Revised Work Plan

Phase I Sediment Characterization Results/Phase II Work Plan

Former Hampshire Chemical Corp Facility
Waterloo, New York

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The Dow Chemical Company

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CH2MHILL

Contents

Acronyms and Abbreviations ..... **v**

1 Introduction **1-1**
1.1 Background 1-2
1.2 Report Organization 1-3

2 Phase I Sediment Characterization **2-1**
2.1 Phase I Study Design 2-1
2.1.1 AOC A—Seneca-Cayuga Canal 2-1
2.1.2 Canal Raceways 2-2
2.2 Phase I Field Summary/Deviations from Work Plan 2-2
2.2.1 AOC A—Seneca-Cayuga Canal 2-2
2.2.2 Canal Raceways 2-3
2.3 Phase I Characterization Results 2-3
2.3.1 AOC A—Seneca-Cayuga Canal Results 2-3
2.3.2 Canal Raceway Results 2-4

3 Phase II Sediment Characterization **3-1**
3.1 Data Quality Objectives 3-1
3.2 Proposed Phase II Sampling and Analysis Plan 3-1
3.2.1 AOC A—Seneca-Cayuga Canal 3-1
3.2.2 Canal Raceway 3-5
3.2.3 Upgradient Sampling 3-7
3.2.4 General Sample Handling and Custody 3-8

4 Project Management and Quality Assurance/Quality Control **4-1**
4.1 Sample Containers, Preservation, and Hold Times 4-1
4.2 Quality Assurance/Quality Control 4-1
4.3 Station/Sample Identification 4-2
4.4 Equipment Decontamination 4-2
4.5 Investigation-Derived Waste 4-3
4.6 Data Validation 4-3
4.7 Health and Safety 4-3
4.8 Reporting 4-3
4.9 Schedule 4-4

5 References **5-1**

Appendixes

A Geophysical Report
B Historical Photographs
C Standard Operating Procedures
D Proposed Phase II Data Report Table of Contents

Tables

1 Data Quality Objectives
2 Sample Summary
3 Analytical Reporting Limits
4 Historical Background Analytical Results
5 Required Analytical Method, Sample Containers, Preservation, and Holding Times

Figures

1 AOC A Transects
2 Raceway Transects
3 Canal Sediment Probing Locations
4 Extent of Soft Sediment in Canal
5 Canal Model
6 Raceway Canal Sediment Probing Locations
7 Extent of Soft Sediment in Raceway Canal
8 Raceway Model
9 AOC A - Seneca-Cayuga Canal Phase II Sediment Sample Locations
10 AOC A – Seneca-Cayuga Canal Phase II Shore Line Delineation Sediment Sample Locations
11 AOC A Canal Surface Water Sample Locations
12 Canal Raceway Phase II Sediment Sample Locations
13 Canal Raceway Surface Water Sample Locations
14 AOC A Seneca-Cayuga Canal Phase II Background Sample Locations
15 AOC A Seneca-Cayuga Canal Phase II Background Sample Locations

Acronyms and Abbreviations

°C	degrees Celsius
AACO	Amended Administrative Consent Order
AOC	area of concern
ASI	Aqua Survey, Inc.
ASTM	American Society for Testing and Materials
DGPS	differential global positioning system
Dow	The Dow Chemical Company
DQO	data quality objective
facility	former Hampshire Chemical Corp facility, now known as the Evans Chemetics Facility
HASP	health and safety plan
HCC	Hampshire Chemical Corp
ID	identification
IDW	investigation-derived waste
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
NYSDEC	New York State Department of Environmental Conservation
OBG	O'Brien & Gere
PCB	polychlorinated biphenyl
pH	hydrogen ion concentration
PID	photoionization detector
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act facility investigation

site	former Hampshire Chemical Corp facility, now known as the Evans Chemetics Facility
SOP	standard operating procedure
SPDES	source pollution discharge elimination system
SVOC	semivolatile organic compound
TAL	target analyte list
TCL	target compound list
TIC	tentatively identified compound
TOC	total organic carbon
TSS	total suspended solids
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WWTP	wastewater treatment plant

SECTION 1

Introduction

This revised work plan is an addendum to the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) work plan (CH2M HILL 2004) previously approved by the New York State Department of Environmental Conservation (NYSDEC) for the former Hampshire Chemical Corp (HCC) facility, now known as the "Evans Chemetics Facility" (the "facility" or "site") located in Waterloo, New York. HCC is a subsidiary of The Dow Chemical Company (Dow). The RFI is being conducted pursuant to an Amended Administrative Consent Order (AACO) executed between HCC and NYSDEC (Index Number 8-20000218-3281, June 1, 2004).

Investigation activities proposed in the original RFI work plan (CH2M HILL 2004) were completed in April and December 2004. The results of data collected pursuant to the RFI work plan (CH2M HILL 2004) indicated the need for additional site characterization data to meet the requirements of the AACO. As a result, a work plan addendum (CH2M HILL 2005a) and subsequent modifications (CH2M HILL 2005b; NYSDEC 2005) were developed in conjunction with NYSDEC and were presented in the RFI report (CH2M HILL 2006). That report concluded that additional sediment characterization was needed for the Seneca-Cayuga Canal adjacent to the site (Area of Concern [AOC] A) and the onsite canal raceway.

As discussed with NYSDEC and reflected in the RFI work plan (CH2M HILL 2004), the sediment characterization objectives are as follows:

- AOC A—Characterize the nature and extent of contaminated sediment in the Seneca-Cayuga Canal, adjacent to the facility and downstream to the next major discharger to the canal (that is, Waterloo Wastewater Treatment Plant [WWTP] outfall), sufficiently to support selection of a corrective action that will reduce site-related risks, if any
- Raceway—Investigate the potential for sediment in the onsite raceway to be contaminated with site-related substances and support selection of a corrective action that will reduce site-related risks, if any

Given the limited knowledge of the vertical and horizontal extent of sediment in the canal and raceway, a phased characterization approach was used. A Phase I work plan, designed to map the vertical and horizontal extent of depositional sediment was submitted to NYSDEC on September 18, 2007, which incorporated comments provided by NYSDEC on October 11, 2006; a conference call on October 16, 2006; within the comment letter for the original work plan from NYSDEC dated July 23, 2007; and based on a conference call on September 6, 2007.

The scope of work presented in the Phase I work plan was implemented between November 14 and 16, 2007, and the results are contained in Section 2 of this report. The results of this effort were provided to NYSDEC and were discussed in conferences calls attended by NYSDEC, HCC, and CH2M HILL on April 14 and 23, 2008.

This final Phase II work plan incorporates comments provided by NYSDEC in letters dated October 15, 2008, and March 10, 2009, and during conference calls on October 24, 2008, and April 19, 2009.

The results of this phase of the sediment investigation will be used to characterize the nature and extent of contaminated sediment in the Seneca-Cayuga Canal, adjacent to the facility and downstream to the next major discharger to the canal (that is, Waterloo WWTP outfall), and the onsite raceway sufficient to support selection of a corrective action that will reduce site-related risks. The additional activities presented in this work plan will be completed consistent with the procedures provided in the RFI work plan (CH2M HILL 2004) and associated documents (quality assurance project plan [QAPP] and health and safety plan [HASP]).

1.1 Background

The Seneca-Cayuga Canal (also known as the Seneca River), part of the New York State canal system, is located adjacent to the southern boundary of the facility. The canal was created when three sets of locks and dams were installed to support navigation through a series of rapids. Adjacent to the facility, the canal is approximately 30 feet wide and 8 to 10 feet deep. The canal consists primarily of a bedrock/cobble substrate. Near the facility, the shoreline has been modified with riprap and other fill material.

Canal raceways on the facility property historically connected to the Seneca-Cayuga Canal have been present in the area since the 1800s. By 1948, most of the facility raceways were filled and covered, with the exception of one raceway that currently exists on the northern side of the facility along U.S. Route 20/New York State Route 5. The existing raceway provides noncontact cooling water for existing site operations.

Prior to 1975, liquids collected in facility floor and stormwater drains were discharged directly to the canal through the wash water sewer system. The canal was identified an AOC because of the former discharges to the canal. Currently, the source pollution discharge elimination system (SPDES) sewer system consists of a network of pipes that discharge noncontact cooling water from processes at the facility to the Seneca-Cayuga Canal through the SPDES-permitted outfalls. Historically, discharges to the Seneca-Cayuga Canal were conveyed through as many as nine outfalls. In general, piping associated with the abandoned outfalls have been formally plugged and left in place.

Previous sediment sampling was conducted at 24 locations in the canal (O'Brien & Gere [OBG] 2003; CH2M HILL 2006). Samples collected were surficial (0– to 1-foot depth interval) with some limited samples at depth (1– to 2-foot depth interval). Samples were analyzed for U.S. Environmental Protection Agency (USEPA) SW-846 target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL polychlorinated biphenyls (PCBs), target analyte list (TAL) metals, and total organic carbon (TOC). These results were reported to NYSDEC in an RFI report (CH2M HILL 2006). To date, no characterization of sediment in the existing raceway has been conducted.

1.2 Report Organization

The remainder of this document consists of the following sections:

- Section 2, Phase I Sediment Characterization—Reviews the Phase I sediment characterization plan and provides a detailed discussion of the Phase I sediment characterization outcomes for AOC A – Seneca-Cayuga Canal and the canal raceway
- Section 3, Phase II Sediment Characterization—Provides a detailed description for the Phase II investigation design and sampling plan
- Section 4, Project Management and Quality Assurance/Quality Control – Provides quality assurance (QA)/quality control (QC) procedures for the project, related field procedures, a description of data validation procedures, and relevant project management activities
- Section 5, References—Presents references cited in this work plan

SECTION 2

Phase I Sediment Characterization

To date, the only sediment characterization has consisted of sediment sampling conducted in the Seneca-Cayuga Canal along the shoreline adjacent to the facility to support the RFI report (OBG 2003; CH2M HILL 2006). That investigation was limited to immediate shoreline sediment, and little was known of the vertical and horizontal extent of depositional sediment in the canal proper. The canal raceway appeared to contain sediment, but sediment thickness was unknown. Given the limited knowledge of the vertical and horizontal extent of sediment in the canal and raceway, a phased characterization approach was used.

The Phase I characterization was designed to delineate the spatial extent of depositional sediment in the canal and raceway. The following sections provide an overview of the Phase I study design, details of the methodology, and a detailed report presentation of the Phase I results. As specified in the Phase I work plan, these results were used to develop the Phase II sampling and analysis plan, as discussed in subsequent sections.

2.1 Phase I Study Design

2.1.1 AOC A—Seneca-Cayuga Canal

The objective of the Phase I characterization was to map the vertical and horizontal extent of depositional sediment in the canal adjacent to the facility using a combination of hydroacoustic profiling and manual probing. For the purposes of this investigation, sediment was defined as particles less than 2 millimeters in diameter (that is, clay, silt, and sand).

The following approach was used:

- Sediment thickness was measured using a combination of manual probing methods and acoustic sub-bottom profiling, depending on site conditions.
- Acoustic sub-bottom profiling was performed along three overlapping transects running parallel to the shore and 24 transects located at approximately 60-foot intervals between the western end of the facility property and extending approximately 150 feet downstream of the Gorham Street bridge.
- Manual probing was used in areas where it was too shallow to achieve adequate coverage with the acoustic sub-bottom profiles.
- Manual probing consisted of using a push rod at a series of stations along transects running bank to bank and perpendicular to the left bank, looking downstream. At each location, the metal push rod was inserted by hand from a boat or, if feasible, by wading until refusal was encountered.

2.1.2 Canal Raceways

The objective of the Phase I characterization was to map the vertical and horizontal extent of sediment in the onsite raceway. For the purposes of this investigation, sediment was defined as particles less than 2 millimeters in diameter (that is, clay, silt, and sand).

The following approach was used:

- Sediment thickness was measured using a push rod at a series of stations along transects running perpendicular from bank to bank. At each location, the metal push rod was inserted by hand from a boat or, if feasible, by wading until refusal was encountered.
- Stations were placed approximately 5 feet apart.
- Approximately 10 stations per transect were established, depending on the transect length.
- Thirteen transects were located at approximately 60-foot intervals along the raceway.

2.2 Phase I Field Summary/Deviations from Work Plan

Phase I fieldwork was conducted from November 14 through November 16, 2007. Beginning on November 14, 2007, Aqua Survey, Inc. (ASI) in cooperation with CH2M HILL field staff conducted bathymetric and sub-bottom acoustic profiling, and raceway profiling was conducted on November 15, 2007. Because of excessive vegetation present in the raceway, which is known to interfere with the fathometer and sonar system, manual probing was conducted to measure water depths and sediment thicknesses. Additional manual probing was conducted on November 16, 2007, to further delineate areas where depositional sediment was encountered within the canal. The following sections provide details of the field activities for the canal and raceway sampling.

2.2.1 AOC A—Seneca-Cayuga Canal

Hydroacoustic profiling, using a bathymetric and sub-bottom profile survey of the canal, was conducted along three longitudinal transects and 24 perpendicular transects between the western end of the facility property and extending approximately 150 feet downstream of the Gorham Street bridge, using the following equipment (Figure 1):

- Fathometer (Innerspace Technologies Model 455)
- Trimble® differential global positioning system (DGPS)
- Sub-bottom profiler (ODEC Stratabox® sonar system)

The hydroacoustic profiling was supplemented using manual probing, which consisted of using a metal push rod marked off in 0.1-foot increments to locate the presence and measure the depth of soft sediment. Manual probing was performed at 166 canal locations. The probe was manually inserted into sediment, and upon refusal, the depth of penetration was recorded. (Note: If refusal was encountered immediately upon insertion of the probe, the probe was slightly repositioned to ensure it was not situated on a rock. Three attempts were made to acquire measurable soft sediment, prior to recording a zero thickness.) Staff members recorded each probing location with a Trimble® DGPS provided by ASI.

Additional sediment thickness measurements were collected at 126 locations (that is, 126 of the 166 total probing locations) in areas where measurable depositional sediment was encountered (that is, greater than 0.5 foot) in an effort to delineate the vertical and lateral extent of the deposit. These locations were positioned in all directions surrounding the initial location. Probing continued until 0.1 foot or less of sediment was encountered.

In areas where soft sediment was not recorded by sub-bottom profile survey (such as along Transects 1 through 12), three manual probing locations were added to confirm the lack of soft sediment. As indicated above, three attempts at each location were made to obtain measurable thicknesses of soft sediment.

2.2.2 Canal Raceways

As with the canal characterization, a combination of hydroacoustic profiling and manual probing was used to meet the objective; however, the fathometer and sub-bottom acoustic profiler could not be used in the raceway because of the excessive aquatic vegetation present. As a result, bathymetric and sediment profiles were obtained exclusively using manual probing. Probing was conducted along 13 perpendicular transects established within the raceway (Figure 2). Manual probing was performed at 102 raceway locations.

The following methodology was used:

- Probing stations were placed approximately 5 feet apart along each transect.
- At each station, a push rod was used to measure the water depth. The metal rod was then manually inserted into sediment until refusal and the thickness was recorded.
- Staff members recorded station locations with a Trimble® DGPS provided by ASI.

Additional probing locations were not required, based on the homogeneity of the sediment deposits in the raceway.

2.3 Phase I Characterization Results

2.3.1 AOC A—Seneca-Cayuga Canal Results

Details of the bathymetric and sub-bottom survey conducted by ASI are provided in a geophysical report in Appendix A. The following is a summary of the results.

Sub-bottom Profiling Results

Figure 1 shows the geospatially accurate transects used for the sub-bottom profiling. The maximum penetration of the sonar was 2 feet, which occurred along the bank of the canal opposite of the facility, while penetration was less than 1 foot for most of the canal. Given the limited penetration of the sonar into soft sediment, attributed to lack of soft sediment, sub-bottom sonar was supplemented with manual probing to obtain an accurate profile of the canal.

Probing Results

Geospatially accurate manual probing locations for the canal are shown on Figure 3. The results of the manual probing, shown on Figure 4, indicate that soft sediment was predominately located along the south side of the canal (across from the facility).

Cross-sectional views of each transect are presented on Figures 21 through 44 of the ASI geophysical report (Appendix A). Overall, measurable sediment thicknesses ranged from 0.1 to 3.7 feet, with the thickest areas of soft sediment located between Transects 19 and 20; however, the majority of locations (88 percent) had sediment thicknesses of 0 to 0.5 foot.

Integrated Phase I Results

Figure 5 presents a three-dimensional view of the canal that illustrates the surface water elevation and extent of soft sediment, based on the combined geophysical and mechanical probing results. Areas where no soft sediment was encountered are depicted as a rock layer. As discussed above, the largest soft sediment deposits were localized between Transects 19 and 20 along the canal bank opposite the facility.

The lack of uniform sediment deposits across the canal documented during the Phase I sampling is consistent with what is seen in the photographs taken of the canal (low pool elevation conditions) during the 2004 sediment sampling event. Those photographs (Appendix B) show that the majority of the canal bottom is composed of large boulders, riprap, and/or bedrock. This is consistent with the history of the canal, which was formed when locks and dams were installed to aid navigation through a series of rapids.

In rivers, depositional areas are found in low-energy areas (that is, inside a bend, along the banks, downstream of culverts, and/or near bridge abutments). Because the canal is a controlled system via a lock system and the study area is a fairly straight channel, large deposits of soft sediment would not be expected to settle out within the central portion of the canal; rather, soft sediment particles are expected to settle and accumulate in low-energy areas of the canal (that is, along the banks and/or near Gorham Street bridge abutments). As demonstrated by Phase I, the thickest areas of depositional sediment were encountered along the canal bank (opposite the facility) and near the bridge.

Small deposits of sediment may be present as a veneer on or in the spaces around the boulders and riprap that comprise the canal bottom. This may be the case upstream of Transect 11 and in downstream areas along the thalweg. Because of the flow characteristics, these deposits are likely transitory (that is, represent an equilibrium between deposition and scour) and would not represent a net accumulation of sediment. The Phase I sampling approach was designed to provide a detailed depiction of net depositional sediment in the canal that may be contaminated from releases from the facility. Any deposits that occur as a veneer on or in the interstitial spaces between cobble and boulders are likely transitory and would be small, not represent a release from the facility, and/or not present a significant source of risk.

2.3.2 Canal Raceway Results

Details of the bathymetric and sub-bottom survey conducted by ASI are provided in a geophysical report in Appendix A. The following is a summary of the results.

Geospatially accurate manual probing locations for the raceway are shown on Figure 6. The results of the manual probing are shown on Figure 7 and indicate soft sediment present throughout the raceway. Soft sediment thicknesses ranged from 0.8 to 7 feet, with the thickest deposits in the central portion of the raceway.

Figures 4 through 17 of the ASI geophysical report illustrate the cross-sectional views of each transect (Appendix A). Figure 8 is a three-dimensional model developed to further illustrate the soft sediment throughout the raceway. During manual probing of the raceway, it was noted that the upper layer of soft sediment was predominantly silt (approximately 2 feet in the thickest areas) overlying clay. It also was noted that at refusal, bedrock, concrete, and/or rock was encountered.

SECTION 3

Phase II Sediment Characterization

This section presents the data quality objectives (DQOs) and sampling activities that will be performed as part of the Phase II surface water and sediment characterization for AOC A – Seneca-Cayuga Canal and the canal raceway.

3.1 Data Quality Objectives

As discussed in Section 1, the primary objective of the Phase II investigation for AOC A – Seneca-Cayuga Canal is to determine the nature and extent of constituents from the facility present in sediment at concentrations that pose unacceptable risk to human health and ecological receptors. The primary objective of the Phase II investigation for the canal raceway is to determine what constituents are present in sediment and if those constituents are at concentrations that pose unacceptable risk to human health and ecological receptors. As recommended in USEPA's contaminated sediment remediation guidance (USEPA 2005), USEPA's DQO process (USEPA 2000) was used to identify specific needs for the project and to establish decision rules for collecting sediment samples to support the development of corrective measures. The DQO process is a seven-step iterative planning approach used to prepare plans for environmental data collection activities and is intended to help site managers collect data of the right type, quality, and quantity to support defensible site decisions. The seven steps of the DQO process, which have been established to ensure the investigation objectives are met, are presented in Table 1 for the AOC A – Seneca-Cayuga Canal and canal raceway areas.

3.2 Proposed Phase II Sampling and Analysis Plan

3.2.1 AOC A—Seneca-Cayuga Canal

The proposed Phase II sampling in the canal consists of two efforts:

- Characterize and map the vertical and horizontal extent of depositional sediment in the canal in the area downstream from Phase I Transect 24 to an area immediately upgradient of the Waterloo WWTP outfall
- Characterize the nature and extent of contamination in depositional areas adjacent to and downstream of the facility to an area immediately upgradient of the Waterloo WWTP outfall

Supplemental Downstream Sampling

The Phase I sediment characterization ended approximately 150 feet downstream of the Gorham Street bridge at Transect 24. Additional sediment characterization is proposed to map the vertical and horizontal extent of depositional sediment in the canal in the area downstream from Transect 24 to the upgradient area of the Waterloo WWTP outfall (Figure 9).

The following approach, consistent with Phase I, is proposed:

- Sediment thickness will be measured using manual probing.
- Manual probing will be conducted along 12 transects (Transects 25 to 36) located at approximately 60-foot intervals between Phase I Transect 24 and the Waterloo WWTP outfall.
- Manual probing will be conducted using a push rod at a series of stations along each transect running bank to bank and perpendicular to the left bank, looking downstream. At each location, the metal push rod will inserted by hand from a boat or, if feasible, by wading until refusal is encountered.
- Sediment depth and GPS coordinates will be recorded.

Constituent Characterization

Sediment will be collected from 21 sample locations in the area where Phase I activities (acoustic sub-bottom profiling and manual probing) indicated the presence of soft sediment (Figure 10). Samples will be collected from the following locations:

- Three sample locations in the area between Transects 19 and 20, adjacent to the facility and downstream of Outfalls 001, 002, 005, and 008 (sample locations SCC-SD-1 through SCC-SD-3)
- Fourteen sample locations between Transects 11 and 21 along the south shore of the canal (sample locations SCC-SD-4 through SCC-SD-17)
- Four sample locations between Transects 23 and 24 (sample locations SCC-SD-18 through SCC-SD-21 and subsurface sample locations SCC-SD-18 and SCC-SD-21)

Sediment contamination was documented during the 2004 characterization (CH2M HILL 2004) along the shoreline adjacent to the facility between Outfalls 008 and 006. It is assumed that this area will require remediation and that further delineation is needed for planning purposes. Sediment will be collected from seven locations along the shoreline adjacent to the facility (proposed sample locations SCC-SD-22, SCC-SD-23, SCC-SD-24, SCC-SD-25, SCC-SD-26, SSC-SD-27, and SCC-SD-28). Figure 11 shows the proposed sample locations. These sample locations are located to fill in the gaps between the 2004 sample locations and to supplement sample locations SCC-SD-1 through SCC-SD-3. The source of contamination in this area appears to be historical outfalls. Prior to any remedial action, source control will need to be implemented. Data required for source control are being collected as part of the upland investigation activities.

NYSDEC is making arrangements with the Canal Authority to have the canal water levels lowered to aid in identifying if there is any additional sediment beyond the deposits documented during the Phase I effort, including deposits between rocks and cobble. If additional sediment deposits are observed, efforts will be made to collect sediment in key areas of interest. Observations will focus downstream of Transect 11 in the area of the current and historical outfalls. If sediment deposits are identified, surface samples and subsurface sediment samples, if possible, will be collected where practical. This will include areas where sediment may have accumulated around rocks or cobbles. The number of

samples will depend on the size and frequency of any sediment deposits. It is anticipated that no more than 10 samples of this type will be collected. Based on conversations with NYSDEC, it is anticipated that this sampling will occur in late fall 2009. This approach will need to be modified if NYSDEC cannot get the canal lowered.

Sediment sampling downstream of Transect 24 will be based on the results of the supplemental sediment probing discussed above. Following the supplemental sediment probing, HCC will develop a proposed sample approach for the downstream area. It is anticipated that a similar sampling density to that proposed above will be used in the downstream area. A sampling plan, consisting of a map showing the measured sediment deposits and the proposed sample locations will be submitted to NYSDEC for approval prior to sample collection.

The following sediment sample collection approach is proposed for all sample locations.

1. Establish sample station location.
2. Measure sediment thickness by inserting a metal push rod until refusal is encountered.
3. If sediment thickness is 6 inches or less, collect a surface sample (that is, 0 to 6 inches).
4. If sediment thickness is greater than 6 inches, collect a core sample.

For stations where only surface sampling will be performed, samples will be collected using a stainless steel Ekman grab sampler. For those stations where surface grabs will be taken, the following sample handling procedures will be used:

- Following retrieval of the Ekman grab sampler, check the sampler for the following acceptance criteria:
  - Overlying water is present and has low turbidity.
  - Adequate penetration depth is achieved (within the upper 6 inches).
  - The sampler is not overfilled (no sediment contact with doors).
  - The sediment surface is undisturbed.
  - There are no signs of winnowing or leaking from the sampling device.
- Siphon off overlying water.
- Screen with a photoionization detector (PID).
- Collect subsample of sediment for VOC analysis, using a stainless steel spoon, from the upper 0 to 6 inches without touching the side walls of the sampler and place samples in the appropriate sample collection container.
- Collect remainder of sediment, using a stainless steel spoon, from the upper 0 to 6 inches without touching the side walls of the sampler.
- Place sediment in aluminum foil-lined stainless steel bowl.
- Thoroughly homogenize the sample.
- Place homogenized sediment in appropriate sample container(s).

Appendix C contains the standard operating procedures (SOPs) for collecting, processing, storing, and shipping samples.

Core samples will be collected using either a hand corer or a pneumatic vibratory core system outfitted with a stainless steel core barrel and lined with a disposable 6-mil-thick polyethylene sleeve[1].

For those stations where cores are collected, the cores will be handled as follows:

- Following removal from the core tube, the core will be sectioned into the following depth intervals:
  - 0- to 6-inch horizon
  - 6 to 12 inches
  - 1-foot intervals thereafter
- Screen with a PID.
- Collect a subsample for VOC analysis from each depth interval and place in appropriate sample container.
- Place sediment from each depth interval in aluminum foil-lined stainless steel bowl.
- Thoroughly homogenize the sample.
- Place homogenized sediment in appropriate sample container(s).

The following analyses will be performed on the Seneca-Cayuga Canal sediment samples:

- Metals (USEPA Methods 6010B/7471)
- SVOCs (USEPA Method 8270C)
- VOCs (USEPA Method 8260B)
- PCBs (USEPA Method 8082)
- Grain size (WinSieve Analysis, American Society for Testing and Materials [ASTM] Method D-422)
- TOC (USEPA Region 2 Lloyd-Kahn Method)

A sample analysis matrix is summarized in Table 2. Table 3 contains the TAL along with the method reporting limits (MRLs)[2] and analytical methods for the samples. In addition, the analytical results will present the top 10 tentatively identified compounds (TICs) and the following common facility-related compounds: thioglycolic acid, dithiodiglycolic acid, mercaptopropionic acid, thiodipropionic acid, and dithiodipropionic acid.

In addition to the sediment characterization, a series of surface water samples are proposed to document the following:

- Potential transport of constituents into the area
- Potential flux of constituents from sediment in the canal adjacent to the facility
- Potential transport of constituents out of the area associated with the facility

[1] Sediment sampling method may be changed based on conditions in the Seneca-Cayuga Canal.

[2] Method reporting limits are those required by the New York State Analytical Laboratories Protocol.

Surface water samples will be collected from eight locations (Figure 12). Two sample locations will be upstream of Phase I Transect 1, two along Transect 11, two downstream of Transect 24, and two at the Transect 36 just upstream of the Waterloo WWTP outfall. A grab sample will be collected from midway in the water column using a Teflon® hose and portable pump. Appendix C contains the SOPs for collecting, processing, storing, and shipping water samples.

The following analyses will be performed on the Seneca-Cayuga Canal surface water samples:

- SVOCs (USEPA 3510C/3520C/8270C)
- PCBs (USEPA Method 3510C/3520C/8082)
- Total metals (USEPA Method 3010A/3020A-SW6010B /7000 Series)
- Dissolved metals (USEPA Method 3010A/3020A-SW6010B /7000 Series)
- Total suspended solids (TSS) (USEPA Method 160.2)
- Hardness

A sample analysis matrix is summarized in Table 2. Table 3 contains the TAL along with the MRLs and analytical methods for the samples. In addition, the following field measurements will be taken:

- Water temperature
- Hydrogen ion concentration (pH)
- Conductivity
- Dissolved oxygen
- Turbidity

Flow velocity will be measured at three points along each transect described above. Water velocity will be measure at 50 percent of water depth at each location where a water sample is collected and in the thalweg.

3.2.2 Canal Raceway

Seven sediment cores (surface to refusal) (CR-SD-1 through CR-SD-7) will be collected from the canal raceway (Figure 13). Samples will be collected along the centerline of the raceway at Phase I Transects 1, 3, 5, 7, 9, 10, and 13. However, it should be noted that the approach presented here may change based on Evans Chemetics plans to dredge the raceway to increase water flow for noncontact cooling water.

Sediment samples will be collected using a pneumatic vibratory core system outfitted with a stainless steel core barrel and lined with a disposable 6-mil-thick polyethylene sleeve[3]. Appendix C contains the SOPs for collecting, processing, storing, and shipping samples.

Sediment cores will be sectioned, homogenized, and sampled using the same methods described for the canal samples. All sampled depth intervals from sample stations SD-04, SD-06, and SD-07 will be submitted for chemical analysis. Only the surficial samples (0 to 6 inches below sediment surface) from stations SD-01, SD-02, SD-03, and SD-05 will be submitted for analysis at this time. The remaining depth interval samples will be archived

[3] Sediment sampling method may be changed based on conditions in the Seneca-Cayuga Canal.

for future analysis if the Phase II results warrant it. Analysis of archived samples will be done within acceptable holding times. If PID measurements indicate the potential presence of VOCs, NYSDEC will be consulted regarding the need to analyze equivalent zone in nearby core within the required holding times. The following analyses will be performed on the canal raceway sediment samples:

- Metals (USEPA Methods 6010B/7471)
- SVOCs (USEPA Method 8270C)
- VOCs (USEPA Method 8260B)
- PCBs (USEPA Method 8082)
- Grain size (WinSieve Analysis, ASTM Method D-422)
- TOC (USEPA Region 2 Lloyd-Kahn Method)

A sample analysis matrix is summarized in Table 2. Table 3 contains the TAL along with the MRLs and analytical methods for the samples. In addition, the analytical results will present the top 10 TICs and the following common facility-related compounds: thioglycolic acid, dithiodiglycolic acid, mercaptopropionic acid, thiodipropionic acid, and dithiodipropionic acid.

As described for the canal, a series of surface water samples are proposed for the raceway to document the following:

- Potential transport of constituents into the raceway from upstream
- Potential flux of constituents from sediment in the raceway
- Potential transport of constituents out of the raceway

Inflow and outflow data for the raceway will be gathered as part of the uplands evaluation.

Surface water samples will be collected from two locations (Figure 14) in the raceway: one at the upstream end in the center and one at the downstream facility water intake. A grab sample will be collected from midway in the water column using a Teflon® hose and portable pump. Appendix C contains the SOPs for collecting, processing, storing, and shipping water samples.

The following analyses will be performed on the canal raceway surface water samples:

- SVOCs (USEPA 3510C/3520C/8270C)
- PCBs (USEPA Method 3510C/3520C/8082)
- Total metals (USEPA Method 3010A/3020A-SW6010B /7000 Series)
- Dissolved metals (USEPA Method 3010A/3020A-SW6010B /7000 Series)
- TSS (USEPA Method 160.2)
- Hardness

A sample analysis matrix is summarized in Table 2. Table 3 contains the TAL along with MRLs and analytical methods for the samples.

In addition, the following field measurements will be taken:

- Water temperature
- pH
- Conductivity

- Dissolved oxygen
- Turbidity

Flow velocity will be measured at three points, centerline and halfway between the centerline and each shore, along a transect at the location of the proposed surface water samples. Water velocity will be measure at 50 percent of water depth.

3.2.3 Upgradient Sampling

Given the knowledge that canal sediment is affected by various constituents farther upstream and that some are naturally occurring (that is, background), sediment characterization is proposed to support development of statistically representative upstream concentrations of constituents of potential concern. These data will supplement the NYSDEC sediment screening values (NYSDEC 1999) in delineating the downstream extent of site-related sediment impacts.

Previous sediment sampling was conducted in the canal upstream of the facility (OBG 2003). Ten sediment samples were collected from a location between East Water Street upstream to below Washington Street (Figure 15) and analyzed for TCL VOCs, TCL SVOCs, PCBs, TAL metals, and TOC (CH2M HILL 2004). Table 4 presents the results of six of those 10 sediment samples that represent surface sediment. Most samples had at least one constituent that exceeded its screening value (NYDEC 1999).

Ten additional upgradient samples are proposed to supplement the existing background samples (SDBK-11 through SDBK-20). In addition, two stations (SDBK-04 and SDBK09) from the 2001 sampling event will be resampled to confirm the 2001 results. Upgradient sediment samples will be collected and handled using the same methods described for the canal samples. The following analyses will be performed on the upgradient sediment samples:

- Metals (USEPA Methods 6010B/7471)
- SVOCs (USEPA Method 8270C)
- VOCs (USEPA Method 8260B)
- PCBs (USEPA Method 8082)
- Grain size (WinSieve Analysis, ASTM Method D-422)
- TOC (USEPA Region 2 Lloyd-Kahn Method)

A sample analysis matrix is summarized in Table 2. Table 3 contains the TAL along with MRLs and analytical methods for the samples.

In addition, stormwater or other discharge points observed in the upgradient area that may be impacting sediment quality will be documented.

The following approach is proposed to define local (that is, upstream) background conditions. The upstream data set will first be examined for outliers. Potential outliers will be identified tentatively with box and whisker plots to identify observations that are much larger or smaller than the rest of the data. If potential outliers are identified, statistical tests will be performed to verify the outliers. The statistical test used will be selected based on the characteristics of the data set and the guidance provided in Section 4.4.2 of *Data Quality Assessment: Statistical Methods for Practitioners* (USEPA 2006). The tests alone will not be

used to discard data points within a data set. Any decision will be made in consultation with NYSDEC, based on judgmental or scientific grounds.

After outliers have been identified and removed, if warranted, the 95 percent upper confidence limit (UCL) of the upstream data set will be calculated using Pro UCL 4.00.04 (USEPA 2009). Nondetects will be estimated using the method recommended by ProUCL based on the observed data distribution.

Site samples (both canal and raceway) will first be compared to the risk-based sediment screening values (NYSDEC 1999). Those constituents that exceed their respective screening value will then be compared to the upstream data to determine if the contamination is similar to local background or appears to be site-related. A constitunet in a site sample will be considered site-related when its concentration exceeds the 95 percent UCL of the upstream data set.

