# Methylene Chloride and Acetone in Genesee River Sediments Associated with the CSXT Derailment and Chemical Spill at Charlotte, New York

## Data Evaluation and Monitoring Plan

**Prepared by:**

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**Prepared for:**

**CSX Transportation Inc.**
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**October 17, 2002**

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October 18, 2002

David Pratt, P.E.
NYSDEC- Region 8
6274 East Avon-Lima Road
Avon, NY 14414

**RE: GENESEE RIVER SEDIMENT REPORT AND MONITORING PLAN**

Dear Mr. Pratt:

Shaw Environmental, Inc., on behalf of CSX Transportation, Inc. (CSXT), has prepared the enclosed report for your review. The report presents and evaluates the Genesee River sediment and water data collected to date, and includes the Phase V sampling plan and a monitoring plan for water and sediment. Six copies of the report are enclosed. If you have any questions or require additional copies, please contact me at (732) 469-5599 ext. 317, or via e-mail at Mike.Murray@shawgrp.com.

Sincerely,

**SHAW ENVIRONMENTAL, INC.**

Michael Murray
Senior Environmental Scientist

w/enclosures

cc: J. Scagnelli
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# 1.0 Introduction

Shaw Environmental, Inc. (Shaw) was retained by CSX Transportation (CSXT) to provide technical support and evaluate possible impacts from the December 23, 2001 train derailment at Charlotte, New York in which acetone and methylene chloride were discharged to the surrounding area and into the Genesee River. This report presents the analytical results of River water and sediment sampling events conducted in May and September of 2002, and an evaluation of these results with previous sampling activities.

An initial River impact assessment was performed immediately following the spill. This assessment included water sampling and analysis and sediment sampling for benthic macroinvertebrate community analysis. A phased approach of sampling and analysis was initiated following this investigation to further evaluate and delineate the extent of potential impacts. Core sampling of River sediments for analysis for acetone and methylene chloride was conducted on March 19, 2002 (Phase I). The analytical results showed elevated methylene chloride concentrations in river sediments directly offshore of the spill area. As a result, on April 4-5, 2002 (Phase II), additional sediment samples were collected in a grid pattern to delineate the impact extent of acetone and methylene chloride. The results of the March and April sampling events were presented in the report: *Evaluation of Methylene Chloride and Acetone in Genesee River Sediments Associated with the CSXT Derailment and Chemical Spill at Charlotte, NY* (Shaw, 2002).

In order to determine the concentrations of methylene chloride and acetone in deeper sediments, vibratory core samples were collected on May 29, 2002 (Phase III). Elevated concentrations were found to a sediment depth of seven feet in these samples. Additional vibratory core sampling was conducted on September 17 and 18, 2002 (Phase IV) for the purpose of completing delineation for Interim Remedial Measures (IRM). Analyses of these samples found detectable concentrations of methylene chloride at only two of 19 locations.

This report presents the sampling methodology used to collect the samples and the results of the Phase III and IV water and sediment sampling events. An evaluation of all data obtained in the March, April, May and September 2002 sampling events is presented. Also presented are recommendations for further IRM activities.

# 2.0 Methods

Samples were collected in accordance with the sampling plans included as **Appendix A** of this document.

## 2.1 Sampling Locations

All sampling locations for the four sampling events are indicated on **Figure 1**. Phase I sampling (March 19, 2002) included 13 locations (sampling stations) on the lower Genesee River, upstream from, adjacent to, and downstream from the spill site. Phase II sampling (April 4, 2002), included re-sampling of stations, 3, 4, 5, 6 and 11, as well as new stations 14 through 38. Sample coordinates were recorded in the field with a hand held Global Positioning System (GPS) receiver.

In Phase III, vibratory core samples were collected at eight locations in the area of known impacts. Phase IV sampling was performed at 19 locations upstream from, adjacent to, and downstream from the spill site. Phase IV sampling was also performed with vibratory coring methods. Phase III and IV sampling coordinates were recorded with a boat mounted Differential GPS receiver, which is significantly more accurate than hand held GPS.

## 2.2 Sample Handling in the Field

Because the contaminants of concern are volatile compounds, samples were placed directly into sample containers without mixing/homogenizing. All sample containers were labeled with the location, time of collection, date and sample type and method of analysis. The sample identification information was also recorded on the Chain of Custody forms and field notes.

## 2.3 Field Quality Assurance/Quality Control

Field Activity Daily Logs were used to record all essential information for each sampling station. Included were descriptions of the sampling locations, total number and types of samples collected, time, date, weather and other pertinent information. Chain of Custody forms were prepared in the field and sealed in coolers with the samples for shipment to the laboratory.

## 2.4 Sample Analysis

Sediment samples were analyzed for methylene chloride, acetone, and percent solids. Analysis of the sediment samples was performed by Severn Trent laboratories (STL). Phase III and IV analysis was conducted at the STL on-site mobile laboratory.

# 3.0 Results and Discussion

This section presents and discusses the sediment concentrations and area of impact, and discusses the data in the context of potential persistence in the aquatic environment.

## 3.1 Acetone and Methylene Chloride Sediment and Water Concentrations

### 3.1.1 Phase I and Phase II Results

The Phase I (March 19) and Phase II (April 4) acetone and methylene chloride sediment concentrations are shown in **Table 1**, along with core length obtained, percent solids, and sampling location coordinates. All locations with elevated acetone concentrations had elevated methylene chloride, and elevated methylene chloride was found at more locations. Therefore, methylene chloride was judged to be a better indicator for determining the area of impact. Methylene chloride concentrations in the Phase I samples ranged from 12,000,000 ppb at SS-11 to undetectable levels at many locations.

**Figure 2** gives a graphical indication of the areas of elevated methylene chloride concentration based on the Phase I and II data. The maximum concentrations at each location were used. The area shown in purple represents sediments with a methylene chloride concentration potentially in excess of 1,000,000 ppb (1,000 ppm). The figure is a computer-generated contour map using the Natural Neighbor gridding method, a feature of Surfer Version 7. (Natural Neighbor gridding is a weighted average interpolation, where the weight is based on a triangulation of input points. This triangulation is processed by a software algorithm, which allows for a selection of the closest nodes of the triangles around a given interpolation point. This method can produce more accurate contours than weighting based solely on distance, particularly when a complete grid of data are not available.) To visually interpret the affected area, the coordinates shown on **Figure 2** may be compared to the coordinate grid and channel boundary on **Figure 1.**

### 3.1.2 Phase III Results

The Phase III acetone and methylene chloride data are shown in **Table 2**. Phase III sampling employed vibratory coring to collect sediment cores at seven locations in the area shown to have high concentrations in surface sediments during Phases I and II, and one downstream location (SS-40). Methylene chloride concentrations in the Phase III samples ranged from 10,000,000 ppb at SS-19 to undetectable levels at SS-23 and SS-40. Core samples up to seven feet in length were obtained, and elevated concentrations were found below the sediment/water interface at most locations sampled.

**Figure 3** is a contour plot of the methylene chloride data from the Phase III sampling event using the maximum concentration values at each sampling point. Although the limited number of sampling points do not provide a complete delineation of the elevated contaminant area, the low concentrations at SS-23A indicate that the area having concentrations greater than 1,000,000 ppb may be significantly smaller than that found during Phase I and II sampling.

### *3.1.3 Phase IV Results*

The Phase IV acetone and methylene chloride data are shown in **Table 3**. Methylene chloride at detectable concentrations was present at only two of the 19 locations sampled. Location SS-45 had 750,000 ppb methylene chloride at the surface, 3,400 ppb at a sediment depth of four feet, and 81 ppb at six feet. Location SS-5A had 45 ppb methylene chloride detected at a sediment depth of three feet.

Locations SS-5A and SS-11A were sampled in Phase IV to evaluate potential change in sediment contaminant concentrations over time (natural attenuation). The data show that methylene chloride concentrations decreased significantly at both locations. At SS-5A, 8,800,000 ppb methylene chloride was present at the three foot sediment depth in the Phase III sample collected on May 29. As stated above, only 45 ppb was detected in the Phase IV sample collected on September 18. At location SS-11A, a high of 1,400,000 ppb methylene chloride was detected at the two foot depth in the May Phase III sampling. Methylene chloride was undetected at SS-11A in the September Phase IV sampling.

The contour plot of Phase IV methylene chloride concentrations is shown in **Figure 4**. No concentrations above 1,000,000 were found, and because significant concentrations of methylene chloride were found at only one Phase IV sampling location, the red area (> 100,000 ppb) is probably exaggerated. Also, the detection limits were input to the program when methylene chloride was not detected. Therefore, the areas shown in blue (>10 ppb) represent sediments with no detectable methylene chloride. Potential mechanisms for this relatively rapid attenuation of methylene chloride in river sediment are discussed in Section 3.2.

### *3.1.4 Water Sampling*

Numerous samples of Genesee River bottom water were collected following the spill. Water sampling also was performed on April 5 and on September 12, 2002. Samples were collected primarily at four locations (sampling station designations in parentheses):

- Directly offshore of the spill site (Middle);
- Approximately half way between the spill site and the river mouth (Downstream);
- At the river mouth (Mouth);

- In Lake Ontario approximately 500 feet east of the river mouth (Lake East).

Samples were analyzed for acetone and methylene chloride, and the results are shown in **Table 4**. Methylene chloride was detected in bottom water offshore of the spill site at concentrations ranging from undetected to 320 ppb in the days immediately following the spill, but at much lower concentrations (undetected to 41 ppb) at downstream locations. In the April bottom water samples, methylene chloride was detected at 10 ppb offshore of the spill site and at very low concentrations downstream. However, the April results were qualified due to blank contamination. The September sampling and analysis found a detectable but low concentration of methylene chloride (17 ppb) in bottom water adjacent to the spill, but the compound was not detected at the downstream locations or in the lake. The available water data indicate that spill related contaminants remaining in sediments are not resulting in water concentrations that present a risk to downstream water intakes. This will be verified with the implementation of the proposed monitoring program (**Appendix B**).

### *3.2 Natural Attenuation of Volatile Compounds in Sediment*

Sediment sampling and analysis conducted in March, April, May and September 2002 indicate that acetone and methylene chloride concentrations in Genesee River sediments have declined markedly from initial levels in excess of 10,000,000 ppb.

Volatile compounds such as acetone and methylene chloride are not known to persist in the aquatic environment (USEPA, 2002). This discussion will focus on methylene chloride which is heavier than water, and thus is more likely to sink and enter sediments when released into an aquatic system. Two processes likely resulted in the attenuation of methylene chloride in the river sediments:

- Transport of methylene chloride contaminated pore water (interstitial water) from sediment to the water column, and ultimately to the atmosphere;
- Biodegradation.

Methylene chloride is a somewhat polar compound that has a low octanol/water partition coefficient ($K_{OW}$). The substance tends to be soluble in water and is not expected to adsorb to sediments. The solubility of methylene chloride is 20,000 mg/L at $20^0$C (Verschueren, 1996). Therefore, any methylene chloride that sank to the bottom and entered sediments after the derailment and spill are dissolved in sediment pore water. Assuming a significant rate of exchange between sediment pore water and the water column, pore water containing dissolved methylene chloride would pass to the surface waters of the Genesee River, where it would be

rapidly lost to the atmosphere. Methylene chloride is a volatile compound that has a partition coefficient between water and air that is heavily in favor of air. The reduction of methylene chloride concentrations in water that is in contact with the air has been shown to be reduced by 90% to 95% within 30 to 90 minutes (Dilling, 1977). Verschueren (1996) gives a $t_{1/2}$ of 18 to 25 minutes for a 1 ppm solution of methylene chloride at $25^0$C in still air.

Methylene chloride has been shown to biodegrade under both aerobic conditions, and also under anaerobic conditions (Bayard, et al., 1985). Anaerobic conditions prevail in fine-grained subsurface sediments such as those present in the lower Genesee River. Wood et al. (1981) using sediment spiked with methylene chloride, demonstrated that the compound biodegrades under anaerobic conditions. Laboratory experiments simulating biological wastewater treatment showed that an initial concentration of 10 mg/L methylene chloride completely biodegraded within 4 hours, and 1 mg/L initial concentration completely biodegraded within 3 hours, with a 66 percent conversion to $CO_2$ after 50 hours (Bayard, et al., 1985). Acclimatization was found to be important, and it is likely that the biodegradation rate of methylene chloride in Genesee River sediments increased rapidly after acclimatization of the sediment bacteria community. In addition, elevated levels of organic carbon have been shown to increase the rate of methylene chloride biodegradation (Davis and Madsen, 1991). River sediment samples collected as part of the benthic macroinvertebrate survey (IT, 2002) found total organic carbon (TOC) concentrations ranging from 15,000 mg/kg to 32,000 mg/kg.

The results of the River sampling support the two processes of attenuation. Decreased methylene chloride concentration in the shallow sediments with trace concentrations in the water just at the spill site would indicate that it is not being adsorbed in the shallow sediments but most likely is continuing to pass from the sediment pore water to river water, and then rapidly to the atmosphere. For deeper sediments, degradation of methylene chloride is the result of biological activity, i.e., biodegradation. Although experiments simulating wastewater treatment are not directly applicable to biodegradation in natural sediments, the demonstration of rapid breakdown of methylene chloride via bacterial action in the experiments, the elevated TOC noted in the River sediments, and the decrease noted in the latest deep sediment sampling indicates that biodegradation is the most likely mechanism for the evident attenuation of methylene chloride in Genesee River deep sediments.

# 4.0 Conclusions and Recommendations

High sediment concentrations of methylene chloride initially present in the vicinity of the December 23, 2001 derailment and spill have significantly declined, as demonstrated by sampling conducted in September 2002. The likely mechanisms for the attenuation are transport to the water column and ultimately to the atmosphere, and biodegradation. Of these two mechanisms, biodegradation is probably more significant, particularly for anaerobic subsurface sediments. Methylene chloride was detected at only one of 19 locations sampled in September, where it was present at 750,000 ppb. This represents an approximate 95 percent reduction from previous concentrations. Data from other locations show that a 100 percent reduction (to below detection limits) of methylene chloride has already occurred.

Based on the attenuation rate demonstrated in recent sampling, it is likely that the methylene chloride still present in Genesee River sediments will reach undetectable levels in a relatively short period of time with the current River conditions. Recent water data from the river and Lake Ontario indicate that methylene chloride and acetone are not present above applicable New York State ambient water quality guidance values for protection of drinking water sources (5 ppb methylene chloride, 50 ppb acetone; NYSDEC, 1998). In addition, methylene chloride concentrations remaining in sediments do not represent a significant risk to human or ecological receptors (Shaw, 2002).

As a result of the dramatic contaminant decrease and the natural attenuation potential, the recommended course of action is the implementation of a water and sediment monitoring program. The objectives of the monitoring program are to verify that methylene chloride and acetone concentrations in the Genesee River do not present a risk to drinking water, and to monitor the attenuation of methylene chloride and acetone to undetectable or background levels. The proposed plan would be to monitor the water and sediment concentrations from October 2002 to April 2003 for further degradation. Should conditions remain the same or fail to improve after the monitoring period, IRMs will be planned for implementation. A Draft Monitoring Plan is presented in **Appendix B**.

