Revised Sediment Verification Sampling Plan

Friedrichsohn Cooperage Site
Waterford, New York

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1. Introduction

The Friedrichsohn Cooperage inactive hazardous waste site (the Site) is located at 153-155 Saratoga Avenue in the Town of Waterford, New York. The Site is comprised of three Operable Units (OUs). OU-1 is comprised of the on-Site and off-Site contaminated soils associated with the former cooperage operation. OU-2 is comprised of the on-Site and off-Site groundwater. OU-3 is comprised primarily of the sediments in the Old Champlain Canal between O'Connor Drive and Burton Avenue, and also includes on-Site source area soils. This document focusses on the sediment portion of OU-3.

New York State Department of Environmental Conservation (NYSDEC) issued a Record of Decision (ROD) for OU-3 in March 2011. In the OU-3 ROD, the remedy pertinent to OU-3 sediment is as follows:

- Address contamination of sediment of the Old Champlain Canal from O'Connor Drive in the south to Burton Avenue north of the site, with the horizontal and vertical extent to be refined by sampling during the design.
- PCBs have been identified by NYSDEC as the marker compound for the canal sediments. The remedial objective is removal of sediment within OU-3 for off-Site disposal to achieve a cleanup goal of 1 parts per million (ppm), consistent with verification sampling procedures established as part of the remedial design process.
- Excavation of an estimated 12,500 cubic yards of sediment from the canal within the boundary of OU-3 to a depth of approximately 2 feet below the existing top of sediment. Where necessary, excavated sediments in the canal will be replaced with clean fill to establish the original design water depth of 6 feet in the canal.
- Off-Site transport and disposal of excavated sediments (including sediments with PCBs above 50 ppm) will be shipped to a permitted disposal facility.
- Restored canal bed will meet NYS Canal Corporation requirements.
- Design will contain elements to stabilize excavations, control water within the excavation, control odors, and dewater the excavated materials. In areas where the excavation does not end in bedrock, the design will also require confirmation sediment/soil sampling to verify the extent of contamination has been removed.

On December 20, 2017 GHD prepared and submitted to NYSDEC a Sediment Verification Sampling Plan (SVSP) approach for review and approval. The proposed SVSP approach involves completing additional up-front sampling to pre-define the extent of contamination and then excavate the contaminated materials to those defined limits. This revised approach improves the efficiency of the remedy and was developed in accordance with NYSDEC's Technical Guidance for Site Investigation and Remediation (DER-10) and the aforementioned ROD.

NYSDEC confirmed their acceptance of the approach in a letter dated January 12, 2018 and requested that a detailed SVSP be prepared and submitted for NYSDEC approval. This document was prepared in response to this request.

In formulating the revised SVSP approach, the following priorities were identified and incorporated into the approach:

- Compliance with the Site's ROD and the requirements of DER-10
- Providing a method that can be implemented efficiently and reliably in the field
- Allowing for effective management of remediation to minimize its duration, reducing:
  - Impacts on canal operations
  - Impacts on local community and general public (traffic, dust, odors)
  - Risk from accessing and transporting contaminated materials on busy roads
  - Risks that would arise if remediation was conducted under winter conditions
  - Effects of rainfall events on remediation activities

The revised SVSP approach is to expend more up-front effort to pre-define the extent of required sediment removal to allow excavation to proceed in the most effective and time-efficient manner.

The following summarizes the overall revised SVSP approach:

1. The OU-3 sediment remediation will be separated into three areas (upstream, site/midstream and downstream).
2. The existing data will be compiled and reviewed to provide an initial estimate of required excavation limits, as well as to identify data gaps where there are unknown depths of contamination or spatial delineation is incomplete.
3. The proposed sampling plan to address the data gaps is hereby submitted to NYSDEC for approval, following which additional sampling will be conducted for delineation and documentation purposes.
4. The resulting complete data set (existing plus new sample results) will be used to pre-define excavation cut lines in each of the three OU-3 sediment excavation areas.
   - Cut lines for TSCA wastes will be established such that all sediments containing greater than 50 ppm PCBs are removed.
   - Cut lines for the remaining sediment excavations will be established such that a 95UCL below or equal to 1 ppm PCBs is achieved in each area (site/midstream, upstream, and downstream).
5. Excavation will commence by removing sediments that are classified as TSCA wastes (having greater than 50 ppm PCBs).

2. Sampling Plan

A sampling plan has been developed for each of the three canal areas described previously. The number of samples, sample locations and rationale for the additional samples is described in the following sections. All sampling and analytical procedures will be consistent with the Remedial Design/Remedial Action (RD/RA) Work Plan, OU-3 Sediments dated October 2014 Appendix E

(Field Sampling Plan [FSP]) and Appendix C (Quality Assurance Project Plan [QAPP]). These documents are reproduced for reference as Appendices A and B to this SVSP.

It should be noted that at each sampling location, samples will be collected to bedrock or refusal. Samples not originally targeted for analyses will held at the laboratory until the analytical results are received and evaluated to confirm that the deeper samples do not need to be analyzed. If elevated PCBs are detected in the originally targeted samples, a decision will be made to release additional deeper samples for analyses.

The proposed additional sampling locations are presented in Figures 2.1 (Upstream), 2.2 (Midstream), and 2.3 (Downstream), respectively. Table 2.1 provides a comprehensive listing of the proposed sampling locations (new and repeated locations), along with the depth of samples to be submitted for initial analysis.

The planned approach is to collect a continuous sediment core down to bedrock/refusal. Discrete samples will then be obtained at approximate 2-foot intervals, as needed, where data gaps exist. The expected sediment depth to bedrock in the canal is 7 to 8 feet. At a typical sample location, discrete sediment samples would be collected at the following intervals:

- At sediment surface (i.e., 0 feet below surface, e.g., top 0 to 6 inches of core)
- 2 feet below surface (2 to 2.5 feet)
- 4 feet below surface (4 to 4.5 feet)
- 6 feet below surface (6 to 6.5 feet)
- Bottom of core (last 6 inches of core, likely somewhere 7 to 8 feet below sediment surface)

As introduced above, not all discrete samples will be initially submitted for PCB analysis. Rather, specific depth samples will be targeted (selected based on highest likelihood to provide the needed information), and the remainder will be held at the laboratory in case additional analyses are required based on the analytical results obtained. In selecting the samples for initial analysis, the following approach will be been applied:

1. Where a new location (previously unsampled) is proposed to provide spatial delineation of PCB concentrations, the top two sample depths will be submitted for initial laboratory analysis (i.e., the 0-foot and 2-foot samples), to ensure that potentially-impacted sediments are identified.
2. Where a repeat location (previously sampled) is proposed, one sample depth underlying the deepest previously sampled interval will be initially submitted for laboratory analysis. This will either provide delineation of impacted sediments requiring removal, or indicate that deeper samples (held by the laboratory) should be additionally analyzed. This process may iterate, if needed, should elevated PCB concentrations be present in progressively deeper sediments at the given sample location.

At the completion of the proposed sampling and analysis process, a comprehensive data set of PCB concentrations in OU-3 sediments will have been obtained, such that the required excavation limits in the upstream, midstream, and downstream areas can be defined to achieve the 1 ppm

remediation goal for PCBs with 95 percent confidence. That is, the 95 percent UCL for the PCB sample population mean will be equal to or less than the remediation goal.

Summaries of the sampling approach in each of the three identified sub-areas within OU-3 are presented in the following report sections.

2.1 Sampling Approach

The entire sampling program, including Upstream, Midstream, and Downstream Areas, will yield a final data set including approximately 215 sample locations, and analysis of a minimum of approximately 460 discrete samples. The sediments in OU-3 encompass a total of approximately 128,000 square feet. This in mind, on average, the verification sampling data set represents one sample per 600 square feet. The previous and proposed sampling locations are shown together on Figures 2.4, 2.5, and 2.6 for the Upstream, Midstream, and Downstream areas, respectively.

2.1.1 Upstream Area

The proposed upstream sampling program (previous + new samples) will consist of 50 sampling locations. With an approximate total area of 38,000 square feet in the upstream section of OU-3, this yields a sample location density of approximately one sample per 760 square feet.

Proposed locations for additional sampling of the Upstream Area sediments are shown on Figure 2.1. Twelve new locations and ten repeat locations are proposed.

The PCB concentrations in previous samples suggest that the furthest upstream area mainly has low PCB concentrations (near to or below 1 ppm), with the exception of historic sample location SD-121. Two new sample locations on either side of this historic location are proposed, to confirm the expected limited spatial extent of required excavation in this area.

The remaining new sample locations in the Upstream Area are closer to the Site (within about 300 feet) and have been proposed to close spatial data gaps and confirm required extents of excavation around previous sample locations with elevated PCB concentrations.

The repeat sampling locations in the Upstream Area are required to provide a bottom surface of required excavation where previous samples did not extend below sediment layers that will require excavation to meet the PCB cleanup goal (i.e., 95UCL ≤1 ppm).

2.1.2 Site/Midstream Area

The proposed sampling program (previous + new samples) in the Site/Midstream Area will consist of 110 sampling locations. With an approximate total area of 12,000 square feet in the downstream section of OU-3, this yields a sample location density of approximately one sample per 110 square feet.

Proposed locations for additional sampling of Site/Midstream Area sediments are shown on Figure 2.2. Twenty-five new locations and 47 repeat locations are proposed.

The Site/Midstream Area adjacent to the Site has sediments containing the highest observed PCB concentrations. At some previous sampling locations, the measured PCB concentrations exceed

50 ppm, which is the threshold for considering these materials as Toxic Substances Control Act (TSCA) wastes. In some cases, PCB concentrations exceed 500 ppm, above which level TSCA wastes require incineration for proper disposal. Much of the additional sampling in the Site/Midstream Area therefore consists of repeat samples at identified TSCA waste locations to determine the depth of PCBs exceeding 50 or 500 ppm and demonstrating that sediments below these depths are not TSCA wastes.

The new sample locations are: (i) to fill in spatial data between TSCA waste locations to confirm appropriate classification of sediments to excavate; or (ii) located toward the south bank of the canal (away from the Site, which is adjacent the north bank), to confirm that sediments on the far side of the canal from the Site do not require excavation.

2.1.3 Downstream Area

The proposed downstream sampling program (previous + new samples) will consist of 55 sampling locations. With an approximate total area of 78,000 square feet in the Downstream Area of OU-3, this yields a sample location density of approximately one sample per 1,400 square feet. This lesser density of samples for the Downstream Area is reasonable given the large total area and the relatively low PCB concentrations in this area as it gets further from the Site.

Proposed locations for additional sampling of Downstream Area sediments are shown on Figure 2.3. Ten new locations and 14 repeat locations are proposed.

The PCB concentrations in previous samples suggest that the furthest downstream area has only certain regions likely to require excavation. This wider section of the canal towards Burton Avenue typically has sediments with low PCB concentrations (near to or below 1 ppm), particularly along the north shore of the canal, which may be outside of the main water flow pattern as the canal widens out. Four new and four repeat sample locations are proposed in this furthest downstream area to fill data gaps and define required limits of excavation.

The remaining new sample locations in the Downstream Area are closer to the Site (within about 200 feet) and are proposed to close spatial data gaps and confirm required extents of excavation around previous sample locations with elevated PCB concentrations.

The repeat sampling locations in the Downstream Area are required to provide a bottom surface of required excavation where previous samples did not extend below sediment layers that will require excavation to meet the PCB cleanup goal (i.e., 95UCL ≤1 ppm). One location (SD-60) has sediment with PCB concentrations exceeding 50 ppm (i.e., requiring disposal as a TSCA waste). Deeper sampling at this location, along with two adjacent repeat locations, will define the extent of the TSCA waste removal around this location.

3. Reporting

Upon receipt of the analytical results a data report will be prepared and submitted to NYSDEC that will include a description of the sampling, the laboratory results and the data validation memo.

The analytical data will then be combined with the existing sediment data to define the excavation cut lines that will be presented in the 95% Design Report.

4. Schedule

Implementation of the SVSP will commence immediately upon NYSDEC approval. It is critical to commence the sampling as soon as possible to take advantage of the favorable dewatered and frozen conditions in the canal and to complete the detailed design in 2018.

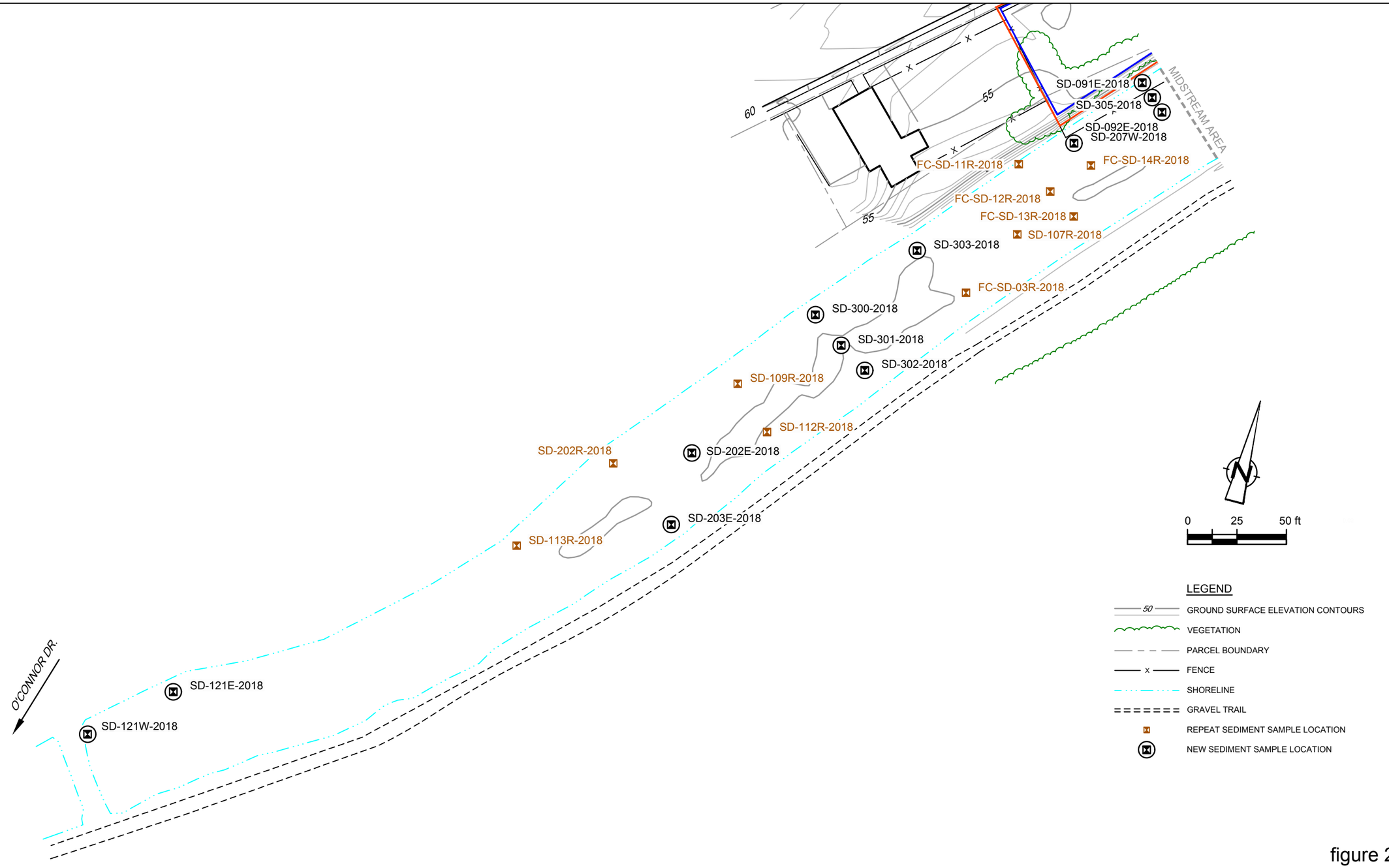

figure 2.1

PROPOSED SAMPLING LOCATIONS - UPSTREAM AREA
OU-3 SEDIMENTS REVISED VERIFICATION SAMPLING PROGRAM
FRIEDRICHSOHN COOPERAGE SITE
153-155 Saratoga Ave. Waterford, NY