3.2.4 General Sample Handling and Custody

The following sample handling and custody procedures will be used as part of the investigation. Details can be found in the QAPP (OBG 2001) and modifications to the QAPP (CH2M HILL 2004).

The laboratory will provide pre-cleaned containers and shipping coolers. Sample containers, with exception of the resealable plastic bags (if used), will be provided by the laboratory and prepared in accordance with *The Samplers Guide to the CLP Program* (USEPA 2001). Sample containers will be purchased by the laboratory and pre-cleaned to requirements of the USEPA Office of Solid Waste and Emergency Response Directive 9240.05A. Microbac Laboratories, Inc.[4], a New York State-certified laboratory that participates in the NYSDEC laboratory program, will be used.

The field team leader will be responsible for proper sampling, labeling, preserving, and shipping samples to the laboratory to meet the required holding times. Samples will be processed immediately following collection as described in the SOPs (Appendix C). Sample custody and documentation procedures will be followed throughout all sample collection activities. Components of sample custody procedures include the use of field logbooks, sample labels, custody seals, and chain-of-custody forms. The chain-of-custody form must accompany the samples during shipment from the field to the laboratory. Samples will be shipped at the end of each sample day or on a schedule determined in conjunction with the laboratory.

[4] Microbac Laboratories, Inc.
Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750
800-373-4071

SECTION 4

Project Management and Quality Assurance/Quality Control

This section contains information about project requirements related to analytical methods, equipment, QA/QC, sample identification (ID) nomenclature, equipment decontamination, investigation-derived waste (IDW), data validation, and health and safety.

4.1 Sample Containers, Preservation, and Hold Times

The required analytical methods, sample containers, preservation, and hold times to be used for this investigation are presented in Table 5. Details can be found in the QAPP (OBG 2001) and modifications to the QAPP (CH2M HILL 2004).

4.2 Quality Assurance/Quality Control

Field QC samples will be collected in accordance with the QAPP (OBG 2001) and modifications to the QAPP (CH2M HILL 2004) and will include the following:

- Equipment rinsate blanks—Samples of ASTM Type II water will be passed through and over the surface of decontaminated sampling equipment. One equipment rinsate blank will be collected for every 20 field samples or per event if less than 20 samples are collected.
- Trip blank—A trip blank consists of VOC-free water that has been shipped from the laboratory to the site and back to the laboratory for VOC analysis. A trip blank will be included in all coolers containing aqueous samples to be analyzed for VOCs.
- Temperature blanks—One temperature blank will be shipped to the offsite laboratory with each cooler that contains samples requiring preservation at approximately 4 degrees Celsius (°C). The temperature blanks are not to be analyzed for analytical parameters.
- Field duplicates—Field duplicates are samples collected to monitor the precision of the field sampling process. One field duplicate will be collected for every 20 field samples or during each sample event if less than 20 samples are collected.
- Matrix spike (MS)/matrix spike duplicates (MSDs)—Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. The duplicate spike results (MS and MSD) are compared to evaluate precision. One MS/MSD sample set will be collected for every 20 field samples or during each sample event if less than 20 samples are collected.

4.3 Station/Sample Identification

The station IDs for AOC A – Seneca-Cayuga Canal and the canal raceway are summarized in Table 2 and discussed in this section. Sediment sample locations will be designated with the following nomenclature:

- Water Body--Location Number

  Water body is designated as follows:
  AOC A - Seneca-Cayuga Canal: SCC
  Canal raceway: CR

- Sample Type

  Sample type is defined as follows:
  Sediment: SD
  Surface water: SW

  Example for sediment Location 01 in Seneca-Cayuga Canal and canal raceway:
  Sample collected at Seneca-Cayuga Canal: SCC-SD-01
  Sample collected at canal raceway: CR-SD-01

- Sample Depth

  Depth is designated as follows:
  A: 0 to 6 inches
  B: Subsurface
  BW: 6 inches to refusal
  B1….n: 1-foot depth intervals

  Example for Location 01 from Seneca-Cayuga Canal:
  Sample collected at 0 to 6 inches: SCC-SD-01A
  Sample collected at 6 inches to refusal: SCC-SD-01BW
  Subsurface sample collected at first 1-foot depth interval: SCC-SD-01B1

- Duplicated Sample ID

  Example for Location 01 at Seneca-Cayuga Canal: DUP-SCC-SD-01A

- MS/MSD Samples (two separate samples)

  Example for Location 01 at Seneca-Cayuga Canal: SCC-SD-01A-MS and SCC-SD-01A-MSD

- Equipment Rinsate Blank Sample ID at Seneca-Cayuga Canal: EB-MMDDYY-SCC
- Trip Blank (for Equipment Blank): TB-MMDDYY

4.4 Equipment Decontamination

Sampling equipment that is reused in the field will be decontaminated in accordance with the procedures described in the SOP (Appendix C). Excess media and decontamination

materials and liquids will be disposed of in accordance with the procedures described in Section 4.5.

4.5 Investigation-Derived Waste

Solid and liquid IDW will be generated during this investigation. Liquid IDW will consist of decontamination fluids. Solid IDW will consist of excess/waste sediment, personal protective equipment, sampling expendables (for example, tubing, liners, etc.), plastic, and related consumable material. IDW will be handled consistent with the May 2007 Waterloo *Materials Management Plan*, as amended February 2009 (CH2M HILL 2007, revised 2009).

Liquid IDW will be disposed of in the sanitary sewer system. Solid waste that is suspected of being contaminated will be stored in a U.S. Department of Transportation-approved 55-gallon drum. Solid IDW drums will be staged as directed by Dow. Each drum will be labeled with the location, materials contained, and the date the waste was generated. Analytical samples will be collected to characterize the waste as hazardous or nonhazardous; after that determination has been made, the drums will be shipped offsite for disposal.

4.6 Data Validation

All field and analytical data collected under this field effort will be managed in accordance with the QAPP (OBG 2001) and modifications to the QAPP (CH2M HILL 2004).

4.7 Health and Safety

A site-specific HASP that meets regulatory requirements and supports Dow's Health and Safety Program has been prepared in accordance with 29 Code of Federal Regulations 1910.120. The HASP will be updated to include the activities described in this work plan. The HASP addresses worker health and safety, required training, record keeping, and emergency procedures. The HASP will be available and implemented at the time of field activities.

In addition, a community HASP will be developed and implemented as needed.

4.8 Reporting

The results of the Phase II sampling will be presented in addendum to the RFI report. Analytical data will be provided electronically in the NYSDEC Category B format, as described in NYSDEC's 2005 Analytical Services Protocol. A proposed table of contents for the Phase II sediment characterization addendum is provided in Appendix D.

4.9 Schedule

The following is a proposed schedule for Phase II activities:

Phase II Activity	Proposed Schedule
Implement proposed Phase II work plan	30 days following NYSDEC approval
Complete field investigation	14 days
Laboratory analysis and data validation	90 days following completion of field investigation
Submit Phase II sediment characterization RFI addendum to NYSDEC	60 days following completion of analysis and data validation

SECTION 5

References

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Tables

TABLE 1
Data Quality Objectives
Sediment Characterization Phase I Results/Phase II Work Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

1. State the Problem	2. Identify the Decision	3. Identify Inputs to the Decision	4. Define the Study Boundaries	5. Develop a Decision Rule	6. Specify Limits on Decision Error	7. Optimize the Design for Obtaining Data
DQO 1—AOC A - Canal						
Chemicals are present in sediments of AOC A that could potentially pose unacceptable risks to human health and ecological receptors	Determine the nature and extent of chemicals present in the sediments of AOC A at concentrations that pose unacceptable risk to human health and ecological receptors	• Conceptual site model • Representative chemical concentrations for sediment in AOC A • Representative chemical concentrations for surface water in AOC A • Sediment quality values (SQVs) toxicological databases and literature including NYSDEC Technical Guidance for Screening Contaminated Sediments. • New York State Department of Health assessment • Reference area data	Lateral: Primary extent is surface sediment in AOC A between Transects 11 and Waterloo Waste Water Treatment Plant outfall location. Vertical: Surface (0 to 6 inches) and subsurface (6 inches to refusal at 6- to 12-inch interval and subsequent 1-foot depth intervals) Analytical: Metals, SVOCs, PCBs, grain size, and TOC for all samples Temporal: Data that are representative of current or future site conditions	If the weight of evidence at a sample location indicates: • Acceptable risk to human health and ecological receptors, with low uncertainty, then no further action is required • Acceptable risk to human health and ecological receptors, with moderate to high uncertainty about the result, then additional data collection may be necessary • Unacceptable risk to human health and/or ecological receptors, with moderate to high uncertainty about the result, then additional data collection may be necessary • Unacceptable risk to human health and/or ecological receptors, with low uncertainty about the result, then remedial alternatives will be developed for that area	• Sampling design will provide sufficient representative data to characterize the nature and extent of contaminated sediment in AOC A • Analytical data will meet QAPP specifications • Project goal is for 90 percent of the targeted samples to be collected and analyzed	• Apply an evaluation approach to address recognized data gaps: - Evaluate existing data - Identify COPCs where inadequate sample numbers exist to characterize the nature and extent of contamination or samples with insufficient analytical detection limits - Target sampling and analysis to address identified data gaps • A biased sampling approach will be used to collect surface sediment and subsurface samples representative of conditions in AOC A adjacent to the site and downstream to the Waterloo WWTP outfall

TABLE 1
Data Quality Objectives
Sediment Characterization Phase I Results/Phase II Work Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

1. State the Problem	2. Identify the Decision	3. Identify Inputs to the Decision	4. Define the Study Boundaries	5. Develop a Decision Rule	6. Specify Limits on Decision Error	7. Optimize the Design for Obtaining Data
DQO 2—Canal Raceway						
Chemicals may be present in sediments of the Canal Raceway that could potentially pose unacceptable risks to ecological receptors	Determine what chemicals are present in the sediments of the Canal Raceway and if those chemicals are at concentrations that pose unacceptable risk to human health and ecological receptors	• Conceptual site model • Representative chemical concentrations for sediment in Canal Raceway • Representative chemical concentrations for surface water in Canal Raceway • Sediment quality values (SQVs) toxicological databases and literature including NYSDEC Technical Guidance for Screening Contaminated Sediments. • New York State Department of Health assessment • Reference area data	Lateral: Surface sediment along the length of the raceway Vertical: Surface (0 to 6 inches) and subsurface (6 inches to refusal at 6- to 12-inch interval and subsequent 1-foot depth intervals) Analytical: Metals, SVOCs, PCBs, grain size, and TOC for all samples Temporal: Data that are representative of current or future site conditions	If the weight of evidence indicates: • Acceptable risk to human health and ecological receptors, with low uncertainty, then no further action is required • Acceptable risk to human health and ecological receptors, with moderate to high uncertainty about the result, then additional data collection may be necessary • Unacceptable risk to human health and/or ecological receptors, with moderate to high uncertainty about the result, then additional data collection may be necessary • Unacceptable risk to human health and/or ecological receptors, with low uncertainty about the result, then remedial alternatives will be developed	• Sampling design will provide sufficient representative data to characterize the nature and extent of any contaminated sediment in the Canal Raceway • Analytical data will meet QAPP specifications • Project goal is for 90 percent of the targeted samples to be collected and analyzed	• Apply an evaluation approach to address recognized data gaps: - Evaluate existing data - Identify COPCs where inadequate sample numbers exist to characterize the nature and extent of contamination or samples with insufficient analytical detection limits - Target sampling and analysis to address identified data gaps • A biased sampling approach will be used to collect seven surface sediment samples representative of conditions in the Canal Raceway • A biased sampling approach will be used to collect 4 subsurface sediment samples representative of conditions in the Canal Raceway

TABLE 2
Sample Summary
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Station ID	Metals	Volatile Organic Compounds	Semivolatile Organic Compounds	Polychlorinated Biphenyls	Total Organic Carbon	Total Suspended Soilds	Grain Size	Archive
Seneca-Cayuga Canal								
SCC-SD-1	X	X	X	X	X		X	
SCC-SD-2	X	X	X	X	X		X	
SCC-SD-3	X	X	X	X	X		X	
SCC-SD-4	X	X	X	X	X		X	
SCC-SD-5	X	X	X	X	X		X	
SCC-SD-6	X	X	X	X	X		X	
SCC-SD-7	X	X	X	X	X		X	
SCC-SD-8	X	X	X	X	X		X	
SCC-SD-9	X	X	X	X	X		X	
SCC-SD-10	X	X	X	X	X		X	
SCC-SD-11	X	X	X	X	X		X	
SCC-SD-12	X	X	X	X	X		X	
SCC-SD-13	X	X	X	X	X		X	
SCC-SD-14	X	X	X	X	X		X	
SCC-SD-15	X	X	X	X	X		X	
SCC-SD-16	X	X	X	X	X		X	
SCC-SD-17	X	X	X	X	X		X	
SCC-SD-18	X	X	X	X	X		X	
SCC-SD-19	X	X	X	X	X		X	
SCC-SD-20	X	X	X	X	X		X	
SCC-SD-21	X	X	X	X	X		X	
SCC-SD-22	X	X	X	X	X		X	
SCC-SD-23	X	X	X	X	X		X	
SCC-SD-24	X	X	X	X	X		X	
SCC-SD-25	X	X	X	X	X		X	
SCC-SD-26	X	X	X	X	X		X	
SCC-SD-27	X	X	X	X	X		X	
SCC-SD-28	X	X	X	X	X		X	
Seneca-Cayuga Surface Water								
SSCC-SW-1	X		X	X		X		
SSCC-SW-2	X		X	X		X		
SSCC-SW-3	X		X	X		X		
SSCC-SW-4	X		X	X		X		
SSCC-SW-5	X		X	X		X		
SSCC-SW-6	X		X	X		X		
SSCC-SW-7	X		X	X		X		
SSCC-SW-8	X		X	X		X		
Canal Raceway - Surface Sediment								
CR-SD-1A	X	X	X	X	X		X	
CR-SD-2A	X	X	X	X	X		X	
CR-SD-3A	X	X	X	X	X		X	
CR-SD-4A	X	X	X	X	X		X	
CR-SD-5A	X	X	X	X	X		X	
CR-SD-6A	X	X	X	X	X		X	
CR-SD-7A	X	X	X	X	X		X	

TABLE 2
Sample Summary
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Station ID	Metals	Volatile Organic Compounds	Semivolatile Organic Compounds	Polychlorinated Biphenyls	Total Organic Carbon	Total Suspended Soilds	Grain Size	Archive
Canal Raceway - Subsurface Sediment								
CR-SD-1B								X
CR-SD-2B								X
CR-SD-3B								X
CR-SD-4B	X	X	X	X	X		X	
CR-SD-5B								X
CR-SD-6B	X	X	X	X	X		X	
CR-SD-7B	X	X	X	X	X		X	
Canal Raceway - Surface Water								
CR-SW-1	X		X	X		X		
CR-SW-2	X		X	X		X		
Seneca-Cayuga Background								
SDBK-04	X	X	X	X	X		X	
SDBK-09	X	X	X	X	X		X	
SDBK-10	X	X	X	X	X		X	
SDBK-11	X	X	X	X	X		X	
SDBK-12	X	X	X	X	X		X	
SDBK-13	X	X	X	X	X		X	
SDBK-14	X	X	X	X	X		X	
SDBK-15	X	X	X	X	X		X	
SDBK-16	X	X	X	X	X		X	
SDBK-17	X	X	X	X	X		X	
SDBK-18	X	X	X	X	X		X	
SDBK-19	X	X	X	X	X		X	

TABLE 3
Analytical Reporting Limits
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Analyte	Method	Method Reporting Limit[a]	Units
Sediment			
	Metals		
Aluminum	SW-846 3050-SW6010B /7000 Series	20	mg/kg
Iron	SW-846 3050-SW6010B /7000 Series	3	mg/kg
Lead	SW-846 3050-SW6010B /7000 Series	5	mg/kg
Manganese	SW-846 3050-SW6010B /7000 Series	0.5	mg/kg
Mercury	SW-846 3050-SW7471A	0.1	mg/kg
Nickel	SW-846 3050-SW6010B /7000 Series	2	mg/kg
Silver	SW-846 3050-SW6010B /7000 Series	0.5	mg/kg
Antimony	SW-846 3050-SW6010B /7000 Series	10	mg/kg
Arsenic	SW-846 3050-SW6010B /7000 Series	5	mg/kg
Barium	SW-846 3050-SW6010B /7000 Series	0.5	mg/kg
Cadmium	SW-846 3050-SW6010B /7000 Series	0.5	mg/kg
Chromium	SW-846 3050-SW6010B /7000 Series	1	mg/kg
Cobalt	SW-846 3050-SW6010B /7000 Series	1	mg/kg
Copper	SW-846 3050-SW6010B /7000 Series	1	mg/kg
Vanadium	SW-846 3050-SW6010B /7000 Series	0.5	mg/kg
Zinc	SW-846 3050-SW6010B /7000 Series	1	mg/kg
Selenium	SW-846 3050-SW6010B /7000 Series	1	mg/kg
	Volatile Organic Compounds		
Dichlorodifluoromethane (Freon-12)	Soil VOC by SW-846 5035/8260B	5	µg/kg
Chloromethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Vinyl chloride	Soil VOC by SW-846 5035/8260B	5	µg/kg
Bromomethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Chloroethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Trichlorofluoromethane(Freon-11)	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,1-Dichloroethene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	Soil VOC by SW-846 5035/8260B	5	µg/kg
Acetone	Soil VOC by SW-846 5035/8260B	10	µg/kg
Carbon disulfide	Soil VOC by SW-846 5035/8260B	5	µg/kg
Methyl acetate	Soil VOC by SW-846 5035/8260B	5	µg/kg
Methylene chloride	Soil VOC by SW-846 5035/8260B	5	µg/kg
trans-1,2-Dichloroethene	Soil VOC by SW-846 5035/8260B	5	µg/kg
Methyl-tert-butyl ether (MTBE)	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,1-Dichloroethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
cis-1,2-Dichloroethene	Soil VOC by SW-846 5035/8260B	5	µg/kg
2-Butanone	Soil VOC by SW-846 5035/8260B	10	µg/kg
Bromochloromethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Chloroform	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,1,1-Trichloroethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Cyclohexane	Soil VOC by SW-846 5035/8260B	10	µg/kg
Carbon tetrachloride	Soil VOC by SW-846 5035/8260B	5	µg/kg
Benzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,2-Dichloroethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,4-Dioxane	Soil VOC by SW-846 5035/8260B	100	µg/kg
Trichloroethene	Soil VOC by SW-846 5035/8260B	5	µg/kg
Methylcyclohexane	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,2-Dichloropropane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Bromodichloromethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
cis-1,3-Dichloropropene	Soil VOC by SW-846 5035/8260B	5	µg/kg

TABLE 3
Analytical Reporting Limits
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Analyte	Method	Method Reporting Limit[a]	Units
4-Methyl-2-pentanone	Soil VOC by SW-846 5035/8260B	10	µg/kg
Toluene	Soil VOC by SW-846 5035/8260B	5	µg/kg
trans-1,3-Dichloropropene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,1,2-Trichloroethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Tetrachloroethene	Soil VOC by SW-846 5035/8260B	5	µg/kg
2-Hexanone	Soil VOC by SW-846 5035/8260B	10	µg/kg
Dibromochloromethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,2-Dibromoethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
Chlorobenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
Ethylbenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
o-Xylene	Soil VOC by SW-846 5035/8260B	5	µg/kg
m- and p-Xylene	Soil VOC by SW-846 5035/8260B	5	µg/kg
Styrene	Soil VOC by SW-846 5035/8260B	5	µg/kg
Bromoform	Soil VOC by SW-846 5035/8260B	5	µg/kg
Isopropylbenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,1,2,2-Tetrachloroethane	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,3-Dichlorobenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,4-Dichlorobenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,2-Dichlorobenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,2-Dibromo-3-chloropropane	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,2,4-Trichlorobenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
1,2,3-Trichlorobenzene	Soil VOC by SW-846 5035/8260B	5	µg/kg
Semivolatile Organic Compounds			
1,1-Biphenyl	SW-846 3550B, 8270C	165	µg/kg
1,3,5-Trinitrobenzene	SW-846 -8330B	250	µg/kg
1,3-Dinitrobenzene	SW-846 3550B/8270C Ultra low	25	µg/kg
2,4,5-Trichlorophenol	SW-846 3550B/8270C	165	µg/kg
2,4,6-Trichlorophenol	SW-846 3550B/8270C	165	µg/kg
2,4-Dichlorophenol	SW-846 3550B/8270C	165	µg/kg
2,4-Dimethylphenol	SW-846 3550B/8270C Ultra low	25	µg/kg
2,4-Dinitrophenol	SW-846 3550B/8270C Ultra low	100	µg/kg
2,4-Dinitrotoluene	SW-846 3550B/8270C	165	µg/kg
2,6-Dinitrotoluene	SW-846 3550B/8270C Ultra low	25	µg/kg
2-Chloronaphthalene	SW-846 3550B/8270C	165	µg/kg
2-Chlorophenol	SW-846 3550B/8270C Ultra low	25	µg/kg
2-Methylnaphthalene	SW-846 3550B/8270C PAHL	5	µg/kg
2-Methylphenol	SW-846 3550B/8270C Ultra low	25	µg/kg
2-Nitroaniline	SW-846 3550B/8270C	825	µg/kg
2-Nitrophenol	SW-846 3550B/8270C Ultra low	25	µg/kg
3,3'-Dichlorobenzidine	SW-846 3550B/8270C Ultra low	25	µg/kg
3-Nitroaniline	SW-846 3550B/8270C Ultra low	100	µg/kg
4-Bromophenyl-phenylether	SW-846 3550B/8270C	165	µg/kg
4-Chloroaniline	SW-846 3550B/8270C Ultra low	25	µg/kg
4-Methylphenol	SW-846 3550B/8270C	165	µg/kg
4-Nitrophenol	SW-846 3550B/8270C Ultra low	100	µg/kg
Acenaphthene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Acenaphthylene	SW-846 3550B/8270C PAHL	5	µg/kg
Anthracene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Benzo(a)anthracene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Benzo(a)pyrene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Benzo(b)fluoranthene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg

TABLE 3
Analytical Reporting Limits
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Analyte	Method	Method Reporting Limit[a]	Units
Benzo(g,h,i)perylene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Benzo(k)fluoranthene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Benzoic acid	SW-846 3550B/8270C	5000	µg/kg
Benzyl alcohol	SW-846 3550B/8270C Ultra low	25	µg/kg
bis(2-Chloroethoxy)methane	SW-846 3550B/8270C Ultra low	25	µg/kg
bis(2-Chloroethyl)ether	SW-846 3550B/8270C	165	µg/kg
bis(2-Ethylhexyl)phthalate	SW-846 3550B/8270C	165	µg/kg
Butylbenzylphthalate	SW-846 3550B/8270C	165	µg/kg
Carbazole	SW-846 3550B/8270C	165	µg/kg
Chrysene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Dibenz(a,h)anthracene	SW-846 3550B/8270C PAHL	5	µg/kg
Dibenzofuran	SW-846 3550B/8270C	165	µg/kg
Diethylphthalate	SW-846 3550B/8270C	165	µg/kg
Dimethyl phthalate	SW-846 3550B/8270C Ultra low	25	µg/kg
Di-n-butylphthalate	SW-846 3550B/8270C	165	µg/kg
Di-n-octylphthalate	SW-846 3550B/8270C	165	µg/kg
Fluoranthene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Fluorene	SW-846 3550B/8270C	165	µg/kg
Hexachlorobenzene	SW-846 3550B/8270C Ultra low	165	µg/kg
Hexachlorobutadiene	SW-846 3550B/8270C	165	µg/kg
Hexachlorocyclopentadiene	SW-846 3550B/8270C	165	µg/kg
Hexachloroethane	SW-846 3550B/8270C	165	µg/kg
Indeno(1,2,3-cd)pyrene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Isophorone	SW-846 3550B/8270C	165	µg/kg
Naphthalene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Nitrobenzene	SW-846 3550B/8270C	165	µg/kg
n-Nitrosodiphenylamine	SW-846 3550B/8270C	165	µg/kg
PAH, total	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Pentachlorophenol	SW-846 3550B/8270C Ultra low	100	µg/kg
Phenanthrene	SW-846 3550B/8270C/8270 PAHL	165	µg/kg
Phenol	SW-846 3550B/8270C	165	µg/kg
Pyrene	SW-846 3550B/8270C	165	µg/kg
	PCBs		
Aroclor-1016	SW-846 3550B, 8082	16.5	µg/kg
Aroclor-1221	SW-846 3550B/8082	16.5	µg/kg
Aroclor-1232	SW-846 3550B/8082	16.5	µg/kg
Aroclor-1242	SW-846 3550B/8082	16.5	µg/kg
Aroclor-1248	SW-846 3550B/8082	16.5	µg/kg
Aroclor-1254	SW-846 3550B/8082	16.5	µg/kg
Aroclor-1260	SW-846 3550B/8082	16.5	µg/kg
Surface Water			
	Metals		
Aluminum	SW-846 3010A/3020A-SW6010B /7000 Series	0.1	mg/L
Antimony	SW-846 3015-SW6020 /7000 Series	0.001	mg/L
Arsenic	SW-846 3010A/3020A-SW6010B /7000 Series	0.1	mg/L
Barium	SW-846 3010A/3020A-SW6010B /7000 Series	0.01	mg/L
Beryllium	SW-846 3010A/3020A-SW6010B /7000 Series	0.002	mg/L
Cadmium	SW-846 3010A/3020A-SW6010B /7000 Series	0.0005	mg/L
Chromium	SW-846 3010A/3020A-SW6010B /7000 Series	0.005	mg/L
Cobalt	SW-846 3010A/3020A-SW6010B /7000 Series	0.02	mg/L

TABLE 3
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The Dow Chemical Company, Waterloo, New York

Analyte	Method	Method Reporting Limit[a]	Units
Copper	SW-846 3010A/3020A-SW6010B /7000 Series	0.005	mg/L
Iron	SW-846 3010A/3020A-SW6010B /7000 Series	0.1	mg/L
Lead	SW-846 3015-SW6020 /7000 Series	0.001	mg/L
Manganese	SW-846 3010A/3020A-SW6010B /7000 Series	0.01	mg/L
Mercury	SW-846 3010A/3020A-SW7470A	0.0002	mg/L
Molybdenum	SW-846 3010A/3020A-SW6010B /7000 Series	0.1	mg/L
Nickel	SW-846 3010A/3020A-SW6010B /7000 Series	0.04	mg/L
Silver	SW-846 3015-SW6020 /7000 Series	0.001	mg/L
Thallium	SW-846 3010A/3020A-SW6010B /7000 Series	0.0002	mg/L
Vanadium	SW-846 3010A/3020A-SW6010B /7000 Series	0.01	mg/L
Zinc	SW-846 3010A/3020A-SW6010B /7000 Series	0.02	mg/L
Selenium	SW-846 3010A/3020A-SW6010B /7000 Series	0.001	mg/L
Semivolatile Organic Compounds			
1,1-Biphenyl	SW-846 3510C/3520C/8270c	5	µg/L
1,3,5-Trinitrobenzene	SW-846 8330B	1	µg/L
1,3-Dinitrobenzene	SW-846 3510C/3520C/8270c	5	µg/L
2,4,5-Trichlorophenol	SW-846 3510C/3520C/8270c	5	µg/L
2,4,6-Trichlorophenol	SW-846 3510C/3520C/8270c	5	µg/L
2,4-Dichlorophenol	SW-846 3510C/3520C/8270c	5	µg/L
2,4-Dimethylphenol	SW-846 3510C/3520C/8270c	5	µg/L
2,4-Dinitrophenol	SW-846 3510C/3520C/8270c	25	µg/L
2,4-Dinitrotoluene	SW-846 3510C/3520C/8270c	5	µg/L
2,6-Dinitrotoluene	SW-846 3510C/3520C/8270c	5	µg/L
2-Chloronaphthalene	SW-846 3510C/3520C/8270c	5	µg/L
2-Chlorophenol	SW-846 3510C/3520C/8270c	5	µg/L
2-Methylnaphthalene	SW-846 3510C/3520C/8270c	5	µg/L
2-Methylphenol	SW-846 3510C/3520C/8270c	5	µg/L
2-Nitroaniline	SW-846 3510C/3520C/8270c	25	µg/L
2-Nitrophenol	SW-846 3510C/3520C/8270c	5	µg/L
3,3'-Dichlorobenzidine	SW-846 3510C/3520C/8270c	5	µg/L
3-Nitroaniline	SW-846 3510C/3520C/8270c	25	µg/L
4,6-Dinitro-2-methylphenol	SW-846 3510C/3520C/8270c Ultra Low	2	µg/L
4-Bromophenyl-phenylether	SW-846 3510C/3520C/8270c Ultra Low	0.5	µg/L
4-Chloro-3-methylphenol	SW-846 3510C/3520C/8270c Ultra Low	0.5	µg/L
4-Chloroaniline	SW-846 3510C/3520C/8270c	5	µg/L
4-Chlorophenyl-phenylether	SW-846 3510C/3520C/8270c	5	µg/L
4-Methylphenol	SW-846 3510C/3520C/8270c	5	µg/L
4-Nitroaniline	SW-846 3510C/3520C/8270c	25	µg/L
4-Nitrophenol	SW-846 3510C/3520C/8270c	25	µg/L
Acenaphthene	SW-846 3510C/3520C/8270c	5	µg/L
Acenaphthylene	SW-846 3510C/3520C/8270c	5	µg/L
Anthracene	SW-846 3510C/3520C/8270c SIM	0.05	µg/L
Benzo(a)anthracene	SW-846 3510C/3520C/8270c SIM	0.05	µg/L
Benzo(a)pyrene	SW-846 3510C/3520C/8270c SIM	0.05	µg/L
Benzo(b)fluoranthene	SW-846 3510C/3520C/8270c	5	µg/L
Benzo(g,h,i)perylene	SW-846 3510C/3520C/8270c	5	µg/L
Benzo(k)fluoranthene	SW-846 3510C/3520C/8270c	5	µg/L
Benzoic acid	SW-846 3510C/3520C/8270c	20	µg/L
Benzyl alcohol	SW-846 3510C/3520C/8270c	5	µg/L
bis(2-Chloroethoxy)methane	SW-846 3510C/3520C/8270c	5	µg/L
bis(2-Chloroethyl)ether	SW-846 3510C/3520C/8270c	5	µg/L

TABLE 3
Analytical Reporting Limits
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Analyte	Method	Method Reporting Limit[a]	Units
bis(2-Ethylhexyl)phthalate	SW-846 3510C/3520C/8270c	5	µg/L
Butylbenzylphthalate	SW-846 3510C/3520C/8270c	5	µg/L
Carbazole	SW-846 3510C/3520C/8270c	20	µg/L
Chrysene	SW-846 3510C/3520C/8270c	5	µg/L
Dibenz(a,h)anthracene	SW-846 3510C/3520C/8270c	5	µg/L
Dibenzofuran	SW-846 3510C/3520C/8270c	5	µg/L
Diethylphthalate	SW-846 3510C/3520C/8270c	5	µg/L
Dimethyl phthalate	SW-846 3510C/3520C/8270c	5	µg/L
Di-n-butylphthalate	SW-846 3510C/3520C/8270c	5	µg/L
Di-n-octylphthalate	SW-846 3510C/3520C/8270c Ultra Low	2	µg/L
Fluoranthene	SW-846 3510C/3520C/8270c	5	µg/L
Fluorene	SW-846 3510C/3520C/8270c	5	µg/L
Hexachlorobenzene	SW-846 3510C/3520C/8270c	5	µg/L
Hexachlorobutadiene	SW-846 3510C/3520C/8270c	5	µg/L
Hexachlorocyclopentadiene	SW-846 3510C/3520C/8270c	5	µg/L
Hexachloroethane	SW-846 3510C/3520C/8270c	5	µg/L
Indeno(1,2,3-cd)pyrene	SW-846 3510C/3520C/8270c	5	µg/L
Isophorone	SW-846 3510C/3520C/8270c	5	µg/L
Naphthalene	SW-846 3510C/3520C/8270c	5	µg/L
Nitrobenzene	SW-846 3510C/3520C/8270c	5	µg/L
n-Nitroso-di-n-propylamine	SW-846 3510C/3520C/8270c	5	µg/L
n-Nitrosodiphenylamine	SW-846 3510C/3520C/8270c	5	µg/L
Pentachlorophenol	SW-846 3510C/3520C/8270c	5	µg/L
Phenanthrene	SW-846 3510C/3520C/8270c	5	µg/L
Phenol	SW-846 3510C/3520C/8270c	5	µg/L
Pyrene	SW-846 3510C/3520C/8270c	5	µg/L
PCBs			
Aroclor-1016	SW-846 3550B, 8082	0.5	µg/L
Aroclor-1221	SW-846 3550B/8082	0.5	µg/L
Aroclor-1232	SW-846 3550B/8082	0.5	µg/L
Aroclor-1242	SW-846 3550B/8082	0.5	µg/L
Aroclor-1248	SW-846 3550B/8082	0.5	µg/L
Aroclor-1254	SW-846 3550B/8082	0.5	µg/L
Aroclor-1260	SW-846 3550B/8082	0.5	µg/L

[a] - Method reporting limits are those required by the NYS Analytical Laboratories Protocol (ASP)

TABLE 4
Historical Background Sediment Results
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

