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Sanders Creek Sediment Sampling Work Plan
(from Court Street to confluence with Ley Creek)

Revision No.: 0

United Technologies/Carrier - Thompson Road Facility
Syracuse, New York

EnSafe Project No. 0888806464

Prepared for:

United Technologies Corporation
UTC Shared Remediation Services
United Technologies Building
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April 2009

Prepared by:

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April 24, 2009
Date

Reviewed by:

David Wyatt, PG

April 24, 2009
Date

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1.0 INTRODUCTION

Carrier Corporation (Carrier), a wholly-owned subsidiary of United Technologies Corporation (UTC) has prepared this work plan in response to comments dated February 24, 2009, made by the New York State Department of Environment and Conservation (NYSDEC) on the Focused Corrective Measures Study (FCMS) dated September 2008. The FCMS was prepared in response to the requests outlined in the NYSDEC letter dated May 23, 2008. Specifically, the FCMS identified, screened, developed, evaluated, and compared remedial action alternatives to reduce exposure to polychlorinated biphenyls (PCBs) by various ecosystems in Sanders Creek and therefore reduce the concentration of PCBs in the tissue of wildlife, over time. Sediment removal (dredging) has been selected as the preferred corrective measure.

Comment #9 of NYSDEC's February 24, 2009, letter brought forth their concern as to the total extent of the PCB impact downstream:

> "The recommended corrective measures will be a reasonable first step to remediating the known PCB contamination in the stream. However, some question remains as to the total extent of the PCB issues downstream. The potential erosion of contaminated sediments to areas downstream of the study site has not been investigated, although the fish tissue study indicated continued impact at the most downstream location. After the implementation of the corrective measures stated here, some additional investigation will be required to confirm that these proposed corrective measures have appropriately removed the PCB impact to the stream adjacent and downstream of the site."

Rather than conducting additional investigations in Sanders Creek after the corrective measure has been implemented, and possibly determining that a second mobilization is necessary to address contaminants farther downstream, Carrier will determine the extent of PCBs in Sanders Creek prior to implementing any corrective actions. Additional sediment samples will be taken between Court Street and the creeks confluence with Ley Creek (see Figure 1). Information gathered will be used to determine the extent of corrective action that was presented in the FCMS. This work plan will outline the proposed investigation strategy, sampling, and analysis to be undertaken, and quality assurance procedures for the sediment sampling.

The background of work previously conducted can be found in the previously submitted *Corrective Action Implementation Plan, Sanders Creek Sediment and Fish Sampling Work Plan,* September 2006.

2.0 INVESTIGATION STRATEGY

2.1 Sediment Sampling

Carrier proposes to sample sediment in select locations of Sanders Creek within a section west of Court Street downstream to the creeks confluence with Ley Creek (Figure 2). Areas of collection for sediment samples will focus on the depositional environment of the stream. Composite samples will be collected in stream locations of ponded or slow moving water. In order to gain a representative sample set over the entire interval of stream, grab samples also will be collected on stream bars in areas of sediment deposition where the stream channel is more lenticular and water is moving faster, and in other areas of the stream based on in-field observations of the sampling personnel. Composite sediment samples from two to three locations within a 5-foot diameter will be collected from the 0- to 6-inch depth interval and analyzed for PCBs (all Aroclors) and Total Organic Carbon (TOC).