GHD

80987-00(018)GN-WA001 FEB 8, 2018

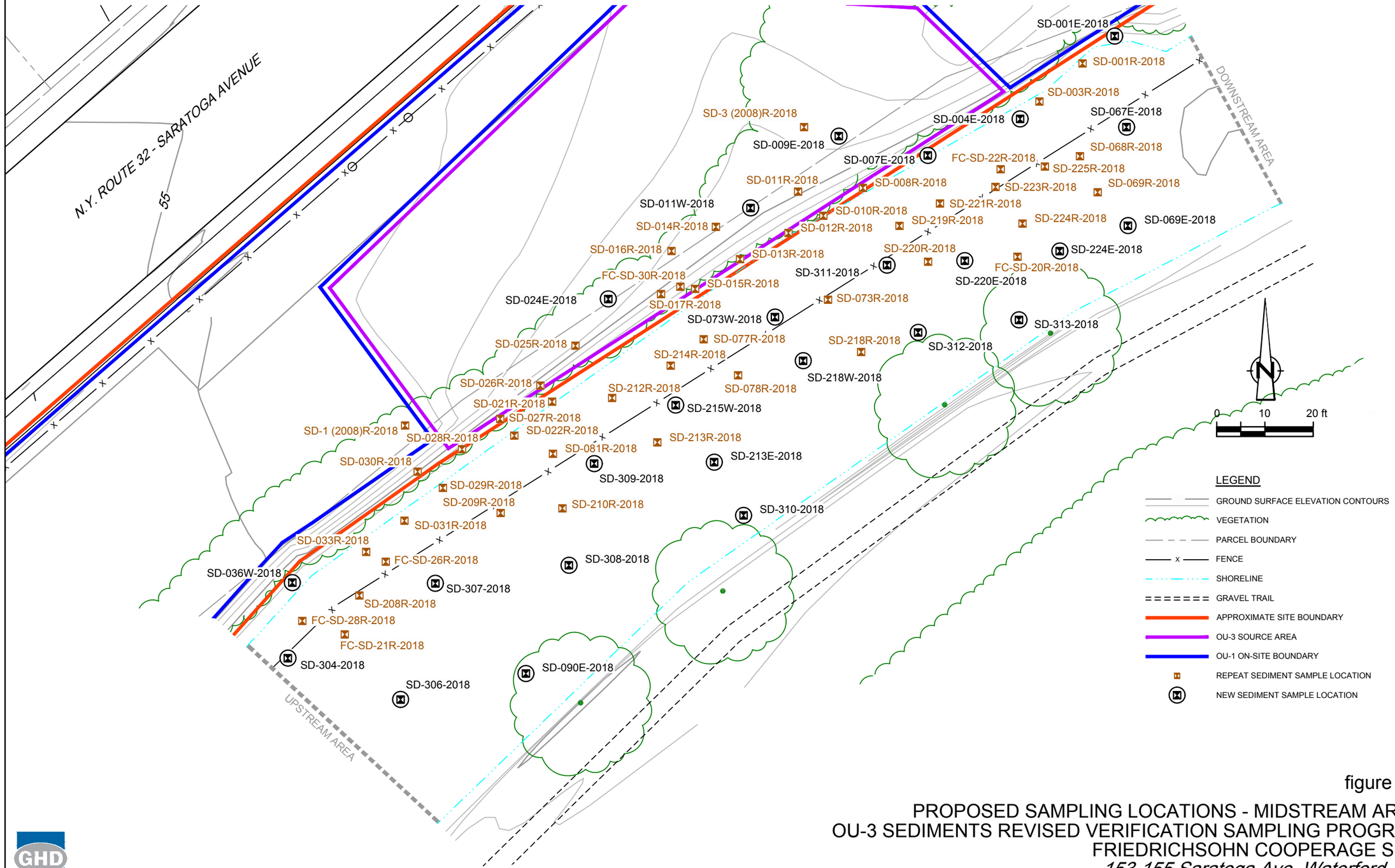

figure 2.2

PROPOSED SAMPLING LOCATIONS - MIDSTREAM AREA
OU-3 SEDIMENTS REVISED VERIFICATION SAMPLING PROGRAM
FRIEDRICHSOHN COOPERAGE SITE
153-155 Saratoga Ave. Waterford, NY

GHD

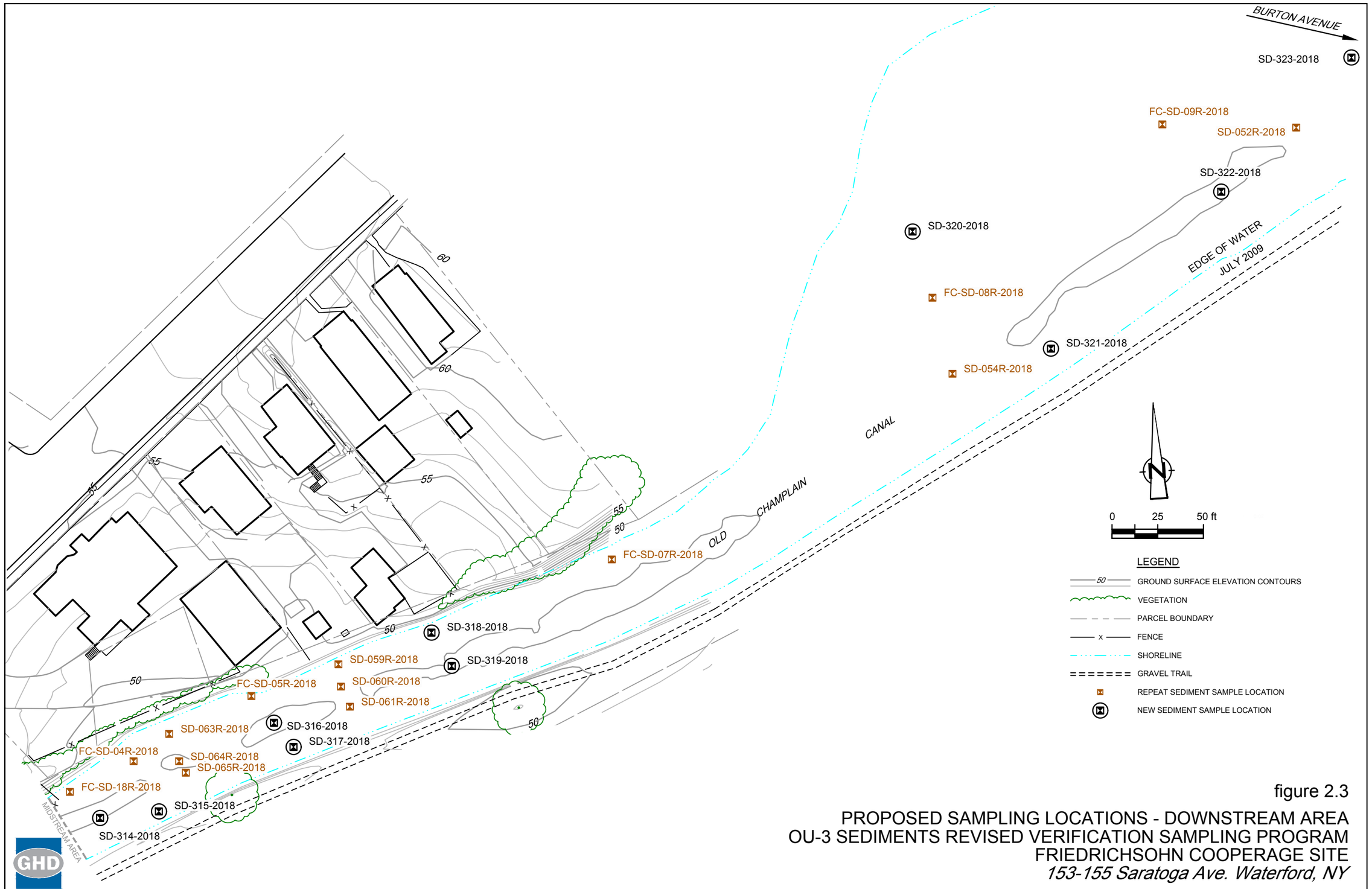

figure 2.3

PROPOSED SAMPLING LOCATIONS - DOWNSTREAM AREA
OU-3 SEDIMENTS REVISED VERIFICATION SAMPLING PROGRAM
FRIEDRICHSOHN COOPERAGE SITE
153-155 Saratoga Ave. Waterford, NY

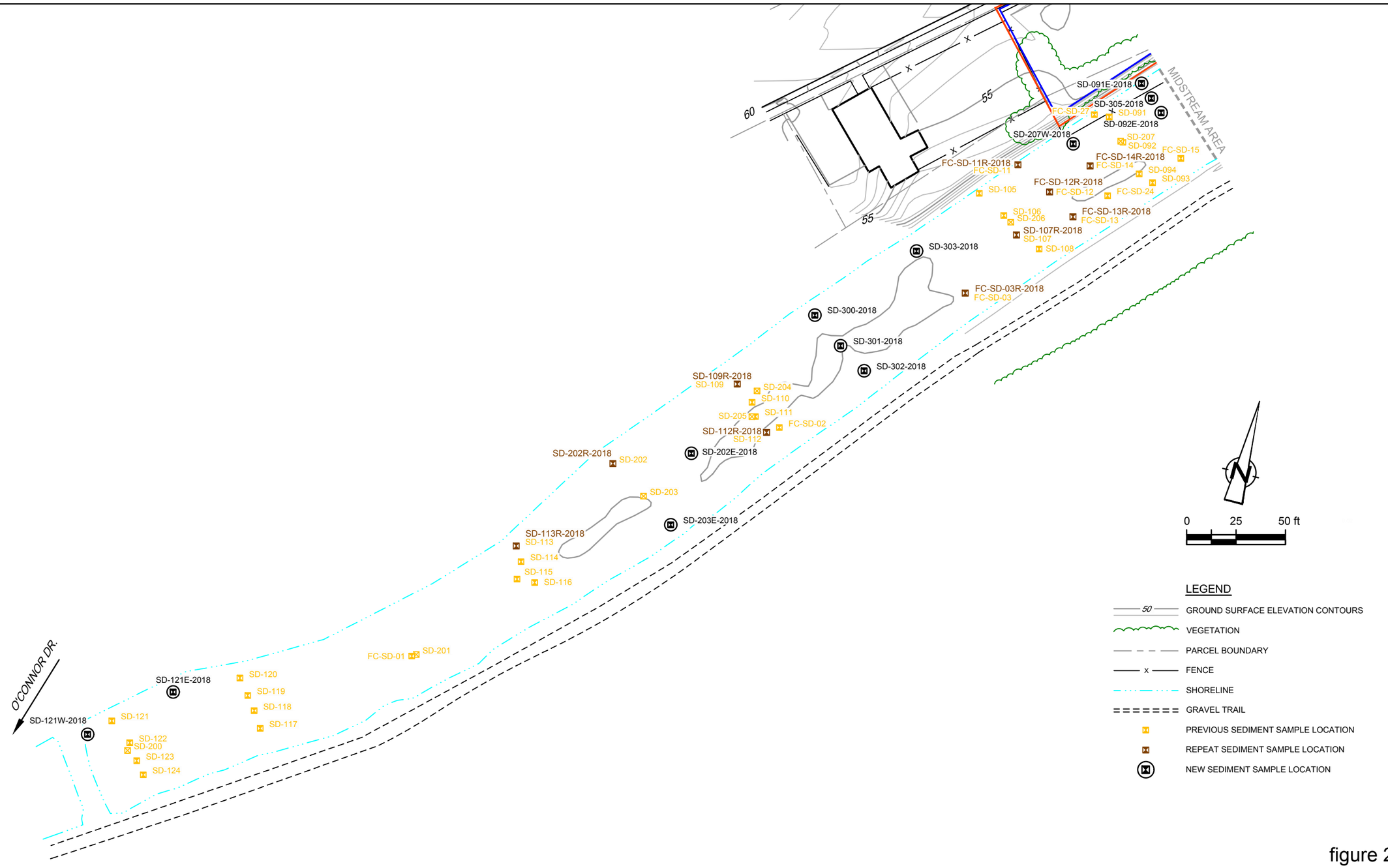

figure 2.4

PREVIOUS AND PROPOSED SAMPLING LOCATIONS - UPSTREAM AREA
OU-3 SEDIMENTS REVISED VERIFICATION SAMPLING PROGRAM
FRIEDRICHSOHN COOPERAGE SITE
153-155 Saratoga Ave. Waterford, NY

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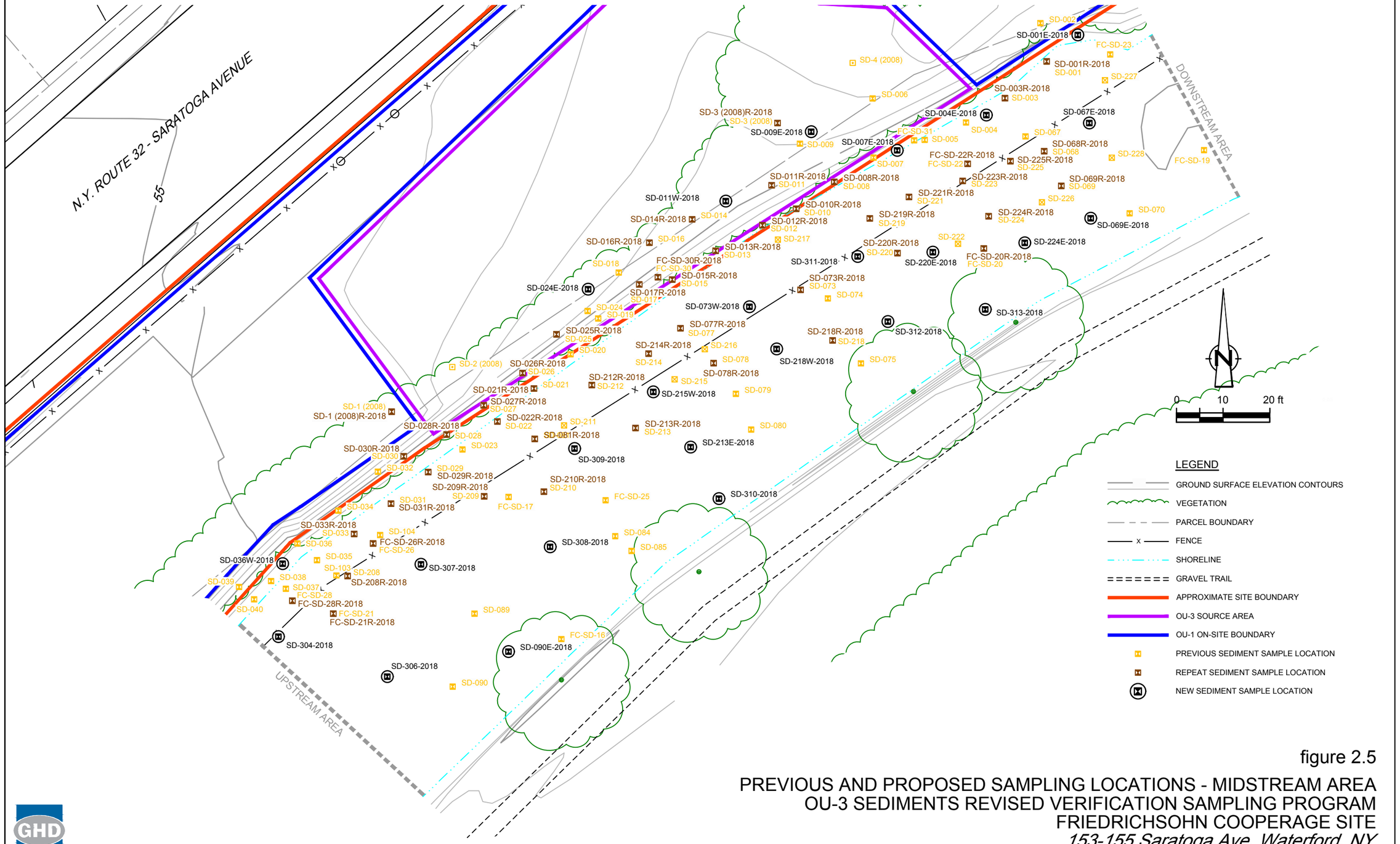

figure 2.5

PREVIOUS AND PROPOSED SAMPLING LOCATIONS - MIDSTREAM AREA
OU-3 SEDIMENTS REVISED VERIFICATION SAMPLING PROGRAM
FRIEDRICHSOHN COOPERAGE SITE
153-155 Saratoga Ave. Waterford, NY

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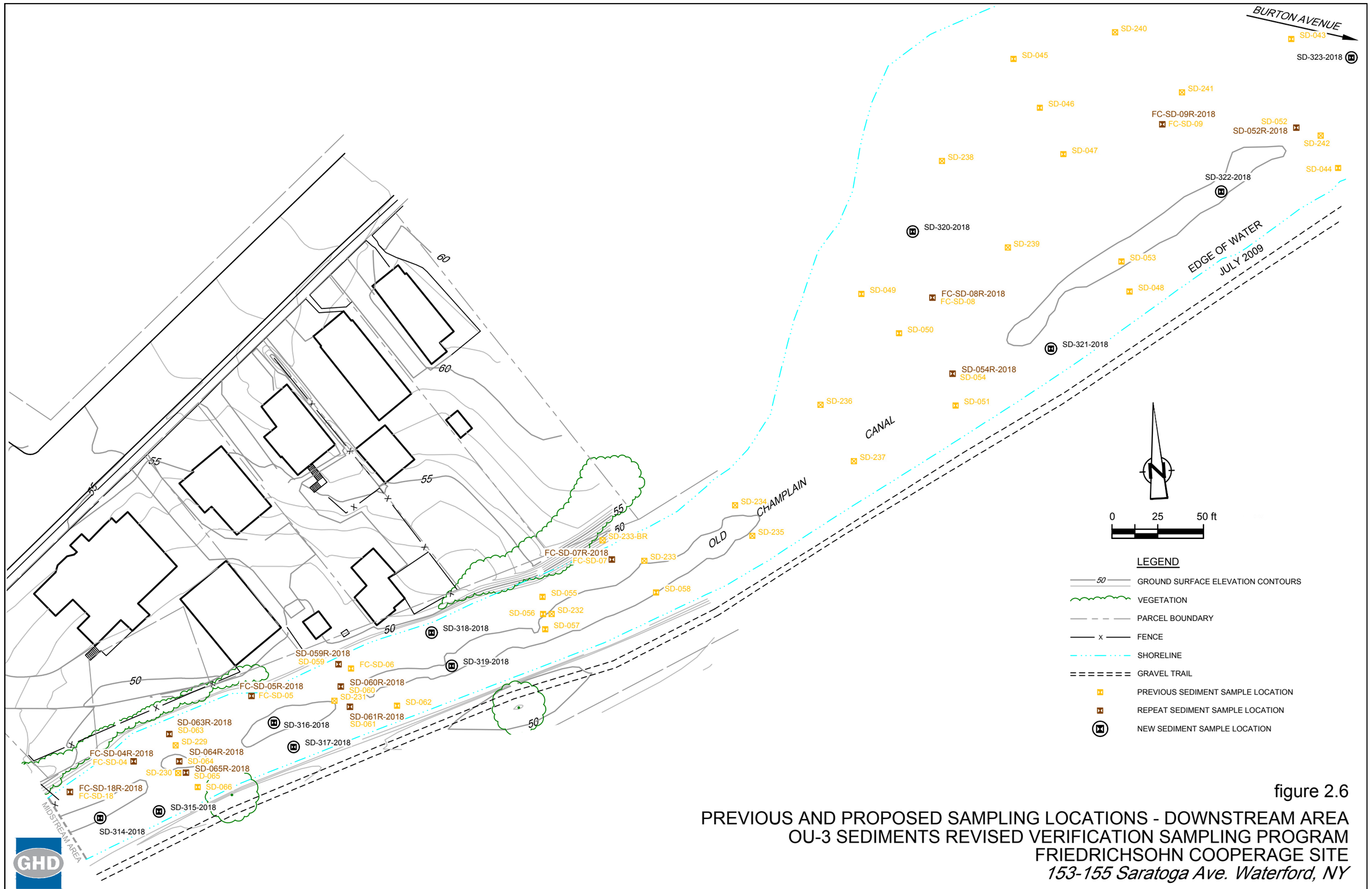

figure 2.6

PREVIOUS AND PROPOSED SAMPLING LOCATIONS - DOWNSTREAM AREA
OU-3 SEDIMENTS REVISED VERIFICATION SAMPLING PROGRAM
FRIEDRICHSOHN COOPERAGE SITE
153-155 Saratoga Ave. Waterford, NY