StationID			SDBK-01		SDBK-02		SDBK-03		SDBK-04		SDBK-05		SDBK-06		SDBK-07		SDBK-08		SDBK-09		SDBK-10	
Sample Depth (ft)>>			0.5 - 1		0 - 0.7		0 - 0.7		0 - 0.5		0 - 0.5		0.5 - 1		0.5 - 1		0 - 0.5		0 - 0.5		0.5 - 1	
SampleDate			12/5/2001		12/5/2001		12/5/2001		12/5/2001		12/5/2001		12/6/2001		12/6/2001		12/6/2001		12/6/2001		12/6/2001	
AnalyteName	CAS	Units																				
Metal (mg/kg)																						
Aluminum	7429-90-5	mg/kg	**4300**		**2900**		**4100**		**2900**		**3600**		**5200**		**3400**		**11000**		**3400**		**3400**	
Antimony	7440-36-0	mg/kg	**0.3**	**J**	8	U	**0.5**	**J**	**0.4**	**J**	**0.3**	**J**	**0.6**	**J**	8	U	**4**	**J**	**0.7**	**J**	**0.3**	**J**
Arsenic	7440-38-2	mg/kg	**4.7**		**3.2**		**10**		**6.3**		**4.7**		**5.8**		**5**		**35**		**10**		**9.5**	
Barium	7440-39-3	mg/kg	**20**		**20**		**20**		**40**		**30**		**40**		**30**		**80**		**40**		**40**	
Beryllium	7440-41-7	mg/kg	**0.3**	**J**	**0.3**	**J**	**0.3**	**J**	**0.3**	**J**	**0.3**	**J**	**0.4**	**J**	**0.2**	**J**	**0.5**	**J**	**0.3**	**J**	**0.3**	**J**
Cadmium	7440-43-9	mg/kg	**0.1**	**J**	**0.3**	**J**	**0.2**	**J**	**1.3**	**J**	**0.2**	**J**	**0.5**	**J**	**0.3**	**J**	**0.3**	**J**	**0.2**	**J**	**0.2**	**J**
Calcium	7440-70-2	mg/kg	**54000**		**88000**		**110000**		**66000**		**84000**		**49000**		**66000**		**79000**		**170000**		**160000**	
Chromium	7440-47-3	mg/kg	**8**		**7**		**12**		**12**		**8**		**12**		**8**		**40**		**14**		**10**	
Cobalt	7440-48-4	mg/kg	**5**	**J**	**5**	**J**	**8**		**4**	**J**	**5**	**J**	**5**	**J**	**4**	**J**	**20**	**J**	**5**	**J**	**5**	**J**
Copper	7440-50-8	mg/kg	**11**		**19**		**50**		**16**		**15**		**130**		**91**		**150**		**41**		**49**	
Cyanide	57-12-5	mg/kg	0.6	U	0.66	U	0.65	U	0.71	U	0.69	U	0.89	U	0.69	U	0.67	U	0.7	U	0.65	U
Iron	7439-89-6	mg/kg	**12000**		**8400**		**20000**		**15000**		**11000**		**15000**		**10000**		**120000**		**32000**		**21000**	
Lead	7439-92-1	mg/kg	**14**		**46**		**32**		**130**		**37**		**100**		**71**		**190**		**120**		**84**	
Magnesium	7439-95-4	mg/kg	**15000**		**12000**		**22000**		**12000**		**24000**		**8800**		**8800**		**14000**		**33000**		**30000**	
Manganese	7439-96-5	mg/kg	**320**		**210**		**290**		**210**		**200**		**180**		**180**		**510**		**480**		**360**	
Mercury	7439-97-6	mg/kg	**0.05**		**0.04**		**0.21**		**0.3**		**0.15**		**0.32**		**0.14**		**0.04**		**0.03**		**0.03**	
Nickel	7440-02-0	mg/kg	**11**		**9**		**21**		**9**		**11**		**13**		**9**		**93**		**14**		**12**	
Potassium	7440-09-7	mg/kg	**700**		**800**		**1200**		**500**	**J**	**700**	**J**	**900**	**J**	**600**	**J**	**800**		**800**		**900**	
Selenium	7782-49-2	mg/kg	**0.5**	**J**	0.7	U	**0.5**	**J**	**0.7**	**J**	**0.3**	**J**	**1.1**		**0.5**	**J**	**3**	**J**	**0.6**	**J**	**0.6**	**J**
Silver	7440-22-4	mg/kg	1	U	1	U	1	U	1	U	1	U	2	U	**0.2**	**J**	**0.2**	**J**	1	U	1	U
Sodium	7440-23-5	mg/kg	**200**		**200**		**200**		**300**		**300**		**400**		**200**		**200**		**400**		**400**	
Thallium	7440-28-0	mg/kg	1	U	1	U	1	U	1	U	1	U	2	U	1	U	1	U	**0.7**	**J**	**0.7**	**J**
Vanadium	7440-62-2	mg/kg	**11**		**10**		**14**		**8**		**10**		**12**		**9**		**20**	**J**	**10**		**10**	
Zinc	7440-66-6	mg/kg	**64**		**74**		**110**		**380**		**84**		**210**		**80**		**360**		**62**		**67**	
PEST/PCB (µg/kg)																						
Aroclor-1016	12674-11-2	µg/kg	20	U	22	U	22	U	24	U	23	U	30	U	23	U	22	U	23	U	22	U
Aroclor-1221	11104-28-2	µg/kg	20	U	22	U	22	U	24	U	23	U	30	U	23	U	22	U	23	U	22	U
Aroclor-1232	11141-16-5	µg/kg	20	U	22	U	22	U	24	U	23	U	30	U	23	U	22	U	23	U	22	U
Aroclor-1242	53469-21-9	µg/kg	20	U	22	U	22	U	24	U	23	U	30	U	23	U	22	U	23	U	22	U
Aroclor-1248	12672-29-6	µg/kg	20	U	22	U	22	U	24	U	23	U	30	U	23	U	22	U	23	U	22	U
Aroclor-1254	11097-69-1	µg/kg	**8.1**	**J**	**24**		**13**	**J**	**28**		**12**	**J**	**10**	**J**	**26**		**8.2**	**J**	**50**		**100**	
Aroclor-1260	11096-82-5	µg/kg	20	U	22	U	22	U	24	U	23	U	30	U	23	U	22	U	23	U	22	U
SVOC (µg/kg)																						
Acenaphthene	83-32-9	µg/kg	400	U	**370**	**J**	**47**	**J**	**140**	**J**	**240**	**J**	**110**	**J**	460	U	450	U	460	U	430	U
Acenaphthylene	208-96-8	µg/kg	400	U	**130**	**J**	430	U	**190**	**J**	**49**	**J**	**150**	**J**	**90**	**J**	450	U	460	U	430	U
Anthracene	120-12-7	µg/kg	400	U	**840**	**J**	**130**	**J**	**1400**		**1100**		**390**	**J**	**180**	**J**	450	U	460	U	430	U
Benzo (a) anthracene	56-55-3	µg/kg	**59**	**J**	**1700**		**460**		**4100**		**3500**		**1400**		**610**		450	U	**79**	**J**	**130**	**J**
Benzo (a) pyrene	50-32-8	µg/kg	**43**	**J**	**1400**		**380**	**J**	**2200**		**2900**		**1300**		**550**		450	U	**77**	**J**	**97**	**J**
Benzo (b) fluoranthene	205-99-2	µg/kg	**67**	**J**	**2200**		**500**		**3300**		**3800**		**1700**		**730**		450	U	**99**	**J**	**130**	**J**
Benzo (g,h,i) perylene	191-24-2	µg/kg	400	U	**190**	**J**	**180**	**J**	**830**		**510**	**J**	**720**		**320**	**J**	450	U	**49**	**J**	**60**	**J**

TABLE 4
Historical Background Sediment Results
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

StationID			SDBK-01		SDBK-02		SDBK-03		SDBK-04		SDBK-05		SDBK-06		SDBK-07		SDBK-08		SDBK-09		SDBK-10	
Sample Depth (ft)>>			0.5 - 1		0 - 0.7		0 - 0.7		0 - 0.5		0 - 0.5		0.5 - 1		0.5 - 1		0 - 0.5		0 - 0.5		0.5 - 1	
SampleDate			12/5/2001		12/5/2001		12/5/2001		12/5/2001		12/5/2001		12/6/2001		12/6/2001		12/6/2001		12/6/2001		12/6/2001	
AnalyteName	CAS	Units																				
Benzo(k)fluoranthene	207-08-9	µg/kg	400	U	**640**		**170**	**J**	**990**		**1200**		**440**	**J**	**260**	**J**	450	U	460	U	430	U
Bis (2-chloroethoxy) methane	111-91-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Bis (2-chloroethyl) ether	111-44-4	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Bis (2-chloroisopropyl) ether	108-60-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Bis (2-ethylhexyl) phthalate	117-81-7	µg/kg	**66**	**J**	**480**		**210**	**J**	**68**	**J**	**73**	**J**	600	U	460	U	**50**	**J**	**75**	**J**	430	U
4-Bromophenyl phenyl ether	101-55-3	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Butyl benzylphthalate	85-68-7	µg/kg	400	U	**250**	**J**	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Carbazole	86-74-8	µg/kg	400	U	**350**	**J**	430	U	**220**	**J**	**460**	**J**	**150**	**J**	**56**	**J**	450	U	460	U	430	U
4-Chloro-3-methylphenol	59-50-7	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
4-Chloroaniline	106-47-8	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
2-Chloronaphthalene	91-58-7	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
2-Chlorophenol	95-57-8	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
4-Chlorophenyl phenyl ether	7005-72-3	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Chrysene	218-01-9	µg/kg	**53**	**J**	**1700**		**400**	**J**	**4000**		**3600**		**1400**		**670**		450	U	**74**	**J**	**120**	**J**
Di-n-butylphthalate	84-74-2	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Di-n-octylphthalate	117-84-0	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Dibenzo (a,h) anthracene	53-70-3	µg/kg	400	U	**130**	**J**	430	U	**260**	**J**	**330**	**J**	**140**	**J**	**67**	**J**	450	U	460	U	430	U
Dibenzofuran	132-64-9	µg/kg	400	U	**270**	**J**	430	U	**210**	**J**	**94**	**J**	**71**	**J**	460	U	450	U	460	U	430	U
1,2-Dichlorobenzene	95-50-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
1,3-Dichlorobenzene	541-73-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
1,4-Dichlorobenzene	106-46-7	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
3,3'-Dichlorobenzidine	91-94-1	µg/kg	810	U	880	U	870	U	950	U	920	U	1200	U	930	U	900	U	930	U	860	U
2,4-Dichlorophenol	120-83-2	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Diethyl phthalate	84-66-2	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Dimethyl phthalate	131-11-3	µg/kg	400	U	**96**	**J**	430	U	**50**	**J**	460	U	600	U	460	U	450	U	460	U	430	U
2,4-Dimethylphenol	105-67-9	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
4,6-Dinitro-2-methylphenol	534-52-1	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
2,4-Dinitrophenol	51-28-5	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
2,4-Dinitrotoluene	121-14-2	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
2,6-Dinitrotoluene	606-20-2	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Fluoranthene	206-44-0	µg/kg	**110**	**J**	**3900**		**940**		**10000**		**7800**		**3500**		**1400**		450	U	**110**	**J**	**220**	**J**
Fluorene	86-73-7	µg/kg	400	U	**410**	**J**	**51**	**J**	**410**	**J**	**340**	**J**	**160**	**J**	**58**	**J**	450	U	460	U	430	U
Hexachlorobenzene	118-74-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Hexachlorobutadiene	87-68-3	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Hexachlorocyclopentadiene	77-47-4	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Hexachloroethane	67-72-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Indeno (1,2,3-c,d) pyrene	193-39-5	µg/kg	400	U	**510**		**210**	**J**	**1100**		**1400**		**650**		**310**	**J**	450	U	**51**	**J**	**57**	**J**
Isophorone	78-59-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
2-Methylnaphthalene	91-57-6	µg/kg	400	U	**180**	**J**	430	U	**240**	**J**	**53**	**J**	**71**	**J**	460	U	450	U	460	U	430	U
2-Methylphenol	95-48-7	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
4-Methylphenol	106-44-5	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U

TABLE 4
Historical Background Sediment Results
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

StationID			SDBK-01		SDBK-02		SDBK-03		SDBK-04		SDBK-05		SDBK-06		SDBK-07		SDBK-08		SDBK-09		SDBK-10	
Sample Depth (ft)>>			**0.5 - 1**		**0 - 0.7**		**0 - 0.7**		**0 - 0.5**		**0 - 0.5**		**0.5 - 1**		**0.5 - 1**		**0 - 0.5**		**0 - 0.5**		**0.5 - 1**	
SampleDate			**12/5/2001**		**12/5/2001**		**12/5/2001**		**12/5/2001**		**12/5/2001**		**12/6/2001**		**12/6/2001**		**12/6/2001**		**12/6/2001**		**12/6/2001**	
AnalyteName	**CAS**	**Units**																				
n-Nitrosodi-n-propylamine	621-64-7	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
n-Nitrosodiphenylamine	86-30-6	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Naphthalene	91-20-3	µg/kg	400	U	**260**	**J**	**62**	**J**	**120**	**J**	**92**	**J**	600	U	460	U	450	U	460	U	430	U
2-Nitroaniline	88-74-4	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
3-Nitroaniline	99-09-2	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
4-Nitroaniline	100-01-6	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
Nitrobenzene	98-95-3	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
2-Nitrophenol	88-75-5	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
4-Nitrophenol	100-02-7	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
Pentachlorophenol	87-86-5	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
Phenanthrene	85-01-8	µg/kg	**46**	**J**	**3500**		**400**	**J**	**4900**		**5500**		**2100**		**810**		450	U	**54**	**J**	**140**	**J**
Phenol	108-95-2	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
Pyrene	129-00-0	µg/kg	**110**	**J**	**3800**		**760**		**7900**		**7600**		**3100**		**1200**		450	U	**100**	**J**	**200**	**J**
1,2,4-Trichlorobenzene	120-82-1	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
2,4,5-Trichlorophenol	95-95-4	µg/kg	2000	U	2200	U	2200	U	2400	U	2300	U	3000	U	2300	U	2200	U	2300	U	2200	U
2,4,6-Trichlorophenol	88-06-2	µg/kg	400	U	440	U	430	U	470	U	460	U	600	U	460	U	450	U	460	U	430	U
VOC (µg/kg)																						
Acetone	67-64-1	µg/kg	**16**		**13**	**J**	**26**		**21**		**26**		**34**		**5.3**	**J**	**6.6**	**J**	14	U	13	U
Acrylonitrile	107-13-1	µg/kg	24	U	26	U	26	U	28	U	28	U	36	U	28	U	**2.5**	**J**	28	U	26	U
Benzene	71-43-2	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	**2.3**	**J**
Bromodichloromethane	75-27-4	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Bromoform	75-25-2	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Bromomethane	74-83-9	µg/kg	6	U	6.6	U	6.5	U	7.1	U	6.9	U	8.9	U	6.9	U	6.7	U	7	U	6.5	U
2-Butanone	78-93-3	µg/kg	**3.5**	**J**	13	U	**4.8**	**J**	**4.3**	**J**	**6**	**J**	**6.8**	**J**	14	U	13	U	14	U	13	U
Carbon disulfide	75-15-0	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	6	U	3.5	U	3.4	U	3.5	U	3.2	U
Carbon tetrachloride	56-23-5	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Chlorobenzene	108-90-7	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Chloroethane	75-00-3	µg/kg	6	U	6.6	U	6.5	U	7.1	U	6.9	U	8.9	U	6.9	U	6.7	U	7	U	6.5	U
Chloroform	67-66-3	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Chloromethane	74-87-3	µg/kg	6	U	6.6	U	6.5	U	7.1	U	6.9	U	8.9	U	6.9	U	6.7	U	7	U	6.5	U
Dibromochloromethane	124-48-1	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
1,1-Dichloroethane	75-34-3	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
1,2-Dichloroethane	107-06-2	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
1,1-Dichloroethene	75-35-4	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Trans-1,2-Dichloroethene	156-60-5	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
cis-1,2-Dichloroethylene	156-59-2	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
1,2-Dichloropropane	78-87-5	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
cis-1,3-Dichloropropene	10061-01-5	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
trans-1,3-Dichloropropene	10061-02-6	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Epichlorohydrin	106-89-8	µg/kg	60	UJ	66	UJ	65	UJ	71	UJ	69	UJ	89	UJ	69	UJ	67	UJ	70	UJ	65	UJ
Ethylbenzene	100-41-4	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U

TABLE 4
Historical Background Sediment Results
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
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StationID			SDBK-01		SDBK-02		SDBK-03		SDBK-04		SDBK-05		SDBK-06		SDBK-07		SDBK-08		SDBK-09		SDBK-10	
Sample Depth (ft)>>			**0.5 - 1**		**0 - 0.7**		**0 - 0.7**		**0 - 0.5**		**0 - 0.5**		**0.5 - 1**		**0.5 - 1**		**0 - 0.5**		**0 - 0.5**		**0.5 - 1**	
SampleDate			**12/5/2001**		**12/5/2001**		**12/5/2001**		**12/5/2001**		**12/5/2001**		**12/6/2001**		**12/6/2001**		**12/6/2001**		**12/6/2001**		**12/6/2001**	
AnalyteName	**CAS**	**Units**																				
2-Hexanone	591-78-6	µg/kg	6	U	6.6	U	6.5	U	7.1	U	6.9	U	8.9	U	6.9	U	6.7	U	7	U	6.5	U
4-Methyl-2-pentanone	108-10-1	µg/kg	6	U	6.6	U	6.5	U	7.1	U	6.9	U	8.9	U	6.9	U	6.7	U	7	U	6.5	U
Methylene chloride	75-09-2	µg/kg	6	U	6.6	U	6.5	U	7.1	U	6.9	U	8.9	U	6.9	U	6.7	U	7	U	6.5	U
Styrene	100-42-5	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Tetrachloroethene	127-18-4	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Toluene	108-88-3	µg/kg	3	U	**0.93**	**J**	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	**1.7**	**J**
1,1,1-Trichloroethane	71-55-6	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
1,1,2-Trichloroethane	79-00-5	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Trichloroethene	79-01-6	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
Vinyl chloride	75-01-4	µg/kg	6	U	6.6	U	6.5	U	7.1	U	6.9	U	8.9	U	6.9	U	6.7	U	7	U	6.5	U
Xylenes, Total	1330-20-7	µg/kg	3	U	3.3	U	3.3	U	3.6	U	3.4	U	4.5	U	3.5	U	3.4	U	3.5	U	3.2	U
WCHEM (mg/kg)																						
Total Organic Carbon	TOC	mg/kg	**31800**		**8230**		**31400**		**33500**		**21900**		**34700**		**51800**		**5840**		**3950**		**6140**	
WCHEM (percent)																						
Percent Solids	SOLID	Percent	**82.8**		**78**		**79.6**		**71.3**		**72.6**		**56.5**		**72**		**74.1**		**79.2**		**78.4**	

Notes:

NA = Not Applicable
U = The constituent was not detected above the associated reporting limit
J = The constituent concentration was estimated
Bold indicates that the constituent was detected above the reporting limits

TABLE 5
Required Analytical Method, Sample Containers, Preservation, and Holding Times
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Analyses	Preparatory / Analytical Method	Sample Matrix[a]	Container[b]	Qty	Preservative[c]	Holding Time [d]
Volatile organic compounds	SW-846 5030B/8260B	W	40-mL, glass	3	HCl, pH<2, cool to 4 ºC	14 days
	SW-846 5035/8260B	S	5-g Encore™ or equivalent sampling technique	3	Cool 4°C	48 hours from collection to preservation, 14 days to analysis
			40-mL, glass	1	Methanol, cool to 4 ºC (if necessary)	48 hours from collection to preservation, 14 days to analysis
Semivolatile organic compounds	SW-846 3510C/3520C/ 8270C	W	1-L amber glass	2	Cool 4°C	7/40 days[f]
	SW-846 3550B/ 8270C or 827-PAHL Sim	S	8-oz glass	1	Cool 4°C	14/40 days[g]
Polychlorinated biphenyls	SW-846 3510C/3520C/ 8082	W	1-L amber glass	2	Cool 4°C	7/40 days[f]
	SW-846 3550B/8082 Cleanup – 3665A	S	8-oz glass	1	Cool 4°C	14/40 days[g]
Metals	SW-846 3010A/3020A-SW6010B /7000 Series or SW6020/7000	W	500-mL polyethylene	1	HNO_3, pH < 2Cool 4°C	6 months
	SW-846 3050-SW6010B /7000 Series	S	8-oz glass	1	Cool 4°C	
Mercury	SW-846 7470A	W	500-mL polyethylene	1	HNO_3, pH < 2 Cool 4°C	28 days
	SW-846 7471A	S	8-oz glass	1	Cool 4°C	
Total dissolved solids	USEPA 160.1	W	250-mL polyethylene	1	Cool 4°C	7 days
Total suspended solids	USEPA 160.2	W	250-mL polyethylene	1	Cool 4°C	7 days
Percent moisture	USEPA 160.3/ASTM D2216	S	16-oz glass	1	None	NA
Total organic carbon	Lloyd Kahn	S	125 mL widemouth glass,	1	Cool 4°C	14 days

TABLE 5
Required Analytical Method, Sample Containers, Preservation, and Holding Times
Sediment Sampling and Analysis Plan: Former Hampshire Chemical Corp
The Dow Chemical Company, Waterloo, New York

Analyses	Preparatory / Analytical Method	Sample Matrix[a]	Container[b]	Qty	Preservative[c]	Holding Time [d]
Dissolved organic carbon	USEPA 415.1/SW-846 9060	W	250-mL glass	1	Field Filter, H_2SO_4 or HCl pH < 2, Cool 4°C	28 days
pH	USEPA 150.1/SW-846 9040B SW-846 9045C	W	Field/Lab, 250-mL glass	1	None	As soon as possible
Dissolved oxygen	USEPA 360.1	W	Field, 250-mL glass	1	None	As soon as possible
Temperature	USEPA 170.1	W	Field, 250-mL glass	1	None	As soon as possible
Turbidity	USEPA 180.1	W	Field, 250-mL glass	1	None	As soon as possible
Conductivity	USEPA 120.1/SW9050	W	Field, 250-mL glass	1	None	As soon as possible

Notes:
Sample container, and volume requirements will be specified by the analytical laboratory performing the tests.
Three times the required volume should be collected for samples designated as MS/MSD samples.
[a]Sample matrix: S = surface soil, subsurface soil, sediment; W = surface water
[b]All containers will be sealed with Teflon®-lined screw caps.
[c]All samples will be stored promptly at 4°C in an insulated chest.
[d]Holding times are from the time of sample collection.
[e]14 days to TCLP extraction, 7 days for extraction, 40 days for analysis
[f] 7 days to extraction for water, 40 days for analysis.
[g]14 days to extraction for soil, 40 days for analysis.
[h]14 days to TCLP extraction for soil, 14 days for analysis
[i]30 days to extraction for water, 45 days for analysis.
[j] Reactivity, Corrosivity, and Ignitability can be obtained from the same container
Source: SW-846, third edition, Update III (June 1997).

ºC = Degrees Centigrade
TCLP = Toxicity characteristic leaching procedure
mL = Milliliter
g = Gram
L = Liter
oz = Ounce
HCl = Hydrochloric acid
HNO_3 = Nitric acid
H_2SO_4 = Sulfuric acid
NaOH = Sodium hydroxide
USEPA = U.S. Environmental Protection Agency
ASTM = American Society for Testing and Materials
NA = Not applicable

Figures

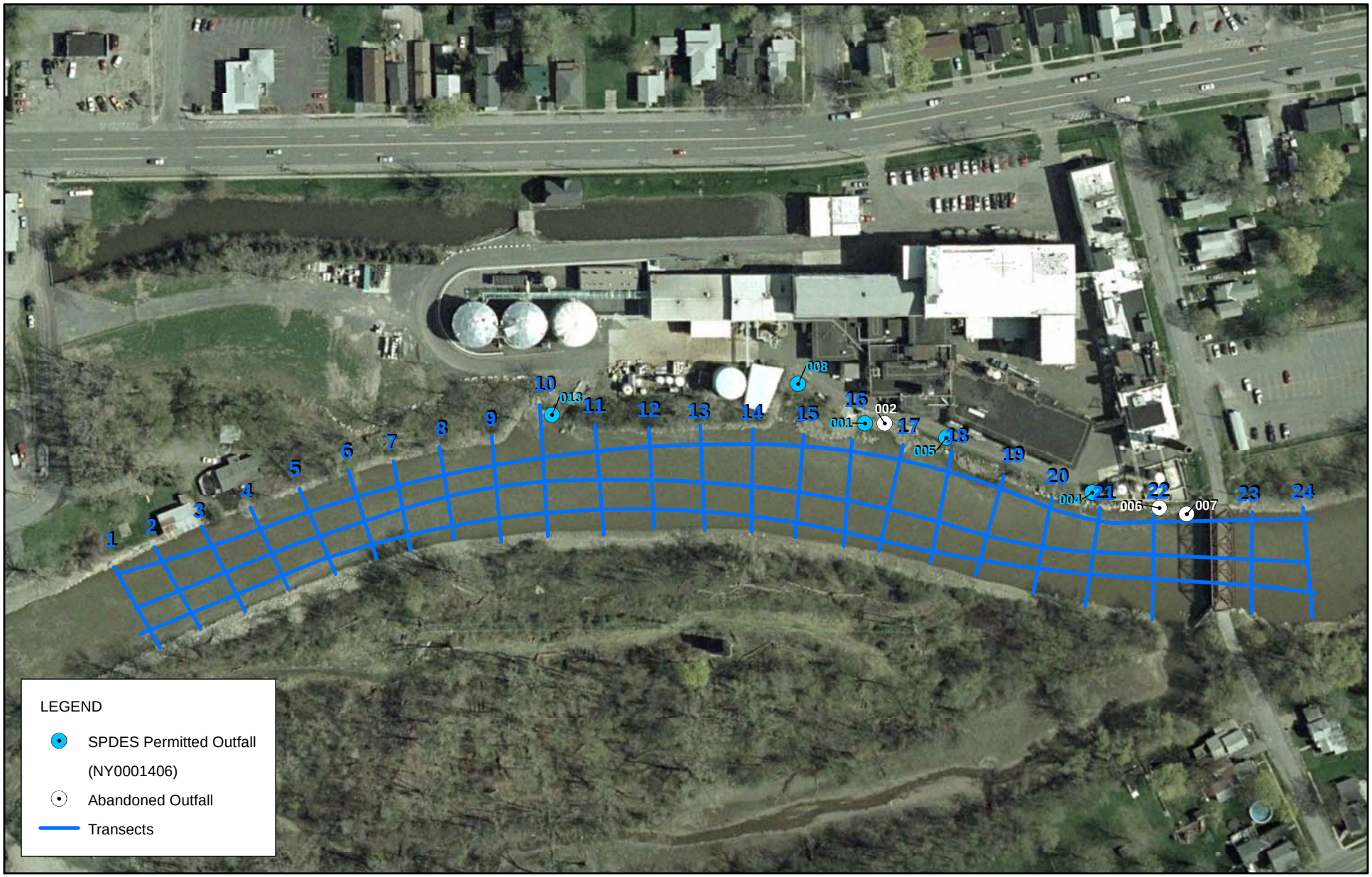

Figure 1
AOC A Transects
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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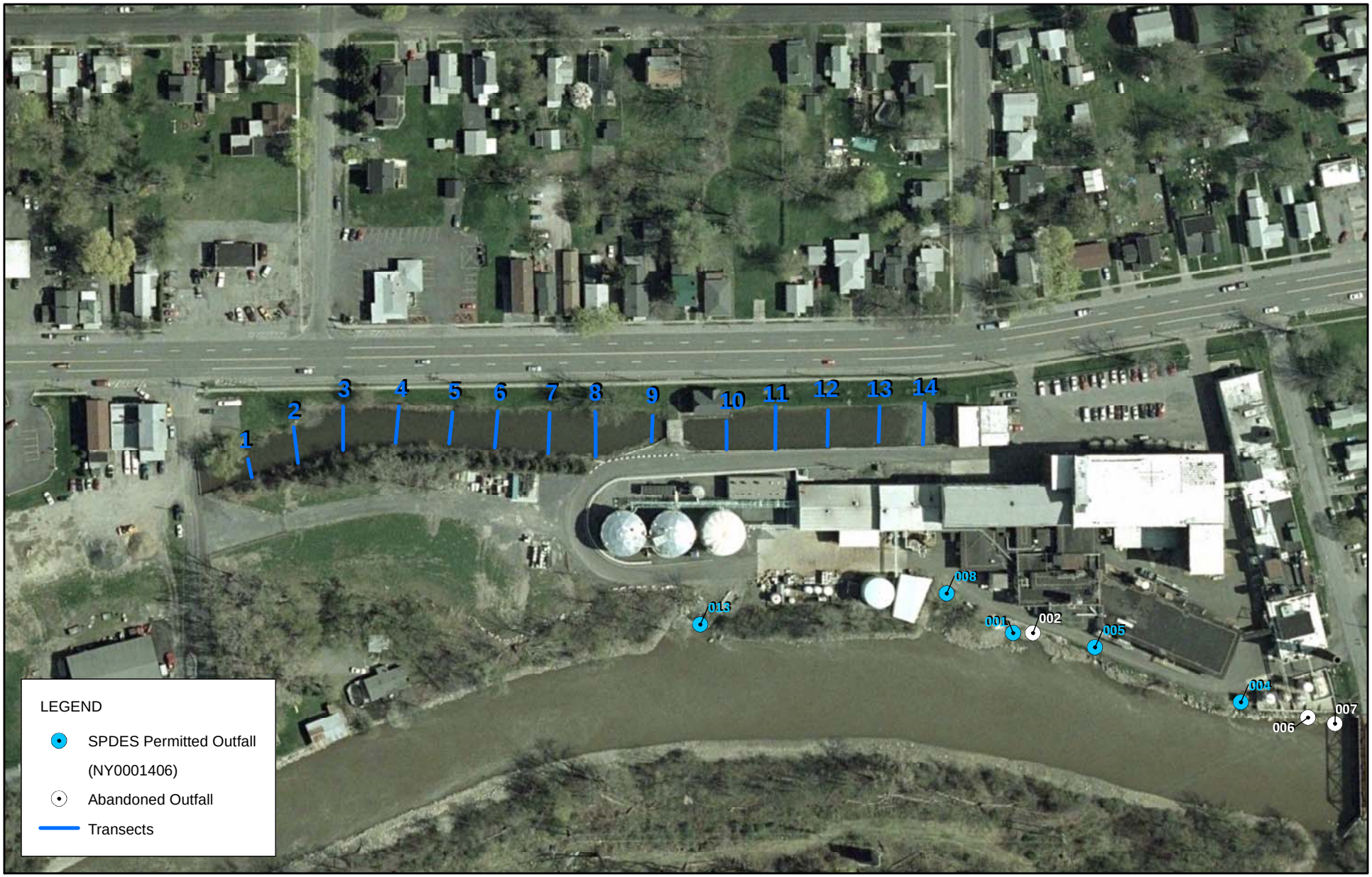

Figure 2
Raceway Transects
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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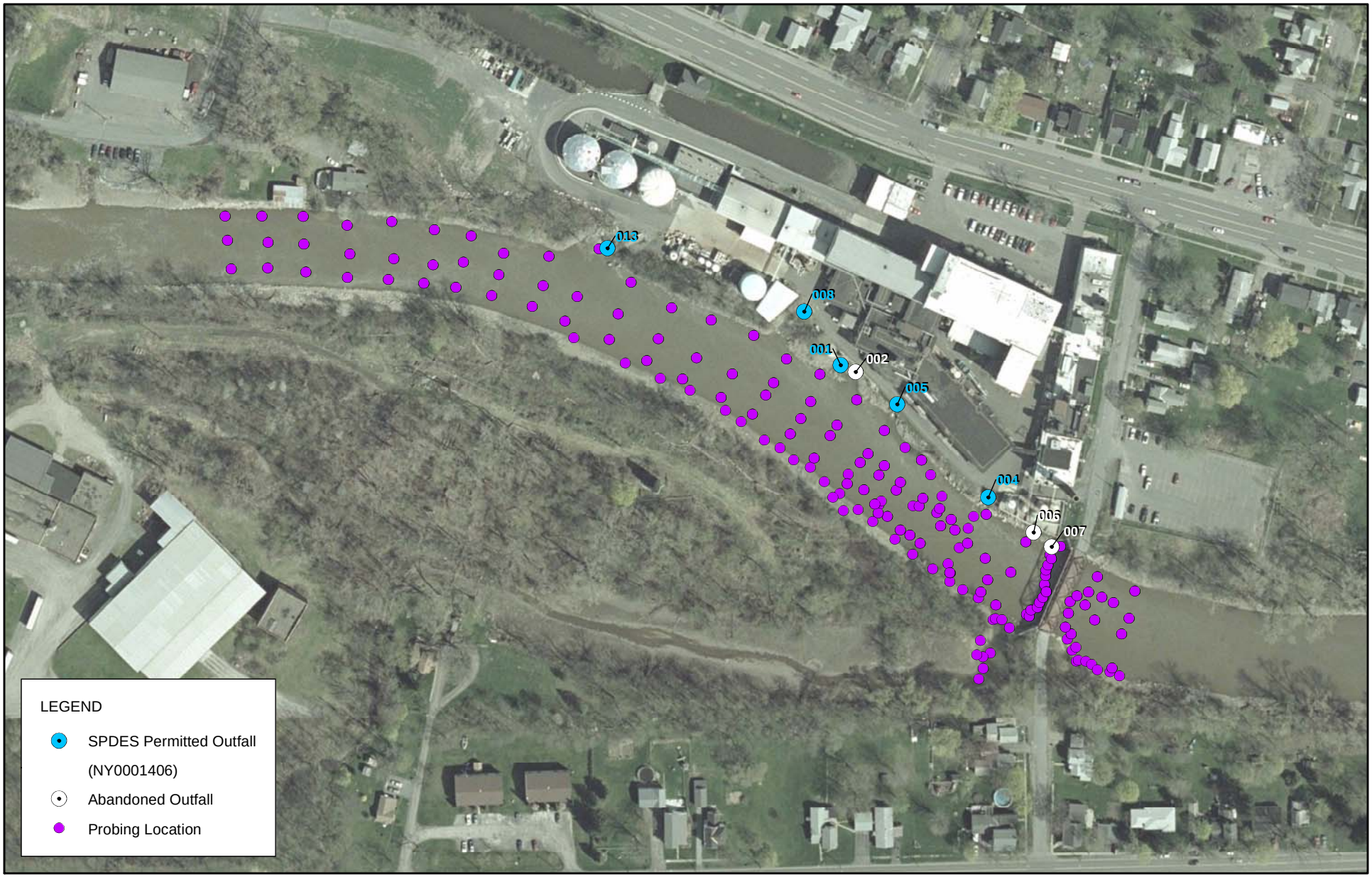

