and that the concentrations are predicted to be low, annual average concentrations will not likely be above the NYSDEC Annual Guideline Concentration (AGC) or 2.1 ug/m^3.

References

ATSDR. 2000. *Toxicological Profile for Methlyene Chloride.* Agency for Toxic Substances and Disease Registry, Atlanta, GA and U.S. Department of Health and Human Services, Public Health Service. September.

Fischer, H.B., List, E.J., Koh, R.C.Y., Imberger, J. and Brooks, N.H. 1979. Mixing in Inland and Coastal Waters. Academic Press, New York.

Hemond, H.F and Levy, E.J.F. 2000. Chemical Fate and Transport in the Environment, Academic Press, Boston.

Lyman, W.J., Reehl, W.F. and Rosenblatt D.H., Ed. 1982. Handbook of Chemical Property Estimation Methods: Environmental Behavior of Organic Compounds. New York, McGraw-Hill Book Co.

Merlin G., Thiebaud, H., Blake, G., Sembiring, S. and Alary, J. 1992. Mesocosms and Microcosms Utilization for Ecotoxicity Evaluation of Dichloromethane, a Chlorinated Solvent. Chemosphere, 24: 37-50.

Thibodeaux, L.J. 1996. Environmental Chemodynamics; Movement of Chemicals in Air, Water and Soil, Second Edition, Wiley Publishers.

USACE, 2000. RECOVERY: A Contaminated Sediment-Water Interaction Model. ERDC/EL SR-D-00-1.

USACE, 2000. Map of Rochester Harbor, New York. U.S. Army Engineer District Buffalo

U. S. EPA. 1989. *Risk Assessment Guidance for Superfund; Volume I: Human Health Evaluation Manual (Part A) - Interim Final.* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002. December.

U.S. EPA, 1994. Chemical Summary for Methylene Chloride (Dichloromethane), Office of Pollution Prevention and Toxics, U.S. Environmental Protection Agency, August 1994.

EPA. 2001. "Risk Assessment Guidance for Superfund Volume I - Human Health Evaluation Manual (Part E, Supplemental Guidance Dermal Risk Assessments) Interim."

Office of Emergency and Remedial Response, Washington, DC. EPA/540/R/99/005. September.

U. S. EPA 2003. ECOTOX User Guide: ECOTOXicology Database System. Version 3.0. Available: http:/www.epa.gov/ecotox/ . August 2003.

USGS, 1966. Time-of-Travel Studies Genesee River Basin. Open File Report TT-3 prepared in cooperation with the New York State Department of Health.

USGS, 1996. Prediction of Traveltime and Longitudinal Dispersion in Rivers and Streams. USGS Water Resources Investigations Report 96-4013.

Zoetman, B.C. Harmsen, K., Linders, J.B., Morra, C.F. and Sloof, W. 1980. Persistent Organic Pollutants in River Water and Ground Water of the Netherlands. Chemosphere, 9: 231-249.

Table 5. Summary Calculation of Cancer Risk from Exposure to Methylene Chloride via the Dermal Route of Exposure while Swimming.

Hypothetical Exposure: Acute Dermal Contact While Swimming
Receptor: Adolescent Child (ages 1-6)

Dose (mg/kg-d) = CW x SA x PC x ET x EF x ED x CF/(BW x ATc)
Risk = Dose x CSF

Chemical	Concentration in Surface Water (mg/l)	Skin Surface Area (cm^2)	Dermal Permeability Constant (cm^2/hr)	Exposure Time (hr/d)	Exposure Time (d)	Conversion Factor (L/cm^3)	Body Wieght (kg)	Carcinogenic Averaging Time (d)	Lifetime Average Daily Dose (mg/kg-d)	Cancer Slope Factor $(mg/kg\text{-}d)^{-1}$	Risk
Methlyene Chloride - max.average	0.021	6600	0.0035	2.6	20	0.001	15	25550	6.58192E-08	7.5E-03	5E-10
Methlyene Chloride - overall max.	0.818	6600	3.50E-03	2.6	20	0.001	15	25550	0.00000	7.5E-03	2E-08

Table 6. Summary Calculation of Risk from Acute Exposure to Methylene Chloride via the Oral Route of Exposure while Swimming.

Hypothetical Exposure: Acute Oral Exposure While Swimming
Receptor: Child (ages 1-6)

Dose (mg/kg-d) = CW x SA x PC x ET x EF x ED x CF/(BW x ATc)
Risk = Dose x CSF

Chemical	Concentration in Surface Water (mg/l)	Contact Rate (ml/hr)	Exposure Time (hr/d)	Acute Exposure Time (d)	Conversion Factor (l/ml)	Body Wieght (kg)	Carcinogenic Averaging Time (d)	Lifetime Average Daily Dose (mg/kg-d)	Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Methlyene Chloride - max.average	0.021	50	2.6	20	0.001	15	25550	1E-07	7.5E-03	1E-09
Methlyene Chloride - overall max.	0.818	50	2.6	20	0.001	15	25550	6E-06	7.5E-03	4E-08

Table 1. Summary of Exposure Parameters Used to Assess Potential Human Health Risks to Child Swimmers Downstream of the Dredging Program - Oral Exposure.

Exposure Paramater	*Units*	*Variable*	*Value*	Source
Contact Rate	ml/hr	CR	50	EPA, 1989
Exposure Time	hrs/d	ET	2.6	EPA, 1989
Acute Exposure Duration	d	AED	20	Duration of dredging
Conversion Factor	L/ml	CF	0.001	EPA, 2001
Body Weight	kg	BW	15	EPA, 2001
Acute Averaging time (non-cancer)	d	AAtnc	20	Duration of dredging
Carcinogenic Averaging time	d	ATc	25550	EPA, 1989
Oral Cancer Slope Factor	(mg/kg-d)-1	CSF	7.5E-03	EPA, 2003
Acute Mimimal Risk Level	mg/kg-d	MRL	0.2	ATSDR, 2000

Table 2. Summary of Exposure Parameters Used to Assess Potential Human Health Risks to Child Swimmers Downstream of the Dredging Program - Dermal Exposure.

Exposure Paramater	*Units*	*Variable*	*Value*	Source
Skin Surface Area	cm^2	SA	6600	EPA, 2001
Dermal Permeability Constant	cm^2/hr	PC	3.50E-03	EPA, 2001
Exposure Time	hrs/d	ET	2.6	EPA, 1989
Acute Exposure Duration	d	AED	20	Duration of dredging
Conversion Factor	L/cm^3	CF	0.001	EPA, 2001
Body Weight	kg	BW	15	EPA, 2001
Carcinogenic Averaging time	d	ATc	25550	EPA, 1989
Oral Cancer Slope Factor [1]	(mg/kg-d)-1	CSF	7.5E-03	EPA, 2003
Acute Averaging time (non-cancer)	d	AAtnc	20	Duration of dredging
Acute Minimal Risk Level [1]	mg/kg-d	MRL	0.2	ATSDR, 2000

Notes:

1 - Because ATSDR (2000) cites an oral absorption of methlyene chloride in dilute aqueous solutions as nearly complete (98%), the oral MRL is used for the dermal route without modification to account for the absorbed vs administered dose (EPA, 1989).

Table 4. Summary Calculation of Risk from Acute Exposure to Methylene Chloride via the Dermal Route of Exposure while Swimming.

Hypothetical Exposure: Acute Dermal Contact While Swimming
Receptor: Adolescent Child (ages 1-6)

Dose (mg/kg-d) = CW x SA x PC x ET x EF x ED x CF/(BW x AATnc)
Noncancer hazard quoteint = Dose/MRL

Chemical	Concentration in Surface Water (mg/l)	Skin Surface Area (cm^2)	Dermal Permeability Constant (cm^2/hr)	Exposure Time (hr/d)	Acute Exposure Time (d)	Conversion Factor (L/cm^3)	Body Wieght (kg)	Acute Averaging Time (d)	Acute Dose (mg/kg-d)	Acute MRL (mg/kg-d)	Acute HQ
Methlyene Chloride - max.average	0.021	6600	0.0035	2.6	20	0.001	15	20	8.4084E-05	0.2	0.0004
Methlyene Chloride - overall max.	0.818	6600	3.50E-03	2.6	20	0.001	15	20	0.00328	0.2	0.02

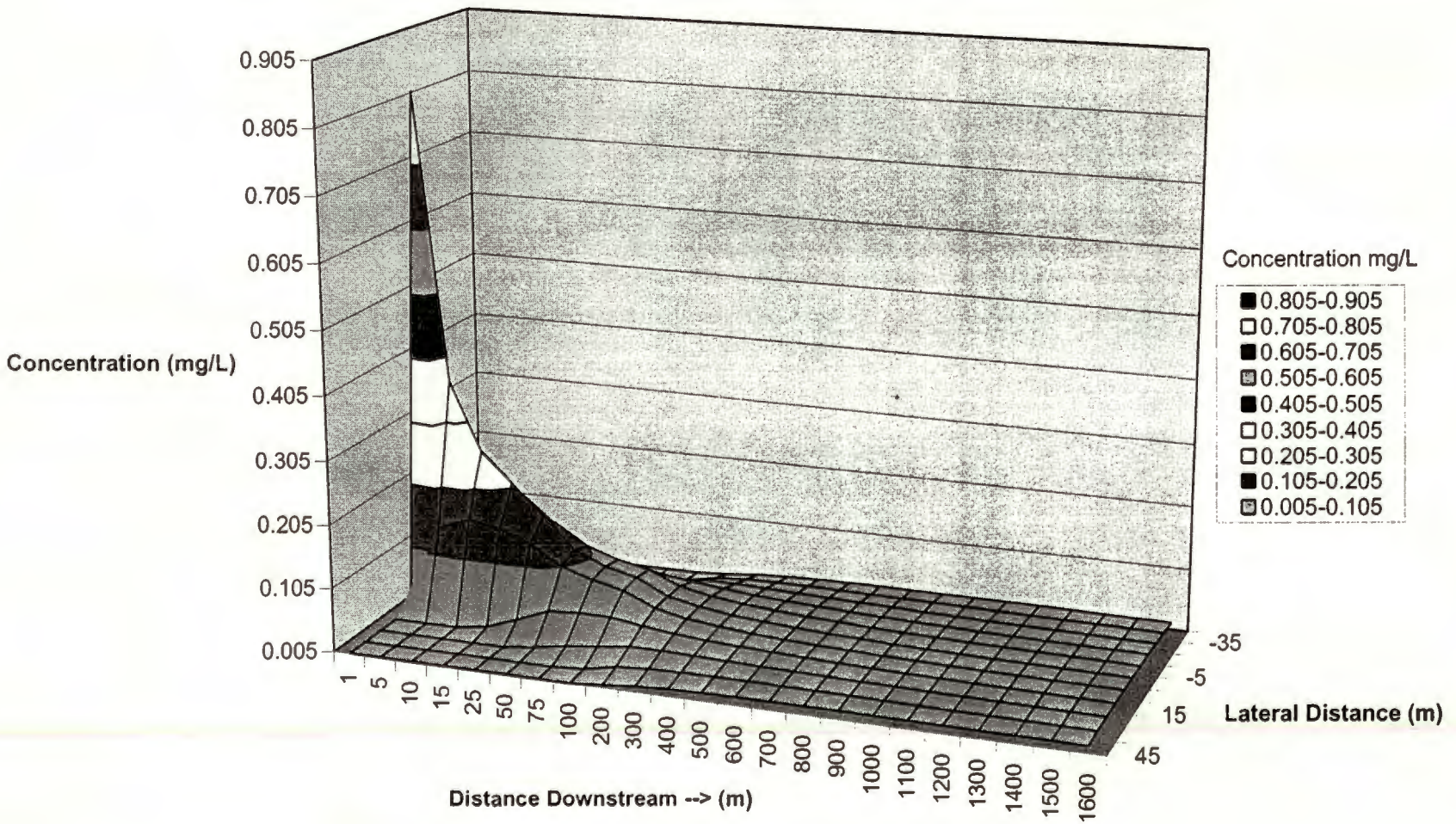
Table 3. Summary Calculation of Risk from Acute Exposure to Methylene Chloride via the Oral Route of Exposure while Swimming.

Hypothetical Exposure: Acute Oral Exposure While Swimming
Receptor: Child (ages 1-6)

Dose (mg/kg-d) = CW xCR x ET x EF x ED x CF/(BW x AATnc)
Risk = Dose/MRL

Chemical	Concentration In Surface Water (mg/l)	Contact Rate (ml/hr)	Exposure Time (hr/d)	Acute Exposure Time (d)	Conversion Factor (l/ml)	Body Wieght (kg)	Acute Averaging Time (d)	Acute Dose (mg/kg-d)	Acute MRL (mg/kg-d)	Acute HQ
Methlyene Chloride - max.average	0.021	50	2.6	20	0.001	15	20	0.000182	0.2	0.0009
Methlyene Chloride - overall max.	0.818	50	2.6	20	0.001	15	20	0.00709	0.2	0.04

Figure 1. Genesee River Advection Dispersion Calculation Results



Application of 2-D Advection Dispersin Equation

Constants	Symbol	Value	Units	Value	Units	Notes
"Hot Spot Mass"		264	kg			
Mass rate of injection	q	6.3	kg/hr	6346.154	g/hr	mass rate of injection mass/time
Depth of injection	h	6.4	m	6.4	m	Length of line source in z direction
x-velocity	u	0.082	m/s	295.2	m/hr	based on flow of 590 - 650 cfs measured on 08/03/65 (USGS, 1966)
Transverse Dispersion	E'y	0.11	m^2/s	396	m^2/hr	
1st order decay	k			0.0041	1/hr	from volatilization estimate page
River width		91.4	m			
River length		1600	m			
River depth (max)		6.4	m			

Results: Concentration in Water, g/m^3 (x,y)

	x(m)																						
Y - Y1(m)	1	5	10	15	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
45	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.009	0.013	0.016	0.017	0.018	0.018	0.018	0.018	0.017	0.017	0.017	0.017	0.016	0.016	0.016
35	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.008	0.018	0.022	0.023	0.023	0.023	0.022	0.022	0.021	0.020	0.020	0.019	0.019	0.018	0.018	0.017
25	0.000	0.000	0.000	0.000	0.002	0.011	0.020	0.025	0.032	0.032	0.030	0.029	0.027	0.026	0.025	0.024	0.023	0.022	0.021	0.020	0.020	0.019	0.019
15	0.000	0.000	0.004	0.013	0.031	0.050	0.054	0.054	0.047	0.041	0.037	0.033	0.031	0.029	0.027	0.026	0.024	0.023	0.022	0.022	0.021	0.020	0.019
5	0.008	0.144	0.162	0.155	0.136	0.105	0.089	0.078	0.056	0.046	0.040	0.036	0.033	0.030	0.028	0.027	0.025	0.024	0.023	0.022	0.021	0.021	0.020
0	0.818	0.366	0.259	0.211	0.164	0.116	0.094	0.082	0.058	0.047	0.041	0.036	0.033	0.031	0.029	0.027	0.026	0.024	0.023	0.022	0.021	0.021	0.020
-5	0.008	0.144	0.162	0.155	0.136	0.105	0.089	0.078	0.056	0.046	0.040	0.036	0.033	0.030	0.028	0.027	0.025	0.024	0.023	0.022	0.021	0.021	0.020
-15	0.000	0.000	0.004	0.013	0.031	0.050	0.054	0.054	0.047	0.041	0.037	0.033	0.031	0.029	0.027	0.026	0.024	0.023	0.022	0.022	0.021	0.020	0.019
-25	0.000	0.000	0.000	0.000	0.002	0.011	0.020	0.025	0.032	0.032	0.030	0.029	0.027	0.026	0.025	0.024	0.023	0.022	0.021	0.020	0.020	0.019	0.019
-35	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.008	0.018	0.022	0.023	0.023	0.023	0.022	0.022	0.021	0.020	0.020	0.019	0.019	0.018	0.018	0.017
-45	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.009	0.013	0.016	0.017	0.018	0.018	0.018	0.018	0.017	0.017	0.017	0.017	0.016	0.016	0.016

Volatilization Rate Calculations - Whitman two-film theory

Constants

	Symbol	Value	Units	Value	Units	Notes
Henry's Constant	h	3.19E-03	atm-m^3/m	0.13045	dimensionl	at 25 deg C
Wind speed	Uw	4.28	m/s	4.28	m/s	Average at 20 ft from Rochester Airport
River depth	Zw	6.4	m			
Molecular weight	MW	84.3	g/mole			

Calculations

Liquid film mass transfer coefficient	Kl	232.1496249	m/yr
Gas-film mass transfer coefficient	Kg	178405.0518	m/yr
Volatilization rate transfer coefficient	Vv	229.856777	m/yr
Volatilization rate	Kv	35.9151214	1/yr
	Kv	0.0040999	1/hr
Half Life	λ	169.0644237	hr
	λ	7.044350987	days

APPENDIX 5

Pilot Test Report

13 August 2003

Mr. Tim Ahrens
AMEC Earth and Environmental, Inc.
155 Eerie Boulevard, Edison Plaza
2nd Floor
Schenectady, New York 12305

Subject: CSXT Genesee River Site
Final Letter Report

Dear Mr. Ahrens:

KEMRON Environmental Services, Inc. (KEMRON) is pleased to present the results of the bench-scale treatability study conducted for AMEC Earth and Environmental, Inc. (AMEC). The dewatering and solidification studies were performed on materials provided to KEMRON by AMEC. Testing was performed by KEMRON's Applied Technologies Group located in Norcross, Georgia. All testing was conducted in general accordance with the Request for Proposal dated 2 July 2003, and the Scope of Work (SOW) developed by KEMRON dated 11 July 2003.

The primary goals for this treatability study were 1) to increase the solids content of the untreated sludge materials in order to meet off-site disposal criteria (specifically resistance to penetration testing, and paint filter testing), using typical dewatering and solidification technologies, and 2) evaluate the potential for these treatment technologies to reduce total concentrations of contaminants of concern (primarily acetone and methylene chloride).

Complete data tables summarizing the results of testing are attached following this text. Summary tables included in this text are for convenience purposes only and may not contain all of the information presented in the attached tables. Complete data reports are included in the appendices attached to this text.

UNTREATED WASTE CHARACTERIZATION

On 18 July 2003, KEMRON's Applied Technologies Group received four sample bags containing approximately 200 pounds of material from the site. The materials were shipped on ice and received at a temperature of 3 degrees Celsius (^{0}C). All materials were delivered to KEMRON's facility by Federal Express. A copy of the chain of custody developed by

KEMRON is included as Attachment A. Upon receipt, the sludge materials were composited and homogenized to better ensure a uniform material for testing. Homogenization was performed by placing each waste material into a large blending chamber and gently mixing with stainless steel utensils. For treatability testing, KEMRON typically removes all particles or debris larger than 0.5 inches in diameter. For this project, no debris or over-sized particles were removed from the as-received materials. Upon completion of homogenization, the contents were placed into 5-gallon containers and stored at a temperature maintained at four degrees Celsius (^{0}C) to reduce potential biological activity and volatilization of any organic constituents.

Immediately upon completion of homogenization, KEMRON performed untreated characterization testing on the as-received materials. Untreated characterization analyses were performed to ensure that the material exhibited similar properties to those expected at the site. The following analyses were performed on aliquots of the as-received sediment in accordance with the referenced test methods:

Solids/Moisture Content	ASTM D 2216
Bulk Density/Specific Gravity	ASTM D 5057
Particle Size Distribution	ASTM D 422
Material pH	EPA Method 9045
Paint Filter	EPA Method 9095

Additionally, KEMRON submitted aliquots of the untreated material for analytical testing to AMEC's subcontract laboratory.

Table 1 summarizes the results of characterization testing performed by KEMRON on the as-received materials. The following is a presentation of the data reported in Table 1:

TABLE 1

TESTING PARAMETER	Units	Untreated
Moisture Content (Dry Basis)	%	82.42
Solids Content	%	54.82
Bulk Density	lbs/ft^3	96.1
Bulk Specific Gravity	-	1.5
Material pH	s.u.	5.92
Paint Filter	Pass / Fail	Fail
Grain Size		
Gravel	%	0.0
Sand	%	3.8
Silt	%	69.8
Clay	%	26.4
Acetone (STL)	mg/kg	55.0
Methylene Chloride (STL)	mg/kg	580

Complete data reports for all untreated characterization analyses are included as Attachment B.

DEWATERING EVALUATIONS

Dewatering testing was performed to determine the potential effectiveness of dewatering methods for the sludge material. KEMRON evaluated gravity drainage, filter press and centrifugation testing for the site-material. Each treatment process was designed to provide an initial screening of the treatment effectiveness while mimicking potential full-scale dewatering procedures to the extent possible in the laboratory. Complete descriptions of each testing procedure and the results obtained by KEMRON are presented herein.

Gravity Drainage Testing

Gravity drainage testing was performed to evaluate the increase in solids content that can be achieved by allowing the material to gravity drain while stockpiled during field operations. The primary advantages of the gravity drainage dewatering method include low operating cost and ease of operation. In order to simulate the process on the laboratory scale, the laboratory testing was performed by allowing a known quantity of material to drain through a filter medium. Evaluations of the quantity of water removed, relative to the initial weight of the material, allowed for determination of the relative effectiveness of gravity drainage at dewatering the sludge materials. KEMRON performed one gravity drainage test on the untreated material.

Gravity drainage testing was performed by placing a pre-weighed aliquot of sample on a filter media (24 micron filter paper) supported by a Buchner funnel set over a 600 milliliter (mL) graduated beaker. Following 6 days of testing it was determined that no additional moisture was being released from the sample, and at the request of AMEC, testing was terminated. The weight of the filter cake and the volume of the filtrate were recorded, and the filter cake was then sampled for solids content testing.

Table 2 presents the results of gravity drainage testing. Complete data sheets are presented in Attachment C. The following is a summary of the data found in Table 2:

TABLE 2

Sample ID	Initial Sample Weight (g)	Final Sample Weight (g)	Solids Content (%)	Solids Increase (%)	Resistance to Penetration	Paint Filter (Pass/Fail)
Untreated	-	-	54.82	-	-	Fail
GD-001	1,147	1,049.6	59.4	8.35	< 3	Pass

Filter Press Testing

Filter press testing was performed to evaluate the increase in solids content achieved by the application of a positive pressure to the sediment sludge. Bench-scale testing was performed at several different positive pressures using a Baroid filter press apparatus. The Baroid filter press apparatus consists of a material reservoir mounted in a frame, a filtering medium, a means of capturing the filtrate, and attachments for a compressed air-supply line. The filter media had a pore size of approximately 1.1 µm. KEMRON performed a total of 4 filter press tests, labeled FP-001 through FP-004.

Filter press testing was performed by placing pre-weighed aliquots of sediment into the reservoir and then introducing pressurized air into the system. Testing was continued under these conditions until pressure breakthrough occurred. Breakthrough was identified as the point at which pressure was released from the apparatus through cracking of the filter cake. Upon release of pressure, testing was terminated and the apparatus was dismantled. The weight of the filter cake and the volume of filtrate were recorded. Aliquots of each filter cake were then sampled for moisture content testing.

The results of filter press testing are summarized in Table 3. This table includes the quantity of material tested, the length of testing, the pressure used for treatment, the weight of the filter cake, the percent moisture/solids of the filter cake, and calculated solids content increase. Complete data sheets for filter press testing are included in Attachment C.

KEMRON performed testing at positive pressures of 10, 25, 50, and 100 pounds per square inch (psi) on the as-received material. Review of Table 3 indicates that the treated solids contents were very similar, ranging from 69.8 to 71.7%. KEMRON observed that while the cake solids content of each treated material was very similar, treatment times varied from 94 minutes with a 10 psi test parameter to 26 minutes with a 100 psi treatment pressure.

Following completion of each filter press test, aliquots of each treated material were subjected to resistance to penetration testing in general accordance with LESL Standard Method #15, and paint filter testing in general accordance with EPA Method 9095. The results of these tests are also included in Table 3. Review of table 3 indicates that all materials had a resistance to penetration value of greater than 3 psi but less than 15 psi (>3<15). Likewise all treated materials passed paint filter testing. The following is a summary of the data found in Table 3:

TABLE 3								
Sample ID	Treatment Pressure (psi)	Run Time (min)	Initial Weight (g)	Final Weigh (g)	Solids Content (%)	Solids Increase (%)	Resistance to Penetration (psi)	Paint Filter (Pass/Fail
Untreated	-	-	-	-	54.82	-	-	Fail
FP-001	10	94	315.0	243.5	70.05	27.78	> 3 < 15	Pass
FP-002	25	67	313.0	236.0	71.71	30.81	> 3 < 15	Pass
FP-003	50	33	311.0	241.0	69.80	27.33	> 3 < 15	Pass
FP-004	100	26	313.5	239.5	70.82	29.19	> 3 < 15	Pass

Centrifugation

Table 4 summarizes the results of centrifuge testing performed on the as-received material. Centrifugation testing was performed to evaluate the potential for full-scale centrifuge treatment to significantly increase the solids content of the site material. Following centrifuge treatment the supernatant was removed from the treated material and aliquots of the remaining solids were subjected to solids content testing. Review of Table 4 indicates that treated material had a solids content of 64.76%, a resistance to penetration value of <3 psi, and passed paint filter testing. The following is a summary of the data presented in Table 4.

TABLE 4								
Sample ID	Centrifuge Speed (rpm)	Run Time (min)	Initial Weight (g)	Final Weigh (g)	Solids Content (%)	Solids Increase (%)	Resistance to Penetration (psi)	Paint Filter (Pass/Fail
Untreated	-	-	-	-	54.82	-	-	Fail
C-001	1,000	15	1,000	831.1	64.76	18.13	< 3	Pass

Following the completion of dewatering evaluations, KEMRON submitted aliquots of material selected from each of the dewatering techniques for analytical testing by STL. Table 5 presents the results of analytical testing performed on the treated materials. Review of this data indicates that acetone was not detected above the analytical reporting limit for any of the treated materials. Concentrations of methylene chloride ranged from 30 mg/kg in the gravity drainage sample to 230 mg/kg in the centrifugation sample.

SOLIDIFICATION EVALUATIONS

Additional testing was performed on the as-received sample to determine the effectiveness of solidifying additives at increasing solids content in the untreated sediments. Reagents used during this phase of treatment included Type I Portland cement, cement kiln dust (CKD), Class

"F" fly ash, and lime kiln dust (LKD). KEMRON developed 15 mixtures on untreated site material.