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# Table 1
## Phase I and II River Sediment Samples

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude | Depth to Bottom (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SS-1 Top | 3/19/2002 | 10:05 | 38 | B | 10 | B | 0.8 | 61 | 43 14.996 | 77 36.655 | |
| SS-1 Bottom | 3/19/2002 | 10:05 | 28 | B | 9 | B | | 67 | | | |
| SS-2 Top | 3/19/2002 | 10:30 | 48 | B | 13 | B | 0.75 | 62 | 43 14.999 | 77 36.646 | |
| SS-2 Bottom | 3/19/2002 | 10:30 | 20 | BJ | 8 | B | | 72 | | | |
| SS-3 Top | 3/19/2002 | 10:40 | 59 | B | 49 | B | 1.8 | | 43 15.087 | 77 36.602 | |
| SS-3 Bottom | 3/19/2002 | 10:40 | 37 | B | 8 | B | | | | | |
| SS-3A | | | | | | | | | 43 15.083 | 77 36.602 | 6 |
| SS-4 Top | 3/19/2002 | 11:00 | 23 | BJ | 11 | B | 1.05 | | 43 15.098 | 77 36.594 | |
| SS-4 Bottom | 3/19/2002 | 11:00 | 17 | BJ | 15 | B | | | | | |
| SS-4A Bottom | 4/4/2002 | 8:30 | 48 | | 35 | B | 0.75 | 71 | 43 15.092 | 77 36.595 | 6 |
| SS-5 Top | 3/19/2002 | 11:15 | ND | | 7,800 | | 1.15 | | 43 15.106 | 77 36.585 | |
| SS-5 Bottom DL | 3/19/2002 | 11:15 | 49 | B | 30,000 | | | | | | |
| SS-5A Top | 4/4/2002 | 9:10 | 300,000 | | 5,400,000 | B | 1.67 | 53 | 43 15.105 | 77 36.586 | 6 |
| SS-5A Middle | 4/4/2002 | 9:10 | ND | | 330,000 | B | | 60 | | | |
| SS-5A BottomDL | 4/4/2002 | 9:10 | 36,000 | U | 440,000 | BD | | 66 | | | |
| SS-6 Top | 3/19/2002 | 11:40 | 35 | | 22 | B | 0.92 | | | | |
| SS-6 Bottom | 3/19/2002 | 11:40 | 49 | | 20 | B | | | | | |
| SS-6A Bottom | 4/4/2002 | 11:20 | 60 | | 240 | B | 0.75 | 59 | 43 15.113 | 77 36.577 | 10 |
| SS-7 Top | 3/19/2002 | 11:55 | 35 | | 22 | B | 0.95 | | | | |
| SS-7 Bottom | 3/19/2002 | 11:55 | 56 | | 18 | B | | | | | |
| SS-8 Top | 3/19/2002 | 12:10 | 19 | J | 11 | B | 0.8 | | | | |
| SS-8 Bottom | 3/19/2002 | 12:10 | 34 | | 15 | B | | | | | |
| SS-9 Top | 3/19/2002 | 12:36 | 15 | J | 82 | B | 0.55 | | | | |
| SS-9 Bottom | 3/19/2002 | 12:36 | 81 | J | 10 | B | | | | | |
| SS-10 Top | 3/19/2002 | 13:40 | 22 | J | 18 | B | 0.75 | | 43 15.084 | 77 36.594 | 18 |
| SS-10 Bottom | 3/19/2002 | 13:40 | 21 | J | 11 | B | | | | | |
| SS-11 Top DL | 3/19/2002 | 13:56 | 0 | | 12,000,000 | | 0.57 | | | | |
| SS-11 Bottom | 3/19/2002 | 13:56 | ND | | 11,000,000 | | | | | | |
| SS-11A Top | 4/4/2002 | 14:30 | 26,000 | | 800,000 | BE | 1.08 | 56 | 43 15.103 | 77 36.581 | 22.5 |
| SS-11A Bottom | 4/4/2002 | 14:30 | 25,000 | | 1,100,000 | BE | | 73 | | | |
| SS-12 Top | 3/19/2002 | 14:05 | ND | | 180 | B | 1.05 | | | | |

# Table 1
## Phase I and II River Sediment Samples

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude | Depth to Bottom (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SS-12 Bottom | 3/19/2002 | 14:05 | 35 | B | 31 | B | | | | | |
| SS-12A Top | 4/4/2002 | 14:44 | 26 | | 10 | B | 1.08 | 63 | 43 15.113 | 77 36.573 | 22 |
| SS-12A Bottom | 4/4/2002 | 14:44 | 41 | | 33 | B | | 65 | | | |
| SS-13 Top | 3/19/2002 | 14:16 | ND | | 30 | B | 1.2 | | | | |
| SS-13 Bottom | 3/19/2002 | 14:16 | 150 | B | 52 | B | | | | | |
| SS-14 Top (Dup from SS-3 Top) | 3/19/2002 | 10:40 | ND | | 58 | B | | | | | |
| SS-14 Bottom (Dup from SS-3 Bot.) | 3/19/2002 | 10:40 | 170 | B | 64 | B | | | | | |
| SS-15 Bottom | 4/4/2002 | 8:40 | ND | | 750,000 | B | 0.8 | 75 | 43 15.090 | 77 36.584 | 6 |
| SS-16 Top | 4/4/2002 | 9:33 | ND | | 30,000 | B | 1.5 | 50 | 43 15.104 | 77 36.582 | 6 |
| SS-16 Middle | 4/4/2002 | 9:33 | ND | | 56,000 | BE | | 64 | | | |
| SS-16 Bottom | 4/4/2002 | 9:33 | ND | | 2,400,000 | BE | | 76 | | | |
| SS-17 Top | 4/4/2002 | 11:35 | 120 | | 38 | B | 1.42 | 56 | 43 15.125 | 77 36.573 | 9 |
| SS-17 Bottom | 4/4/2002 | | 54 | B | 50 | B | | 71 | | | |
| SS-18 Top | 4/4/2002 | 14:15 | 57 | | 49 | B | 1.12 | 66 | 43 15.094 | 77 36.589 | 22 |
| SS-18 Bottom | 4/4/2002 | | 39 | B | 32 | B | | 66 | | | |
| SS-19 Bottom | 4/4/2002 | 14:23 | ND | | 960,000 | B | 0.71 | 76 | 43 15.100 | 77 36.583 | 20 |
| SS-20 Top | 4/4/2002 | 14:52 | 25 | | 14 | B | 1.25 | 61 | 43 15.123 | 77 36.565 | 21 |
| SS-21 Top | 4/4/2002 | | 67 | | 35 | B | | | | | |
| SS-22 Top | 4/4/2002 | 15:17 | 33 | | 19 | | 1.16 | 60 | 43 15.083 | 77 36.580 | 24 |
| SS-23 Top | 4/4/2002 | 15:21 | ND | | 14,000,000 | B | 1.04 | 66 | 43 15.095 | 77 36.575 | 23 |
| SS-23 BottomDL | 4/4/2002 | 15:21 | 370,000 | D | 7,000,000 | BD | | 65 | | | |
| SS-24 Top | 4/4/2002 | 15:31 | ND | | 58,000 | B | 1 | 60 | 43 15.101 | 77 36.567 | 24 |
| SS-24 BottomRE | 4/4/2002 | 15:31 | ND | | 770,000 | BD | | 64 | | | |
| SS-25 Top | 4/4/2002 | 15:41 | 60 | | 23 | B | 1.08 | 59 | 43 15.109 | 77 36.559 | |
| SS-25 Bottom | 4/4/2002 | 15:41 | 35 | | 32 | B | | 60 | | | |
| SS-26 Top | 4/4/2002 | | 8,600 | U | 9,500 | BD | 1 | 57 | 43 15.122 | 77 36.553 | 24 |
| SS-26 Bottom | 4/4/2002 | | 51 | B | 97 | B | | 68 | | | |
| SS-27 Top | 4/4/2002 | 16:07 | 50 | | 64 | B | 1.25 | 68 | 43 15.089 | 77 36.550 | 26 |
| SS-27 Bottom | 4/4/2002 | | 30 | B | 70 | B | | 65 | | | |
| SS-28 Top | 4/4/2002 | 16:13 | 17 | J | 14 | B | 1.04 | 64 | 43 15.083 | 77 36.572 | 26 |
| SS-29 Top | 4/5/2002 | 7:50 | 51 | | 250 | B | 1.13 | 65 | 43 15.102 | 77 36.554 | 24 |

# Table 1
## Phase I and II River Sediment Samples

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude | Depth to Bottom (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SS-29 Bottom | 4/4/2002 | | 89 | B | 64 | B | | 63 | | | |
| SS-30 Top | 4/5/2002 | 8:20 | 45 | | 22 | B | 1.16 | 70 | 43 15.106 | 77 36.553 | 24.5 |
| SS-31 Bottom | 4/5/2002 | 8:26 | 55 | | 82 | B | 0.75 | 66 | 43 15.108 | 77 36.550 | 24.2 |

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

# Table 2
# Phase III River Sediment Samples

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude | Depth to Bottom (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SS-5A 1' | 5/29/2002 | 9:15 | 1,515,152 | U | 770,000 | | 5' | 66 | 43.15.107 | 077.36.581 | 16' |
| SS-5A 2' | 5/29/2002 | 9:18 | 1,244,338 | U | 2,500,000 | | | 74 | | | |
| SS-5A 3' | 5/29/2002 | | 360,000 | U | 8,800,000 | BD | | 67.24 | | | |
| SS-5A 4' DL | 5/29/2002 | | 91,000 | D | 1,400,000 | BD | | 65.76 | | | |
| SS-5A 5' | 5/29/2002 | | 1,600 | J | 15,000 | B | | 71.61 | | | |
| SS-11A 1' | 5/29/2002 | 10:45 | 772,034 | U | 920,000 | | 7' | 63 | 43.15.104 | 077.36.575 | 24' |
| SS-11A 2' | 5/29/2002 | 10:47 | 1,444,586 | U | 1,400,000 | | | 68 | | | |
| SS-11A 3' | 5/29/2002 | | 3,125 | U | 22,000 | B | | 74.19 | | | |
| SS-11A 4' | 5/29/2002 | | 3,125 | U | 4,000 | B | | 72.86 | | | |
| SS-11A 5' | 5/29/2002 | | 520 | J | 5,600 | B | | 67.66 | | | |
| SS-11A 6' | 5/29/2002 | 10:55 | 1,354 | U | 1,400 | | | 72 | | | |
| SS-11A 7' | 5/29/2002 | 11:57 | 6,329 | U | 3,400 | | | 79 | | | |
| SS-15A 1' | 5/29/2002 | 9:49 | 141,808 | U | 330,000 | | 7' | 69 | 43.15.102 | 077.36.584 | 17 |
| SS-15A 2' | 5/29/2002 | 9:51 | 736,941 | U | 770,000 | | | 66 | | | |
| SS-15A 3' DL | 5/29/2002 | | 6,900 | U | 100,000 | BE | | 75.27 | | | |
| SS-15A 4' | 5/29/2002 | | 3,125 | U | 5,900 | B | | 72.51 | | | |
| SS-15A 5' | 5/29/2002 | | 3,125 | U | 2,900 | B | | 72.82 | | | |
| SS-15A 6' | 5/29/2002 | 9:57 | 750 | | 326 | U | | 76 | | | |
| SS-15A 7' | 5/29/2002 | 10:01 | 696 | U | 400 | | | 71 | | | |
| SS-16A 1' | 5/29/2002 | 8:27 | 270 | | 250 | | 7' | 62 | 43.15.116 | 077.36.577 | 16 |
| SS-16A 2' | 5/29/2002 | 8:30 | 70,490 | U | 130,000 | | | 69 | | | |
| SS-16A 3' | 5/29/2002 | | 3,125 | U | 3,900 | B | | 68.4 | | | |
| SS-16A 4' | 5/29/2002 | | 3,125 | U | 2,000 | B | | 67.79 | | | |
| SS-16A 5' | 5/29/2002 | | 31 | B | 44 | B | | 70.61 | | | |
| SS-16A 6' | 5/29/2002 | 8:39 | 150 | | 290 | | | 74 | | | |
| SS-16A 7' | 5/29/2002 | 8:40 | 120 | | 59 | U | | 75 | | | |
| SS-19A 1' | 5/29/2002 | 10:14 | 7,545,575 | U | 10,000,000 | | 5' | 66 | 43.15.099 | 077.36.581 | 18' |
| SS-19A 2' | 5/29/2002 | 10:16 | 680,846 | U | 640,000 | | | 73 | | | |
| SS-19A 3' DL | 5/29/2002 | | 6,600 | D | 53,000 | BD | | 72.56 | | | |
| SS-19A 4' DL | 5/29/2002 | | 15,000 | D | 100,000 | BD | | 67.86 | | | |
| SS-19A 5' | 5/29/2002 | | 3,125 | U | 3,700 | B | | | | | |

# Table 2
# Phase III River Sediment Samples

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude | Depth to Bottom (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SS-23A 1' | 5/29/2002 | 11:50 | 163 | U | 82 | U | 6' | 59 | 43.15.093 | 077.36.566 | 26' |
| SS-23A 2' | 5/29/2002 | 11:51 | 127 | U | 63 | U | | 76 | | | |
| SS-23A 3' | 5/29/2002 | | 38 | B | 47 | B | | 72.3 | | | |
| SS-23A 4' | 5/29/2002 | | 28 | B | 91 | B | | 76.7 | | | |
| SS-23A 5' | 5/29/2002 | | 41 | B | 44 | B | | 71.39 | | | |
| SS-23A 6' | 5/29/2002 | 11:58 | 77 | | 34 | U | | 70 | | | |
| SS-24A 1' | 5/29/2002 | 11:14 | 781,152 | U | 690,000 | | 7' | 63 | 43.15.102 | 077.36.568 | 25' |
| SS-24A 2' | 5/29/2002 | 11:16 | 1,275 | U | 2,200 | | | 75 | | | |
| SS-24A 3' | 5/29/2002 | | 3,125 | U | 4,200 | B | | 74.4 | | | |
| SS-24A 4' | 5/29/2002 | | 3,125 | U | 1,100 | B | | 72.53 | | | |
| SS-24A 5' | 5/29/2002 | | 3,125 | U | 1,600 | B | | 74.76 | | | |
| SS-24A 6' | 5/29/2002 | 11:22 | 1,130 | U | 760 | | | 88 | | | |
| SS-24A 7' | 5/29/2002 | 11:24 | 108 | U | 110 | | | 89 | | | |
| SS-40 1' | 5/29/2002 | 13:10 | 145 | U | 73 | U | 5' | 65 | 43.15.130 | 077.36.540 | 25 |
| SS-40 2' | 5/29/2002 | 13:12 | 121 | U | 60 | U | | 74 | | | |
| SS-40 3' | 5/29/2002 | | 54 | B | 16 | B | | 64.51 | | | |
| SS-40 4' | 5/29/2002 | | 46 | B | 13 | B | | 71.87 | | | |
| SS-40 5' | 5/29/2002 | | 14 | BJ | 24 | B | | 72.1 | | | |
| SS-Dup 1 | 5/29/2002 | | 7,900 | D | 86,000 | BD | | 73.36 | | | |
| SS-Dup 2 | 5/29/2002 | | 746,826 | U | 1,100,000 | | | 65 | | | |