Figure 3
Canal Sediment Probing Locations
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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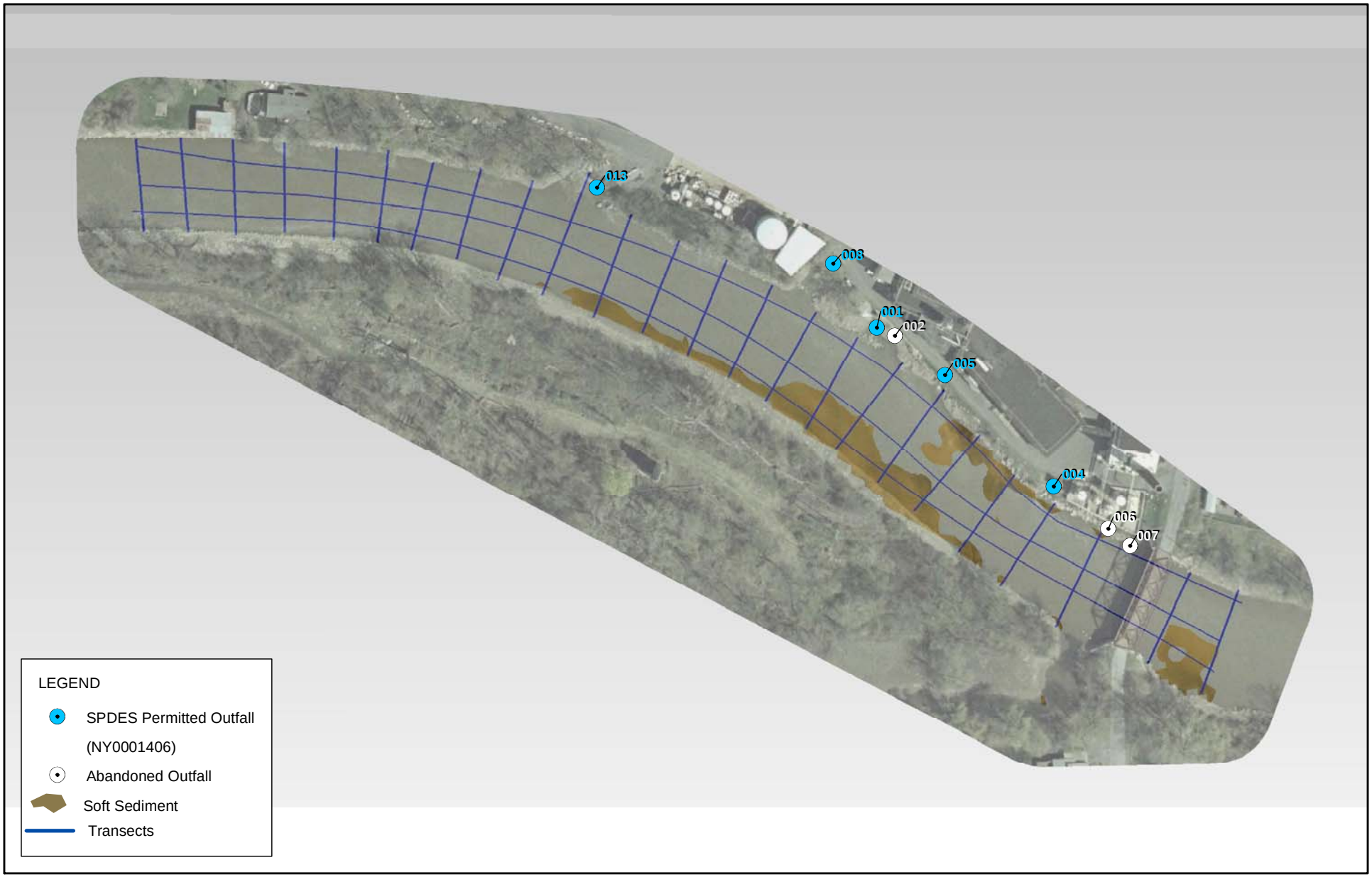

N

0 75 150 Feet

Figure 4
Extent of Soft Sediment in Canal
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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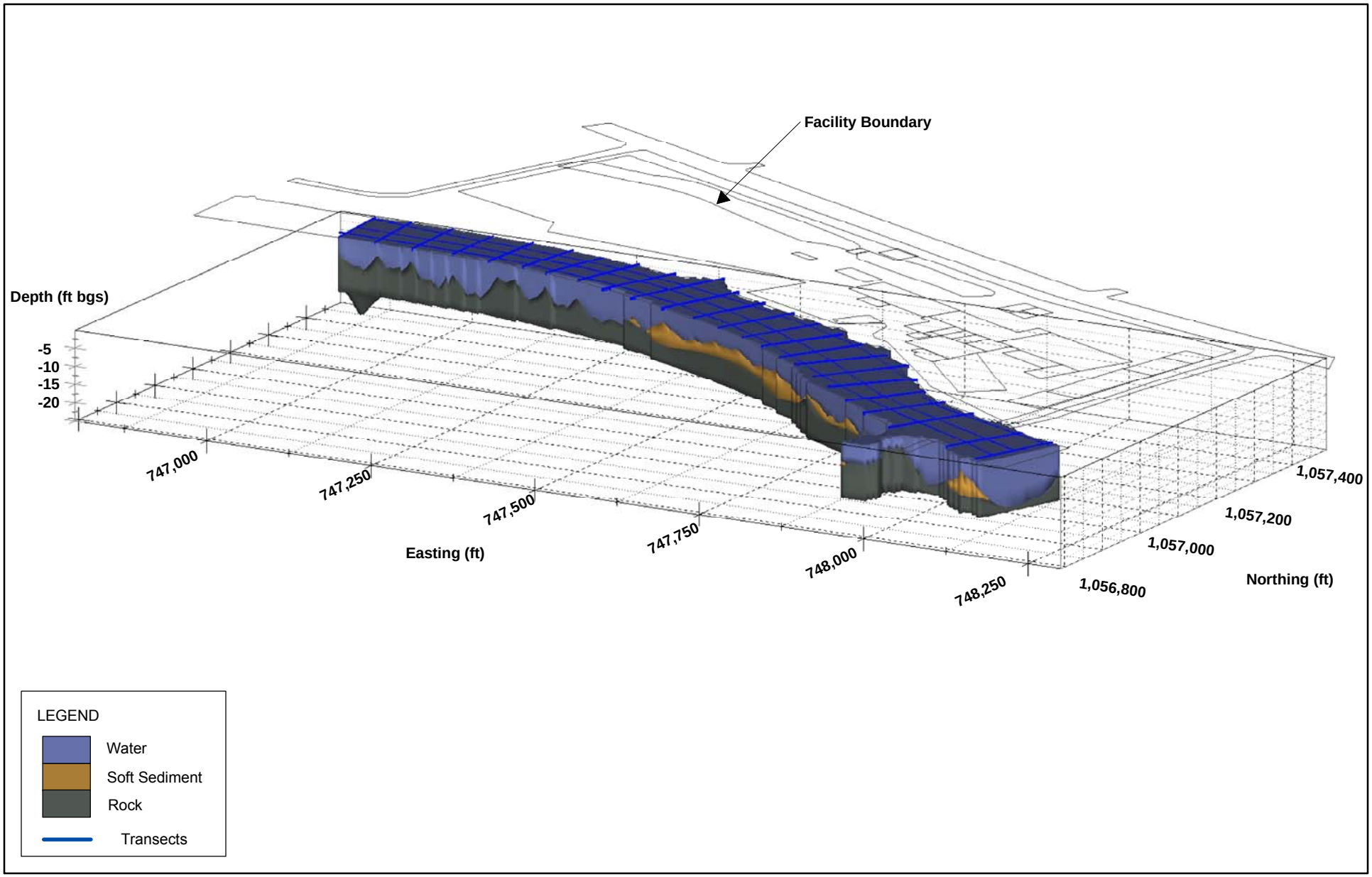

Note:
1. Rock layer thickness was not measured – an assumed thickness of 15 feet
2. Site Coordinates are in New York State Plane Central (ft).
3. Vertical Exaggeration = 5

Figure 5
Canal Model
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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Figure 6
Raceway Canal Sediment Probing Locations
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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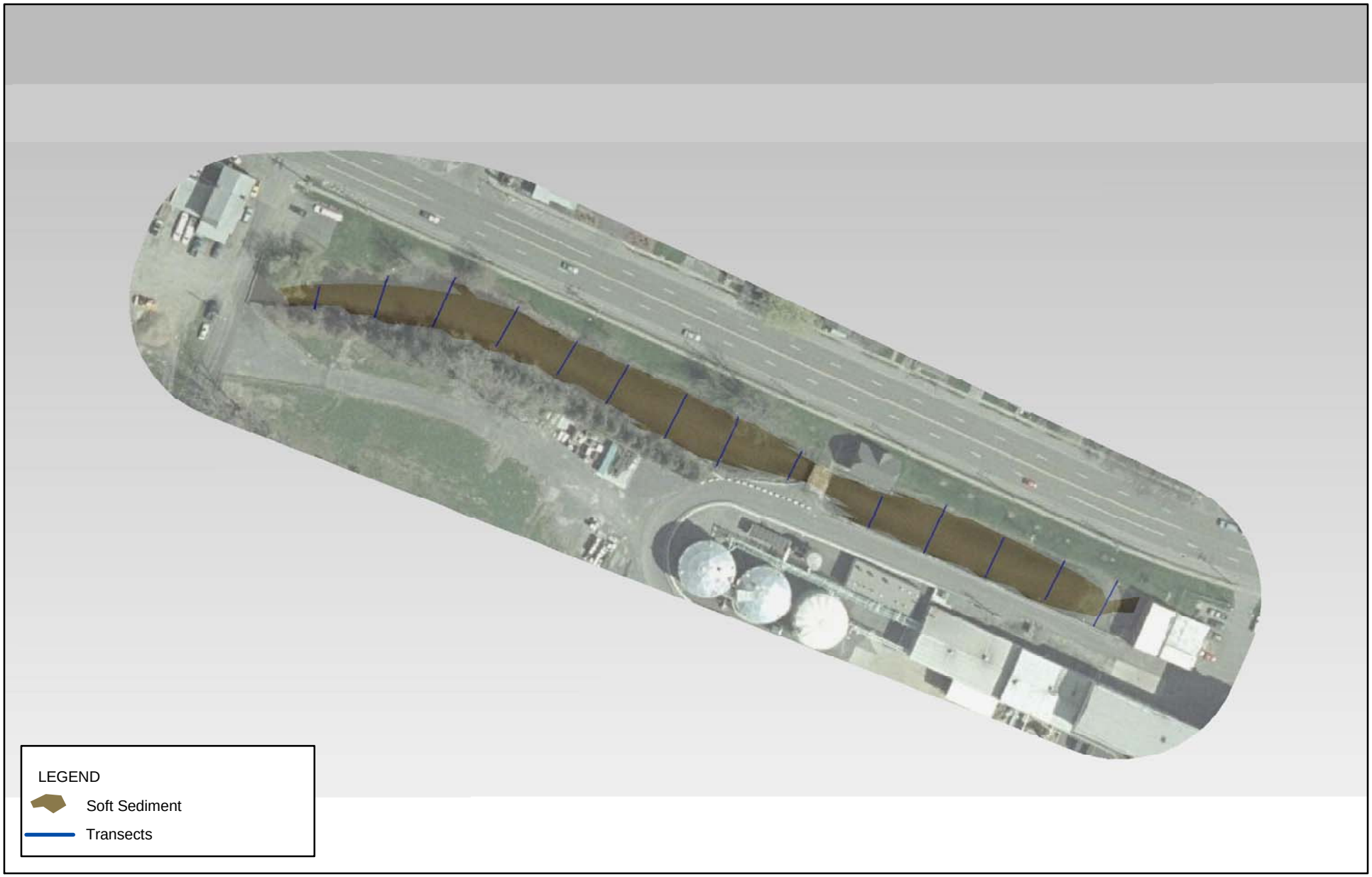

N

0 60 120 Feet

Figure 7
Extent of Soft Sediment in Raceway Canal
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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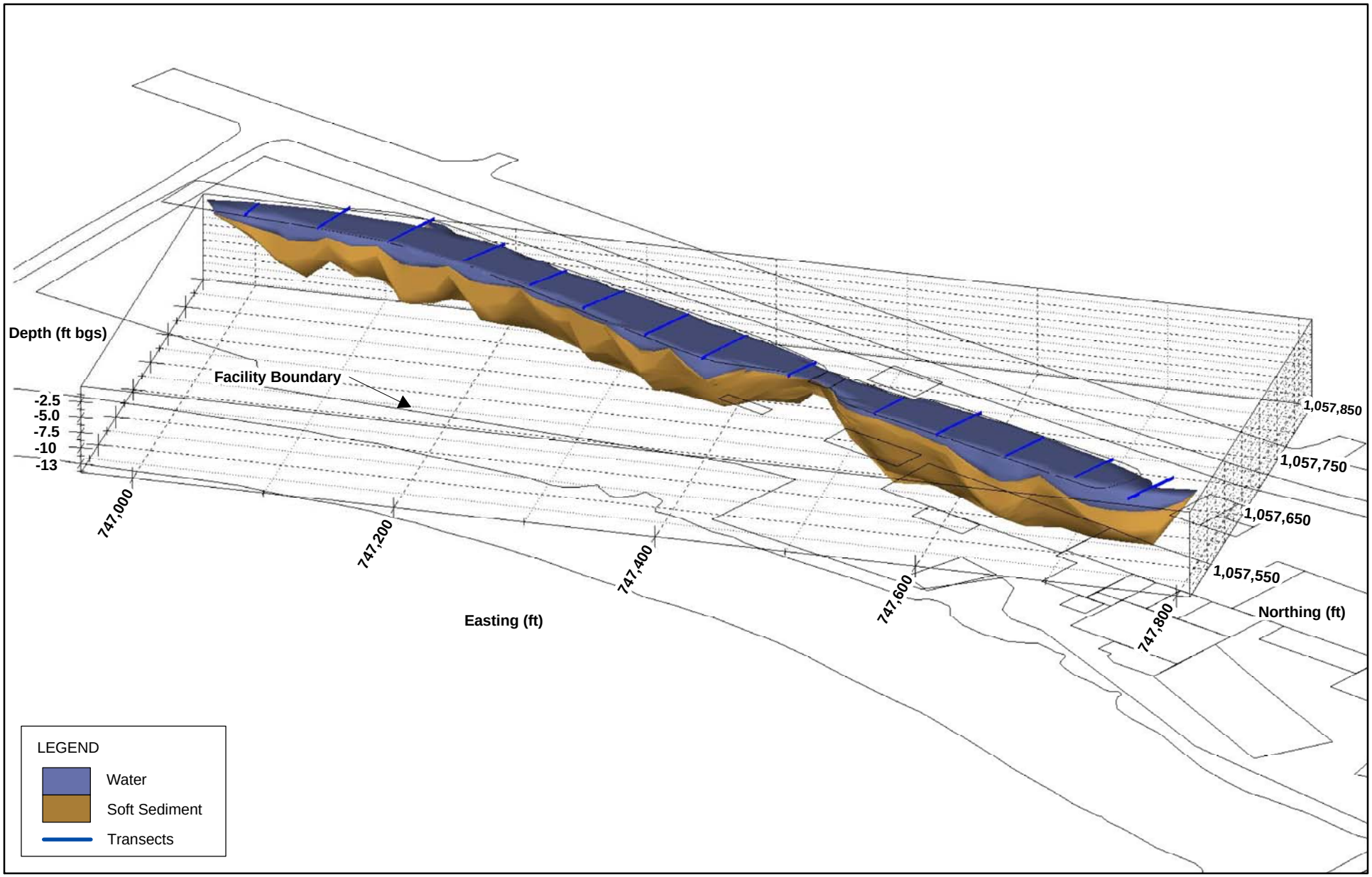

Note:
1. Rock layer below sediment is assumed.
2. Site Coordinates are in New York State Plane Central (ft).
3. Vertical Exaggeration = 10

Figure 8
Raceway Model
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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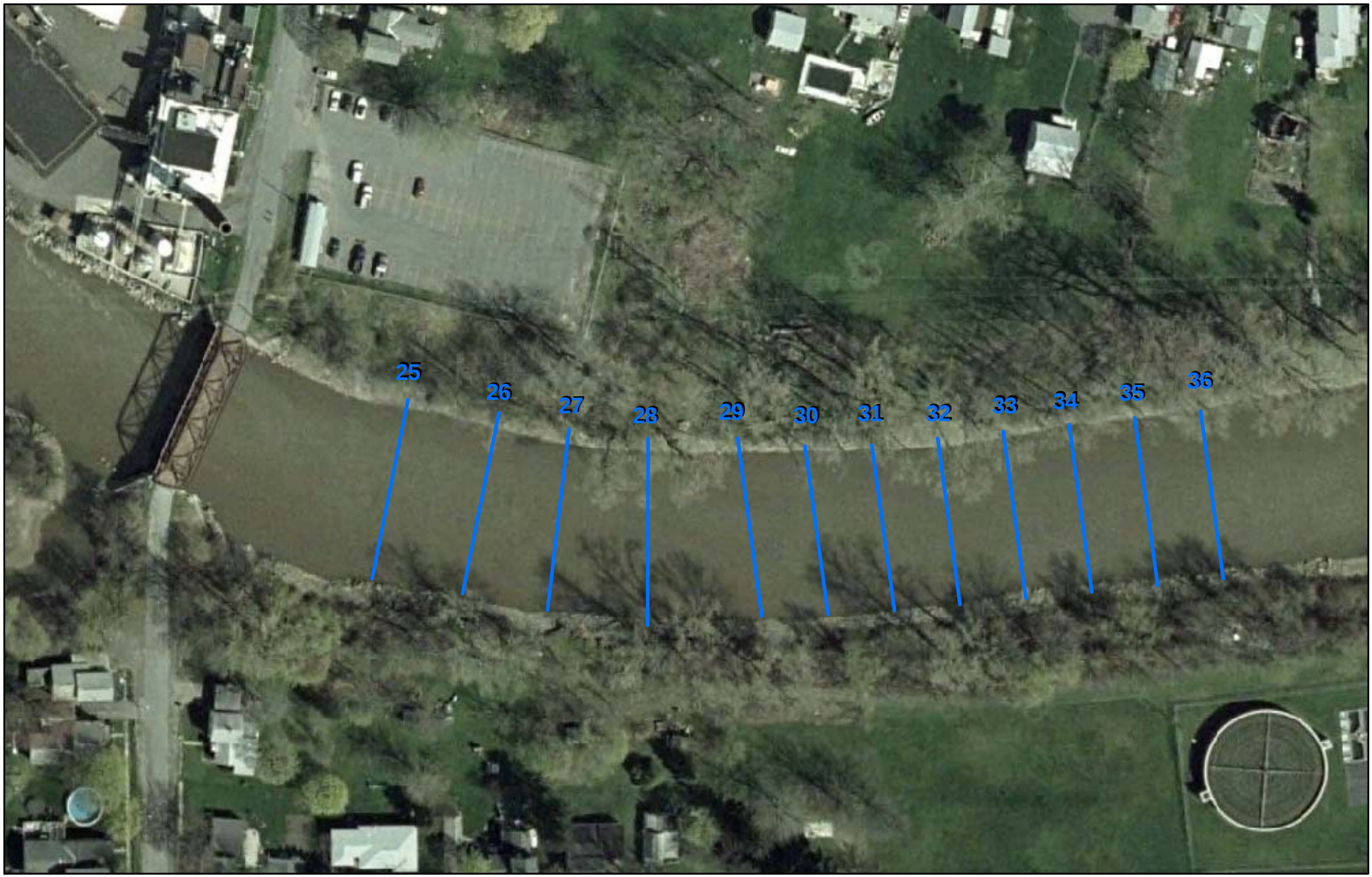

N

0 75 150 Feet

Figure 9
Proposed Downstream Transects for Sediment Probing.
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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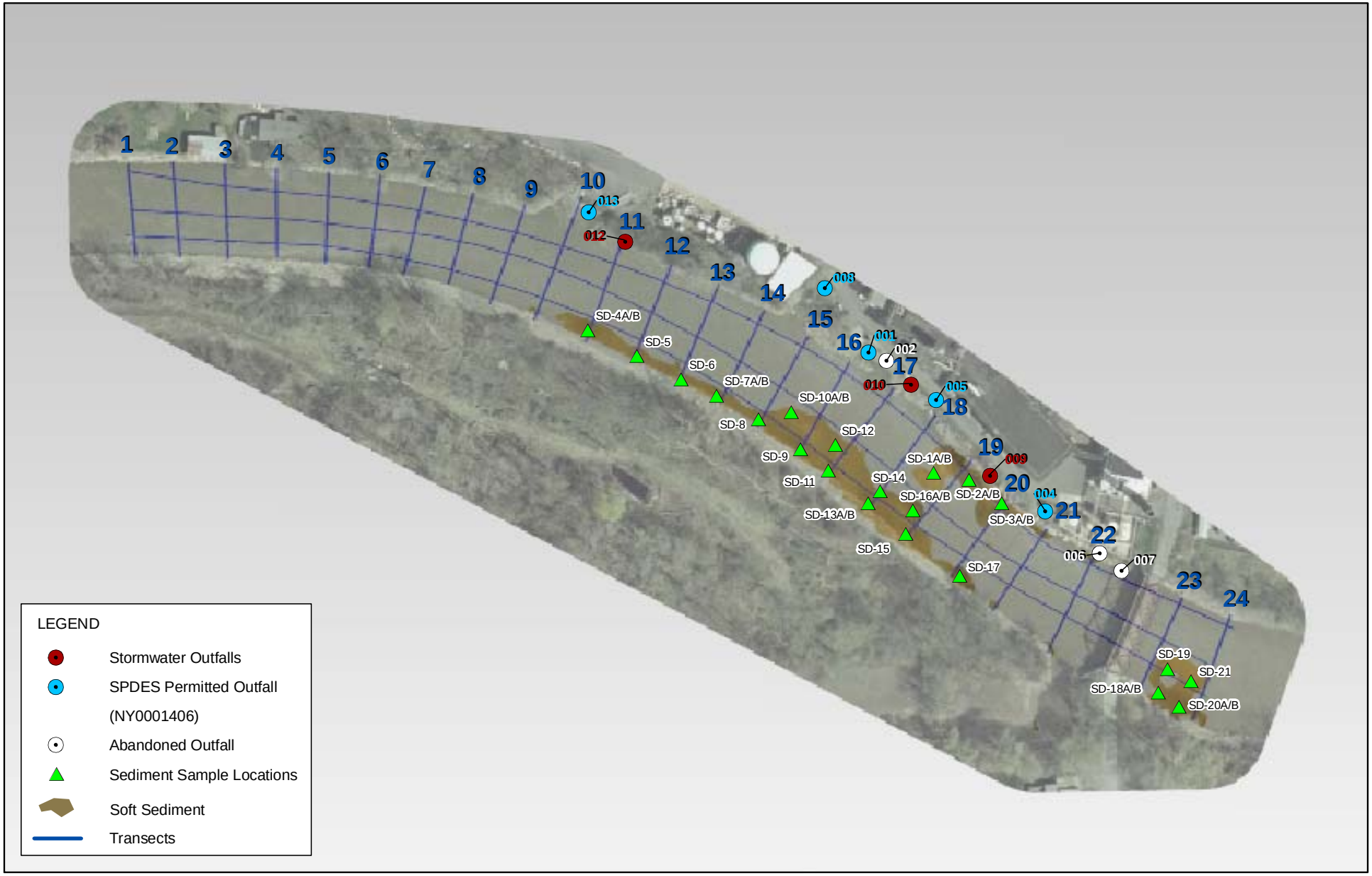

N

Figure 10
AOC A - Seneca-Cayuga Canal Phase II Sediment Sample Locations
Sediment Sampling and Analysis Plan
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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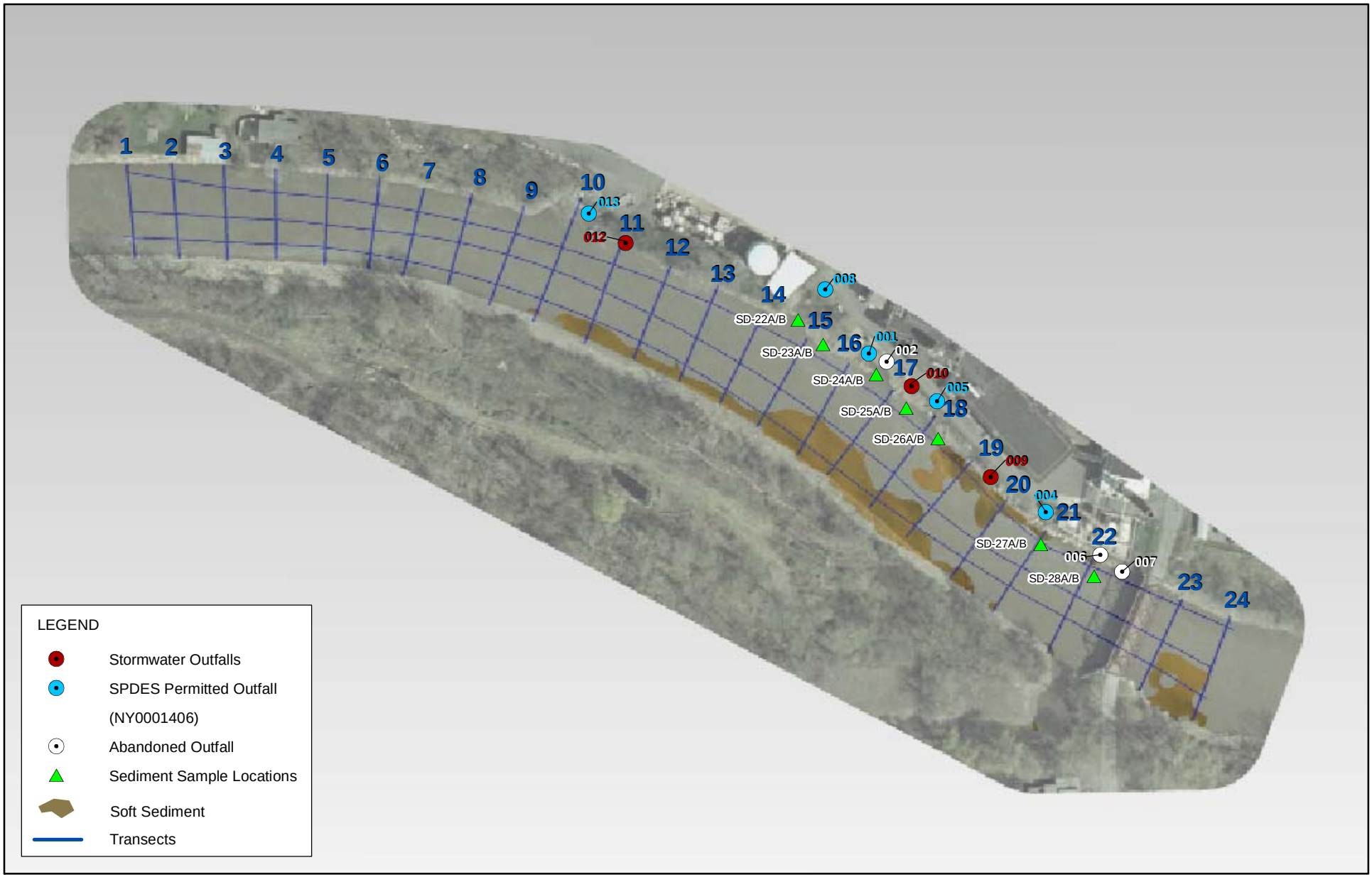
\\LAKEFRONT\PROJ\GIS\DOW\WATERLOO\REPORTS\PHASE_I_II_REPORTNOV2008\FIGURE 10 - AOCA A CANAL PHASE II SEDIMENT SAMPLE LOCATIONS.MXD JHANSEN1 6/12/2009 11:24:20



N

Figure 11
AOC A - Seneca-Cayuga Canal Phase II Shoreline Delineation Sediment Sample Locations
Sediment Sampling and Analysis Plan
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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Figure 12
AOC A Canal Surface Water Sample Locations
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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Figure 13
Canal Raceway Phase II Sediment Sample Locations
Sediment Sampling and Analysis Plan
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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\\LSG31039025\GIS\DOW\WATERLOO\REPORTS\PHASE_I_II_REPORTNOV2008\FIGURE 13 - CANAL RACEWAY (CR) PHASE II SED SAMPL LOCS.MXD FIGURE 13 - CANAL RACEWAY (CR) PHASE II SED SAMPL LOCS.MXD RVANSLAM 5/29/2009 09:32:28

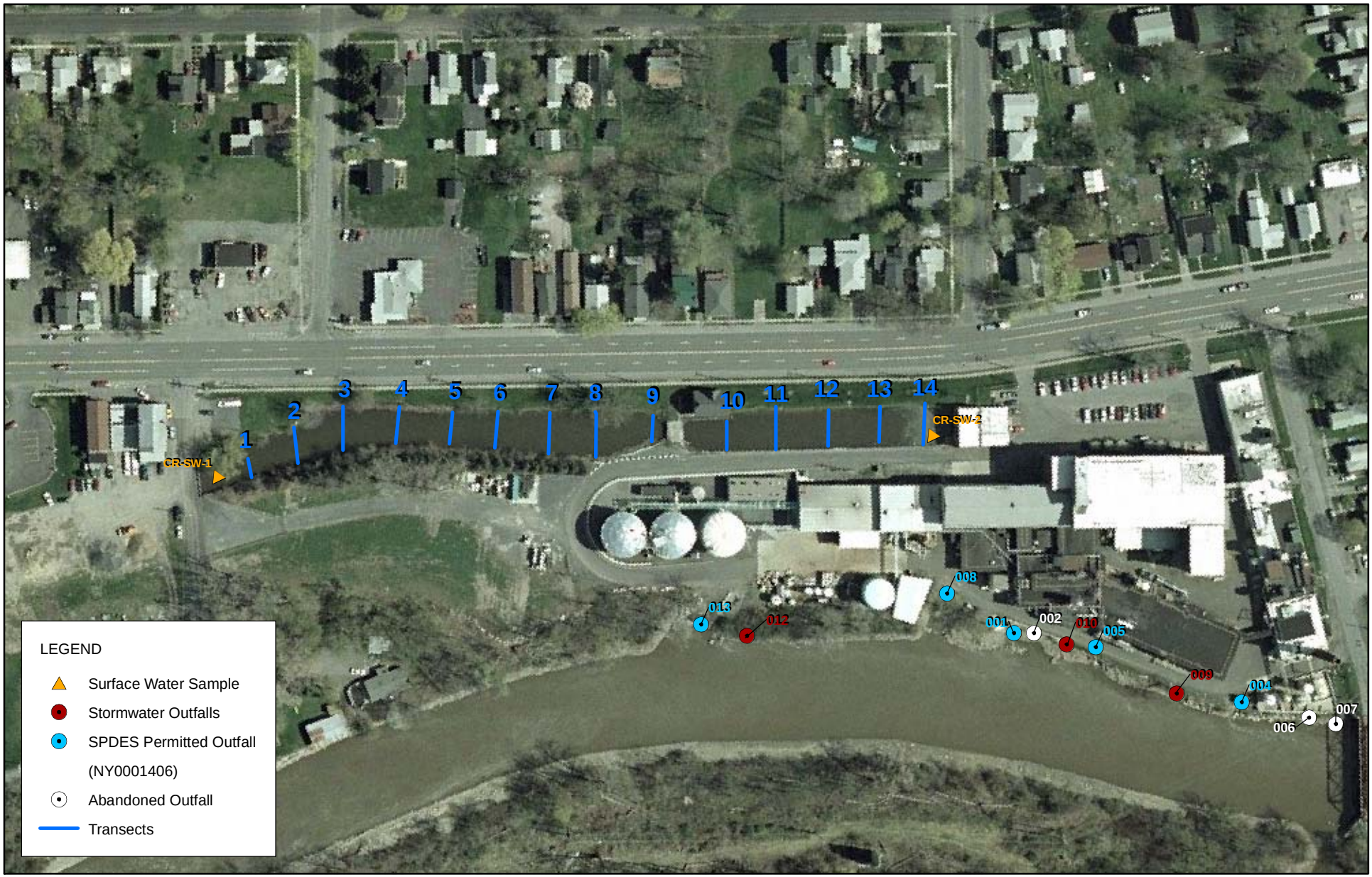

Figure 14
Canal Raceway Surface Water Sample locations
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

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East Main St. (U.S. Rte. 20, N.Y.S. Rte. 5)

East Water Street

Seneca-Cayuga Canal Raceway

Gorham St.

Seneca-Cayuga Canal (Seneca River)

SDBK11

SDBK12

SDBK19

SDBK18

SDBK13

SDBK14

SDBK15

SDBK17

SDBK09

SDBK16

SDBK04

Legend

- Proposed Sediment Sample Location
- Previous Sediment Sample Location
- Site Boundary

N

0 200 400

Feet

Figure 15
AOC A Seneca Cayuga Canal Phase II Background Sample Locations
Sediment Sampling and Analysis Plan
Former Hampshire Chemical Corp Facility
The Dow Chemical Company
Waterloo, New York

CH2MHILL

\\LSG31039025\GIS\DOW\WATERLOO\REPORTS\PHASE_I_II_REPORTNOV2008\FIGURE 15 - AOC A SENECA CAYUGA CANAL (SCC) PHASE II BACKGROUND SAMPLE LOCATIONS _NEW.MXD FIGURE 15 - AOC A SENECA CAYUGA CANAL (SCC) PHASE II BACKGROUND SAMPLE LOCATIONS _NEW.MXD RVANSLAM 5/29/2009 10:55:34

Appendix A
Geophysical Report

TECHNICAL REPORT, GEOPHYSICAL SURVEY, FORMER HAMPSHIRE CHEMICAL COMPANY FACILITY, WATERLOO, NY

SPONSOR

CH2M Hill, Inc.
99 Cherry Hill Road,
Suite 200
Parsippany, NJ 07054

SURVEY COMPANY

Aqua Survey Inc.
469 Point Breeze Rd.
Flemington, NJ 08822

ASI Project Number 27-281

December 27, 2007

TECHNICAL REPORT, GEOPHYSICAL SURVEY, FORMER HAMPSHIRE CHEMICAL COMPANY FACILITY, WATERLOO, NY

SPONSOR

CH2M Hill, Inc.
99 Cherry Hill Road,
Suite 200
Parsippany, NJ 07054

ASI Project Number 26-281

This report, as well as all records and raw data were audited and found to be an accurate reflection of the study. Copies of raw data will be maintained by Aqua Survey, Inc., 469 Point Breeze Road, Flemington, NJ 08822.