Each mixture was developed by placing an aliquot of untreated material into a blending chamber. Reagents were added dry to the untreated soil either separately or in combinations. The soil and reagent was then blended at a rate of approximately 30 to 40 rotations per minute (rpm) until visually homogeneous, approximately 60 to 90 seconds. Immediately following mixture development, the mixtures were placed into 3 inch diameter by 6 inch high cylindrical molds for curing. Each mixture was allowed to cure for a period of 7 days in a humid environment maintained at a temperature of 18 to 24°C.

Following 7 days of curing, KEMRON performed modified resistance to penetration testing, standard resistance to penetration, paint filter, and moisture/solids content testing on each treated material. The modified penetration testing was performed on the undisturbed treated materials in the mold. That is, there was no manipulation of the treated materials prior to testing. All other testing was performed in general accordance with the previously mentioned test methods.

Table 6 presents the results of testing performed on the treated solidification mixtures, and includes the reagent type used, reagent addition and results from testing. The following is a summary of the data provided in Table 6:

TABLE 6

Sample ID	Reagent Type	Reagent Addition (%)	RESULTS				
			Moisture Content (%)	Solids Content (%)	Resistance to Penetration (Undisturbed) (psi)	Resistance to Penetration (Remolded) (psi)	Paint Filter (Pass/Fail
3244-001	Type I Portland Cement	5	73.9	57.5	> 15	> 3 < 15	Pass
3244-002	Cement	7.5	69.0	59.2	> 15	> 15	Pass
3244-003	Cement	10	63.5	61.2	> 15	> 15	Pass
3244-004	Cement Kiln Dust	5	76.9	56.5	< 3	< 3	Fail
3244-005	CKD	10	71.1	58.5	< 3	< 3	Pass
3244-006	CKD	20	61.2	62.0	> 3 < 15	< 3	Pass
3244-007	Cement / CKD	5 / 5	66.0	60.2	> 15	> 3 < 15	Pass
3244-008	Class "F" Fly Ash	5	75.7	56.9	< 3	< 3	Fail
3244-009	Class "F" Fly Ash	10	71.5	58.3	< 3	< 3	Fail
3244-010	Class "F" Fly Ash	20	63.5	61.2	< 3	< 3	Fail
3244-011	Cement / Class "F" Fly	5 / 10	61.4	62.0	> 15	> 3 < 15	Pass
3244-012	Lime Kiln Dust	5	75.5	57.0	< 3	< 3	Fail
3244-013	LKD	10	68.7	59.3	> 3 < 15	< 3	Pass
3244-014	LKD	20	57.7	63.4	> 15	> 3 < 15	Pass
3244-015	Cement / LKD	5 / 5	64.3	60.9	> 15	> 3 < 15	Pass

Review of Table 6 indicates that there is no direct correlation between moisture/solids content and a passing value for resistance to penetrometer testing between the different reagents used. This may be primarily due to the way that the water in the material is bound by the respective reagents.

Based on the results of resistance to penetration and paint filter testing, AMEC selected four treated materials for analytical testing. The results of analytical testing performed by STL is presented in Table 7. The following is a summary of the data presented in Table 7.

TABLE 7

Sample ID	Reagent Type	Reagent Addition	Acetone (mg/kg)	Methylene Chloride (mg/kg)
Untreated	-	-	<55.0	580
3244-002	Cement	7.5	0.8	7.1
3244-003	Cement	10	0.9	7.3
3244-006	CKD	20	0.3	8.6
3244-014	LKD	20	0.6	6.8

DISCUSSION OF RESULTS

Dewatering Evaluations

A review of the data collected during dewatering evaluations indicates that dewatering using both natural (gravity drainage), and mechanical (filter press, and centrifugation) techniques resulted in treated materials that passed paint filter testing. However, resistance to penetration testing results indicated that dewatering was insufficient in treating the site materials to a >15 psi value. Analytical testing results indicated that the dewatered materials exhibited only a slight decrease in total acetone and methylene chloride concentrations.

Solidification Evaluations

Review of the data from the solidification evaluations reveal that several mixtures passed paint filter testing. However, only those mixtures developed with cement additions of 7.5 and 10% resulted in resistance to penetration values >15 psi. Additionally, the solidification mixtures tested for total acetone and methylene chloride resulted in significant decreases of contaminants compared to those seen in the untreated material.

CLOSURE

KEMRON Environmental Services, Inc. appreciates the opportunity to provide AMEC with treatability testing services. If you have any questions, or require additional information, please call either of the undersigned at (770) 242-4090.

Sincerely,

KEMRON ENVIRONMENTAL SERVICES, INC.

Mark Clark
Applied Technologies Group
Project Manager
mclark@kemron.com

Robert Semenak
Applied Technologies Group
Department Manager
rsemenak@kemron.com

Attachments

CLOSURE

KEMRON Environmental Services, Inc. appreciates the opportunity to provide AMEC with treatability testing services. If you have any questions, or require additional information, please call either of the undersigned at (770) 242-4090.

Sincerely,

KEMRON ENVIRONMENTAL SERVICES, INC.

Mark Clark
Applied Technologies Group
Project Manager
mclark@kemron.com

Robert Semenak
Applied Technologies Group
Department Manager
rsemenak@kemron.com

Attachments

KEMRON ENVIRONMENTAL SERVICES, INC.
AMEC
CSXT GENESEE RIVER SITE

TABLE 1
Untreated Material
Summary of Baseline Characterization

ANALYTICAL PARAMETER	UNIT	UNTREATED
Moisture Content (Dry Basis) (1)	%	82.42
Solids Content (1)	%	54.82
Bulk Density (1)	lb/ft³	96.1
Bulk Specific Gravity (1)	-	1.5
Material pH (1)	s.u.	5.92
Paint Filter	Pass / Fail	Fail
Grain Size Distribution		
Gravel	%	0.0
Sand	%	3.8
Silt	%	69.8
Clay	%	26.4

(1) Results are an average of three determinations.

KEMRON ENVIRONMENTAL SERVICES, INC.

AMEC

CSXT GENESEE RIVER SITE

TABLE 2

Summary of Gravity Drainage Testing

SAMPLE ID.	INITIAL SAMPLE WEIGHT (g)	FINAL SAMPLE WEIGHT (g)	SUPERNATANT VOLUME COLLECTED (ml)	SOLIDS CONTENT (%)	SOLIDS CONTENT INCREASE (%)	RESISTANCE TO PENETRATION (psi)	PAINT FILTER TESTING (Pass / Fail)
Untreated	-	-	-	54.82	-	-	Fail
GD-001 (1)	1,147	1049.6	95.6	59.40	8.35	< 3	Pass

(1) The filter media for this test was a filter paper with a pore size of 24 microns

KEMRON ENVIRONMENTAL SERVICES, INC.
AMEC
CSXT GENESEE RIVER SITE

TABLE 3
Dewatering Evaluations
Summary of Filter Press Dewatering Testing

SAMPLE ID.	TREATMENT PRESSURE (psi)	RUN TIME (min)	INITIAL SAMPLE WEIGHT (g)	FINAL SAMPLE WEIGHT (g)	FILTRATE VOLUME COLLECTED (ml)	SOLIDS CONTENT (%)	SOLIDS CONTENT INCREASE (%)	RESISTANCE TO PENETRATION (psi)	PAINT FILTER TESTING (Pass / Fail)
Untreated	-	-	-	-	-	54.82	-		Fail
FP-001	10	94	315.0	243.5	71.2	70.05	27.78	> 3 < 15	Pass
FP-002	25	67	313.0	236.0	75.7	71.71	30.81	> 3 < 15	Pass
FP-003	50	33	311.0	241.0	70.1	69.80	27.33	> 3 < 15	Pass
FP-004	100	26	313.5	239.5	74.0	70.82	29.19	> 3 < 15	Pass

KEMRON ENVIRONMENTAL SERVICES, INC.
AMEC
CSXT GENESEE RIVER SITE

TABLE 4
Dewatering Evaluations
Summary of Centrifugation Testing

SAMPLE ID.	CENTRIFUGE SPEED (rpm)	RUN TIME (min)	INITIAL SAMPLE WEIGHT (g)	FINAL SAMPLE WEIGHT (g)	SUPERNATANT VOLUME COLLECTED (ml)	SOLIDS CONTENT (%)	SOLIDS CONTENT INCREASE (%)	RESISTANCE TO PENETRATION (psi)	PAINT FILTER TESTING (Pass / Fail)
Untreated	-	-	-	-	-	54.82	-	-	Fail
C-001	1,000	15	1,000	831.1	169.5	64.76	18.13	< 3	Pass

KEMRON ENVIRONMENTAL SERVICES, INC.

AMEC

CSXT GENESEE RIVER SITE

TABLE 5

Dewatering Evaluations

Summary of Analytical Testing

SAMPLE ID	DEWATERING TECHNOLOGY	RESULTS	
		ACETONE (mg/kg)	METHYLENE CHLORIDE (mg/kg)
Untreated	-	< 55.0	580
C-001	Centrifugation	< 22.0	230
FP-004	Filter Press @ 100 psi	< 20.0	170
GD-001	Gravity Drainage	< 3.13	30

KEMRON ENVIRONMENTAL SERVICES, INC.
AMEC
CSXT GENESEE RIVER SITE

TABLE 6
Solidification Evaluations
Summary of Results @ 7 Day Cure

SAMPLE ID	REAGENT TYPE	REAGENT ADDITION (%)	RESULTS				
			Moisture Content (%)	Solids Content (%)	Resistance to Penetration (undisturbed) (psi)	Resistance to Penetration (remolded) (psi)	Paint Filter (Pass / Fail)
3244-001	Type I Portland Cement	5	73.9	57.5	>15	>3<15	Pass
3244-002	Type I Portland Cement	7.5	69.0	59.2	>15	>15	Pass
3244-003	Type I Portland Cement	10	63.5	61.2	>15	>15	Pass
3244-004	Cement Kiln Dust	5	76.9	56.5	<3	<3	Fail
3244-005	Cement Kiln Dust	10	71.1	58.5	<3	<3	Pass
3244-006	Cement Kiln Dust	20	61.2	62.0	>3<15	<3	Pass
3244-007	Type I PC / CKD	5 / 5	66.0	60.2	>15	>3<15	Pass
3244-008	Class "F" Fly Ash	5	75.7	56.9	<3	<3	Fail
3244-009	Class "F" Fly Ash	10	71.5	58.3	<3	<3	Fail
3244-010	Class "F" Fly Ash	20	63.5	61.2	<3	<3	Fail
3244-011	Type I PC / Class "F" Ash	5 / 10	61.4	62.0	>15	>3<15	Pass
3244-012	Lime Kiln Dust	5	75.5	57.0	<3	<3	Fail
3244-013	Lime Kiln Dust	10	68.7	59.3	>3<15	<3	Pass
3244-014	Lime Kiln Dust	20	57.7	63.4	>15	>3<15	Pass
3244-015	Type I PC / LKD	5 / 5	64.3	60.9	>15	>3<15	Pass

KEMRON ENVIRONMENTAL SERVICES, INC.
AMEC
CSXT GENESEE RIVER SITE

TABLE 7
Solidification Evaluations
Summary of Analytical Testing

SAMPLE ID	REAGENT TYPE	REAGENT ADDITION (%)	RESULTS	
			ACETONE (mg/kg)	METHYLENE CHLORIDE (mg/kg)
Untreated	-	-	< 55.0	580
3244-002	Type I Portland Cement	7.5	0.8	7.1
3244-003	Type I Portland Cement	10	0.9	7.3
3244-006	Cement Kiln Dust	20	0.3	8.6
3244-014	Lime Kiln Dust	20	0.6	6.8

APPENDIX 6

NYSDEC Generic Effluent Criteria for Surface Water Discharges

MEMORANDUM

TO: Michael O'Toole, Director, Division of Hazardous Waste Remediation
FROM: N.G. Kaul, Director, Division of Water
SUBJECT: Generic Effluent Criteria for Surface Water Discharges

DATE: **September 28, 1995**

This memo is to transmit a general authorization for short term, batch surface water discharges of pump test and containerized well development waters. Remedial investigations and designs have often required DOW to provide rapid turnaround times to develop short term surface water pump test and containerized well development water discharge criteria. The attached generic surface water effluent criteria and general conditions were developed by DOW staff to reduce delays in implementing these short term surface water discharges and to save staff time for both Divisions. Please have your staff pay particular attention to the footnotes listed at the end of the document.

The attached criteria are subject to the following conditions:

1. Discharges to surface waters within the New York City watershed are not authorized by the attached criteria. A full DOW review is required by these discharges.

2. The criteria do not contain discharge limitations for radioactive discharges. Limitations on discharges of radiation or radioactive isotopes are addressed under Part 380 Radiation Control Permits.

3. Alternate monitoring frequencies, discharge limitations (where appropriate) or inclusion of parameters not identified in the attachment will be considered; however, a complete review by DOW staff will be required.

4. The attached parameter list is extensive and DOW's intent is for monitoring to be conducted only for those parameters which are known or suspected to be present at the site. Monitoring of parameters not present is not required by these criteria.

The DOW does not have any regulatory authority over a discharge from State, PRP, Federal Superfund Sites without SPDES permits. DHWR will be responsible for ensuring compliance with the attached effluent criteria and approval of all engineering submissions. Footnote (11) requires identification of the DHWR contact person who will receive all effluent results, engineering submissions and modification requests. The Regional Water Engineer should be kept appraised of the status of each discharge and sent a copy of the effluent results for informational purposes.

Long term groundwater and surface water discharges are not addressed in the attached criteria or in the short term groundwater criteria sent in a previous memo. A complete review of these proposed discharge scenarios will still require full DOW review. The attached criteria may be used as a planning tool by your staff, consultants and PRPs determining the most feasible discharge option. All long term groundwater and surface water discharge requests and modifications of the short term discharge criteria should be directed to Mr. Angus Eaton, Chief, Chemical Systems Section, Bureau of Wastewater Facilities Design.

If you have any questions, please call Mr. Angus Eaton at 457-0625.

Attachment

cc: Regional Water Engineers
A. Eaton, DOW

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements: Measurement Frequency	Sample Type
Outfall 001 - Containerized Well Development Water and/or Pump Test Water:					
Flow	NA	Monitor	gpd	Continuous	Meter
pH(Range)	NA	6.5 to 8.5	SU	(1)	Grab
Oil and Grease	NA	15	mg/l	(1)	Grab
BOD, 5-day	NA	5	mg/l	(1)	Grab
Solids, Total Suspended	NA	10	mg/l	(1)	Grab
Solids, Total Dissolved	NA	200	mg/l	(1)	Grab
Turbidity	NA	5	NTUs	(1)	Grab
Acenaphthene	83-32-9	10	µg/l	(1)	Grab
Acenaphthylene	208-96-8	10	µg/l	(1)	Grab
Acetone	67-64-1	100.0[2]	µg/l	(1)	Grab
Acrylic acid	79-10-7	50	µg/l	(1)	Grab
Acrylonitrile	107-13-1	0.07	µg/l	(1)	Grab
Alachlor	15972-60-8	0.3	µg/l	(1)	Grab
Aldicarb	116-06-3	8.0[2]	µg/l	(1)	Grab
Methomyl	16752-77-5	40.0[2]	µg/l	(1)	Grab
Aldicarb sulfone	1646-88-4	2	µg/l	(1)	Grab
Aldicarb sulfoxide	1646-87-3	4	µg/l	(1)	Grab
Aldrin	309-00-2	0.020[2]	µg/l	(1)	Grab
Alkyl dimethyl benzyl ammonium chloride	68391-01-5	50	µg/l	(1)	Grab
Alkyl diphenyl oxide sulfonates[3]	NA	50	µg/l	(1)	Grab
Aluminum, Total	NA	100	µg/l	(1)	Grab
Ametryn	834-12-8	50	µg/l	(1)	Grab
Aminomethylene phosphonic acid salts[4]	NA	50	µg/l	(1)	Grab
Sum of Aminopyridines	NA	1.0	µg/l	(1)	Grab
Ammonia, Total (as NH_3)	7664-41-7	660	µg/l	(1)	Grab
Aniline	62-53-3	10.0[2]	µg/l	(1)	Grab
Anthracene	120-12-7	10	µg/l	(1)	Grab
Antimony, Total	NA	10.0[2]	µg/l	(1)	Grab
Arsenic, Total	NA	36	µg/l	(1)	Grab
Aryltriazoles[3]	NA	50	µg/l	(1)	Grab
Atrazine	1912-24-9	8.0[2]	µg/l	(1)	Grab
Azinphosmethyl	86-50-0	0.60[2]	µg/l	(1)	Grab
Azobenzene	103-33-3	0.5	µg/l	(1)	Grab
Barium, Total	NA	1,000	µg/l	(1)	Grab
Benz(a)anthracene	56-55-3	0.050[2]	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Benzene	71-43-2	0.80[2]	µg/l	(1)	Grab
Benzidine	92-87-5	0.30[2]	µg/l	(1)	Grab
Benzisothiazole	271-61-4	50	µg/l	(1)	Grab
Benzo(a)anthracene	56-55-3	10	µg/l	(1)	Grab
Benzo(b)fluoranthene	205-99-2	0.070[2]	µg/l	(1)	Grab
Benzo(k)fluoranthene	207-08-9	0.020[2]	µg/l	(1)	Grab
Benzo(ghi)Perylene	191-24-2	10	µg/l	(1)	Grab
Benzo(a)pyrene	50-32-8	0.090[2]	µg/l	(1)	Grab
Beryllium, Total	NA	3	µg/l	(1)	Grab
Bis(2-chloroethyl)ether	111-44-4	1.0[2]	µg/l	(1)	Grab
Bis(2-ethylhexyl)phthalate	117-81-7	8.0[2]	µg/l	(1)	Grab
Boric acid, Borates & Metaborates[5]	NA	125	µg/l	(1)	Grab
Boron, Total	NA	1,000	µg/l	(1)	Grab
Bromide, Total	NA	2,000	µg/l	(1)	Grab
Bromobenzene	108-86-1	5	µg/l	(1)	Grab
Bromochloromethane	74-97-5	5	µg/l	(1)	Grab
Bromodichloromethane	75-27-4	10	µg/l	(1)	Grab
Bromoform	75-25-2	10	µg/l	(1)	Grab
Bromomethane	74-83-9	5	µg/l	(1)	Grab
Butoxyethoxyethanol	112-34-5	50	µg/l	(1)	Grab
Butoxypropanol	5131-66-8	50	µg/l	(1)	Grab
Butylate	2008-41-5	50	µg/l	(1)	Grab
n-Butylbenzene	104-51-8	5	µg/l	(1)	Grab
sec-Butylbenzene	135-98-8	5	µg/l	(1)	Grab
tert-Butylbenzene	98-06-6	5	µg/l	(1)	Grab
Butyl benzyl phthalate	85-68-7	50	µg/l	(1)	Grab
Butyl isopropyl phthalate	NA	50	µg/l	(1)	Grab
Cadmium, Total	NA	1.2	µg/l	(1)	Grab
Carbofuran	1563-66-2	10.0[2]	µg/l	(1)	Grab
Carbon tetrachloride	56-23-5	0.50[2]	µg/l	(1)	Grab
Carboxin	5234-68-4	50	µg/l	(1)	Grab
Chloramben[6]	NA	50	µg/l	(1)	Grab
Chlordane	57-74-9	0.060[2]	µg/l	(1)	Grab
Chloride	NA	250,000	µg/l	(1)	Grab
2,3,7,8-Tetrachlorodibenzo-p-dioxin	NA	0.0080[2]	µg/l	(1)	Grab
Chlorinated dibenzo-p-dioxins and Chlorinated dibenzofurans	NA	0.0080[2]	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements: Measurement Frequency	Minimum Monitoring Requirements: Sample Type
Chlorine, Total Residual	NA	100.0[2]	µg/l	(1)	Grab
Chlorobenzene	108-90-7	5	µg/l	(1)	Grab
4-Chlorobenzotrifluoride	98-56-6	5	µg/l	(1)	Grab
Chloroethane	75-00-3	5	µg/l	(1)	Grab
Chloroform	67-66-3	7	µg/l	(1)	Grab
2-Chloronaphthalene	91-58-7	10	µg/l	(1)	Grab
2-Chlorotoluene	95-49-8	5	µg/l	(1)	Grab
4-Chlorotoluene	106-43-4	5	µg/l	(1)	Grab
5-Chloro-o-toluidine	95-79-4	0.7	µg/l	(1)	Grab
Chromium, Total	NA	207	µg/l	(1)	Grab
Chromium, Hexavalent	NA	11	µg/l	(1)	Grab
Chrysene	218-01-0	0.60[2]	µg/l	(1)	Grab
Cobalt, Total	NA	5	µg/l	(1)	Grab
Copper, Dissolved	NA	Monitor	µg/l	(1)	Grab
Copper, Total	NA	24	µg/l	(1)	Grab
Cyanide, Amenable to Chlorination	NA	60.0[2]	µg/l	(1)	Grab
Dalapon[6]	NA	50	µg/l	(1)	Grab
4,4'-DDT	50-29-3	0.050[2]	µg/l	(1)	Grab
4,4'-DDD	72-54-8	0.040[2]	µg/l	(1)	Grab
4,4'-DDE	72-55-9	0.020[2]	µg/l	(1)	Grab
Sum of Demeton	NA	0.1	µg/l	(1)	Grab
Dechlorane Plus	13560-89-9	5	µg/l	(1)	Grab
Diazinon	333-41-5	0.7	µg/l	(1)	Grab
Dibenzo(a,h)Anthracene	53-70-3	10	µg/l	(1)	Grab
Dibromochloromethane	124-48-1	10	µg/l	(1)	Grab
1,2-Dibromo-3-chloropropane	96-12-8	0.2	µg/l	(1)	Grab
Dibromodichloromethane	594-18-3	5	µg/l	(1)	Grab
Dibromomethane	74-95-3	5	µg/l	(1)	Grab
2,2-Dibromo-3-nitrilopropionamide	10222-01-2	20	µg/l	(1)	Grab
Di-n-butyl phthalate	84-74-2	50	µg/l	(1)	Grab
1,2-Dichlorobenzene	95-50-1	see sum of Dichlorobenzenes			
1,4-Dichlorobenzene	106-46-7	see sum of Dichlorobenzenes			
1,3-Dichlorobenzene	541-73-1	see sum of Dichlorobenzenes			
Sum of Dichlorobenzenes	NA	5	µg/l	(1)	Grab
3,4-Dichlorobenzotrifluoride	328-84-7	5	µg/l	(1)	Grab
Dichlorodifluoromethane	75-71-8	5	µg/l	(1)	Grab
1,1-Dichloroethane	75-34-3	5	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
1,2-Dichloroethane	107-06-2	0.8	µg/l	(1)	Grab
cis-1,2-Dichloroethylene	156-59-2	5	µg/l	(1)	Grab
trans-1,2-Dichloroethylene	156-60-5	5	µg/l	(1)	Grab
1,1-Dichloroethylene	75-35-4	0.50[2]	µg/l	(1)	Grab
Dichlorofluoromethane	75-43-4	5	µg/l	(1)	Grab
2,4-Dichlorophenol	120-83-2	2.0[2]	µg/l	(1)	Grab
2,4-Dichlorophenoxyacetic acid	94-75-7	10	µg/l	(1)	Grab
1,2-Dichloropropane	78-87-5	0.5	µg/l	(1)	Grab
1,1-Dichloropropane	78-99-9	5	µg/l	(1)	Grab
1,3-Dichloropropane	142-28-9	5	µg/l	(1)	Grab
2,2-Dichloropropane	594-20-7	5	µg/l	(1)	Grab
1,1-Dichloropropene	563-58-6	5	µg/l	(1)	Grab
cis-1,3-Dichloropropene	10061-01-5	5	µg/l	(1)	Grab
trans-1,3-Dichloropropene	10061-02-6	5	µg/l	(1)	Grab
2,3-Dichlorotoluene	32768-54-0	5	µg/l	(1)	Grab
2,4-Dichlorotoluene	95-73-8	5	µg/l	(1)	Grab
2,5-Dichlorotoluene	19398-61-9	5	µg/l	(1)	Grab
2,6-Dichlorotoluene	118-69-4	5	µg/l	(1)	Grab
3,4-Dichlorotoluene	95-75-0	5	µg/l	(1)	Grab
3,5-Dichlorotoluene	25186-47-4	5	µg/l	(1)	Grab
Dieldrin	60-57-1	0.0080[2]	µg/l	(1)	Grab
Di(2-ethylhexyl)adipate	103-23-1	50	µg/l	(1)	Grab
Diethyl phthalate	84-66-2	50	µg/l	(1)	Grab
N,N-Dimethyl aniline	121-69-7	1.0	µg/l	(1)	Grab
Dimethylformamide	68-12-2	50	µg/l	(1)	Grab
Dimethyl phthalate	131-11-3	50	µg/l	(1)	Grab
Dimethyl tetrachloroterephthalate	1861-32-1	50	µg/l	(1)	Grab
2,6-Dinitrotoluene	606-20-2	0.080[2]	µg/l	(1)	Grab
Di-n-octyl phthalate	117-84-0	50	µg/l	(1)	Grab
Dioxin	see Chlorinated dibenzo-p-dioxins and Chlorinated dibenzofurans"				
Diphenamid	957-51-7	50	µg/l	(1)	Grab
1,2-Diphenylhydrazine	122-66-7	0.05	µg/l	(1)	Grab
Diquat dibromide	85-00-7	20	µg/l	(1)	Grab
Dodecylguanidine acetate	2439-10-3	see sum of Dodecylguanidine acetate and			
Dodecylguanidine hydrochloride	13590-97-1	Dodecylguanidine hydrochloride			
Sum of Dodecylguanidine acetate and dodecylguanidine hydrochloride	NA	50	µg/l	(1)	Grab
Dyphylline	479-18-5	50	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Endosulfan	115-73-3	0.020[2]	µg/l	(1)	Grab
Endothall	145-73-3	50	µg/l	(1)	Grab
Endrin	72-20-8	0.020[2]	µg/l	(1)	Grab
Ethylbenzene	100-41-4	5	µg/l	(1)	Grab
Ethylene chlorohydrin	107-07-3	50	µg/l	(1)	Grab
Ethylene dibromide	106-93-4	0.05	µg/l	(1)	Grab
Ethylene glycol	107-21-1	50	µg/l	(1)	Grab
Ethylene oxide	75-21-8	0.05	µg/l	(1)	Grab
Fluometuron	2164-17-2	50	µg/l	(1)	Grab
Fluoranthene	206-44-0	10	µg/l	(1)	Grab
Fluorene	86-73-7	10	µg/l	(1)	Grab
Fluoride	NA	2000	µg/l	(1)	Grab
Glyphosate	1071-83-6	50	µg/l	(1)	Grab
Guaifenesin	93-14-1	50	µg/l	(1)	Grab
Heptachlor	76-44-8	0.010[2]	µg/l	(1)	Grab
Heptachlor epoxide	1024-74-3	0.30[2]	µg/l	(1)	Grab
Hexachlorobenzene	118-74-1	0.20[2]	µg/l	(1)	Grab
Hexachlorobutadiene	87-68-3	1.0[2]	µg/l	(1)	Grab
• -Hexachlorocyclohexane(• -BHC)	319-84-6	0.010[2]	µg/l	(1)	Grab
• -Hexachlorocyclohexane(• -BHC)	319-85-7	0.020[2]	µg/l	(1)	Grab
• -Hexachlorocyclohexane(• -BHC)	319-86-8	0.040[2]	µg/l	(1)	Grab
• -Hexachlorocyclohexane(Lindane)	58-89-9	0.020[2]	µg/l	(1)	Grab
Hexachlorocyclopentadiene	77-47-4	2.0[2]	µg/l	(1)	Grab
2-Hexanone	591-78-6	50	µg/l	(1)	Grab
Hexazinone	51235-04-2	50	µg/l	(1)	Grab
Hydrazine	302-01-2	5	µg/l	(1)	Grab
Hydrogen sulfide	7783-06-4	2.0	µg/l	(1)	Grab
Hydroquinone	123-31-9	2.2	µg/l	(1)	Grab
1-Hydroxyethylidene-1,1-diphosphonic acid	2809-21-4	50	µg/l	(1)	Grab
2-(2-Hydroxy-3,5-di-tert-pentylphenyl)benzotriazole	25973-55-1	50	µg/l	(1)	Grab
Indeno(1,2,3-cd)pyrene	193-39-5	0.20[2]	µg/l	(1)	Grab
Iron, Total	NA	300	µg/l	(1)	Grab
Isodecyl diphenyl phosphate	29761-21-5	1.7	µg/l	(1)	Grab
Isophorone	78-59-1	10	µg/l	(1)	Grab
Isopropylbenzene	98-82-8	5	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
4-Isopropyltoluene	99-87-6	5	µg/l	(1)	Grab
Total Isothiazolones	NA	1	µg/l	(1)	Grab
Lead, Total	NA	4.0[2]	µg/l	(1)	Grab
Magnesium, Total	NA	35,000	µg/l	(1)	Grab
Malathion	121-75-5	0.6[2]	µg/l	(1)	Grab
Manganese, Total	NA	300	µg/l	(1)	Grab
Mercaptobenzothiazole	149-30-4	50	µg/l	(1)	Grab
Mercury, Total	NA	0.8[2]	µg/l	(1)	Grab
Methacrylic acid	79-41-4	50	µg/l	(1)	Grab
Methoxychlor	72-43-5	0.4[2]	µg/l	(1)	Grab
(2-Methoxyethyl)benzene	4013-34-7	50	µg/l	(1)	Grab
(1-Methoxyethyl)benzene	3558-60-9	50	µg/l	(1)	Grab
Sum of Methybenz(a)anthracenes	NA	0.002	µg/l	(1)	Grab
Methyl chloride	74-87-3	5	µg/l	(1)	Grab
Methylene bisthiocyanate	6317-18-6	1.0	µg/l	(1)	Grab
Methylene chloride	75-09-2	5	µg/l	(1)	Grab
4-(1-Methylethoxy)-1-butanol	31600-69-8	50	µg/l	(1)	Grab
2-Methylethyl-1,3-dioxolane	126-39-6	50	µg/l	(1)	Grab
Methyl ethyl ketone	78-93-3	50	µg/l	(1)	Grab
2-Methylstyrene	611-15-4	5	µg/l	(1)	Grab
3-Methylstyrene	100-80-1	5	µg/l	(1)	Grab
Metribuzin	21087-64-9	50	µg/l	(1)	Grab
Mirex	2385-85-5	0.4[2]	µg/l	(1)	Grab
Naphthalene	91-20-3	10	µg/l	(1)	Grab
Niacinamide	98-92-0	500	µg/l	(1)	Grab
Nickel, Total	NA	96	µg/l	(1)	Grab
Nitrate (as N)	NA	10,000	µg/l	(1)	Grab
Nitrilotriacetic acid[7]	NA	3	µg/l	(1)	Grab
Nitrite	NA	20	µg/l	(1)	Grab
Nitrobenzene	98-95-3	5	µg/l	(1)	Grab
N-Nitrosodiphenylamine	86-30-6	10	µg/l	(1)	Grab
Oxamyl(Vydate)	23135-22-0	10	µg/l	(1)	Grab
Parathion	56-38-2	0.6[2]	µg/l	(1)	Grab
Methyl parathion	298-00-0	0.6[2]	µg/l	(1)	Grab
Pentachlorophenol	87-86-5	2[2]	µg/l	(1)	Grab
Phenanthrene	85-01-8	10	µg/l	(1)	Grab
Phenolic compounds (total phenols)[11]	NA	8.0[2]	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Phenyl ether	101-84-8	10	µg/l	(1)	Grab
Phenylpropanolamine	14838-15-4	50	µg/l	(1)	Grab
cis-1-Phenyl-1-propene	766-90-5	5	µg/l	(1)	Grab
trans-1-Phenyl-1-propene	873-66-5	5	µg/l	(1)	Grab
3-Phenyl-1-propene	637-50-3	5	µg/l	(1)	Grab
Phosphorus	NA	20	µg/l	(1)	Grab
Picloram[6]	1918-02-1	50	µg/l	(1)	Grab
PCB-1016	12674-11-2	0.30[2,8]	µg/l	(1)	Grab
PCB-1221	11104-28-2	0.30[2,8]	µg/l	(1)	Grab
PCB-1232	11141-16-5	0.30[2,8]	µg/l	(1)	Grab
PCB-1242	53469-21-9	0.30[2,8]	µg/l	(1)	Grab
PCB-1248	12672-29-6	0.30[2,8]	µg/l	(1)	Grab
PCB-1254	11097-69-1	0.30[2,8]	µg/l	(1)	Grab
PCB-1260	11096-82-5	0.30[2,8]	µg/l	(1)	Grab
Prometon	1610-18-0	50	µg/l	(1)	Grab
Propham	122-42-9	50	µg/l	(1)	Grab
n-Propylbenzene	103-65-1	5	µg/l	(1)	Grab
Pyrene	129-00-0	10	µg/l	(1)	Grab
Pyridine	110-86-1	50	µg/l	(1)	Grab
Sum of Quaternary ammonium compounds	NA	10	µg/l	(1)	Grab
Selenium, Total	NA	4[2]	µg/l	(1)	Grab
Silver, Total	NA	200	µg/l	(1)	Grab
Simazine	122-34-9	8[2]	µg/l	(1)	Grab
Styrene	100-42-5	50	µg/l	(1)	Grab
Sulfate	NA	250,000	µg/l	(1)	Grab
Sulfides, Total	NA	50	µg/l	(1)	Grab
Sulfite	NA	200	µg/l	(1)	Grab
Tebuthiuron	34014-18-1	50	µg/l	(1)	Grab
Terbufos	13071-79-9	100.0[2]	µg/l	(1)	Grab
Sum of Tetrachlorobenzenes	12408-10-5	10	µg/l	(1)	Grab
1,1,1,2-Tetrachloroethane	630-20-6	5	µg/l	(1)	Grab
1,1,2,2-Tetrachloroethane	79-34-5	0.2	µg/l	(1)	Grab
Tetrachloroethylene	127-18-4	0.7	µg/l	(1)	Grab
Tetrahydrofuran	109-99-9	50	µg/l	(1)	Grab
Thallium, Total	NA	4	µg/l	(1)	Grab
Theophylline	58-55-9	40	µg/l	(1)	Grab
Terbufos	13071-79-9	100.0[2]	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Sum of Tetrachlorobenzenes	12408-10-5	10	µg/l	(1)	Grab
1,1,1,2-Tetrachloroethane	630-20-6	5	µg/l	(1)	Grab
1,1,2,2-Tetrachloroethane	79-34-5	0.2	µg/l	(1)	Grab
Tetrachloroethylene	127-18-4	0.7	µg/l	(1)	Grab
Toluene	108-88-3	5	µg/l	(1)	Grab
o-Toluidine	95-53-4	10[2]	µg/l	(1)	Grab
Tolytriazole	29385-43-1	50	µg/l	(1)	Grab
Toxaphene	8001-35-2	1.0[2]	µg/l	(1)	Grab
1,2,4-Tribromobenzene	615-54-3	5	µg/l	(1)	Grab
Tributyltin oxide	56-35-9	50	µg/l	(1)	Grab
Sum of Trichlorobenzenes	12002-48-1	10	µg/l	(1)	Grab
1,1,1-Trichloroethane	71-55-6	5	µg/l	(1)	Grab
1,1,2-Trichloroethane	79-00-5	0.6	µg/l	(1)	Grab
Trichloroethylene	79-01-6	3	µg/l	(1)	Grab
Trichlorofluoromethane	75-69-4	5	µg/l	(1)	Grab
2,4,5-Trichloro-phenoxypropionic acid	93-72-1	10	µg/l	(1)	Grab
1,1,2-Trichloropropane	598-77-6	5	µg/l	(1)	Grab
1,2,3-Trichloropropane	96-18-4	5	µg/l	(1)	Grab
cis-1,2,3-Trichloropropene	13116-57-9	5	µg/l	(1)	Grab
trans-1,2,3-Trichloropropene	13116-58-0	5	µg/l	(1)	Grab
alpha,2,4-Trichlorotoluene	94-99-5	5	µg/l	(1)	Grab
alpha,2,6-Trichlorotoluene	2014-83-7	5	µg/l	(1)	Grab
alpha,3,4-Trichlorotoluene	102-47-6	5	µg/l	(1)	Grab
alpha,alpha,2-Trichlorotoluene	88-66-4	5	µg/l	(1)	Grab
alpha,alpha,4-Trichlorotoluene	13940-94-8	5	µg/l	(1)	Grab
2,3,4-Trichlorotoluene	7359-72-0	0.34	µg/l	(1)	Grab
2,3,5-Trichlorotoluene	56961-86-5	0.34	µg/l	(1)	Grab
2,3,6-Trichlorotoluene	2077-46-5	0.34	µg/l	(1)	Grab
2,4,5-Trichlorotoluene	6639-30-1	0.34	µg/l	(1)	Grab
2,4,6-Trichlorotoluene	23749-65-7	0.34	µg/l	(1)	Grab
1,1,1-Trichloro-2,2,2-trifluoroethane	354-58-5	5	µg/l	(1)	Grab
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5	µg/l	(1)	Grab
1,2,3-Trimethylbenzene	526-73-8	5	µg/l	(1)	Grab
1,2,4-Trimethylbenzene	95-63-6	5	µg/l	(1)	Grab
1,3,5-Trimethylbenzene	108-67-8	5	µg/l	(1)	Grab
2,3,6-Trimethylpyridine	1462-84-6	50	µg/l	(1)	Grab