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

# Table 3
# Phase IV Sediment Data

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude |
|---|---|---|---|---|---|---|---|---|---|---|
| SS-5A 1' | 9/18/2002 | 16:55 | 62 | | 18 | U | 6 | 71 | N1186350.9848 | E1407683.3885 |
| SS-5A 3' | 9/18/2002 | 16:57 | 226 | | 45 | | | 64 | | |
| SS-5A 6' | 9/18/2002 | 16:59 | 225 | | 17.2 | U | | 71 | | |
| SS-11A 1' | 9/18/2002 | 17:35 | 64 | | 18.5 | U | 10 | 66 | N1186320.5219 | E1407670.3009 |
| SS-11A 3' | 9/18/2002 | 17:36 | 47 | | 16.8 | U | | 73 | | |
| SS-11A 4' | 9/18/2002 | 17:37 | 36.9 | U | 18.5 | U | | 68 | | |
| SS-11A 5' | 9/18/2002 | 17:34 | 34 | | 16.9 | U | | 72 | | |
| SS-11A 7' | 9/18/2002 | 17:32 | 28.6 | U | 14.3 | U | | 88 | | |
| SS-11A 10' | 9/18/2002 | 17:30 | 35 | | 17.5 | U | | 75 | | |
| SS-42 1' | 9/18/2002 | 15:46 | 105 | | 18.2 | U | 4 | 67 | N1186108.3964 | E1407610.3578 |
| SS-42 2.5' | 9/18/2002 | 15:47 | 39.1 | U | 19.5 | U | | 64 | | |
| SS-42 4' | 9/18/2002 | 15:44 | 27.4 | U | 13.7 | U | | 89 | | |
| SS-43 1' | 9/18/2002 | 15:00 | 200 | | 19.9 | U | 9 | 62 | N1186212.0182 | E1407658.7158 |
| SS-43 4' | 9/18/2002 | 15:01 | 40 | | 17.6 | U | | 69 | | |
| SS-43 6' | 9/18/2002 | 15:03 | 65 | | 17.9 | U | | 70 | | |
| SS-43 9' | 9/18/2002 | 15:02 | 32.2 | U | 16.1 | U | | 76 | | |
| SS-44 1' | 9/18/2002 | 14:22 | 43 | | 16.8 | U | 9 | 72 | N1186285.3107 | E1407638.6450 |
| SS-44 4' | 9/18/2002 | 14:28 | 34.9 | U | 17.4 | U | | 71 | | |
| SS-44 7' | 9/18/2002 | 14:30 | 35 | | 17.2 | U | | 72 | | |
| SS-44 9' | 9/18/2002 | 14:24 | 61 | | 19.3 | U | | 64 | | |
| SS-45 1' | 9/18/2002 | 13:38 | 747,116 | U | 750,000 | | 6 | 66 | N1186250.9133 | E1407719.0339 |
| SS-45 4' | 9/18/2002 | 13:37 | 1,333 | U | 3,400 | | | 75 | | |
| SS-45 6' | 9/18/2002 | 13:35 | 106.3 | U | 81 | | | 84 | | |
| SS-46 1' | 9/18/2002 | 12:06 | 115 | | 19.9 | U | 9.5 | 63 | N1186365.0275 | E1407727.3805 |
| SS-46 3' | 9/18/2002 | 12:08 | 37.6 | U | 18.8 | U | | 70 | | |
| SS-46 5' | 9/18/2002 | 12:08 | 32.6 | U | 16.3 | U | | 76 | | |
| SS-46 7' | 9/18/2002 | 12:13 | 69 | | 14.6 | U | | 83 | | |
| SS-46 9.5' | 9/18/2002 | 12:15 | 320 | | 20.6 | U | | 61 | | |
| SS-47 1' | 9/18/2002 | 11:42 | 36 | | 16.2 | U | 7 | 77 | N1186365.6360 | E1407754.9488 |
| SS-47 2' | 9/18/2002 | 11:43 | 45 | | 18 | U | | 67 | | |
| SS-47 5' | 9/18/2002 | 11:45 | 32.9 | U | 16.4 | U | | 76 | | |
| SS-47 7' | 9/18/2002 | 11:40 | 28.8 | U | 14.4 | U | | 85 | | |

# Table 3
# Phase IV Sediment Data

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude |
|---|---|---|---|---|---|---|---|---|---|---|
| SS-48 1' | 9/18/2002 | 11:10 | 157 | | 19.5 | U | 9 | 63 | N1186298.9041 | E1407771.9649 |
| SS-48 2' | 9/18/2002 | 11:08 | 32 | | 16.1 | U | | 77 | | |
| SS-48 4' | 9/18/2002 | 11:12 | 32 | U | 15.4 | U | | 79 | | |
| SS-48 6' | 9/18/2002 | 11:06 | 33.8 | U | 16.9 | U | | 74 | | |
| SS-48 9' | 9/18/2002 | 11:04 | 28.8 | U | 14.4 | U | | 85 | | |
| SS-49 1' | 9/18/2002 | 10:38 | 35.3 | U | 17.7 | U | 6 | 69 | N1186406.5981 | E1407720.9613 |
| SS-49 3' | 9/18/2002 | 10:36 | 36.5 | U | 18.2 | U | | 71 | | |
| SS-49 6' | 9/18/2002 | 10:34 | 41 | | 18.9 | U | | 65 | | |
| SS-50 1' | 9/18/2002 | 10:07 | 131 | | 18.1 | U | 4 | 67 | N1186395.2567 | E1407748.5678 |
| SS-50 2' | 9/18/2002 | 10:09 | 41 | | 18.4 | U | | 66 | | |
| SS-50 4' | 9/18/2002 | 10:05 | 65 | | 18.6 | U | | 68 | | |
| SS-51 1' | 9/18/2002 | 9:20 | 34.7 | U | 17.4 | U | 6.5 | 72 | N1186376.3801 | E1407782.5938 |
| SS-51 3' | 9/18/2002 | 9:22 | 38 | | 16.5 | U | | 73 | | |
| SS-51 5' | 9/18/2002 | 9:24 | 29.7 | U | 14.9 | U | | 85 | | |
| SS-51 6.5' | 9/18/2002 | 9:18 | 30.7 | U | 15.4 | U | | 83 | | |
| SS-52 1' | 9/18/2002 | 8:55 | 78 | | 18.3 | U | 7 | 66 | N1186365.9673 | E1407806.1903 |
| SS-52 2' | 9/18/2002 | 8:57 | 35.7 | U | 17.9 | U | | 70 | | |
| SS-52 5' | 9/18/2002 | 8:59 | 31.2 | U | 15.6 | U | | 79 | | |
| SS-52 7' | 9/18/2002 | 8:52 | 30.4 | U | 15.2 | U | | 83 | | |
| SS-53 1' | 9/18/2002 | 8:30 | 60 | | 17.8 | U | 7.5 | 73 | N1186425.7134 | E1407773.9033 |
| SS-53 3' | 9/18/2002 | 8:32 | 169 | | 18.3 | U | | 68 | | |
| SS-53 5' | 9/18/2002 | 8:34 | 30.4 | U | 15.2 | U | | 84 | | |
| SS-53 7.5' | 9/18/2002 | 8:28 | 29 | U | 14.5 | U | | 85 | | |
| SS-54 1' | 9/17/2002 | 19:15 | 182 | | 20 | U | 5 | 62 | N1186432.1215 | E1407810.8317 |
| SS-54 3' | 9/17/2002 | 19:20 | 39 | | 16.7 | U | | 75 | | |
| SS-54 5' | 9/17/2002 | 19:25 | 33 | | 14.8 | U | | 86 | | |
| SS-55 1' | 9/17/2002 | 18:45 | 46 | | 17.6 | U | 8 | 74 | N1186434.6274 | E1407849.7780 |
| SS-55 3' | 9/17/2002 | 18:55 | 67 | | 17.7 | U | | 69 | | |
| SS-55 5' | 9/17/2002 | 18:50 | 32 | | 15.6 | U | | 81 | | |
| SS-55 8' | 9/17/2002 | 19:04 | 30.3 | U | 15.2 | U | | 82 | | |
| SS-56 1' | 9/17/2002 | 18:33 | 96 | | 19.8 | U | 7 | 63 | N1186586.0796 | E1407867.2079 |
| SS-56 3' | 9/17/2002 | 18:37 | 38 | | 17.1 | U | | 75 | | |

# Table 3
# Phase IV Sediment Data

| IT Sample ID | Sample Date | Sample Time | Acetone (ppb) | | Methylene Chloride (ppb) | | Core Length (ft) | % Solids | Sample Latitude | Sample Longitude |
|---|---|---|---|---|---|---|---|---|---|---|
| SS-56 5' | 9/17/2002 | 18:39 | 40 | | 16.7 | U | | 77 | | |
| SS-56 7' | 9/17/2002 | 18:46 | 28.6 | U | 14.3 | U | | 86 | | |
| SS-57 1' | 9/17/2002 | 16:55 | 226 | | 19.7 | U | 4 | 64 | N1186674.5019 | E1407912.0015 |
| SS-57 3' | 9/17/2002 | 16:58 | 37.9 | U | 18.9 | U | | 67 | | |
| SS-57 4' | 9/17/2002 | 17:03 | 28.7 | U | 14.3 | U | | 89 | | |
| SS-58 1' | 9/17/2002 | 16:21 | 34 | | 16.3 | U | 7 | 75 | N1186736.9542 | E1407943.6391 |
| SS-58 2' | 9/17/2002 | 16:15 | 84 | | 19 | U | | 66 | | |
| SS-58 4' | 9/17/2002 | 16:18 | 94 | | 19.2 | U | | 66 | | |
| SS-58 7' | 9/17/2002 | 16:20 | 48 | | 17 | U | | 72 | | |

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

# Table 4
# Genessee River Bottom Water Samples

| IT Sample ID | Sample Date | Sample Time | Acetone UG/L (ppb) | Methylene Chloride UG/L (ppb) |
|---|---|---|---|---|
| Upstream +20 | 12/28/2001 | 14:57 | 50.0 U | 1.0 U |
| Middle +20 | 12/27/2001 | 15:20 | 12.0 | 104.0 |
| Middle +20 | 12/28/2001 | 9:20 | 5.9 J | 2.9 |
| Middle +20 | 12/28/2001 | 12:15 | 50.0 U | 1.0 U |
| Middle +20 | 12/28/2001 | 14:51 | 50.0 U | 19.8 |
| Middle +20 | 12/29/2001 | 9:55 | 33.4 J | 21.8 |
| Middle +20 | 12/29/2001 | 12:13 | 14.4 J | 4.5 |
| Middle +20 | 12/29/2001 | 14:04 | 20.0 J | 75.0 |
| Middle +20 | 12/30/2001 | 10:35 | 80.0 | 230.0 |
| Middle +20 | 12/30/2001 | 13:13 | 64.0 | 16.0 |
| Middle +20 | 1/2/2002 | 12:40 | 50.0 U | 21.0 |
| Middle +20 | 1/2/2002 | 14:30 | 50.0 U | 4.7 B |
| Middle +20 | 1/2/2002 | 16:00 | 50.0 U | 19.0 |
| Middle +20 | 1/3/2002 | 9:25 | 20.0 U | 5.0 U |
| Middle +20 | 1/3/2002 | 11:45 | 20.0 U | 5.0 U |
| Middle +20 | 1/3/2002 | 15:00 | 20.0 U | 14.0 |
| Middle +20 | 1/4/2002 | 7:30 | 20.0 U | 320.0 E |
| Middle +20 | 1/4/2002 | 9:25 | 20.0 U | 18.0 |
| Middle +20 | 1/4/2002 | 10:20 | 20.0 U | 76.0 |
| Middle +20 | 4/5/2002 | | 25.0 U | 10.0 B |
| Middle +20 | 9/12/2002 | | 10.0 U | 17.0 |
| Downstream +20 | 12/27/2001 | 15:06 | 20.0 U | 8.5 |
| Downstream +20 | 12/28/2001 | 9:13 | 12.9 J | 10.5 |
| Downstream +20 | 12/28/2001 | 12:08 | 50.0 U | 7.2 |
| Downstream +20 | 12/28/2001 | 14:46 | 50.0 U | 8.0 |
| Downstream +20 | 12/28/2001 | 14:46 | 50.0 U | 8.1 |
| Downstream +20 | 12/29/2001 | 9:10 | 16.2 J | 18.2 |
| Downstream +20 | 12/29/2001 | 12:07 | 50.0 U | 10.0 |
| Downstream +20 | 12/29/2001 | 13:56 | 14.0 J | 12.1 |
| Downstream +20 | 12/30/2001 | 10:30 | 45.0 | 20.0 |
| Downstream +20 | 12/30/2001 | 13:07 | 80.0 | 7.0 |
| Downstream +20 | 1/2/2002 | 12:30 | 50.0 U | 9.0 |
| Downstream +20 | 1/2/2002 | 14:40 | 50.0 U | 11.0 |
| Downstream +20 | 1/2/2002 | 16:10 | 50.0 U | 7.4 |
| Downstream +20 | 1/3/2002 | 9:20 | 20.0 U | 11.0 |
| Downstream +20 | 1/3/2002 | 11:35 | 20.0 U | 12.0 |
| Downstream +20 | 1/3/2002 | 14:55 | 20.0 U | 14.0 |
| Downstream +20 | 1/4/2002 | 7:35 | 20.0 U | 13.0 |
| Downstream +20 | 1/4/2002 | 9:30 | 20.0 U | 17.0 |
| Downstream +20 | 1/4/2002 | 10:25 | 20.0 U | 14.0 |
| Downstream +20 | 4/5/2002 | | 6.0 J | 3.0 BJ |
| Downstream +20 | 9/12/2002 | | 10.0 U | 15.0 U |

# Table 4
# Genessee River Bottom Water Samples

| IT Sample ID | Sample Date | Sample Time | Acetone UG/L (ppb) | Methylene Chloride UG/L (ppb) |
|---|---|---|---|---|
| Channel/Lake +20 | 12/27/2001 | 14:57 | 20.0 U | 41.0 |
| Channel/Lake +20 | 12/28/2001 | 9:04 | 11.8 J | 14.2 |
| Channel/Lake +20 | 12/28/2001 | 11:57 | 9.2 U | 11.3 |
| Channel/Lake +20 | 12/28/2001 | 14:37 | 11.4 J | 12.0 |
| Channel/Lake +20 | 12/29/2001 | 9:01 | 11.9 J | 21.5 |
| Channel/Lake +20 | 12/29/2001 | 12:00 | 11.2 J | 16.8 |
| Channel/Lake +20 | 12/29/2001 | 13:47 | 12.0 J | 17.9 |
| Channel/Lake +20 | 12/30/2001 | 10:25 | 42 J | 18 |
| Channel/Lake +20 | 12/30/2001 | 13:01 | 52.0 | 25.0 |
| Channel/Lake +20 | 1/2/2002 | 12:10 | 50.0 U | 9.3 |
| Channel/Lake +20 | 1/2/2002 | 14:50 | 50.0 U | 12.0 |
| Channel/Lake +20 | 1/2/2002 | 16:15 | 50.0 U | 11.0 |
| Channel/Lake +20 | 1/3/2002 | 9:10 | 20.0 U | 11.0 |
| Channel/Lake +20 | 1/3/2002 | 11:25 | 20.0 U | 10.0 |
| Channel/Lake +20 | 1/3/2002 | 14:45 | 20.0 U | 9.7 |
| Channel/Lake +20 | 1/4/2002 | 7:40 | 20.0 U | 11.0 |
| Channel/Lake +20 | 1/4/2002 | 9:35 | 20.0 U | 11.0 |
| Channel/Lake +20 | 1/4/2002 | 10:30 | 20.0 U | 12.0 |
| Channel/Lake +20 | 4/5/2002 | | 6.0 J | 4.0 BJ |
| Channel/Lake +20 | 9/12/2002 | | 10.0 U | 5.0 U |
| Lake 500' east +20 | 12/27/2001 | 14:50 | 16.0 J | 22.0 |
| Lake 500' east +20 | 12/28/2001 | 8:59 | 11.2 J | 8.4 |
| Lake 500' east +20 | 12/28/2001 | 11:52 | 8.6 J | 5.1 |
| Lake 500' east +20 | 12/28/2001 | 14:30 | 10.6 J | 8.7 |
| Lake 500' east +20 | 12/29/2001 | 8:25 | 10.0 J | 8.0 U |
| Lake 500' east +20 | 12/29/2001 | 11:54 | 10.7 J | 9.8 |
| Lake 500' east +20 | 12/29/2001 | 13:42 | 12 J | 2.9 |
| Lake 500' east +20 | 1/2/2002 | 12:00 | 50 U | 6.5 |
| Lake 500' east +20 | 1/2/2002 | 15:00 | 50 U | 8 |
| Lake 500' east +20 | 1/2/2002 | 16:20 | 50 U | 6 |
| Lake 500' east +20 | 1/3/2002 | 9:00 | 20 U | 5 U |
| Lake 500' east +20 | 1/3/2002 | 11:15 | 20 U | 5.3 |
| Lake 500' east +20 | 1/3/2002 | 14:40 | 20 U | 6.7 |
| Lake 500' east +20 | 1/4/2002 | 7:45 | 20 U | 5 U |
| Lake 500' east +20 | 1/4/2002 | 9:40 | 20 U | 5 U |
| Lake 500' east +20 | 1/4/2002 | 10:40 | 50 U | 5 |
| Lake 500' east +20 | 4/5/2002 | | 7 J | 3 BJ |
| Lake 500' east +20 | 9/12/2002 | | 10 U | 5 U |

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

New York State ambient water quality guidance values for protection of drinking water sources:

50 ppb acetone, 5 ppb methylene chloride.