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Table 2.1

Proposed Sampling Location Details and Initial Depths for PCB Analysis
Revised Sediment Verification Sampling Plan
Friedrichsohn Cooperage Site
Waterford, New York

Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Upstream	2018	SD-121W-2018	709149	1441605	0	x	
Upstream	2018	SD-121W-2018	709149	1441605	2	x	
Upstream	2018	SD-121W-2018	709149	1441605	4		x
Upstream	2018	SD-121W-2018	709149	1441605	6		x
Upstream	2018	SD-121W-2018	709149	1441605	8		x
Upstream	2018	SD-121E-2018	709185	1441637	0	x	
Upstream	2018	SD-121E-2018	709185	1441637	2	x	
Upstream	2018	SD-121E-2018	709185	1441637	4		x
Upstream	2018	SD-121E-2018	709185	1441637	6		x
Upstream	2018	SD-121E-2018	709185	1441637	8		x
Upstream	2018	SD-113R-2018	709334	1441753	0		x
Upstream	2018	SD-113R-2018	709334	1441753	2		x
Upstream	2018	SD-113R-2018	709334	1441753	4		x
Upstream	2018	SD-113R-2018	709334	1441753	6	x	
Upstream	2018	SD-113R-2018	709334	1441753	8		x
Upstream	2018	SD-202R-2018	709371	1441805	0		x
Upstream	2018	SD-202R-2018	709371	1441805	2		x
Upstream	2018	SD-202R-2018	709371	1441805	4		x
Upstream	2018	SD-202R-2018	709371	1441805	6	x	
Upstream	2018	SD-202R-2018	709371	1441805	8		x
Upstream	2018	SD-203E-2018	709407	1441783	0	x	
Upstream	2018	SD-203E-2018	709407	1441783	2	x	
Upstream	2018	SD-203E-2018	709407	1441783	4		x
Upstream	2018	SD-203E-2018	709407	1441783	6		x
Upstream	2018	SD-203E-2018	709407	1441783	8		x
Upstream	2018	SD-202E-2018	709408	1441821	0	x	
Upstream	2018	SD-202E-2018	709408	1441821	2	x	
Upstream	2018	SD-202E-2018	709408	1441821	4		x
Upstream	2018	SD-202E-2018	709408	1441821	6		x
Upstream	2018	SD-202E-2018	709408	1441821	8		x
Upstream	2018	SD-109R-2018	709421	1441860	0		x
Upstream	2018	SD-109R-2018	709421	1441860	2		x
Upstream	2018	SD-109R-2018	709421	1441860	4		x
Upstream	2018	SD-109R-2018	709421	1441860	6	x	
Upstream	2018	SD-109R-2018	709421	1441860	8		x
Upstream	2018	SD-112R-2018	709442	1441841	0		x
Upstream	2018	SD-112R-2018	709442	1441841	2		x
Upstream	2018	SD-112R-2018	709442	1441841	4		x
Upstream	2018	SD-112R-2018	709442	1441841	6	x	
Upstream	2018	SD-112R-2018	709442	1441841	8		x
Upstream	2018	SD-300-2018	709450	1441904	0	x	
Upstream	2018	SD-300-2018	709450	1441904	2	x	
Upstream	2018	SD-300-2018	709450	1441904	4		x
Upstream	2018	SD-300-2018	709450	1441904	6		x
Upstream	2018	SD-300-2018	709450	1441904	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
Revised Sediment Verification Sampling Plan
Friedrichsohn Cooperage Site
Waterford, New York

Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Upstream	2018	SD-301-2018	709467	1441893	0	x	
Upstream	2018	SD-301-2018	709467	1441893	2	x	
Upstream	2018	SD-301-2018	709467	1441893	4		x
Upstream	2018	SD-301-2018	709467	1441893	6		x
Upstream	2018	SD-301-2018	709467	1441893	8		x
Upstream	2018	SD-302-2018	709481	1441883	0	x	
Upstream	2018	SD-302-2018	709481	1441883	2	x	
Upstream	2018	SD-302-2018	709481	1441883	4		x
Upstream	2018	SD-302-2018	709481	1441883	6		x
Upstream	2018	SD-302-2018	709481	1441883	8		x
Upstream	2018	SD-303-2018	709491	1441949	0	x	
Upstream	2018	SD-303-2018	709491	1441949	2	x	
Upstream	2018	SD-303-2018	709491	1441949	4		x
Upstream	2018	SD-303-2018	709491	1441949	6		x
Upstream	2018	SD-303-2018	709491	1441949	8		x
Upstream	2018	FC-SD-03R-2018	709521	1441935	0		x
Upstream	2018	FC-SD-03R-2018	709521	1441935	2		x
Upstream	2018	FC-SD-03R-2018	709521	1441935	4	x	
Upstream	2018	FC-SD-03R-2018	709521	1441935	6		x
Upstream	2018	FC-SD-03R-2018	709521	1441935	8		x
Upstream	2018	SD-107R-2017	709538	1441970	0		x
Upstream	2018	SD-107R-2017	709538	1441970	2		x
Upstream	2018	SD-107R-2017	709538	1441970	4	x	
Upstream	2018	SD-107R-2017	709538	1441970	6		x
Upstream	2018	SD-107R-2017	709538	1441970	8		x
Upstream	2018	FC-SD-11R-2018	709530	1442004	0		x
Upstream	2018	FC-SD-11R-2018	709530	1442004	2	x	
Upstream	2018	FC-SD-11R-2018	709530	1442004	4	x	
Upstream	2018	FC-SD-11R-2018	709530	1442004	6		x
Upstream	2018	FC-SD-11R-2018	709530	1442004	8		x
Upstream	2018	FC-SD-12R-2018	709549	1441995	0		x
Upstream	2018	FC-SD-12R-2018	709549	1441995	2		x
Upstream	2018	FC-SD-12R-2018	709549	1441995	4	x	
Upstream	2018	FC-SD-12R-2018	709549	1441995	6		x
Upstream	2018	FC-SD-12R-2018	709549	1441995	8		x
Upstream	2018	FC-SD-13R-2018	709564	1441986	0		x
Upstream	2018	FC-SD-13R-2018	709564	1441986	2		x
Upstream	2018	FC-SD-13R-2018	709564	1441986	4	x	
Upstream	2018	FC-SD-13R-2018	709564	1441986	6		x
Upstream	2018	FC-SD-13R-2018	709564	1441986	8		x
Upstream	2018	SD-207W-2018	709554	1442022	0	x	
Upstream	2018	SD-207W-2018	709554	1442022	2	x	
Upstream	2018	SD-207W-2018	709554	1442022	4		x
Upstream	2018	SD-207W-2018	709554	1442022	6		x
Upstream	2018	SD-207W-2018	709554	1442022	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
Revised Sediment Verification Sampling Plan
Friedrichsohn Cooperage Site
Waterford, New York

Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Upstream	2018	FC-SD-14R-2018	709565	1442013	0		x
Upstream	2018	FC-SD-14R-2018	709565	1442013	2		x
Upstream	2018	FC-SD-14R-2018	709565	1442013	4	x	
Upstream	2018	FC-SD-14R-2018	709565	1442013	6		x
Upstream	2018	FC-SD-14R-2018	709565	1442013	8		x
Upstream	2018	SD-091E-2018	709580	1442060	0	x	
Upstream	2018	SD-091E-2018	709580	1442060	2	x	
Upstream	2018	SD-091E-2018	709580	1442060	4		x
Upstream	2018	SD-091E-2018	709580	1442060	6		x
Upstream	2018	SD-091E-2018	709580	1442060	8		x
Upstream	2018	SD-092E-2018	709593	1442048	0	x	
Upstream	2018	SD-092E-2018	709593	1442048	2	x	
Upstream	2018	SD-092E-2018	709593	1442048	4		x
Upstream	2018	SD-092E-2018	709593	1442048	6		x
Upstream	2018	SD-092E-2018	709593	1442048	8		x
Site	2018	SD-305-2018	709598	1442055	0	x	
Site	2018	SD-305-2018	709598	1442055	2	x	
Site	2018	SD-305-2018	709598	1442055	4		x
Site	2018	SD-305-2018	709598	1442055	6		x
Site	2018	SD-305-2018	709598	1442055	8		x
Site	2018	SD-304-2018	709596	1442067	0	x	
Site	2018	SD-304-2018	709596	1442067	2	x	
Site	2018	SD-304-2018	709596	1442067	4		x
Site	2018	SD-304-2018	709596	1442067	6		x
Site	2018	SD-304-2018	709596	1442067	8		x
Site	2018	FC-SD-28R-2018	709599	1442075	0		x
Site	2018	FC-SD-28R-2018	709599	1442075	2	x	
Site	2018	FC-SD-28R-2018	709599	1442075	4	x	
Site	2018	FC-SD-28R-2018	709599	1442075	6		x
Site	2018	FC-SD-28R-2018	709599	1442075	8		x
Site	2018	SD-036W-2018	709597	1442083	0	x	
Site	2018	SD-036W-2018	709597	1442083	2	x	
Site	2018	SD-036W-2018	709597	1442083	4		x
Site	2018	SD-036W-2018	709597	1442083	6		x
Site	2018	SD-036W-2018	709597	1442083	8		x
Site	2018	FC-SD-21R-2018	709608	1442072	0		x
Site	2018	FC-SD-21R-2018	709608	1442072	2		x
Site	2018	FC-SD-21R-2018	709608	1442072	4	x	
Site	2018	FC-SD-21R-2018	709608	1442072	6		x
Site	2018	FC-SD-21R-2018	709608	1442072	8		x
Site	2018	SD-306-2018	709619	1442059	0	x	
Site	2018	SD-306-2018	709619	1442059	2	x	
Site	2018	SD-306-2018	709619	1442059	4		x
Site	2018	SD-306-2018	709619	1442059	6		x
Site	2018	SD-306-2018	709619	1442059	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
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Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-208R-2018	709611	1442080	0		x
Site	2018	SD-208R-2018	709611	1442080	2	x	
Site	2018	SD-208R-2018	709611	1442080	4	x	
Site	2018	SD-208R-2018	709611	1442080	6		x
Site	2018	SD-208R-2018	709611	1442080	8		x
Site	2018	SD-033R-2018	709612	1442089	0		x
Site	2018	SD-033R-2018	709612	1442089	2		x
Site	2018	SD-033R-2018	709612	1442089	4	x	
Site	2018	SD-033R-2018	709612	1442089	6	x	
Site	2018	SD-033R-2018	709612	1442089	8		x
Site	2018	FC-SD-26R-2018	709616	1442087	0		x
Site	2018	FC-SD-26R-2018	709616	1442087	2		x
Site	2018	FC-SD-26R-2018	709616	1442087	4		x
Site	2018	FC-SD-26R-2018	709616	1442087	6	x	
Site	2018	FC-SD-26R-2018	709616	1442087	8		x
Site	2018	SD-031R-2018	709620	1442096	0		x
Site	2018	SD-031R-2018	709620	1442096	2		x
Site	2018	SD-031R-2018	709620	1442096	4	x	
Site	2018	SD-031R-2018	709620	1442096	6		x
Site	2018	SD-031R-2018	709620	1442096	8		x
Site	2018	SD-030R-2018	709623	1442106	0		x
Site	2018	SD-030R-2018	709623	1442106	2		x
Site	2018	SD-030R-2018	709623	1442106	4	x	
Site	2018	SD-030R-2018	709623	1442106	6		x
Site	2018	SD-030R-2018	709623	1442106	8		x
Site	2018	SD-1(2008)R-2018	709620	1442116	0		x
Site	2018	SD-1(2008)R-2018	709620	1442116	2	x	
Site	2018	SD-1(2008)R-2018	709620	1442116	4	x	
Site	2018	SD-1(2008)R-2018	709620	1442116	6		x
Site	2018	SD-1(2008)R-2018	709620	1442116	8		x
Site	2018	SD-029R-2018	709628	1442103	0		x
Site	2018	SD-029R-2018	709628	1442103	2		x
Site	2018	SD-029R-2018	709628	1442103	4	x	
Site	2018	SD-029R-2018	709628	1442103	6		x
Site	2018	SD-029R-2018	709628	1442103	8		x
Site	2018	SD-307-2018	709626	1442083	0	x	
Site	2018	SD-307-2018	709626	1442083	2	x	
Site	2018	SD-307-2018	709626	1442083	4		x
Site	2018	SD-307-2018	709626	1442083	6		x
Site	2018	SD-307-2018	709626	1442083	8		x
Site	2018	SD-028R-2018	709632	1442111	0		x
Site	2018	SD-028R-2018	709632	1442111	2	x	
Site	2018	SD-028R-2018	709632	1442111	4		x
Site	2018	SD-028R-2018	709632	1442111	6		x
Site	2018	SD-028R-2018	709632	1442111	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
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Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-209R-2018	709640	1442098	0		x
Site	2018	SD-209R-2018	709640	1442098	2		x
Site	2018	SD-209R-2018	709640	1442098	4	x	
Site	2018	SD-209R-2018	709640	1442098	6		x
Site	2018	SD-209R-2018	709640	1442098	8		x
Site	2018	SD-022R-2018	709643	1442114	0		x
Site	2018	SD-022R-2018	709643	1442114	2		x
Site	2018	SD-022R-2018	709643	1442114	4		x
Site	2018	SD-022R-2018	709643	1442114	6		x
Site	2018	SD-022R-2018	709643	1442114	8	x	
Site	2018	SD-090E-2018	709645	1442064	0	x	
Site	2018	SD-090E-2018	709645	1442064	2	x	
Site	2018	SD-090E-2018	709645	1442064	4		x
Site	2018	SD-090E-2018	709645	1442064	6		x
Site	2018	SD-090E-2018	709645	1442064	8		x
Site	2018	SD-026R-2018	709648	1442124	0		x
Site	2018	SD-026R-2018	709648	1442124	2		x
Site	2018	SD-026R-2018	709648	1442124	4		x
Site	2018	SD-026R-2018	709648	1442124	6	x	
Site	2018	SD-026R-2018	709648	1442124	8		x
Site	2018	SD-021R-2018	709651	1442121	0		x
Site	2018	SD-021R-2018	709651	1442121	2		x
Site	2018	SD-021R-2018	709651	1442121	4		x
Site	2018	SD-021R-2018	709651	1442121	6		x
Site	2018	SD-021R-2018	709651	1442121	8	x	
Site	2018	SD-081R-2018	709651	1442110	0		x
Site	2018	SD-081R-2018	709651	1442110	2		x
Site	2018	SD-081R-2018	709651	1442110	4	x	
Site	2018	SD-081R-2018	709651	1442110	6		x
Site	2018	SD-081R-2018	709651	1442110	8		x
Site	2018	SD-210R-2018	709653	1442099	0		x
Site	2018	SD-210R-2018	709653	1442099	2		x
Site	2018	SD-210R-2018	709653	1442099	4	x	
Site	2018	SD-210R-2018	709653	1442099	6		x
Site	2018	SD-210R-2018	709653	1442099	8		x
Site	2018	SD-027R-2018	709640	1442117	0		x
Site	2018	SD-027R-2018	709640	1442117	2		
Site	2018	SD-027R-2018	709640	1442117	4	x	
Site	2018	SD-027R-2018	709640	1442117	6		x
Site	2018	SD-027R-2018	709640	1442117	8		x
Site	2018	SD-308-2018	709654	1442087	0	x	
Site	2018	SD-308-2018	709654	1442087	2	x	
Site	2018	SD-308-2018	709654	1442087	4		x
Site	2018	SD-308-2018	709654	1442087	6		x
Site	2018	SD-308-2018	709654	1442087	8		x

Table 2.1

Proposed Sampling Location Details and Initial Depths for PCB Analysis
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Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-025R-2018	709655	1442132	0		x
Site	2018	SD-025R-2018	709655	1442132	2		x
Site	2018	SD-025R-2018	709655	1442132	4		x
Site	2018	SD-025R-2018	709655	1442132	6	x	
Site	2018	SD-025R-2018	709655	1442132	8		x
Site	2018	SD-212R-2018	709663	1442121	0		x
Site	2018	SD-212R-2018	709663	1442121	2		x
Site	2018	SD-212R-2018	709663	1442121	4	x	
Site	2018	SD-212R-2018	709663	1442121	6		x
Site	2018	SD-212R-2018	709663	1442121	8		x
Site	2018	SD-309-2018	709659	1442108	0	x	
Site	2018	SD-309-2018	709659	1442108	2	x	
Site	2018	SD-309-2018	709659	1442108	4		x
Site	2018	SD-309-2018	709659	1442108	6		x
Site	2018	SD-309-2018	709659	1442108	8		x
Site	2018	SD-024E-2018	709662	1442142	0	x	
Site	2018	SD-024E-2018	709662	1442142	2	x	
Site	2018	SD-024E-2018	709662	1442142	4		x
Site	2018	SD-024E-2018	709662	1442142	6		x
Site	2018	SD-024E-2018	709662	1442142	8		x
Site	2018	SD-213R-2018	709672	1442112	0		x
Site	2018	SD-213R-2018	709672	1442112	2		x
Site	2018	SD-213R-2018	709672	1442112	4	x	
Site	2018	SD-213R-2018	709672	1442112	6		x
Site	2018	SD-213R-2018	709672	1442112	8		x
Site	2018	SD-016R-2018	709675	1442152	0		x
Site	2018	SD-016R-2018	709675	1442152	2		x
Site	2018	SD-016R-2018	709675	1442152	4	x	
Site	2018	SD-016R-2018	709675	1442152	6		x
Site	2018	SD-016R-2018	709675	1442152	8		x
Site	2018	SD-017R-2018	709673	1442143	0		x
Site	2018	SD-017R-2018	709673	1442143	2		x
Site	2018	SD-017R-2018	709673	1442143	4		x
Site	2018	SD-017R-2018	709673	1442143	6	x	
Site	2018	SD-017R-2018	709673	1442143	8		x
Site	2018	FC-SD-30R-2018	709677	1442144	0		x
Site	2018	FC-SD-30R-2018	709677	1442144	2		x
Site	2018	FC-SD-30R-2018	709677	1442144	4	x	
Site	2018	FC-SD-30R-2018	709677	1442144	6		x
Site	2018	FC-SD-30R-2018	709677	1442144	8		x
Site	2018	SD-015R-2018	709680	1442144	0		x
Site	2018	SD-015R-2018	709680	1442144	2		x
Site	2018	SD-015R-2018	709680	1442144	4		x
Site	2018	SD-015R-2018	709680	1442144	6	x	
Site	2018	SD-015R-2018	709680	1442144	8		x