SEE PAGES 9 OF 10 AND 10 OF 10 FOR FOOTNOTES.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning with the start of each discharge event

and lasting until 7 days from start of discharge.

the discharges from the treatment facility to surface water shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter	CAS No.	Discharge Limitations Daily Max.	Units	Minimum Monitoring Requirements: Measurement Frequency	Minimum Monitoring Requirements: Sample Type
2,4,6-Trimethylpyridine	108-75-8	50	µg/l	(1)	Grab
Triphenyl phosphate	115-86-6	4	µg/l	(1)	Grab
Vanadium, Total	NA	14	µg/l	(1)	Grab
Vinyl chloride	75-01-4	0.70[2]	µg/l	(1)	Grab
1,2-Xylene	95-47-6	5	µg/l	(1)	Grab
1,3-Xylene	108-38-2	5	µg/l	(1)	Grab
1,4-Xylene	106-42-3	5	µg/l	(1)	Grab
Zinc, Total	NA	166	µg/l	(1)	Grab

Footnotes:

(1) Samples must be collected prior to each discharge event. Discharge may not commence until the sample results show compliance with the above discharge limitations.

(2) Discharge limit is set at the Practical Quantitation Limit (PQL). Actual surface water effluent standard/limitation is below this limit.

(3) Limit applies to each isomer individually.

(4) Limit applies to each salt individually.

(5) Limit applies as boron equivalents to the sum of these substances.

(6) Limit includes forms that convert to the organic acid upon acidification to a pH of 2 or less; and esters of the organic acid.

(7) Includes related forms that convert to nitrilotriacetic acid upon acidification to a pH of 2.3 or less.

SEE PAGE 10 OF 10 FOR ADDITIONAL FOOTNOTES.

Footnotes (continued):

(8) a. The treatment plant operator must monitor this discharge for PCBs using USEPA laboratory method 608. The laboratory must make all reasonable attempts to achieve a Minimum Detection Level (MDL) of 0.065 µg/l.

b. 0.065 µg/l is the discharge goal. The treatment plant operator shall report all values above the MDL (0.065 µg/l per Aroclor). If the level of any Aroclor is above 0.065 µg/l, the treatment plant operator must evaluate the treatment system and identify the cause of the detectable level of PCBs in the discharge.

c. If the Department determines that effluent monitoring results above 0.065 µg/l can be prevented by implementation of additional measures as proposed by the treatment plant operator in footnote 10.b above, and approved by the Department, the treatment plant operator shall implement such additional measures.

(8) Only site generated pump test and containerized well development water are authorized for treatment and discharge.

(9) Samples and measurements, to comply with the monitoring requirements specified above, must be taken from the holding tank prior to discharge to _____.

(10) Discharge is not authorized until such time as an engineering submission showing the method of treatment and discharge is approved by the Department. The discharge rate may not exceed the effective treatment system capacity. All monitoring data, engineering submissions and modification requests must be submitted to the following DHWR contact person: _____.

(11) Total phenolics must be analyzed using EPA Methods 420.1 or 420.2.

(12) Discharge to a surface water body within the New York City Watershed is not authorized by these effluent criteria. Seperate review of any proposed discharge to a surface water within the New York City Watershed is required.

APPENDIX 7

Turbidity Curtain Design

Outer Turbidity Curtain Design Calculations
CSXT Genesee River Sediments

Design Criteria

Length of outer curtain section that is subject to direct force of current (L): 328 linear feet (LF)
River Depth (Sd): 24 feet, corrected for flowthrough (-6%) is 22.6 feet
Curtain deployment angle (Angle): 37 degrees
Correction factor for deployment angle (fc): 0.45
Current velocity (U): 1 foot per second (measured), increased to 2.5 fps (for 2.5 factor of safety
Freeboard (Su): 1 foot
Wind speed (V): 17.4 knots (20 mph)

Section	L (ft)	Sd (ft)	Angle	fc	U (fps)	Wc (lb/LF)	Su (ft)	V (knots)	Ww (lb/LF)	Wtot (lb/LF)	Ftot (lb)
1	328	22.6	37	0.45	2.5	122	1	17.4	1	123	40295

Current Loading (Wc):

$Wc = 1.92 \times Sd \times U^2 \times fc$

$Wc = 1.92 \times 22.6 \times 2.5^2 \times 0.45$

$Wc = 122$ lb/LF

Wind Loading (Ww):

$Ww = 0.0039 \times V^2 \times Su$

$Ww = 0.0039 \times 17.4^2 \times 1.0$

$Ww = 1$ lb/LF

Total Loading (Wtot):

$Wtot = Wc + Ww$

$Wtot = 122 + 1$

$Wtot = 123$ lb/LF

Total Loading for 328' of Turbidity Curtain subject to force of current (Ftot):

$Ftot = L \times Wtot$

$Ftot = 328$ LF $\times$ 123 lb/LF

$Ftot = 40295$ lb

Anchor holding power for Hooker Model #85, Danforth type anchor (lbs, per anchor):
2800 lb/anchor

# of anchors required along face exposed to currrent:
= Ftot / per anchor holding force
= 40295 lb / 2800 lb/anchor
= 14 anchors

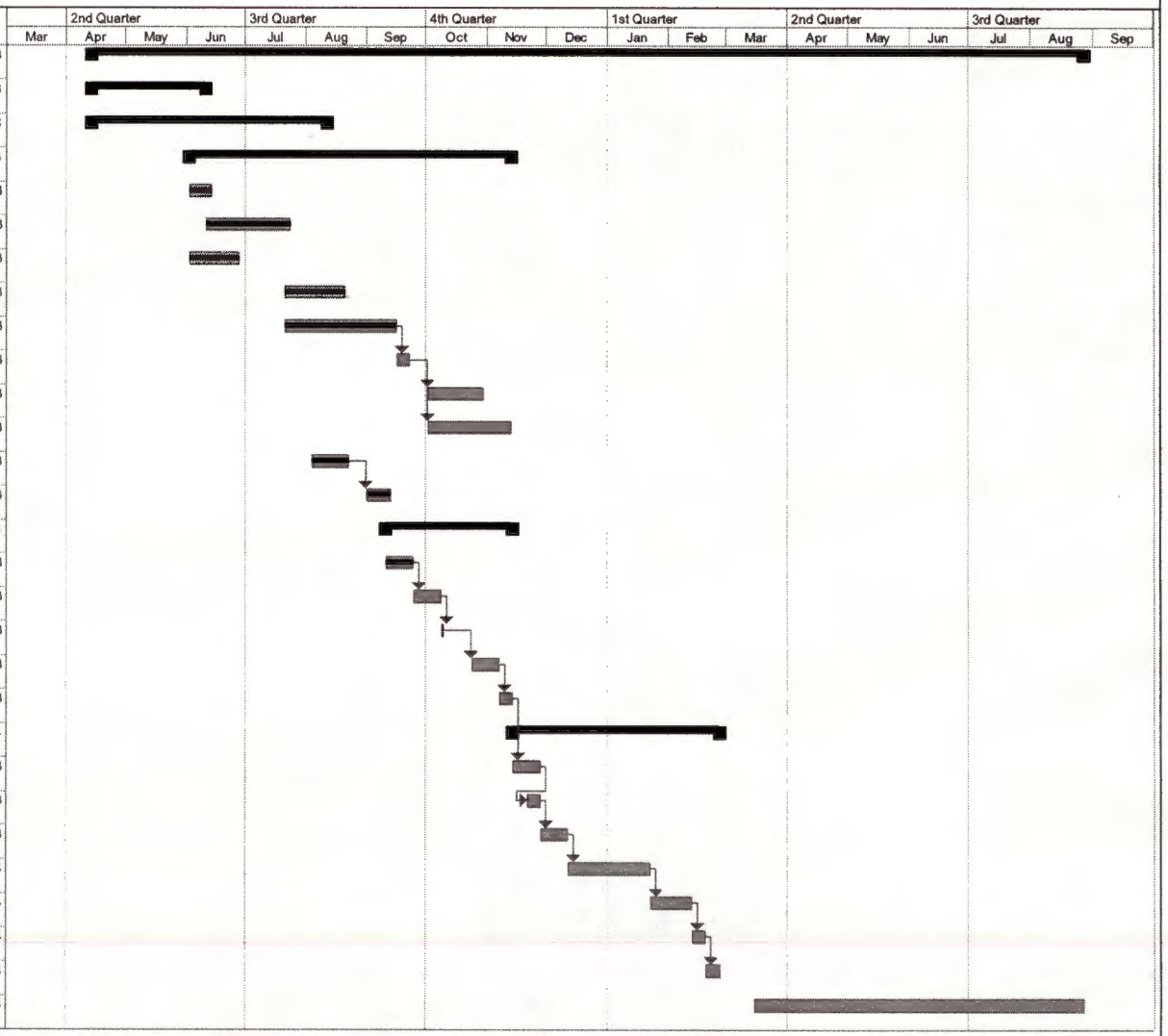
Anchor spacing (ft)
= 328 feet / 14 anchors
= 23 feet

APPENDIX 8

Schedule

CSXT River St. - Genesee River

ID	Task Name	Duration	Start	Finish
1	**Genesee River**	**360 days**	**Mon 04/14/03**	**Fri 08/27/04**
2	**Phase VII Sampling Event**	**42 days**	**Mon 04/14/03**	**Tue 06/10/03**
8	**Work Plan Preparation and Research**	**86 days**	**Mon 04/14/03**	**Mon 08/11/03**
15	**Implementation of Work Plan**	**118 days**	**Mon 06/02/03**	**Wed 11/12/03**
16	Historical Review of Genesee	10 days	Mon 06/02/03	Fri 06/13/03
17	Final Plume Delineation (1,100 ppb)	31 days	Wed 06/11/03	Wed 07/23/03
18	Dredging Technology Evaluation	20 days	Mon 06/02/03	Fri 06/27/03
19	Pilot Test & Modeling	23 days	Mon 07/21/03	Fri 08/22/03
20	RAS and Engineering Design	41 days	Mon 07/21/03	Mon 09/15/03
21	CSXT / AMEC Review of RAS	5 days	Tue 09/16/03	Mon 09/22/03
22	NYSDEC Review of RAS and Design	20 days	Thu 10/02/03	Wed 10/29/03
23	USACE Permit Application Review	30 days	Thu 10/02/03	Wed 11/12/03
24	Dredging HASP	15 days	Mon 08/04/03	Fri 08/22/03
25	Dredging CAMP	10 days	Mon 09/01/03	Fri 09/12/03
26	**Dredging Procurment**	**46 days**	**Thu 09/11/03**	**Thu 11/13/03**
27	Request for Qualifications	10 days	Thu 09/11/03	Wed 09/24/03
28	RFP Process	10 days	Thu 09/25/03	Wed 10/08/03
29	Bid Walk	1 day	Thu 10/09/03	Thu 10/09/03
30	Review Proposals	10 days	Fri 10/24/03	Thu 11/06/03
31	Award Bid and Contract Negotiations	5 days	Fri 11/07/03	Thu 11/13/03
32	**Dredging Activities**	**75 days**	**Fri 11/14/03**	**Thu 02/26/04**
33	Submittal Process	10 days	Fri 11/14/03	Thu 11/27/03
34	Dredging Mobilization	5 days	Fri 11/21/03	Thu 11/27/03
35	Site Setup	10 days	Fri 11/28/03	Thu 12/11/03
36	Dredging & Dewatering	30 days	Fri 12/12/03	Thu 01/22/04
37	Cap Installation	15 days	Fri 01/23/04	Thu 02/12/04
38	Site Restoration	5 days	Fri 02/13/04	Thu 02/19/04
39	Demobilization	5 days	Fri 02/20/04	Thu 02/26/04
40	Closure Reporting	120 days	Mon 03/15/04	Fri 08/27/04



Project: Schedule - Genesee River 09
Date: Thu 10/02/03

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

APPENDIX 9

Remedial Design Construction Drawings

(Drawings have been attached separately.)

APPENDIX 10

Remedial Design Construction Specifications

DRAFT DESIGN REPORT
CSXT GENESEE RIVER SITE

TECHNICAL SPECIFICATIONS

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.1 SUMMARY OF WORK

The Work included in this project consists of furnishing all supervision, labor, materials, equipment, supplies, transportation, fuel and performing all Work as required by the Contract, in strict accordance with the Contract Documents, all of which are made a part hereof, and including such detail Drawings provided at the time of bidding and as may be furnished by the Client from time to time during construction in clarification or interpretation of said Work. All Work, materials and services not expressly called for in the Contract Documents which may be necessary for proper construction to carry out the Contract in good faith (for example, construction haul roads, etc.) shall be performed, furnished, and/or installed by the Contractor at no additional cost to the Client. The Work shall be accomplished in the best and most workmanlike manner by qualified, careful and experienced personnel. It shall be the responsibility of the Contractor to obtain all necessary building permits, street opening permits, utility permits, or any other permits required to complete the Work, unless otherwise specified herein.

1.2 SCOPE OF WORK

The goal of the project is to excavate approximately 3,000 CY of methylene chloride and acetone impacted Genesee River sediments, process the sediments to make them acceptable for shipment and landfilling, and load sediments for transportation to landfill facility(ies). The work to be performed for this contract generally consists of providing all labor, materials, equipment, tools, services and incidentals necessary to complete major components of the work, including: installation of the sediment processing/stockpile area, sediment unloading area, decontamination pad, management of all waters, installation of erosion protection, installation of turbidity curtains, excavation, processing, and loading of sediments, restoration of subaqueous areas and the site, disposal of all waste construction water, as shown on the Drawings and specified herein. The Client will be responsible for transportation and disposal of the processed sediments, including all required sediment characterization and disposal sampling. The Engineer will sample sediments for disposal and monitor river water quality.

1.3 STAGING AREA, STORAGE AND FIELD OFFICES

All portable trailers or structures required by the Contractor for this Project shall be included in its Contract Prices. Contractor must receive approval from the Client before placing any such structure.

All portable office trailers or similar buildings furnished by the Contractor shall be the property of the Contractor and must be removed at the Contractor's expense on or before the completion of the Construction portion of the Project or extensions given by the Client. Grounds must be restored to original condition, including proper removal of all temporary utilities.

1.4 ACCESS TO THE PROJECT

The Contractor's access to the construction area shall be through the construction entrance designated on the drawings. The Contractor and all the Contractor's Subcontractors and visitors shall sign in and out of the site access log each day.

1.5 HOURS OF WORK

The work on the project shall progress every workday during the week, and continuously week by week until the job is complete, except for days when the weather or working conditions make work impractical in the opinion of the Contractor or the Engineer. Night work after 7:00 PM and earlier than 7:00 AM, Saturday, Sunday and Holiday work shall not be performed without the written consent of the Client as stipulated in Paragraph 1. 6, Night, Saturday, Sunday and Holiday Work.

1.6 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

The Contractor shall be allowed to perform work at night, on Saturdays, Sundays, or legal holidays provided that the conditions below are met.

1. The projected work dates are given in the construction schedule as approved by the Client; and as specified in Paragraph 1.7, Schedule.

2. The Contractor, prior to each such work day, notify the Client at least three (3) work days (72 hours) in advance requesting written permission;

3. Written authorization is given by the Client prior to such work days.

4. All such work shall be at no additional cost to the Client.

5. If such authorized scheduled work is canceled by the Contractor, the Contractor shall give the Client at least two (2) work days (48 hours),

advance notice of the change in schedule. If the Contractor fails to give such notice the Contractor will reimburse the Client for all costs associated with inspection services for such work.

1.7 SCHEDULE

The Contractor shall submit a preliminary schedule submittal with the bid form indicating major tasks and the expected duration of construction. The Contractor shall submit Construction Schedule for all Work under this contract to the Client for review within ten (10) calendar days after issuance of the Notice of Award. This Construction Schedule shall set forth the proposed sequence of operations and rates of progress. If the Client and its authorized representatives agree to the schedule, it shall become part of the Contract Documents and be binding on all parties. If Subcontractors are to perform work on the Project, the Contractor shall prepare such Construction Schedule in consultation with his Subcontractors.