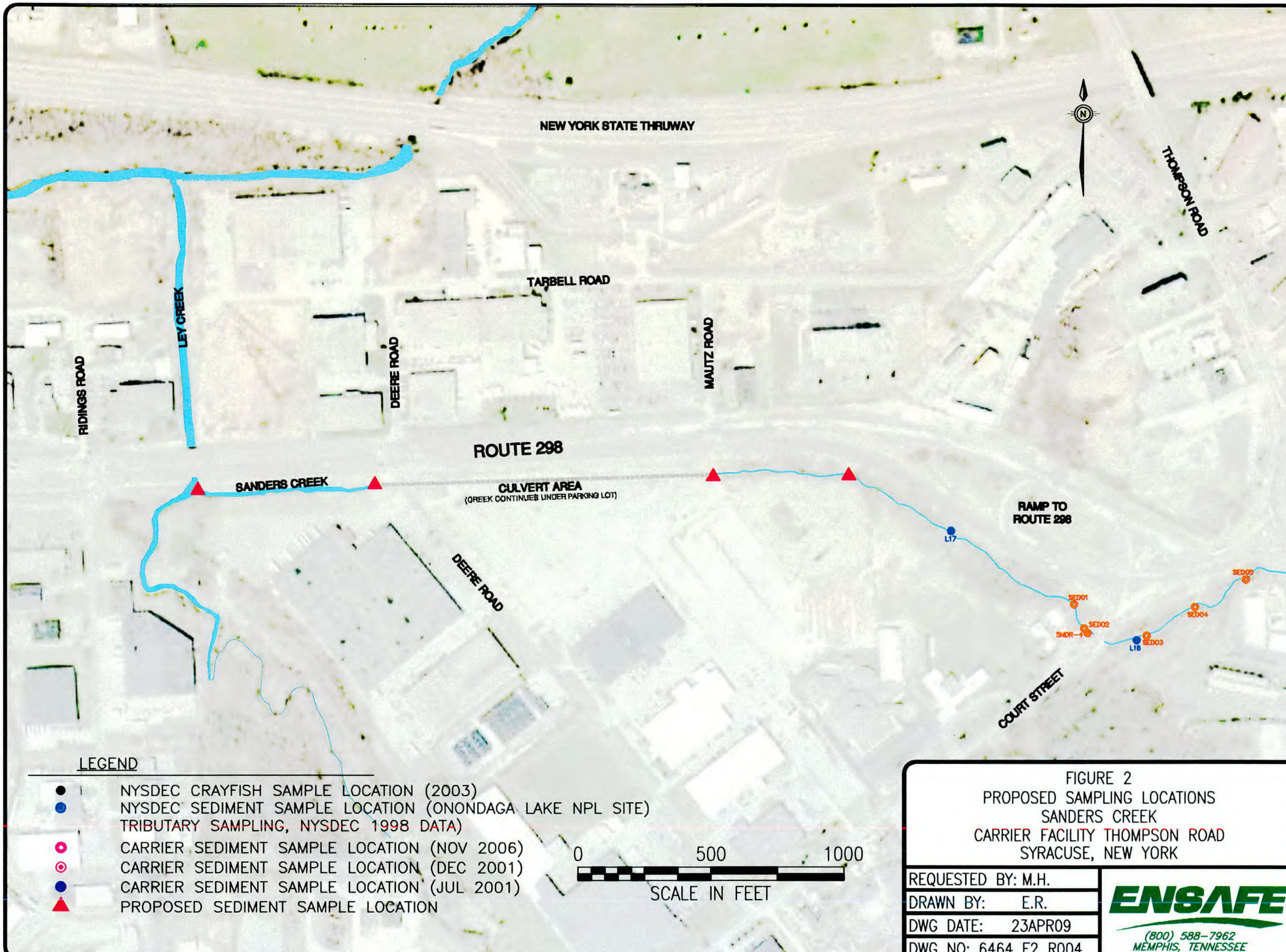
The distance from Court Street to the end of the proposed sampling area is approximately 3,600 feet. The number of data collection locations proposed will be appropriate to gather additional information concerning the presence or absence of PCBs and TOC concentrations in the creek sediment beyond those areas previously sampled by the NYSDEC and Carrier. As indicated in the photographs included in Attachment A, sediments do not collect in many areas of Sanders Creek from Court Street to its confluence with Ley Creek. Additionally, Sanders Creek enters a culvert as it crosses under Mautz Road and continues in the culvert for approximately 1,200 feet before it exits the culvert at Deere Road. Sediments in this 1,200-foot span will not be sampled due to health and safety concerns. Sediment sample distribution will be as follows:

- Between Court Street and Mautz Road, west of the previous sample locations SED 01 and SED 02 (estimated 1 sample).