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Proposed Sampling Location Details and Initial Depths for PCB Analysis
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Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-214R-2018	709675	1442128	0		x
Site	2018	SD-214R-2018	709675	1442128	2		x
Site	2018	SD-214R-2018	709675	1442128	4	x	
Site	2018	SD-214R-2018	709675	1442128	6		x
Site	2018	SD-214R-2018	709675	1442128	8		x
Site	2018	SD-077R-2018	709682	1442134	0		x
Site	2018	SD-077R-2018	709682	1442134	2		x
Site	2018	SD-077R-2018	709682	1442134	4		x
Site	2018	SD-077R-2018	709682	1442134	6		x
Site	2018	SD-077R-2018	709682	1442134	8	x	
Site	2018	SD-215W-2018	709676	1442120	0	x	
Site	2018	SD-215W-2018	709676	1442120	2	x	
Site	2018	SD-215W-2018	709676	1442120	4		x
Site	2018	SD-215W-2018	709676	1442120	6		x
Site	2018	SD-215W-2018	709676	1442120	8		x
Site	2018	SD-213E-2018	709684	1442108	0	x	
Site	2018	SD-213E-2018	709684	1442108	2	x	
Site	2018	SD-213E-2018	709684	1442108	4		x
Site	2018	SD-213E-2018	709684	1442108	6		x
Site	2018	SD-213E-2018	709684	1442108	8		x
Site	2018	SD-310-2018	709690	1442097	0	x	
Site	2018	SD-310-2018	709690	1442097	2	x	
Site	2018	SD-310-2018	709690	1442097	4		x
Site	2018	SD-310-2018	709690	1442097	6		x
Site	2018	SD-310-2018	709690	1442097	8		x
Site	2018	SD-014R-2018	709684	1442157	0		x
Site	2018	SD-014R-2018	709684	1442157	2		x
Site	2018	SD-014R-2018	709684	1442157	4	x	
Site	2018	SD-014R-2018	709684	1442157	6		x
Site	2018	SD-014R-2018	709684	1442157	8		x
Site	2018	SD-013R-2018	709689	1442150	0		x
Site	2018	SD-013R-2018	709689	1442150	2		x
Site	2018	SD-013R-2018	709689	1442150	4		x
Site	2018	SD-013R-2018	709689	1442150	6	x	
Site	2018	SD-013R-2018	709689	1442150	8		x
Site	2018	SD-078R-2018	709689	1442126	0		x
Site	2018	SD-078R-2018	709689	1442126	2		x
Site	2018	SD-078R-2018	709689	1442126	4	x	
Site	2018	SD-078R-2018	709689	1442126	6		x
Site	2018	SD-078R-2018	709689	1442126	8		x
Site	2018	SD-011W-2018	709692	1442161	0	x	
Site	2018	SD-011W-2018	709692	1442161	2	x	
Site	2018	SD-011W-2018	709692	1442161	4		x
Site	2018	SD-011W-2018	709692	1442161	6		x
Site	2018	SD-011W-2018	709692	1442161	8		x

Table 2.1

Proposed Sampling Location Details and Initial Depths for PCB Analysis
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Friedrichsohn Cooperage Site
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Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-073W-2018	709697	1442138	0	x	
Site	2018	SD-073W-2018	709697	1442138	2	x	
Site	2018	SD-073W-2018	709697	1442138	4		x
Site	2018	SD-073W-2018	709697	1442138	6		x
Site	2018	SD-073W-2018	709697	1442138	8		x
Site	2018	SD-218W-2018	709703	1442129	0	x	
Site	2018	SD-218W-2018	709703	1442129	2	x	
Site	2018	SD-218W-2018	709703	1442129	4		x
Site	2018	SD-218W-2018	709703	1442129	6		x
Site	2018	SD-218W-2018	709703	1442129	8		x
Site	2018	SD-012R-2018	709700	1442156	0		x
Site	2018	SD-012R-2018	709700	1442156	2		x
Site	2018	SD-012R-2018	709700	1442156	4		x
Site	2018	SD-012R-2018	709700	1442156	6		x
Site	2018	SD-012R-2018	709700	1442156	8	x	
Site	2018	SD-011R-2018	709701	1442164	0		x
Site	2018	SD-011R-2018	709701	1442164	2		x
Site	2018	SD-011R-2018	709701	1442164	4		x
Site	2018	SD-011R-2018	709701	1442164	6	x	
Site	2018	SD-011R-2018	709701	1442164	8		x
Site	2018	SD-010R-2018	709707	1442159	0		x
Site	2018	SD-010R-2018	709707	1442159	2		x
Site	2018	SD-010R-2018	709707	1442159	4	x	
Site	2018	SD-010R-2018	709707	1442159	6		x
Site	2018	SD-010R-2018	709707	1442159	8		x
Site	2018	SD-073R-2018	709708	1442142	0		x
Site	2018	SD-073R-2018	709708	1442142	2		x
Site	2018	SD-073R-2018	709708	1442142	4		x
Site	2018	SD-073R-2018	709708	1442142	6	x	
Site	2018	SD-073R-2018	709708	1442142	8		x
Site	2018	SD-009E-2018	709710	1442176	0	x	
Site	2018	SD-009E-2018	709710	1442176	2	x	
Site	2018	SD-009E-2018	709710	1442176	4		x
Site	2018	SD-009E-2018	709710	1442176	6		x
Site	2018	SD-009E-2018	709710	1442176	8		x
Site	2018	SD-008R-2018	709715	1442165	0		x
Site	2018	SD-008R-2018	709715	1442165	2		x
Site	2018	SD-008R-2018	709715	1442165	4	x	
Site	2018	SD-008R-2018	709715	1442165	6		x
Site	2018	SD-008R-2018	709715	1442165	8		x
Site	2018	SD-311-2018	709720	1442149	0	x	
Site	2018	SD-311-2018	709720	1442149	2	x	
Site	2018	SD-311-2018	709720	1442149	4		x
Site	2018	SD-311-2018	709720	1442149	6		x
Site	2018	SD-311-2018	709720	1442149	8		x

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Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-218R-2018	709715	1442131	0		x
Site	2018	SD-218R-2018	709715	1442131	2		x
Site	2018	SD-218R-2018	709715	1442131	4	x	
Site	2018	SD-218R-2018	709715	1442131	6		x
Site	2018	SD-218R-2018	709715	1442131	8		x
Site	2018	SD-219R-2018	709723	1442157	0		x
Site	2018	SD-219R-2018	709723	1442157	2		x
Site	2018	SD-219R-2018	709723	1442157	4		x
Site	2018	SD-219R-2018	709723	1442157	6	x	
Site	2018	SD-219R-2018	709723	1442157	8		x
Site	2018	SD-007E-2018	709728	1442172	0	x	
Site	2018	SD-007E-2018	709728	1442172	2	x	
Site	2018	SD-007E-2018	709728	1442172	4		x
Site	2018	SD-007E-2018	709728	1442172	6		x
Site	2018	SD-007E-2018	709728	1442172	8		x
Site	2018	SD-221R-2018	709731	1442162	0		x
Site	2018	SD-221R-2018	709731	1442162	2	x	
Site	2018	SD-221R-2018	709731	1442162	4		x
Site	2018	SD-221R-2018	709731	1442162	6		x
Site	2018	SD-221R-2018	709731	1442162	8		x
Site	2018	SD-220R-2018	709728	1442150	0		x
Site	2018	SD-220R-2018	709728	1442150	2		x
Site	2018	SD-220R-2018	709728	1442150	4	x	
Site	2018	SD-220R-2018	709728	1442150	6		x
Site	2018	SD-220R-2018	709728	1442150	8		x
Site	2018	SD-3(2008)-2018	709703	1442178	0		x
Site	2018	SD-3(2008)-2018	709703	1442178	2	x	
Site	2018	SD-3(2008)-2018	709703	1442178	4		x
Site	2018	SD-3(2008)-2018	709703	1442178	6		x
Site	2018	SD-3(2008)-2018	709703	1442178	8		x
Site	2018	SD-312-2018	709726	1442135	0	x	
Site	2018	SD-312-2018	709726	1442135	2	x	
Site	2018	SD-312-2018	709726	1442135	4		x
Site	2018	SD-312-2018	709726	1442135	6		x
Site	2018	SD-312-2018	709726	1442135	8		x
Site	2018	SD-220E-2018	709736	1442150	0	x	
Site	2018	SD-220E-2018	709736	1442150	2	x	
Site	2018	SD-220E-2018	709736	1442150	4		x
Site	2018	SD-220E-2018	709736	1442150	6		x
Site	2018	SD-220E-2018	709736	1442150	8		x
Site	2018	FC-SD-20R-2018	709747	1442151	0		x
Site	2018	FC-SD-20R-2018	709747	1442151	2	x	
Site	2018	FC-SD-20R-2018	709747	1442151	4		x
Site	2018	FC-SD-20R-2018	709747	1442151	6		x
Site	2018	FC-SD-20R-2018	709747	1442151	8		x

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Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-223R-2018	709742	1442165	0		x
Site	2018	SD-223R-2018	709742	1442165	2		x
Site	2018	SD-223R-2018	709742	1442165	4	x	
Site	2018	SD-223R-2018	709742	1442165	6		x
Site	2018	SD-223R-2018	709742	1442165	8		x
Site	2018	FC-SD-22R-2018	709743	1442169	0		x
Site	2018	FC-SD-22R-2018	709743	1442169	2		x
Site	2018	FC-SD-22R-2018	709743	1442169	4	x	
Site	2018	FC-SD-22R-2018	709743	1442169	6		x
Site	2018	FC-SD-22R-2018	709743	1442169	8		x
Site	2018	SD-004E-2018	709747	1442179	0	x	
Site	2018	SD-004E-2018	709747	1442179	2	x	
Site	2018	SD-004E-2018	709747	1442179	4		x
Site	2018	SD-004E-2018	709747	1442179	6		x
Site	2018	SD-004E-2018	709747	1442179	8		x
Site	2018	SD-224R-2018	709748	1442158	0		x
Site	2018	SD-224R-2018	709748	1442158	2		x
Site	2018	SD-224R-2018	709748	1442158	4	x	
Site	2018	SD-224R-2018	709748	1442158	6		x
Site	2018	SD-224R-2018	709748	1442158	8		x
Site	2018	SD-313-2018	709747	1442138	0	x	
Site	2018	SD-313-2018	709747	1442138	2	x	
Site	2018	SD-313-2018	709747	1442138	4		x
Site	2018	SD-313-2018	709747	1442138	6		x
Site	2018	SD-313-2018	709747	1442138	8		x
Site	2018	SD-003R-2018	709751	1442183	0		x
Site	2018	SD-003R-2018	709751	1442183	2	x	
Site	2018	SD-003R-2018	709751	1442183	4		x
Site	2018	SD-003R-2018	709751	1442183	6		x
Site	2018	SD-003R-2018	709751	1442183	8		x
Site	2018	SD-225R-2018	709753	1442169	0		x
Site	2018	SD-225R-2018	709753	1442169	2	x	
Site	2018	SD-225R-2018	709753	1442169	4		x
Site	2018	SD-225R-2018	709753	1442169	6		x
Site	2018	SD-225R-2018	709753	1442169	8		x
Site	2018	SD-001R-2018	709760	1442191	0		x
Site	2018	SD-001R-2018	709760	1442191	2		x
Site	2018	SD-001R-2018	709760	1442191	4	x	
Site	2018	SD-001R-2018	709760	1442191	6		x
Site	2018	SD-001R-2018	709760	1442191	8		x
Site	2018	SD-068R-2018	709760	1442171	0		x
Site	2018	SD-068R-2018	709760	1442171	2		x
Site	2018	SD-068R-2018	709760	1442171	4	x	
Site	2018	SD-068R-2018	709760	1442171	6		x
Site	2018	SD-068R-2018	709760	1442171	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
Revised Sediment Verification Sampling Plan
Friedrichsohn Cooperage Site
Waterford, New York

Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Site	2018	SD-224E-2018	709756	1442152	0	x	
Site	2018	SD-224E-2018	709756	1442152	2	x	
Site	2018	SD-224E-2018	709756	1442152	4		x
Site	2018	SD-224E-2018	709756	1442152	6		x
Site	2018	SD-224E-2018	709756	1442152	8		x
Site	2018	SD-001E-2018	709767	1442196	0	x	
Site	2018	SD-001E-2018	709767	1442196	2	x	
Site	2018	SD-001E-2018	709767	1442196	4		x
Site	2018	SD-001E-2018	709767	1442196	6		x
Site	2018	SD-001E-2018	709767	1442196	8		x
Site	2018	SD-067E-2018	709770	1442177	0	x	
Site	2018	SD-067E-2018	709770	1442177	2	x	
Site	2018	SD-067E-2018	709770	1442177	4		x
Site	2018	SD-067E-2018	709770	1442177	6		x
Site	2018	SD-067E-2018	709770	1442177	8		x
Site	2018	SD-069R-2018	709764	1442164	0		x
Site	2018	SD-069R-2018	709764	1442164	2		
Site	2018	SD-069R-2018	709764	1442164	4		x
Site	2018	SD-069R-2018	709764	1442164	6	x	
Site	2018	SD-069R-2018	709764	1442164	8		x
Site	2018	SD-069E-2018	709770	1442157	0	x	
Site	2018	SD-069E-2018	709770	1442157	2	x	
Site	2018	SD-069E-2018	709770	1442157	4		x
Site	2018	SD-069E-2018	709770	1442157	6		x
Site	2018	SD-069E-2018	709770	1442157	8		x
Downstream	2018	FC-SD-18R-2018	709796	1442199	0		x
Downstream	2018	FC-SD-18R-2018	709796	1442199	2		x
Downstream	2018	FC-SD-18R-2018	709796	1442199	4		x
Downstream	2018	FC-SD-18R-2018	709796	1442199	6		x
Downstream	2018	FC-SD-18R-2018	709796	1442199	8	x	
Downstream	2018	SD-314-2018	709811	1442184	0	x	
Downstream	2018	SD-314-2018	709811	1442184	2	x	
Downstream	2018	SD-314-2018	709811	1442184	4		x
Downstream	2018	SD-314-2018	709811	1442184	6		x
Downstream	2018	SD-314-2018	709811	1442184	8		x
Downstream	2018	FC-SD-04R-2018	709832	1442214	0		x
Downstream	2018	FC-SD-04R-2018	709832	1442214	2		x
Downstream	2018	FC-SD-04R-2018	709832	1442214	4	x	
Downstream	2018	FC-SD-04R-2018	709832	1442214	6		x
Downstream	2018	FC-SD-04R-2018	709832	1442214	8		x
Downstream	2018	SD-315-2018	709844	1442186	0	x	
Downstream	2018	SD-315-2018	709844	1442186	2	x	
Downstream	2018	SD-315-2018	709844	1442186	4		x
Downstream	2018	SD-315-2018	709844	1442186	6		x
Downstream	2018	SD-315-2018	709844	1442186	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
Revised Sediment Verification Sampling Plan
Friedrichsohn Cooperage Site
Waterford, New York

Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Downstream	2018	SD-063R-2018	709852	1442228	0		x
Downstream	2018	SD-063R-2018	709852	1442228	2		x
Downstream	2018	SD-063R-2018	709852	1442228	4		x
Downstream	2018	SD-063R-2018	709852	1442228	6	x	
Downstream	2018	SD-063R-2018	709852	1442228	8		x
Downstream	2018	SD-064R-2018	709856	1442213	0		x
Downstream	2018	SD-064R-2018	709856	1442213	2		x
Downstream	2018	SD-064R-2018	709856	1442213	4		x
Downstream	2018	SD-064R-2018	709856	1442213	6	x	
Downstream	2018	SD-064R-2018	709856	1442213	8		x
Downstream	2018	SD-065R-2018	709860	1442206	0		x
Downstream	2018	SD-065R-2018	709860	1442206	2		x
Downstream	2018	SD-065R-2018	709860	1442206	4	x	
Downstream	2018	SD-065R-2018	709860	1442206	6		x
Downstream	2018	SD-065R-2018	709860	1442206	8		x
Downstream	2018	FC-SD-05R-2018	709898	1442246	0		x
Downstream	2018	FC-SD-05R-2018	709898	1442246	2		x
Downstream	2018	FC-SD-05R-2018	709898	1442246	4		x
Downstream	2018	FC-SD-05R-2018	709898	1442246	6	x	
Downstream	2018	FC-SD-05R-2018	709898	1442246	8		x
Downstream	2018	SD-316-2018	709909	1442231	0	x	
Downstream	2018	SD-316-2018	709909	1442231	2	x	
Downstream	2018	SD-316-2018	709909	1442231	4		x
Downstream	2018	SD-316-2018	709909	1442231	6		x
Downstream	2018	SD-316-2018	709909	1442231	8		x
Downstream	2018	SD-317-2018	709919	1442217	0	x	
Downstream	2018	SD-317-2018	709919	1442217	2	x	
Downstream	2018	SD-317-2018	709919	1442217	4		x
Downstream	2018	SD-317-2018	709919	1442217	6		x
Downstream	2018	SD-317-2018	709919	1442217	8		x
Downstream	2018	SD-059R-2018	709946	1442261	0		x
Downstream	2018	SD-059R-2018	709946	1442261	2		x
Downstream	2018	SD-059R-2018	709946	1442261	4		x
Downstream	2018	SD-059R-2018	709946	1442261	6	x	
Downstream	2018	SD-059R-2018	709946	1442261	8		x
Downstream	2018	SD-060R-2018	709947	1442249	0		x
Downstream	2018	SD-060R-2018	709947	1442249	2		x
Downstream	2018	SD-060R-2018	709947	1442249	4	x	
Downstream	2018	SD-060R-2018	709947	1442249	6		x
Downstream	2018	SD-060R-2018	709947	1442249	8		x
Downstream	2018	SD-061R-2018	709951	1442237	0		x
Downstream	2018	SD-061R-2018	709951	1442237	2		x
Downstream	2018	SD-061R-2018	709951	1442237	4	x	
Downstream	2018	SD-061R-2018	709951	1442237	6		x
Downstream	2018	SD-061R-2018	709951	1442237	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
Revised Sediment Verification Sampling Plan
Friedrichsohn Cooperage Site
Waterford, New York

Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Downstream	2018	SD-318-2018	709998	1442275	0	x	
Downstream	2018	SD-318-2018	709998	1442275	2	x	
Downstream	2018	SD-318-2018	709998	1442275	4		x
Downstream	2018	SD-318-2018	709998	1442275	6		x
Downstream	2018	SD-318-2018	709998	1442275	8		x
Downstream	2018	SD-319-2018	710008	1442257	0	x	
Downstream	2018	SD-319-2018	710008	1442257	2	x	
Downstream	2018	SD-319-2018	710008	1442257	4		x
Downstream	2018	SD-319-2018	710008	1442257	6		x
Downstream	2018	SD-319-2018	710008	1442257	8		x
Downstream	2018	FC-SD-07R-2018	710099	1442310	0		x
Downstream	2018	FC-SD-07R-2018	710099	1442310	2		x
Downstream	2018	FC-SD-07R-2018	710099	1442310	4	x	
Downstream	2018	FC-SD-07R-2018	710099	1442310	6		x
Downstream	2018	FC-SD-07R-2018	710099	1442310	8		x
Downstream	2018	SD-320-2018	710273	1442479	0	x	
Downstream	2018	SD-320-2018	710273	1442479	2	x	
Downstream	2018	SD-320-2018	710273	1442479	4		x
Downstream	2018	SD-320-2018	710273	1442479	6		x
Downstream	2018	SD-320-2018	710273	1442479	8		x
Downstream	2018	FC-SD-08R-2018	710282	1442443	0		x
Downstream	2018	FC-SD-08R-2018	710282	1442443	2		x
Downstream	2018	FC-SD-08R-2018	710282	1442443	4	x	
Downstream	2018	FC-SD-08R-2018	710282	1442443	6		x
Downstream	2018	FC-SD-08R-2018	710282	1442443	8		x
Downstream	2018	SD-054R-2018	710290	1442401	0		x
Downstream	2018	SD-054R-2018	710290	1442401	2		x
Downstream	2018	SD-054R-2018	710290	1442401	4		x
Downstream	2018	SD-054R-2018	710290	1442401	6	x	
Downstream	2018	SD-054R-2018	710290	1442401	8		x
Downstream	2018	SD-321-2018	710345	1442411	0	x	
Downstream	2018	SD-321-2018	710345	1442411	2	x	
Downstream	2018	SD-321-2018	710345	1442411	4		x
Downstream	2018	SD-321-2018	710345	1442411	6		x
Downstream	2018	SD-321-2018	710345	1442411	8		x
Downstream	2018	FC-SD-09R-2018	710412	1442530	0		x
Downstream	2018	FC-SD-09R-2018	710412	1442530	2		x
Downstream	2018	FC-SD-09R-2018	710412	1442530	4	x	
Downstream	2018	FC-SD-09R-2018	710412	1442530	6		x
Downstream	2018	FC-SD-09R-2018	710412	1442530	8		x
Downstream	2018	SD-322-2018	710443	1442492	0	x	
Downstream	2018	SD-322-2018	710443	1442492	2	x	
Downstream	2018	SD-322-2018	710443	1442492	4		x
Downstream	2018	SD-322-2018	710443	1442492	6		x
Downstream	2018	SD-322-2018	710443	1442492	8		x

Proposed Sampling Location Details and Initial Depths for PCB Analysis
Revised Sediment Verification Sampling Plan
Friedrichsohn Cooperage Site
Waterford, New York

Location Group	Event	Sample Location	Position X	Position Y	Sample Top (ft bgs)	Analyze Sample	Hold Sample
Downstream	2018	SD-052R-2018	710485	1442524	0		x
Downstream	2018	SD-052R-2018	710485	1442524	2		x
Downstream	2018	SD-052R-2018	710485	1442524	4		x
Downstream	2018	SD-052R-2018	710485	1442524	6	x	
Downstream	2018	SD-052R-2018	710485	1442524	8		x
Downstream	2018	SD-323-2018	710518	1442561	0	x	
Downstream	2018	SD-323-2018	710518	1442561	2	x	
Downstream	2018	SD-323-2018	710518	1442561	4		x
Downstream	2018	SD-323-2018	710518	1442561	6		x
Downstream	2018	SD-323-2018	710518	1442561	8		x

Notes:

Sample locations with an "R" suffix are repeats of previous locations, sampling at lower depths.
Sample locations with "W" or "E" suffixes are new locations west or east (respectively) of previous sample locations, to provide spatial delineation of needed excavations.
Sample locations in the 300's (i.e., "SD-3##-2018") are new location to fill in spatial data gaps.
All locations will be cored to full depth (bedrock/refusal) and sampled at 2 foot intervals.
For illustration, samples to 8 feet are shown in this table, but may be shallower or deeper.

Appendices

Appendix A
Field Sampling Plan

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1.0 INTRODUCTION

This Appendix presents the Field Sampling Plan (FSP) for implementation of pre-design field activities associated with the Remedial Design/Remedial Action (RD/RA) Work Plan for Operable Unit (OU)-3 at the Friedrichsohn Cooperage Site (Site) in the Town of Waterford, New York. This report outlines the field sampling protocols that will be implemented during the following pre-design and remediation activities:

- Collection of sediment samples for chemical analysis
- Collection of bulk sediment samples for bench scale treatability testing
- Equipment cleaning
- Waste handling

2.0 GENERAL SAMPLING PROTOCOLS

The following general sampling procedures will be conducted for all sampling activities presented in this FSP.

1) Prior to sampling at each location, all sampling instruments and equipment will be cleaned in accordance with the protocols presented in Section 6.0.

2) Disposable gloves will be worn by samplers and changed between sampling points. Additional glove changes will be undertaken as necessary.

3) All sampling generated wastes such as gloves, Tyvek, etc., will be collected and consolidated with the waste material for proper disposal.

4) Samples will be labeled noting the location and/or interval, analysis required, preservative added, date, time and sampler's initials. A hardcover bound field book will be maintained to record all samples and sampling events. Details regarding recordkeeping and labeling are presented in the Quality Assurance Project Plan (QAPP).

5) Sample containers will be packed loosely in laboratory-supplied coolers to allow for placement of cushioning materials (i.e., vermiculite) between bottles to prevent breakage.

6) Following packing of the sample cooler, the completed chain-of-custody (see Section 7.0) will be placed in a watertight plastic bag and attached to the inside of the cooler lid.

7) A signed custody seal will be placed across the cooler closure and the cooler will then be sealed with packing tape. The packing tape will not completely cover the seal.

8) Samples will be handled and shipped in accordance with the protocols described in the QAPP.

9) All samples will be delivered to the laboratory via an overnight courier.

10) At the laboratory, all samples will be stored at 4 degrees Celsius (C) ±2 degrees C.

3.0 SEDIMENT SAMPLING

As presented in the RD/RA Work Plan, the sediment investigation will include collection and analysis of 71 sediment samples throughout the Study Area. Additional samples will be collected, extracted, and archived for analysis as necessary to define the extent of material exceeding the SCG concentrations for PCBs. Sediment samples will be collected from varying depths to provide further definition of the concentrations of Site-related constituents in bioavailable sediments and to collect bulk material for treatability testing.

Proposed sediment sampling locations are presented in the RD/RA Work Plan.

The field sampling procedures for the sediment investigation are consistent with the approved Project Quality Assurance Project Plan (QAPP).

3.1 SEDIMENT SAMPLING

Sediment samples will be collected from the start depth of each location identified in Table 2.2 of the RD/RA Work Plan, and collected in 1-foot increments from the start depth down to bedrock. Each core will be advanced to until refusal is encountered. Cores with less than 60 percent recovery will be resampled; however, smaller intervals may be accepted based on difficult field conditions. Cores will be subsectioned into one ft intervals from the sampling start depth to the end of the core. The top intervals (top 1 ft) will be submitted for chemical analysis; all deeper intervals will be extracted and the extract stored for analysis if necessary. Samples will be analyzed moving downward from the starting sample interval until a sample with a PCB concentration below the SCG concentration is identified.

Field Procedures. Sediment core samples will be collected using an electrically powered vibracorer which is lowered through the water column under winch control and penetrates the sediment by means of its weight and powered vibration.

The following steps outline the procedures for using a vibracorer in the field.

1. Maneuver the sampling vessel to the proposed sampling location using DGPS and deploy a marker buoy at the location; record the water depth using a lead line or calibrated fathometer.

2. Check to ensure that the metal core barrel is securely fastened to the powerhead of the vibracorer and insert a decontaminated core liner inside the metal core barrel.

3. Insert a core catcher into the end of the barrel so that the catcher fingers will extend into the core liner, and then screw the cutter head onto the bottom of the core barrel until the shoulder snugs against the end of the core barrel. Tighten the cutter head with a spanner or strap wrench.

4. Start the electrical generator, but **DO NOT** yet energize the corer.

5. Signal the winch operator to hoist the corer and swing it over the stern or side of the vessel at the marked sampling location. Reposition the vessel if necessary. Record the water depth using a lead line or calibrated fathometer.

6. Signal the winch operator to lower the corer through the water column. Determine the depth of the corer in the water column and track its subsequent penetration into the sediment by either marking the winch line in 1 ft increments or by attaching a flexible tape measure to the powerhead.

7. When the cutter head is within approximately 10 ft of the bottom, energize the corer by actuating the circuit breaker on the generator control panel.

8. Slow the descent speed of the corer in order to determine when the core nose enters the sediment. Maintain tension on the winch line throughout the coring process to keep the corer from toppling over. The worker monitoring the penetration of the corer into the sediment will signal the winch operator when to pay out more line.

9. If refusal is encountered or if the measured distance to the tip of the core nose indicates that project depth has been reached, stop paying out line and de-energize the corer. Do not power down the generator. Refusal is indicated by less than 6 inches of penetration in a given 30-second interval.

10. Signal the winch operator to bring the winch line taut. Maneuver the boom or the boat until the winch pulley is directly above the corer, as indicated by the winch line being as close to true vertical as possible.

11. Record the position of the actual coring location. The navigation antenna may be mounted on the winch boom near the pulley to place it directly over the corer.

12. Signal the winch operator to retrieve the corer. If the corer is stuck in the bottom, energize the power head while maintaining tension on the winch line. To reduce the risk of losing sediment from the core barrel, de-energize the corer as soon as it shows any sign of vertical movement. As soon as retrieval of the corer is underway, power down the generator. Swing the corer over the deck and lower it to a holding rack. Note and record the length of smearing on the

outside of the core barrel, which gives an indication of the amount of penetration.

13. Use a spanner or strap wrench to unscrew the cutter head and remove it. The catcher may stay inside the cutter head or remain attached to sediment inside the core liner. Retain any sediment in the cutter head and core catcher for examination and possible use.

14. Pull the core liner approximately 6 inches out of the core barrel, remove the catcher, if necessary, and immediately cap the bottom end of the core liner with a plastic cap. Secure the bottom cap with duct tape.

15. Extract the core liner entirely from the core barrel, and immediately cap the top of the core liner.

16. If the core is to be cut into sections, draw a mark on the outside of the core liner where the cut will be made to cut off the bottommost section. Apply duct tape and use a permanent marker to mark the sections on both sides of the location of the future cut. Mark arrows pointing toward the top end of the core, write the core ID, write date and time, and indicate the depth interval spanned by the sections in terms of feet below mudline.

17. Cut the core at the section boundary using a saws-all loaded with a decontaminated blade. Another person will be at the ready to immediately cap both the exposed ends and secure with duct tape.

18. Repeat the cutting procedure if more sections need to be cut.

19. Remove the cap from the top end of the top-most section and drain the water. Draining may be accomplished by drilling a hole through the core liner just above the top of the sediment or by gently tipping the section to empty the water out the top. Care must be taken to avoid loss of sediments during decanting, particularly "soupy" sediments with high water content.

20. After decanting, cut off the excess plastic tubing, cap the end at the sediment interface, and secure the cap with duct tape.

21. Evaluate the appearance and length of the core sample by examination through the clear plastic core liner. Note any stratigraphic intervals or other salient features on the core collection log sheet.

22. Store the core sections at 4°C (±2°C) in a refrigerator or iced cooler for subsampling and further processing (see below).

23. Complete any additional entries on the coring field form.

Core Acceptance Criteria. Acceptance criteria for sediment core samples are as follows:

- The core penetrated to target depth
- The core did not suffer significant sample-induced compaction or loss of material (i.e., recovery greater than 60 percent, as measured by recovery length divided by penetration length)
- Cored material did not extend out the top of the core tube or contact any part of the sampling apparatus at the top of the core tube
- There are no obstructions in the cored material that might have blocked the subsequent entry of sediment into the core tube, which may have resulted in an incomplete and biased core section

If sample acceptance criteria are not achieved, the sample will be rejected and a repeated deployment will be made as close as possible to the original location. If redeployment does not result in an acceptable sample according to these criteria, the Project Manager will be contacted to discuss relocating the proposed core sample.

Core Processing. The following steps outline the general procedures to be followed when cores are split, logged, and subsampled for laboratory analysis.

1. All equipment coming into contact with sediment will be decontaminated before use with each sample to avoid cross contamination.
2. Cut the core liner longitudinally on opposite sides using a small jig or reciprocating saw. Pull away the top half of the core liner to expose the sediment sample.
3. Log and describe the sediment on a core log form according to standard ASTM soil description procedures. Core logs should include:
    a. Visual grain size classification
    b. Color
    c. Consistency (stiffness or denseness)
    d. Odor
    e. Presence of debris
    f. Presence of biological activity (e.g., detritus, shells tubes, bioturbation, live or dead organisms)
    g. Presence of oil sheen
    h. Any other unusual or distinguishing characteristics

4. After the sediment description is complete, subsample the core on two ft intervals (based on in situ conditions). The ex situ core intervals will be corrected for compaction, and therefore may be somewhat less than two ft in actual length.
5. Homogenize each depth interval using a stainless steel mixing spoon or an electric drill with a stainless steel paddle.
6. Collect samples of the homogenized sediment as appropriate for chemical and/or radioisotope analysis. Label sample jars and place them in refrigerators or coolers with blue ice to maintain sediment at 4°C until dispatched under chain of custody to the appropriate laboratory. Samples designated for archiving will be frozen for possible future analysis.

Additional cores will be co-located with investigative cores. Sediment from the upper 4 feet will be homogenized in a bulk sample for treatability sample analysis as outlined in the RD/RA Work Plan. Core locations for collection of bulk samples will be selected in the field to provide coverage of the areas of potential sediment removal in the canal.

Analytical methods, detection limits, and QA/QC requirements are provided in the QAPP.

4.0 GENERAL SAMPLING PROTOCOLS

4.1 SAMPLE HANDLING AND DOCUMENTATION

Samples will be collected at the locations and frequencies specified in this Work Plan. The following protocols will be employed during all sampling:

1. All sampling instruments and equipment will be cleaned in accordance with the protocol presented herein prior to collecting samples for chemical analysis at each location.
2. A new pair of disposable nitrile gloves will be used at each sampling location for chemical analysis. Additional glove changes at each sample location will be made if the gloves are observed to be torn, if the gloves are suspected of being soiled from a source other than the sample media itself, or at the discretion of the Field Task Leader.
3. Quality assurance samples will be collected as outlined in the QAPP
4. All sampling generated wastes such as gloves, tyvek, etc. will be collected and containerized for proper disposal.
5. Samples will be labeled with the following information:
    a) Project name
    b) Unique sample ID/number (e.g., SE-70267-MM-DD-YYYY-XX-01)
    c) Sample interval (if appropriate)
    d) Analysis required
    e) Preservative added (if appropriate)
    f) Date and time
    g) Sampler's initials
6. A hard cover bound field book and/or field forms will be maintained to record all samples and sampling events. The field book will record, at a minimum, the following information:
    a) Project name and location
    b) Project number
    c) Date and time of entry (24-hour clock)
    d) Time and duration of daily sampling activities
    e) Weather conditions and water level
    f) Variations, if any, from specified sampling protocols and reasons for deviations

g) Name of person making entries and other field personal present

h) Onsite visitors, if any

i) Specific information on each type of sampling activity

j) The station name, date, gear, water depth, and location coordinates

k) Station identifiers and sample numbers for all samples collected each day

7. Containers for sample collection, handling, and preservation requirements will be determined by the analytical laboratory as required by the laboratory's standard operating procedures (SOPs) and the analytical method. All sample bottles will be provided pre-cleaned by the laboratory.

8. Sample shipments for chemical analysis will be iced in supplied coolers after collection and labeling to minimize sample temperatures at 4°C. Any remaining space will be filled with packing to cushion the containers within the shipment coolers. A completed chain-of-custody form will be sealed in plastic and affixed to the inside lid of each cooler. Each cooler will be sealed in two places with custody seal and the sampler's name. The cooler will be then sealed with packing tape.

9. Samples will be shipped to the analytical laboratory under chain-of-custody procedures using an overnight service.

5.0 SAMPLING EQUIPMENT CLEANING

Prior to mobilization of sampling equipment and commencing work, all sampling equipment will be thoroughly cleaned to remove oil, grease, mud, and other foreign material. Subsequently, before sampling each location, samplers and associated equipment will be cleaned to prevent cross-contamination from the previous sampling location. Cleaning will be accomplished by flushing and wiping the components to remove all visible particulates and other solid material followed by a thorough high pressure water wash.