The Contractor shall work such hours and furnish such forces and equipment as are necessary to insure performance of the Work in accordance with the Construction Schedule. If the work of the Contractor falls behind the Construction Schedule, the Contractor shall take such steps, as necessary, including, but not limited to, increasing the number of shifts, overtime operation, days of work, and/or the amount of construction plant, all without additional cost to the Client, as may be necessary to perform the Work in accordance with the Construction Schedule. Failure of the Contractor to perform the Work in accordance with the Construction Schedule shall be grounds for termination by the Client that the Contractor is not prosecuting the Work with such diligence as will insure completion within the time specified, determining the Contractor is in default of the Contract or for the withholding by the Client of payments otherwise due the Contractor hereunder.

1.8 MOBILIZATION

Mobilization shall consist of the assembling and setting up for the project the Contractor's necessary general plant, including offices, storage areas, sanitary and any other facilities as required by the Specifications and special requirements of the contract, as well as by local or State law and regulation. The Contractor shall provide all tools, equipment, materials, labor and Work for the construction and furnishing of the required facilities and services. All work under this item shall be performed in a safe and workmanlike manner. The determination of the adequacy of the Contractor's facilities shall be made by the Engineer.

1.9 WATER

The Contractor shall be responsible for obtaining and payment for all water used during the Construction of the Project. The cost of water shall be incorporated in the Contract Prices.

1.10 SANITATION

The Contractor shall be responsible for providing and maintaining, and paying for sanitary facilities during the construction of the Project. The cost of these sanitary facilities shall be incorporated in the Contract Prices. This shall include all discharge fees for construction water discharged to the sanitary sewer.

1.11 POWER

The Contractor shall furnish, at his own expense, all power (electrical, steam or compressed air) which may be required during the construction of the Project.

1.12 SECURITY

The Contractor shall be responsible for the secure storage of his equipment and materials, and for protection of the site and Work in progress. The Contractor shall provide temporary gates and 6-foot high chain-link fence at the locations shown on the Drawings. The Contractor shall install plastic privacy slats on all fencing, both temporary fence and any existing fence utilized. The Client shall not be responsible for any damage to or loss of the Contractor's equipment, materials, supplies, or Work in progress.

1.13 CLEANING

The Contractor shall keep the premises free from accumulations of waste material, rubbish, and other debris resulting from the Work on a daily basis. Failure to comply herewith constitutes grounds for the Client not to approve payment.

1.14 COMPLETION

At the completion of the Work, Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for operation. Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

1.15 FACILITY

Office Facilities – The Contractor shall provide a field office at a location approved by the Client for the exclusive use of the Client and the Engineer. The Contractor shall provide electric service to the trailer and dedicated phone and facsimile service.

The facility shall be maintained by the Contractor for the duration of the contract, and loss or damage by any cause shall be repaired or replaced by the Contractor at no additional cost to the Client. The facilities shall remain the property of the Contractor and upon completion of the contract work, shall be removed to the satisfaction of the Client. The Contractor shall remove garbage and trash from the premises at least weekly. The Contractor shall sweep and mop the premises at least weekly.

Prior to construction of the field office, the Contractor shall prepare and submit plans for the approval of the Client. Installation shall conform with all applicable regulations.

The field office must be erected, completed as specified herein, within fourteen (14) days after the initial job conference, unless such time is extended by the Client.

PART 2 – MATERIALS

Not used.

PART 3 - EXECUTION

Not used.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

Implementation of the work required and described in this section shall be considered incidental to the work and no additional payment will be made.

END OF SECTION

SECTION 01050

PROJECT SURVEYING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all survey work required in execution of the project.
B. Provide civil, structural, or other professional engineering services specified or required to execute Contractor's construction method.
C. Provide Record Drawings to be used for confirming quantities and documenting construction.
D. The Contractor shall retain the services of an independent registered land surveyor or professional engineer licensed in the New York State to perform all surveying.

1.2 RELATED SECTIONS

Section 01010 – Summary of Work
Section 01300 – Submittals
Section 01400 – Contractor Quality Control Plan
Section 01720 – Project Record Document

1.3 SUBMITTALS

A. Submit name, address and a summary of qualification of registered land surveyor to be used on this project to the Engineer within twenty (20) days of the Notice to Proceed for approval by the Engineer.
B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.
C. The Contractor is required to submit surveys prepared, signed and sealed by a registered land surveyor. All surveys shall be tied to NAVD 88 (IGLD85) and NAD83. These drawings shall constitute the project record documents. The Contractor shall submit each survey on Mylar and on CD disk in AutoCAD Release 14 or 2000 format. All elevation information in the AutoCAD file must be at appropriate 3-D elevations. All horizontal data in the AutoCAD file shall be at appropriate NAD coordinates. All entities shall be placed on layer names, which adequately describe the entity being mapped. The Contractor's surveyor is required to perform, and submit to the Engineer, the following surveys:

1. Certified topographic map surveys and Digital Terrain Models (DTM) of the project area shall be performed:

   a. Prior to performing any construction and starting any sediment excavation.

   b. Immediately following completion of excavation and prior to starting placement of cap material (if necessary).

c. Upon completion of sediment excavation and upon completion of placement of the sediment cap (if necessary) and sheetpile wall backfill.

The surveys shall meet the following criteria:

a. 1" = 10' scale reproducible plot.

b. Produced at National Map Accuracy Standards for 1" = 10 scale maps with 1 contour interval.

c. The surveys defined in 1.3 C.1.a, 1.3 C.1.b, and 1.3 C.1.c will be used by the surveyor to determine the quantities of excavation for the project. The DTM must contain adequate 3-D points and 3-D breaklines required to accurately model the photographed surface to within above stated accuracy. The DTM must also provide a 2-D polyline defining the limits of the area surveyed. The DTM model AutoCAD file must be compatible for use with SoftDesk software.

d. All surveys must be accurate to plus or minus 0.1 feet.

1.4 QUALIFICATIONS OF SURVEYOR

A. Independent registered land surveyor with a minimum of 5 years in business, currently licensed in the New York State.

1.5 SURVEY REFERENCE POINTS

A. Existing basic horizontal and vertical control points for the Project are those designated on Drawings.

B. Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to the Engineer.

2. Report to the Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations,

3. Require surveyor to correctly replace project control points that may be lost or destroyed.

a. Establish replacements based on original horizontal and vertical survey control.

1.6 PROJECT SURVEY REQUIREMENTS

A. Establish permanent bench marks on site as shown on the Drawings, referenced to data established by survey control points.

B. Record locations, with horizontal and vertical data, on Project Record Documents.

C. From time to time, verify work by same methods.

1.7 RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses. Survey logs are to be promptly produced to the Engineer upon request.

B. Update the Project Record Drawings on a monthly basis based on the work performed during the month ending at the pay request as a condition for approval of monthly progress payment requests.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

Implementation of the work required and described in this section shall be considered incidental to the work and no additional payment will be made.

END OF SECTION

SECTION 01110

ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. For purposes of this specification, environmental pollution means the creation, presence, and/or discharge into the environment of any chemical, physical, biological, or auditory element or agent which adversely affects human health or welfare; alters, interferes with or unfavorably impacts or affects the existing ecological balances with the animal or plant life of or surrounding the environment receiving said element or agent; or which would be within the definition of "pollution" contained in any federal, state or local statute, rule, regulation or ordinance.

B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.

C. Schedule and conduct all work in a manner that will minimize the erosion of sediments in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.

D. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.

1.2 APPLICABLE LAWS AND REGULATIONS

A. Comply with all applicable Federal, State and local governmental constraints applicable to or affecting the work in any way.

1.3 NOTIFICATIONS

A. Contractor shall be required to perform all work required by him/her under the Contract Documents in an environmentally protective and acceptable manner and in accordance with all applicable Federal, State and local environmental statutes, laws, rules, regulations, ordinances and constraints applicable to same. The Engineer will notify the Contractor in writing of any observed non-compliance or environmentally objectionable acts observed by the Engineer. Federal, State or local agencies responsible for enforcement or verification of environmental protection requirements may also notify the Contractor in writing either

directly or through the Engineer or the Client, of any non-compliance with applicable laws, regulations, constraints or requirements observed by them. Neither the Engineer nor the Client, however, is responsible for monitoring the Contractor's compliance with the environmental statutes, laws, rules, regulations, ordinances and constraints applicable to the work or the conduct of the work in an environmentally protective and acceptable manner and the failure of Contractor to receive any notice from the Engineer, Client or regulatory agency shall not relieve him of his obligation to perform the work in an environmentally protective and acceptable manner and in accordance with all applicable environmental laws as aforesaid. Contractor shall, after receipt of any such notice from the Engineer or any regulatory agency, immediately (within 24 hours) take corrective action. Such notice, when delivered to the Contractor or his/her authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Client may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop work orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

1.4 IMPLEMENTATION

A. Prior to commencement of the work, meet with the Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program, and then develop a plan outlining the components of the environmental pollution control program and how same is to be administrated by Contractor during the course of the work. Such plan will become part of the submittals required by the Contract Documents and the work will not commence until such time as the plan had been submitted to and approved by the Engineer.

B. Remove temporary environmental control features, when approved by the Engineer and incorporate permanent control features into the project at the earliest practicable time.

C. Compliance with the provisions of this section by Subcontractors shall be the responsibility of the Contractor.

1.5 ENVIRONMENTAL INSPECTION

A. Throughout the performance of the work required, the Contractor shall be subject to environmental inspections of his/her equipment, routine daily operations and environmental protection procedures by the Client, the Engineer, and Federal, State or local agency officials.

B. Environmental inspections or tests by the Client shall not relieve the Contractor from his/her obligations to perform the work in accordance with the requirements of the Contract Documents.

C. At the completion of the work, a joint final field inspection shall be made by the Client, the Engineer and the Contractor.

1.6 RELATED SECTIONS

Section 01300 - Submittals
Section 01401 - Health and Safety Requirements
Section 01500 - Construction Water Management
Section 01564 - Spill and Discharge Control
Section 01640 - Offsite Transportation and Disposal
Section 02900 - Sediment Excavation and Subaqueous Cap
Section 02921 - Turbidity Curtain

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 EROSION CONTROL

A. Contractor shall comply with the requirements of the latest edition of the New York State Stormwater Management Design Manual. The Contractor shall provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures, such as siltation basins, hay check dams, mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into work areas shall be prevented. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

3.2 PROTECTION OF STREAMS AND RIVERS

A. Care shall be taken to prevent, or reduce, or minimize any damage to any stream and rivers from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams and rivers. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the river water, shall not be returned to the river and shall be treated and discharged in accordance to specification Section 01500, "Construction Water Management." Any other waters will be diverted through a settling basin or filter before being directed into the river.

B. The Contractor shall not discharge water from sediment processing operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from de-watering operations shall be treated in accordance to specification Section 01500, "Construction Water Management."

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan prepared at Contractor's expense, and to be approved by the Engineer.

D. The Contractor shall be held responsible for any such spillage and shall hold the Client and Engineer harmless from any and all costs, fines, penalties and damages arising therefrom including but not limited to the Clients expenses incidental to any enforcement/penalty proceedings instituted by government agencies, third party claims for damage and any fines set or imposed by government agencies.

3.3 PROTECTION OF LAND RESOURCES

A. Land resources within the project boundaries, shown on the drawings, and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings. The Contractor shall not store construction equipment and vehicles and/or stockpile construction materials at locations not previously specified and approved by the Client for said purposes.

B. Earthwork for the construction of the new facilities shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage.

C. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of and replaced.

D. The locations of the Contractor's storage and other construction buildings, required temporarily in the performance of the work, shall be placed on cleared portions of the job site. Drawings showing storage facilities and office facilities shall be submitted for approval of the Engineer.

E. If the Contractor proposes to construct temporary roads or embankments and excavations for work areas, he/she shall submit the following for approval at least ten days prior to scheduled start of such temporary work. No construction shall take place without express written approval of the Engineer.

1. A layout of all temporary roads, excavations and embankments to be constructed within the work area.
2. Details of temporary road construction
3. Drawings and cross sections of proposed embankments and their foundations, including a description of proposed materials.
4. A drawing showing the proposed restoration of the area.

F. Remove all signs of temporary construction facilities such as haul roads and work areas (to the extent shown on the Drawings), structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling and plowing of

roadways will not be required to restore the area, but all above grade structures must be removed unless otherwise approved by the Engineer.

G. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner, and at all appropriately licensed/authorized disposal facility in accordance with all applicable laws and regulations

3.4 PROTECTION OF AIR QUALITY

A. Burning - The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control - The Contractor will be required to maintain all stockpiles, access roads, plant sites, waste areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded and which would cause a hazard or nuisance to others.

1. The use of petroleum products for dust control is prohibited.
2. The use of calcium chloride may be permitted with approval from the Engineer. Calcium chloride shall conform to AASHTO M144, Type I except the requirements for "total alkali chlorides" and other impurities shall not apply.
3. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by air monitoring or the Engineer.

3.5 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

3.6 NOISE CONTROL

A. The Contractor shall make every effort to minimize noises caused by his/her operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal regulations.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

Implementation of the work required and described in this section shall be considered incidental to the work and no additional payment will be made.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. This section describes and identifies the submittal requirements that are necessary to ensure the successful completion of this Project. The submittals listed in this Section are required in addition to the bidding and contractual requirements of this Contract, and the inadvertent omission of any submittal requirement from this list that are specified in individual sections does not relieve the Contractor from obligation to provide such items.

B. The Contractor shall provide the submittals within the time frames specified. The Engineer may request additional data and information to be submitted by the Contractor during any time of the contract period if deemed necessary.

C. Review and approval or acceptance of Contractor's submittals by the Engineer shall not relieve the Contractor of the responsibility for engineering, design, workmanship, installation and materials as specified under the Contract Documents.

1.2 RELATED SECTIONS

Section 01010 – Summary of Work
Section 01050 – Project Surveying
Section 01110 – Environmental Protection
Section 01400 – Contractor Quality Control Plan
Section 01401 – Health and Safety Requirements
Section 01411 – Turbidity Monitoring
Section 01500 – Construction Water Management
Section 01510 – Mobilization/Demobilization
Section 01564 – Spill and Discharge Control
Section 01640 – Offsite Transportation and Disposal
Section 01720 – Project Record Documents
Section 02410 – Sampling and Analysis
Section 02900 – Sediment Excavation and Subaqueous Cap
Section 02921 – Turbidity Barriers

1.3 SUBMITTAL DESCRIPTIONS

A. The submittals described below include, but are not limited to, all those required and further described in other sections of the Technical Specifications.

1. Data

   Submittals that provide calculations, descriptions, or documentation regarding the work.

2. Drawings

   Submittals which graphically show relationship of various components of the work, schematic diagrams of systems, details of fabrication, layouts of particular elements, connections, and other relational aspects of the work.

3. Instructions

   Preprinted materials describing installation of a product, system, or material, including special notices and material safety data sheets, if any, concerning impedances, hazards, and safety precautions.

4. Schedules

   Tabular lists showing location, features, or other pertinent information regarding products, materials, equipment, or components used in the work.

5. Statements

   A document, required of the Contractor, or through the Contractor, from a supplier, installer, manufacturer, or other lower tier Contractor, the purpose of which is to confirm the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.

6. Reports

Reports of inspections or test, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used shall be identified and test results shall be recorded.

7. Certificates

Statement signed by an official authorized to certify on behalf of the manufacturer of a product, system, or material, attesting that the product, system, or material meets specified requirements. The statement must be dated after the award of the contract and must state the Contractor's name, address, name of the project, location, and the specific requirements, which are being certified.

8. Samples

Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.

9. Records

Documentation to record compliance with technical or administrative requirements.

10. Design Change Notice (DCN)

This document will be issued by the engineer to implement changes to a completed design prior to the issuance of a document revision. A DCN may be processed to document a change by the engineer, or it may be processed to document a major change initiated by a Field Change Request.

11. Field Change Request (FCR)

A document initiated by the construction site personnel to request a change to a completed design document.

B. Submittal Register

1. Table 01300-1 has been included at the end of this section indicating the minimum submittal requirements. This register is not necessarily complete, and the Contractor shall be responsible

for developing a comprehensive submittal register and schedule using USACE Submittal Register Form 4288.

2. In addition to those items listed on Table 01300-1, the Contractor shall furnish submittals for any deviation from the plans or specifications. The scheduled submittal dates must be recorded on the document for each item for control purposes. In preparing the document, a minimum of 10 days (or longer time as specified in the individual technical specification section) shall be allowed for review and acceptance and possible resubmittal. Scheduling shall be coordinated with the accepted progress schedule, to be provided to the Engineer as part of the Construction Work Plan.

C. Submittal Approval

1. The approval of submittals by the Engineer shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing, and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error, which may exist, as the Contractor under the Contractor Quality Control Plan requirements of this contract, is responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work. After Submittals have been approved by the Engineer, no resubmittal for the purpose of substituting materials or equipment will be given consideration unless accompanied by an explanation as to why a substitution is necessary.

2. If the submittal is disapproved, the Contractor shall make all corrections required by the Engineer and promptly furnish a corrected submittal in the form and number of copies as specified for the initial submittal.

D. Performance of Work

Work on this Contract shall be in general conformance to the accepted submittals. Deviations from the accepted submittals shall be resubmitted as an as-built submittal after written acceptance from the Engineer.

E. Schedule of Submittals

1. The table, attached at the end of this section, shall be used as a reference of the minimum submittal requirements. The submittals listed shall be used in preparing the schedule of submittals by the Contractor.

2. Furnish subnetwork to the Project Schedule indicating respective progress schedule activity, which sequentially follows the submittal activity. The schedule shall allow adequate time for review, but not less than ten (10) days unless otherwise specified for each submittal.

F. Payment

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. In addition, progress estimates will not be processed for payment unless all daily submittals are current to the date of the progress estimate.

PART 2 - PRODUCTS

2.1 SUBMITTALS

A. Submittals that the Contractor is required to provide prior to the initiation of any site work include a Work Plan, a Contractor Quality Control Plan, a Sampling and Analysis Plan, and a Health and Safety Plan (HASP). Due to the expedited project schedule, pre-construction submittals will be required ten (10) days after the Notice to Proceed. Should the project scheduled be extended at the request of the Client, the Engineer may extend the submittals time. No site work shall be performed until these plans have been approved by the Engineer. Refer to Table 01300-1 and the other referenced specifications for a more detailed description of information regarding the requirements of each of these plans.

B. The Contractor shall provide five (5) copies of each submittal unless otherwise directed by the Engineer. The pre-construction submittals shall be presented individually in separate 3-ring binders. Each section of each plan shall be indexed separately and referenced by a Table of Contents and all pages shall be numbered.

C. Time for Contractor preparation of these documents and Engineer approval thereof is included in the total completion days and no additional time or time extension will be considered for completion and approval of these submittals.

PART 3 - EXECUTION

3.1 SUBMITTAL PROCEDURES

A. The Contractor shall submit to the Engineer all items listed on the Submittal Register or specified in the other sections of these specifications. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

B. The Engineer reserves the right to modify the procedures or requirements for submittals, as necessary to accomplish the specific purpose of each submittal. The Engineer may request submittals in addition to those listed when deemed necessary to adequately describe the work covered in the respective sections. The Contractor shall direct inquiries to the Engineer regarding the procedure, purpose, or extent of any submittal.

C. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings, descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves, test reports, test cylinders, samples, O&M manuals including parts and spare parts lists, certifications, warranties, and other such required submittals.

D. Review, acceptance, or approval of substitutions, schedules, shop drawings, list of materials, and procedures submitted or requested by the Contractor shall not add to the Contract amount, and additional costs which may result shall be solely the obligation of the Contractor. Proposed deviations from the contract requirements shall be clearly identified.

E. The Engineer is not responsible to provide engineering or other services to protect the Contractor from additional costs accruing from submittals.

F. Submittals processed by the Engineer do not become Contract Documents and are not to be considered Change Orders; the purpose of a submittal review is to establish a reporting procedure and is intended for the Contractor's convenience in organizing the work and to permit the Engineer to monitor the Contractor's progress and understanding of the design.

G. Submittals requiring Engineer approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby or before any work described is initiated.

H. After checking and verifying all field measurements, the Contractor shall make submittals to the Engineer in accordance with the schedule of submittals for review.

I. Submittals shall bear a stamp or specific written indication that the Contractor has satisfied his/her responsibilities under the Contract Documents with respect to the review of the submittal.

J. Data shown shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to enable the Engineer to review the information. Units of weights and measures used on all submittals shall be the same used in the Technical Specifications and on the Contract Drawings.

K. The Contractor shall check samples and identify clearly as to material, supplier, pertinent data such as catalog numbers, and the intended use.

L. Before submission of each submittal, the Contractor shall determine and verify quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar data with respect thereto; review and coordinate each submittal with other submittals, requirements of work, and the Contract Documents.

M. At the time of each submission, the Contractor shall provide the Engineer with specific written notice of each variation that the submittal may have from the requirements of the Contract Documents; in addition, make specific notation on each shop drawing submitted to the Engineer for review and approval of each such variation.

N. The Engineer's review will be only for compliance with the design concept of the project and for compliance with the information given in the Contract Documents, not extending to means, methods, techniques, sequences, or procedures of construction (except where a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents), or to standards, codes, or regulations, or to safety precautions or programs incident thereto. The review of a separate item as such will not indicate review of the assembly in which the item functions. The Contractor shall plan his schedule to include an Engineer review period of ten (10) days for each pre-construction submittal or revision thereof and ten (10) days for all other submittals or revision thereof. No time extension will be granted for Contractor's time to prepare and Engineer's time to review and accept the revised submissions.

O. The Engineer's review of submittals shall not relieve the Contractor from responsibility for any variation from the requirements of the

Contract Documents unless the Contractor has in writing called the Engineer's attention to each such variation at the time of the submission, and the Engineer has given written acceptance of each such variation by a specific written notation thereof incorporated in or accompanying the submittal approval; nor will any acceptance by the Engineer relieve the Contractor from responsibility for errors or omissions in the submittal or from the responsibility for having complied with the provisions herein.

P. Where a submittal is required by the Technical Specifications, related work performed prior to the Engineer's review and approval of the pertinent submission shall be the sole expense and responsibility of the Contractor.

Q. Unchecked submittals will not be accepted. Submittals, which do not clearly show the Contractor's review, stamp or specific written indication of the Contractor's review will be returned to the Contractor for revision and resubmission.

R. The Contractor shall provide to the Engineer for review and acceptance in accordance with the accepted schedule of submittals, ten (10) copies of submittals unless otherwise specified in accordance with the finalized schedule of submittals.

S. The Contractor shall transmit each submittal utilizing a form or letter acceptable to the Engineer.

T. The Contractor shall sequentially number the transmittal forms; resubmittals shall have the original number with consecutive alphabetic suffix.

U. The Contractor shall identify the project, Contractor, Technical Specification section number, pertinent drawing sheet and detail number(s), products, units and assemblies, and the system or equipment identification or tag number as shown.

V. The Contractor shall apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the Contract Documents.

W. The Contractor shall revise and resubmit submittals as required while identifying all changes made since previous submittal.

X. When submittals have been reviewed by the Engineer, one copy will be returned to the Contractor appropriately annotated. If major changes or corrections are necessary, the submittal may be rejected and one set will

be returned to the Contractor with such changes or corrections indicated. The Contractor shall correct and resubmit the submittal in the same manner and quantity as specified for the original submittal.

3.2 SUBMITTAL REVIEW-ACCEPTANCE

A. If a submittal is acceptable, it will be marked "Accepted for Construction" or "Corrections as Noted – Resubmit." One copy of the submittal, which will be identified as having received approval by being so stamped and dated, will be returned to the Contractor for all submittals.

B. Upon return of a submittal marked "Accepted for Construction" or "Corrections as Noted – Resubmit," the Contractor may order, ship, or fabricate the materials included on the submittal, provided it is in accordance with the corrections indicated.

C. If a Shop Drawing is marked "Corrections as Noted – Resubmit," the Contractor shall make the corrections indicated thereon and resubmit the Shop Drawings for record purposes.

D. Submittals that are for information only will be marked "No Action Required" and one copy will be returned to the Contractor.

E. If a submittal is unacceptable, one copy will be returned to the Contractor with one of the following notations:

1. "Revise and Resubmit"
2. "Not Accepted"
3. "Incomplete or Deficient Submittal"

F. Upon return of a submittal marked "Revise and Resubmit," the Contractor shall make the corrections indicated then repeat the initial acceptance procedure.

G. The "Not Accepted" notation is used to indicate material or equipment that is not acceptable. Upon return of a submittal so marked, the Contractor shall repeat the initial approval procedure utilizing acceptable material or equipment at no additional cost to the Client.

H. Submittals lacking adequate details or other information to allow the Engineer to determine whether or not the submittal meets the Contract shall be marked "Incomplete or Deficient Submittal" and returned without further comment.

I. Shop Drawings or other submittals not bearing the Engineer's "Accepted for Construction" notations shall not be issued by Contractor nor utilized for construction purposes. No work shall be performed or requirement installed without a drawing or submittal bearing this notation.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time shall be allowed on the register for review and approval. No delays, damages, or time extensions will be allowed for time lost in late submittals.

3.4 SUBMITTAL PROCEDURE

A. All submittals shall be addressed to the Engineer and distributed as directed by the Engineer.

B. For submittals that include proposed deviations requested by the Contractor, the "Variation" shall be indicated on the transmittal form. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Engineer reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

3.5 CONTROL OF SUBMITTALS

The Contractor shall carefully control his operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

3.6 INFORMATION ONLY SUBMITTALS

Submittals that are for information only will be marked "No Action Required" and one copy will be returned to the Contractor. Approval of the Engineer is not required on information only submittals. These submittals will be used for information purposes. The Engineer reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications and will not prevent the Engineer from requiring removal and replacement if nonconforming material is incorporated in the work. This does not relieve the Contractor of the requirement to furnish samples for testing by the Engineer laboratory or check testing by the Engineer in those instances where technical specifications so prescribe.

3.7 REVISIONS

A. Revisions to shop drawings, reports, specifications, and technical documents after formal submittal shall generally be reviewed and sealed by a Registered Professional Engineer. In addition, if circumstances require that a revision to the original of a shop drawing be approved by a Professional Engineer other than the one who sealed and signed the original, this engineer must be a Registered Professional Engineer in the state where the project is located. The full last name and Professional Engineer registration number of this engineer shall be printed in the revision box under "Revision." The engineer shall also sign in the revision box under "Approval" and shall sign, date, and seal the shop drawing at a convenient location near the original seal. State licensing laws should be reviewed for differing protocols. Subsequent revisions, if approved by the same engineer, need only be signed. However, for subsequent revisions that are approved by a different engineer, the same guidelines shall be followed as described at the beginning of the paragraph. The same methodology applies to revisions to other technical documents.