- In the ponded areas on either side of approximately 1,200-foot culvert that runs underground from Mautz Road to Deere Road (estimated 2 composite samples).

- Just east of the confluence of Sanders Creek and Ley Creek (estimated 1 sample).

Much of the drainage ditch from on either side of the Mautz Road/Deere Road culvert does not appear to have accumulated sediments. However, during the sampling event, if pooling water or sediment accumulations are noted, additional samples may be obtained from this drainage ditch.



LEGEND

- NYSDEC CRAYFISH SAMPLE LOCATION (2003)
- NYSDEC SEDIMENT SAMPLE LOCATION (ONONDAGA LAKE NPL SITE) TRIBUTARY SAMPLING, NYSDEC 1998 DATA)
- CARRIER SEDIMENT SAMPLE LOCATION (NOV 2006)
- CARRIER SEDIMENT SAMPLE LOCATION (DEC 2001)
- CARRIER SEDIMENT SAMPLE LOCATION (JUL 2001)
- PROPOSED SEDIMENT SAMPLE LOCATION

0 500 1000

SCALE IN FEET

FIGURE 2
PROPOSED SAMPLING LOCATIONS
SANDERS CREEK
CARRIER FACILITY THOMPSON ROAD
SYRACUSE, NEW YORK

REQUESTED BY:	M.H.
DRAWN BY:	E.R.
DWG DATE:	23APR09
DWG NO:	6464 F2 R004

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I:\2009 Projects-BST\6464 Carrier - Syracuse, NY\6464 F2 R004.dwg 4/23/2009 13:05:37 PM CST

2.1.1 Sediment Sample Collection Methods

Sediment samples will be collected from each location using stainless-steel spoons, trowels, or hand augers. For each sampling location a sample from the 0- to 6-inch interval will be collected. In the event that a sample cannot be obtained from the 0- to 6-inch interval at the designated sampling location, an alternate, adjacent sampling location (within 10 feet of the original location) will be chosen and sampled. When this situation occurs, the 0- to 6-inch sample from the original location will be returned to the creek from where it was gathered and the sampling container properly discarded.

All samples will be homogenized by mixing the sampling interval in a stainless-steel bowl prior to placing the representative sample in the laboratory-supplied sample jar. A two-person field crew is required for health and safety reasons as well as for documentation purposes. One person will collect the samples and the other will properly document sample location and sample character (color, grain size, etc.) and will provide sample containers and chain of custody for the sampling event. No field screening will be performed for this event. Sample locations will be marked for subsequent surveying by a New York State Registered Land Surveyor.

Additional information on the sediment sampling procedures is included in Attachment B. A project Quality Assurance Project Plan for this sediment sampling event is included in Attachment C.

2.1.2 Sample Analysis

Samples collected will be analyzed for all Aroclor PCBs and for TOC. Specifically, samples will be analyzed using U.S. Environmental Protection Agency (USEPA) Method 8082 for PCBs and Method 9060M for TOC. Samples will be analyzed by Accutest Laboratories Northeast in Dayton, New Jersey, which holds as New York State analytical laboratory certification.

2.1.3 Surveying of Locations

After sampling of each location is complete, all locations will be surveyed from a U.S. Coast and Geodetic Bench Mark, U.S. Geological Survey Bench Marks, a site benchmark, or other equivalent. The National Geodetic Vertical Datum or site benchmark elevations for ground surface will be surveyed to an accuracy of ±0.1 foot vertically and ±1.0 foot horizontally by a New York State Registered Land Surveyor.

The horizontal position of each sampling point will be located using the New York State Plan Coordinate System or a site grid coordinate system that can easily be translated into the State Plan Coordinate System. Following completion of the survey, each boring will be incorporated into computer-generated site maps based on the surveyed coordinates.