Equipment not used for collection of samples for chemical analyses will be cleaned as follows:

1) Clean off any gross contamination with a stiff brush
2) Wash and scrub using laboratory grade non-phosphate detergent
3) Rinse with potable water

Reusable equipment (e.g., stainless steel spoons and bowls, etc.) used for the collection of samples to be submitted for chemical laboratory analyses will be cleaned prior to use and between each sampling events/location using the following rinse sequence.

1) Wash and scrub with potable water and low phosphate detergent.
2) Rinse with potable water.
3) Rinse with 10 percent ultrapure HNO_3, (dilute to 1 percent HNO_3 if carbon samplers utilized).
4) Rinse with potable water.
5) Rinse with methanol.
6) Thoroughly rinse with deionized demonstrated analyte-free water. The volume of water used must be at least five times the volume of solvent used in step 5).
7) Air dry for 15 minutes.
8) Following the final rinse, sampling equipment will be visually inspected to verify that it is free of particulates and other solid material which may contribute to possible sample cross-contamination. Fluids used for cleaning will not be recycled. Washwater, rinse water, and decontamination fluids will be collected and disposed of off site following waste characterization sampling.
9) Excess sediment will be returned to the river at the corresponding sample location.

6.0 CHAIN-OF-CUSTODY

Samples will remain in coolers under the control of the sampling personnel in the field until relinquished to the delivery firm or directly to the laboratory. Chain-of-custody documents will be completed for each sample cooler. The original and two copies of each chain-of-custody will be placed within the cooler. The fourth copy will be retained by the sampler. In addition, Field Sampling Data Sheets and a sample log of samples collected and shipped off Site will be maintained on Site.

7.0 WASTE HANDLING

Decontamination water will be containerized and stored in a designated secure location until it is properly characterized, and disposed of in accordance with appropriate regulations.

All coveralls, gloves, etc. will be collected in plastic bags for disposal off Site.

Appendix B
Quality Assurance/Quality Control Plan

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LIST OF TABLES
(Following Text)

LIST OF ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the policies, organization, objectives, functional activities, and Quality Assurance (QA) and Quality Control (QC) activities designed to achieve the specific data quality goals associated with the Remedial Design/Remedial Action (RD/RA) and Groundwater Monitoring Plan (GWMP) for the Friedrichsohn Cooperage inactive hazardous waste site (the Site) located at 153-155 Saratoga Avenue in the Town of Waterford, New York. The RD/RA includes both the OU-1 and OU-3 upland areas and the OU-3 sediment. RD/RA work plans for the OU-1 and OU-3 Source Areas will be submitted separately from the RD/RA OU-3 Sediment work plan. This QAPP is intended to cover all sample collection activities for both RD/RA Work Plans and the Groundwater Monitoring Plan. This QAPP has been prepared in accordance with the following documents:

1) United States Environmental Protection Agency (USEPA) "Preparation Aids for the Development of Category III Quality Assurance Project Plans", EPA/600/8-91-005, February 1991.
2) New York State Department of Environmental Conservation (NYSDEC) Division of Hazardous Substance Regulation "RCRA Quality Assurance Project Plan Guidance", March 29, 1991
3) NYSDEC's "DER-10 Technical Guidance for Site Investigation and Remediation", May 3, 2010.

The objectives of the QAPP are to provide sufficiently thorough and concise descriptions of the measures to be applied during the RD/RA and groundwater monitoring programs such that the data generated will be of a known and acceptable level of precision and accuracy. The QAPP has been prepared to identify procedures for sample preparation and handling, sample chain-of-custody, laboratory sample analyses, and laboratory data reporting to be implemented during the remedial field activities to ensure the accuracy and integrity of the data generated.

Protocols for the collection of samples are presented in the Work Plans.

2.0 PROJECT DESCRIPTION

2.1 GENERAL

The objective is to satisfy the requirements of the Consent Order A5-0784-1202 (Order) executed on January 28, 2013 between NYSDEC and Respondents (General Electric Company and SI Group, Inc.).

The activities for the RD/RA and groundwater monitoring programs include the following:

- Predesign data collection including soil, sediment and groundwater sampling and analyses
- Routine groundwater monitoring for OU-2
- Active remediation including excavation of impacted soils and sediment
- Off-site transport and disposal of impacted soils and sediment
- Verification sampling following excavation
- Backfilling with clean imported soil
- Site restoration

2.2 SITE BACKGROUND

The Site location, description, and history are detailed in the Remedial Design/Remedial Action (RD/RA) Work Plan and the Groundwater Monitoring Plan.

3.0 PROJECT MANAGEMENT

The project management structure for QA/QC activities associated with the RD/RA and the groundwater monitoring program is discussed below, along with a brief description of the duties of the key personnel.

Keith Cowan/John Uruskyj - Project Manager

- Provides overall project management
- Participates in negotiations with the agencies involved
- Provides guidance to CRA's Project Manager

CRA Project Manager - Jamie Puskas

- Ensures professional services provided are cost effective and of the highest quality
- Ensures necessary resources are available on an as-required basis
- Participates in key technical negotiations with the agencies involved
- Provides managerial and technical guidance to the Project Engineer

CRA Design Coordinator - Jeff Daniel

- Provides day-to-day project management
- Provides managerial guidance to the project technical group
- Provides technical representation at meetings as appropriate
- Acts as liaison between the technical group and the client
- Acts as liaison with the agencies involved
- Prepares and reviews reports
- Conducts preliminary chemical data interpretation

CRA Quality Assurance/Quality Control Officer - Analytical Activities - Susan Scrocchi

- Overviews and reviews laboratory activities
- Determines laboratory data corrective action
- Performs analytical data validation and assessment
- Reviews laboratory QA/QC
- Assists in preparation and review of final report
- Provides technical representation for analytical activities

Quality Assurance/Quality Control Officer - Field Activities

- Provides immediate supervision of on-Site activities
- Provides field management of sample collection and field QA/QC
- Assists in preparation and review of final report
- Provides technical representation for field activities
- Is responsible for maintenance of the field equipment

Quality Assurance/Quality Control Site Coordinator - Field Activities

- The individual designated to be Site Coordinator will be specified prior to commencement of field activities
- Provides support to QA/QC Officer
- Conducts sample collection consistent with FSP and QAPP
- Manages subcontractors as directed by the QA/QC Officer

Laboratory Project Manager, Analytical Subcontractor

- Ensures resources of laboratory are available on an as-required basis
- Coordinates laboratory analyses
- Supervises laboratory's in-house chain of custody
- Schedules analyses of samples
- Oversees review of data
- Oversees preparation of analytical reports
- Approves final analytical reports prior to submission to CRA's QA/QC Officer

Laboratory Quality Assurance/Quality Control Officer, Analytical Subcontractor

- Overviews laboratory QA/QC
- Overviews QA/QC documentation
- Conducts detailed data review
- Decides laboratory corrective actions, if required
- Provides technical representation for laboratory QA/QC procedures

Laboratory Sample Custodian - Analytical Subcontractor

- Receives and inspects the sample containers
- Records the condition of the sample containers
- Signs appropriate documents

- Verifies chains of custody and their correctness
- Notifies laboratory project manager and laboratory QA/QC officer of sample receipt and inspection
- Assigns a unique laboratory identification number correlated to the field sample identification number, and enters each into the sample receiving log
- Initiates transfer of the samples to the appropriate lab sections with assistance from the laboratory project manager
- Controls and monitors access to and storage of samples and extracts

Primary responsibility for data quality rests with the QA/QC Officers. Ultimate responsibility for project quality rests with CRA's Project Manager. Independent QA will be provided by the laboratory's Project Manager and QA/QC Officer prior to release of the data to CRA.

The analytical laboratory chosen to perform the analyses will be certified by the New York State Department of Health (NYSDOH) through the environmental laboratory approval program for the appropriate categories of analysis. The name of the analytical laboratory and the laboratory QA/QC manual will be submitted to NYSDEC for review and approval prior to sample collection.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for sample collection and analyses of groundwater, soil and sediment which will provide data with an acceptable level of accuracy and precision.

The purpose of this Section is to define the QA goals required to meet the Data Quality Objectives (DQOs) of the project. QA goals for accuracy, precision, and sensitivity of analyses; and completeness, representativeness, and comparability of measurement data are established in the following sections.

The sampling and analysis program is summarized in Table 4.1.

4.1 LEVEL OF QA EFFORT

To assess the quality of data resulting from the field sampling program, field duplicate samples, field blank samples, samples for laboratory matrix spike/matrix spike duplicate (MS/MSD) analyses, trip blanks, and rinsate blank samples will be collected (where appropriate) and submitted to the contract laboratory.

For all field samples collected, field duplicate samples will be submitted at a frequency of one per 20 samples or in the event that a sampling round consists of less than 20 samples, one field duplicate will be collected. MS/MSD samples will be analyzed at a minimum frequency of one per 20 field samples. Rinsate blanks will be submitted at a frequency of one per 20 samples in the event that non-dedicated sampling equipment is used. Trip blanks will be submitted with each cooler containing aqueous samples for volatile organic compound (VOC) analyses.

The sampling and analysis program summarized in Table 4.1 lists the specific parameters to be measured, the number of samples to be collected and the level of QA effort required for each matrix.

Groundwaters, soil and sediment will be analyzed for VOCs, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and metals. Sediment samples may also be analyzed for Total Organic Carbon (TOC). Some soil samples may also be analyzed for waste characterization.

Target quantitation limits for compounds to be tested are presented in Tables 4.2 and 4.3. TCLP regulatory limits and analytes to be tested are presented in Table 4.4.

MS and MSD samples will be analyzed as a check on the analytical method's accuracy and precision. Trip blank samples (for VOC determinations only) will be shipped by the laboratory to the Site and back to the laboratory without opening in the field. The trip blank will provide a measure of potential cross-contamination of samples resulting from shipment, handling and/or ambient conditions at the Site. Rinsate blank samples will be collected and analyzed as a check on the efficiency of the sampling device cleansing protocols.

4.2 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSES

The fundamental QA objective with respect to the accuracy, precision and sensitivity of analytical data is to meet the QC acceptance criteria of each analytical protocol. Laboratory analytical parameters and methods are listed in Table 4.1 and target quantitation limits are listed in Tables 4.2 and 4.3.

The method accuracy (percent recovery) for groundwater, soil and sediment samples will be determined by spiking selected samples (matrix spikes) with representative spiking compounds as specified in the analytical methods. Accuracy will be reported as the percent recovery of the spiking compounds and will be compared to the criteria specified in the appropriate methods as identified in Section 8.0.

The precision of the methods (reproducibility between duplicate analyses) will be determined based on the analysis of field duplicate samples and the duplicate analysis of MS samples. Precision will be reported as relative percent differences (RPDs) between duplicate analyses; acceptance criteria will be as specified in the appropriate analytical methods identified in Section 8.0.

4.3 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

A completeness requirement of 90 percent will be targeted for the RD/RA and the GWMP work (see Section 13.1.3 for a definition of completeness).

The quantity of samples to be collected has been determined in an effort to effectively represent the population being studied.

Analytical methods selected for this study are consistent with those used for previous studies (if applicable) to assure comparability of the data. All standards used by the laboratory will be traceable to reliable sources and will be checked with an independent standard.

5.0 SAMPLING PROCEDURES

All monitoring and sampling activities will be performed in accordance with the FSP and the Groundwater Monitoring Plan.

Sampling equipment will be decontaminated as specified in the FSP. Required sample containers, sample preservation methods, maximum holding times, and filling instructions are summarized in Table 5.1. Sample containers will be purchased from a USEPA-certified manufacturer and will be precleaned (I-Chem Series 200 or equivalent).

6.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

The following documentation procedures will be used during sampling and analysis to provide chain-of-custody control during transfer of samples from collection through storage and analysis. Record keeping documentation will include use of the following:

- Field log books (bound with numbered pages) to document sampling activities in the field
- Labels to identify individual samples
- Chain-of-custody record sheets to document sample IDs and analyses to be performed
- Laboratory sample custody log books
- Evidentiary files

6.1 FIELD LOG BOOK

Log books will be used in the field to record information. The field log book will be bound and the information will be entered in indelible ink. Each field log book page will be signed by the sampler. Field measurements and observations will assist in the interpretation of analytical results obtained and it is important that these measurements and observations be as complete as possible.

For each sample collected, the following will be recorded in indelible ink in the field log book if applicable:

i) Site location identification
ii) Depth interval of sample
iii) Unique sample identification number
iv) Date and time (in 24:00-hour time format) of sample collection
v) Weather conditions
vi) Designation as to the type of sample (groundwater, soil, sediment, etc.)
vii) Designation as to the means of collection (split spoon, etc.)
viii) Brief description of the sample
ix) Name of sampler
x) Analyses to be performed on sample

xi) Departure from established QA/QC field procedures

xii) Instrument problems

xiii) Other relevant comments such as odor, staining, texture, size of area sampled, etc.

6.2 SAMPLE LABELS

Sample labels are necessary to identify and prevent misidentification of the samples. The labels will be affixed to the sample container (not the caps) prior to the time of sampling. The labels will be filled out in waterproof ink at the time of collection. The labels will include the following information:

i) Sample number/identification code

ii) Name of collector

iii) Date and time of collection

iv) client and geographic location

v) Project number

vi) Required analysis

vii) Type of preservation

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example:	GW-80987-110513 - AA-XXX	
where:	GW - Designates sample type	
	(GW - Groundwater, SE - Sediment, S - Soil)	
80987	-	ID number unique to the project site
110513	-	date of collection (mm,dd,yy)
AA	-	sampler initials
xxx	-	unique sample number

QC samples will also be numbered with a unique sample number.

Sample container labels will include sample number, place of collection, and date and time of collection.

6.3 FIELD INSTRUMENT CALIBRATION AND USE LOGS

Standardized instrument calibration logs for each field instrument will be maintained during sampling activities to demonstrate properly functioning equipment. Included in the log should be documentation of time of instrument use, operator, and any maintenance performed.

6.4 CHAIN-OF-CUSTODY RECORDS

Chain-of-custody forms will be completed for samples collected during the program. chain-of-custody forms will be completed to document the transfer of sample containers.

The chain-of-custody record, completed at the time of sampling, will contain, but not be limited to, the sample number, date, and time of sampling, and the name of the sampler. The chain-of-custody document will be signed, timed, and dated by the sampler when transferring the samples.

The chain-of-custody form will consist of four copies which will be distributed to the shipper, the receiving laboratory, and two copies to CRA. The shipper will keep one copy while the other three copies will be enclosed in a waterproof envelope within the cooler with the samples. The laboratory, upon receiving the samples, will complete the three remaining copies. The laboratory will maintain one copy for their records; one copy will be returned to CRA upon receipt of the samples by the laboratory; one copy will be submitted to CRA with the data deliverables package.

6.5 SAMPLE SHIPMENT

All samples will be refrigerated using wet ice at <6°C. Custody seals will be placed around each cooler and the coolers will then be sealed with packing tape for shipment to the analytical laboratory within 24 to 48 hours of collection by either commercial courier or Subcontractor personnel.

6.6 LABORATORY SAMPLE CUSTODY LOG BOOKS

Upon receipt of the sample coolers at the laboratory, each sample cooler and the custody seal will be inspected by the designated sample custodian. The condition of the cooler and the custody seal will be noted on the chain-of-custody record sheet by the sample custodian.

The sample custodian will record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the chain-of-custody. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The sample custodian will document the date and time of receipt of the container, and sign the form.

If damage or discrepancies are noticed (including sample temperature exceedances), they will be recorded in the remarks column of the record sheet, dated and signed. Any damage or discrepancies will be reported to the lab supervisor who will inform the lab manager and QA Officer before samples are processed.

6.7 EVIDENTIARY FILES

The laboratory will be responsible for maintaining analytical log books and laboratory data as well as a sample (on hand) inventory for submittal to CRA on an as-required basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of 5 years at which time CRA will advise the laboratory regarding the need for additional storage.

Evidentiary files for the entire project will be inventoried and maintained by CRA and will consist of the following:

i) Project-related plans
ii) Project log books
iii) Field data records
iv) Sample identification documents
v) Chain-of-custody records
vi) Report notes, calculations, etc.
vii) Laboratory data, etc.
viii) References, copies of pertinent literature

ix) Miscellaneous - photos, maps, drawings, etc.

x) Copies of final reports pertaining to the project

The evidentiary file materials will be the responsibility of CRA's Project Manager with respect to maintenance and document removal.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 INSTRUMENT CALIBRATION AND TUNING

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards is determined by the manufacturers' guidelines, the analytical method, or the requirements of special contracts.

A bound notebook will be kept with each instrument requiring calibration in which will be recorded activities associated with QA monitoring and repairs programs. These records will be checked during periodic equipment review and internal and external QA/QC audits.

7.1.1 GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

It is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria prior to initiating any ongoing sample analyses and data collection. This is accomplished through the analyses of tuning compounds as specified in the analytical methods.

Calibration of the GC/MS system will be performed daily at the beginning of the day or with each 12 hours of instrument operating time when more than 12 hours of instrument operating time is needed in 1 day.

All method-specified calibration criteria will be met prior to sample analyses. All calibrations will be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of 0.995). Higher order fits will not be allowed unless the laboratory can demonstrate that the instrument is working properly, and that the instrument response over the concentration range of interest is second-order.

Quantification of samples that are analyzed by GC/MS will be performed by internal standard calibration. For quantitation, the nearest internal standard **free of interferences** will be used.

7.1.2 GAS CHROMATOGRAPHY (GC)

Quantification for samples that are analyzed by GC with element selective detectors will be performed by external standard calibration. Standards containing the compounds of interest will be analyzed at a minimum of three concentrations to establish the linear range of the detector. Single point calibration will be performed at the beginning of each day and at every tenth injection. The response factors from the single point calibration will be checked against the average response factors from multi-level calibration. If deviations in response factors are greater than those allowed by the analytical method protocols, then system recalibration will be performed. Alternatively, fresh calibration standards will be prepared and analyzed to verify instrument calibration.

All method-specified calibration criteria will be met prior to sample analyses. All calibrations will be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of 0.995). Higher order fits will not be allowed unless the laboratory can demonstrate that the instrument is working properly, and that the instrument response over the concentration range of interest is second-order.