Kenneth Hayes **Date**
President

Mark Padover **Date**
Field Project Manager

List of Figures

Figure 1. Survey area near Hampshire Chemical Company Facility. 2
Figure 2. Locations of transects 1 to 7 in the raceway. 4
Figure 3. Locations of transects 8 to 14 in the raceway. 4
Figure 4. Profile of raceway at transect 1, North to South. Soft sediment in red..... 5
Figure 5. Profile of raceway at transect 2, North to South. Soft sediment in red..... 5
Figure 6. Profile of raceway at transect 3, North to South. Soft sediment in red..... 6
Figure 7. Profile of raceway at transect 4, North to South. Soft sediment in red..... 6
Figure 8. Profile of raceway at transect 5, North to South. Soft sediment in red..... 7
Figure 9. Profile of raceway at transect 6, North to South. Soft sediment in red..... 7
Figure 10. Profile of raceway at transect 7, North to South. Soft sediment in red..... 8
Figure 11. Profile of raceway at transect 8, North to South. Soft sediment in red..... 8
Figure 12. Profile of raceway at transect 9, North to South. Soft sediment in red..... 9
Figure 13. Profile of raceway at transect 10, North to South. Soft sediment in red..... 9
Figure 14. Profile of raceway at transect 11, North to South. Soft sediment in red..... 10
Figure 15. Profile of raceway at transect 12, North to South. Soft sediment in red..... 10
Figure 16. Profile of raceway at transect 13, North to South. Soft sediment in red..... 11
Figure 17. Profile of raceway at transect 14, North to South. Soft sediment in red..... 11
Figure 18. Locations of transects 1 to 13 in the canal. 12
Figure 19. Locations of transects 13 to 19 in the canal. 12
Figure 20. Locations of transects 19 to 24 in the canal. 13
Figure 21. Profile of canal at transect 1, South to North. No soft sediment present. 13
Figure 22. Profile of canal at transect 2, South to North. No soft sediment present. 14
Figure 23. Profile of canal at transect 3, South to North. No soft sediment present. 14
Figure 24. Profile of canal at transect 4, South to North. No soft sediment present. 15
Figure 25. Profile of canal at transect 5, South to North. No soft sediment present. 15
Figure 26. Profile of canal at transect 6, South to North. No soft sediment present. 16
Figure 27. Profile of canal at transect 7, South to North. No soft sediment present. 16
Figure 28. Profile of canal at transect 8, South to North. No soft sediment present. 17
Figure 29. Profile of canal at transect 9, South to North. No soft sediment present. 17
Figure 30. Profile of canal at transect 10, South to North. No soft sediment present. 18
Figure 31. Profile of canal at transect 11, South to North. No soft sediment present. 18
Figure 32. Profile of canal at transect 12, South to North. Soft sediment in red. 19
Figure 33. Profile of canal at transect 13, South to North. Soft sediment in red. 19
Figure 34. Profile of canal at transect 14, South to North. Soft sediment in red. 20
Figure 35. Profile of canal at transect 15, South to North. Soft sediment in red. 20
Figure 36. Profile of canal at transect 16, South to North. Soft sediment in red. 21
Figure 37. Profile of canal at transect 17, South to North. Soft sediment in red. 21
Figure 38. Profile of canal at transect 18, South to North. Soft sediment in red. 22
Figure 39. Profile of canal at transect 19, South to North. Soft sediment in red. 22
Figure 40. Profile of canal at transect 20, South to North. Soft sediment in red. 23
Figure 41. Profile of canal at transect 21, South to North. Soft sediment in red. 23
Figure 42. Profile of canal at transect 12, South to North. No soft sediment present. 24
Figure 43. Profile of canal at transect 23, South to North. Soft sediment in red. 24
Figure 44. Profile of canal at transect 24, South to North. Soft sediment in red. 25

The primary goal of the survey was to perform a bathymetric and geophysical survey in order to determine water depths and thickness of sediment in the raceway and canal adjacent to the former Hampshire Chemical Company Facility in Waterloo, New York.

The remote sensing survey work encompassed the canal bottom from shoreline to shoreline for a half mile stretch of the Seneca-Cayuga Canal along the shore of the facility as well as 150 feet downstream of the Gorham Street Bridge. Probing operations were conducted in the Seneca-Cayuga Canal Raceway as well as in the same section of the Seneca-Cayuga Canal itself (Figure 1). The survey work results were produced in New York Central State Plane feet NAD83 for the horizontal datum and referenced to water level at the time of the survey for the vertical datum.

The geophysical survey was conducted between November 14 and November 15, 2007. Technologies and techniques employed included sub-bottom profiler, fathometer, differential global positioning (DGPS), and probing. On November 14, three survey lines were run longitudinally in the Seneca-Cayuga Canal using the fathometer and sub-bottom profiler. Cross-lines spaced 60 feet apart were run perpendicular to the flow of the canal with the fathometer. Those same lines as well as other locations likely to contain soft sediments were also probed to detect the presence and determine the thickness of those sediments if present. On November 15, survey lines spaced 60 feet apart were probed in the Seneca-Cayuga Canal Raceway to determine water depth and the thickness of soft sediments present. It had been initially planned to use the remote sensing equipment in the Seneca-Cayuga Canal Raceway, but upon arrival it was determined that due to the shallow water depths and significant amount of aquatic vegetation, that they would be ineffective.

An Innerspace Technologies model 455 fathometer was used to conduct the hydrographic survey. A Trimble DGPS system was used for horizontal positioning. Positioning data was collected from the DGPS and electronically paired with the soundings from the fathometer in Hypack Max 6.2a survey control software. Prior to the commencement of survey operations, a bar check was conducted to adjust for draft and speed of sound in order to ensure accurate sounding data. A bar check was also conducted at the end of each day to be sure the settings continued to be correct. The antenna for the DGPS was mounted directly above the transducer, eliminating any positioning offset errors. Following the survey, the data was processed, point plotted, and contoured.

An ODEC Stratabox sonar system was used to collect the sub-bottom profiling data during the survey along the Seneca-Cayuga Canal. The principal objective of the survey was to collect sub-bottom images to identify the thickness of the soft sediments which might contain contamination. During the survey, the sensor was deployed at a depth between 1 and 3 ft to minimize interference from the vessel and to help avoid hitting rocks and other debris. During the survey, the transducer was hard-mounted to the side of the survey vessel with the DGPS antenna mounted directly over the transducer, eliminating offset errors. The navigational data was logged at one-second intervals by the ODEC Stratabox

Figure 1. Survey area near Hampshire Chemical Company Facility in Waterloo, New York.

digital recording system. During the sub-bottom survey, the data was observed in real-time on the Stratbox monitor. The data displayed included the reflection coefficient of the river bottom (a measure of the acoustic impedance contrast at the water/sediment interface), the relative amplitude of bottom and sub-bottom reflections, a cross-sectional image of the last ~600 sub-bottom pulses that were recorded, as well as the current position, time, date, course and speed of the survey vessel.

The depths of the sub-bottom reflections were calculated assuming a sound velocity of 1500 m/s. This is a typical velocity for sediments that are water-saturated, which is a reasonable assumption given the rather shallow depths of penetration of the sub-bottom system that was used. Even if velocities varied on the order of 50 m/s, as a function of the different types of sediments and their water content, the possible errors in depth estimations would vary only on the order of tenths of feet for the depth intervals over which the reflections were observed.

The maximum depth of penetration of the profiler was on the order of 2 feet which occurred in a small area along the southern side of the canal across from the facility. Penetration over the rest of the Seneca-Cayuga Canal was typically less than 1 feet. The sub-bottom profiling was unsuccessful in terms of its ability to generate geologic cross-sections of the sub-bottom sediments. The principal limiting factors to the quality of the sub-bottom data were the presence of organic, gaseous, materials in the shallow sub-bottom, the relatively shallow water depths, and the lack sediment before encountering rock. Depth of penetration of the sub-bottom acoustic signal was limited primarily by lack of soft sediments in the survey area. In locations that soft sediment was encountered, decomposition of the leafy and organic

material in these sediments produced gas. Since gases are characterized by very high acoustic impedance (the product of a material's density and sound velocity) contrasts with surrounding materials, when trapped, they limit the passage of sound waves deeper into the sub-surface. The shallow waters exacerbated the problem of multiples in the sonar data. Multiples are generated by sound energy reverberating in the water column as opposed to penetrating into the sub-bottom. In the sub-bottom profiles, the presence of multiples, which essentially parallel the river bottom, mask the presence of possible deeper reflection events.

Due to the inability of the sub-bottom systems to successfully image the soft sediment, depth limitations, and aquatic vegetation in the survey areas, it was decided implement a sediment probing survey to determine the thickness of soft sediments. It was initially planned to use a hydro-probe to conduct this portion of the project. The hydro-probe functions by using a centrifugal water pump to supply a ¾ inch diameter hollow steel probe with pressurized water. The probe, marked off in 0.1 foot increments, is lowered into the sediments. The pressurized water acts to liquefy the sediments immediately in front of the probe. This allows the probe to penetrate silts, clays, sands, and small gravel. As the probe is manually lowered, the operator can feel the different materials, and knows whether they have reached solid rock, or whether the probe was stopped by gravel or other debris. Since the hydro-probe would have penetrated sands with ease, it was decided to use the lance without supplying pressurized water. This allowed the used to better detect the silt/sand interface.

The results of the hydrographic and probing surveys were point plotted in Hypack and AutoCAD. These data sets (raceway top of sediment, raceway bottom of sediment, canal top of sediment, canal bottom of sediment) were individually contoured. In order to determine the thickness of the sediment over the entire project area, Quicksurf 5.1 software was used to compare the top and bottom of sediment contours. Profiles were created at each of the individual transects (Figures 2 to 44).

The Seneca-Cayuga Canal Raceway was found to have significant silt deposits in the center with varying thicknesses near the edges. Top of sediment depth averaged about 2 feet in the center. A maximum sediment thickness of 4.8 feet was found on transect 10. The volume of soft sediments as calculated from comparison of top and bottom of sediment contours in the raceway was found to be 2775 cubic yards.

The Seneca-Cayuga Canal was found to consist of steep rocky sides, with a relatively flat bottom consisting largely of sand and rock. No soft sediment deposits were found in the first 11 transects. A soft sediment deposit was found along the southern side of the canal from transect 12 to transect 19. The deposit was fairly thin (less than one foot) between transects 12 and 15. The deposit slowly thickened to a maximum of 3.7 feet thick near transect 19. The deposit then quickly thins out to nothing as it approaches the Gorham Street Bridge. Another deposit was found East of the bridge along the southern side of the canal on transects 23 and 24. The volume of soft sediments in the surveyed area of the canal as calculated from comparison of top and bottom of sediment contours was found to be 936 cubic yards.

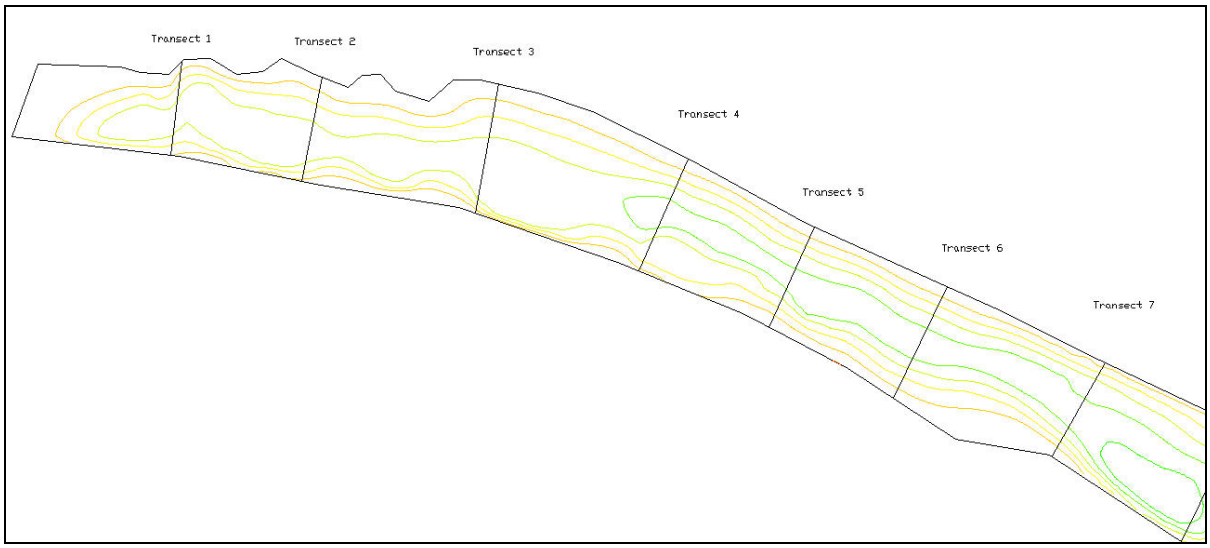


Figure 2. Locations of transects 1 to 7 in the raceway.

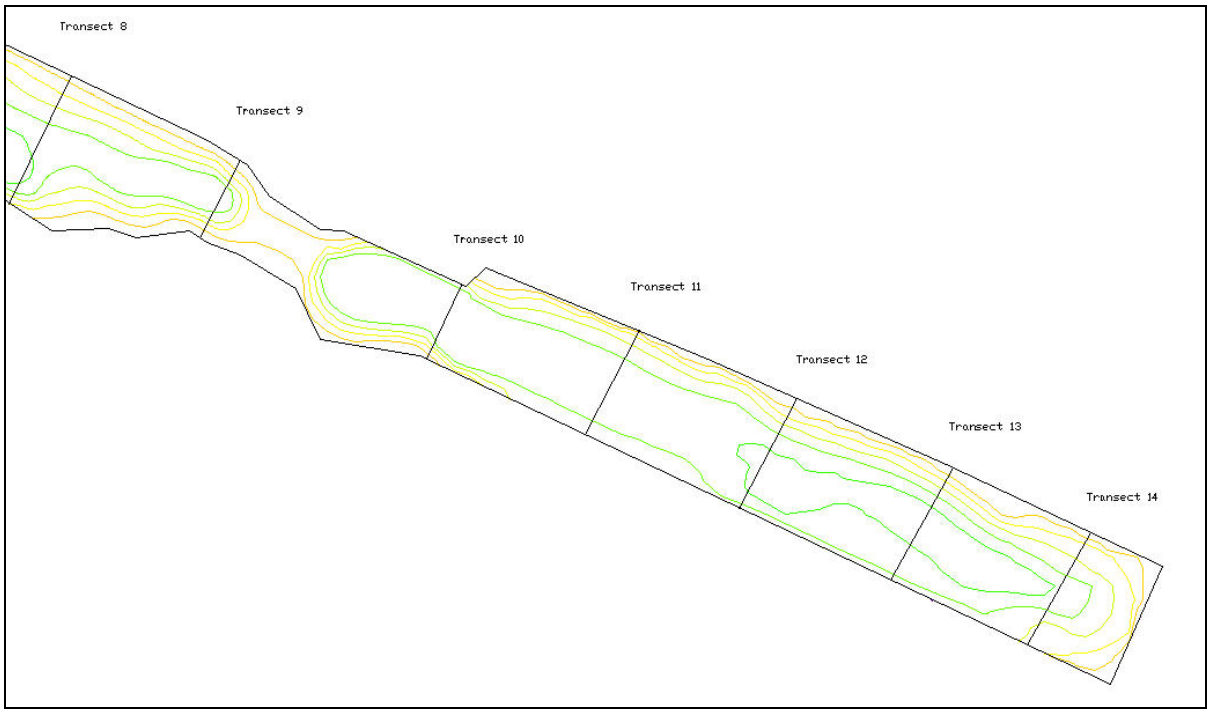


Figure 3. Locations of transects 8 to 14 in the raceway.

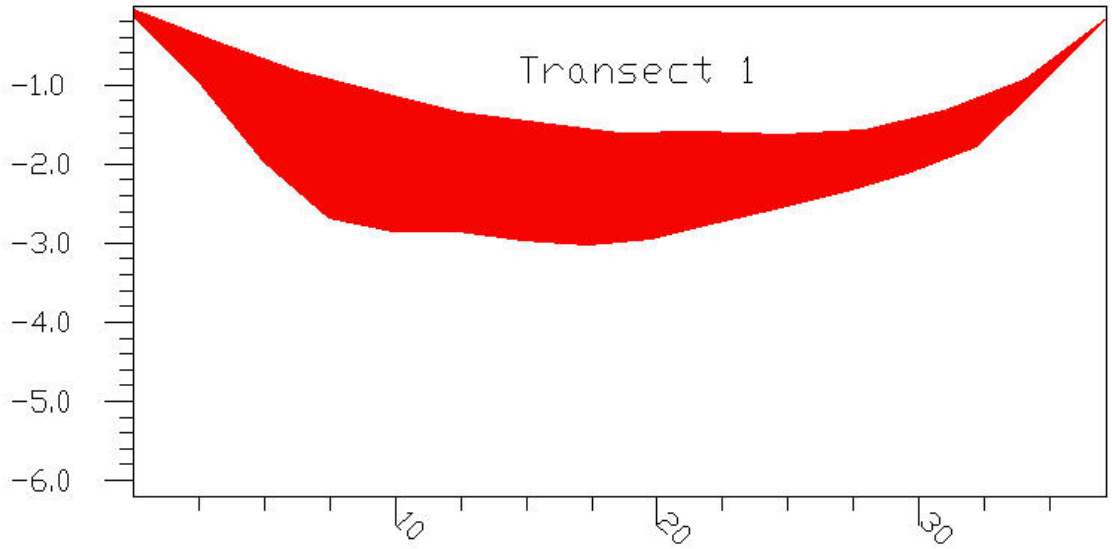


Figure 4. Profile of raceway at transect 1, North to South. Soft sediment in red.

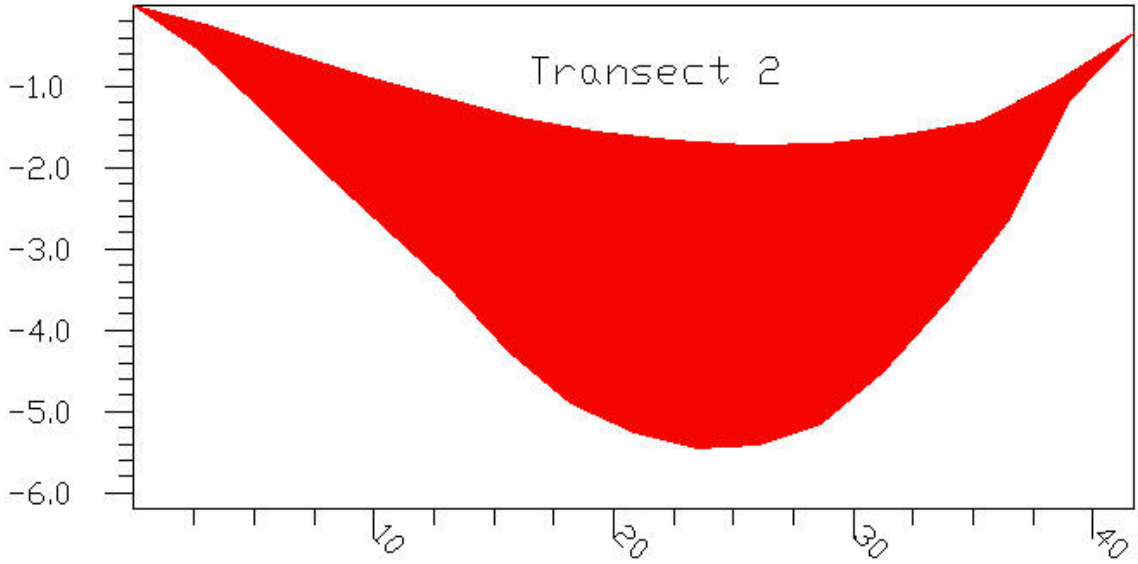


Figure 5. Profile of raceway at transect 2, North to South. Soft sediment in red.

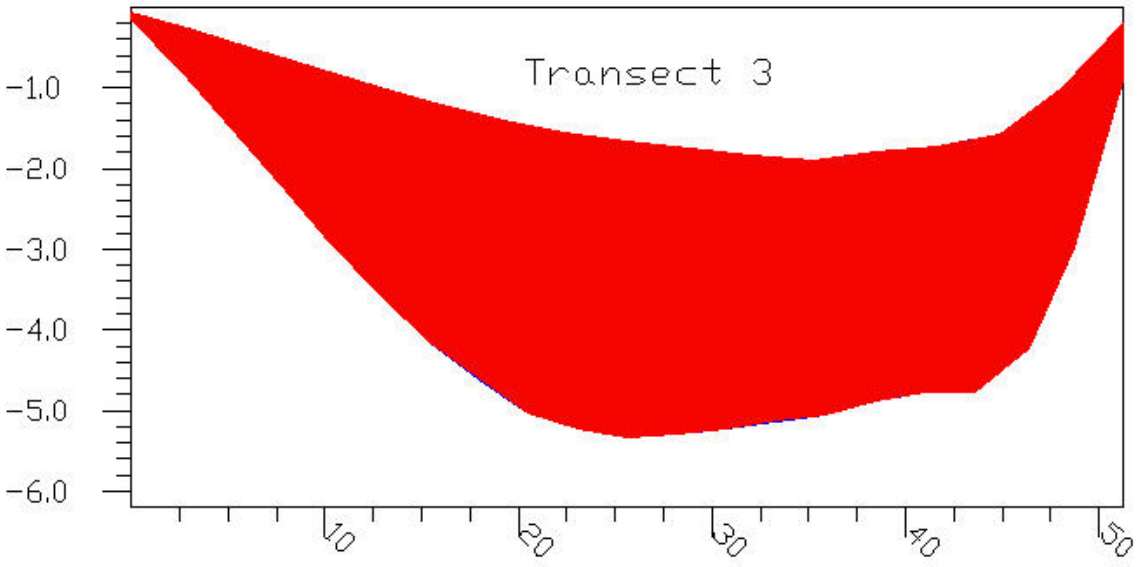


Figure 6. Profile of raceway at transect 3, North to South. Soft sediment in red.

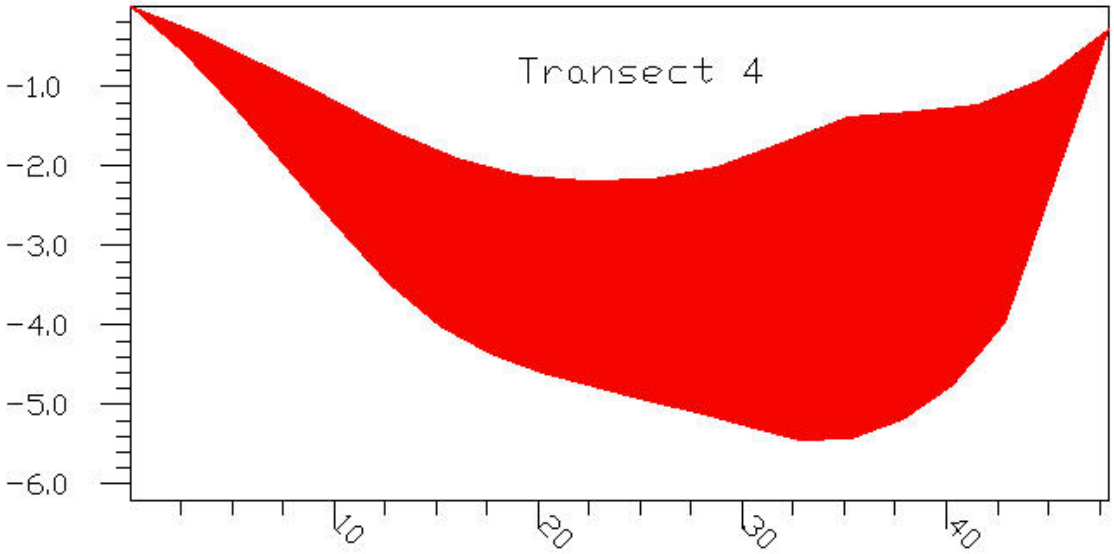


Figure 7. Profile of raceway at transect 4, North to South. Soft sediment in red.

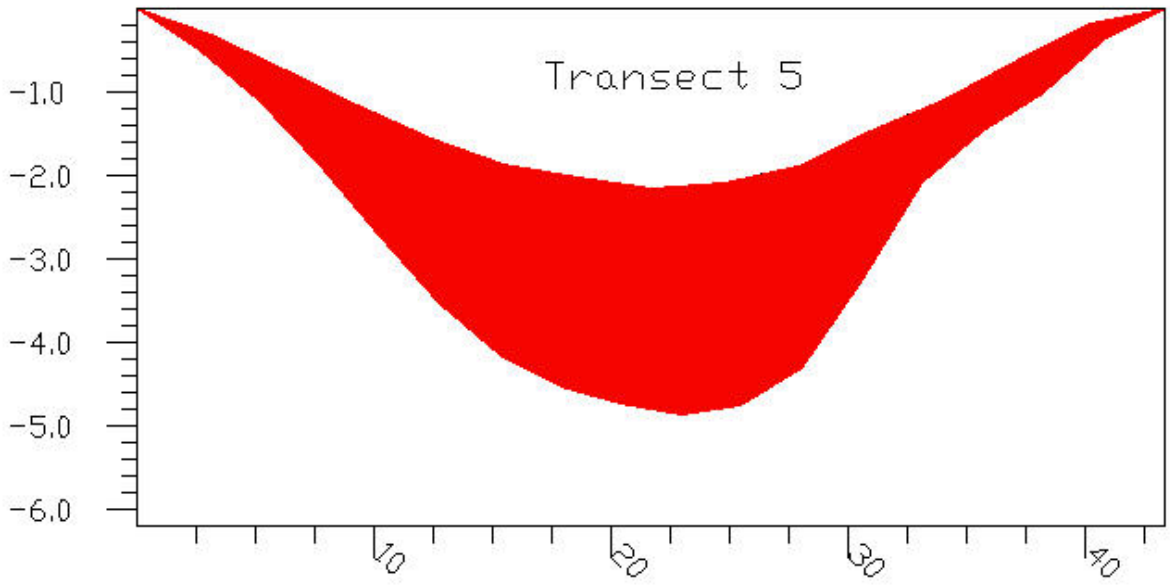


Figure 8. Profile of raceway at transect 5, North to South. Soft sediment in red.

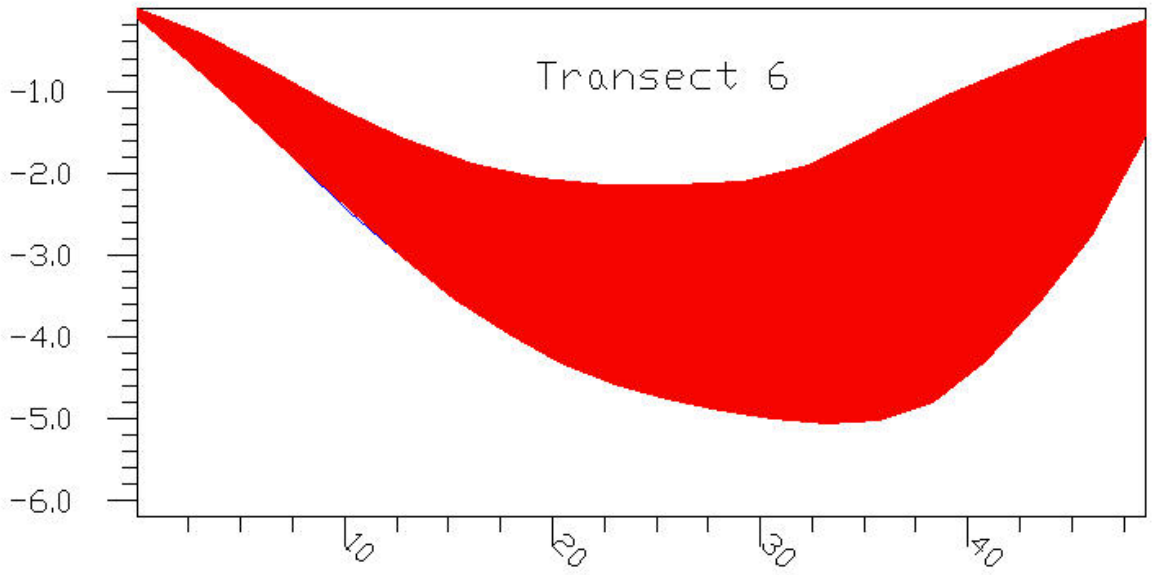


Figure 9. Profile of raceway at transect 6, North to South. Soft sediment in red.

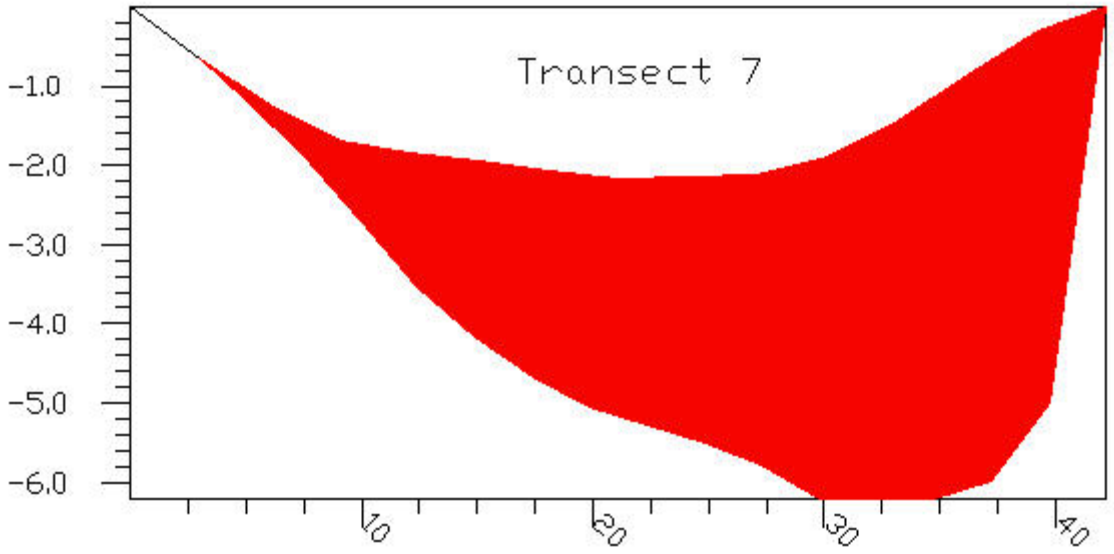


Figure 10. Profile of raceway at transect 7, North to South. Soft sediment in red.

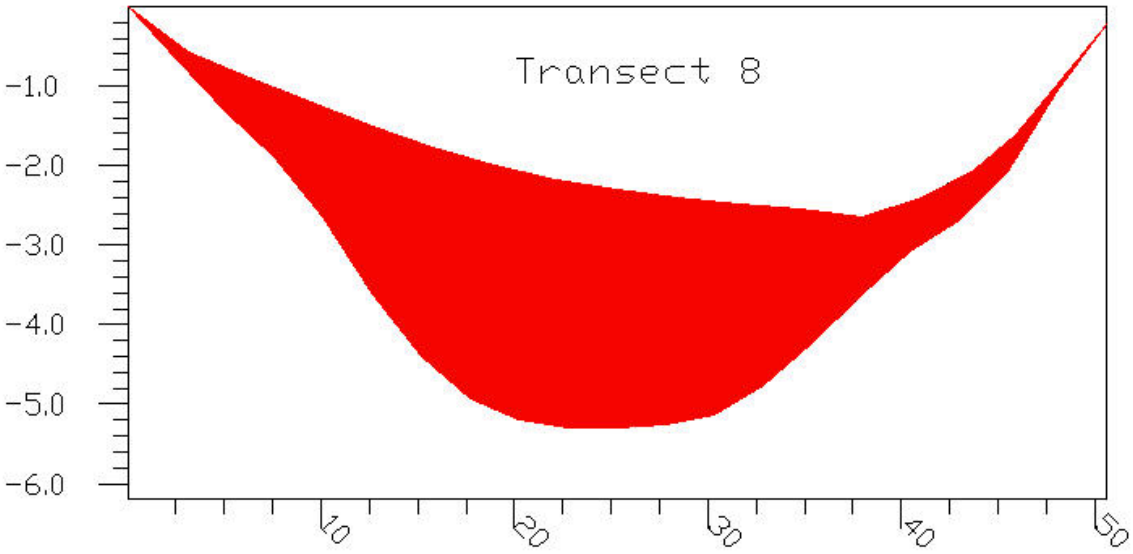


Figure 11. Profile of raceway at transect 8, North to South. Soft sediment in red.

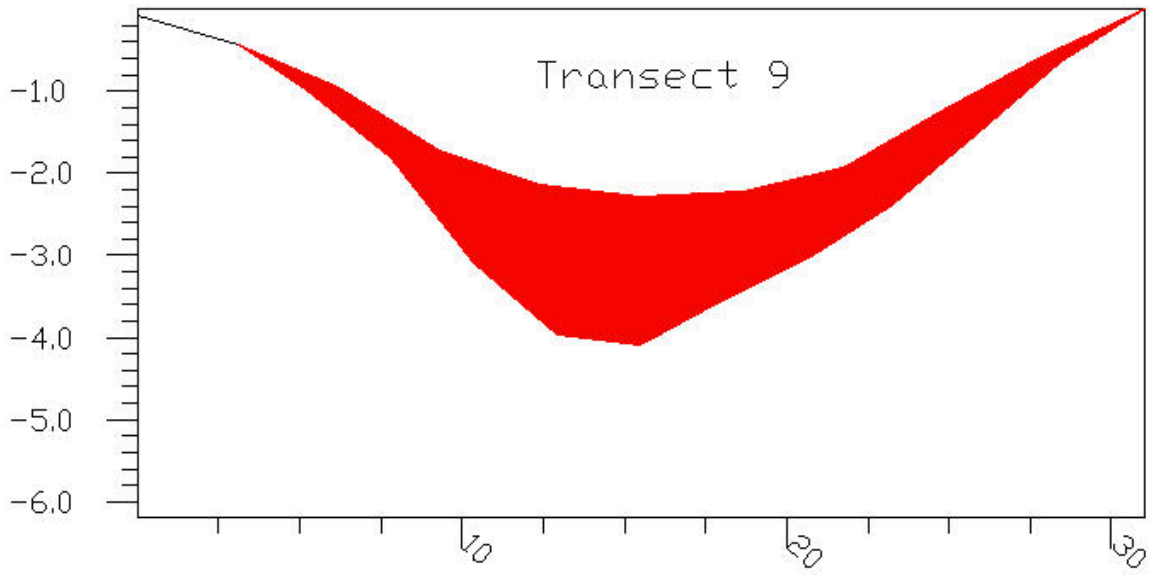


Figure 12. Profile of raceway at transect 9, North to South. Soft sediment in red..

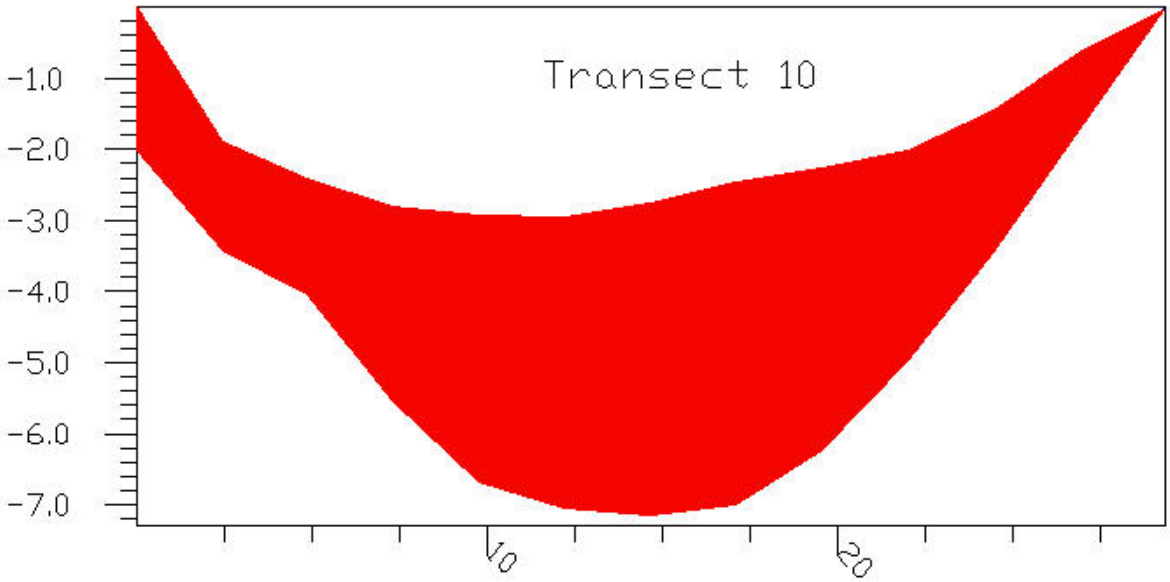


Figure 13. Profile of raceway at transect 10, North to South. Soft sediment in red.