IMAGE | X-REF | OFFICE | DRAWING NUMBER
--- | --- | PGH | 776748-D16

SPILL SITE

TRAILER

DOCK

FORMER DANIS

USCG AUX

PUMP STAT.

LA-1

N1186500

N1186450

N1186400

N1186350

N1186300

N1186250

N1186200

E1407600

E1407650

E1407700

E1407750

E1407800

E1407850

SS-1 SS-2 SS-3 SS-4 SS-5 SS-5A SS-6 SS-7 SS-8 SS-9 SS-10 SS-11 SS-11A SS-12 SS-13 SS-15 SS-15A SS-16 SS-16A SS-17 SS-18 SS-19 SS-19A SS-20 SS-21 SS-22 SS-23 SS-24 SS-24A SS-25 SS-26 SS-27 SS-28 SS-29 SS-30 SS-31 SS-40A SS-42 SS-43 SS-44 SS-45 SS-46 SS-47 SS-48 SS-49 SS-50 SS-51 SS-52 SS-53 SS-54 SS-55 SS-56 SS-57 SS-58

222 224 226 228 230 232 234 236

Genesee River

Current Direction

Approximate Distance to Lake Ontario–1 Mile

LEGEND:

- SS-# PHASE I SEDIMENT SAMPLES TAKEN 3/19/02
- SS-# PHASE II SEDIMENT SAMPLES TAKEN 4/4-5/02
- SS-# PHASE III SEDIMENT SAMPLE TAKEN 5/29/02
- SS-# PHASE IV SEDIMENT SAMPLE TAKEN 9/17-18/02 (5A AND 11A RESAMPLED)
- NAVIGATION CHANEL BOUNDARY
- 224 BATHOMETRIC CONTOUR LINE IN FT

SCALE 0 50 100 FEET

| REV | DATE | BY | CHK'D | APR'VD | DESCRIPTION/ISSUE |
|---|---|---|---|---|---|

FIGURE 1

Shaw Shaw E & I, Inc.

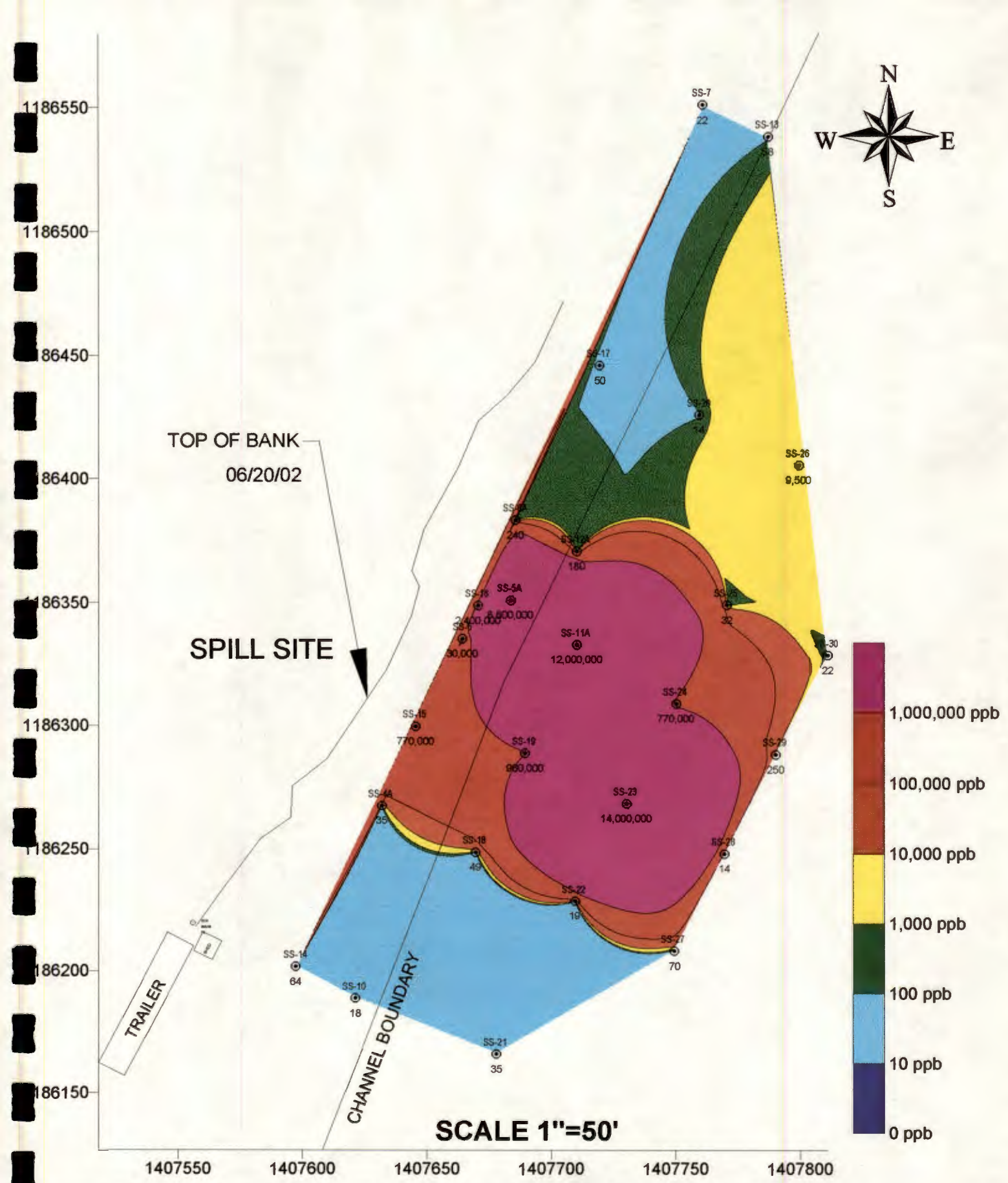
CSX TRANSPORTATION
JACKSONVILLE, FL

RIVER SEDIMENT SAMPLING LOCATIONS
CSXT RIVER ST. DERAILMENT
480 RIVER ST. ROCHESTER, NY

| DESIGNED BY | | | CHECKED BY | |
|---|---|---|---|---|
| DRAWN BY | A. Yanavicius | 09/27/02 | APPROVED BY | |

| SCALE: | DRAWING NO. | SHEET NO. | REVISION NO. |
|---|---|---|---|
| AS SHOWN | 834540D16 | | |

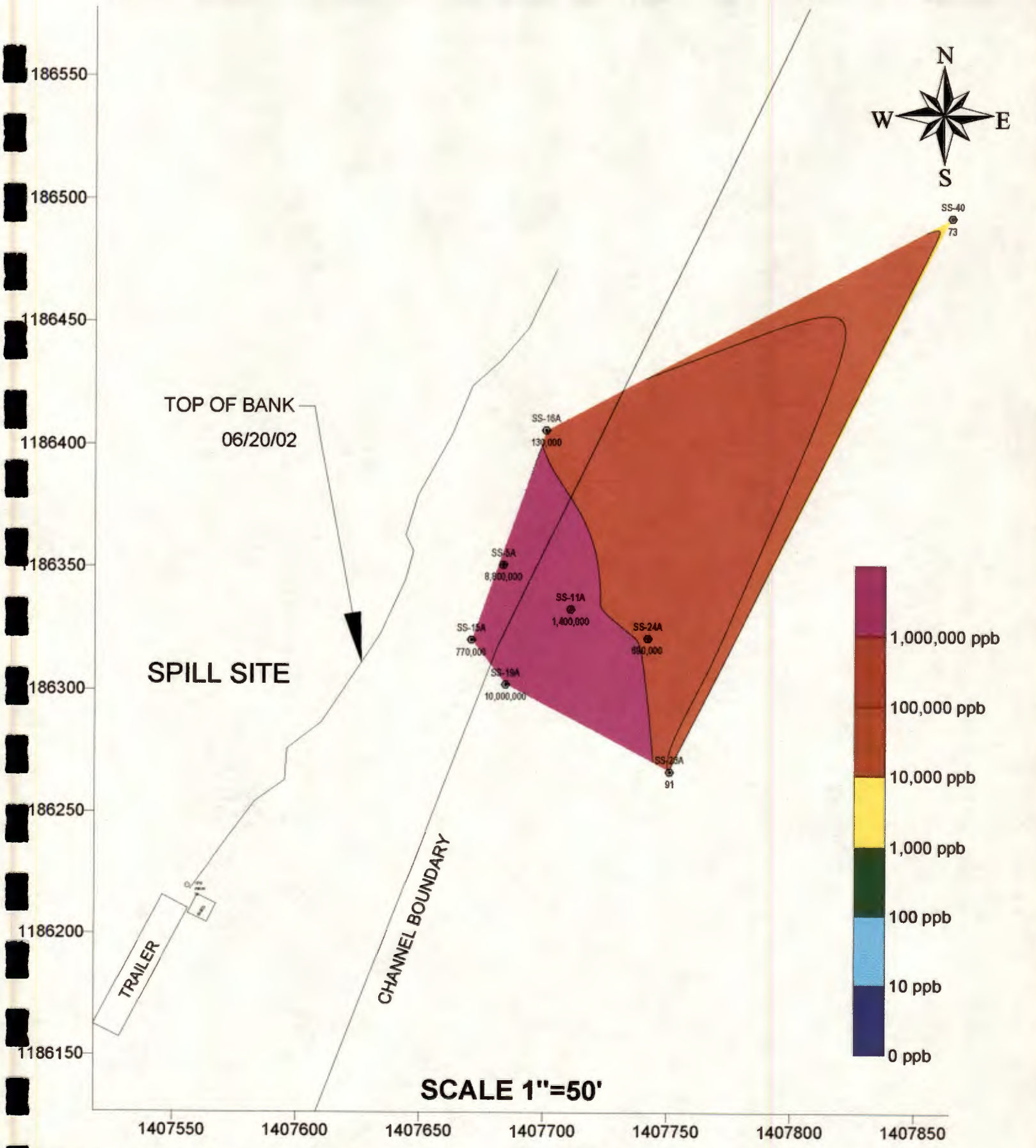
TIME: 2:?? AM
FORMAT REVISION 2/26/99




Methylene Chloride concentrations in ppb. Phase I and II samples taken on 3/19/2002 and 4/4/2002
Natural Neighbor gridding method and maximum concentration values at the sample point have been used to generate contours.

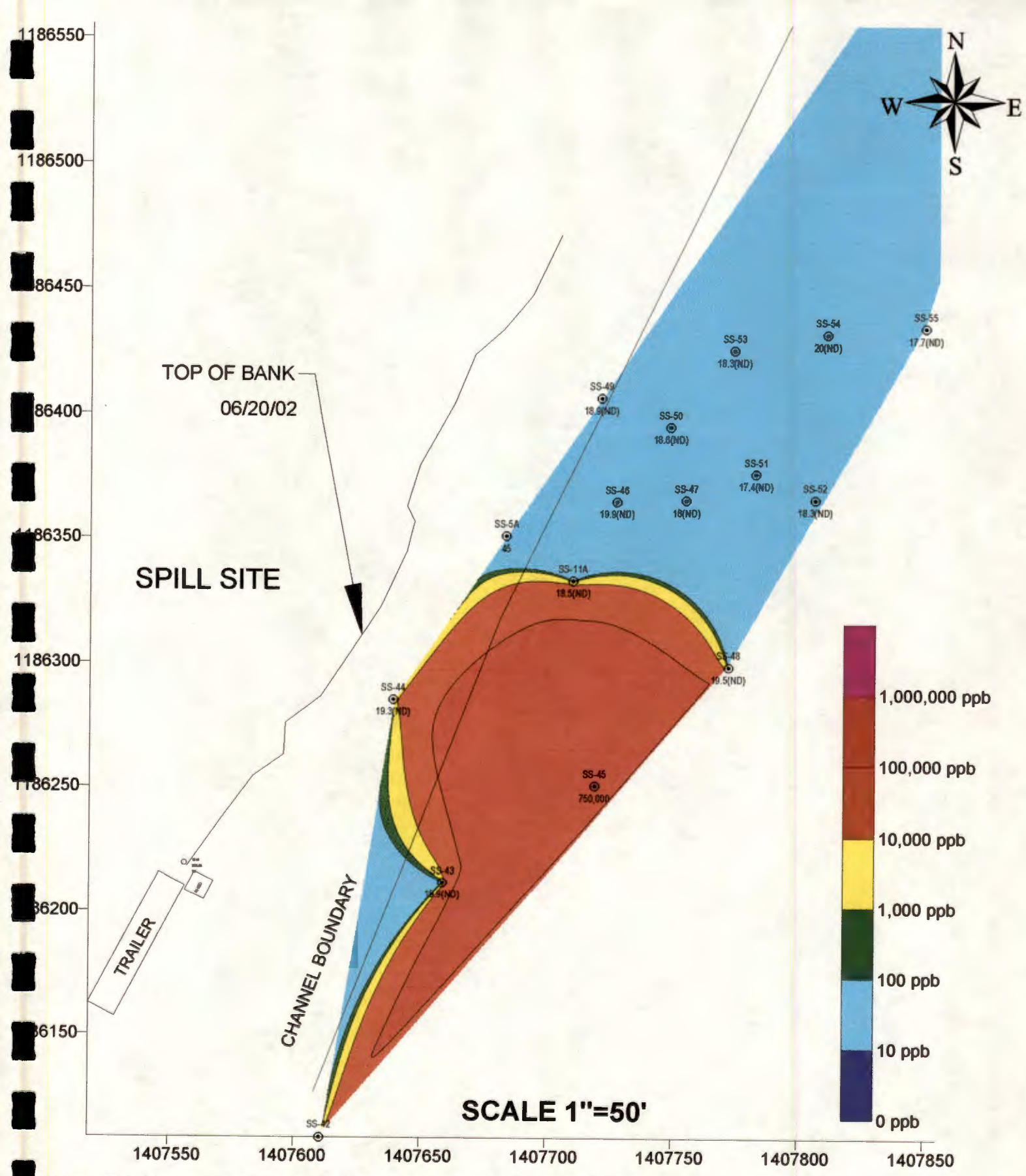
**FIGURE 2**

**Methylene Chloride Sediment Concentration Isopleths**
**Phase I and II Data**




Methylene Chloride concentrations in ppb. Phase III samples taken on 5/29/2002
Natural Neighbor gridding method and maximum concentration values at the sample point have been used to generate contours.

**FIGURE 3**
**Methylene Chloride Sediment Concentration Isopleths**
**Phase III Data**




ethylene Chloride concentrations in ppb. Phase IV samples taken on 9/17-18/2002
Natural Neighbor gridding method and maximum concentration values at the sample point have been used to generate contours.