7.1.3 INSTRUMENTATION FOR INORGANIC ANALYSES

All method-specified calibration procedures will be performed and acceptance criteria will be met prior to sample analyses. Standard curves derived from data consisting of one reagent blank and a minimum of three concentrations [one reagent blank and one concentration for ion coupled plasma (ICP)] will be prepared for each inorganic analyte. Calibrations will be performed using either average response factors, or first-order linear regression (with a correlation coefficient requirement of 0.995).

The standard curve will be used with each subsequent analysis provided the standard curve is verified by using at least one reagent blank and one standard at a level normally encountered or expected in such samples. If the results of the verification are not within ±10 percent of the original curve, a new standard will be prepared and analyzed. If the results of the second verification are not within ±10 percent of the original standard curve, the analysis will be stopped, and the analyst will reject any data obtained after the last acceptable verification standard. A reference standard will be used to determine if the discrepancy is with the standard or with the instrument. Once the cause is identified, a new calibration curve will be performed before sample analyses can continue.

New standards will also be prepared on a quarterly basis at a minimum. All data used in drawing or describing the curve will be so indicated on the curve or its description. A record will be made of the verification.

7.1.4 FIELD INSTRUMENTATION

Field equipment used during the RD/RA or groundwater monitoring program will be calibrated both prior to and following the day's utilization in accordance with the manufacturer's instructions. The equipment will also be operated in accordance with the manufacturer's instructions. Records of calibrations of field equipment will be recorded in a bound field notebook.

8.0 ANALYTICAL PROCEDURES

8.1 ANALYTICAL METHODS

All groundwater, soil and sediment samples will be analyzed for the parameters listed in Tables 4.2,4.3 and 4.4 using the methods cited in Table 4.1. These methods have been selected to meet the DQOs for each sampling activity.

Data deliverables for this program will be as specified in Section 9.2.

8.2 COMPOUND IDENTIFICATION

Compounds which will be analyzed by GC/MS will be identified by comparison of the sample mass spectrum with the mass spectrum of a standard of the suspected compound (standard reference spectrum). Mass spectra for standard references should be obtained on the user's GC/MS within the same 12 hours as the sample analysis. These standard reference spectra may be obtained through analysis of the calibration standards. The following criteria will be satisfied to verify identification:

i) Elution of the sample component at the same GC relative retention time (RRT) as the standard component

ii) Correspondence of the sample component and the standard component mass spectrum

For GC determinations of specific analytes, the RRT of the unknown will be compared with that of an authentic standard. Since a true identification by GC is not possible, an analytical run for compound confirmation will be followed according to the specifications in the methods. Peaks will elute within daily retention time windows established for each indicator parameter to be declared a tentative or confirmed identification. Retention time windows are determined using standard protocols defined in each method.

8.3 QUANTITATION

The procedures for quantitation of analytes are discussed in the appropriate analytical methods. Sample results are calculated using either an external standard or an internal standard technique. External standard techniques directly compare the response from the sample to the response of the target analyte in the calibration standards. Internal

standard technique utilizes the addition of a compound that resembles the target compound but is not commonly found in nature. This compound is added to all standards, samples, and QC samples. Quantitation is based on the ratio of the target compound in the sample to the response of the internal standard in the sample compared to a similar ratio derived for each calibration standard.

8.4 QUANTITATION LIMIT REQUIREMENTS

Targeted quantitation limits will be consistent with those presented in Tables 4.2 and 4.3. When matrix interferences are noted during sample analysis, actions will be taken by the laboratory to achieve the specified quantitation limits. Samples will not be diluted by more than a factor of five to reduce matrix effects. The laboratory will re-extract and/or use any of the cleanup techniques presented in the analytical methods to eliminate matrix interferences.

Samples may be diluted to a greater extent if the concentrations of analytes of concern exceed the calibration range of the instrument. In such cases, the laboratory QA/QC Officer will assure that the laboratory demonstrates good analytical practices and that such practices are documented in order to achieve the specified quantitation limits.

Soil and sediment results will be reported based on dry weight. The dry weight conversion will raise the targeted quantitation limit.

9.0 DATA REDUCTION, VALIDATION, ASSESSMENT, AND REPORTING

9.1 GENERAL

The contract laboratory will perform analytical data reduction and validation in-house under the direction of the laboratory QA Officer. The laboratory's QA Officer will be responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other qualifications based on the QC criteria outlined in the analytical methods, which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as detailed in the following:

- Raw data produced and checked by the responsible analysts is turned over for independent review by another analyst
- The area supervisor reviews the data for attainment of quality control criteria presented in the referenced analytical methods
- Upon completion of reviews and acceptance of the raw data by the laboratory operations manager, a computerized report will be generated and sent to the laboratory QA Officer
- The laboratory QA Officer will complete a thorough inspection of reports
- The laboratory QA officer and area supervisor will decide whether any sample reanalysis is required
- Upon acceptance of the preliminary reports by the laboratory QA officer, final reports will be generated and signed by the laboratory Project Manager

Validation of the analytical data pertaining to the monitoring wells will be performed by CRA's QA/QC Officer for analytical activities. The data validation will be performed utilizing guidance contained in the following documents: "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA 540/R-08-01, June 2008 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA 540/R-10-011, January 2010. Data analyzed using methods not covered in these documents will be validated using the general principles used in these documents, and the analytical requirements specified in the methods.

Assessment of analytical and in-house data will include checks on data consistency by looking for comparability of duplicate analyses, comparability to previous data from the same sampling location (if available), adherence to accuracy and precision control criteria detailed in this QAPP and anomalously high or low parameter values. Verification of 100 percent of QC sample results (both qualitative and quantitative) will

be performed. Verification of the identification of 100 percent of sample results (both positive hits and non-detects) will be performed and 10 percent of investigative sample results will be recalculated.

A Data Usability Summary Report (DUSR) will be prepared and will present the results of the data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. The DUSR will be submitted to CRA's Project Manager.

Data from field measurements and sample collection activities that are used in project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. Field data will be audited for anomalously high or low values that may appear to be inconsistent with other data.

The qualifications of CRA's QA/QC Officer are presented in Attachment A.

9.2 LABORATORY REPORTING

Reporting and deliverables will be in accordance with NYSDEC Analytical Services Protocol (ASP) Category B. The minimum deliverables required by the laboratory are summarized in Table 9.1. Reporting and deliverables for waste characterization samples (Toxicity Characteristic Leaching Procedure [TCLP] and Resource Conservation and Recovery Act [RCRA] analyses) shall include, but not be limited to, all items listed in Table 9.2. The laboratory will also include an electronic data deliverable in EQuis 4-file format.

All sample data and corresponding QA/QC data as specified in the analytical methods will be maintained accessible to CRA either in hard copy or on magnetic tape or disk.

10.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

10.1 QC FOR FIELD MEASUREMENTS

Quality control procedures for field measurements will be limited to a check of the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instrument (where appropriate).

10.2 QC FOR LABORATORY ANALYSES

Specific procedures related to internal laboratory QC samples are described in the following subsections.

10.2.1 REAGENT BLANKS

A reagent blank will be analyzed by the laboratory at a frequency of one blank per analytical batch. The reagent blank, an aliquot of analyte-free water or solvent, will be carried through the entire analytical procedure.

10.2.2 MS/MSD ANALYSES

An MS/MSD sample will be analyzed for all methods at the frequency specified in Table 4.1. Acceptable criteria and analytes that will be used for matrix spikes are identified in the analytical methods. Percent spike recoveries will be used to evaluate analytical accuracy while percent relative standard deviation or the relative percent difference (RPD) between duplicate analyses will be used to assess analytical precision.

10.2.3 SURROGATE ANALYSES

Surrogates are organic compounds which are similar to the analytes of interest, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard and environmental sample analyzed by GC or GC/MS, including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries will fall within the control

limits specified in the analytical methods. If surrogate recoveries are excessively low (<10 percent), the laboratory will contact CRA's QA/QC Officer for further instructions.

Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantitation limit. Reanalysis of these samples is not required. Assessment of analytical quality in these cases will be based on the MS/MSD sample analysis results.

10.2.4 LCS SAMPLES

LCS samples (also known as QC Check Samples) will be analyzed to determine the accuracy of the analytical methods. LCS samples generally are prepared from standards that are from a different source than the calibration standards or are standard reference materials. The percent recoveries will be calculated and compared to the acceptance criteria. In most cases, sample analyses cannot proceed if the LCS acceptance criteria is not achieved. Corrective actions for outlying LCS data will be consistent with those specified in the methods.

10.3 QC FOR SAMPLING PROTOCOL

To assess the quality of data resulting from the field sampling program, field duplicate and field blank samples will be collected (where appropriate) and submitted to the analytical laboratory as samples.

10.3.1 FIELD DUPLICATE SAMPLES

Field duplicate samples will be collected at the frequency of one per 20 samples. These samples will be submitted "blind" to the laboratory for analysis, the results will be compared, and RPD values will be assessed against control limits of 50 percent for water samples and 100 percent for soil samples.

10.3.2 FIELD BLANK SAMPLES

Trip blanks for VOCs will be prepared by the laboratory using analyte-free water and submitted with the sample collection containers. The trip blanks will be kept unopened in the field with sample bottles. One trip blank will be transported to the laboratory

with each cooler of aqueous VOC samples. The laboratory will analyze trip blanks as samples.

Rinsate blanks will be used to assess decontamination procedures of collection equipment used for multiple samples. The rinse blank will be prepared using analyte-free deionized water when non-dedicated equipment is used in the field. The rinse blanks will be analyzed by the laboratory as samples. Rinse blanks will be prepared at the frequency of one per 20 samples in the event that non-dedicated sampling equipment is used.

11.0 PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY

11.1 LABORATORY

For the purpose of external evaluation, performance evaluation check samples are analyzed periodically by the laboratory. Internally, the evaluation of data from these samples is done on a continuing basis over the duration of a given project.

CRA's QA/QC Officer may carry out performance and/or systems audits to insure that data of known and defensible quality are consistently produced during this program.

Systems audits are qualitative evaluations of all components of field and laboratory quality control measurement systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before systems are operational, during the program, or after completion of the program. Such audits typically involve a comparison of the activities given in the laboratory's QA/QC plan described herein, with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

The performance audit is a quantitative evaluation of the measurement systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to quantitatively evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the laboratory's QA/QC Officer without the knowledge of the analyst during each sampling event for this program.

It should be noted, however, that any additional external QA audits will only be performed if deemed necessary.

11.2 FIELD

Audits of field techniques will be conducted by CRA's Field QA/QC Officer. These audits will include review of the sample collection and instrument calibration logbooks and chain-of-custody documents. Field inspections will also be performed to review: sample collection and handling techniques; on-Site supplies of sampling equipment and standards availability of relevant project documents.

12.0 PREVENTIVE MAINTENANCE

Analytical instruments to be used in this project will be serviced by laboratory personnel at regularly scheduled intervals in accordance with the manufacturers' recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of laboratory personnel will be performed by the equipment manufacturer or their designated representative.

Daily checks of each instrument will be performed by the analyst who has been assigned responsibility for that instrument. Manufacturers' recommended procedures will be followed in every case.

Maintenance procedures and schedules and instrument logbooks will be documented in bound notebooks and made available to CRA's project QA/QC Officer upon request.

13.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

13.1 QA MEASUREMENT QUALITY INDICATORS

13.1.1 PRECISION

Precision will be assessed by comparing the analytical results between duplicate spike or duplicate sample analyses. Precision as RPD will be calculated as follows for values significantly greater than the associated detection limit:

Matrix Spike/Matrix Spike Duplicate

$$\text{Precision} = \frac{\{D_2 - D_1\}}{\{D_1 + D_2/2\}} \times 100$$

D_1 = matrix spike recovery
D_2 = matrix spike duplicate recovery

Sample Duplicates

$$\text{Precision} = \frac{\{D_2 - D_1\}}{\{D_1 + D_2/2\}} \times 100$$

D_1 = original sample result
D_2 = duplicate sample result

For results near the associated detection limits, precision will be assessed based on the following criteria:

Precision = original result - duplicate result <Contract Required Detection Limits (CRDL)

13.1.2 ACCURACY

Accuracy will be assessed by comparing a set of analytical results to the accepted or "true" values that would be expected. In general, MS/MSD and check sample recoveries will be used to assess accuracy. Accuracy as percent recovery will be calculated as follows:

$$\text{Accuracy} = \frac{A-B}{C} \times 100$$

A = The analyte determined experimentally from the spike sample
B = The background level determined by a separate analysis of the unspiked sample
C = The amount of spike added

13.1.3 COMPLETENESS

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under normal conditions.

To be considered complete, the data set will contain QC check analyses verifying precision and accuracy for the analytical protocol. In addition, data are reviewed in terms of stated goals in order to determine if the database is sufficient.

When possible, the percent completeness for each set of samples will be calculated as follows:

$$\text{Completeness} = \frac{\text{valid data obtained}}{\text{total data planned}} \times 100 \text{ percent}$$

13.1.4 EXCEEDANCES

Procedures discussed previously will be followed for documenting deviations. In the event that a result deviates significantly from method established control limits, this deviation will be noted and its effect on the quality of the remaining data assessed and documented.

14.0 CORRECTIVE ACTION

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective action system will be:

- Checking the predetermined limits for data acceptability beyond which corrective action is required
- Identifying and defining problems
- Assigning responsibility for investigating the problem
- Investigating and determining the cause of the problem
- Determination of a corrective action to eliminate the problem (this may include reanalysis or resampling and analyses)
- Assigning and accepting responsibility for implementing the corrective action
- Implementing the corrective action and evaluating the effectiveness
- Verifying that the corrective action has eliminated the problem
- Documenting the corrective action taken

For each measurement system, the laboratory QA Officer will be responsible for initiating the corrective action and the laboratory supervisor will be responsible for implementing the corrective action.

15.0 QUALITY ASSURANCE REPORT TO MANAGEMENT

The CRA QA/QC Officer will receive reports on the performance of the measurement system and the data quality following each sampling round and at the conclusion of the project.

Minimally, these reports will include:

- Assessment of measurement quality indicator (i.e., data accuracy, precision, and completeness);
- Results of system audits
- QA problems and recommended solutions.

CRA's QA/QC Officer will be responsible within the organizational structure for preparing these periodic reports. The final report for the project will also include a separate QA section which will summarize data quality information contained in the periodic QA/QC reports to management, and present an overall data assessment and validation in accordance with the data quality objectives outlined in this QAPP.

16.0 REFERENCES

"Preparation Aids for the Development of Quality Assurance Project Plans", United States Environmental Protection Agency, Office of Research and Development, EPA/600/8-91/005, February 1991.

"RCRA Quality Assurance Project Plan Guidance", NYSDEC, August 1989.

"USEPA Region II CERCLA Quality Assurance Manual", Revision 1, October 1989.

"Test Methods for Evaluating Solid Waste" USEPA Office of Solid Waste, SW846 Third Edition, November 1986 (with revisions).

"DER-10 Technical Guidance for Site Investigation and Remediation", New York State Department of Environmental Conservation, May 2010.

TABLE 4.1

SAMPLING AND ANALYSIS SUMMARY
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

Sample Matrix	*Analytical Parameters*	*Analytical Method*[1]	*Investigative Samples*	*Field Duplicates*	*Rinsate Blanks*	*Trip Blanks*	*MS/MSD*
Groundwater	TCL Volatiles plus TICs	SW-846 8260	TBD	1/20	1/20	1/Cooler	1/20
	TCL Semi-Volatiles plus TICs	SW-846 8270	TBD	1/20	1/20	-	1/20
	PCBs	SW-846 8082	TBD	1/20	1/20	-	1/20
	TAL Metals	SW-846 6010/7470	TBD	1/20	1/20	-	1/20
Soil	TCL Volatiles plus TICs	SW-846 8260	TBD	1/20	1/20	-	1/20
	TCL Semi-Volatiles plus TICs	SW-846 8270	TBD	1/20	1/20	-	1/20
	PCBs	SW-846 8082	TBD	1/20	1/20	-	1/20
	TAL Metals	SW-846 6010/7471	TBD	1/20	1/20	-	1/20
	TCLP Volatiles	SW-846 1311/8260	TBD	1/20	1/20	-	1/20
	TCLP Semi-Volatiles	SW-846 1311/8270	TBD	1/20	1/20	-	1/20
	TCLP Metals	SW-846 1311/6010/7471	TBD	1/20	1/20	-	1/20
	Ignitability	SW-846 1010	TBD	1/20	1/20	-	1/20
	Cyanide, Reactive (as Total)	SW-846 9014	TBD	1/20	1/20	-	1/20
	Corrosivity by pH (S. U.)	SW-846 9045	TBD	1/20	1/20	-	1/20
	Sulfide, Reactive (as Total)	SW-846 9030	TBD	1/20	1/20	-	1/20
Sediment	TCL Volatiles plus TICs	SW-846 8260	TBD	1/20	1/20	-	1/20
	TCL Semi-Volatiles plus TICs	SW-846 8270	TBD	1/20	1/20	-	1/20
	PCBs	SW-846 8082	TBD	1/20	1/20	-	1/20
	TAL Metals	SW-846 6010/7471	TBD	1/20	1/20	-	1/20
	TOC	Lloyd Kahn	TBD	1/20	1/20	-	1/20

Notes:

(1) Methods referenced from "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, Third Edition, 1986 (Revised 9/94). Analysis of Water and Wastes", EPA-600/4-79-020, March 1983; for chloride, sulfate, nitrate-nitrite

MS Matrix Spike.
MSD Matrix Spike Duplicate.
PCBs Polychlorinated Biphenyls.
TAL Target Analyte List.
TCL Target Compound List.
TICs Tentatively Identified Compounds.
- Not applicable.
TCLP Toxicity Characterization Leaching Procedure.