B. When a Computer Aided Drafting (CAD) shop drawing or any other computer-generated shop drawing is revised, the computer produces a new drawing of the revision (e.g., R1 or R2, etc.). However, the initials and the signatures of the approvers (of R0 or the foregoing revision) are not reproduced on the revision; instead, only the names and initials (as applicable) of the approvers together with the Professional Engineer registration number (if it appears on the previous revision) are printed by the computer in the appropriate revision approval box. Also at this time, the computer should automatically print the following note on the revision of the CAD drawings: "The original drawing and subsequent revisions thereof, with approval names, initials and with the PE seal, if applicable, are maintained in the files of the Engineer."

C. Approval of the revised CAD shop drawing will then be undertaken in the usual manner, in that the responsible Designers and Engineers shall affix their initials. The Professional Engineer shall sign, date, and seal each revision in the designated box.

D. After a CAD-produced shop drawing revision is approved as stated above, the names and Professional Engineer registration number as applicable shall be entered on the CAD file for that revision. Thus a CAD-produced drawing revision will contain on file the latest information, including approval sign-off date. Each copy provided to any public agency shall be signed, dated and sealed to conform to state statutes.

E. Technical questions from contractors or vendors with regard to a drawing, report, specification, or inquiry should be evaluated and responded to by the PE or their designee. The PE should consult with contributing disciplines. Records of responses to questions should be maintained in accordance with the applicable project filing system. If a question results in changes to the technical requirements, the PE or their designee initiates a revision to the appropriate design documents.

F. Proposed changes to the design are normally initiated by engineering but often will be responsive to field change requests. During the normal engineering and design phase of the project, such changes should be reflected by formal revision of effected documents. However, during more critical circumstances such as during construction, the process notes below may be followed.

G. The PE may issue a Design Change Notification (DCN); see Attachment 1 included in this section. If a change has significant or immediate impact on construction. The PE should consider the impact of the change on the various disciplines and how these secondary effects may impact construction.

H. The PE has the option of checking one of the DCN form boxes - a) Engineering "Hold" placed on the area defined pending receipt of formally revised document(s) and/or revised DCN; or b) released for construction on basis of modification(s) prescribed by the DCN. If the engineering representative in the field determines that the indicated action (will stop or delay work progress) cannot be accepted and cannot defer disposition of the DCN to a later date due to the nature of the change, the engineering representative in the field should inform the PM, PE and the Site Manager (or Project Superintendent) for reconciliation with engineering.

I. The PE, assisted by the appropriate discipline personnel, compiles documentation to define the change (marked-up drawing, specifications, sketch, etc.), and completes the DCN in detail.

J. For changes initiated by construction the Resident Engineer (or equivalent) may issue a Field Change Request (FCR) (see Attachment 2 included in this section) to document a change to the "as designed condition." Changes are qualified as:

1. Major Change - One which affects intent of original design including equipment, component, system or structure which relate to function, operation, or safety of the designed product and/or personnel safety.

2. Minor Change - Does not affect intent of original design including equipment, component, system or structure, which relates to function, operation or safety.

K. Where the FCR is checked "Minor Change" by the engineering representative in the field, the field may execute the change and, in parallel, obtain PE concurrence that the change was indeed "Minor."

L. Where the FCR is checked "Major Change," disposition must be sought from the PE before execution. The PE may respond by issuing an appropriately executed DCN. A DCN should not be issued for a "minor change" FCR.

M. On occasion, the PE may requalify the FCR checked "Minor" to be "Major" and require discipline disposition accordingly. This change can be appealed to higher levels of engineering authority, but it is ultimately the affected discipline's responsibility to determine impact of changes. Similarly, engineering may requalify the FCR checked "Major" to be "Minor," in which case, the field may execute change as it considers appropriate.

N. The constructor (whether internal or another constructor) has the responsibility for identifying and providing input data relative to "record" conditions. This input data should be communicated to engineering using the FCR showing the changes. "Record" drawings are drawings that reflect the as-installed conditions. At a minimum, they should consist of the latest revision of the design drawing plus copies of approved changes (FCRs, DCNs) attached. The extent of detail required for "record" documentation should be in accordance with ENG-8 or as determined by the PM based on contract requirements.

O. Originals of DCNs and FCRs should be forwarded to the Engineer for incorporation into the permanent records of the project.

3.8 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR (Firm Name)	
_____	Approved
_____	Approved with corrections as noted on submittal data and/or attached sheet(s).
SIGNATURE:	_____
TITE:	_____
DATE:	_____

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

Preparation of submittals shall be considered as a job.

4.2 PAYMENT

A. Payment will be made at the lump sum price bid for "Submittals." Sixty percent (60%) of this bid item will be paid upon written approval, from the Engineer, of the Work Plan, Health and Safety Plan, and Contractor Quality Control Plan. The remaining forty percent (40%) of this bid item will be paid upon submission and Engineer approval of the Final Submittals.

B. Any revisions, modifications, or additions to any submittal will be considered a part of this item and no additional payment will be made therefor.

TABLE 01300-1			
A. Pre-Construction Submittals		**Section Number**	**Submittal Deadline**
1.	Work Plan	See Below	10 days following Notice to Proceed, except as noted.
	a. Site Layout Plan	01510	
	b. Construction Sequence and Schedule	01510	With bid. Update for submittals.
	c. Decontamination Plan	01401	
	d. Decontamination Pad Design (if necessary)	01401	
	e. Construction Water Management Plan	01500	
	f. Turbidity Curtain Shop Drawing, installation and removal methods	02921	
	g. Dredging Work Plan	02900	
	h. Sediment Processing Plan	01640	
	i. Surveyor Qualifications	01050	
2.	Health and Safety Plan	01401	10 days following Notice to Proceed
3.	Contractor Quality Control Plan	01400	10 days following Notice to Proceed

TABLE 01300-1			
B. Construction Submittals		**Section Number**	**Submittal Deadline**
1.	Sealed and certified bathymetric surveys and digital terrain modes (DTM) prior to any site disturbance; upon completion of excavation; and upon completion of project	01050	7 Days - Upon completion of survey.
2.	Daily Safety Log	01401	By noon daily – on following day
3.	Health and Safety Reports	01401	Weekly
4.	Training Logs	01401	Upon Engineer Request
5.	Air Monitoring Reports	01401	Daily
6.	Certification of OSHA Training	01401	Prior to personnel arriving on-site
7.	Certification of medical fitness	01401	Prior to personnel arriving on-site.
8.	Accident/Incident Reports	01401	Within 24 hours of accident.
9.	Materials Safety Data Sheets	01401	Upon delivery of chemicals to site
10.	Quality Assurance Records	01400	Upon Engineer Request
11.	Contractor Daily Quality Control Report (i.e. Daily Activity Report)	01400	Within 24 hours of end of workday
12.	Noncompliance Reports	01400	Immediately upon identification of noncompliance
13.	Construction Water Disposal DMRs or manifests	01500	Within 5 days
14.	Notification of Spill or Discharge	01564	Immediately upon discovery
15.	Records and Certification of Spill or Discharge Cleanup	01564	At the completion of spill/discharge cleanup
16.	Analytical Data Report	02410	Within 1 day
17.	Sheetpile Wall Monitoring Results	02900	Within 24 hours

C. Final Submittals		**Section Number**	**Submittal Deadline**
1.	Close-Out Safety Report	01401	Upon completion of project and before final payment.
2.	QC Program Summary Report	01400	Upon completion of project and before final payment.
3.	Evidence of final payment for all vendors and subcontractors	01510	Upon completion of project and before final payment.
4.	As-Built Drawings and certified bathymetric surveys.	01050	Upon completion of project and before final payment.

END OF SECTION

SECTION 01400

CONTRACTOR QUALITY CONTROL PLAN

PART 1 - GENERAL

1.1 SUMMARY

A. This Section covers the general Quality Control (QC) requirements for control of the equipment, material, and services supplied by the Contractor during the construction activities.

B. Construction Quality Management is the means by which the Contractor assures himself that his construction complies with the requirements of the Contract, plans, and specifications. The management shall be adequate to cover all construction operations, including both onsite and offsite operations, and will be keyed to the proposed construction sequence.

C. The Quality Control Policy and management procedures for this Project shall be described by the Contractor in a detailed Quality Control Plan. The Contractor shall furnish for approval by the Client, the Contractor Quality Control (CQC) Plan within ten (10) calendar days after award of contract. The plan shall identify personnel, procedures, instructions, records and forms to be used. If the Contractor fails to submit an acceptable CQC plan within the time herein prescribed, the Client may refuse to allow construction to start until such time as the Contractor submits an acceptable final plan.

D. Acceptance of Plan: Acceptance of the plan by the Client is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction.

E. Notification of Changes: After acceptance of the CQC Plan, the Contractor shall notify the Client in writing of any proposed change. Proposed changes are subject to acceptance by the Client.

1.2 RELATED SECTIONS

Section 01050 – Project Surveying
Section 01300 – Submittals
Section 01401 – Health and Safety Requirements
Section 01500 – Construction Water Management
Section 01640 – Offsite Transportation and Disposal
Section 01720 – Project Record Documents
Section 02410 – Sampling and Analysis
Section 02900 – Sediment Excavation and Subaqueous Cap

1.3 SUBMITTALS

A. Quality Control Plan

1. The Contractor shall prepare and submit five (5) copies of the Quality Control Plan (QCP) to the Client for review and acceptance within 10 days of Notice to Proceed. The Contractor shall not be permitted to mobilize personnel or equipment to the site prior to approval of the QCP by the Client.

2. The Contractor's QCP shall include at a minimum the following:

   a. A description of the Quality Control Organization, including a chart showing lines of authority and acknowledgment that the Construction Quality Control (CQC) staff shall report to the Construction Quality Control system manager.

   b. The name, qualifications, duties, authorities and responsibilities of each person assigned to perform Quality Control (QC) functions.

3. The Contractor shall outline within the QCP the Construction Quality Control Program (CQCP) proposed for equipment and materials supplied to the site and for controlling the quality of construction activities performed at the site. The CQCP shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

   a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the QC staff shall implement the control system for all aspects of the work specified. The staff shall include a QC Manager who shall report to the project manager and to someone higher in the Contractor's organization. Project manager in this context shall mean the individual with responsibility for the overall management of the project including quality and production.

   b. The name, duties, responsibilities, and authorities of each person assigned a QC function.

   c. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents.

   d. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

e. Reporting procedures, including proposed reporting formats.

B. The management procedures shall also include surveying, site testing, reporting of noncompliance conditions, field change activities, and inspection of all site activities.

C. Contractor Daily Activity Report

1. The Contractor shall complete a Daily Activity Report (DAR) summarizing the activities completed that day. The Contractor DAR shall include, as the Client deems appropriate, the following items:

   a. Date
   b. Task/site location
   c. Name and number of personnel by each trades working on site
   d. Weather conditions
   e. Work performed today, giving location, description, and by whom
   f. Equipment used on site and hours of operation
   g. Subcontractors and other personnel working on site
   h. Material deliveries to the site with copies of delivery tickets
   i. Disposal or offsite shipment including manifest
   j. Sampling performed and personnel conducting sampling
   k. Levels of protection used during the work performed
   l. Problems and corrective action taken
   m. Impacts on project schedule, if any
   n. Quality control activities initiated to correct problems, if any
   o. Written instructions from Client personnel for retesting or change of work
   p. Materials received with statement as to its acceptability and storage
   q. Submittals reviewed with contract reference, by whom, and action taken
   r. Job safety evaluations stating what was checked, results, and instructions for corrective actions, if any
   s. General remarks
   t. Contractor's verification statement that equipment and materials incorporated into the work and workmanship comply with the contract.

2. This report shall be dated and signed by the Contractor's QC Manager, and submitted to the Client within one (1) working day of the activities described.

3. It will be acceptable to separate delivery tickets and disposal documents for delivery on a weekly basis if more convenient.

D. Quality Control Summary Report

1. The Contractor Quality Control Summary Report shall be prepared by the Contractor at the completion of the work. This report shall be submitted to the Client for approval. The report shall include, at a minimum, the following items:

   a. A brief summary of sampling and analytical procedures, noting any deviations from procedures proposed in the Sampling and Analysis Plan

   b. A consolidation and summary of Contractor DARs

   c. Analytical results, including detection limits, in tabular format

   d. An outline of QC practices employed, including problems encountered and corrective actions taken

   e. Conclusions and recommendations describing the impact of analytical results on disposal of material removed from the project site.

2. The Contractor shall submit the Quality Control Summary Report to the Client for review and approval within 14 working days of the completion of site activities.

E. Qualifications of Surveyor

1. The Contractor shall contract an independent land surveyor registered in the State of New York to perform all survey work and shall submit the Surveyor's qualifications to the Client for approval. The qualifications shall include:

   a. The qualifications of the Surveyor's firm.
   b. A brief description of the equipment and methods that will be used.
   c. Any required certification
   d. A verification of certificate of surveyor's professional license.

PART 2 - MATERIALS

Not Applicable

PART 3 - EXECUTION

3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the contract requirements. The system shall cover

all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence.

3.2 QUALITY CONTROL ORGANIZATION

A. QC Manager

The Contractor shall identify an individual within his organization at the site of work who shall be responsible for overall management of QC and have the authority to act in all QC matters for the Contractor. This QC Manager shall be onsite at all times during construction and will be employed by the Contractor. An alternate for the QC Manager will be identified in the plan to serve in the event of the QC Manager's absence. The QC Manager shall be a degreed engineer or have a degree in construction management, with a minimum of 5 years of construction experience on construction projects similar to this contract.

B. Personnel

The personnel of the QC staff shall be fully qualified by experience and technical training to perform their assigned responsibilities and shall be directly hired by and work for the contractor.

3.3 CONTROL

A. Contractor Quality Control is the means by which the Contractor assures himself/herself that his/her construction complies with the requirements of the contract plans and specifications. The controls shall be adequate to cover all construction operations, including both onsite and offsite operations and will be keyed to the proposed construction sequence.

B. Follow-up Inspection: These shall be performed daily to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. Such inspection shall be made a matter of record in the CQC documentation as required below. Final follow-up inspections shall be conducted and deficiencies corrected prior to the addition of new features of work.

C. At the completion of all work, the Client shall conduct an inspection of the work and develop a "punch list" of items that do not conform to the approved Plans and Specifications. Such a list of deficiencies shall be included in the QC documentation and shall include the estimated date by which the deficiencies will be corrected. The QC Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Client. These inspections and any corrections required by this paragraph will be accomplished within the time stated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.4 TESTS

A. Test Procedures: The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product, which conforms to contract requirements. A list of tests, which the Contractor understands he/she is to perform, shall be furnished as a part of the CQC plan to the Client. The list shall give the test name, specification paragraph containing the test requirements and the personnel and laboratory responsible for each type of test. The contractor shall perform the following activities and record the following data:

1. Verify that testing procedures comply with contract requirements.
2. Verify that facilities and testing equipment are available and comply with current testing standards.
3. Verify that test instrument calibration data are checked against certified standards.
4. Verify that recording forms, including all of the test documentation requirements, have been prepared.

3.5 DOCUMENTATION

A. The Contractor shall maintain current records of quality control operations, activities and tests performed including the work of suppliers and subcontractors. These records shall be on an acceptable form (sample form attached) and indicate a description of trades working on the project, the numbers of personnel working, the weather conditions encountered, any delays encountered and acknowledgment of deficiencies noted along with the corrective actions taken on current and previous deficiencies. In addition, these records shall include factual evidence that required activities or tests have been performed, including but not limited to the following:

1. Type and number of control activities and tests involved.
2. Results of control activities or tests.
3. Nature of defects, causes for rejection, etc.
4. Proposed remedial action.
5. Corrective actions taken.

B. These records shall cover both conforming and defective or deficient features and shall include a statement that supplies and materials incorporated in the work comply with the requirements of the contract. Legible copies of these records shall be furnished to the Client daily.

3.6 NOTIFICATION OF NONCOMPLIANCE

The Client will notify the Contractor of any detected failure or inadequacy in complying with the requirements of the contract. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor at the site of the work, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Client may issue an order stopping all or part of the work until

satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess or damages by the Contractor.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

Implementation of the work required and described in this section shall be considered incidental to the work and no additional payment will be made.

END OF SECTION

SECTION 01401

HEALTH AND SAFETY REQUIREMENTS

PART 1 - GENERAL

The Contractor shall provide all materials, labor, and equipment to perform the work specified in this section in accordance with the Technical Specifications and Project Drawings.

The responsibility for development, implementation and enforcement of the Site-Specific Health and Safety Plan (HASP) lies solely with the Contractor and its health and safety personnel.

The HASP developed by the Contractor shall include programs for accident prevention, personnel protection, emergency response/contingency planning, air monitoring and handling hazard materials and chemicals on site. The HASP shall meet all requirements of 29 CFR 1910 (General Industry Occupational Safety and Health Standards) and shall include enough detail to support the Contractor's work.

1.1 RELATED SECTIONS

Section 01110 - Environmental Protection
Section 01510 - Mobilization/Demobilization
Section 01400 - Contractor Quality Control Plan
Section 01300 - Submittals
Section 01500 - Construction Water Management
Section 01564 - Spill and Discharge Control
Section 01640 - Offsite Transportation and Disposal
Section 02410 - Sampling and Analysis
Section 02900 - Sediment Excavation and Subaqueous Cap
Section 02921 - Turbidity Curtains

1.2 REFERENCES

The Contractor shall comply with federal, state and local regulations and guidelines, including all applicable Occupational Safety and Health Administration (OSHA) Regulations; 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Standards). These include, but are not limited to the following:

ANSI, Practice for Respiratory Protection, Z88.2 (1980).

ANSI, Emergency Eyewash and Shower Equipment, Z41.1 (1983).

ANSI, Protective Footwear, Z358.1 (1981).

ANSI, Physical Qualifications for Respirator Use, Z88.6 (1984).

ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1 (1968).

National Fire Protection Association (NFPA), Flammable and Combustible Liquids Code, NFPA 30, 1984.

OSHA Hazardous Waste Operations Standard 29 CFR 1910.120.

OSHA Hazard Communication Standard 29 CFR 1926.59.

OSHA Construction Standards, Subpart P - Excavations, 29 CFR 1926.650-652.

OSHA General Industry Standards, Subpart I - Personal Protective Equipment, 29 CFR 1926.132-137.

OSHA Construction Standards, Subpart X - Stairways and Ladders, 29CFR 1926.1050 - 1060.

OSHA, Construction Standards for Fall Protection, 29 CFR 1926.501 - 502.

NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, USDHHS/PHS/CDC/NIOSH, October 1985.

NOISH Pocket Guide to Chemical Hazards, USDHHS/PHS/CDC/NIOSH, June 1990.

U.S. Department of Health and Human Services, (DHHS) "NIOSH Sampling and Analytical Methods," DHHS (NIOSH) Publication 84-100.

U.S. Environmental Protection Agency (USEPA), Standard Operating Safety Guidelines, November, 1984.

U.S. Department of Health and Human Services (DHHS) "Manual of Analytical Methods," 3rd Edition Volumes I and II, DHHS (NIOSH) Publication 84-100.

1.3 GENERAL REQUIREMENTS

A. The Contractor, via the Health and Safety Manager, shall be responsible for the development and implementation of the Health and Safety Plan (HASP) in accordance with the references listed in Section 1.2.

B. The HASP shall be submitted for review and acceptance by the Engineer.

C. Site mobilization will not be permitted until written acceptance of the HASP has been issued by the Engineer.

D. Determination of the appropriate level of worker safety equipment and procedures shall be made by the Contractor's Health and Safety Manager. This determination shall be based upon a thorough review of background information, analytical data from previous sampling events, an initial site survey and a continuing safety and health program. As work progresses, the Health and Safety Manager shall specify the worker protection level based on site activity.

E. Should the Contractor seek modification of any portion or provision of the HASP, such modification shall be requested in writing to the Engineer, and if accepted, be authorized in writing by all who authorized the HASP. The

modification shall be appended to the HASP. All onsite personnel shall be fully informed of the modifications and required actions.

F. Specifications and requirements delineated in this section are in addition to or an amplification of all applicable State and Federal regulations pertaining to this kind of work. Any revision or addition to these regulations must be reviewed by the Contractor for the applicability to his Site-Specific Health and Safety Plan. In such case, the Contractor shall revise or add the new requirement to his HASP and resubmit it to the Engineer for review and acceptance.

G. Any disregard for the provisions of these health and safety specifications shall be deemed just and sufficient cause for ordering the stopping of all work beyond the support zone until the matter has been rectified to the satisfaction of the Engineer.

H. Revisions required to produce an acceptable HASP will be at the Contractor's expense. Delays in receiving acceptance of the HASP shall not be considered justification for a time extension to the Contract.

I. The Contractor shall provide potable water from an offsite source in sufficient quantity and of sufficient quality for all potable needs of the Engineer and the Contractor, and to perform all dust suppression and decontamination operations at the site, in accordance with this specification. The Contractor may use treated site water for the purposes of dust suppression and decontamination in accordance with Section 02410 upon approval by the Engineer. The Contractor shall certify to the Engineer that all water used or reused onsite for the purposes of dust suppression, personnel decontamination and equipment decontamination has been tested for, and meets the water quality discharge criteria listed within Appendix A, Generic Effluent Criteria. The Contractor will be responsible for collecting all decontamination fluids and disposing of it in accordance with Section 01500 "Construction Water Management."

1.4 SUBMITTALS

A. Pre-Construction Submittals

1. The Site-specific HASP shall include a description of, but not be limited, to the following items:

   a) Personnel.

   b) Hazard Assessment.

   c) Safe Work Practices and Engineer Safeguards.

   d) Training.

   e) Medical Surveillance Program.

   f) Work Zone Categories Delineation.

   g) Personal Safety Equipment and Protective Clothing.

   h) Personnel and Equipment Decontamination.

   i) Sanitation.

j) Emergency equipment and first aid requirements.

k) Emergency response and contingency planning.

l) Posted regulations.

m) Communications.

n) Environmental and Personnel Monitoring.

o) Record Keeping and Reporting.

p) Inspection/Audit Program.

q) MSDS.

r) Excavation safety.

2. The Contractor shall prepare and submit the Site-Specific Health and Safety Plan, as specified herein, to the Engineer for review and acceptance. If required, the Contractor shall make all necessary amendments required by the Engineer and resubmit the HASP to the Engineer for acceptance. This procedure shall continue until such time that the Engineer gives its written final acceptance. Mobilization onsite will not be permitted until written acceptance of the HASP by the Engineer has been received.

3. The Contractor shall construct the decontamination pad shown on the Drawings or submit a decontamination pad design. The Contractor shall provide design calculations, plans, and specifications, complete with a New York Professional Engineer's stamped approval, that demonstrate the decontamination pad will support the intended loadings and meet the requirements set forth in Part 3 of this Section.

   The Contractor shall be required to submit a Decontamination Plan as part of the Contractor's Work Plan in accordance with the requirements of Section 01300, "Submittals." The Decontamination Plan shall detail all equipment and procedures proposed for the decontamination of vehicles, personnel, process equipment and debris leaving the site, and post-decontamination pad removal of any soils impacted by Contractor operations. The Contractor shall discuss the decontamination pad location and ability to move equipment off the site.

B. Construction Submittals

1. Daily safety logs shall be maintained by the Contractor and shall be submitted to the Engineer daily.

2. Weekly Health and Safety Reports shall be maintained by the Contractor and submitted to the Engineer weekly.

3. Accident/Incident Reports shall be prepared and submitted by the Contractor to the Engineer within 24 hours of occurrence. Reports shall be completed for lost time occupational injury or illness, medical treatment cases, unplanned exposure to toxic materials, and for any significant occurrence resulting in property damage. The

Contractor shall notify the Engineer immediately of any accidents or incidents.

4. Training logs shall be maintained by the Contractor and submitted to the Engineer upon request and upon completion of the work.

5. Medical authorization documents shall be submitted to the Engineer for each onsite employee, prior to working at the site. Medical authorization documentation shall include the following: the name and signature of the physician, the date of the exam, his/her opinion of the employee's ability to perform work at hazardous waste sites, and his/her opinion of the employee's ability to wear a NIOSH/MSHA approved respiratory device (as specified in ANSI Z88.2).

6. Material Safety Data Sheets shall be submitted for all hazardous chemicals onsite and shall accompany all new shipments of hazardous chemicals.

C. Certification of Potable Water Source

The Contractor shall certify to the Engineer that all water brought onsite for potable use was supplied by a potable water source. Certification shall be in the form of a letter from a municipal agency confirming that the source of water brought onsite is suitable for human consumption, or in the form of current laboratory analyses documenting that the water contains no impacts above USEPA drinking water standards and/or New York health department standards.

D. Final Submittals

A Closeout Safety Report shall be submitted by the Contractor to the Engineer on completion of the work. This report shall summarize the weekly safety reports and provide an overview of the Contractor's performance with regard to the HASP requirements. This report shall also include certification of final medical examination of onsite employees and equipment decontamination.

PART 2 - MATERIALS

The Contractor shall be responsible for providing all necessary materials to perform the work specified in this Section.

PART 3 - EXECUTION

3.1 TRAINING

A. The Contractor shall certify that all Contractor personnel performing or supervising work, for health, safety, security or administrative purposes, for maintenance or for any other site-related function, have received site-specific health and safety training provided by the Contractor via the Safety Officer. Proof of site-specific training will be documented and provided to the Engineer. Training should include CSXT Contractor Roadway Workers training, as necessary.

B. The Contractor shall ensure that all personnel assigned to or entering areas with hazardous materials or who are working with hazardous materials that have not been previously trained, complete a minimum of forty hours of general health and safety training, eight hour refresher and supervisory training (when appropriate) in accordance with 29 CFR 1910.120(e). The training program shall be conducted by a qualified instructor, such as the Health and Safety Manager. The Contractor shall provide evidence of training for each employee.

C. The Contractor's Health and Safety Manager, or the health and safety officer shall be responsible for site-specific training of visitors in order to inform them of the hazards associated with the site, to explain emergency procedures and instruct them in the use of protective gear required during the visit. No visitors or employees will be permitted in the exclusion and impacted reduction zones without documented training and medical clearance.

D. The Contractor shall be responsible for, and ensure that personnel not successfully completing the required training and/or not having the required medical clearance shall not be permitted to enter the Exclusion Zone or the Contamination Reduction Zone.