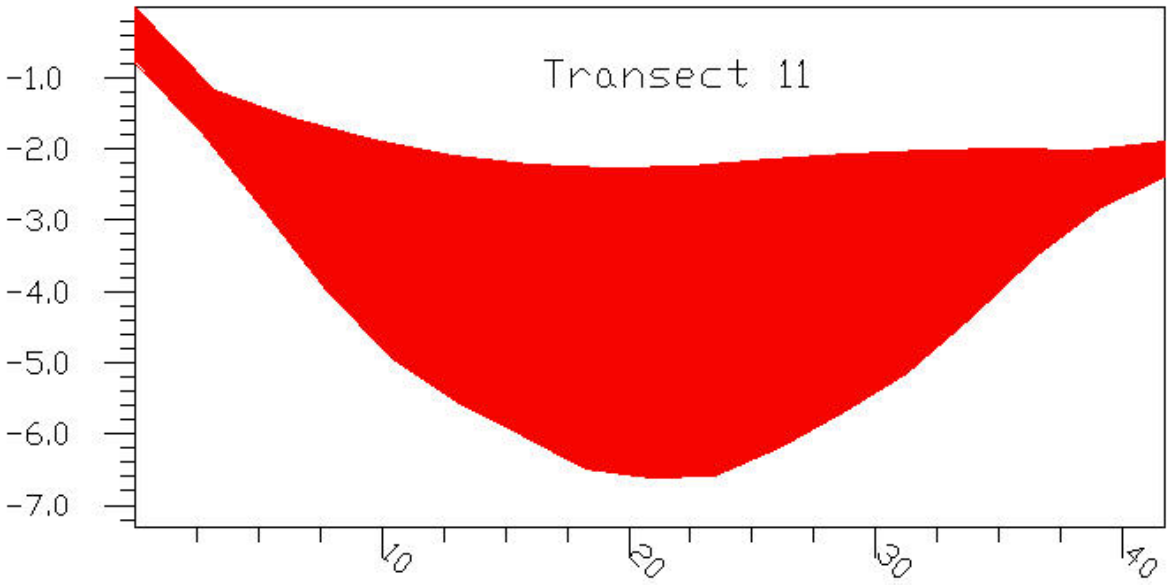


Figure 14. Profile of raceway at transect 11, North to South. Soft sediment in red.

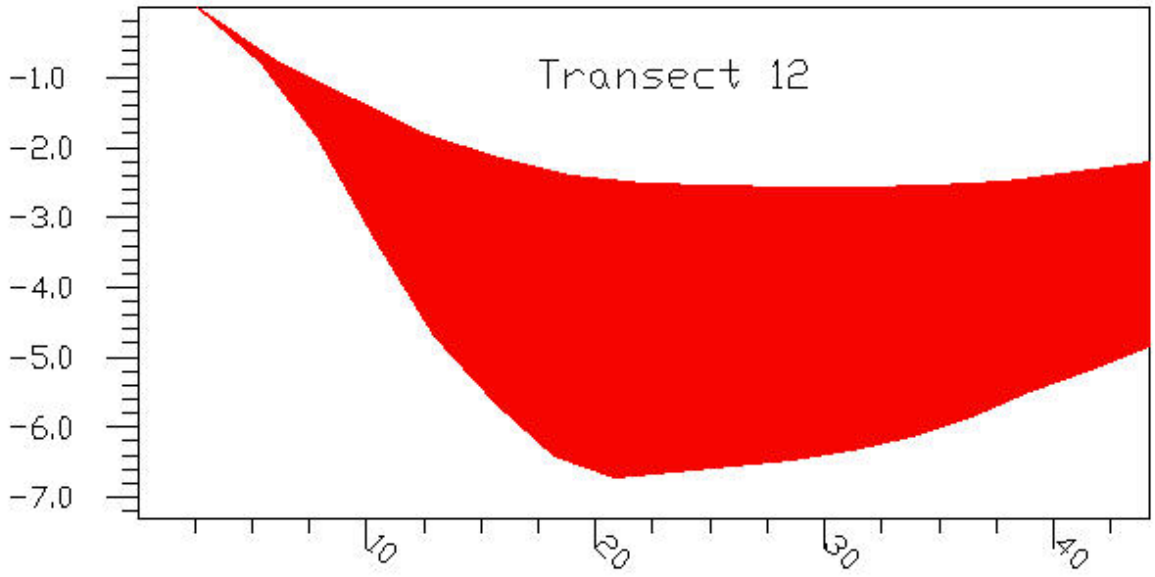


Figure 15. Profile of raceway at transect 12, North to South. Soft sediment in red.

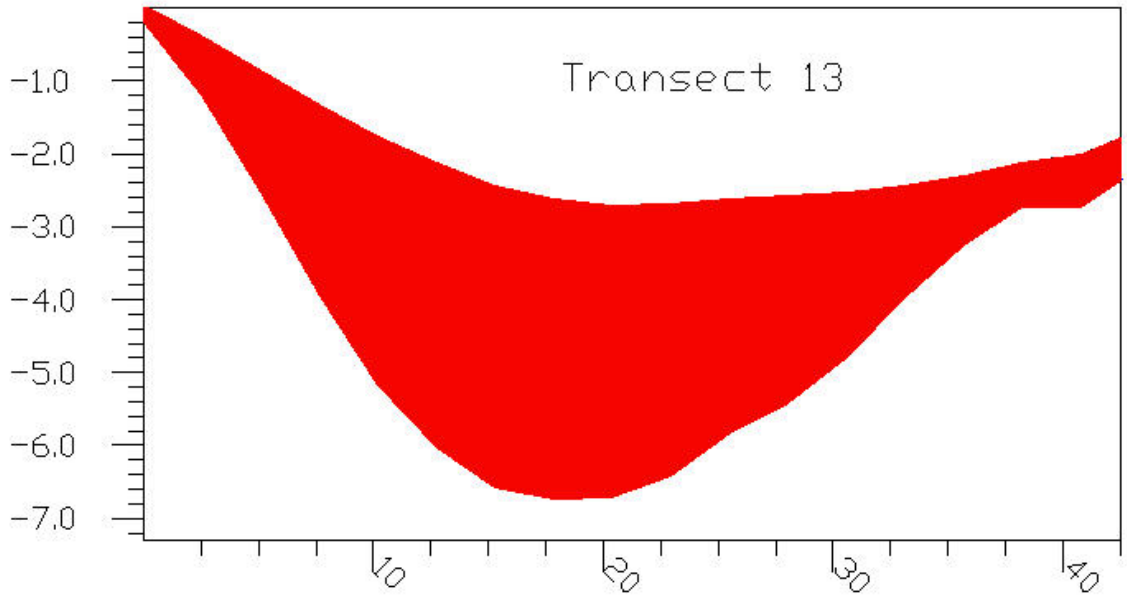


Figure 16. Profile of raceway at transect 13, North to South. Soft sediment in red..

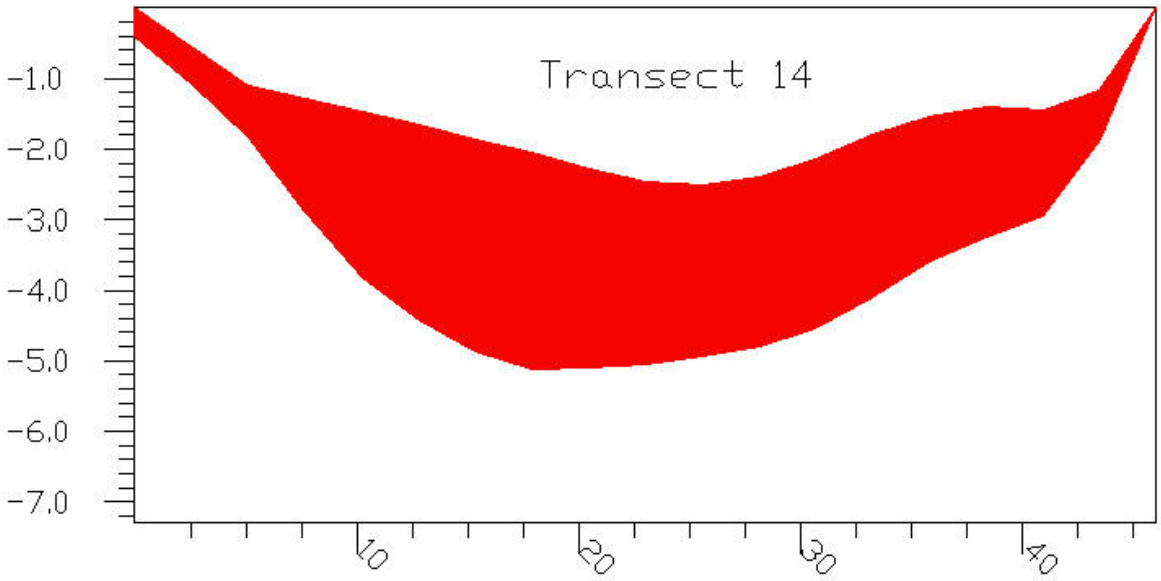


Figure 17. Profile of raceway at transect 14, North to South. Soft sediment in red.

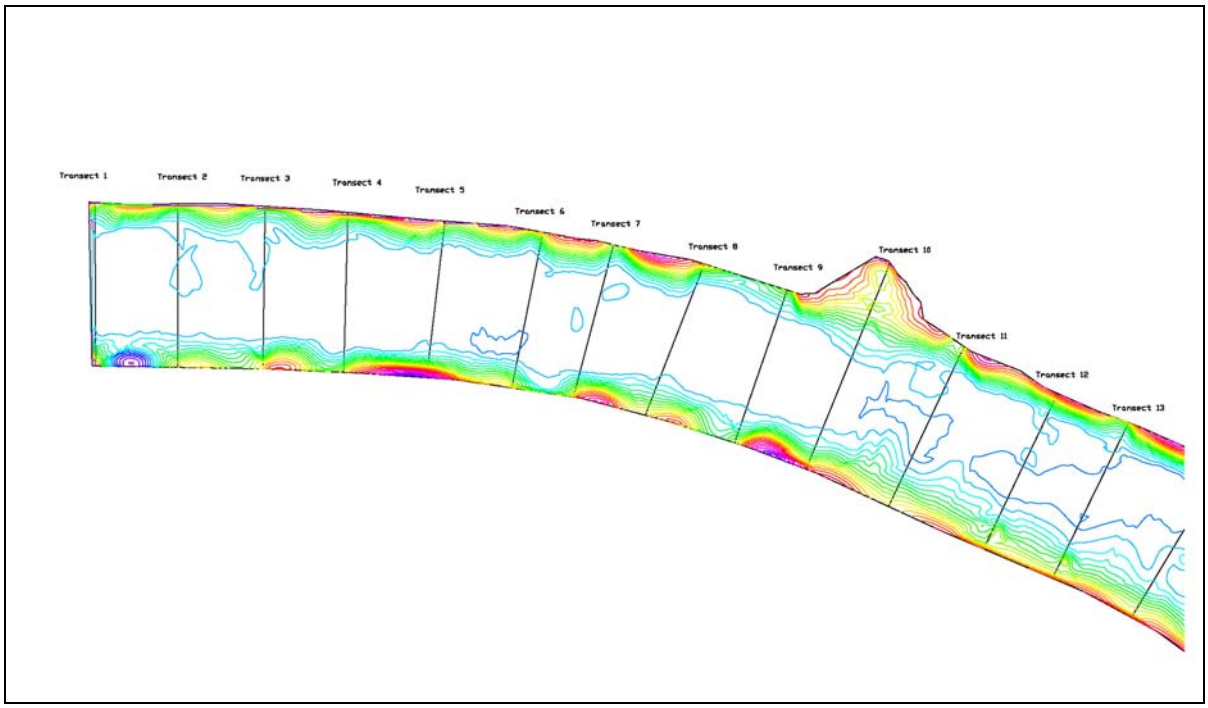


Figure 18. Locations of transects 1 to 13 in the canal.

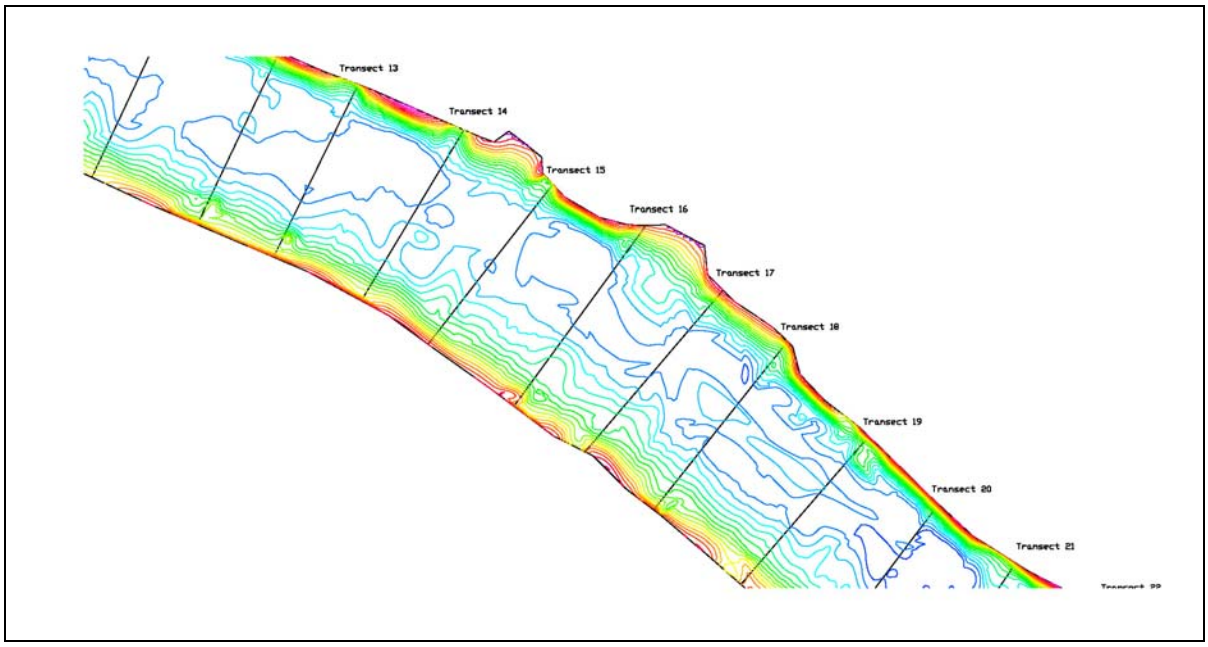


Figure 19. Locations of transects 13 to 19 in the canal.

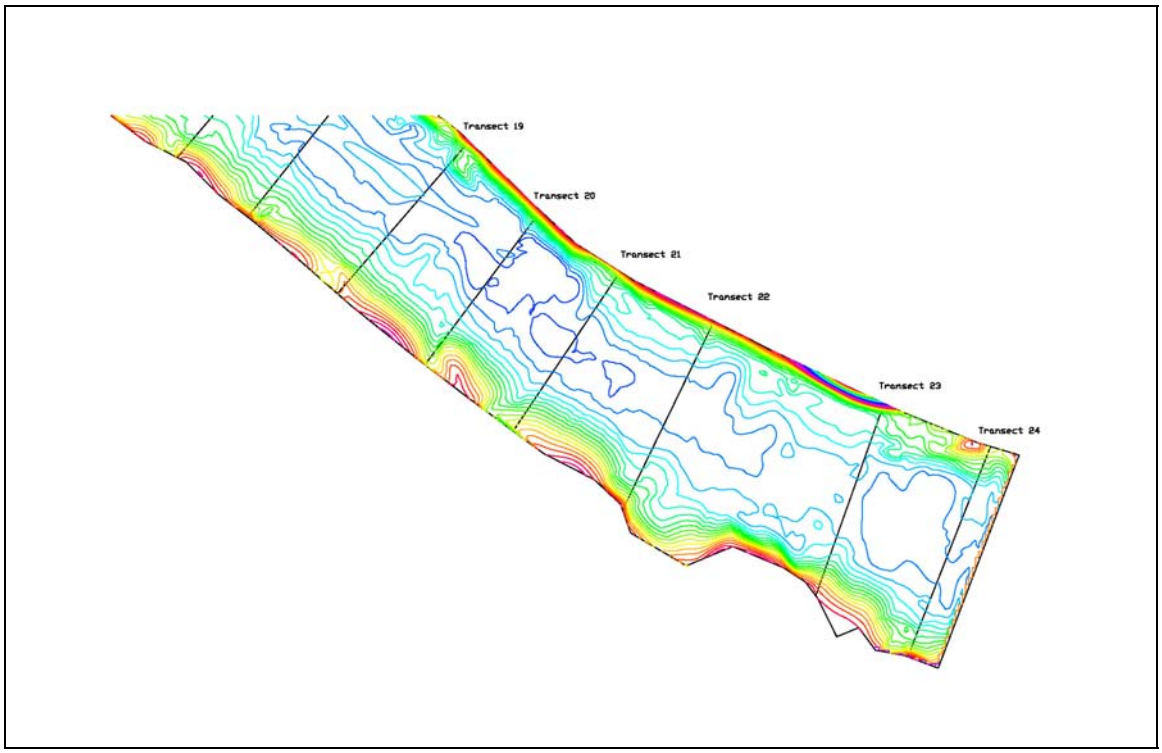


Figure 20. Locations of transects 19 to 24 in the canal.

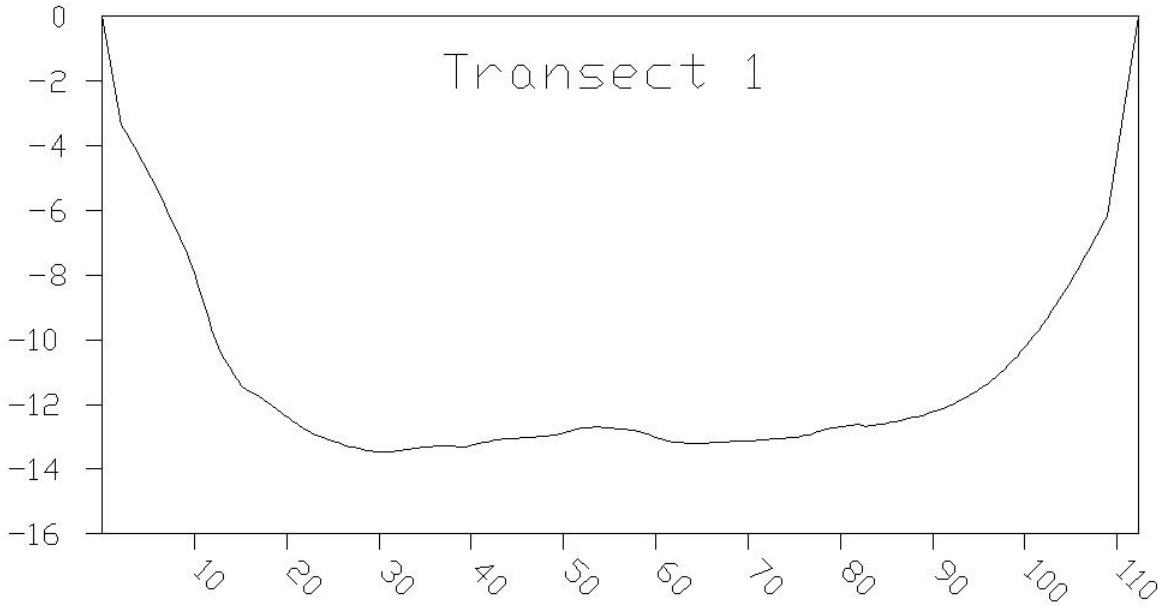


Figure 21. Profile of canal at transect 1, South to North. No soft sediment present.

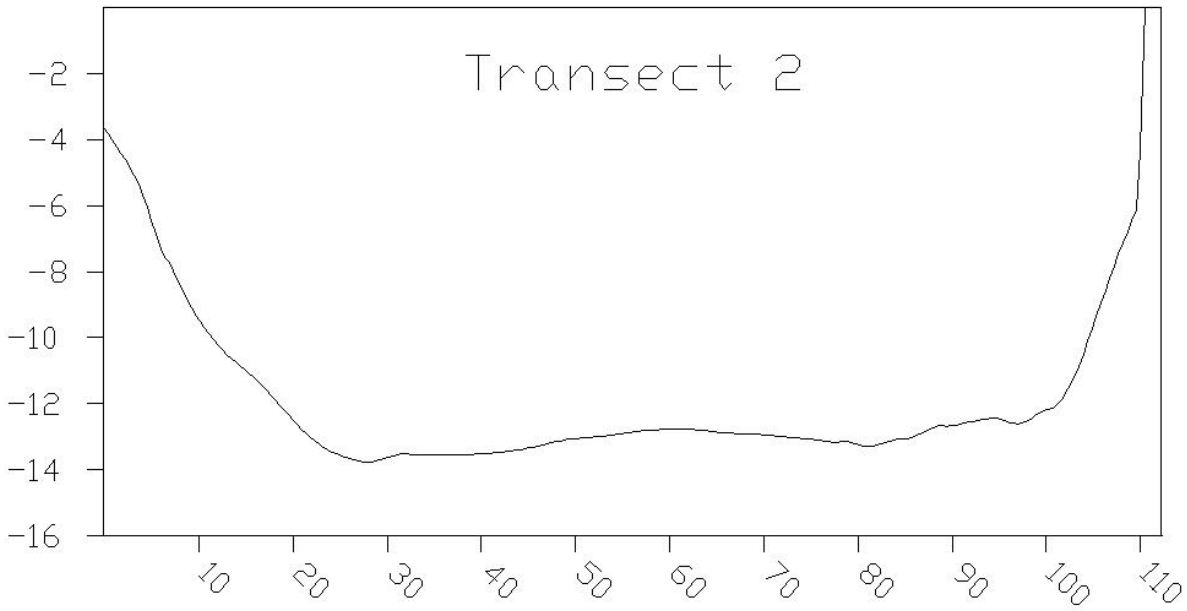


Figure 22. Profile of canal at transect 2, South to North. No soft sediment present.

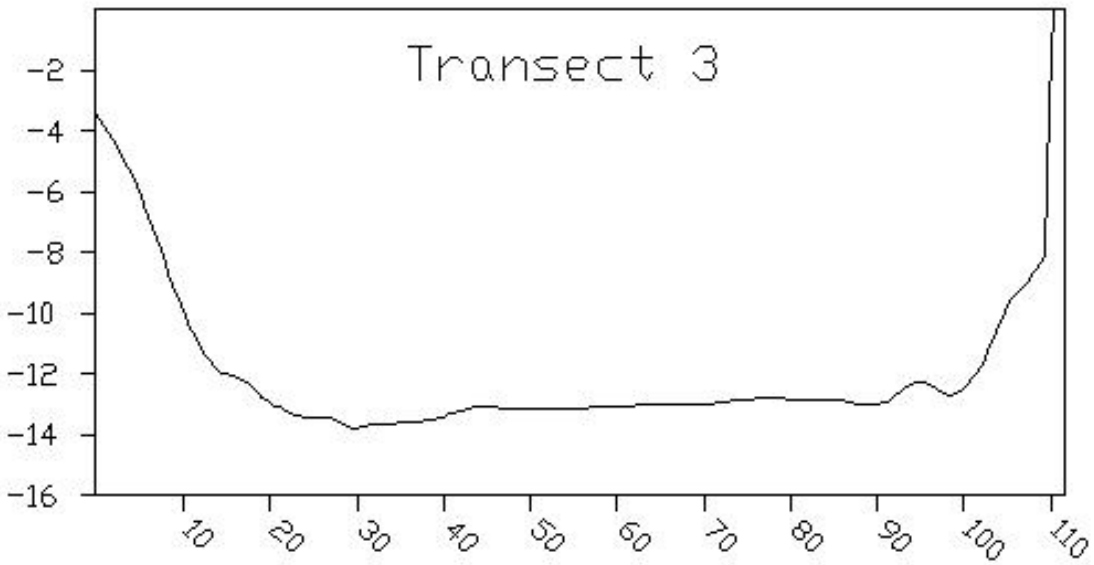


Figure 23. Profile of canal at transect 3, South to North. No soft sediment present.

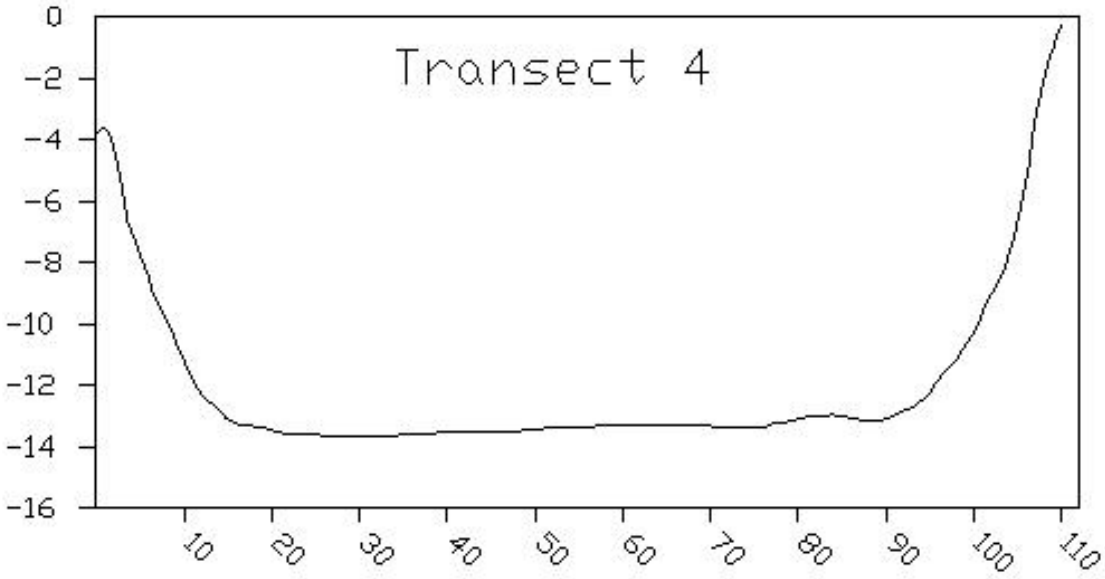


Figure 24. Profile of canal at transect 4, South to North. No soft sediment present.

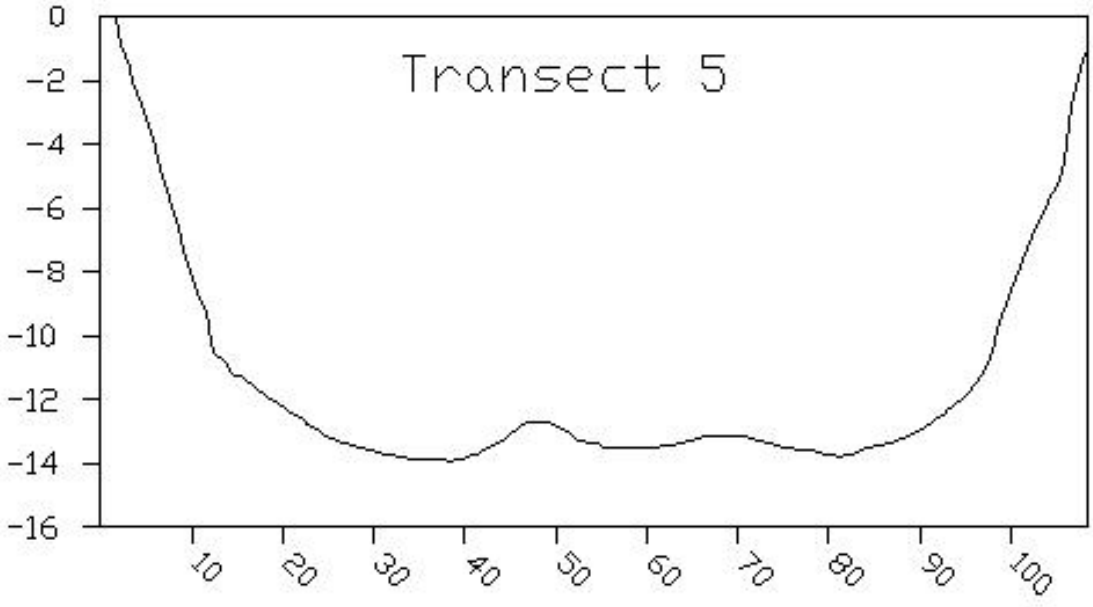


Figure 25. Profile of canal at transect 5, South to North. No soft sediment present.

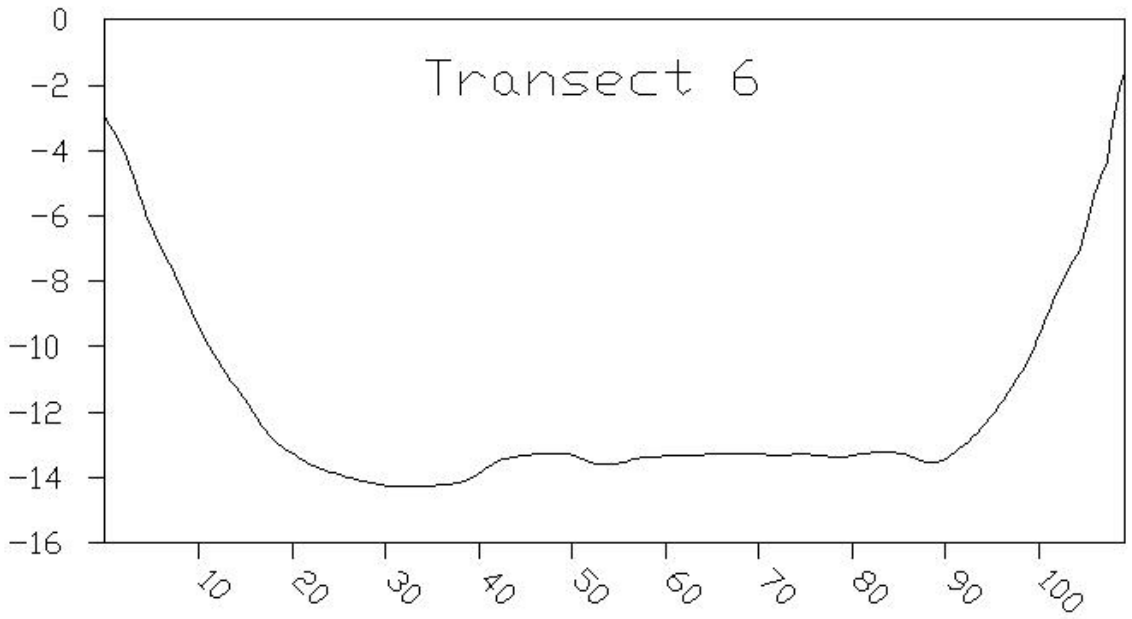


Figure 26. Profile of canal at transect 6, South to North. No soft sediment present.

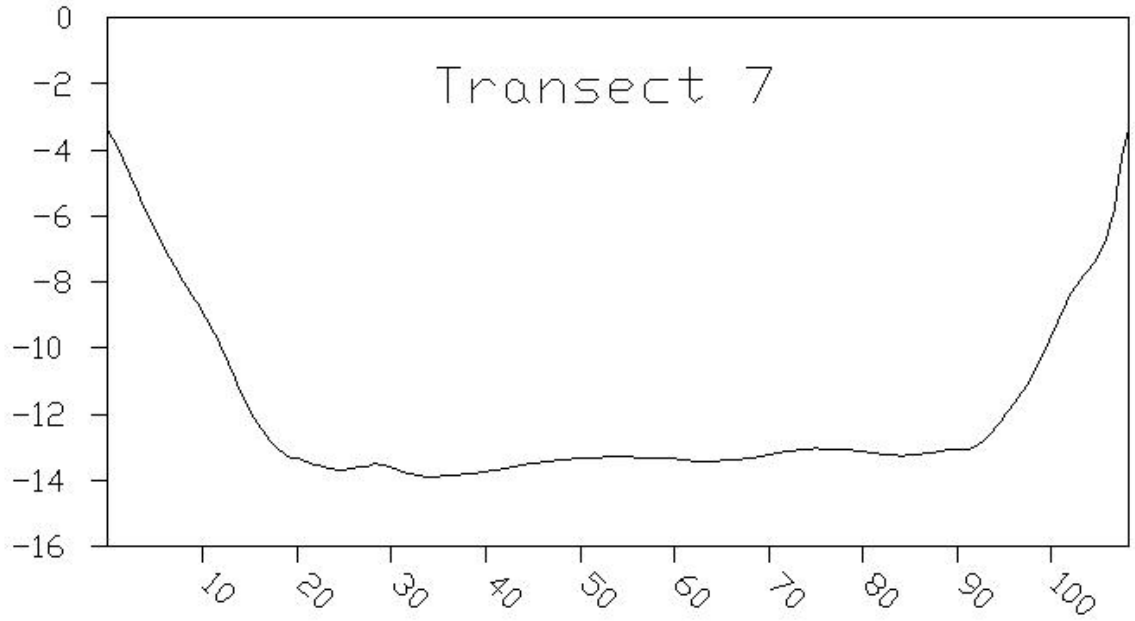


Figure 27. Profile of canal at transect 7, South to North. No soft sediment present.