**FIGURE 4**
**Methylene Chloride Sediment Concentration Isopleths**
**Phase IV Data**

# Appendix A

# Genesee River Sediment Sampling Plans

# Genesee River Sediment Sampling Plan

**CSXT Charlotte - Project Number 834540 01000000**

**Safety:**
PFDs must be worn at all times when on board the vessel. In sub-freezing air temperatures deck icing will occur, and extreme care must be taken to avoid slips and falls.

**Documentation:**
All activities must be recorded on FADL sheets or waterproof notebooks. Chain of Custody (COC) forms must be filled out in the field and must accompany the samples to the laboratory.

**Sample locations:**
Samples will be collected from four (4) Genesee River locations. These locations are to be co-located to the extent possible with the deep-water samples and benthic macroinvertebrate samples were collected. These locations are:

1. Directly offshore of the acetone/methylene chloride spill area;
2. Upstream of the spill area;
3. Approximately half way between the spill area and the mouth of the river;
4. At the river mouth.

The depth at these locations is expected to be approximately 20 feet. Previous sampling has indicated that the substrate is silt and is suitable for collection using an Ekman dredge.

If possible, sample location coordinates should be recorded with a handheld GPS receiver. At a minimum, detailed notes and drawings should be made of the sample locations referencing distance to shore landmarks.

**Quality Control Samples**
In addition to the four samples at each location, sufficient sediment must be collected at one location for a field duplicate sample and an MS/MSD sample. A field blank sample (de-ionized water poured over decontaminated dredge) must also be collected. A trip blank (VOA vial of DI water) must accompany the samplers and be submitted for volatiles analysis.

**Ekman Dredge Operation:**
The Ekman Dredge will be operated in accordance with following procedure which is a modification of ASTM Standard Practice D 4343 – 84:

1. Sampler must be thoroughly decontaminated prior to sampling at each location.
2. The sampler is cocked by raising each jaw upward into the cocked position and securing the cable to the catch pin.

3. The cocked sampler is lifted overboard and allowed to fall rapidly to the bottom keeping light pressure on the line so that the dredge falls vertically and strikes the bottom squarely.
4. When the dredge strikes bottom, the line is pulled taught and the messenger is sent down to trip the dredge.
5. The dredge is retrieved at a slow but steady rate to minimize loss of fine particles.
6. Once the dredge is on board, empty the sample into a stainless steel pan.
7. Repeat steps 1 through 5 if material collected is insufficient to fill required sample containers.

**Acetone, Methylene Chloride and TOC sampling:**
Because the compounds of interest are volatile, samples are not homogenized, but are place directly and without delay into appropriate sample containers. Care should be taken to clean the jar threads to prevent leakage during transport. The field notes should include a physical description of each sample, including color, nature of coarse particles they may be present, presence or absence of a sheen or odor.

**Sample Labeling:**
The field crew must insure that all sample containers are clearly labeled with the location, time of collection, date and sample type and method of analysis. The sample identification information must also be recorded on the COCs and field notes. Labels should be covered with clear tape to prevent loss prior to analysis.

**Sample Packing and Transport:**
The glass jars should be placed in bubble wrap and put into ziploc bags. The benthic samples should be placed into large ziploc bags and sealed. The samples are packed in clean coolers with sufficient ice and vermiculite to prevent movement of the jars during transport. Samples should be transported or shipped to the analytical laboratory as soon as possible after collection. If shipment to the analytical laboratory is made by commercial carrier, the COCs are placed in the coolers and the coolers are sealed with custody tape.

# Genesee River Phase II Sediment Sampling Plan
## CSXT Charlotte - Project Number 834540 01000000

**Purpose:**
Sampling of Genesee River sediments in the vicinity of the CSXT derailment and chemical spill indicated that sediments in the river directly adjacent to the spill site contains elevated levels of methylene chloride. This Sampling Plan describes additional sampling to be performed to delineate the area and vertical extent of sediment contamination.

**Safety:**
Coast Guard approved personal floatation devices (PFDs) must be worn at all times when on board the vessel. The vessel used for sampling must have on board all Coast Guard required safety equipment. Large commercial vessels may transit the sampling area at any time. At all times and especially when engaged in sampling operations, the operator and crew will maintain a lookout for other vessels. Sampling PPE includes a waterproof outer layer, chemical resistant gloves and protective eyewear.

**Documentation:**
All activities must be recorded on Field Activity Daily Log (FADL) sheets or waterproof notebooks. Chain of Custody (COC) forms must be filled out in the field and must accompany the samples to the laboratory.

**Sample locations:**
Phase II sampling will focus on the previously identified area of contamination. Samples will be collected at the previously sampled locations plus additional locations in order to delineate the area of contamination (See Sediment sampling Location Map). Samples will be collected at these nine previously sampled locations:

- SS-3, SS-4, SS-5, SS-6, SS-7, SS-10, SS-11, SS-12 and SS-13.

Twenty two (22) additional locations will be sampled to form a grid with approximately 50 ft spacing between sampling points. These locations are as follows:

- Three sampling points at 50 foot intervals, perpendicular to the shoreline, beginning 50 feet offshore (east) of SS-4;
- Five sampling points at 50 foot intervals, perpendicular to the shoreline, the first point to be approximately half way between SS-4 and SS-5;
- Four sampling points at 50 foot intervals, perpendicular to the shoreline, beginning 50 feet offshore (east) of SS-11;
- Four sampling points at 50 foot intervals, perpendicular to the shoreline, beginning 50 feet offshore (east) of SS-12: and
- Six sampling points at 50 foot intervals, perpendicular to the shoreline, beginning 50 feet downstream (north) of SS-6.

The 31 sampling locations described above form a sampling grid over the area of potential methylene chloride contamination. The shape of the grid is based on the likelihood that the chemical formed a plume that traveled away from the shoreline down the slope of the river channel, and also was directed to the north by the current. Because methylene chloride may have settled in depressions in the river bed, the sampling technicians will use the vessel's depth sounder and locate the deepest areas in the vicinity of the area of known contamination. Sampling locations described above may be adjusted in the field to ensure that sediment is collected from these deep areas.

Sample location coordinates should be recorded with a handheld GPS receiver. In the event that GPS coordinates cannot be recorded, detailed notes and drawings should be made of the sample locations referencing distance to shore landmarks.

**Sediment Core Sampling:**
Samples will be collected with a coring device, either a slide-hammer corer or a corer with extension handles that can be forced into the sediment. Because of the potential for dredging of contaminated sediments, obtaining sediment cores of sufficient length is very important. If possible, cores should be at least 18 inches in length. The core will be sectioned into separate samples as described below.

**Slide-Hammer Corer Operation:**
The corer will be operated in accordance with the manufacturer's specifications:

1. Sampler must be thoroughly decontaminated prior to sampling at each location.
2. The sampler is lowered to the riverbed and bronze messenger is repeatedly dropped until the sampler has been driven to the appropriate depth.
3. The sampler is retrieved at a slow but steady rate to minimize loss of fine particles.
4. The sampler is lifted onboard and the core barrel is capped at both ends to ensure that none of the sample is lost.
5. Once the core barrel has been capped the sample will be evaluated documenting recovery, strata and other features.

**Hand Corer Operation:**
1. Sampler must be thoroughly decontaminated prior to sampling at each location.
2. The water depth at the sampling location is determined with an on board depth sounder or sounding lead.
3. Sections of threaded handle with a total length several feet greater than the water depth are connected to the corer tube.
4. The corer assembly is lowered vertically to the bottom, and the corer is forced into the sediment. The sampling technician should estimate the depth of sediment penetration and should attempt to collect a core 18 inches or greater in length.
5. If necessary, a sledgehammer may be used to achieve the required depth of sediment penetration.

**Sample Collection**:
The sediment core will be sectioned and sample collection will be as follows:

1. Assuming sufficient core length is obtained, the core will be sectioned into three layers, 0-6 inches, 6-12 inches, and 12 –18 inches.
2. Three samples will be collected from each core, one will be taken at the sediment water interface, the second will be from the 6-12 inch layer, and the third from the 12-18 inch layer. The 12-18 inch layer will be archived and will be analyzed only if significant methylene chloride contamination is found in the 6-12 inch sample.
3. If significant stratification is encountered a sample may be collected for analysis at the strata layer.
4. The sample is mixed thoroughly with a stainless steel spoon and placed into appropriate sample containers. Care should be taken to clean the jar threads to prevent leakage during transport.
5. The field notes should include a physical description of each sample, including color, nature of coarse particles they may be present, presence or absence of a sheen or odor.

**Quality Control Samples**
In addition to the above samples, the following QA/QC samples should be collected each day of sampling. A field duplicate sample and an MS/MSD sample should be collected at a rate of one for every twenty samples. A field blank sample (de-ionized water poured over decontaminated dredge) must also be collected. A trip blank (VOA vial of DI water) must accompany the samplers and be submitted for volatiles analysis.

**Sample Labeling:**
The field crew must insure that all sample containers are clearly labeled with the location, time of collection, date and sample type and method of analysis. The sample identification information must also be recorded on the COCs and field notes. Labels should be covered with clear tape to prevent loss prior to analysis.

**Sample Analysis:**
Sediment samples will be submitted for analysis of VOCs including methylene chloride, and percent moisture.

**Sample Packing and Transport:**
The glass jars should be placed in bubble wrap and put into ziploc bags. The benthic samples should be placed into large ziploc bags and sealed. The samples are packed in clean coolers with sufficient ice and vermiculite to prevent movement of the jars during transport. Samples should be transported or shipped to the analytical laboratory as soon as possible after collection. If shipment to the analytical laboratory is made by commercial carrier, the COCs are placed in the coolers and the coolers are sealed with custody tape.

# Genesee River Phase III Sediment Sampling Plan - Vibracoring
## CSXT Charlotte - Project Number 834540 01000000

**Purpose:**
Sampling of Genesee River sediments in the vicinity of the CSXT derailment and chemical spill indicated that sediments in the river directly adjacent to the spill site contains elevated levels of methylene chloride. Phase II sediment core sampling delineated the area of contamination, but the methods used did not allow the vertical extent of contamination to be determined. This Sampling Plan describes additional Phase III sampling to be performed using vibracoring techniques which will adequately delineate the vertical extent of sediment contamination, and supplement horizontal delineation of the affected area.

**Safety:**
Coast Guard approved personal floatation devices (PFDs) must be worn at all times by all personnel when on board the vessel. The vessel used for sampling must have on board all Coast Guard required safety equipment. Large commercial vessels may transit the sampling area at any time. At all times and especially when engaged in sampling operations, the operator and crew will maintain a lookout for other vessels. Sampling PPE includes a waterproof outer layer, chemical resistant gloves and protective eyewear. Hardhats must be worn during vibracoring operations.

**Documentation:**
All activities must be recorded on field logs or waterproof notebooks. A member of Shaw E&I will be aboard the subcontractor vessel during sampling operations, and will document sampling activities, including the recording of sample coordinated obtained with the onboard DGPS receiver. Chain of Custody (COC) forms must be filled out in the field and must accompany the samples to the laboratory.

**Sample locations:**
Sampling will focus on areas of known elevated methylene chloride concentrations in subsurface sediments. A review of the existing data found elevated concentrations in subsurface sediments at the following sampling stations:

- SS-5
- SS-11
- SS-15
- SS-16
- SS-19
- SS-23
- SS-24

These locations are shown on Figure 1, the Sediment Sampling Location Map. Contamination in surface sediments was found at sampling station SS-26, and this location need not be re-sampled using vibracoring. However, a core sample will be

collected at a location approximately 50 feet downstream of SS-26 for the purpose of completing horizontal delineation of the area of elevated concentrations.

The Shaw E&I technician on board will be one of the original Phase II sampling team members and will have a knowledge of the sampling locations. This person will assist the subcontractor in positioning the vibracoring vessel at the sampling stations. The vessel will be anchored securely with bow and stern anchors prior to deploying the vibracorer. After the sample is retrieved at each location, sample location coordinates will be recorded with the vessel's DGPS receiver.

**Sediment Core Sampling:**
One core sample will be collected from each of the eight sampling stations described previously to a depth of five feet below sediment surface, or to the depth of refusal. If refusal occurs, a second attempt will be made. If the second attempt does not reach five feet below sediment surface, the longer of the two cores will be retained, and the refusal depth will be noted in the core log.

Samples will be collected with an electric vibracorer with a 4-inch barrel using flexible plastic liners. The cores will be kept in the liners until examined by the Shaw E&I technician on board. The Shaw E&I technician will examine the core and collect samples as described below. The core shall be retained in the plastic liner during examination to prevent the loss of volatile compounds.

**Sample Evaluation and Collection**:
Once the core and liner has been removed from the core barrel and placed on deck, the sample will be evaluated, and recovery, strata and other features will be documented. The core will then be sectioned at 12-inch intervals. Prior to sample collection, an instrument capable of measuring organic vapors such as a photoionization (PID) detector or flame ionization detector (FID) will be used to estimate the depth of contamination. During the organic vapor screening process, if the sampling technician discovers contamination at the core's deepest point he/she will direct the sampling crew to collect another core sample to a total depth of 10' or refusal. This process will continue in 5' increments until clean samples are obtained. To increase volatilization from the sediment and facilitate obtaining an instrument reading, a portion of the core from each section will be placed into clean plastic buckets and stirred prior to using the instrument.

Samples will be collected from the 0-12 inch section, the deepest one-foot section where organic vapors are detected, and from the section immediately below the lowest depth of organic vapor detection. Samples for laboratory analysis will be taken from the undisturbed portion of the core section, i.e., the portion that has not been used for organic vapor evaluation. If no instrument reading is obtained in any core section, samples will be collected from the 0-12 inch, 13-24 inch and 25-36 inch sections. Sediment must completely fill the sample jars. The field notes should include a physical description of each sample, including color, nature of coarse particles they may be present, presence or absence of a sheen or odor and PID/FID instrument reading.

**Sample Labeling:**
The field crew must insure that all sample containers are clearly labeled with the location, time of collection, date, sample type, sample depth (core interval), and method of analysis. The sample identification information must also be recorded on the COCs and field notes. Labels should be covered with clear tape to prevent loss prior to analysis.

**Sample Analysis:**
Sediment samples will be submitted for analysis of volatile organic compounds (VOCs) including acetone and methylene chloride. The samples will also be analyzed for percent moisture.

**Sample Packing and Transport:**
The glass sample jars should be placed in bubble wrap and put into ziploc bags. The samples are packed in clean coolers with sufficient ice and vermiculite to prevent movement of the jars during transport. Samples should be transported or shipped to the analytical laboratory as soon as possible after collection. If shipment to the laboratory is made by commercial carrier, the COCs are placed in the coolers and the coolers are sealed with custody tape.

# Preliminary Genesee River Phase IV Sediment Sampling Plan
## Additional Vibracore Sampling
### CSXT Charlotte - Project Number 834540 01000000

**Purpose:**
Sampling of Genesee River sediments in the vicinity of the CSXT derailment and chemical spill indicated that sediments in the river directly adjacent to the spill site contains elevated levels of methylene chloride. Phase II sediment core sampling delineated the area of contamination, and Phase III vibracore sampling determined the vertical extent of contamination. This Sampling Plan describes additional Phase IV vibracore sampling and sediment analysis to delineate the horizontal and vertical area of sediments containing methylene chloride greater than the 50 ppb. clean-up level recommended by NYSDEC. In addition, the Phase IV sampling will collect additional sediment samples up-stream and down-stream of the contaminated area in order to perform an accurate calculation of background methylene chloride concentrations.

**Safety:**
Coast Guard approved personal floatation devices (PFDs) must be worn at all times by all personnel when on board the vessel. The vessel used for sampling must have on board all Coast Guard required safety equipment. Large commercial vessels may transit the sampling area at any time. At all times and especially when engaged in sampling operations, the operator and crew will maintain a lookout for other vessels. Sampling PPE includes a waterproof outer layer, chemical resistant gloves and protective eyewear. Hardhats must be worn during vibracoring operations.