TABLE 4.2

ORGANIC COMPOUND LIST AND
PRACTICAL QUANTITATION LIMIT (PQL)
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

	CAS Number	*Quantitation Limits*	
		Water (µg/L)	*Soil/Sediment (µg/Kg)*
TCL Volatiles			
1,1,2,2-Tetrachloroethane	79-34-5	10	10
1,1,2-Trichloroethane	79-00-5	10	10
1,1-Dichloroethane	75-34-3	10	10
1,1-Dichloroethylene	75-35-4	10	10
1,2-Dibromo-3-chloropropane	96-12-8	10	10
1,2-Dibromoethane	106-93-4	10	10
1,2-Dichloroethane	107-06-2	10	10
1,2-Dichloropropane	78-87-5	10	10
Bromodichloromethane	75-27-4	10	10
Bromoform	75-25-2	10	10
Carbon tetrachloride	56-23-5	10	10
Chlorobenzene	108-90-7	10	10
Chloroethane	75-00-3	10	10
Chloroform	67-66-3	10	10
cis-1,3-Dichloropropene	10061-01-5	10	10
Dibromochloromethane	124-48-1	10	10
Dichlorodifluoromethane	75-71-8	10	10
m-Dichlorobenzene	541-73-1	10	10
Bromomethane	74-83-9	10	10
Chloromethane	74-87-3	10	10
Methylene chloride	75-09-2	10	10
o-Dichlorobenzene	95-50-1	10	10
p-Dichlorobenzene	106-46-7	10	10
Tetrachloroethylene	127-18-4	10	10
trans-1,2-Dichloroethylene	156-60-5	10	10
trans-1,3-Dichloropropene	10061-02-6	10	10
Trichloroethylene	79-01-6	10	10
Trichlorofluoromethane	75-69-4	10	10
Vinyl chloride	75-01-4	10	10
4-Methyl-2-pentanone	108-10-1	10	10
2-Butanone	78-93-3	10	10
Benzene	71-43-2	10	10
Ethylbenzene	100-41-4	10	10
Styrene	100-42-5	10	10
Toluene	108-88-3	10	10
Xylene(total)	1330-20-7	10	10
1,1,1-Trichloroethane	71-55-6	10	10
2-Hexanone	591-78-6	10	10
Acetone	67-64-1	10	10
Carbon disulfide	75-15-0	10	10
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	10	10
Methyl Acetate	79-20-9	10	10
Methyl tert-Butyl Ether	1634-04-4	10	10
cis-1,2-Dichloroethene	156-59-2	10	10
Cyclohexane	110-82-7	10	10
Methylcyclohexane	108-87-2	10	10
Isopropylbenzene	98-82-8	10	10
1,2,4-Trichlorobenzene	120-82-1	10	10
TCL Semi-Volatiles			
2,4,6-Trichlorophenol	88-06-2	10	330
2,4-Dichlorophenol	120-83-2	10	330
2,4-Dimethylphenol	105-67-9	10	330
2,4-Dinitrophenol	51-28-5	25	830
2-Chlorophenol	95-57-8	10	330
4,6-Dinitro-o-cresol	534-52-1	25	830
o-Nitrophenol	88-75-5	10	330

TABLE 4.2

ORGANIC COMPOUND LIST AND
PRACTICAL QUANTITATION LIMIT (PQL)
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

	CAS Number	*Quantitation Limits*	
		Water (µg/L)	*Soil/Sediment (µg/Kg)*
p-Chloro-m-cresol	59-50-7	10	330
Pentachlorophenol	87-86-5	25	830
Phenol	108-95-2	10	330
p-Nitrophenol	100-02-7	25	830
Bis(2-ethylhexyl) phthalate	117-81-7	10	330
Butyl benzyl phthalate	85-68-7	10	330
Diethyl phthalate	84-66-2	10	330
Dimethyl phthalate	131-11-3	10	330
Di-n-butyl phthalate	84-74-2	10	330
Di-n-octyl phthalate	117-84-0	10	330
2,4-Dinitrotoluene	121-14-2	10	330
2,6-Dinitrotoluene	606-20-2	10	330
Isophorone	78-59-1	10	330
Nitrobenzene	98-95-3	10	330
Acenaphthene	83-32-9	10	330
Acenaphthylene	208-96-8	10	330
Anthracene	120-12-7	10	330
Benzo[a]anthracene	56-55-3	10	330
Benzo[a]pyrene	50-32-8	10	330
Benzo[b]fluoranthene	205-99-2	10	330
Benzo[ghi]perylene	191-24-2	10	330
Benzo[k]fluoranthene	207-08-9	10	330
Chrysene	218-01-9	10	330
Dibenz[a,h]anthracene	53-70-3	10	330
Fluoranthene	206-44-0	10	330
Fluorene	86-73-7	10	330
Indeno(1,2,3 cd)pyrene	193-39-5	10	330
Naphthalene	91-20-3	10	330
Phenanthrene	85-01-8	10	330
Pyrene	129-00-0	10	330
2-Chloronaphthalene	91-58-7	10	330
Hexachlorobenzene	118-74-1	10	330
Hexachlorobutadiene	87-68-3	10	330
Hexachlorocyclopentadiene	77-47-4	10	330
Hexachloroethane	67-72-1	10	330
2,4,5-Trichlorophenol	95-95-4	25	830
2-Methylnaphthalene	91-57-6	10	330
3,3'-Dichlorobenzidine	91-94-1	10	330
4-Chlorophenyl phenyl ether	7005-72-3	10	330
Bis(2-chloroethoxy)methane	111-91-1	10	330
Bis(2-chloroethyl)ether	111-44-4	10	330
Dibenzofuran	132-64-9	10	330
m-Nitroaniline	99-09-2	25	830
N-Nitrosodiphenylamine	86-30-6	10	330
N-Nitrosodipropylamine	621-64-7 1	10	330
o-Cresol	95-48-7	10	330
o-Nitroaniline	88-74-4	25	830
p-Chloroaniline	106-47-8	10	330
p-Cresol	106-44-5	10	330
p-Nitroaniline	100-01-6	25	830
Benzaldehyde	100-52-7	10	330
2,2'-oxybis(1-Chloropropane)	108-60-1	10	330
Acetophenone	98-86-2	10	330
Caprolactam	105-60-2	10	330
1,1'-Biphenyl	92-52-4	10	330
4-Bromophenyl-phenylether	101-55-3	10	330
Atrazine	1912-24-9	10	330
Carbazole	86-74-8	10	330

TABLE 4.2

ORGANIC COMPOUND LIST AND
PRACTICAL QUANTITATION LIMIT (PQL)
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

	CAS Number	*Quantitation Limits*	
		Water (µg/L)	*Soil/Sediment (µg/Kg)*
PCBs			
Aroclor-1016	12674-11-2	1.0	33
Aroclor-1221	11104-28-2	1.0	67
Aroclor-1232	11141-16-5	1.0	33
Aroclor-1242	53469-21-9	1.0	33
Aroclor-1248	12672-29-6	1.0	33
Aroclor-1254	11097-69-1	1.0	33
Aroclor-1260	11096-82-5	1.0	33
Aroclor-1262	37324-23-5	1.0	33
Aroclor-1268	11100-14-4	1.0	33

Notes:

PCBs - Polychlorinated Biphenyls.
TCL - Target Compound List.

TABLE 4.3

INORGANIC COMPOUND LIST AND
PRACTICAL QUANTITATION LIMIT (PQL)
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

Parameters	*CAS Number*	*Quantitation Limits*	
		Water (µg/L)	*Soil/Sediment (µg/Kg)*
TAL Metals			
Aluminum	7429-90-5	200	20
Antimony	7440-36-0	60	6.0
Arsenic	7440-38-2	10	1.0
Barium	7440-39-3	200	20
Beryllium	7440-41-7	5.0	0.5
Cadmium	7440-43-9	5.0	0.5
Calcium	7440-70-2	5000	500
Chromium	7440-47-3	10	1.0
Cobalt	7440-48-4	50	5.0
Copper	7440-50-8	25	2.5
Iron	7439-89-6	100	10
Lead	7439-92-1	5.0*	0.5
Magnesium	7439-95-4	5000	500
Manganese	7439-96-5	15	1.5
Mercury	7439-97-6	0.2	0.1
Nickel	7440-02-0	40	4.0
Potassium	7440-09-7	5000	500
Selenium	7782-49-2	5.0	0.5
Silver	7440-22-4	10	1.0
Sodium	7440-23-5	5000	500
Thallium	7440-28-0	10	1.0
Vanadium	7440-62-2	50	5.0
Zinc	7440-66-6	20	2.0
General Chemistry			
TOC	7440-44-0	-	1.0

Note:

TOC Total Organic Carbon.
TAL Target Analyte List.

TABLE 4.4

WASTE CHARACTERIZATION COMPOUND LIST AND REGULATORY LIMITS
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

Parameters	*Regulatory Limits*
TCLP Volatiles (mg/L)	
Vinyl chloride	0.2
1,1-Dichloroethene	0.7
Chloroform	6.0
1,2-Dichloroethane	0.5
2-Butanone	200
Carbon Tetrachloride	0.5
Trichloroethene	0.5
Benzene	0.5
Tetrachloroethene	0.7
Chlorobenzene	100
TCLP Semi-Volatiles (mg/L)	
Pyridine	5.0
1,4-Dichlorobenzene	7.5
2-Methylphenol	200
3- and/or 4-Methylphenol	200
Hexachloroethane	3.0
Nitrobenzene	2.0
Hexachlorobutadiene	0.5
2,4,6-Trichlorophenol	2.0
2,4,5-Trichlorophenol	400
2,4-Dinitrotoluene	0.13
Hexachlorobenzene	0.13
Pentachlorophenol	100
TCLP Metals (mg/L)	
Silver	5.0
Arsenic	5.0
Barium	100
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
RCRA Characteristics	
Ignitability (° F)	<140
Cyanide, Reactive (as Total) (mg/Kg)	250
Corrosivity by pH (S. U.)	2.0-12.5
Sulfide, Reactive (as Total) (mg/Kg)	500
Total Polychlorinated Biphenyls (µg/Kg)	
Aroclor-1016	33
Aroclor-1221	67
Aroclor-1232	33
Aroclor-1242	33
Aroclor-1248	33
Aroclor-1254	33
Aroclor-1260	33
Aroclor-1262	33
Aroclor-1268	33

Note:

TCLP Toxicity Characteristic Leaching Procedures.
RCRA Resource Conservation and Recovery Act.

TABLE 5.1

SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME PERIODS
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

Matrix	*Analyses*	*Sample Containers* [1]	*Preservation*	*Maximum Holding Time*	*Notes*
Water					
	TCL VOCs	Three 40 mL Teflon lined septum vials	Cool <6°C, HCl to pH<2	14 Days to analyses	Fill completely, no air bubbles
	TCL SVOCs	Two 1 liter amber glass bottles per analysis	Cool <6°C	7 Days to extraction 40 days from extraction to analysis	Fill to neck of bottles
	PCBs	Two 1 liter amber glass bottles per analysis	Cool <6°C	7 Days to extraction 40 days from extraction to analysis	Fill to neck of bottles
	TAL Metals (Except Mercury)	One 1 liter plastic bottle	HNO_3 to pH<2, Cool <6°C	6 Months from collection to analysis	Fill to neck of bottles
	Mercury	One 1 liter plastic bottle	HNO_3 to pH<2, Cool <6°C	28 Days to analysis	Fill to neck of bottles
				-	
Soil/Sediment					
	TCL VOCs	Three terracores (or equivalent)[2] One 2oz jar[3]	Cool <6°C	48 Hours for preservation 14 Days to analyses	Fill per directions
	TCL SVOCs	One 4 oz. glass jar	Cool <6°C	14 Days to extraction 40 days from extraction to analysis	Fill to neck of bottles
	PCBs	One 4 oz. glass jar	Cool <6°C	14 Days to extraction 40 days from extraction to analysis	Fill to neck of bottles
	TAL Metals (Except Mercury)	One 4 oz. glass jar	Cool <6°C	6 Months from collection to analysis	Fill to neck of bottles
	Mercury	One 4 oz. glass jar	Cool <6°C	28 Days to analysis	Fill to neck of bottles
	TOC	One 4 oz. glass jar	Cool <6°C	28 Days to analysis	Fill to neck of bottles
Soil Waste Characterization					
	TCLP VOCS	Three 40 mL Teflon lined septum vials	Cool <6°C	7 days from collection to leaching 7 days from leaching to analysis	Fill completely, no air bubbles
	TCLP SVOCS	1 L Amber	Cool <6°C	5 days from receipt to leaching 7 days from leaching to extraction 40 days from extraction to analysis	Fill to neck of bottles
	TCLP Metals (except Mercury)	1-500 ml HDPE	Cool <6°C	180 days from receipt to leaching 180 days from leaching to analysis	Fill to neck of bottles
	TCLP Mercury	1-500 ml HDPE	Cool <6°C	5 days from receipt to leaching 28 days from leaching to analysis	Fill to neck of bottles
	RCRA Characteristics	2-500ml HDPE	Cool <6°C	Analyze immediately	Fill to neck of bottles

Notes:

(1) Multiple parameters on a single sample with identical preservation requirements may be combined into one single sample container.
(2) Sediment samples may be too wet for Terracores and should be collected as a bulk sample.
(3) For dry weight determination and sediment collection, if necessary.
PCBs Polychlorinated Biphenyls.
TAL Target analyte list.
TCL Target compound list.
SVOC Semi-Volatile Organic Compound.
VOC Volatile Organic Compound.
TCLP Toxicity Characteristic Leaching Procedure.
RCRA Resource Conservation and Recovery Act.

TABLE 9.1

LABORATORY REPORTING DELIVERABLES - FULL
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

A detailed report narrative should accompany each submission, summarizing the contents and results.

A. Chain of Custody Documentation and Detailed Narrative (1)

B. Sample Information
   i) date collected
   ii) date extracted or digested
   iii) date analyzed
   iv) analytical method and reference

C. Data (including all raw data and CLP-like summary forms)
   i) samples
   ii) laboratory duplicates (2)
   iii) method blanks
   iv) spikes; spike duplicates (2) (3)
   v) surrogate recoveries (2)
   vi) internal standard recoveries
   vii) calibration
   viii) any other applicable QC data (e.g., serial dilutions)
   ix) TICs (if applicable)

D. Miscellaneous
   i) method detection limits and/or instrument detection limits
   ii) percent solids (where applicable)
   iii) metals run logs
   iv) standard preparation logs
   v) sample preparation logs

All sample data and its corresponding QA/QC data shall be maintained accessible to CRA either in hard copy or on magnetic tape or disc (computer data files). All solid sample results must be reported on a dry-weight basis.

Notes:

(1) Any quality control (QC) outliers must be addressed and corrective action taken must be specified.
(2) Laboratory must specify applicable control limits for all quality control sample results.
(3) A blank spike must be prepared and analyzed with each sample batch.
TICs Tentatively Identified Compounds.

TABLE 9.2

LABORATORY REPORTING DELIVERABLES - STANDARD
REMEDIAL DESIGN/REMEDIAL ACTION
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, NEW YORK

A detailed report narrative should accompany each submission, summarizing the contents and results.

A. Chain of Custody Documentation and Detailed Narrative [1]

B. Sample Information
1. date collected
2. date extracted or digested
3. date analyzed
4. analytical method and reference

C. Final Results
1. samples
2. laboratory duplicates [2]
3. method blanks
4. spikes, spike duplicates [2] [3]
5. surrogate recoveries [2]
6. internal standard recoveries
7. tentatively identified compounds (TICs) (if applicable)

D. Miscellaneous
1. method detection limits and/or instrument detection limits
2. percent solids (where applicable)
3. metals run logs
4. sample preparation logs

All sample data and its corresponding quality assurance/quality control (QA/QC) data shall be maintained accessible to CRA either in hard copy or on magnetic tape or disc (computer data files). All solid sample results must be reported on a dry-weight basis.

Notes:

[1] Any QC outliers must be addressed and corrective action taken must be specified.

[2] Laboratory must specify applicable control limits for all QC sample results.

[3] A blank spike must be prepared and analyzed with each sample batch.

ATTACHMENT A

QA/QC OFFICER QUALIFICATIONS

EDUCATION

B.S. Chemistry, Canisius College, 1983

Other Training

USEPA Region II Training Course for CLP Organic Data Validation,
Westchester Community College, Dr. John Samuelian, March 1997
40-Hour HAZWOPER OSHA Training (per 29 CFR 1910.120), 2000
8-Hour HAZWOPER Refresher OSHA Training (per 29 CFR 1910.120), Annually

EMPLOYMENT HISTORY

2000-Present	Conestoga-Rovers & Associates, Niagara Falls, NY
1996-00	Project Chemist, CRA Services
1983-96	Senior Organic Chemist, Advanced Environmental Services, Inc., Niagara Falls, NY

PROFESSIONAL REGISTRATIONS/AFFILIATIONS

Member, American Chemical Society

PROFILE OF PROFESSIONAL ACTIVITIES

- Stack Testing:
  - set up field gas chromatograph for on-site analyses
  - help develop methods for detection of various compounds in the field
- Innovative Technologies
  - Set up Gas Chromatographs (GCs) for the CRA Treatability Laboratory
  - Developed and conducted GC analyses for treated and untreated samples to monitor the removal of organic compounds
  - Performed training and oversight of organic extractions involving various matrices
- Project Chemist:
  - Oversight and review of analytical testing in support of NPDES projects
  - Assessment and validation of ASP, CLP, and SW-846 analytical data
  - Liaison with analytical laboratories in support of various investigative and remedial projects
  - Preparation of analytical laboratory bidding documents
  - Preparation of analytical Quality Assurance Project Plans (QAPPs)
  - Preparation of site sampling and analysis plans
  - Performance of laboratory audits and assessments

  - Prepared a Laboratory Quality Control Manual for an application for National Environmental Laboratory Accreditation Program (NELAP) approval
  - Training of plant personnel to perform required analytical methods for NELAP approval
- Senior Organic Chemist:
  - Provided administrative support for all department chemists and technicians
  - Provided a quality control check of all analytical data prior to submission
  - Prepared and maintained all analytical Standard Operating Procedures
  - Provided technical support for clients and agency personnel
  - Evaluated and developed new methods as needed
  - Technically proficient in all areas of organic testing, including sample extraction techniques and operation of gas chromatographs (GC) and gas chromatograph/mass spectrometers (GC/MS)
  - Proficient at performing routine maintenance and repairs on GC and GC/MS systems
- Database:
  - Basic training in database using Microsoft Access
  - Able to generate flat files
  - Import data and maintain the Shell database
- ISO Internal Auditor:
  - Internal ISO 9001 Auditor performing quality system checks on filing, document control, and other internal quality system guidelines

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