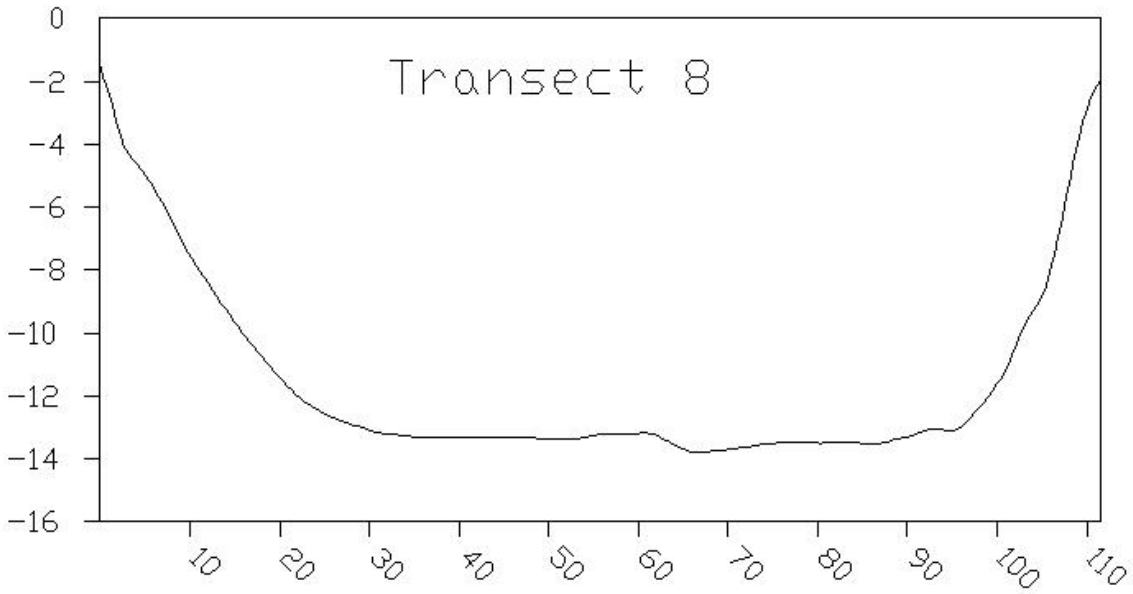


Figure 28. Profile of canal at transect 8, South to North. No soft sediment present.

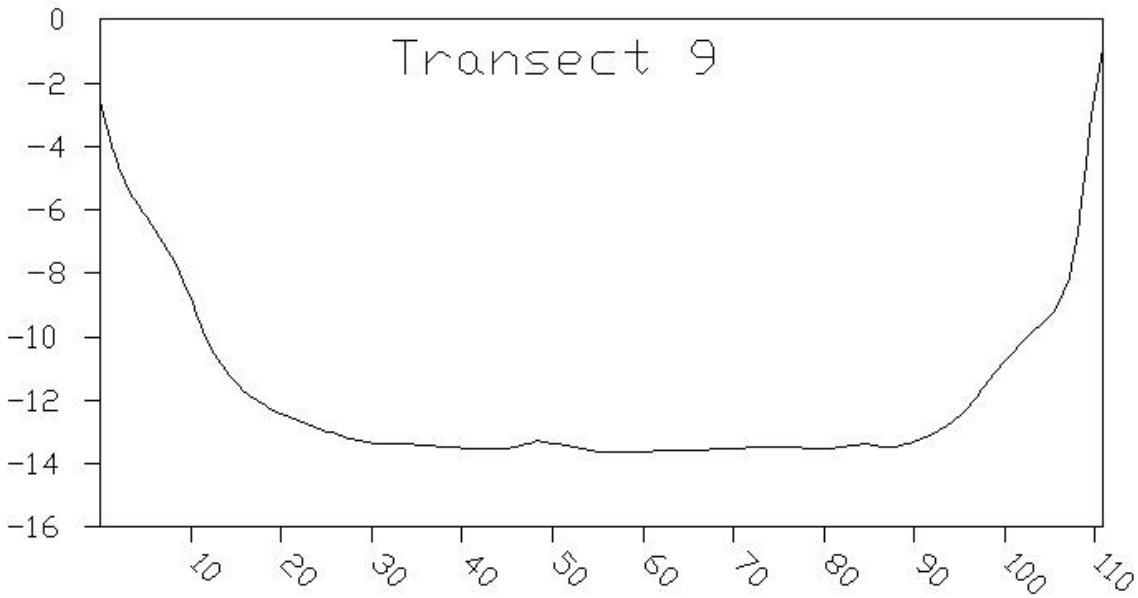


Figure 29. Profile of canal at transect 9, South to North. No soft sediment present.

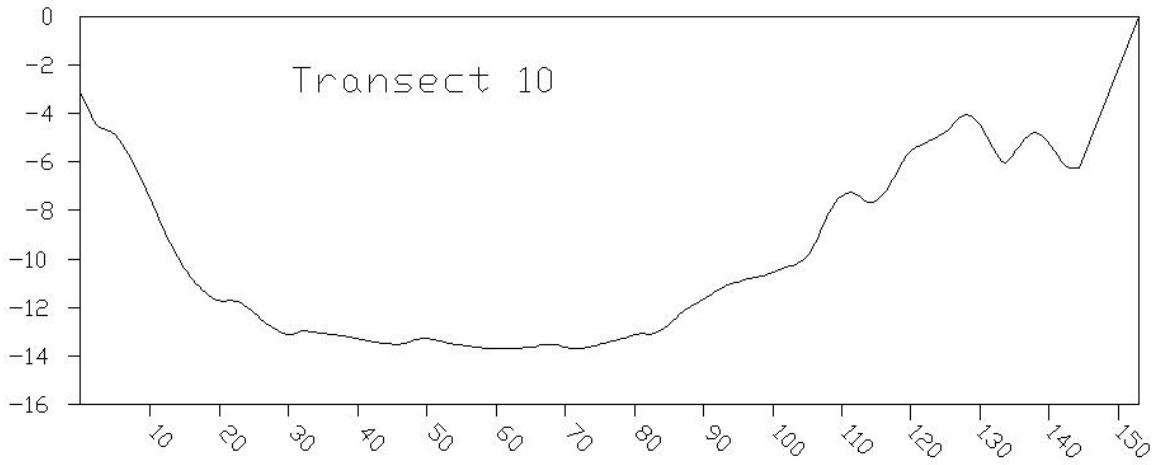


Figure 30. Profile of canal at transect 10, South to North. No soft sediment present.

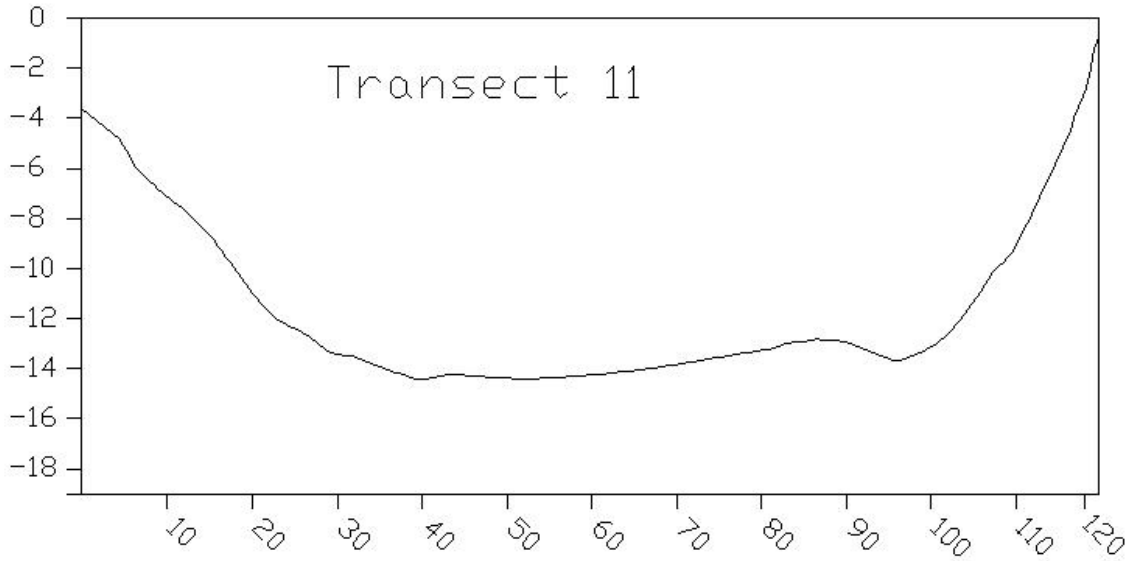


Figure 31. Profile of canal at transect 11, South to North. No soft sediment present.

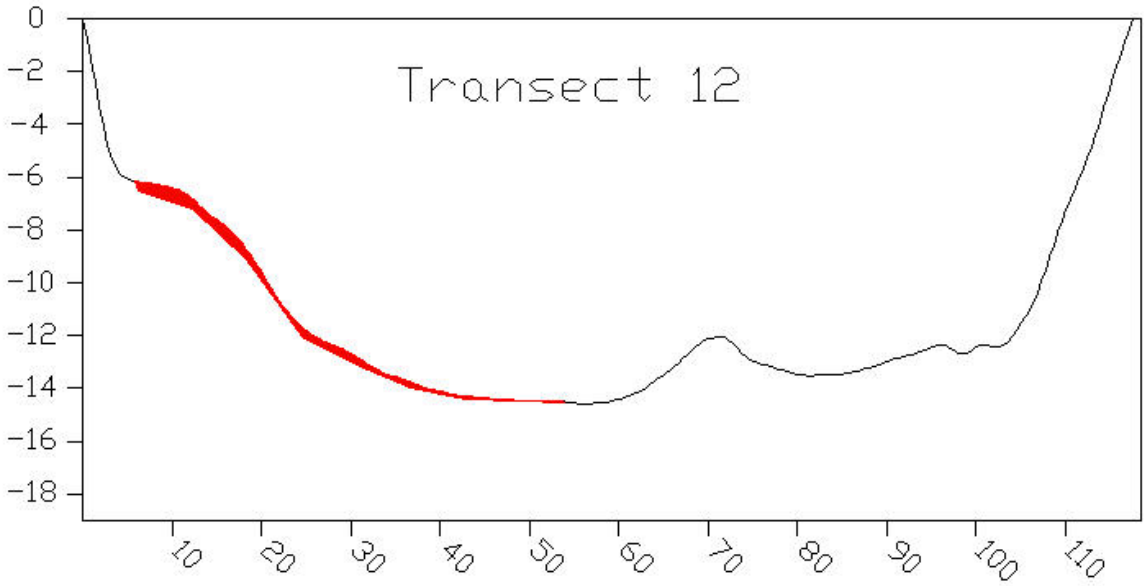


Figure 32. Profile of canal at transect 12, South to North. Soft sediment in red.

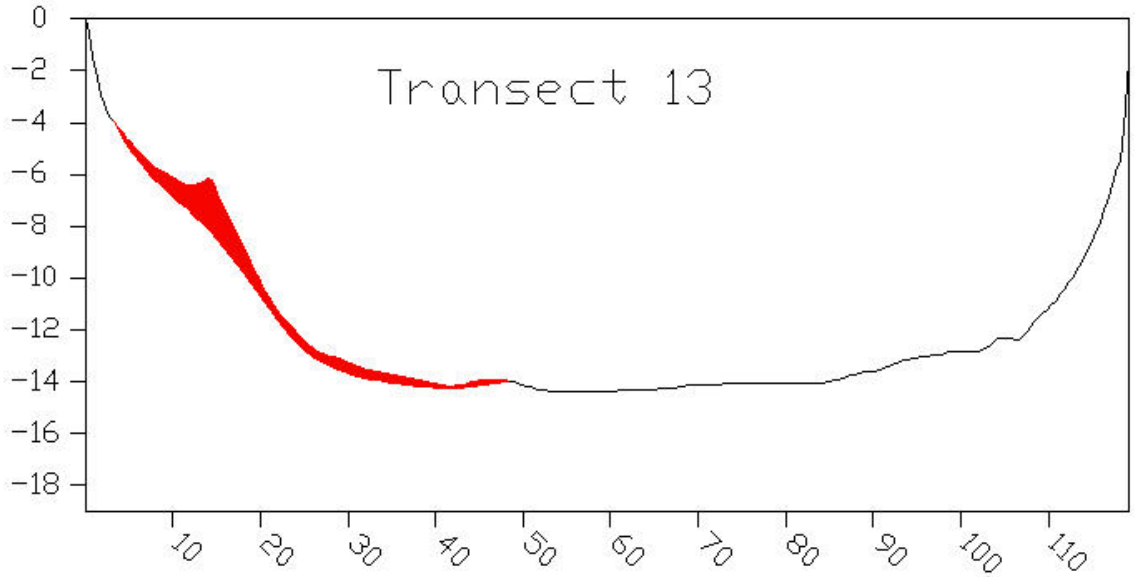


Figure 33. Profile of canal at transect 13, South to North. Soft sediment in red.

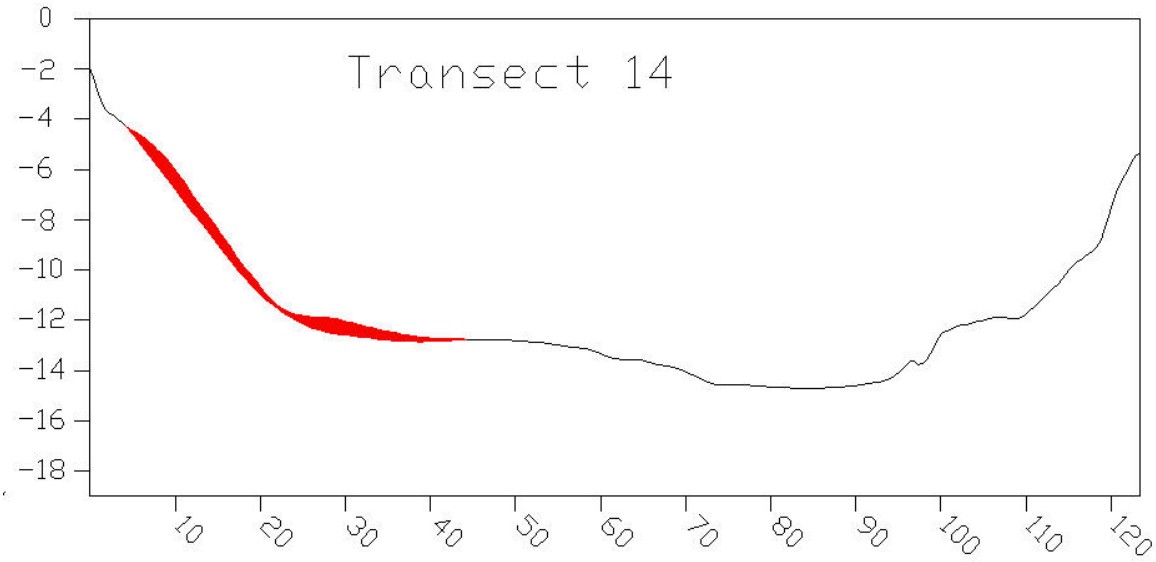


Figure 34. Profile of canal at transect 14, South to North. Soft sediment in red.

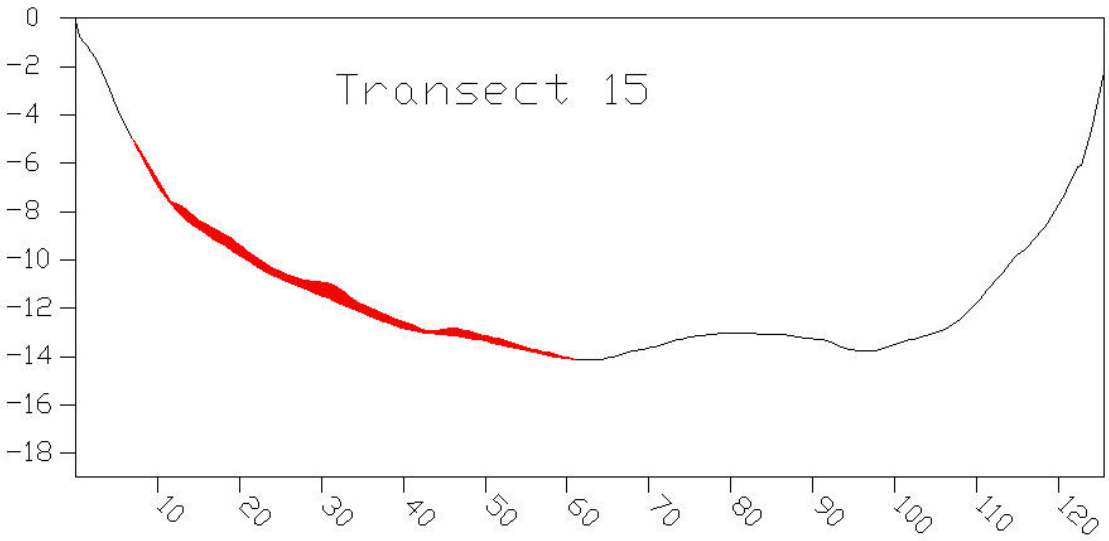


Figure 35. Profile of canal at transect 15, South to North. Soft sediment in red.

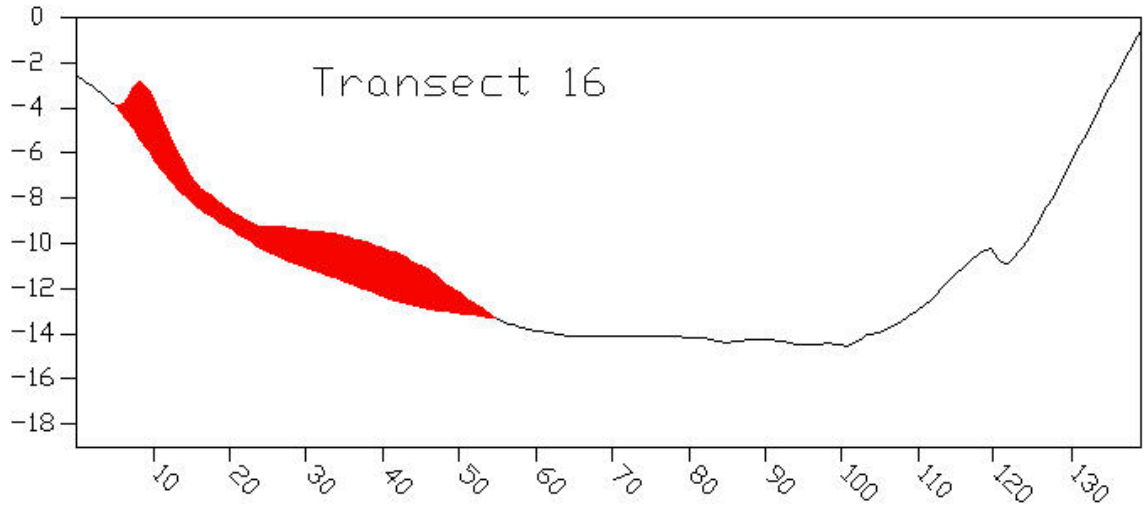


Figure 36. Profile of canal at transect 16, South to North. Soft sediment in red.

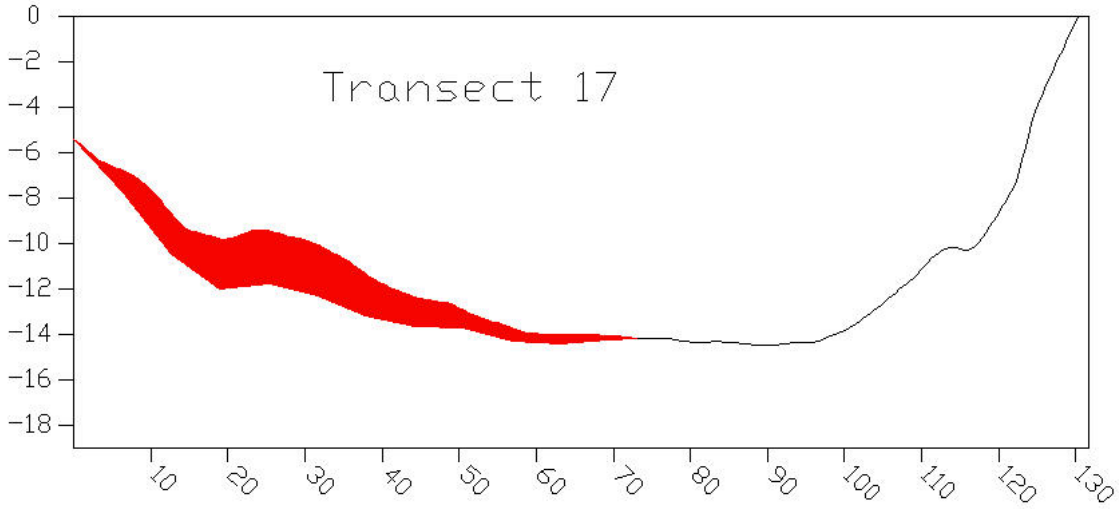


Figure 37. Profile of canal at transect 17, South to North. Soft sediment in red.

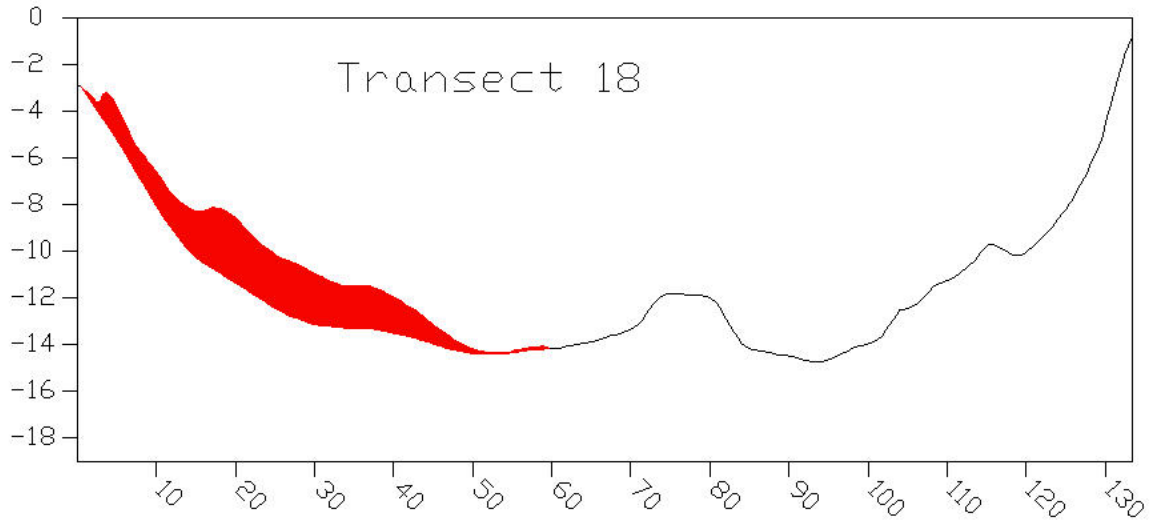


Figure 38. Profile of canal at transect 18, South to North. Soft sediment in red.

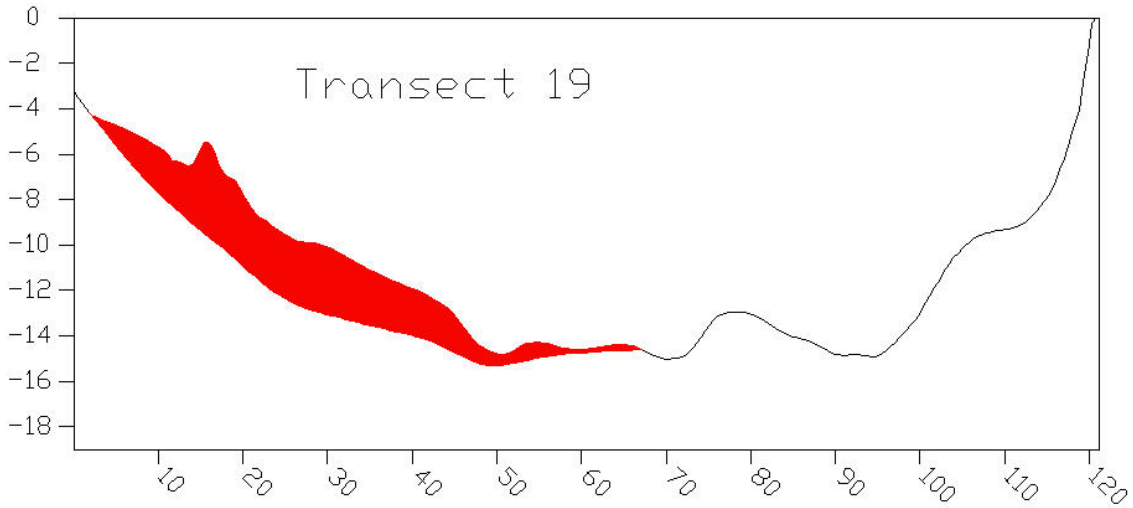


Figure 39. Profile of canal at transect 19, South to North. Soft sediment in red.

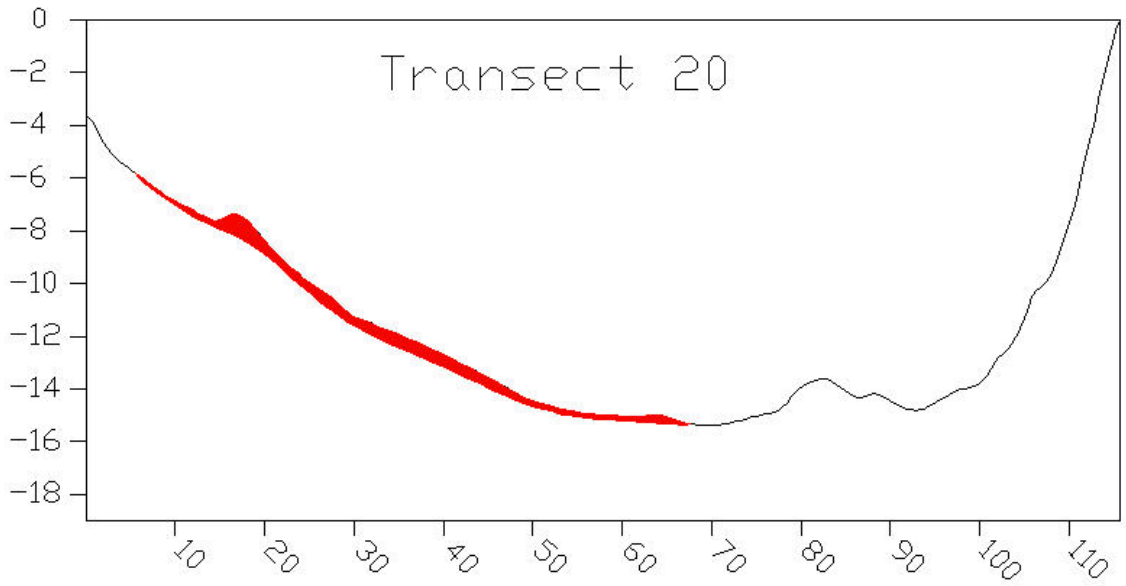


Figure 40. Profile of canal at transect 20, South to North. Soft sediment in red.

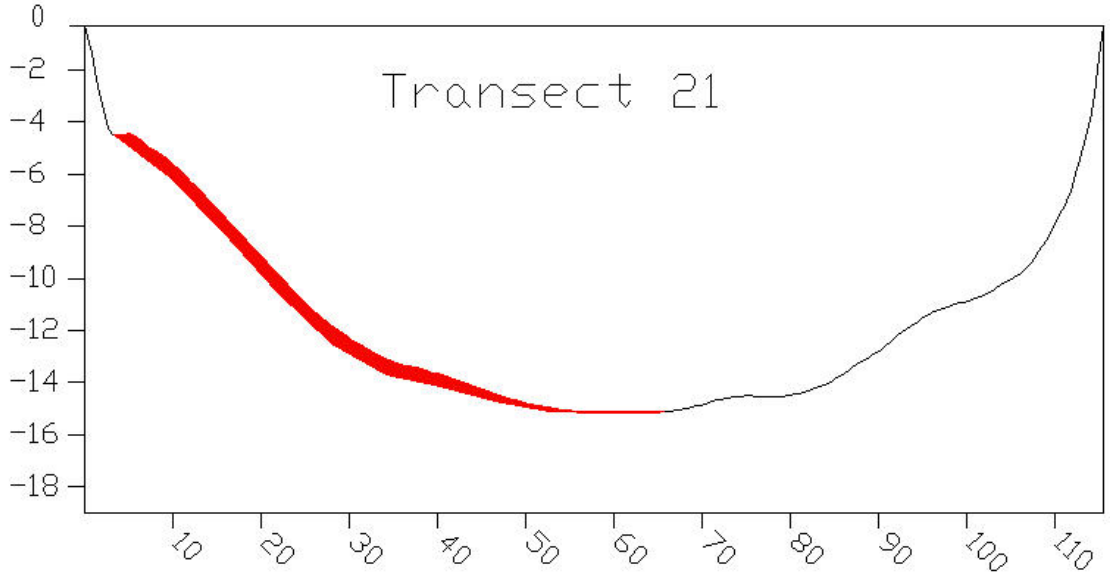


Figure 41. Profile of canal at transect 21, South to North. Soft sediment in red.

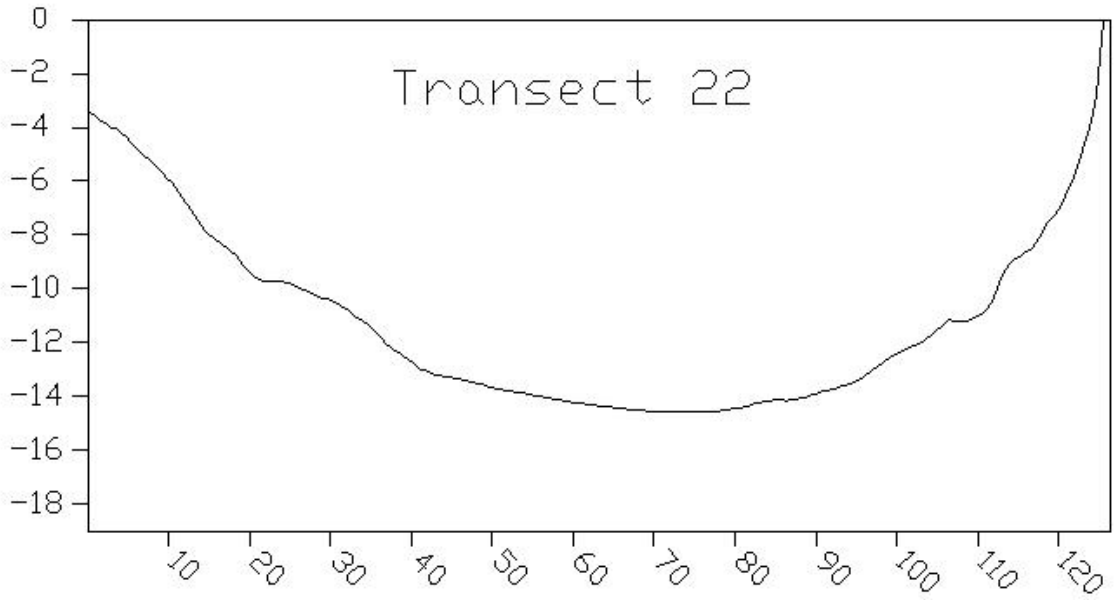


Figure 42. Profile of canal at transect 12, South to North. No soft sediment present.

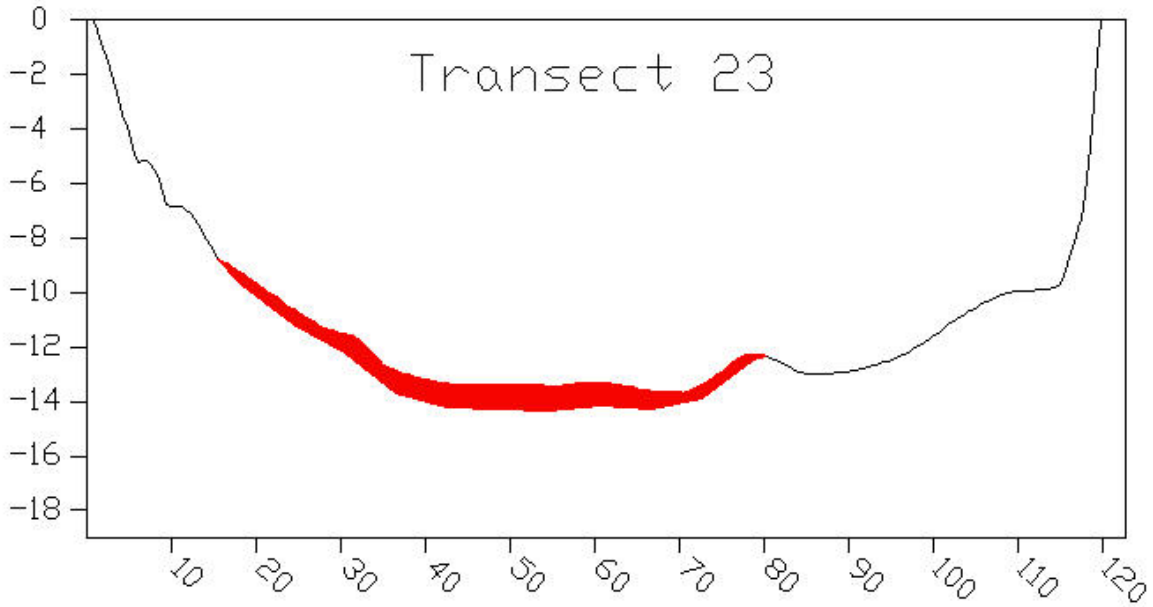


Figure 43. Profile of canal at transect 23, South to North. Soft sediment in red.

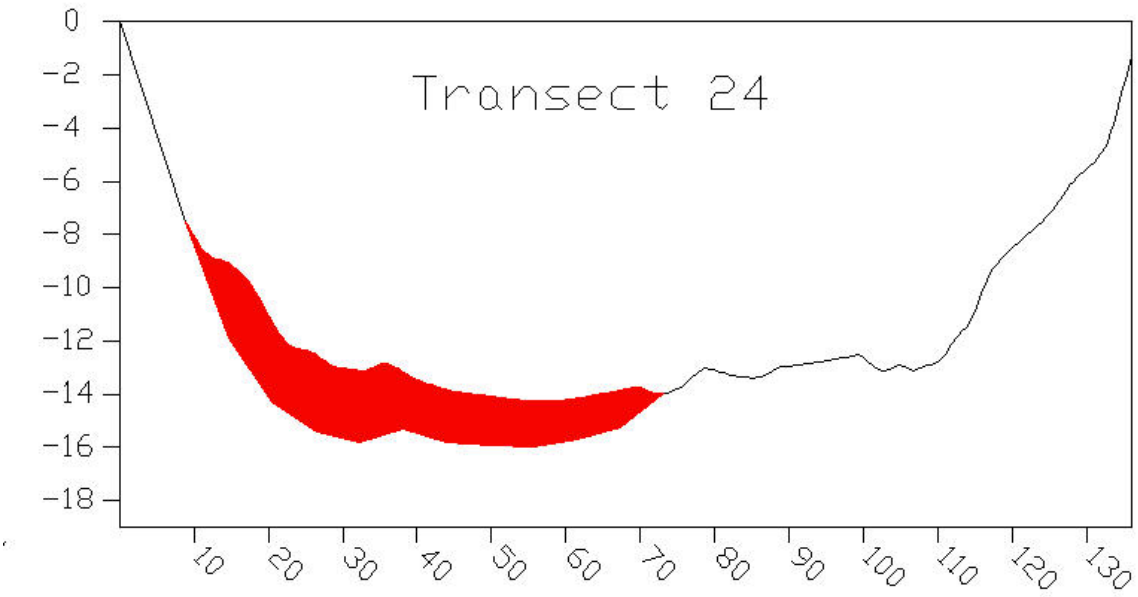


Figure 44. Profile of canal at transect 24, South to North. Soft sediment in red.