**Documentation:**
All activities must be recorded on field logs or waterproof notebooks. A member of Shaw E&I will be aboard the subcontractor vessel during sampling operations, and will document sampling activities, including the recording of sample coordinated obtained with the onboard DGPS receiver. Chain of Custody (COC) forms must be filled out in the field and must accompany the samples to the laboratory.

**Sample locations:**
Samples will be collected in the following areas:

- Six previously un-sampled locations within the area of known elevated methylene chloride concentrations;
- Six locations near the perimeter of the previously delineated area to determine the vertical extent of contamination;
- Three locations well upstream of the area of known elevated methylene chloride concentrations;
- Three locations well downstream of the area of known elevated methylene chloride concentrations: and
- Two previously sampled areas containing high methylene chloride concentrations.

The coordinates of these locations are indicated on Figure 1, the Sediment Sampling Location Map.
The Shaw E&I technician on board will be one of the original sampling team members and will have a knowledge of the sampling locations. This person will assist the subcontractor in positioning the vibracoring vessel at the sampling stations. The vessel will be anchored securely with bow and stern anchors prior to deploying the vibracorer. After the sample is retrieved at each location, sample location coordinates will be recorded with the vessel's DGPS receiver.

**Sediment Core Sampling:**
One core sample will be collected from each of the sampling stations described previously to a depth of ten feet below sediment surface, or to the depth of refusal. If refusal occurs, a second attempt will be made. If the second attempt does not reach ten feet below sediment surface, the longer of the two cores will be retained, and the refusal depth will be noted in the core log.

Samples will be collected with an electric vibracorer with a 4-inch barrel using flexible plastic liners. The cores will be kept in the liners until examined by the Shaw E&I technician on board. The Shaw E&I technician will examine the core and collect samples as described below. The core shall be retained in the plastic liner during examination to prevent the loss of volatile compounds.

**Sample Evaluation and Collection**:
Once the core and liner has been removed from the core barrel and placed on deck, the sample will be evaluated, and recovery, strata and other features will be documented. The core will then be sectioned at 12-inch intervals. Prior to sample collection, an instrument capable of measuring organic vapors such as a photoionization (PID) detector or flame ionization detector (FID) will be used to estimate the depth of contamination. To increase volatilization from the sediment and facilitate obtaining an instrument reading, a portion of the core from each section will be placed into clean plastic buckets and stirred prior to using the instrument.

Samples will be collected from the 0-12 inch section, the deepest one-foot section where organic vapors are detected, and from the section immediately below the lowest depth of organic vapor detection. Samples for laboratory analysis will be taken from the undisturbed portion of the core section, i.e., the portion that has not been used for organic vapor evaluation. If no instrument reading is obtained in any core section, samples will be collected from the 0-12 inch, 13-24 inch and 25-36 inch sections. Sediment must completely fill the sample jars. The field notes should include a physical description of each sample, including color, nature of coarse particles they may be present, presence or absence of a sheen or odor and PID/FID instrument reading. Up to 54 sediment samples will be submitted for analysis.

**Sample Labeling:**
The field crew must insure that all sample containers are clearly labeled with the location, time of collection, date, sample type, sample depth (core interval), and method of

analysis. The sample identification information must also be recorded on the COCs and field notes. Labels should be covered with clear tape to prevent loss prior to analysis.

**Sample Analysis:**
Sediment samples will be submitted for analysis of volatile organic compounds (VOCs) including acetone and methylene chloride. The samples will also be analyzed for percent moisture.

**Sample Packing and Transport:**
The glass sample jars should be placed in bubble wrap and put into ziploc bags. The samples are packed in clean coolers with sufficient ice and vermiculite to prevent movement of the jars during transport. Samples should be transported or shipped to the analytical laboratory as soon as possible after collection. If shipment to the laboratory is made by commercial carrier, the COCs are placed in the coolers and the coolers are sealed with custody tape.

# Appendix B

# Genesee River Phase V Investigation and Sediment and Water Monitoring Plan

## CSXT Derailment and Spill – Charlotte, NY
## October, 2002

# *Appendix B*

# *Genesee River Phase V Investigation and Sediment and Water Monitoring Plan*

## *CSXT Derailment and Spill – Charlotte, NY October, 2002*

## 1.0 OBJECTIVES AND SAMPLING STRATEGY

The objectives of the monitoring program are to verify that methylene chloride and acetone concentrations in the Genesee River do not present a risk to drinking water, and to monitor the anticipated attenuation of methylene chloride and acetone to undetectable or background levels.

This plan describes two distinct tasks necessary to accomplish these objectives:

- **Phase V Investigation** – A sediment and water sampling event will be conducted in October 2002 to further define the limits of acetone and methylene chloride impacts.

- **Sediment and Water Monitoring Program** (Monitoring) – Following the Phase V, periodic events will occur to monitor attenuation of both compounds in water and sediments.

The proposed work will begin with a Phase V Investigation, consisting of vibratory sediment coring and water sampling scheduled for October 24 and 25, 2002. The Phase V Investigation sampling will determine the horizontal and vertical extent of the remaining area of impact, and will allow the correlation of sediment concentrations of methylene chloride with concentrations in bottom waters. The monitoring program will consist of several sampling events to provide for the collection of water and sediment samples in the remaining impact area to study the effects of natural attenuation on methylene chloride and acetone. The monitoring program will also include the collection of downstream water samples to verify that acetone and methylene chloride remaining in sediments do not present a risk to drinking water sources.

### Sampling Locations

Two sets of sampling locations are proposed. Phase V sediment sampling will be performed at 12 sampling stations adjacent to the spill site. Water samples collected during the Phase V event will be obtained at 6 stations co-located with the sediment sampling stations and at three downstream locations. Subsequent monitoring will include three co-located sediment and water stations adjacent to the spill site, and additional water sampling at three downstream stations.

### Sampling Methods

This section contains a general description of the sampling methods to be used in Phase V sampling and collection of samples for monitoring of surface water and sediment. Detailed field

instructions are included as **Attachment A.** The Health and Safety Plan for sediment and water sampling is included as **Attachment B.**

## 2.0 PHASE V SAMPLING

**Sampling Locations:**

Phase V sediment samples will be collected at 12 locations in the area adjacent to the spill. Samples of bottom water will be collected at six of these locations, plus three downstream locations. Six previously sampled locations will be re-sampled in Phase V: SS-5A, SS-11A, SS-15A, SS-19A, SS-24A and SS-45. Six previously un-sampled locations will also be added for Phase V. These sampling stations are designated SS-59 through SS-64. The downstream stations are designated SS-1, SS-2 and SS-3. The location coordinates for these stations are given in the table below.

**Phase V Sampling Locations**

| STATION | SAMPLE TYPE | STATE PLANE NAD83 NY WEST | |
|---|---|---|---|
| SS-5A | Sediment/Water | N1186350.9848 | E1407683.3885 |
| SS-11A | Sediment/Water | N1186320.5219 | E1407670.3009 |
| SS-15A | Sediment | N1186320.5258 | E1407670.2080 |
| SS-19A | Sediment/Water | N1186302.4734 | E1407683.8853 |
| SS-24A | Sediment/Water | N1186321.1537 | E1407741.4456 |
| SS-45 | Sediment/Water | N1186250.9133 | E1407719.0339 |
| SS-59 | Sediment | N1186282.2358 | E1407655.9983 |
| SS-60 | Sediment | N1186264.8064 | E1407690.4037 |
| SS-61 | Sediment/Water | N1186298.0146 | E1407716.5058 |
| SS-62 | Sediment | N1186209.1888 | E1407699.3721 |
| SS-63 | Sediment | N1186287.4051 | E1407737.4490 |
| SS-64 | Sediment | N1186229.1226 | E1407742.8894 |
| WS-1 | Water | N1186492.5188 | E1407863.7890 |
| WS-2 | Water | N1188208.6836 | E1409105.4559 |
| WS-3 | Water | N1190444.1315 | E1410522.0005 |

Stations SS-5A through SS-64 are shown on **Figure B-1.** Stations WS-1, WS-2 and WS-3 are shown on Figure **B-2.**

**Sediment Sampling:**

One core sample will be collected from each of the sampling stations described previously to a depth of ten feet below sediment surface, or to the depth of refusal. If refusal occurs, a second attempt will be made. If the second attempt does not reach ten feet below sediment surface, the longer of the two cores will be retained, and the refusal depth will be noted in the core log. Samples will be collected with a vibratory corer with a 4-inch barrel using flexible plastic liners. The cores will be kept in the liners until examined by the Shaw E&I technician on board. The Shaw E&I technician will examine the core and collect samples as described below. The core will be retained in the plastic liner during examination to prevent the loss of volatile compounds. The core will be divided into three sections of approximately equal length, and sediment samples will be collected from each interval. Sediment samples will be submitted for analysis of volatile organic compounds (VOCs) including acetone and methylene chloride. The samples will also be analyzed for percent moisture.

**Water Sampling:**

Bottom water will be collected at the 6 locations previously described and will be analyzed for methylene chloride and acetone. Samples will be collected with a horizontal water sampler. Samples will be collected from approximately one foot above the sediments.

**Split Samples:**

During Phase V sampling, split samples will be provided to the NYSDEC. A NYSDEC representative will be present during sampling for acquisition of the split samples. It is anticipated that NYSDEC will provide appropriate sample containers for the split samples.

## 3.0 SEDIMENT AND WATER MONITORING

**Monitoring Locations:**

Monitoring locations are shown on **Figure B-2**. Sediment and bottom water will be collected at three locations in the vicinity of the spill. The stations to be sampled during monitoring will be the three locations having the highest Phase V methylene chloride concentrations. Locations SS-5A, SS-19A and SS-45 are provisionally designated, pending results of Phase V sampling. Bottom water samples will also be collected at three downstream locations. These locations are located and designated as follows (previously used station designations in parentheses):

- WS-1, mid-channel offshore of the Coast Guard Auxiliary Station;
- WS-2, mid-channel, offshore of the Coast Guard Station (Downstream);
- WS-3, mid-channel at the mouth of the Genesee River, adjacent to the end of the U.S. East Pier (Channel/Lake).

The coordinates for these locations are given in the following table, and are also shown on **Figure B-2**.

**Sediment and Water Monitoring Locations**

| STATION | SAMPLE TYPE | STATE PLANE NAD83 NY WEST | |
|---|---|---|---|
| SS-5A | Sediment/Water | N1186350.9848 | E1407683.3885 |
| SS-19A | Sediment/Water | N1186302.4734 | E1407683.8853 |
| SS-45 | Sediment/Water | N1186250.9133 | E1407719.0339 |
| WS-1 | Water | N1186492.5188 | E1407863.7890 |
| WS-2 | Water | N1188208.6836 | E1409105.4559 |
| WS-3 | Water | N1190444.1315 | E1410522.0005 |

**Sediment Sampling:**

Sediment sampling during the monitoring period will be performed with an Ekman Dredge, or gravity corer. The Ekman dredge will be used if Phase V sampling verifies that, in remaining locations with detectable methylene chloride, surface sediments contain higher concentrations than deeper sediments. If subsurface sediments are found to have higher concentrations than deeper sediments, a gravity corer or, if necessary, a vibratory corer will be used.

**Water Sampling:**

As in Phase V sampling, bottom water will be collected at the locations previously described and will be analyzed for methylene chloride and acetone. Samples will be collected with a horizontal water bottle. Samples will be collected from approximately one foot above the sediments.

## 4.0 PROGRAM SCHEDULE AND DURATION

**Phase V Sampling:**

Phase V sampling is scheduled to be conducted on October 24, and 25, 2002.

**Monitoring Program – Water:**

Monitoring of bottom water will be conducted in November 2002 and will be repeated monthly, weather permitting. Sampling will not take place during periods of ice formation on the Genesee River.

**Monitoring Program – Sediment:**

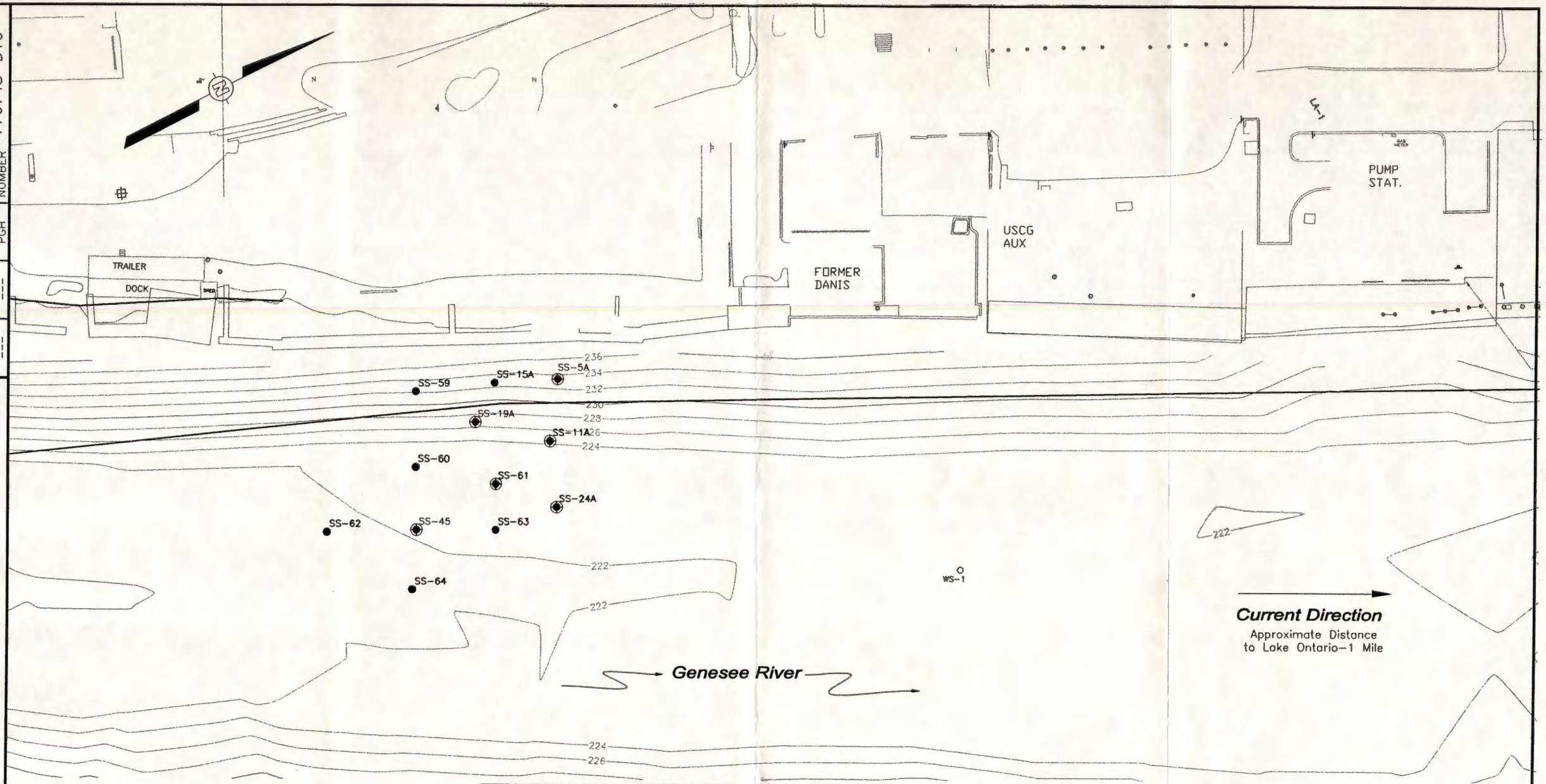
Monitoring of sediment will be conducted in November 2002 and will be repeated quarterly, weather permitting. Sampling will not take place during periods of ice formation on the Genesee River.