E. The Contractor shall be responsible for providing hazard communication training in accordance with 29 CFR 1910.1200 for employee's working with chemicals brought to the site. This training shall be documented and kept on file at the site by the HSO.

3.2 PERSONNEL AND EQUIPMENT DECONTAMINATION

A. The Contractor shall establish procedures for small equipment (i.e. - respirators, instruments) decontamination and personnel decontamination which shall be included in the HASP. Boots, gloves, and respirators shall be decontaminated by means of decontamination procedures performed prior to entering support zones. All required breathing devices shall be provided and maintained by the Contractor. Eating, chewing gum or tobacco, smoking, drinking and application of cosmetics shall be prohibited except in facilities provided in the Support Zone.

B. Personnel Decontamination

The Contractor shall provide a Personnel Decontamination Area, where all impacted personal protective equipment shall be decontaminated, removed and appropriately disposed of or stored for further use.

1. Layout and Features

The Contractor, if proposing its own decontamination pad design, shall submit a drawing for the Engineer to review and accept, showing the proposed layout of the facilities to be established. The features of the Personnel Decontamination Area shall include, but not be limited to, the following:

a) Provisions for employees working in the Exclusion Zone to remove protective outer clothing and to wash hands, face, and other exposed skin prior to eating.

b) Provisions for Contamination Reduction Zone employees to remove protective outer clothing and wash-up before eating.

c) Benches, tables, lockers, and boot racks for clothing, as needed.

2. The personnel decontamination area is the initial area where surface contamination and outer protective clothing are removed. The area shall be partially covered (pavilion) to provide workers protection from the weather. This area shall include provisions for washing contamination and mud from boots and protective clothing and containers for collecting of outer protective clothing. This area shall include provisions for washing contamination and mud from boots, gloves, protective clothing and respirators. Boots and gloves shall be washed with a mixture of water and Alconox or equivalent. Respirators shall be washed with a non-alcohol sanitizer solution, such as MSA brand or equivalent. Containers for collection of impacted Tyvek, gloves, etc. shall be provided. Provisions for drumming the boot and glove washes and rinses shall be made.

3. Used disposable outerwear shall not be re-used and shall be placed inside designated disposal containers provided by the Contractor for that purpose in the Contamination Reduction Zone and disposal by the Contractor.

C. Equipment Decontamination

1. The Contractor shall provide an equipment decontamination station within the Contamination Reduction Zone for removing sediment from all vehicles and equipment leaving the work area. As a minimum, this station shall include a high-pressure water wash area for equipment and vehicles and a steam- cleaning system for use after the mud and/or dirt has been cleaned from the equipment. The Contractor shall also provide storage tank(s) to collect the waste water resulting from the decontamination of the equipment. Provisions for collection and storage of liquids generated during equipment decontamination shall be specified in the HASP.

2. A designated clean area shall be established within the Contamination Reduction Zone for performing equipment maintenance. This area shall be used when personnel are required to come in contact with ground sediment, i.e., crawling under a vehicle to change oil. All equipment within the Exclusion or Contamination Reduction Zones shall be decontaminated prior to maintenance work.

3. In general, any item taken into an Exclusion Zone must be assumed to be impacted and must be carefully inspected and/or decontaminated before the item leaves the site. Vehicles, equipment, and materials brought into the Exclusion Zone shall remain in the Exclusion Zone until no longer necessary to the

project. All impacted vehicles, equipment, and materials shall be cleaned and decontaminated to the satisfaction of the Engineer prior to leaving the site. All construction material shall be handled and brought onto the site in such a way as to minimize the potential for constituents of concern being carried off site. Separate, clearly marked parking and delivery areas shall be established in the Support Zone.

3.3 AIR MONITORING

The Contractor's Health and Safety Plan shall include an Air Monitoring Plan to specify the methods and measures to be used to control and monitor fugitive dust and other air pollutants during site demolition and impacted sediment handling. Air monitoring shall, at a minimum, be performed in compliance with 40 CFR Part 58 and any State requirements.

A. General Requirements

1. The Contractor shall comply with the air monitoring and dust control requirements as outlined in this section.

2. The Contractor's Health and Safety Manager and/or Health and Safety Officer shall design, develop and implement an Air Monitoring Program to detect and quantify any volatilization of sediment constituents of concern associated with remedial work in the surrounding air. The program shall be submitted as part of HASP for review and acceptance by the Engineer.

3. Information gathered during the air monitoring program shall be used to determine appropriate safety and personnel protective measures to be implemented during the site activities, to document onsite employee's exposures, and to assess offsite migration of constituents of concern released during remedial activities so that appropriate control measures and/or contingency plans can be implemented.

4. Information gathered during the air monitoring program shall be cataloged and included in the project records and safety and health log.

5. Site work shall not commence until the air monitoring and dust control methods have been submitted to and accepted by the Engineer.

B. General Responsibilities

1. The Contractor's Health and Safety Manager and/or Health and Safety Officer shall be responsible for establishing air monitoring strategies and protocols using real time instrumentation and appropriate industrial hygiene sampling and analytical procedures in order to characterize and qualify the airborne release and transport of constituents of concern during remediation work. These strategies and protocols shall address appropriate air monitoring for VOCs and particulate matter in the active work zones of the site and the active site perimeter.

2. The Contractor shall be responsible for establishing and documenting baseline (background) air quality conditions prior to commencement of work and for conducting continuous air monitoring during onsite work.

3. All air monitoring equipment required shall be provided by the Contractor and shall be maintained and calibrated according to manufacturers' recommendations. Such maintenance and calibration data shall be recorded and included in the project record documents.

4. All air monitoring equipment shall be operated by personnel trained in their specific use (i.e.- Health and Safety Officer or the Health and Safety Technician).

5. The Contractor shall be responsible for establishing and documenting the minimum Action Levels to be followed during the implementation of the HASP. These action levels will determine the minimum level of protection/action to be taken; such as level D, C, or B, adequacy of air monitoring, stop work, or emergency/contingency action. The decision logic for selection of the action levels shall be included in the HASP.

6. The Contractor shall provide the support necessary for the sampling and analysis of all samples collected during the program, for the interpretation of the analytical results and for the recording, presentation and documentation of all results.

C. Real-Time Air Monitoring

1. The Contractor shall furnish and maintain real-time air monitoring equipment at each monitoring station and all necessary calibration/audit equipment and supplies as deemed necessary by the Contractor's HASP.

2. The Contractor shall perform real-time air monitoring prior to commencement of work in order to establish baseline conditions. Monitoring shall be provided during active site operations both onsite and near each active work zone. This real-time air quality monitoring is required during excavation, processing, staging or loading of potentially impacted sediments and/or handling of impacted liquids. Real-time air monitoring shall also be performed

adjacent to each work zone. This monitoring shall be performed in the area of highest employee exposure risk in the Exclusion Zone.

3. The Contractor's trained Health and Safety Manager shall delineate background levels for dust using qualitative visual monitoring at the work area perimeter and adjacent to sediment processing, staging and loading operations.

4. Any departures from general background shall be reported by the Health and Safety Officer to the Health and Safety Manager, shall determine when operation should be shut down and contingency plans activated.

5. The Contractor shall establish the frequency of real-time monitoring in the Air Monitoring Plan.

6. Action levels for upgrading of PPE will apply to all site work. Action levels are for unknown constituents of concern using direct reading instruments in the breathing zone (BZ).

7. If the real-time air monitoring shows or the Health and Safety Manager feels that an imminent health hazard exists then that work location shall be shut down and personnel evacuated to a predetermined upwind location. The Engineer shall be notified immediately and work will not resume until:

   a. Appropriate corrective measures are implemented.

   b. Authorization to continue work is given by the Engineer after consultation with the Health and Safety Manager.

8. Should VOC levels at the Support Zone exceed the baseline ambient levels or the Action Levels, appropriate action shall be taken as directed by the Health and Safety Officer. During such time that the VOC levels exceed the aforementioned limits in the Support Zone, personnel shall be notified and all personnel within this area shall don respiratory protective equipment as described by the Health and Safety Plan.

9. A data sheet shall be developed and implemented by the Health and Safety Manager/Health and Safety Officer upon which to record the following real-time monitoring data information:

   a) Date and time of monitoring.

   b) Air monitoring location.

   c) Instrument, model number, serial number.

   d) Calibration/background levels.

   e) Results of monitoring.

   f) Health and Safety Officer Signature.

g) Interpretation of the data and any further recommendations by the Health and Safety Manager or the Health and Safety Officer in consultation with the Health and Safety Manager.

These results shall be given verbally to the Engineer following each site scan and documented in writing by the end of each workday with three copies provided. Copies of the data sheets shall be included in the daily safety log.

D. Time Weighted Average (TWA) Air Sampling

1. The Contractor shall develop a TWA air sampling plan as part of its overall air monitoring program in order to assess exposures to hazardous substances that are likely to exceed permissible exposure limits or published exposure levels. The air sampling plan shall ensure that TWA monitoring is performed frequently enough to adequately characterize employee exposures. If the employees likely to have the highest exposure are over the permissible exposure limits or published exposure levels, then monitoring shall continue to determine all employees likely to be above those limits.

2. The Contractor shall provide personal air sampling pumps and appropriate sampling media for conducting required onsite TWA personnel sampling. All necessary support equipment and supplies for operating, maintaining and calibrating all equipment shall be supplied by the Contractor.

3. TWA sampling shall be conducted in accordance with NIOSH or OSHA analytical methods. The Contractor's Health and Safety Manager shall review available sediment and groundwater sampling data in order to determine which hazardous substances employees are likely to be exposed to and shall include in the health and safety plan a list of those substances and the decision logic for selection.

4. Personal TWA samples shall be analyzed by a laboratory accredited by the American Industrial Hygiene Association.

E. Dust and VOC Emission Control

1. The Contractor shall conduct operations and maintain the project site so as to minimize the creation and dispersion of dust and VOCs. Visible dust is not necessarily the criterion if hazardous wastes are involved.

2. The Contractor shall provide foam, tarps, or water spraying equipment and clean potable water (free from salt, oil, and other deleterious materials) for dust and VOC emission control.

3. The Contractor shall implement dust control procedures as required to minimize offsite transport of particulates.

a) Equipment

The contractor shall supply appropriate water spraying equipment capable of accessing all work areas for dust control during project activities.

b) Execution

The Contractor shall apply water to the site when dust control is necessary. For this project, the dust levels shall be kept to below visible levels while working in the exclusion zone and below levels established at the perimeter of the site. Dust shall be controlled by arranging spray bar height, nozzle spacing, and spray pattern to provide complete coverage of ground or excavation area. Water shall be applied without interfering with excavation equipment or site operations and without creating nuisance conditions such as ponding. If dust is visibly observed to be leaving the Contractor's work area, the Engineer will shut down the project until the situation is remedied and the Contractor shall receive no additional compensation for downtime.

3.4 DECONTAMINATION PAD

A. A decontamination pad shall be installed prior to any equipment or materials entering the impacted zones of the Site. The decontamination pad shall be used to decontaminate any equipment exiting the impacted zones and any trucks transporting waste from the site, and shall also be used for decontamination of personnel, equipment, or materials, as required by the approved Work Plan for the duration of the project. The decontamination pad shall not be constructed until the relevant submittals have been approved by the Engineer.

B. The Contractor shall certify to the Engineer that all water used onsite for the purposes of decontamination has been tested for, and meets the water quality discharge criteria listed within Appendix A, Generic Effluent Criteria. The Contractor will be responsible for collecting all decontamination fluids and disposing of it in accordance with Section 01500 "Construction Water Management."

C. The Contractor shall provide and maintain the equipment required for decontamination and shall maintain the decontamination pad, sump, and equipment draining the pad. The Contractor shall be responsible for proper operation of the decontamination system. In general, 40 CFR 268.45 Hazardous Debris Regulations and 57 FR 371.94 shall apply to this contract.

D. The decontamination pad shall conform to the Drawings or alternate approved design. The length and width of the pad shall be such that they will accommodate the largest piece of equipment on the Site with a minimum of five (5) feet of decontamination pad extending around the equipment on all sides.

E. The Contractor shall decon all equipment that has potential contacted impacted sediments prior to leaving the site, with the exception of the inside of the loaded bed of trucks hauling processed sediments for off site disposal.

F. The decontamination process shall be performed in such a manner that all water used and sediment removed during decontamination falls onto the decontamination pad and is captured by the sump provided in the decontamination facility. Sediment captured by the sump shall be removed on a daily basis, as operationally required, or as required by the Engineer. The decontamination pad shall be washed down at the completion of each day of work. All sediment removed from the sump shall be transported to the waste pile facility for treatment and disposal.

PART 4 MEASUREMENT AND PAYMENT

Plan preparation activities outlined under this Section will be paid in accordance with Section 01300, "Submittals." Implementation of the HASP as described in this Section shall be considered incidental to the work and no additional payment will be made therefor.

END OF SECTION

SECTION 01500

CONSTRUCTION WATER MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY OF WORK

The Contractor shall furnish all labor, materials, and equipment necessary to handle and treat, or dispose of, construction waters potentially generated during site activities. The Contractor may utilize one or more of the three options for disposal of construction water identified below. The Contractor is responsible for determining which of the three options can be implemented and what treatment equipment will be required to meet discharge standards if options #1 or #3 are chosen.

Construction water is defined as:

A. Collection and handling of decontamination washdown water following decontamination procedures.
B. Collection and handling of leachate water (including storm runoff) from sediment unloading and sediment processing areas.
C. Collection and handling of water that has been in contact with sediments in transport vessels.
D. Collection and handling of process waters generated during onsite sediment processing operations.

1.1.1 Option #1: Onsite treatment, sampling, and discharge to the Monroe County Pure Waters (MCPW) sanitary sewer in accordance with their requirements. The Engineer has contacted the city with regards to the requirements for disposal at their facility. The Contractor must obtain approvals from NYSDEC. Water must be pretreated by the Contractor prior to discharge, regardless of quality, and sampled for methylene chloride, acetone and any MCPW required parameters at a sampling rate determined by MCPW. Treated water must meet discharge standards of 2.13 mg/l for methylene chloride and 20 mg/l for acetone. Treated water meeting discharge standards may be discharged at a rate up to 150 gallons per hour, dependent upon sanitary sewer flow conditions and to be approved by MCPW. The Contractor is responsible for complying with all MCPW criteria if this option is chosen. The Contractor is required to contract with the MCPW for the disposal at a rate to be determined between the Contractor and Monroe County Pure Waters. The Contractor shall provide means of conveyance for construction water for disposal, as necessary, in accordance with 49 CFR 106-179 and 40 CFR 263. The Contractor shall also comply with all applicable federal, state, and local requirements, including obtaining all necessary permits, licenses, and approvals.

1.1.2 Option #2: Disposal offsite at a facility of the Contractor's choice (pre-approved). The Contractor may choose an alternate offsite facility for the disposal of construction water. This offsite facility must be approved by the Engineer prior to shipment of any material from the site. The Contractor must, at a minimum, provide in advance the facility name, address, phone number, and contact information, along with the facility EPA ID number and any additional permit information. The Contractor shall provide transportation of construction water for disposal, if necessary, in accordance with 49 CFR 106-179 and 40 CFR 263. The Contractor shall also comply with all applicable federal, state and local requirements, including obtaining all necessary permits, licenses, and approvals.

1.1.3 Option #3: Onsite treatment, sampling, and discharge to the Genesee River in accordance with the NYSDEC Generic Effluent Criteria for Surface Water Discharges provided in Appendix A. The Contractor is responsible for complying with all applicable federal, state and local requirements, including obtaining all necessary permits, licenses, and approvals if this option is chosen.

1.2 TREATMENT

The Contractor shall treat all collected construction water generated onsite in accordance with applicable federal and state wastewater treatment regulations. The Contractor shall comply with option #2 (1.1.2), or treat all construction through an onsite wastewater treatment system to meet all applicable discharge conditions for option #1 (1.1.1) or option #3 (1.1.3), unless otherwise directed in writing by the Engineer.

A. The Contractor shall provide all necessary containers, storage tanks, vehicles, equipment, labor, signs, and labels.

B. The Contractor shall remove and properly manage all sediment at the completion of decontamination and construction water management activities or as required for the duration of the project in accordance with applicable state and federal regulations.

C. The Contractor shall properly identify all construction water using the criteria established in the disposal regulations.

1.3 RELATED SECTIONS

Section 01110 – Environmental Protection
Section 01300 – Submittals
Section 01400 – Contractor Quality Control Plan
Section 01401 – Health and Safety Requirements
Section 01510 – Mobilization/Demobilization
Section 01564 – Spill and Discharge Control
Section 01640 – Offsite Transportation and disposal

Section 02410 – Sampling and Analysis
Section 02900 – Sediment Excavation and Subaqueous Cap

1.4 SUBMITTALS

A. Construction Water Management Plan

The Contractor shall prepare and submit as part of the overall Work Plan a Construction Water Management Plan identifying which option or options will be used and detailing the handling, storage, treatment, and disposal of all waters generated during remedial activities. The Construction Water Management Plan shall include, but not be limited to, the Contractor's proposed method of handling, sampling and analyses (if required), storage (if necessary), treatment (if necessary), transportation (if necessary), and disposal of construction water generated during construction. Copies of acceptance letters from offsite disposals facility(ies), MCPW, NYSDEC, and approved permit(s) should be submitted as part of the Construction Water Management Plan.

B. Discharge Monitoring Report

If option #3 is used, the Contractor shall prepare and submit Discharge Monitoring Reports (DMRs) to the Engineer during field activities. Reports shall be completed for each applicable constituents required by the permit(s), and submitted to the Engineer on a monthly basis.

1.5 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Code of Federal Regulations - Protection of the Environment, Subchapter I - Solid Wastes

40 CFR 122 National Pollutant Discharge Elimination System Standards
40 CFR 263 Standards Applicable to Transporters of Hazardous Waste

B. Code of Federal Regulations - Transportation - Subchapter B - Hazardous Materials Transportation and Pipeline Safety

49 CFR 106 Rule-making Procedures
49 CFR 107 Hazardous Materials Program Procedures

C. Code of Federal Regulations - Transportation - Subchapter C, Hazardous Materials Regulations

49 CFR 171 General Information, Regulations, and Definitions
49 CFR 172 Hazardous Materials Tables and Hazardous Materials Communications Regulations
49 CFR 173 Shippers - General Requirements for Shipments and Packages
49 CFR 177 Carriage by Public Highway
49 CFR 178 Specifications for Packagings
49 CFR 179 Specifications for Tank Cars
49 CFR 180 Continuing Qualification and Maintenance of Packagings

D. NYSDEC Generic Effluent Criteria for Surface Water Discharges.

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

3.1 COMPLIANCE

A. It shall be the responsibility of the Contractor to investigate and comply with all applicable federal, state, and local laws and regulations governing the handling, storage, and disposal of stormwater and construction water.

B. The Contractor shall obtain all required permits, manifests, etc. required for the handling, storage, and disposal of construction water.

C. No construction water shall be transported offsite or discharged unless Engineer approval is granted and it meets receiving facility acceptance criteria or acceptable discharge limits.

D. The Contractor's Construction Water Management Facilities must be in place and operational prior to performing any impacted sediment excavation or handling.

3.2 MINIMIZATION OF CONSTRUCTION WATER GENERATION

The Contractor shall make every effort to minimize the generation of construction water. Appropriate methods to minimize generation of construction water include, but are not limited to, erection of temporary berms; use of low permeability tarpaulin or other means to cover exposed sediments; limiting the amount of exposed sediments; grading to control run-on and run-off; engineering controls on construction activities to minimize contact of personnel and equipment with sediments, thus minimizing the amount of decontamination required; and other appropriate methods.

3.3 HANDLING AND TRANSPORTATION

Water shall be handled utilizing equipment compatible with anticipated constituents of concern that may be present. Water shall be contained, handled, and transported using equipment and methods that prevents spillage.

3.4 CONSTRUCTION WATER MANAGEMENT

A. Handling

Construction water consisting of all potentially impacted water generated onsite, including water from equipment and personnel decontamination and stormwater collected in potentially impacted areas, shall be stored in the wastewater storage tanks or processed through an onsite treatment system.

B. Disposal

The Contractor shall provide facilities for conveying construction water from its sources to the wastewater treatment system, temporary storage tanks, or tanker trucks for offsite disposal or onsite treatment. The Contractor will be responsible for all corrective action regarding spills that occur during transferring operations. The construction water shall be:

1. Construction water shall be treated, sampled, and discharged into the sanitary sewer system via an onsite or offsite inlet, in accordance with the requirements of MCPW. The Contractor is responsible for constructing connections to the MCPW sanitary sewer system in accordance with MCPW requirements.
2. Containerized and transported offsite for disposal at an offsite disposal facility approved by the Engineer.
3. Construction water shall be treated, sampled, and discharged to a point onsite (approved by the Engineer) in accordance with the NYSDEC Generic Effluent Criteria for Surface Water Discharges.

3.5 SURFACE WATER MANAGEMENT DURING SEDIMENT EXCAVATION, HANDLING, AND PROCESSING ACTIVITIES

The Contractor shall provide all facilities and equipment in the sediment processing area necessary to remove water from or bind water in excavated sediments to prepare sediments for offsite disposal in accordance with specification Section 01640, "Offsite Transportation and Disposal." Sediment dewatering water shall be handled and disposed in accordance with 3.4 above. Sediment dewatering water shall not be discharged to the ground surface in a manner that would allow the water to run off of the site. Surface water entering

the sediment processing areas shall be contained, collected, and treated as construction water as specified in this section. Details of these procedures shall be provided in the Construction Water Management Plan.

3.6 CHARACTERIZATION OF CONSTRUCTION WATER

A. The Contractor, at its expense, shall characterize all contained construction water by approved USEPA methods, as described below, to determine appropriate treatment requirements to meet disposal criteria. A copy of the test results shall be submitted to the Engineer. Construction water samples shall be collected in sufficient number to accurately characterize construction waters contained onsite for discharge in accordance with any permit or disposal requirements. Approval in writing from the Engineer must be received before commencement of any construction water treatment and/or disposal or discharge.

B. All construction water samples submitted for disposal/discharge characterization testing shall be analyzed in accordance with specification Section 02410, "Sampling and Analysis," and/or permit conditions.

3.7 TRANSPORTATION

The Contractor shall provide transportation of construction water for disposal, if necessary, in accordance with 49 CFR 106-179 and 40 CFR 263. The Contractor shall also comply with state and local requirements, including obtaining all necessary permits, licenses, and approvals.

3.8 DISPOSAL/DISCHARGE

Construction water consisting of all potentially impacted water generated onsite, including water from equipment and personnel decontamination and stormwater collected in potentially impacted areas, shall be collected, treated, and disposed/discharged in accordance with methods outlined in this previous sections.

PART 4 - MEASUREMENT AND PAYMENT

Work included under this Section for the development of the Construction Water Management Plan and Discharge Monitoring Reports will be paid in accordance with Bid Item, "Construction Water Disposal" on a lump sum basis. Work included for the collection, handling, laboratory analysis, treatment, transportation, or disposal of construction water shall be considered incidental to work activities and no separate payment will be made therefor.

END OF SECTION

SECTION 01510

MOBILIZATION/DEMOBILIZATION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This section covers the requirements for proper site mobilization prior to the start of remediation activities and demobilization after the completion of all work required under this contract.

B. Mobilization shall include transporting all personnel, tools, materials, equipment and supplies as well as furnishing, assembling, installing and maintaining all treatment systems and equipment required to complete the work described in this contract and to comply with the contract documents and local, State, and Federal laws and regulations. Treatment systems and equipment include water treatment equipment, temporary field offices, storage areas, buildings, utilities, and other items required to perform all work required for or incidental to the work included as part of other bid items.

C. Demobilization shall includes the disposal of impacted PPE, and the decontamination and demobilization of treatment equipment, trailers, utilities, unused materials, turbidity curtains, temporary fence and gates, jersey barriers and other facilities that have been mobilized to the site to complete the work. Demobilization shall include removal, treatment, and disposal of impacted sediment that has been collected in the sediment unloading area, sediment processing area and decontamination pad or around these areas. The sediment loading area and decontamination pads shall be decontaminated by pressure-washing, all surface and subsurface structures removed, including, but not limited to, impervious surface, berms, and sumps. The areas shall be restored to pre-construction condition. The sediment processing/stockpile area pad impervious surface shall be decontaminated and may remain, if approved by the Engineer, but berms must be removed and sumps must be backfilled. The Engineer will sample soils below the decontamination pad, sediment unloading area, and sediment processing/stockpile areas to confirm that the soils have not been impacted.

1.2 RELATED SECTIONS

Section 01300 – Submittals
Section 01401 – Health and Safety Requirements
Section 01500 – Construction Water Management

Section 01564 – Spill and Discharge Control
Section 01640 – Offsite Transportation and Disposal
Section 02900 – Sediment Excavation and Subaqueous Cap

1.3 SUBMITTALS

A. The Contractor shall submit the following as part of the overall Work Plan in accordance with the requirements of Section 01300 - Submittals:

1. Project Schedule – A preliminary proposed project schedule shall be submitted with the bid form. The proposed project schedule shall then be updated and submitted as part of the Work Plan. The proposed project schedule for the overall project presented in Gantt Chart format. The schedule shall be prepared utilizing project management software capable of providing a baseline measurement for comparison with updates to the schedule on a monthly basis, including the latest version of Microsoft Projects or Primavera.

2. Sequence of Operations - The proposed construction sequence for the performance of all major tasks for this work. Each major work task shall be described in sufficient detail to demonstrate to the Client that the Contractor is familiar with site conditions, and is prepared to implement and complete the work in an efficient and safe manner.

3. Site Layout Plan - The plan shall provide, at a minimum, the following:

a. Details and locations of facilities and utilities for process equipment and material staging areas

b. Equipment decontamination pads

c. Areas designated for trailers, sheds, laydown, storage, decontamination and sanitary facilities, health and safety, parking, access roads, loading, and unloading.

B. The Contractor shall submit to the Client evidence of final payment of all subcontractors and utility services after all temporary and existing utilities are disconnected and removed.

PART 2 - MATERIALS

The Contractor shall fabricate, supply, provide, and maintain all materials, fabrication, installation, and delivery of services as specified in this section for complete and proper site mobilization and demobilization, including, but not limited to the following:

2.1 HAUL ROAD

Haul roads shall be constructed as per the Drawings utilizing a minimum thickness of 12 inches of NYDOT 304-2.02A Type 2 stone. A woven geotextile shall be placed under the stone.

2.2 ASPHALT PAVEMENT

1. Subgrade of sufficient strength shall be prepared by regrading existing gravel or supplying NYDOT 304-2.02A Type 2 stone.
2. Base course shall consist of 4 inches of NYDOT 401-2.03 Type 1 base course.
3. Top coat shall consist of 2 inches of NYDOT 401-2.03 Type 6 asphalt.