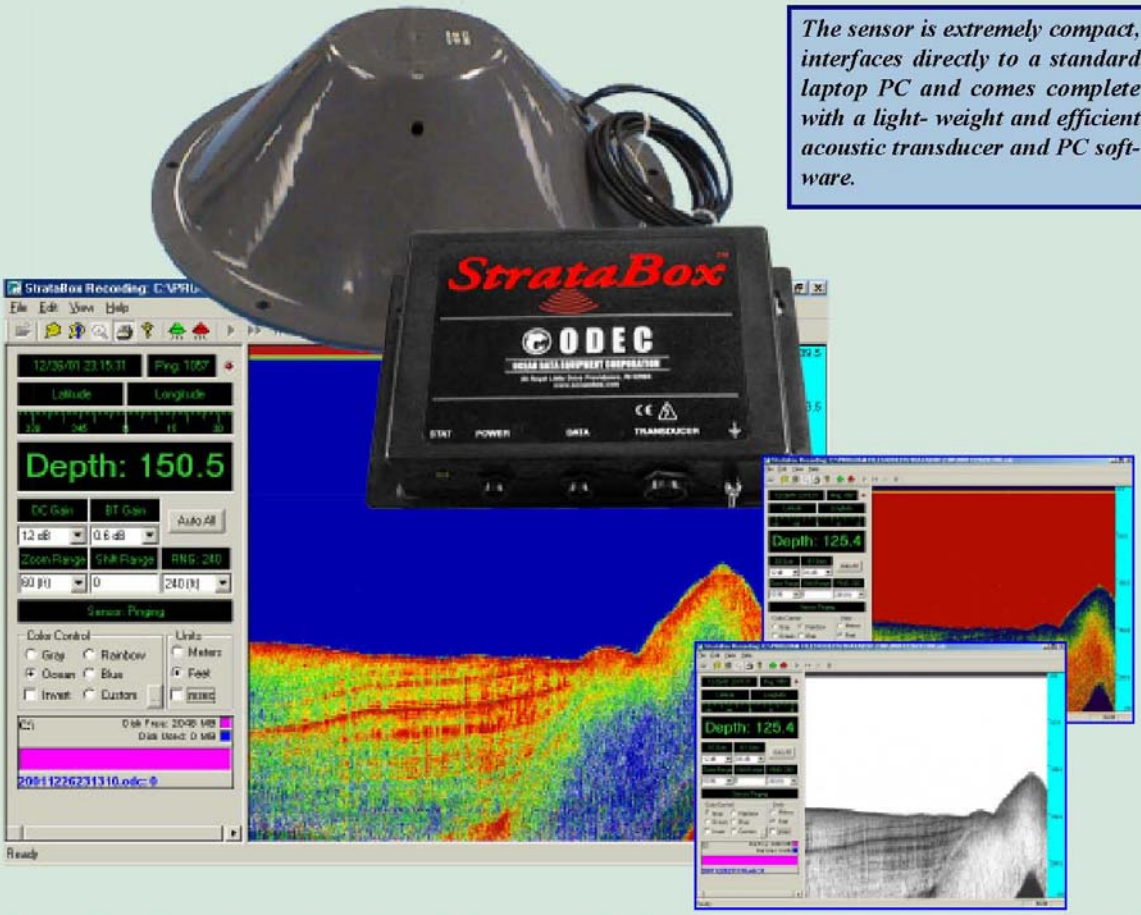
Appendix A

Equipment Specifications

StrataBox ™
Marine Geophysical Instrument

The StrataBox ™ is a portable high- resolution marine sediment imaging instrument capable of delivering 6 cm of marine sediment strata resolution with bottom penetration of up to 40 meters. It is designed exclusively for inshore and coastal geophysical marine survey up to 150 meters of water depth.

The sensor is extremely compact, interfaces directly to a standard laptop PC and comes complete with a light- weight and efficient acoustic transducer and PC soft-ware.



Extreme ease of use, portability, and cost efficiency make this device a perfect choice for shallow water marine geophysical applications

FEATURES

- **Strata Resolution: 6 cm with up to 40 meters bottom penetration.**
- **Depth Accuracy: ± 0.5%**
- **Geographic Position Input, NMEA Compatible**
- **Hypack & HydroPro Compatible**
- **Data Storage & Playback**
- **Zoom Modes**
- **Event Marks**
- **Low Input Power**

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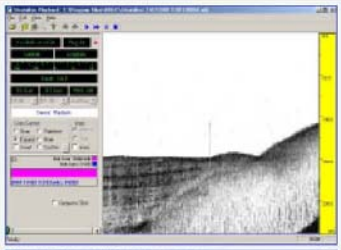
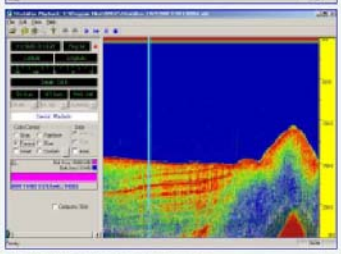
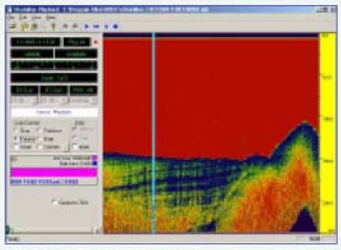
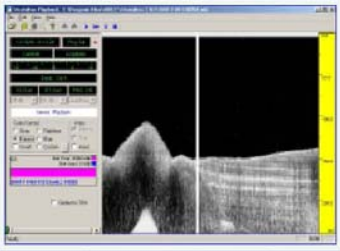
SPECIFICATIONS

StrataBox - Marine Geophysical Instrument









Units:	Feet or Meters
Depth Ranges:	0-15, 0-30, 0-60, 0-120, 0-240, 0-450 Feet. 0-5, 0-10, 0-20, 0- 40, 0- 80, 0-150 Meters. Millisecond Range-scale available in either Feet or Meters. Auto-ranging Modes in all units.
Shift Range:	0-450 feet in 1 foot increments 0-150 meters in 1 meter increments
Zoom Range:	15, 30, 60, 120, 240 feet 5, 10, 20, 40, 80 meters
Zoom Modes:	Bottom Zoom, Bottom Lock, Marker Zoom, GUI Zoom (Playback Only)
Display:	Normal Data, Zoom Data, Navigation, Depth, Command/Status Color Control for Data: 4 selections or Custom (User Input), Data Invert possible.
Strata Resolution:	6 cm with up to 40 Meters bottom penetration.
Depth Resolution:	0.1 foot, 0.1 meters.
Depth Accuracy:	±0.5%
Speed of Sound:	1500 Meters/Second or 4800 Feet/Second.
Navigation Input:	NMEA 0183, GLL, GGA, RMC, VTG, VHW, HDT. Selectable Baud Rate, RS-232 COM2.
StrataBox Interface:	Serial data, 57.6Kbaud, RS-422, COM1.
Printer Output:	Centronics (Parallel Port) interface to TDU Series Thermal Printers.
Shallow Water Operation:	< 2.5 meters; bottom type dependant
Transmit Rate:	Up to 10 Hz, depth and operator mode dependent.
Event Marks:	Manual or Periodic (selectable in 1 minute intervals)
Data File Storage:	Saves Depth, Navigation, and Graphic Data in ODEC format (Proprietary). Normal Data and Zoom Data stored is Pixel Data and can be played back and printed.
Data File Playback:	Files played back and printed at Normal or Rapid Advance Speed, with Pause and GUI Zoom available.
Frequency Output:	10 Khz.
Transmit Output Power:	300 Watts (Pulsed), 1000 Watts capable.
Input Power:	10-30 Volts DC, Nominal Power 8 watts, Reverse Polarity and Over Voltage Protected.
Dimensions:	25.4 cm (10") Length, 15.876 cm (6.25") Width, and 6.25 cm (2.5") Height.
Weight:	0.9 kg (2.0 lbs).
Environmental:	-25°C to +60°C Operating Temperature (-55°C to +90°C Storage) Water Resistant to EN60529 IP65 EMC meets EN60945 Emissions, CE Compliant

All specifications subject to change without notice.

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MS750

Dual Frequency RTK Receiver for Precise Dynamic Positioning

Key features and benefits

- **20 Hz position update rate**
- **Less than 20 milliseconds position latency**
- **Centimeter-level position accuracy**
- **Front panel display & keypad for status monitoring and configuration**
- **User-defined local coordinates direct from receiver**
- **Industry standard CAN bus interface**

The MS750™ represents the highest level of accuracy and response available from a dual frequency GPS receiver. The receiver is specifically designed to allow the easy integration of reliable centimeter-level positions to any guidance or control application.

Accuracy and Response Times

Dynamic platforms, require virtually instantaneous position reports multiple times per second. The MS750 delivers positions to guidance or control loop software twenty times per second with a latency of less than 20 milliseconds. This responsiveness is matched with a horizontal accuracy of two centimeters and vertical accuracy of three centimeters. For the most precise applications, the MS750 provides one centimeter accuracy horizontally at a 5 Hz rate with a small increase in latency.

Interfacing and Configuration Ease

The MS750 is designed to plug right into your application with minimal development. An easy to-use application file interface enables the user to completely program receiver operation with a single command. Alternately, the receiver can be configured via the user-friendly built-in display and keyboard interface, or by the included Windows-based Configuration Toolbox software. Multiple configurations can be stored in the receiver as files and activated when desired. Local datum and transformation parameters may be loaded directly into the receiver. Therefore, output grid coordinates are compatible with GPS and traditional survey systems that may be in use on the same site. ASCII or Binary messages may be output through any of the three bi-directional serial ports. The receiver also includes support for the industry standard CAN (Controller Area Network) interface.

Dual Frequency RTK Receiver for Precise Dynamic Positioning

Advanced Technology

The accuracies, update rates and latencies available in the MS750 are made possible through a GPS architecture specifically designed for demanding dynamic positioning applications. Reliable operation in the most adverse environments, such as radio interference experienced at construction or mining sites, is a strict requirement. Custom designed hardware with Supertrak™ multibit GPS signal technology and Everest™ advanced multipath suppression provide superior tracking especially for weaker, low elevation satellites.

Both the RTCM format for differential GPS corrections and Trimble's published Compact Measurement Record (CMR) differential data can be received simultaneously, allowing the receiver to choose the optimum source and provide seamless navigation. Available as an option is the ability to calculate the baseline vector between two moving receivers to centimeter accuracy. The MS750 addresses a vast range of applications in the field of machine positioning, guidance and control.

MS750

Dual Frequency RTK Receiver for Precise Dynamic Positioning

STANDARD FEATURES

- Centimeter accuracy, real-time positioning
- 20 Hz position updates
- < 20 ms position latency
- Front panel display & keypad
- User-defined local coordinates direct from receiver
- 3 serial I/O ports
- 2 CAN ports
- 1 PPS Output
- Trimble CMR Input/Output
- RTCM Input/Output
- One year hardware warranty
- Compact, easy mounting design
- Synchronized 5 Hz position updates

OPTIONS AND ACCESSORIES

- Moving Base RTK
- Rugged L1/L2 machine mount antenna
- Micro-Centered Antenna
- 5 m, 7.5 m, 10 m, 24 m & 30 m antenna cables
- Data extension cable
- Extended hardware warranty
- Firmware and Software update service

ORDERING INFORMATION

MS750 **Part Number 36577-00**

Includes MS750 receiver, Configuration Toolbox software, operating manual, power/data cable, data/1 PPS cable

PHYSICAL CHARACTERISTICS

Size	14.5cmW × 5.1cmH × 23.9cmD (5.7"W × 2.0" H × 9.4"D)
Weight	1.0 kg (2.25 lbs)
Power	12VDC/24VDC, 9 Watts

ENVIRONMENTAL CHARACTERISTICS

Operating temp	-20°C to +60°C
Storage temp	-30°C to +80°C
Humidity	MIL 810 E, Meth. 507.3 Proc III, Aggravated, 100% condensing
Vibration	MIL 810 D, Tailored Random 3gRMS Operating Random 6.2gRMS Survival
Mechanical Shock	MIL 810 D ± 40 g Operating ± 75 g Survival
EMC	
Radiated Emissions	CISPR 12
Conducted Emissions	SAE J1113/41
Radiated Immunity	ISO/DIS 13766, 30V/m
ESD	±15KV
Input Voltage Transients	ISO 7637-2

TECHNICAL SPECIFICATIONS

Tracking	9 channels L1 C/A code, L1/L2 full cycle carrier Fully operational during P-code encryption		
Signal processing	Supertrak Multibit Technology Everest Multipath Suppression		
Positioning mode	**Accuracy[1]**	**Latency[2]**	**Max Rate**
Synchronized RTK	1cm + 2ppm Horizontal 2cm + 2 ppm Vertical	300ms[3]	5 Hz Std
Low Latency	2cm + 2ppm Horizontal[4] 3cm + 2 ppm Vertical	< 20ms	20Hz
DGPS	< 1m	< 20ms	20Hz

[1] 1 sigma level
[2] At maximum output rate
[3] Dependent on data link throughput
[4] Assumes 1 second data link delay

Initialization	Automatic OTF (on-the-fly) while moving
Time required	Typically < 1 minute
Range	Up to 20 km from base for RTK
Start-up	< 90 seconds from power on to positioning < 30 seconds with recent ephemeris
Communications	3 × RS-232 ports. Baud rates up to 115,200 2 × CAN/J1939
Configuration	Via front panel display & keypad, Configuration Toolbox Software or user definable application files
Output Formats	NMEA-0183: GGK, GGA, ZDA, VTG, GST, PJT and PJK Trimble Binary Streamed Output

Trimble

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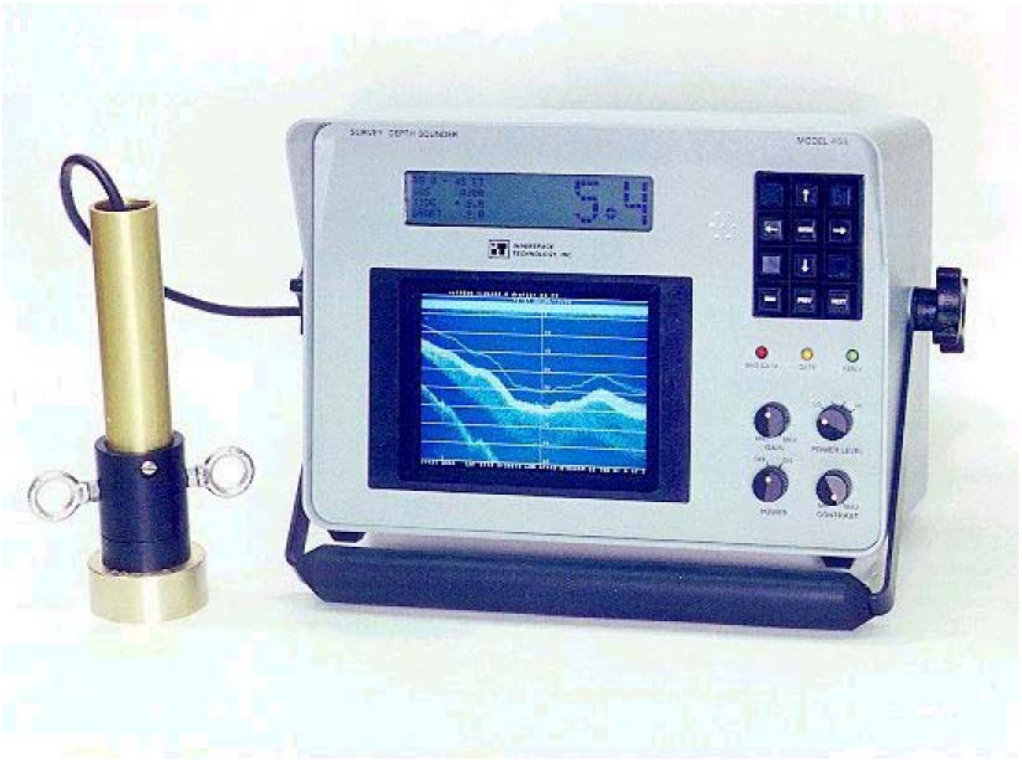
YOUR LOCAL TRIMBLE OFFICE OR REPRESENTATIVE

MODEL 455



DESCRIPTION

The Innerspace Technology Model 455 Survey Depth Sounder provides analog and digital depth on high resolution LCD display screens. The small, lightweight unit is ideal for use on small boats for hydrographic and GIS surveys, and also has applications on general purpose workboats and Corps of Engineers reconnaissance vessels. The 455 has most of the capabilities of Innerspace's legendary thermal printing depth sounder recorders, except for the thermal chart recording, plus it has many new features. Designed with the operator in mind, the easy-to-use menu is controlled via up / down, left / right arrows; no numerical entries are required and, when power is turned off, all entries are saved for next power on. In the operation mode, operator entries are always in view on the LCD display screen, along with the large numeral, digitized depth. The 455's analog display provides a continuous, high resolution bottom profile with alphanumerical annotation of pertinent information including: Speed-of-Sound, Tide, Draft, Time and Fix Number. For a hard copy, a screen print of the analog data may be sent to a standard computer printer or it can be stored internally on a 24 or 48 mb integrated circuit for later recall.

SPECIFICATIONS

GRAPHIC DISPLAY

- 640 x 480 Pixel Monochrome Transflective LCD with Backlight and Contrast Control
- 5 ¾ in. x 4 ¾ in. viewing area
- Emulates paper chart recorder

NUMERIC DISPLAY

- 4 lines x 40 characters with large 1 in. high numerics and Backlight

OPERATION

- Menu driven parameter selection on alphanumeric display

PARAMETER SELECTION

- Speed-of-Sound, Tide, Draft, Gate Width, Scale, Backlight, Com Ports and many more

RESOLUTION

- .1 Unit graphic and numeric

DEPTH RANGES

- 0-45, 40-85, 80-125, 120-165, 160-205 Feet or Meters (dm and cm selection)
- Multipliers: 1, 2, 10
- Auto Ranging

ANNOTATION

- LCD graphic display numerically displays Speed-of-Sound, Tide, Draft, Date, Time, Depth, Fix number and GPS Data

TRANSMITTER

- Front panel switch selectable power levels: 250 watts to 10 watts in 4 levels

RECEIVER

- Time varied automatic gain adjustment under microprocessor control 20 or 30 Log
- Front panel manual gain control 20db
- Adjustable Blanking

DIGITIZER

- Range Gated (selectable widths)
- Initial Depth Entry
- 4 Modes of Operation
- Gate Mark on Graphic Display

UTILITIES

- Depth Simulator

- Chart Speed
- Screen capture to memory

INPUTS/OUTPUTS

- RS232 Port A
- RS232 Port B
- RS232 Port C
- Parallel Port
- Keyboard and VGA Port
- GPS Antenna with GPS option
- Floppy Port

TRANSDUCER

- 200kHz 8°
- Optional: 200kHz 3°

POWER

- 12VDC, 2½ Amp

ENCLOSURE

- Drawn aluminum case
- Aluminum panel painted to resist corrosion.
- Removable handle and soft carry bag included.

OVERALL SIZE

- 13 in. Wide x 9 in. High x 9 in. Deep
- 38.1 cm Wide x 22.86 High x 22.86 Deep

WEIGHT

- 15 lb.
- 6.8 kg

OPTIONS:

- Heave sensor
- Remote VGA display
- Tabletop / overhead mounting bracket
- Custom annotation (1 Line 40 Characters)
- Remote readout (large numeric)
- Continuous analog storage, 48mb
- AC power supply
- Portable transducer mounts
- Floppy Disk Drive in travel case
- Mini keyboard (89 key) and adapter cable
- 125 kHz transceiver and transducer 125kHz 7º
- Laplink software
- Color graphic display

Appendix B
Historical Photographs

Seneca-Cayuga Canal Looking Upstream. Taken near outfall 002 in December 2004.

Seneca-Cayuga Canal looking downstream. Taken from outfall 008 in December 2004.

Seneca-Cayuga Canal Looking Upstream. Taken upstream of outfall 008 in December 2004.

Appendix C
Standard Operating Procedures

STANDARD OPERATING PROCEDURE

Sediment Sampling – Grab Sampler

Purpose

This technical practice describes collecting and handling sediment samples during field operations using sediment grab sampler.

Scope and Applicability

This sediment sampling procedure is applicable to collecting representative surficial sediment samples using an Ekman grab sampler.

Example Equipment/Materials

- Stainless steel Ekman grab sampler
- Rope
- Messenger
- Accessory sampler handle
- Stainless steel spoon or spatula for sediment sample transfer
- Stainless steel bowls or pans
- Measuring tape
- Logbook and waterproof and permanent marker
- Personal protection equipment (rubber or latex gloves, boots, hip waders, etc.)
- Samples bottles
- Cooler with ice
- Paper towel or Kimwipes™

Ekman Grab Sampler

An Ekman sampler is a clam-shell type sampler for collecting surficial sediment from shallow lakes and slow moving streams. The stainless steel Ekman is designed for constituent studies to minimize cross contamination and aid in decontamination. The Ekman sampler can be used either from a boat or by wading. The sampler is deployed and the jaws are closed by a spring system tripped by a messenger or handle if used in a wading situation.

The Ekman sampler is very effective in quiet water environments when collecting for sample volumes required for chemical analysis and/or toxicity testing.

Typical Procedures/Guidelines

1. Mobilize sampling boat and equipment to collect and process samples.
2. Locate targeted sampling location using handheld global positioning system (GPS).
3. Take the following water quality measurements at surface and approximately 10 centimeters above substrate:
    - Temperature
    - Dissolved oxygen
    - pH
4. Lower Ekman grab sampler at a steady rate until contacting the sediment surface.
5. Trip sampler mechanism.
6. Slowly retrieve sampler.
7. Check sampler for the following acceptance criteria:
    - Overlying water is present and has low turbidity.
    - Adequate penetration depth is achieved (within the upper 6 inches).
    - The sampler is not overfilled (no sediment contact with doors).
    - The sediment surface is undisturbed.
    - There are no signs of winnowing or leaking from the sampling device.
8. If sample is acceptable, record GPS coordinates and continue to process sample. If the sample does not meet the acceptance criteria, empty sampler in 5-gallon bucket and rinse in site water to remove large sediment deposits. Reposition the boat and redeploy the sampler.
9. Ensure that all field observations are recorded completely and correctly. After the sample is judged acceptable, the following observations should be recorded:
    - Station location indicated on the GPS instrument
    - Station depth
    - Gross characteristics of the sediment
      (Texture; color; biological structures [for example, shells, tubes, macrophytes]; presence of debris [for example, wood chips, wood fibers, human artifacts]; presence of oily sheen; and odor [for example, hydrogen sulfide, oil, creosote])
10. Siphon off overlying water.
11. Collect sediment, using a stainless steel spoon, from the upper 0 to 6 inches without touching the side walls of the sampler.
12. Place sediment in aluminum foil lined stainless steel bowl
13. Thoroughly homogenize the sample.
14. Distribute homogenized sample into appropriately marked sample containers.

15. Place samples in a cooler with a maximum temperature of 4 degrees Celsius (^{o}C).
16. Fill out necessary chain-of-custody forms.
17. Decontaminate sampling and processing equipment procedure described in SOP - *Decontamination of Sampling Equipment*.
18. Excess sediment remaining after processing will be returned to the water, and the deck will be rinsed clean after all grab samples are collected and before moving to the next station.
19. The sampler will be secured and moved to the next sample location.

Key Checks/Items

- If in moving water start downstream, work upstream.
- Log exact locations using combination of permanent features and GPS coordinates.
- Work safely. Beware of hidden hazards under the water.

STANDARD OPERATING PROCEDURE

Vibracore Sediment Sampling

I. Purpose

These general outlines describe the collection and handling of sediment samples using a vibracore over water during field operations.

II. Scope

The procedures herein describe necessary equipment procedures, and documentation for the collection of representative sediment from a vibracore sample.

III. Equipment and Materials

- Ensure that the sampling vessel is appropriate for anticipated sampling conditions (mooring, core deployment and recovery system, vessel draft)
- Nautical charts and tide tables
- Marine VHF radio and cellular telephone
- U.S. Coast Guard (USCG)-required vessel safety device, including personal flotation device (PFD)
- Appropriate vessel navigation and position recording equipment, including shore side reference station beacon and tide staff gauge installed onsite
- Fathometer and bar gauge or equivalents for recording depth to sediment
- Vibratory core barrel of appropriate sampling length, and polycarbonate core liner material, if required
- Decontaminated core cutter (nose cone) and sample retainer (catcher) assemblies
- Decontaminated core cutting and sample processing equipment
- Decontamination supplies, including wash down pump and hoses
- Steel tape measure
- Sample coolers and ice
- Log book
- Personal protective equipment (nitrile gloves, rubber boots, rain gear, etc.)

IV. Procedures and Guidelines

1. Inspect decontaminated core cutter and core retainer assemblies prior to vessel departure.

2. Conduct tailgate health and safety meeting at the launch site, prior to vessel departure. Review the day's planned sampling activities to ensure that all required equipment is onboard the vessel, and that the planned sampling order is appropriate. Program sample location coordinates into onboard navigation system and confirm they were determined in the proper coordinate system and datum for the site.

3. Sampling will begin downstream and work upstream to prevent contamination of unsampled areas. For tidally influenced sites, sampling will be scheduled to coincide with low tide and under low flow conditions when possible to minimize the dilution of possible constituents.

4. Confirm that land based reference beacon (if used) and differential geographic positioning system (DGPS) links have been established, and global positioning system (GPS) antenna is over sample location, and antenna offsets have been measured to correct for the actual sampling location.

5. Inspect tide staff gauge and record water surface level to the nearest 0.1 foot.

6. Navigate to sampling location and anchor in position, securing the mooring to minimize the effects of current and wind. Follow all vessel crew instructions, remaining clear of equipment and moorage rigging.

7. Once vessel is in position, at the direction of the vessel crew, record sampling station identification, depth to sediment from the vessel decking using a bar gauge and fathometer, depth to water from vessel deck, position coordinates, position relative to fixed reference points, weather, and water surface conditions.

8. Before advancing the core, ensure that winch cable, push rod, or vibracore barrel have been measured and clearly marked in order to record penetration depth and note changes in drilling advancement or effort.

9. Core assembly is lowered or pushed until penetrative depth or refusal has been encountered. Record depth of penetration, vessel position, time, and apparent sampling conditions. As soon as is practicable following sampling, record water surface level reading from the staff gage. In the event of sample refusal relocate within 5 feet and repeat procedure from Step 6.

10. Observe vessel crew instructions, and clear the sampling portal or boom area as core is retrieved, monitor worker breathing space air quality.

11. Once vessel crew has secured the core barrel, inspect the barrel cutter head. Provide qualitative description of cutter head catch condition, or soil if retained.

12. Ensure that external sampling equipment is decontaminated using site water and a decontaminated brush, while not disturbing the open end of the core barrel.

13. Label sample end cap for base of sample, remove cutter head assembly, affix end cap, and decontaminate cutter head assembly.

14. Once suspended sediment has had adequate time to settle following sample staging (15 to 30 minutes), measure total recovery, using a decontaminated tape, calculate and record recovered percentage.

15. Cut or drill a small drain slit above the water-sediment interface, above the depth of recovered sediment and decant supernatant water. Once water has been decanted cut excess sample barrel or liner approximately 1 inch above the water-sediment interface, label end cap, and affix to barrel. Dry barrel and label with an indelible marker. Sample labeling should include up and down designations with the sample number on the end caps, and directional arrows on the barrel or liner body. Cut barrel sections to fit staging coolers, transfer labeled samples to coolers immediately post-processing.

V. Attachments

ASTM D4823 Core Sampling Submerged, Unconsolidated Sediments

VI. Key Checks and Items

- Start downstream, work upstream.
- Log exact locations using permanent features.
- Beware of hidden hazards.

STANDARD OPERATING PROCEDURE

Surface Water Sampling—General Procedures

Purpose

This standard operating procedure (SOP) provides general guidelines for surface water sampling.

Scope and Applicability

This SOP covers the general surface water sampling technique, including standard surface water sampling procedures and equipment. Surface water sampling procedures for volatile organic compounds (VOCs) are provided in the *Surface Water Volatile Organic Compound Sampling* SOP. Refer to the specific requirements of the project in the Workplan when using this SOP during field activities.

Example Equipment/Materials

- Teflon™ tubing
- Pump
- Battery
- Decontaminated polyethylene or glass sample containers to be used for field parameter measurements
- Sample bottles, sample labels, and chain-of-custody forms
- Appropriate field instruments (typically thermometer, pH meter, and conductivity meter—refer to the specific field sampling plan for details)
- Paper towels or Kimwipes™
- Cooler with ice
- Field notebook and waterproof and permanent markers
- Appropriate sampling equipment and sample bottle decontamination equipment

Procedures/Guidelines

Refer to the work plan for specifics (such as sampling depth) of sample collection. Sampling procedures are as follows:

1. Mobilize equipment to collect and process samples.
2. Locate targeted sampling location using handheld global positioning system (GPS).

3. Order of station sampling:
    - When river sampling, field personnel should always start downstream and work upstream to avoid potentially affecting unsampled areas with the river sediment suspended as a result of working in the river. When using a mechanized vehicle, additional care must be taken not to disturb sediments before sampling.
    - If sampling is to occur in a standing water body without a current (such as a water impoundment), the field team must take care to minimize the amount of sediment that is disturbed.
4. Measure approximate water depth using sounding rod.
5. Lower Teflon™ sampling tube to approximately mid-point of water column.
6. Collect sufficient surface water to fill the required sample containers.
7. Distribute sample into appropriately marked sample containers.
8. Filter subsample targeted for dissolved metals analysis through a 0.45-millimeter Gelman Supor® 12175, or equivalent filter.
9. Acidify filtered sample to a pH of 2 with 0.9 N nitric acid.
10. Place samples in a cooler with a maximum temperature of 4 degrees Celsius (^{o}C).
11. Calibrate all field measurement equipment before use in accordance with manufacturers' instructions.
12. Note in the field logbook any characteristics of the sample such as color or odor, and also note any observations of the station conditions such as weather and water conditions (such as "choppy"), amount and type of debris, odor, color, station offset, boat activity, and current.

Key Checks/Items

- Avoid suspending sediment when sampling by moving from downstream to upstream.
- Avoid sampling areas with observed suspended sediment.

STANDARD OPERATING PROCEDURE

Field Sampling Equipment Decontamination

Purpose

To provide general guidelines for decontamination of soil sampling equipment, monitoring equipment, and sample containers used in potentially contaminated environments.

Equipment / Materials

- Demonstrated analyte-free deionized or distilled water.
- Potable water.
- Deionized or distilled water.
- Alconox™ (or other phosphate free detergent) and water solution.
- Methanol. DO NOT USE ACETONE.
- Large plastic pails or tubs for detergent and water, scrub brushes, squirt bottles for detergent, methanol and water, plastic bags and sheets.
- U.S. Department of Transportation (DOT)-approved 55-gallon drum for disposal of waste.

Procedures/Guidelines

Sampling Equipment Decontamination

All soil, surface water, and sediment sampling equipment not to be steam cleaned (for example, drilling equipment) will be decontaminated by personnel wearing disposable latex gloves or vinyl gloves using the following procedure:

1. Remove loose soil and gross contamination.
2. Rinse with potable water.
3. Wash all equipment surfaces that contacted the potentially contaminated soil or water with Alconox™ solution, using a brush as needed to remove particulate matter and surface films.
4. Rinse with potable water.
5. If organic contamination is suspected, rinse twice with methanol solution and air dry. DO NOT USE ACETONE.
6. Rinse with deionized or distilled water and air dry.

7. Wrap the equipment with aluminum foil, if appropriate, to prevent contamination if the equipment is to be stored or transported.
8. Collect all decontamination fluids and dispose of in a DOT approved 55-gallon drum.

Monitoring Equipment Decontamination

1. Wrap soil contact points in plastic to reduce need for subsequent cleaning.
2. Wipe surfaces that had possible contact with contaminated materials with a paper towel wet with detergent solution; if organic contamination is suspected, wipe with a towel wet with methanol solution; and wipe three times with a towel wet with deionized or distilled water.
3. Dispose of all used paper towels in a DOT-approved 55-gallon drum.

Sample Container Decontamination

The outer surface of sample containers filled in the field must be decontaminated before being packed for shipment or handled by personnel without dermal hand protection.

1. Wipe container with a paper towel dampened with detergent solution after the containers have been sealed.
2. Wipe container with a paper towel dampened with potable water.
3. Dispose of used paper towels in a DOT-approved 55-gallon drum.

Key Checks/Items

- Clean with solutions of detergent, methanol, and deionized or distilled water.
- Do not use acetone for decontamination.
- Drum all contaminated rinsate and materials.
- Decontaminate sample bottles before relinquishing them to anyone.
- Document any deviations from above procedure.

Appendix D

Proposed Phase II Data Report Table of Contents

Phase II Sediment Characterization RFI Addendum

1. Introduction
    1.1. Background
    1.2. Report Organization
2. Field and Analytical Program Overview
    2.1. Phase II Study Design
        2.1.1. AOC A Seneca-Cayauga Canal
            2.1.1.1. Sediment Samples
            2.1.1.2. Surface Water Samples
        2.1.2. Canal Raceway
            2.1.2.1. Sediment Samples
            2.1.2.2. Surface Water Samples
    2.2. Field Methods
        2.2.1. Sediment Collection and Handling
        2.2.2. Surface Water Collection and Handling
    2.3. Analytical Program
        2.3.1. Phase II Sediment Chemical Data QA/QC Results
        2.3.2. Phase II Surface Water Data QA/QC Results
    2.4. Data Quality Assessment
3. Phase II Sediment Characterization Results
    3.1. Nature and Extent
        3.1.1. AOC A Seneca-Cayauga Canal
            3.1.1.1. Sediment Samples
            3.1.1.2. Surface Water Samples
        3.1.2. Canal Raceway
            3.1.2.1. Sediment Samples
            3.1.2.2. Surface Water Samples
    3.2. Ecological Risk
        3.2.1. AOC A Seneca-Cayauga Canal
            3.2.1.1. Sediment Samples
            3.2.1.2. Surface Water Samples
        3.2.2. Canal Raceway
            3.2.2.1. Sediment Samples
            3.2.2.2. Surface Water Samples
4. Conclusions and Recommendation
        4.1.1. AOC A Seneca-Cayauga Canal
            4.1.1.1. Conclusions
            4.1.1.2. Recommendations
        4.1.2. Canal Raceway
            4.1.2.1. Conclusions
            4.1.2.2. Recommendations

5. References

Appendix A – Analytical Data