**Monitoring Program Duration and Review:**

The monitoring program will continue, at a minimum, through May 2003. If the results of the May 2003 water and sediment monitoring show no detectable methylene chloride attributable to

the CSXT derailment and spill, the monitoring program will be reviewed with the NYSDEC for potential modification or elimination. If methylene chloride attributable to the spill is detected, but the results show continuing significant attenuation, the monitoring program will continue. If review of the May 2003 data indicates that elevated levels of methylene chloride remain in sediments and significant attenuation is not occurring, remediation with dredging and/or capping will be re-evaluated.

IMAGE ---
X-REF ---
OFFICE PGH
DRAWING NUMBER 776748-D16




LEGEND:

- WS-1 — WATER SAMPLING LOCATION
- SS-59 — SEDIMENT SAMPLING LOCATION
- SS-45 — SEDIMENT AND WATER SAMPLING LOCATION
- NAVIGATION CHANEL BOUNDARY
- 224 — BATHOMETRIC CONTOUR LINE IN FT

NOTE:
SEE FIG. B-2 FOR SAMPLE WS-2 AND WS-3 LOCATIONS

| STATION | STATE PLANE NAD83 NY WEST | |
|---|---|---|
| SS-5A | N1186350.9848 | E1407683.3885 |
| SS-11A | N1186320.5219 | E1407670.3009 |
| SS-15A | N1186320.5258 | E1407670.2080 |
| SS-19A | N1186302.4734 | E1407683.8853 |
| SS-24A | N1186321.1537 | E1407741.4456 |
| SS-45 | N1186250.9133 | E1407719.0339 |
| SS-59 | N1186282.2358 | E1407655.9983 |
| SS-60 | N1186264.8064 | E1407690.4037 |
| SS-61 | N1186298.0146 | E1407716.5058 |
| SS-62 | N1186209.1888 | E1407699.3721 |
| SS-63 | N1186287.4051 | E1407737.4490 |
| SS-64 | N1186229.1226 | E1407742.8894 |
| WS-1 | N1186492.5188 | E1407863.7890 |
| WS-2 | N1188208.6836 | E1409105.4559 |
| WS-3 | N1190444.1315 | E1410522.0005 |

SCALE
0 50 100 FEET

FIGURE B-1

| REV | DATE | BY | CHK'D | APR'VD | DESCRIPTION/ISSUE |
|---|---|---|---|---|---|
| | | | | | |

Shaw
Shaw E & I, Inc.

CSX TRANSPORTATION
JACKSONVILLE, FL

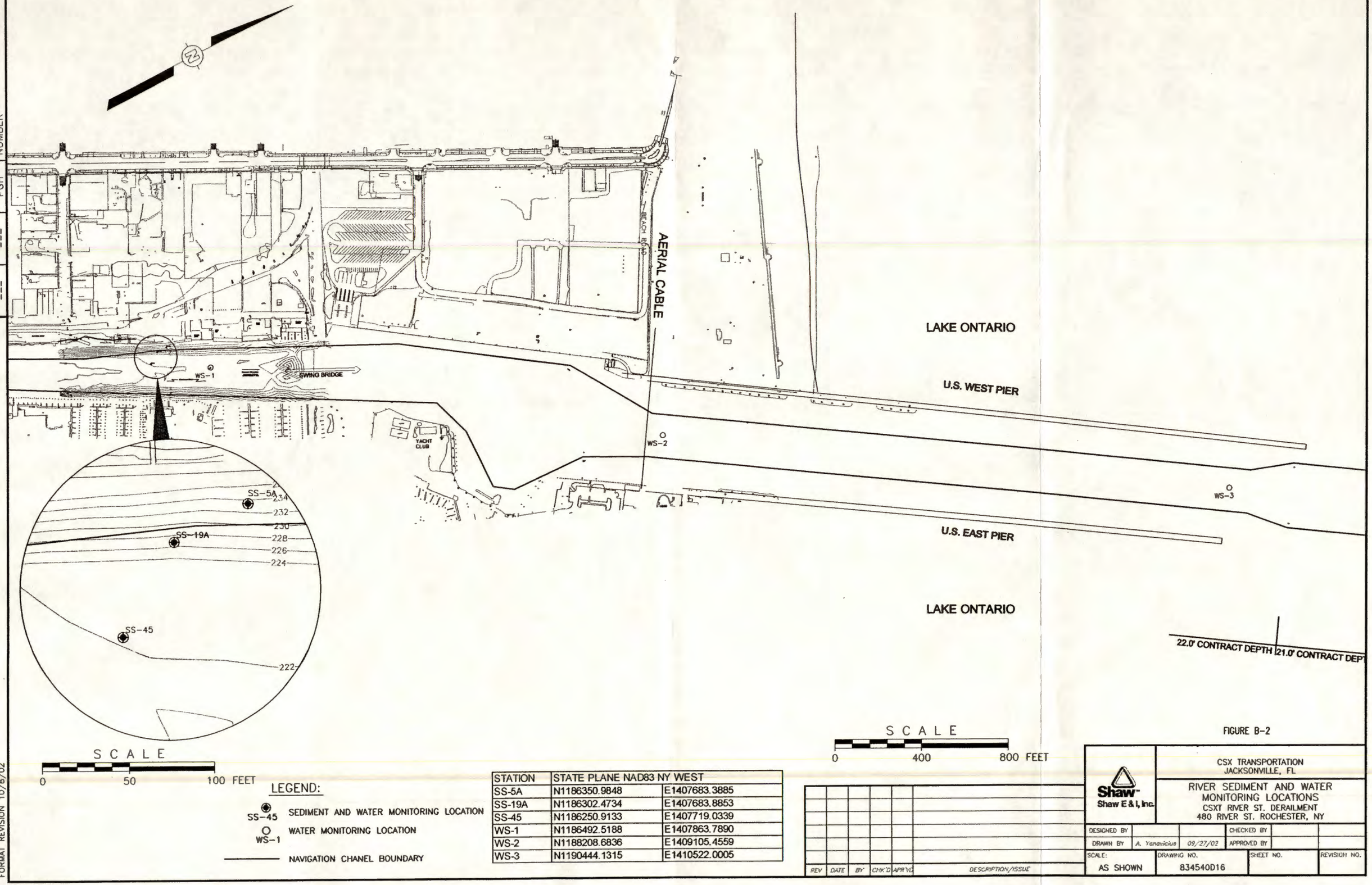
PHASE V RIVER
SAMPLING LOCATIONS
CSXT RIVER ST. DERAILMENT
480 RIVER ST. ROCHESTER, NY

| DESIGNED BY | | | CHECKED BY | | |
|---|---|---|---|---|---|
| DRAWN BY | A. Yanavicius | 10/08/02 | APPROVED BY | | |

| SCALE: | DRAWING NO. | SHEET NO. | REVISION NO. |
|---|---|---|---|
| AS SHOWN | 834540D16 | | |

DATE: ?/?/98
TIME: ?:?? AM
FORMAT REVISION 2/26/99

| IMAGE | X-REF | OFFICE | DRAWING NUMBER |
|---|---|---|---|
| --- | --- | PGH | 776748-D16 |




LEGEND:

- SS-45 — SEDIMENT AND WATER MONITORING LOCATION
- WS-1 — WATER MONITORING LOCATION
- NAVIGATION CHANEL BOUNDARY

| STATION | STATE PLANE NAD83 NY WEST | |
|---|---|---|
| SS-5A | N1186350.9848 | E1407683.3885 |
| SS-19A | N1186302.4734 | E1407683.8853 |
| SS-45 | N1186250.9133 | E1407719.0339 |
| WS-1 | N1186492.5188 | E1407863.7890 |
| WS-2 | N1188208.6836 | E1409105.4559 |
| WS-3 | N1190444.1315 | E1410522.0005 |

| REV | DATE | BY | CHK'D | APR'VD | DESCRIPTION/ISSUE |
|---|---|---|---|---|---|
| | | | | | |

FIGURE B-2

Shaw
Shaw E & I, Inc.

CSX TRANSPORTATION
JACKSONVILLE, FL

RIVER SEDIMENT AND WATER MONITORING LOCATIONS
CSXT RIVER ST. DERAILMENT
480 RIVER ST. ROCHESTER, NY

| DESIGNED BY | | | CHECKED BY | | |
|---|---|---|---|---|---|
| DRAWN BY | A. Yanavicius | 09/27/02 | APPROVED BY | | |
| SCALE: AS SHOWN | DRAWING NO. 834540D16 | | SHEET NO. | | REVISION NO. |

DATE: 10/10/02
FORMAT REVISION 10/8/02

# Attachment A

# Phase V and Monitoring Plan
# Field Instructions

# Genesee River Phase V Field Instructions
# Additional Vibracore Sampling and Bottom Water Sampling
## CSXT Charlotte, NY

**Purpose:**
Sampling of Genesee River sediments in the vicinity of the CSXT derailment and chemical spill indicated that sediments in the river directly adjacent to the spill site contains elevated levels of methylene chloride. Phase II sediment core sampling delineated the area of contamination, Phase III vibracore sampling determined the vertical extent of contamination, and Phase IV sampling indicated that methylene chloride levels in river sediments have diminished. This Sampling Plan describes Phase V vibracore sampling and sediment analysis to delineate the present impact area. In addition, bottom water samples will be collected in the affected area, and at downstream locations for the purpose of evaluating potential impact to surface water.

**Safety:**
Coast Guard approved personal floatation devices (PFDs) must be worn at all times by all personnel when on board the vessel. The vessel used for sampling must have on board all Coast Guard required safety equipment. Large commercial vessels may transit the sampling area at any time. At all times and especially when engaged in sampling operations, the operator and crew will maintain a lookout for other vessels. Sampling PPE includes a waterproof outer layer, chemical resistant gloves and protective eyewear. Hardhats must be worn during vibracoring operations. A detailed Health and Safety Plan (HASP) for work on and around the river is included as **Attachment B.**

**Documentation:**
All activities must be recorded on field logs or waterproof notebooks. A member of Shaw E&I will be aboard the subcontractor vessel during sampling operations, and will document sampling activities, including the recording of sample coordinated obtained with the onboard DGPS receiver. Chain of Custody (COC) forms must be filled out in the field and must accompany the samples to the laboratory.

**Sample locations:**
Sediment core samples will be collected at the 12 locations shown in the following table:

### Phase V Sampling Locations

| STATION | SAMPLING TYPE | STATE PLANE NAD83 NY WEST | |
|---|---|---|---|
| SS-5A | Sediment and Water | N1186350.9848 | E1407683.3885 |
| SS-11A | Sediment and Water | N1186320.5219 | E1407670.3009 |
| SS-15A | Sediment | N1186320.5258 | E1407670.2080 |
| SS-19A | Sediment and Water | N1186302.4734 | E1407683.8853 |
| SS-24A | Sediment and Water | N1186321.1537 | E1407741.4456 |
| SS-45 | Sediment and Water | N1186250.9133 | E1407719.0339 |
| SS-59 | Sediment | N1186282.2358 | E1407655.9983 |
| SS-60 | Sediment | N1186264.8064 | E1407690.4037 |
| SS-61 | Sediment and Water | N1186298.0146 | E1407716.5058 |

| | | | |
|---|---|---|---|
| SS-62 | Sediment | N1186209.1888 | E1407699.3721 |
| SS-63 | Sediment | N1186287.4051 | E1407737.4490 |
| SS-64 | Sediment | N1186229.1226 | E1407742.8894 |
| WS-1 | Water | N1186492.5188 | E1407863.7890 |
| WS-2 | Water | N1188208.6836 | E1409105.4559 |
| WS-3 | Water | N1190444.1315 | E1410522.0005 |

The coordinates of these locations are also indicated on **Figure B-1**.

An onboard DGPS receiver will be used to position the vibracoring vessel at the sampling stations. The vessel will be anchored securely with bow and stern anchors prior to deploying the vibracorer. After the vessel is anchored at each station, correct positioning will be verified with the vessel's DGPS receiver.

**Water Sample Collection**:
The sampling team shall take precautions to prevent the contamination of water samples with sediment. At the locations designated for water and sediment collection, water samples will be taken before deployment of sediment sampling equipment. In addition, the downstream samples should be collected first, subsequent samples should be collected working in an upstream direction, with the furthest upstream samples collected last.

Water sample collection will be performed with a horizontal water sampler, a device specifically designed for the collection of bottom water samples, as follows:

- Prior to sample collection, the depth of the water will be determined and recorded; (A sounding lead or the on-board depth sounder may be used for depth determination)
- The water sampler will be lowered to approximately one foot above the bottom;
- The water sampler is held at the collection depth for approximately one minute to ensure that that water from higher in the water column has been displaced and the water bottle contains only bottom water;
- A messenger is then sent down the water bottle line to close the sampler and collect the water sample;
- The sampler is retrieved and the sample is poured directly into the sample vials with as little disturbance as possible, completely filling the vials;
- The vials are closed immediately and checked to insure that no air bubbles are present.

If the water sampler contacts the sediment, the bottle will be retrieved and decontaminated prior to water sample collection. The water sampler will be rinsed thoroughly with site water and left with the valves open between sampling locations.

**Sediment Core Sampling:**
One core sample will be collected from each of the sampling stations described previously to a depth of ten feet below sediment surface, or to the depth of refusal. If refusal occurs, a second attempt will be made. If the second attempt does not reach ten feet below sediment surface, the longer of the two cores will be retained, and the refusal depth will be noted in the core log.

Samples will be collected with an electric vibracorer with a 4-inch barrel using flexible plastic liners. The cores will be kept in the liners until examined by the Shaw E&I technician on board. The Shaw E&I technician will examine the core and collect samples as described below. The core shall be retained in the plastic liner during examination to prevent the loss of volatile compounds.

**Sediment Sample Collection**:
Once the core and liner has been removed from the core barrel and placed on deck, the sample will be evaluated, and recovery, strata and other features will be documented. The core will then be sectioned into three approximately equal lengths. Samples will be collected from the top section, the middle section, and the bottom section of the core. To reduce the potential of cross-contamination between sediment layers, samples for laboratory analysis will be taken from the inner, undisturbed portion of the core section. Sediment must completely fill the sample jars. The field notes should include a physical description of each sample, including color, nature of coarse particles they may be present, and presence or absence of a sheen or odor. Thirty six (36) sediment samples will be submitted for analysis.

**Sample Labeling:**
The field crew must insure that all sample containers are clearly labeled with the location, time of collection, date, sample type, sample depth (core interval), and method of analysis. The sample identification information must also be recorded on the COCs and field notes. Labels should be covered with clear tape to prevent loss prior to analysis.

**Sample Analysis:**
Sediment samples will be submitted for analysis of volatile organic compounds (VOCs) including acetone and methylene chloride. The samples will also be analyzed for percent moisture.

**Sample Packing and Transport:**
The glass sample jars should be placed in bubble wrap and put into ziploc bags. The samples are packed in clean coolers with sufficient ice and vermiculite to prevent movement of the jars during transport. Samples should be transported or shipped to the analytical laboratory as soon as possible after collection. If shipment to the laboratory is made by commercial carrier, the COCs are placed in the coolers and the coolers are sealed with custody tape.

# Field Instructions for Genesee River Water and Sediment Monitoring
## CSXT Charlotte, NY

**Purpose:**
Sampling of Genesee River sediments in the vicinity of the CSXT derailment and chemical spill indicated that sediments in the river directly adjacent to the spill site contained elevated levels of methylene chloride. Subsequent sampling indicated that methylene chloride levels in river sediments have diminished, and are at background levels in much of the previously affected area. The purpose of the monitoring program are to verify that methylene chloride and acetone concentrations in the Genesee River do not present a risk to drinking water, and to monitor the anticipated attenuation of methylene chloride and acetone to undetectable or background levels.