PART 3 - EXECUTION

3.1 MOBILIZATION

A. Prior to the commencement of Work, the Contractor's plant and equipment will be inspected and shall be subject to the Engineer's approval.

B. The offices, buildings, necessary utilities, and other facilities shall be established in accordance with specification Section 01010, "Summary of Work."

C. All work shall be performed by competent, trained personnel skilled in the field to which they are executing the work.

D. The Contractor shall be responsible for supplying all materials needed to implement the Health and Safety Plan at the site.

E. The Contractor shall identify, locate, and protect any existing utilities. The Contractor shall contact New York One-Call Systems prior to mobilization. The Contractor shall notify the utilities of any construction activities which will disturb utilities and provide the utility with the opportunity to disconnect and reconnect the utility.

F. The Contractor shall construct the sediment unloading area pad, decontamination pad, and sediment processing/stockpile area pad at the locations shown of the Drawings, unless approved otherwise. Contractor shall improve the existing haul road as necessary to permit construction. Contractor shall construct additional connecting portions of haul road, as shown on the Drawings. CSX Transportation is responsible for constructing a temporary railroad crossing near the sediment processing/stockpile area, but the Contractor is responsible for contacting, scheduling, and coordinating work with CSX Transportation. Contractor shall maintain haul roads, smooth and free of puddles, ponding water, or debris, throughout project duration and provide all necessary traffic control devices. Contractor shall install and connect temporary 6-foot high chain-link fence and gates to permanent fence, with plastic privacy slats installed throughout, as shown on the Drawings. Contractor shall move or remove existing fence, as necessary, to accommodate construction.

G. Indiscriminate construction of roads and travel by the Contractor's vehicles will not be permitted.

3.2 DEMOBILIZATION

A. At the conclusion of the work, the Contractor shall be responsible for restoring the Site to its previous condition.

B. The Contractor shall dismantle and properly dispose and/or remove from the Site all temporary and supporting facilities, including temporary fence and gates, traffic control devices, decontamination pad, sediment unloading area, and turbidity curtains unless otherwise directed by the Engineer. Portions of the haul road shall be removed, as shown on the Drawings. The Contractor shall restore pre-existing fence, if moved, removed, or damaged during construction. The contractor shall decontaminate and remove the decontamination pad and sediment unloading area pad structures, and dispose of removed materials. The Engineer will sample underlying soils to confirm that soils have not been impacted by Contractor operations. If soil impacts occur the Contractor shall excavate, dispose of impacted soils, and restore the area at no additional cost to the Client. The Contractor shall decontaminate the sediment processing/stockpile area pad. The Engineer will sample underlying soils to confirm that soils have not been impacted by Contractor operations. The pad may remain if approved by the Engineer. Decontamination water shall be disposed according to specification Section 01500, "Construction Water Management."

C. Any remaining solid waste material, decontamination solids, personnel protection materials, residual wastewater and construction debris shall be

removed to an approved offsite treatment, storage and disposal facility in accordance with specification Section 01640, "Offsite Transportation and Disposal."

D. Waste materials and wastewater generated by the Contractor during demobilization shall be properly disposed of off the project site or temporarily stored and processed through the onsite treatment systems.

E. The Contractor shall repair any erosion or related runoff damage caused by site activities, as directed by the Engineer.

F. The Contractor shall clean debris from remediated areas, staging areas, support zones, and drainage systems and rake clean landscaped areas. All equipment, supplies, construction trailers, utilities, and other facilities mobilized at the site to complete the work shall be demobilized and transported offsite. Transportation of equipment and materials offsite shall be in accordance with all applicable Federal, State, and local regulations.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

Mobilization/Demobilization will be considered and measured as part of "Item 10," Bid for Miscellaneous.

4.2 PAYMENT

1. Payment will be made at the lump sum price bid for Mobilization/Demobilization under the Miscellaneous bid item. Sixty percent (60%) of this bid item will be paid following completion of mobilization onto the site, including complete assembly in working order of all equipment necessary to perform the required work and the satisfactory storage at the Site of all such, materials and supplies. The remaining forty percent (40%) will be paid when all equipment is removed and satisfactory cleanup operations have been performed following the satisfactory completion of the Contract.

2. No additional compensation and/or payment shall be made for sampling, removal and disposal of impacted materials adjacent to or beneath the decontamination pad or sediment stockpile area, operations area or any other support areas and structures constructed by the Contractor. Sampling and analysis shall be considered incidental and no additional payment shall be made therefore.

3. No additional compensation and/or payment shall be made for performance of the site survey, relocation of existing benchmarks, or preparation of base maps for site activities. Surveying shall be considered incidental and no additional payment shall be made.

END OF SECTION

SECTION 01564

SPILL AND DISCHARGE CONTROL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall provide contingency measures for potential spills and discharges, handling, on-site transportation of impacted sediments, debris, and liquids and spill control for any sediment storage, transfer of wastewater onsite, and any fuel storage tanks that are stored onsite.

B. The Contractor shall provide methods, means, and facilities required to prevent impact to sediment, water, atmosphere, unimpacted structures, equipment, or material by the discharge of wastes from spills due to the Contractor's operations.

C. The Contractor shall provide equipment and personnel to perform emergency measures required to contain any spillage and to remove spilled materials and sediments or liquids that become impacted due to spillage. This collected spill material shall be properly disposed of at no additional cost to the Client, in accordance with this Specification.

D. The Contractor shall provide equipment and personnel to perform decontamination measures that may be required to remove spillage from previously impacted structures, equipment, or material. Decontamination residues must be properly disposed of at no additional cost to the Client, in accordance with this Specification.

1.2 RELATED SECTIONS

Section 01110 – Environmental Protection
Section 01300 – Submittals
Section 01401 – Health and Safety Requirements
Section 01500 – Construction Water Management
Section 01640 – Offsite Transportation and Disposal
Section 02410 – Sampling and Analysis
Section 02900 – Sediment Excavation and Subaqueous Cap

1.3 SUBMITTALS

A. Within 48 hours of the completion of spill or discharge cleanup, the Contractor shall document the cleanup in a Spill and Discharge Cleanup Report. This report shall include the following:

1. Identification of the source of the spill
2. Estimated or actual date and time of the spill occurrence
3. The date and time cleanup was completed or terminated (if cleanup was delayed by emergency or adverse weather, the nature and duration of the delay)
4. A brief description of the spill location
5. Sampling data taken prior to the cleanup and a brief description of the sampling methodology used to establish the spill boundaries
6. A brief description of the solid surface cleaned and the wash/rinse method used
7. Approximate depth of sediment excavation and the amount of sediment removed
8. A certification statement signed by the Contractor stating that the cleanup requirements have been met and that the information contained in the record is true to the best of its knowledge
9. Copies of the documents and certifications which were submitted to the Engineer for review and acceptance.

PART 2 - MATERIALS

The Contractor shall provide and maintain any and all materials required for spill control and/or spill cleanup, for the duration of the construction activities.

PART 3 - EXECUTION

3.1 SPILL CONTROL

A. Solid Spills - The Contractor shall immediately remove and place impacted materials into staging piles and cover; identify the pile as impacted; test the material for disposal requirements, if appropriate, dispose of at an approved offsite treatment, storage and disposal facility as specified in specification Section 01640, "Offsite Transportation and Disposal."

B. Liquid and/or Sludge Spills - The Contractor shall absorb with sand, clean fill, or other absorbent material and dispose of the absorbent/spill mixture in the manner specified in paragraph 3.1.A, Solid Spills.

3.2 REPORTING REQUIREMENTS

In addition to the immediate notification of the Engineer and reporting under the applicable requirements of the Clean Water Act, the Contractor shall follow the following reporting procedures:

A. Where a spill directly impacts surface water, the Contractor shall immediately notify any appropriate government agencies, as necessary, and the Engineer and shall immediately initiate appropriate cleanup measures.

B. Spills that are not addressed in paragraph 3.2.A above, must be cleaned in accordance with the approved Preparedness, Prevention and Contingency Plan. Notification of the Engineer is still required.

3.3 DETERMINATION OF SPILL AREA IN THE ABSENCE OF VISIBLE TRACES

For spills where there are insufficient visible traces yet there is evidence of a leak or spill, the boundaries of the spill are to be determined by the Contractor using a statistically based sampling scheme approved by the Engineer. The Engineer must be present during sample collection and must approve the final delineation of the spill area.

3.4 EQUIPMENT REQUIREMENTS

The Contractor shall provide the appropriate equipment and materials for any unexpected spill or discharges. This equipment and material shall be kept onsite at all times during site work activities and must be readily available to site workers.

3.5 DISCHARGES

If a discharge of material stored in a container or from a pipe break or leak occurs, the following actions shall be taken by the Contractor to reduce potential migration to adjacent properties:

A. Immediately notify the Engineer and the appropriate agencies (see paragraph 3.2 above).

B. Take immediate measures to control the discharge within the site boundaries or beyond the site boundaries, if necessary. The measures shall include the following actions:

1. Contain and eliminate the discharge, if possible.

2. Remove or retrieve any discharged liquids or sludges, if possible.

3. Keep unnecessary people away; isolate the hazardous area and deny entry.

4. Do not allow anyone to touch the discharged materials.

5. Other actions, as needed.

3.6 DECONTAMINATION PROCEDURES

Decontamination procedures may be required after cleanup to eliminate traces of the substance spilled or to reduce it to an acceptable level as determined by the Engineer. Complete cleanup may require removal of impacted sediments. Personnel decontamination shall include showers and cleansing or disposing of clothing and equipment. All impacted materials, including solvents, cloth, sediment, and wood that cannot be decontaminated, must be properly containerized, labeled, and properly disposed of as soon as possible.

PART 4 - MEASUREMENT AND PAYMENT

Work included for the performance of spill and discharge control activities shall be considered incidental to work activities and no additional payment will be made therefor.

END OF SECTION

SECTION 01640

OFFSITE TRANSPORTATION AND DISPOSAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The work specified hereunder in this section includes the management, processing, staging and loading of excavated sediments. Specifications for the excavation of sediments and transportation of sediments to the processing area are described in Section 02900, "Sediment Excavation and Subaqueous Cap." The Contractor shall be responsible for providing all materials, equipment, and labor necessary to perform the work.

B. The Contractor shall ensure that all operations in the onsite hauling and loading and of impacted materials are in compliance with all federal, state, and local regulations.

C. The Engineer will conduct waste classification sampling and analysis as required by the TSD facility.

D. The Client will be responsible for transportation and disposal of sediments.

1.2 RELATED SECTIONS

Section 01110 – Environmental Protection
Section 01300 – Submittals
Section 01400 – Contractor Quality Control Plan
Section 01401 – Health and Safety Requirements
Section 01500 – Construction Water Management
Section 01510 – Mobilization/Demobilization
Section 01564 – Spill and Discharge Control
Section 02410 – Sampling and Analysis

1.3 SUBMITTALS

A. The Contractor shall prepare a Sediment Processing Plan as part of the overall Work Plan. The Contractor shall submit to the Engineer a detailed plan of how sediments will be processed to meet transportation and landfill criteria, particularly the paint filter and resistance to penetration tests, as outlined in this specification. The plan shall describe the equipment, materials, methods, and procedures that will be employed in the work.

1.4 APPLICABLE REGULATIONS

A. Federal Resource Conservation and Recovery Act, as amended
B. Department of Transportation 49 CFR 171 through 179
C. Department of Transportation Regulations applicable to method of transport
D. USEPA: 40 CFR 263, 40 CFR 268
E. OSHA Standards (29 CFR 1904, 1910, and 1926)
F. NY Hazardous Waste Regulations
G. Posted weight limitations on roads and bridges.
H. EPA Method 9095 (Paint Filter Test).
I. LESL Standard Method #15 (Resistance to Penetration Test).

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

3.1 GENERAL

A. The Client will provide transportation and disposal of sediments. The Engineer will coordinate with the Contractor, laboratories, transporters, and disposal facilities to arrange for sample analysis, transportation, and material deliveries at the TSD facility(ies). The Client will sign all manifests.

B. The Contractor shall supply all materials, equipment, and labor necessary to process, stage, and load sediments for transportation and disposal. Sediments should be stored/stockpiled in an appropriate manner (e.g. within jersey barriers) while awaiting processing. The sediment processing area should be constructed as per the Drawings using impervious materials with a berm and sump to contain sediments and liquids. The Contractor shall be prepared to provide adequate containment if the material is wet and draining. The Contractor shall process the sediments to satisfy all required shipping and disposal requirements including, but not limited to, the paint filter test and resistance to penetration test presented in Section 1.4. The results of a bench-scale pilot test that investigated dewatering and solidification methods for sediment processing is included as Appendix B, for information purposes only. The Client assumes no responsibility for the accuracy of the data. The Contractor may use dewatering, solidification, or other method(s) as long as processed sediments meet all required shipping and disposal requirements. The proposed method(s) shall be outlined in the Sediment Processing Plan and approved by the Engineer. After processing, sediments should be stored in contained, covered, and

segregated 100 to 400 CY piles within the sediment processing area while awaiting sampling, loading and disposal. The Contractor shall be responsible for all costs related to rejected loads resulting from any materials found to be nonconforming to the specifications or requirements imposed by the disposal facility or any cost associated with leakage during transportation.

C. The Contractor shall provide prompt written notice to the Engineer that a batch (or batches) of sediments have been processed and are ready for sampling. The Contractor must allow for five (5) business days from the time it provides written notice until the transport truck arrives to allow for this process. This time is necessary for the Engineer to coordinate characterization sampling and analysis, NYSDEC notification/approval procedures, transportation, and landfill facility(ies) disposal.

D. All vehicles leaving the site that have been exposed to impacted sediments (with the exception of inside of truck beds transporting sediments) shall be decontaminated by the Contractor to the extent they will not contaminate offsite areas and to the approval of the Engineer, in accordance with Section 01401, "Health and Safety Requirements," and the approved Health and Safety Plan. The Contractor and Engineer shall inspect all vehicles prior to their leaving the site to confirm that adequate decontamination efforts have been performed.

E. At a minimum, the Contactor shall cover stockpiles every night. The Contractor should be prepared to use tarps, foam, or other means to limit VOC and dust emissions, if required, as per the specification Section 01401, "Health and Safety Requirements."

F. During processing, the Contractor shall contain, manage, and dispose of all water that comes in contact with sediments or is dewatered from sediments in accordance with Section 01500, "Construction Water Management."

3.2 WASTE CLASSIFICATION SAMPLING

A. Waste material, debris, and liquid (not including construction water), generated due to the fault of the Contractor shall require disposal classification sampling as required by the disposal facility, in addition to sampling requirements outlined in specification Section 02410, "Sampling and Analysis," prior to offsite transportation and disposal. The Contractor is responsible for performing all classification sampling required by the receiving facility(ies). The ultimate determination as to the specific tests as required prior to disposal shall be determined by the approved disposal facilities and sample results shall be subject to the Engineer's approval prior to offsite shipment. Sampling and disposal

will be the responsibility of the Contractor and will be performed at no additional cost to the Client.

3.3 TRANSPORTATION

A. Transportation will be coordinated by the engineer and paid for directly by the Client.

3.4 OFFSITE DISPOSAL

A. Offsite disposal will be coordinated by the engineer and paid for directly by the Client.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Bid Item No. 3 – Sediment Processing, Handling, and Loading

1. Measurement for Item No. 3 – Sediment Processing, Handling, and Loading, shall be based by the tons of material disposed offsite at the disposal landfill. The material will be weighed at the disposal facility using a state-approved calibrated scale. Sediments resulting from excavation performed beyond the specified limits and allowance as shown on the Contract Drawings shall be deducted by subtracting the percent of over-excavation from the payment amount due to the Contractor.

4.2 PAYMENT

A. Item No. 3 – Sediment Processing, Handling, and Loading

1. Payment for Item No. 3 – Sediment Processing, Handling, and Loading, shall be measured at the unit price bid per ton and shall be full compensation for all labor, equipment, materials, and incidentals required to process, handle, and load sediments into trucks for transport to an approved landfill facility. No payment shall be made for sediments resulting from excavation performed beyond the specified limits and allowance as shown on the Contract Drawings (see below). This item will be paid upon receipt of a disposal facility(ies) Certificate of Disposal. In addition, the Contractor shall be responsible for any damage or financial penalties imposed by the disposal facilities caused by failure to meet processing requirements, at no additional cost to the Client.

B. Non-Payment for Overexcavation

1. The volume of sediments to be excavated to the limits, shown on the Drawings, including an overexcavation tolerance as specified in specifications Section 02900, "Sediment Excavation and Subaqueous Cap," will be calculated from the survey using AutoCAD. If excavation is performed beyond the limits shown without the written approval of the Engineer, the percentage of excavation beyond the overexcavation tolerance will be calculated using the final survey. This percentage of the total tonnage of disposal shall not be measured for payment and the Client shall apply liquidated damages to the Contractor for the disposal costs of this additional material.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Maintain at the site for the Client one record copy of:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. Engineer's Field Orders or written instructions.
6. Approved Shop Drawings, and Samples.
7. Field Test records.
8. Construction photographs (digital format).
9. All other construction related permits.
10. Contractor Quality Control Plan.
11. Approved submittals.
12. Approved Workplans.
13. Any other required documents.

1.2 RELATED SECTIONS

Section 01050 – Project Surveying
Section 01300 – Submittals
Section 01400 – Contractor Quality Control Plan

1.3 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in Contractor's field office apart from documents used for construction.

1. Provide files and racks for storage of documents.
2. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with CSI format.

C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by the Engineer.

E. As a prerequisite for monthly progress payments, the Contractor is to exhibit the currently updated "Project Record Documents" for review by the Engineer and Client.

1.4 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color code designated by the Engineer.

1.5 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with construction progress.

1. Do not conceal any work until required information is recorded.

C. Drawings: Legibly mark to record actual construction:

1. Excavation limits and depths.

2. Limits and thickness of capping material (if required).

3. Field changes of dimension and detail.

4. Changes made by Field Order or by Change Order.

5. Details not on original contract drawings.

6. Equipment.

D. Specifications and Addenda; legibly mark each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

2. Changes made by Field Order or by Change Order.

E. Shop Drawings (after final review and approval):

1. Five sets of record drawings.

1.6 SUBMITTAL

A. At Contract close-out, deliver Record Documents to the Engineer for the Client.

B. Accompany submittal with transmittal letter in duplicate, containing:

1. Date.

2. Project title and number.

3. Contractor's name and address.

4. Title and number of each Record Document.

5. Signature of Contractor or his authorized representative.

PART 2: PRODUCTS

Not used.

PART 3: EXECUTION

Not used.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

Implementation of the work required and described in this section shall be considered incidental to the work and no additional payment will be made.

END OF SECTION

SECTION 02410

SAMPLING AND ANALYSIS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The scope of the Sampling and Analysis section includes the collection and analysis of the following types of samples:

1. Construction water sampling;
2. Waste generated by the Contractor;
3. Any other sampling required to complete the project.

This section includes routine sample collection, handling, monitoring, and analysis requirements established to ensure compliance with environmental regulations and all requirements for remediation at the site.

B. The results of previous investigations at the site indicate that elevated concentrations of methylene chloride and lower concentrations of acetone are present in the sediments.

1.2 RELATED SECTIONS

Section 01110 – Environmental Protection
Section 01300 - Submittals
Section 01400 - Contractor Quality Control Plan
Section 01401 - Health and Safety Requirements
Section 01500 - Construction Water Management
Section 01564 - Spill and Discharge Control
Section 01640 – Offsite Transportation and Disposal
Section 02900 - Sediment Excavation and Subaqueous Cap

1.3 SUBMITTALS

A. Analytical Data Report

1. Data generated by the NYSDEC-approved analytical testing laboratory shall be supplied to the Engineer both in hard copy and electronically (ASCII format) within one (1) working day of receipt by the Contractor. Both preliminary and final laboratory results shall be submitted to the Client. Analytical data submittals shall include the following information:

a. Sample location and sample identification number.

b. Analytical results and associated data qualifiers expressed in the appropriate units (e.g., ug/kg, mg/kg, ug/m^3, or ug/l).

c. QA/QC and validation results (final data only).

d. Field survey and sampling notes.

2. The Analytical Data Report shall include a cover letter outlining the nature of the analytical data covered by the report, including the media sampled, the quantity of samples obtained, the purpose of the sampling (waste characterization, confirmation of sediment treatment, etc.), the date(s) of sampling covered by the report, and the identity of the personnel obtaining the sample(s).

1.4 APPLICABLE PUBLICATIONS

The Contractor shall review and use, as appropriate, all applicable state and federal publications and requirements in the development of the SAP. At a minimum, the following applicable publications form a part of this specification to the extent referenced:

A. Test Methods for Evaluating Solid Waste, USEPA Office of Solid Waste, SW-846, 3rd Edition, November 1986, Updates I and II, September 1994.

B. Methods for Chemical Analysis of Water and Wastes, USEPA Environmental Monitoring and Support Laboratory, EPA 600/4-79-020, Revised March 1983.

C. Standard Methods for the Examination of Water and Wastewater - 16th Edition, 1985.

D. Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act, Federal Register, October 26, 1984 and January 4, 1985.

E. TCLP as described in 40 CFR, Part 261, Appendix II, 7-1-90. See also Federal Register, Vol. 55, 11862, 3-39-90 and Vol. 55, 26987, 6-29-90.

F. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II - Available Sampling Methods, EPA-600/4-84-076, 2nd Edition, December 1984.

G. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80.

H. Draft DER-10 Technical Guidance for Site Investigations and Remediation, Dec. 25, 2002.

I. Data Quality Objectives for Remedial Response Activities, USEPA, OSWER Directive 9355.0-7B, March 1987.

PART 2 - MATERIALS

The Contractor shall provide all necessary sampling, collecting, and storing equipment and materials necessary, including, but not limited to, stainless-steel scoops, disposable bailers, laboratory bottleware, coolers, vermiculite, etc.

PART 3 - EXECUTION

3.1 CONSTRUCTION WATER SAMPLING

Any water that has come from sediments or contacted sediments in the scow, decontamination pad, sediment unloading pad, or sediment processing/stockpile pad will be managed and disposed as potentially impacted construction water in accordance with specification Section 01500, "Construction Water Management." Construction water shall be sampled and analyzed for methylene chloride and acetone by EPA Method 8260 or as required by the receiving facility.

3.2 SAMPLING WASTE OR IMPACTS CAUSED BY THE CONTRACTOR

Any wastes generated by the Contractor, as defined in specification Section 01640, "Offsite Transportation and Disposal," shall be sampled in accordance with the parameters required by the disposal facility for acceptance. Areas potentially contaminated by the Contractor shall be sampled by EPA method 8260 or any other contaminant potentially released to verify cleanup of impacts.

PART 4 - MEASUREMENT AND PAYMENT

Implementation of the work required and described in this section shall be considered incidental to the work and no additional payment will be made.

END OF SECTION

SECTION 02900

SEDIMENT EXCAVATION AND SUBAQUEOUS CAP

PART I - GENERAL

1.1 SUMMARY

A. This section includes the specifications for the operations related to the removal of the sediments from the Genesee River primarily through dredging (also referred to throughout as excavation) with an environmental bucket, transport of the excavated material to shore, unloading sediments, and transport of sediments to the Sediment Processing/Stockpile Area of the site. Section 01640, "Offsite Transportation and Disposal," includes specifications for processing sediments as required for disposal.

B. The following defines the terminology used in the specification:

1. Coordinates: North reference is based on NAD 83 and vertical datum for river bottom elevations is International Great Lakes Datum of 1985 (IGLD85), which is equivalent to NAVD 88.
2. Debris: Pieces of wood, tree branches, sunken logs, tree roots, wire, rope, tires, scrap steel, pipes, concrete, riprap, rocks, cobbles, bricks, boat moorings, anchors, sunken boat hulls, fishing gear, drill rods, and other waste material within the river bed that may inhibit dredging operations and therefore require separate removal and management.
3. Estimated Quantity: In-place volume of sediment calculated to be excavation grade limit of dredging and inside specified lateral limits of dredging.
4. Dredging or excavating: Removal of the submerged sediments with dredges and transport of the sediment to the Sediment Processing Area. Debris and aquatic vegetation associated with the sediment may require removal using other means. Dredging equipment shall be adapted for environmental dredging purposes.
5. Limits of Dredging: Grade above which and lateral limits within which all material is to be removed. Original Limits of Dredging are defined prior to dredging.
6. Obstructions: Large materials and objects, not listed under debris, that hinder passage or operation of the dredging equipment.
7. Sediment: Clay, silt, sand, gravel, vegetative matter, debris, or any material located within the limits of dredging. Additional sediment is sediment identified outside the original limits of dredging and subsequently designated by Engineer for removal.
8. Sediment Excavation: Dredging and transport of sediments to Sediment Processing Area, including removal of debris and aquatic vegetation as necessary to complete the dredging within the final limits of dredging.
9. Subaqueous Cap: Stone cover of 1 foot in thickness placed to serve as a cap in below water excavation for areas where post-excavation river sediment samples exceed limits (if necessary).

10. Work Area: Major areas where dredging is to be performed as specified on the drawings.
11. Work Zones: Subareas of the Work Areas where dredging will be performed bounded by inner turbidity barriers such as silt curtains. The location, size and shape of Work Zones to be determined by Contractor, subject to Engineer's approval.

C. Contractor shall immediately bring to the Engineer's attention any apparent inconsistencies in these definitions and their use during the bidding process.

1.2 RELATED SECTIONS

Section 01110 – Environmental Protection
Section 01050 – Project Surveying
Section 01300 – Submittals
Section 01400 – Contractor Quality Control Plan
Section 01401 – Health and Safety Requirements
Section 01500 – Construction Water Management
Section 01564 – Spill and Discharge Control
Section 01640 – Offsite Transportation and Disposal
Section 02410 – Sampling and Analysis
Section 02921 – Turbidity Curtains

1.3 REQUIREMENT OF REGULATORY AGENCIES

A. Meet U.S. Coast Guard and New York State Navigation Law requirements.

B. Meet New York State Department of Environmental Conservation (NYSDEC) requirements on stream bank disturbance, water quality criteria and spill regulations. Requirements are available directly from NYSDEC.

C. Meet conditions and requirements of U.S. Army Corps of Engineers and NYSDEC requirements for dredging calendar restrictions including periods of no dredging.

D. Meet requirements of USEPA for disposal of dewatered sediments and water.

1.4 SITE INFORMATION

A. Results of the most recent bathymetric survey are depicted on the Drawings. This data may differ from present site conditions and actual conditions at the time of the Work. Water levels change significantly with season and weather conditions and sediments also may change. The Contractor shall alert the Engineer if conditions differ from this survey.