**Safety:**
Coast Guard approved personal floatation devices (PFDs) must be worn at all times by all personnel when on board the vessel. The vessel used for sampling must have on board all Coast Guard required safety equipment. Large commercial vessels may transit the sampling area at any time. At all times and especially when engaged in sampling operations, the operator and crew will maintain a lookout for other vessels. Sampling PPE includes a waterproof outer layer, chemical resistant gloves and protective eyewear. Hardhats must be worn during vibracoring operations. A detailed Health and Safety Plan (HASP) for work on and around the river is included as **Attachment B**.

**Documentation:**
All activities must be recorded on field logs or waterproof notebooks. A member of Shaw E&I will be aboard the subcontractor vessel during sampling operations, and will document sampling activities, including the recording of sample coordinated obtained with the onboard DGPS receiver. Chain of Custody (COC) forms must be filled out in the field and must accompany the samples to the laboratory.

**Sample locations:**
Samples will be collected at the 6 locations shown in the following table:

### Sediment and Water Monitoring Locations

| STATION | SAMPLE TYPE | STATE PLANE NAD83 NY WEST | |
|---|---|---|---|
| SS-5A | Sediment/Water | N1186350.9848 | E1407683.3885 |
| SS-19A | Sediment/Water | N1186302.4734 | E1407683.8853 |
| SS-45 | Sediment/Water | N1186250.9133 | E1407719.0339 |
| WS-1 | Water | N1186492.5188 | E1407863.7890 |
| WS-2 | Water | N1188208.6836 | E1409105.4559 |
| WS-3 | Water | N1190444.1315 | E1410522.0005 |

**Figure B-2** is a map of the site showing the monitoring locations. The table of coordinates is also included on the Figure.

The sampling vessel will be positioned with a GPS receiver and shore landmarks. The vessel will be anchored and stationary at the sampling location prior to deployment of sampling equipment.

**Water Sample Collection**:
The sampling team shall take precautions to prevent the contamination of water samples with sediment. At the locations designated for water and sediment collection, water samples will be taken before deployment of sediment sampling equipment. In addition, the downstream samples should be collected first, subsequent samples should be collected working in an upstream direction, with the furthest upstream samples collected last.

Water sample collection will be performed with a horizontal water sampler, a device specifically designed for the collection of bottom water samples, as follows:

- Prior to sample collection, the depth of the water will be determined and recorded; (A sounding lead or the on-board depth sounder may be used for depth determination)
- The water sampler will be lowered to approximately one foot above the bottom;
- The water sampler is held at the collection depth for approximately one minute to ensure that that water from higher in the water column has been displaced and the water bottle contains only bottom water;
- A messenger is then sent down the water bottle line to close the sampler and collect the water sample;
- The sampler is retrieved and the sample is poured directly into the sample vials with as little disturbance as possible, completely filling the vials;
- The vials are closed immediately and checked to insure that no air bubbles are present.

If the water sampler contacts the sediment, the bottle will be retrieved and decontaminated prior to water sample collection. The water sampler will be rinsed thoroughly with site water and left with the valves open between sampling locations.

**Sediment Sampling:**
Sediment sampling during the monitoring period will be performed with an Ekman Dredge, or gravity corer. The Ekman dredge will be used if Phase V sampling verifies that, in remaining locations with detectable methylene chloride, surface sediments contain higher concentrations than deeper sediments. If subsurface sediments are found to have higher concentrations than deeper sediments, a gravity corer or, if necessary, a vibratory corer will be used.

**Ekman Dredge Operation:**
The Ekman Dredge will be operated in accordance with following procedure which is a modification of ASTM Standard Practice D 4343 – 84:

1. Sampler must be thoroughly decontaminated prior to sampling at each location.
2. The sampler is cocked by raising each jaw upward into the cocked position and securing the cable to the catch pin.
3. The cocked sampler is lifted overboard and allowed to fall rapidly to the bottom keeping light pressure on the line so that the dredge falls vertically and strikes the bottom squarely.
4. When the dredge strikes bottom, the line is pulled taught and the messenger is sent down to trip the dredge.
5. The dredge is retrieved at a slow but steady rate to minimize loss of fine particles.
6. Once the dredge is on board, empty the sample into a stainless steel pan.
7. Repeat steps 1 through 5 if material collected is insufficient to fill required sample containers.

**Sediment Core Sampling:**
If necessary, samples will be collected with a coring device, either a slide-hammer corer or a corer with extension handles that can be forced into the sediment. If possible, cores should be at least 18 inches in length. The core will be sectioned into separate samples as described below.

**Slide-Hammer Corer Operation:**
The corer will be operated as follows:

1. Sampler must be thoroughly decontaminated prior to sampling at each location.
2. The sampler is lowered to the riverbed and bronze messenger is repeatedly dropped until the sampler has been driven to the appropriate depth.
3. The sampler is retrieved at a slow but steady rate to minimize loss of fine particles.
4. The sampler is lifted onboard and the core barrel is capped at both ends to ensure that none of the sample is lost.
5. Once the core barrel has been capped the sample will be evaluated documenting recovery, strata and other features.

**Hand Corer Operation:**
1. Sampler must be thoroughly decontaminated prior to sampling at each location.
2. The water depth at the sampling location is determined with an on board depth sounder or sounding lead.
3. Sections of threaded handle with a total length several feet greater than the water depth are connected to the corer tube.
4. The corer assembly is lowered vertically to the bottom, and the corer is forced into the sediment. The sampling technician should estimate the depth of sediment penetration and should attempt to collect a core 18 inches or greater in length.
5. If necessary, a sledgehammer may be used to achieve the required depth of sediment penetration.

**Acetone, Methylene Chloride and TOC sampling:**
Because the compounds of interest are volatile, samples are not homogenized, but are place directly and without delay into appropriate sample containers. If core samples are collected, each core will be sectioned in half and samples will be collected from both sections. The sample jars must be completely filled. Care should be taken to clean the jar threads to prevent leakage during transport. The field notes should include a physical description of each sample, including color, nature of coarse particles they may be present, presence or absence of a sheen or odor.

**Sample Labeling:**
The field crew must insure that all sample containers are clearly labeled with the location, time of collection, date, sample type, sample depth (core interval), and method of analysis. The sample identification information must also be recorded on the COCs and field notes. Labels should be covered with clear tape to prevent loss prior to analysis.

**Sample Analysis:**
Sediment samples will be submitted for analysis of volatile organic compounds (VOCs) including acetone and methylene chloride. The samples will also be analyzed for percent moisture.

**Sample Packing and Transport:**
The glass sample jars should be placed in bubble wrap and put into ziploc bags. The samples are packed in clean coolers with sufficient ice and vermiculite to prevent movement of the jars during transport. Samples should be transported or shipped to the analytical laboratory as soon as possible after collection. If shipment to the laboratory is made by commercial carrier, the COCs are placed in the coolers and the coolers are sealed with custody tape.

# Attachment B

# Health and Safety Plan

# *ATTACHMENT B*

## *CSXT CHARLOTTE HEALTH AND SAFETY PLAN AMENDMENT DOCUMENTATION FORM*

**SITE SPECIFIC HEALTH AND SAFETY PLAN**
**AMENDMENT DOCUMENTATION**

**Project Name:** CSXT Rochester **Project No.:** 834540

**Amendment No.:** 001 **Date:** 8/20/02

**Amendment Revises:** *Page:* **N/A** **Section:**

**Task(s) Amendment Affects:*** Addition of new Task

Activities associated with sampling from boats/barges on the Genesee River

**(Attach new/revised Job Safety Analyses)*

**Reason For Amendment:**

Task was not part of the original HASP.

**Amendment:** *(Attach separate sheet(s) as necessary)*

Sediment contamination associated with a release of materials from a CSXT train requires work on the water using small boats or barges for sample collection. Air Monitoring, PPE requirements will be similar to working along the river's edge. JSAs are attached.

**Completed by:** **Approved by:**

| JOB SAFETY ANALYSIS FOR SMALL CRAFT TRANSPORT AND DEPLOYMENT | | | | |
|---|---|---|---|---|
| **Task Breakdown** | **Potential Hazards** | **Critical Safety Practices** | **Personal Protective Clothing and Equipment** | **Monitoring Devices** |
| Boat Mobilization /Launching | Load Shift in Transit | • Follow trailer/boat manufacturer's instructions for securing boat to trailer<br>• Follow trailer/boat manufacturer's instructions for securing boat trailer to towing vehicle<br>• Prohibit loading of heavy objects in boat during transport | | |
| | Caught In/ Between Objects or Pinch Points | • Prohibit workers from moving into trailer/vehicle pinch points without advising vehicle operator<br>• Use experienced operators when backing trailers on boat ramps<br>• Wear proper work gloves when the possibility of pinching, or other injury may be caused by moving/ handling large or heavy objects<br>• Maintain all equipment in a safe condition | | |
| | Slips, Trips, Falls | • Wear boots with non-slip soles when launching boats<br>• Wear USCG approved flotation devices when working on/near water<br>• Keep ropes and lines coiled and stowed to eliminate trip hazards<br>• Maintain 3 point contact on dock/pier ladders | | |
| | Drowning | • Wear USCG Approved personal flotation devices for work activities on or near water<br>• Provide a floating ring buoy with at least 90 feet in the immediate boat launch/land areas<br>• Place ring buoys not more than 200 feet apart<br>• Maintain two Jon boats (minimum) during on water activities | USCG approved flotation device | |

| JOB SAFETY ANALYSIS FOR SMALL CRAFT TRANSPORT AND DEPLOYMENT | | | | |
|---|---|---|---|---|
| **Task Breakdown** | **Potential Hazards** | **Critical Safety Practices** | **Personal Protective Clothing and Equipment** | **Monitoring Devices** |
| Boat Mobilization (Continued) | Struck By/ Against Heavy Equipment | • Wear reflective warning vests when exposed to vehicular traffic<br>• Launch boats one at a time to avoid collisions<br>• Use a spotter for vehicles backing boats to launch area<br>• Understand and review hand signals | Warning vests, hard hat, safety glasses, steel toe work boots | |
| | Capsizing (Slips, Trips, Falls) | • Step into the center of the boat<br>• Keep your weight low when moving in the boat<br>• Move slowly and deliberately<br>• Steer directly across other boat wakes at 90 degree angle to avoid capsizing<br>• Steer boat facing forward<br>• Watch for floating objects in the water<br>• Right-of-way is yielded to vessels on your boat's right (and vessels with limited ability to maneuver)<br>• Cleanup spills immediately on docks, piers and ladders | | |
| On-Water Boat Operations | Handling Heavy Objects | • Observe proper lifting techniques<br>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)<br>• Use mechanical lifting equipment (pulleys, winches) to move large, awkward loads | | |
| | Sprains and Strains (Overexertion) | • Use mechanical means to lift large/heavy objects from the water<br>• Use even strokes when pull starting outboard engines | | |
| | Sharp Objects | • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects<br>• Maintain all equipment in a safe condition<br>• Keep guards in place during use | Leather gloves | |

| JOB SAFETY ANALYSIS FOR SMALL CRAFT TRANSPORT AND DEPLOYMENT | | | | |
|---|---|---|---|---|
| **Task Breakdown** | **Potential Hazards** | **Critical Safety Practices** | **Personal Protective Clothing and Equipment** | **Monitoring Devices** |
| On-Water Boat Operations /Silt Curtain Deployment (Continued) | Insect Bites | • Avoid insect nests areas, likely habitats along shore lines<br>• Use insect repellant, wear PPE to protect against sting/bite injuries | Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers | |
| | Contact Dermatitis | • Wear PPE to avoid skin contact with contaminated materials<br>• Change socks and/or gloves to avoid water borne bacteria/contamination | Rain/splash suit (See Section 5.0 HASP) | |
| | Drowning | • Wear USCG Approved personal flotation devices for work activities on or near water<br>• Provide a floating ring buoy with at least 90 feet in the immediate boat launch/land areas<br>• Place ring buoys not more than 200 feet apart<br>• Maintain two Jon boats (minimum) during on water activities | USCG approved flotation device | |
| | Capsizing (Slips, Trips, Falls) | • Step into the center of the boat<br>• Keep your weight low when moving in the boat<br>• Move slowly and deliberately<br>• Steer directly across other boat wakes at 90 degree angle to avoid capsizing<br>• Cleanup spills immediately on docks, piers and ladders<br>• Maintain at least one powered craft in reserve to assist vessels adrift or swamped | | |
| | Allergic Reaction | • Provide workers proper skin protection to prevent skin allergic reaction from exposure boom material, spill contaminants, or other skin irritants | latex or nitrile gloves | |

| JOB SAFETY ANALYSIS FOR SMALL CRAFT TRANSPORT AND DEPLOYMENT | | | | |
|---|---|---|---|---|
| **Task Breakdown** | **Potential Hazards** | **Critical Safety Practices** | **Personal Protective Clothing and Equipment** | **Monitoring Devices** |
| On-Water Boat Operations /Silt Curtain Deployment (Continued) | Caught In/ Between Objects | • Keep hands inside boat in proximity to other boats, on- water objects, piers<br>• Wear proper work gloves when the possibility of pinching, or other injury may be caused by moving/ handling large or heavy objects<br>• Maintain all equipment in a safe condition | | |
| | Boat Adrift/Survival | • Maintain a minimum of 2 flares in the boat<br>• Maintain a minimum of 1 air horn<br>• Maintain a minimum of 2 flash lights<br>• Maintain a minimum of 1 anchor with rope<br>• Maintain a minimum of 75 feet of rope attached to a ring buoy<br>• Maintain a minimum of 1 2 lb. ABC fire extinguisher<br>• Maintain a minimum of 2 gas tanks<br>• Maintain a minimum of 1 boat plug<br>• Maintain a minimum of 2 oars<br>• Maintain a minimum of 1 two-way radio<br>• Maintain one set of rain gear for each person<br>• Maintain one first aid kit<br>• Keep at least one person on shore to facilitate on shore emergency services when needed | | |
| | Struck by/ Against Heavy Objects, Splashes, Hand Tools | • Yield right-of-way to larger vessels<br>• Steer directly across boat wakes at 90 degree angle to avoid capsizing<br>• Wear splash goggles when handling boom when visible contamination is present<br>• Understand and review hand signals | | |
| | Severe Weather | • Halt all on water operations for lightening, high winds, severe weather | | |

| JOB SAFETY ANALYSIS FOR SMALL CRAFT TRANSPORT AND DEPLOYMENT | | | | |
|---|---|---|---|---|
| **Task Breakdown** | **Potential Hazards** | **Critical Safety Practices** | **Personal Protective Clothing and Equipment** | **Monitoring Devices** |
| On-Water Boat Operations /Silt Curtain Deployment (Continued) | Inhalation and Contact with Hazardous Substances | • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present<br>• Review hazardous properties of site contaminants with workers before operations begin<br>• Monitor breathing zone air to determine levels of contaminants | Tyvek coveralls, nitrile gloves, latex or neoprene boots (see Section 5.0 HASP) | PID |
| | Fires | • Provide ABC (or equivalent) fire extinguishers for fuel (gas/diesel) powered boats<br>• Prohibit storage, transfer of flammable liquids in plastic containers<br>• Enforce use of approved flammable liquid safety cans<br>• Prohibit smoking in fueling/fuel storage areas<br>• Inspect fuel lines and tanks for leaks<br>• Prohibit smoking in the boat<br>• Provide oars for manual maneuvering | Portable fire extinguishers | LEL/$O_2$ |
| | High Ambient Temperature | • Monitor for Heat stress in accordance with IT Health and Safety Procedures # HS400<br>• Provide fluids to prevent worker dehydration<br>• Follow work/rest schedule in Section 3.3.1 of the HASP | Insulated Clothing (subject to ambient temperature) | Meteorological Equipment |