1.5 SEDIMENT REMOVAL SEQUENCE

A. Dredging shall not proceed in any Work Area before the sediment unloading area, sediment Processing/Stockpile areas, haul roads, and

turbidity curtains are installed, as shown on the Drawings, and approved by the Engineer.

B. Contractors shall supply the Engineer with sediment removal sequence and/or stages for all Work Areas and Work Zones for approval prior to mobilization.

C. Dredging operations shall be limited on a seasonal basis in accordance with local environmental regulations and all permit conditions.

1.6 SUBMITTALS

A. Within ten (10) days after Notice to Proceed, the Contractor shall submit a Dredging Work Plan as part of the overall Work Plan.

PART 2 - PRODUCTS

2.1 SUBAQUEOUS CAP

A. A subaqueous cap, no less than one (1) foot thick, may be potentially be placed above the excavation grades in areas where post-excavation river sediment samples exceed requirements outlined 3.5.G. of this section. The subaqueous cap shall meet the following requirements:

1. AASHTO No. 3 stone as supplied by a NYDOT-approved source.

2.2 SHEETPILE WALL BACKFILL

A. The Contractor shall backfill excavations within 20 feet of the sheetpile wall to pre-existing grade or 236.2' IGLD85 (whichever is higher), but not to exceed 241.8' IGLD85. Contactor shall use:

1. Washed ¾" stone (NYDOT Size 2 stone).

PART 3 - EXECUTION

3.1 DREDGING WORK PLAN

A. Prepare and submit a Dredging Work Plan as part of the Work Plan. The Dredging Work Plan will specify the following:

1. Qualifications and experience of dredging personnel
2. Specifications for navigational equipment and monitoring instrumentation.
3. Specifications for proposed dredging equipment, including, as may be applicable, dredge type, depth capability and accuracy, dredge platform dimensions and working draft, and proposed dredge material handling.
4. A drawing showing the width, length, and location of the dredge lanes and target elevations in each lane.
5. Proposed peak and average dredge rates.
6. Anticipated peak and average rates of dredge advancement.
7. Proposed cut or bite height relative to sediment thickness.

8. Number, relative location, type, and stabilization control design details of "inner" turbidity curtains deployed to control sediment resuspended during dredging.
9. Proposed method for sediment transport, unloading, and handling.
10. Describe the equipment, materials and source, methods, procedures, and placement rates that will be employed for the subaqueous cap. Particular emphasis shall be made in those methods used to minimize sediment resuspension.

B. The Dredging Work Plan will include a narrative for the following:

1. Proposed Dredge Operations Layout and Work Zone delineations plotted on a copy of Drawing, numbered to indicate the anticipated sequence of Work Zone dredging within each Work Area, and indicating proposed dredging directions within each Work Zone.
2. General dredging approach, and means to deal with variable water depth and sediment thicknesses.
3. Use of specialized services such as divers.
4. Means to be employed to minimize resuspension of sediment.
5. Means to remove aquatic vegetation.
6. Means to remove debris.
7. Means to control and accurately document position of dredge and prevent over-dredging.
8. Means to minimize effect of wind and waves on dredging precision.

C. The Dredging Work Plan shall be approved by the Engineer prior to commencement of sediment excavation.

3.2 LAYOUT OF WORK

A. Maintain the established horizontal and vertical control, and lay out the Work from the established references. Contractor shall be responsible for the accuracy of Work relative to established references. Establish any necessary line of sight references. Provide and maintain electronic position fixing and distance measuring equipment as required for accurate sediment removal control.

B. Contractor shall use electronic position fixing equipment to provide accurate real-time control of the dredge lateral and vertical position in the project's coordinate system or State Plane Coordinate System while dredging preparation and operations are underway. Minimum accuracy of positioning shall be ± 1 feet for horizontal (x, y) and ± 0.5 feet (6 inches) for vertical (z). An on-line graphics display of position and a hard copy capability are required. The Contractor's electronic positioning system must be made accessible to the Engineer or his representative upon request. It must provide a continuous automatic update (and, preferably, logging) of position in all weather conditions. Positioning system shall be compatible with project's coordinate system and is subject to the Engineer's approval.

C. Establish a readily visible floating boom to delineate the Work Area perimeter. The boom shall be maintained and remain in place for the duration of the dredging. Establish and maintain additional temporary survey targets, markers, and buoys for location and definition (color coded) of designated Work Area and Work Zone limits for the duration of the Work. Remove on completion of Work.

3.3 SEDIMENT EXCAVATION PREPARATION

A. Establish Work Zones within the Work Areas for efficient layout, sequencing, and execution of the dredging and monitoring operations. Turbidity curtains shall be installed in accordance with specification Section 02921, "Turbidity Curtains." Include an overlapped gap as necessary to enable passage of the dredging equipment. Protect "upwind" side of the Work Zone with a temporary wave, current barrier, or breakwater structure as necessary to maintain low energy conditions in the Work Zone and facilitate dredging depth precision. Prior to moving the inner or outer turbidity curtain, river water within the turbidity curtains shall be allowed to clarify to limit release of TSS and constituents of concern to the river.

B. As necessary, remove large debris or obstructions that may interfere with dredging operations prior to dredging in that area. No removal of large debris or obstructions shall occur outside established Work Zones. Debris and vegetation will be brought on land, decontaminated (if necessary) and disposed of as non-hazardous waste, unless otherwise approved by the Engineer.

C. The Contractor will perform a pre-dredging survey in each Work Zone in accordance with Section 3.7 to confirm sediment bed depth, elevation, and thickness. The Engineer will adjust the grade limits of dredging at that time, if necessary.

3.4 SEDIMENT TRANSPORT AND HANDLING

A. Sediment Transport - Transport the sediment to the sediment processing area using appropriate methods. The selected method for river transport should also include precautions to minimize additional resuspension of sediments within the excavation area. The sediment unloading area should be constructed as per the Drawings using impervious materials with a berm and sump to contain and collect any sediments or liquids spilled during unloading and transfer to land transport equipment. Liquids collected in the sump shall be handled and disposed according to specification Section 01500, "Construction Water Management." Transport equipment shall be capable of transporting sediments with no spillage and without tracking sediments onto public roads or haul roads. If spills or sediment tracking occur outside the impervious work areas (for instance, the haul road), the Contractor should handle such spills in accordance with specification Section 01564, "Spill and Discharge Control." Any water in contact with sediments within the transport vessel(s) must be managed in accordance with Section 01500, "Construction Water Management." The contractor is responsible for all traffic control at the River Street and public access road crossings.

B. The sheetpile wall was designed to support a uniform load of 400 pounds per square foot within 50 feet of the wall. When excavating within 20 feet of the sheetpile wall, the Contractor shall perform excavation in a manner that limits the width of exposed wall to 20 feet. Excavation within 20 feet of the sheetpile wall must be immediately backfilled with stone as described in 2.2.A.1. The Contractor is responsible for implementing measures to protect the wall, monitoring wall deflection, and repairing any damage to the wall resulting from its operations. The Contractor shall conduct survey monitoring of the sheetpile wall in x, y, and z dimensions to measure sheetpile wall deflection. The Contractor shall employ a Land Surveyor licensed in the state of New York to establish monitoring points at the top of the sheetpile wall on a 10-foot spacing along the wall alignment. A baseline survey shall be conducted on established reference points prior to any work. These and subsequent measurements shall be reported, along with incremental and cumulative changes in x, y, and z dimensions, in a monitoring report to the Engineer. Survey tolerances shall comply with the licensed surveyor standard of practice accuracy requirements. Monitoring shall be performed until construction is completed at the following schedule, unless indicated otherwise by Engineer: (a) weekly during dredging after baseline survey when excavation is within 20 feet of the wall and (b) suspended when no deflections are observed. The Contractor shall provide a spreadsheet of updated survey monitoring results to the Engineer no later than 24 hours following the survey.

If observable deflections beyond 1 inch are noted during equipment operation near the wall or dredging adjacent to the sheetpile wall, the Contractor shall cease operations and notify the Engineer. The Contractor shall be responsible for protecting the wall and repairing any damage to the wall.

C. The Contractor should be prepared to use tarps, foam, or other means to limit VOC emissions, if required, as per the specification Section 01401, "Health and Safety Requirements."

3.5 SEDIMENT EXCAVATION OPERATIONS

A. General - Remove sediment by dredging/excavating equipment and methods, supplemented by ancillary mechanical equipment and methods as necessary to remove debris. Dredge equipment shall be selected to maximize the efficiency while minimizing resuspension and over-excavating. The Contractor has the option to use different types of dredging/excavating equipment in the Work Area, given the different conditions throughout the Work Area. Noise suppression devices shall be incorporated into the dredge plant to minimize auditory impacts to neighboring residents.

B. Dredge - The dredge shall be selected and operated to minimize resuspension of sediment. The Contractor shall document that the dredge is specifically designed for environmental dredging and operated to minimize turbidity and resuspension, e.g., include as appropriate, covers, shutters, shields, grates, and sensors. Optimize operation, vertical position, cut depth, and movement of the dredge head to prevent unnecessary resuspension. The dredge shall include a closed clamshell

environmental bucket capable of performing a flat, level cut or other proposed equipment approved by the Engineer. Alternate equipment should be equal to or better than the closed clamshell environmental bucket in its ability to minimize turbidity and resuspension of sediment.

C. Excess Water - Take all necessary precautions to minimize the quantity of excess water generated during sediment excavation operations and minimize turbidity and resuspension of sediments. Excess river water shall be allowed to drain from the dredge bucket to the river (within the inner turbidity curtain) prior to placement of sediments into the sediment transport vessel (scow). Any water in contact with sediments within the transport vessel must be siphoned from the scow prior to unloading and must be managed in accordance with Section 01500, "Construction Water Management."

D. Dredge Depth - Remove sediment from the Work Zone to the grade indicated on the drawings as expressed in IGLD85 Coordinate Elevations, or as indicated otherwise by the Engineer following the pre-excavation survey. Remove all materials above specified grade within limits of excavation. Material removed from below the specified grade or outside specified limits of excavation is not part of the Work. There is no sub-grade elevation in this contract, unless requested by the Engineer. Over-excavation is not to exceed 0.5 feet (6 inches) beyond specified limits. Overexcavation limits should have sidewall slopes no steeper than existing steepest slopes in the river. If conditions permit, steeper slopes may be allowed, with approval of the Engineer. Excavation beyond the specified limits will not be measured for payment unless specifically directed in writing by the Engineer.

E. Debris and Aquatic Vegetation - Remove debris and any remaining clusters of aquatic vegetation which cannot be safely and efficiently removed by the dredging/excavation equipment using mechanical or other suitable equipment in a slow and careful manner that minimizes the amount of resuspension and potentially impacted runoff. Make no claims for delays attributed to the presence or removal of debris and aquatic vegetation. Transport debris and removed aquatic vegetation to the dewatering area in a manner approved in advance by the Engineer.

F. Post-Excavation Bathymetry – The Contractor will perform a post-excavation bathymetric survey in accordance with Section 3.7 to confirm that the sediment was adequately removed within the limits of excavation and allowance.

G. Sediment Sampling – The Contractor shall notify the Engineer when post-excavation soundings show that the limits of excavation have been completed for the Work Zone. The Engineer shall collect river sediment samples from 0 to 0.5 feet below the river bottom in the Work Zone to confirm the removal of impacted sediments. In the event that the sample results at any post-excavation river sediment sample location are above 1,133 ppb methylene chloride or 773 ppb acetone, the Engineer shall decide on the appropriate action, which may include the placement of a subaqueous cap limited to the area(s) of exceedance.

H. The Contractor should be prepared to use tarps, foam, or other means to limit VOC emissions, if required, as per the specification Section 01401, "Health and Safety Requirements."

I. Contractor shall keep and maintain records of the following activities, and furnish copies to Engineer upon request:

1. Detailed log of the Work Zones planned, in progress, and completed. Information recorded for the completed Work Zones shall include, but not be limited to, dates of sediment excavation, Work Zone dimensions and corner coordinates, Engineer's pre-excavation adjustments to sediment volumes, excavation direction, water depth, significant debris removed, extent of any additional excavation required, problems encountered, and corrective measures taken.
2. Log of any corrective actions taken to lower total suspended solids (TSS).
3. Log of dates and times of any failures of the turbidity barriers or silt curtains together with any corrective measures taken.
4. Log of any spills and corrective actions taken.

3.6 SUBAQUEOUS CAP

A. A subaqueous cap may be required in limited areas if post-excavation river sediment samples exceed 1,133 ppb methylene chloride or 773 ppb acetone.

B. Should a cap be required, the Contractor shall place cap material in a manner that will minimize sediment suspension. This shall be accomplished by limiting the fall distance of cap material to the bottom. Diffuser or spreader devices may also be used to minimize sediment suspension.

C. The layer of stone shall be at least 1 foot thick when completed. The acceptable tolerance of the thickness is plus or minus 0.25 feet (3 inches) when measured by a survey pattern on a maximum 50-foot grid or as otherwise approved by the Engineer.

3.7 PRE- AND POST-EXCAVATION SURVEYS

A. Contract drawings are based on latest available bathymetry for the site taken during the dates indicated on the drawings. Estimated Quantity shown on the Unit Price Table is based on these surveys.

B. Contractor's surveyor will perform a pre-excavation bathymetric survey in each Work Zone just prior to excavation. The survey will consist of soundings for bathymetry and will be performed in the presence of the Engineer.

C. Contractor's surveyor will perform a post-excavation bathymetric survey in the Work Zone just after excavation to verify that dredge grades have been achieved, and determine whether re-excavation is necessary. The survey will be performed in the presence of the Engineer.

D. The Engineer will perform post-excavation river sediment sampling after the excavation bathymetric survey indicates that dredge grades have been achieved. The sampling results will be used by Engineer to determine if the placement of subaqueous cap material is necessary. If subaqueous cap material placement is required, a post-capping bathymetric survey will be required.

E. If additional surveys are required due to Contractor's failure to adequately remove sediment to the limits shown, the Contractor shall bear costs of these additional surveys.

F. Contractor will provide the Engineer with the results of the pre- and post-removal surveys prior to and upon completion of the Work in the Work Zone.

G. The Engineer will notify Contractor of the post-removal survey results within 7 working days of survey completion and give a subsequent release if he has successfully fulfilled the requirements of the Work.

3.8 SPILL PREVENTION AND RESPONSE

A. Take all necessary precautions to ensure spills do not occur as a result of Contractor's activities, particularly in the waterway as specified in Section 01564, "Spill and Discharge Control." Such precautions shall include the provision and use of trained staff, proper equipment and materials, proper operations and maintenance procedures, proper equipment washing and decontamination procedures, regular inspections, frequent testing and maintenance of all equipment and materials, and the availability of appropriate spill response equipment.

B. In the event of any spills, eliminate the cause of the spill, immediately cease excavation activities as necessary, and commence cleanup of the spill or the leak. The Contractor shall ensure that adequate labor, materials, and equipment are or can be made promptly available to quickly and effectively perform the cleanup.

3.9 WATER QUALITY MONITORING AND SHUTDOWN CRITERIA

A. The Engineer shall monitor turbidity at locations upstream, downstream, and within the outer turbidity curtain, as shown on the Drawings. The upstream location will provide background conditions for river water VOC and TSS.

B. In the event that turbidity readings inside the outer curtain exceed 50 NTUs or 50 percent more than the upstream turbidity value (whichever is greater), the Contractor shall take immediate action to reduce the amount of sediment being suspended. Action shall also be taken if readings outside the outer curtain exceed 40 NTUs or 20 percent more than the upstream turbidity value (whichever is greater). Action shall also be taken if a visible turbidity plume attributable to the excavation or capping operation is observed more than 100 feet from the active operation and outside the outer turbidity curtain.

If immediate actions are not successful in reducing downstream turbidity to below shut-down criteria, listed in Section B above, within 60 minutes, as indicated by the monitoring instruments or by visual means, excavation or capping operations shall cease. The Engineer will collect water samples outside the outer turbidity curtain at both the upstream and downstream monitoring station. These samples will be analyzed for methylene chloride and acetone by SW846 Method 8260. Methylene chloride concentrations will be compared to 100 ppm. Additional control measures will be evaluated by the Engineer and will be the responsibility of the Contractor to implement at no additional cost to the Client. Excavation activities can resume when the source of the problem has been corrected and downstream turbidity has been reduced below shut-down criteria.

3.10 COOPERATION AND ASSISTANCE TO ENGINEER

A. Cooperate with Engineer on inspection of Work and provide assistance requested.

B. Furnish use of such boats, equipment, labor, and materials forming ordinary and usual part of dredging/excavation system as may be reasonably necessary to inspect and supervise Work.

C. Provide transport of Engineer and regulatory agency's inspectors to and from shore to dredge as required during operations at no extra cost.

3.11 MONITORING OF WORK

A. Contractor is responsible to monitor effectiveness and productivity of its own work on an ongoing basis.

B. Contractor shall identify and demonstrate the effectiveness of proposed productivity monitoring methods prior to commencement of Work.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Sediment Excavation shall be measured by the number of cubic yards of sediment excavated. The volume of sediment excavated shall be calculated by an independent land surveyor retained by the Contractor. The surveyor shall be licensed in the State of New York. The volume shall be calculated by the surveyor using the average end area method based on initial and final bathymetric surveys surveyed by him in the presence of the Engineer. Excavation quantities should be calculated by the surveyor using Autodesk Land Development Desktop 3. It shall not include areas excavated to maintain a stable sidewall slope around the excavation and any excavation beyond the line and grades of the initial extent of excavation shown in the drawings, unless the Contractor has obtained written approval from the Engineer to do so.

B. Subaqueous cap shall be measured by the number of cubic yards of cap material placed. The volume of capping stone placed shall be calculated by the Engineer. The volume shall be calculated by the using the area

enclosed with the limits of area requiring the cap, as determined by AutoCAD, multiplied by the required 1-foot thickness. It will not include any subaqueous cap placed beyond the limits required, unless the Contractor has obtained written approval from the Engineer to do so.

C. Backfill shall be measured by the number of cubic yards of backfill material placed at a 2:1 slope. The volume shall be calculated by the Engineer from the pre and post-construction surveys using Autodesk Land Development Desktop 3. It will not include any material placed beyond the limits required, unless the Contractor has obtained written approval from the Engineer to do so.

4.2 PAYMENT

A. Sediment Excavation shall include excavation, handling, and transportation of all sediments to the sediment processing/stockpile area and will be paid for at the unit prices bid per cubic yard for "Sediment Excavation." These prices shall be full compensation for all excavating, handling, and transportation. Excavation required to maintain a stable sidewall slope beyond the slopes shown on the Drawings is incidental to this work. This price also includes any cost associated with labor, equipment, tools, materials, and incidentals necessary to perform this work. No additional compensation will be made for stoppage of work associated with exceedances of the shutdown criteria.

B. Subaqueous cap will be paid for at unit price per cubic yard for "Subaqueous Cap." These prices shall be full compensation for all hauling, transporting, placing, compacting and grading of material. This price also includes any cost associated with labor, equipment, tools, materials, and incidentals necessary to perform the work.

C. Backfill will be paid for at unit price per cubic yard for "Backfill." These prices shall be full compensation for all hauling, transporting, placing, and grading of material. This price also includes any cost associated with labor, equipment, tools, materials, and incidentals necessary to perform the work.

D. Non-Payment for Overexcavation

1. The volume of sediments to be excavated to the limits, shown on the Drawings, including an overexcavation tolerance as specified in this specification will be calculated from the bathymetric survey using AutoCAD. Overexcavation limits should have sidewall slopes no steeper than existing steepest slope in the river. If excavation is performed beyond the limits shown without the written approval of the Engineer, the percentage of excavation beyond the overexcavation tolerance will be calculated using the final bathymetric survey. This percentage of the total volume of excavation shall not be measured for payment. The Client shall apply liquidated damages to the Contractor for the disposal costs of this additional material as per specification Section 01640, "Offsite Transportation and Disposal."

END OF SECTION

SECTION 02921

TURBIDITY CURTAINS

PART 1 - GENERAL

1.1 GENERAL

A. Contractor shall use turbidity curtains in accordance with and to perform work required in specification Section 02900, "Sediment Excavation and Subaqueous Cap," and as specified on the Drawings. The two types of curtains included in this section are the Inner Curtain and the Outer Curtain. No more than half of the river width may be blocked by Contractor activities. The Contractor must accommodate commercial and non-commercial river traffic. The turbidity curtains shall be moveable to facilitate this. One commercial cargo vessel (Esroc Company, formerly Quikcrete) is expected to traverse the river every two to three weeks.

B. Inner Curtain. The purpose of the impermeable inner curtain is to provide local turbidity protection around operating dredges. The mobile inner curtain shall meet the general guidelines specified on the Drawings and in this section.

C. Outer Curtain. The purpose of the permeable outer curtain is to provide turbidity protection to the Work Zone. The outer curtain shall meet the design requirements in this specification and Drawings. The outer turbidity curtain has been designed to operate in most river conditions. However, it is the responsibility of the Contractor to take into account the aberrant conditions such as unusual flood conditions, potential ice buildup, and other unusual factors in the construction of this turbidity curtain.

D. Oil Boom. The purpose of the oil boom is to provide absorption of sheens.

1.2 RELATED SECTIONS

Section 01110 – Environmental Protection
Section 01300 – Submittals
Section 01401 – Health and Safety Requirements
Section 01510 – Mobilization/Demobilization
Section 02900 – Sediment Excavation and Subaqueous Cap

1.3 QUALITY ASSURANCE

A. Comply with conditions and requirements of Corps of Engineers Permit, Coast Guard regulations, and all state and local permits.

B. Contractor shall keep and maintain records of the following:

1. Design calculations for the turbidity curtains, if installation differs from the Drawings.

2. A log of the dates and times of any failures of the turbidity curtains together with any corrective actions taken.

1.4 SUBMITTALS

A. Product information and shop drawings showing the type of curtain to be used, including calculations supporting the design, if installation differs from the Drawings.

B. A brief written description of the proposed methods for installation and removal of the turbidity curtains.

1.5 SITE CONDITIONS

A. The outer turbidity curtain has been designed based on preliminary analysis of river current data collected during May 2003. This data suggests that the maximum current perpendicular to the outer turbidity curtain is approximately 1 foot per second during normal flow conditions. If extreme weather conditions arise, the Contractor must take measures to protect the curtains.

B. The bathymetric conditions presented on the drawings are variable and subject to change. The Contractor will perform pre-dredging bathymetric surveys of the work area as directed in Section 02900, "Sediment Excavation and Subaqueous Cap" and shall adjust the curtains as necessary.

PART 2 – PRODUCTS

2.1 INNER CURTAIN MATERIALS

A. The curtain fabric shall be Spilldam, Inc. type impermeable with a minimum of 22 ounces per square yard PVC or approved equivalent.

B. Anchors for the inner turbidity curtain shall be chosen in light of the site conditions. Anchor types appropriate for the application include DOR-MOR, Danforth, and mushroom, spaced as shown on the Drawings.

C. Inner turbidity curtains shall be manufactured or modified in the field so that the ballast chain is on the bottom of the riverbed.

D. Inner turbidity curtains shall be fitted with reefing lines to allow for adjustment and to facilitate movement of the curtain to accommodate ship traffic. The Contractor shall accommodate commercial and non-commercial river traffic as necessary. The turbidity of the water within the turbidity curtains shall be allowed to clarify prior to moving the curtains.

2.2 OUTER CURTAIN MATERIALS

A. The outer turbidity curtain (permeable) fabric shall be a minimum of 22 ounces per square yard, or equivalent for the impermeable panels, such as the Spilldam, Inc. Type 2, geotextile skirt. The outer turbidity curtain shall be double steel cable type with interlocking aluminum or steel connector plates or equivalent. Panel load cables shall be 5/16-inch minimum diameter, vinyl coated, and connected to a stress plate at the connectors. Typical outer turbidity curtain details are shown on the Drawings.

B. Flotation of the outer turbidity curtain shall be achieved by means of a minimum 12-inch-diameter expanded polystyrene floats providing buoyancy equal to at least three times the weight of the curtain, ballast chain, and load cables. The outer turbidity curtain shall remain fixed with respect to elevation as shown on the Drawings.

C. Anchors for the outer turbidity curtain shall be Hooker model #85 "Super Hooker" Danforth-type anchors, or approved equal, spaced as shown on the Drawings.

D. Outer turbidity curtains shall be manufactured or modified in the field so that the ballast chain is on the bottom of the riverbed.

E. The outer turbidity curtain shall be fitted with reefing lines to adjust the curtain so that it is flush with the riverbed and to allow moving the curtain to accommodate ship traffic. The turbidity of the water within the turbidity curtains shall be allowed to clarify prior to moving the curtains.

F. The outer curtain shall be fitted with boom marker lights. The Contractor shall contact the USCG to determine appropriate light colors and spacing.

2.3 OIL BOOM

A. The Contractor shall install the oil boom along the inside of the outer turbidity curtain.

2.4 MONITORING

A. The Contractor shall monitor the inner and outer turbidity curtains to ensure that the curtains are not being subjected to forces exceeding their design. The Contractor shall monitor the oil boom to ensure the oil boom is functioning properly. The Contractor shall monitor for and be prepared to remove any floating oil or debris.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall install all turbidity curtains and oil boom, with the approval of the Engineer and in strict accordance with manufacturers recommended procedures, prior to sediment excavation.

B. The Contractor shall install all turbidity curtains in a manner that minimizes disturbance of the sediments. When terminating at shoreline, closure shall be provided with the shore using approved means.

C. The Contractor shall deploy the inner turbidity curtain(s) around work zones to isolate the area being dredged. The inner turbidity curtains shall be moved as required by the dredging progress. The curtain hem and ballast chain shall be maintained slightly above or on the riverbed to minimize disturbance of sediments.

3.2 REMOVAL

A. The turbidity curtains and oil boom shall remain in place until construction is complete. The Contractor shall exercise extreme care in removing turbidity curtains to avoid increasing turbidity in the river.

3.3 MAINTENANCE

A. The Contractor shall maintain all turbidity curtains in working order. Damaged sections shall be repaired or replaced as required to the satisfaction of the Engineer.

3.4 DISPOSAL

A. Contractor shall be completely responsible for and shall pay all costs associated with disposal of turbidity curtains and oil boom.

PART 4 - MEASUREMENT AND PAYMENT

Measurement and Payment will be made under the contract lump sum price bid for "Miscellaneous." The price bid shall be full payment for all costs involved in providing the materials, testing, equipment, and personnel required for the particular bid item, and for performing the necessary work.

END OF SECTION