2.1.4 Documentation

All notes, descriptions, and observations will be recorded in a project field logbook.

2.1.5 Equipment Decontamination

Before each sample is collected, all small sampling and downhole (intrusive) equipment will be decontaminated manually in accordance with the following procedures:

- Wash equipment with tap water and laboratory (phosphate-free) detergent using a brush, if necessary, to remove particulate and surface film
- Rinse with tap water
- Rinse with distilled water
- Air dry
- If necessary, wrap in aluminum foil to prevent recontamination prior to use

3.0 HEALTH AND SAFETY PLAN

All PCB sediment sampling field activities will be conducted in compliance with the site-specific health and safety plan, to be prepared prior to conducting activities outlined in this work plan. The health and safety plan will be prepared by EnSafe specifically for the activities described herein for the facility.

4.0 IMPLEMENTATION SCHEDULE

The schedule for the activities outlined in this work plan is as follows:

Submittal to NYSDEC	April 25, 2009
NYDEC Review/Approval	30 days after Submittal (May 25, 2009)
Preparation/Mobilization for Field Activities	21 days after Approval (June 15, 2009)
Field Activities	24 days after Approval (June 18, 2009)
Lab Analysis	20 to 45 days after completion of field activities (August 3, 2009)
Report generated for submittal to NYSDEC	60 days after receipt of hardcopy analytical data from laboratory (October 3, 2009)
Corrective Measure Work Plan	Once the additional stream sampling has been completed and data evaluated
Cleanup actions in Sanders Creek	Upon approval of the CM Work Plan

Note: Dates are conditional based upon approval date of Work Plan, site conditions, and other factors.

The report generated will detail the sampling activities and procedures, results, and further actions, if warranted.

Attachment A

Sanders Creek Photographs — Downstream of Court Street

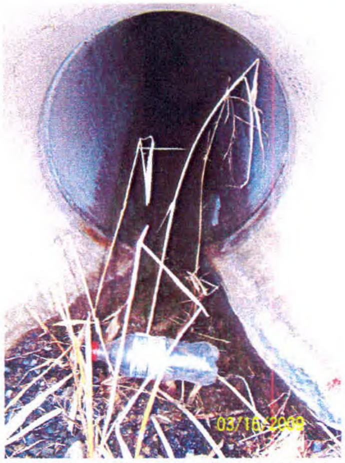
Photo Log of Sanders Creek
Court Street to Confluence with Ley Creek
March 2009

Deer Road Culvert

81 Culvert at Deer Road looking west

82 Culvert at Deer Road looking west

83 Culvert at Deer Road looking west


84 Culvert at Deer Road; about 18 inch culvert

85 Drainage ditch leading to Deer Road culvert

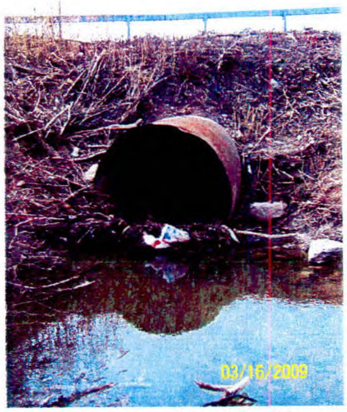
Photo Log of Sanders Creek
Court Street to Confluence with Ley Creek
March 2009

Mautz Road Culvert

86 Culvert at Mautz Road looking east

87 Drainage from culvert crossing Thompson Road from North; ~ 18 inch diameter

88 Culvert at Mautz Road looking west — no concrete collar around culvert



89 Culvert at Mautz Road looking west — diameter ~ 4 feet

90 Culvert at Mautz Road looking west

91 Culvert at Mautz Road looking west

Photo Log of Sanders Creek
Court Street to Confluence with Ley Creek
March 2009

92 North drainage to culvert area

93 Culvert at Mautz Road looking east

95 Culvert at Mautz Road looking east

Attachment B

Sediment Sampling Procedures

Sediment will be sampled for PCB analysis using stainless-steel spoons. Samples will be collected from the stream banks, areas of sediment accumulated within the stream, and low-energy areas at the water-stream bank interface. Specific procedures for sediment sampling are as follows:

Before Surface Soil Sampling:

- Don personal protective clothing and/or equipment as required by the HASP
- Designate the location(s) to be sampled.
- Clear vegetation and other debris from the surface around the boring location.
- Place clean plastic sheeting on the surface near the sample collection location to hold decontaminated sampling equipment.
- Set up a decontamination area for sampling equipment, if required.

During Surface Soil Sampling (0- to 6-inches depth):

- Remove surface debris from the sample location.
- With a stainless-steel device, scrape the sample collection location to obtain a previously unexposed surface.
- For non-volatile organic compound (VOC) samples, use a decontaminated stainless-steel or Teflon-lined sampling device (e.g., spoon, spatula) to collect the volume needed to fill the sample container(s).
- For non-VOC grab samples, completely fill the sample containers directly from the sampling device, avoiding twigs, large rocks, and grass. Secure container with Teflon-lined cap.
- For non-VOC composite samples, empty contents of the sampling device into a decontaminated stainless-steel or Teflon-lined bowl. Collect enough to fill all the containers. Mix sample using a decontaminated stainless-steel or Teflon-lined spoon or spatula. Place the homogenized mixture into the appropriate sample containers. Secure container with Teflon-lined cap.
- Label each sample container and preserve to 4 °C.

If a Hand Auger is Used for collecting Sediment Samples:

- Begin augering to the depth required for sampling.

- Record pertinent details about features of the soil or sediments in the field notebook or on a field boring log.

- While advancing the auger to the desired depth, it might be necessary to insert a PVC surface casing to minimize disturbance of the borehole walls.

- Stop augering at the top of the specified or selected sampling depth.

- Collect sample.

  - Place the remaining sample volume into a stainless-steel bowl. If a composite soil sample is required, mix the sample in until thoroughly homogenized and place into the appropriate containers. Label the samples and preserve to 4 °C.

  - Record the sample identification number, sample collection depth, and analyses required in the field logbook and/or on the appropriate field forms.

After Soil Sampling:

- Backfill the borehole with any excess soil.

- Record pertinent information in the field logbook.

- Clean site and place disposable materials in the designated dumpster for disposal.

- Complete the field logbook entry. Entries in the field notebook will be legibly written in indelible ink.

Attachment C
Quality Assurance Project Plan

Quality Assurance Project Plan
Sanders Creek Sediment Sampling
(between Court Street and confluence with Ley Creek)
Carrier Thompson Road Facility
Thompson Road, Syracuse, New York

EnSafe Project Number
0888804084

Prepared for:

UTC Shared Remediation Services
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Submitted by:

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April 2009

A-1 TITLE AND APPROVAL SHEET

Quality Assurance Project Plan
Sanders Creek Sediment Sampling
(between Court Street and confluence with Ley Creek)
Carrier Thompson Road Facility
Thompson Road, Syracuse, New York

Submitted To:

UTC Shared Remediation Services
United Technologies Building
Hartford, Connecticut 06010

Submitted by:

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April 2009

Project Signatures:

May M. Heflin
May Heflin, PE
EnSafe Inc.

April 25, 2009
Date

A-2 TABLE OF CONTENTS

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A-3 DISTRIBUTION LIST

The following individuals will receive copies of the approved Quality Assurance Project Plan (QAPP) and subsequent revisions:

William E. Penn — Program Manager, United Technologies Corporation, Hartford, Connecticut

Nelson Wong — Carrier Thompson Road Facility EH&S Manager, Syracuse New York

Craig Wise, PE — Program Manager, EnSafe Inc.

May M. Heflin, PE — Project Manager, EnSafe Inc.

Tina Cantwell, CHMM — QA Manager, EnSafe Inc.

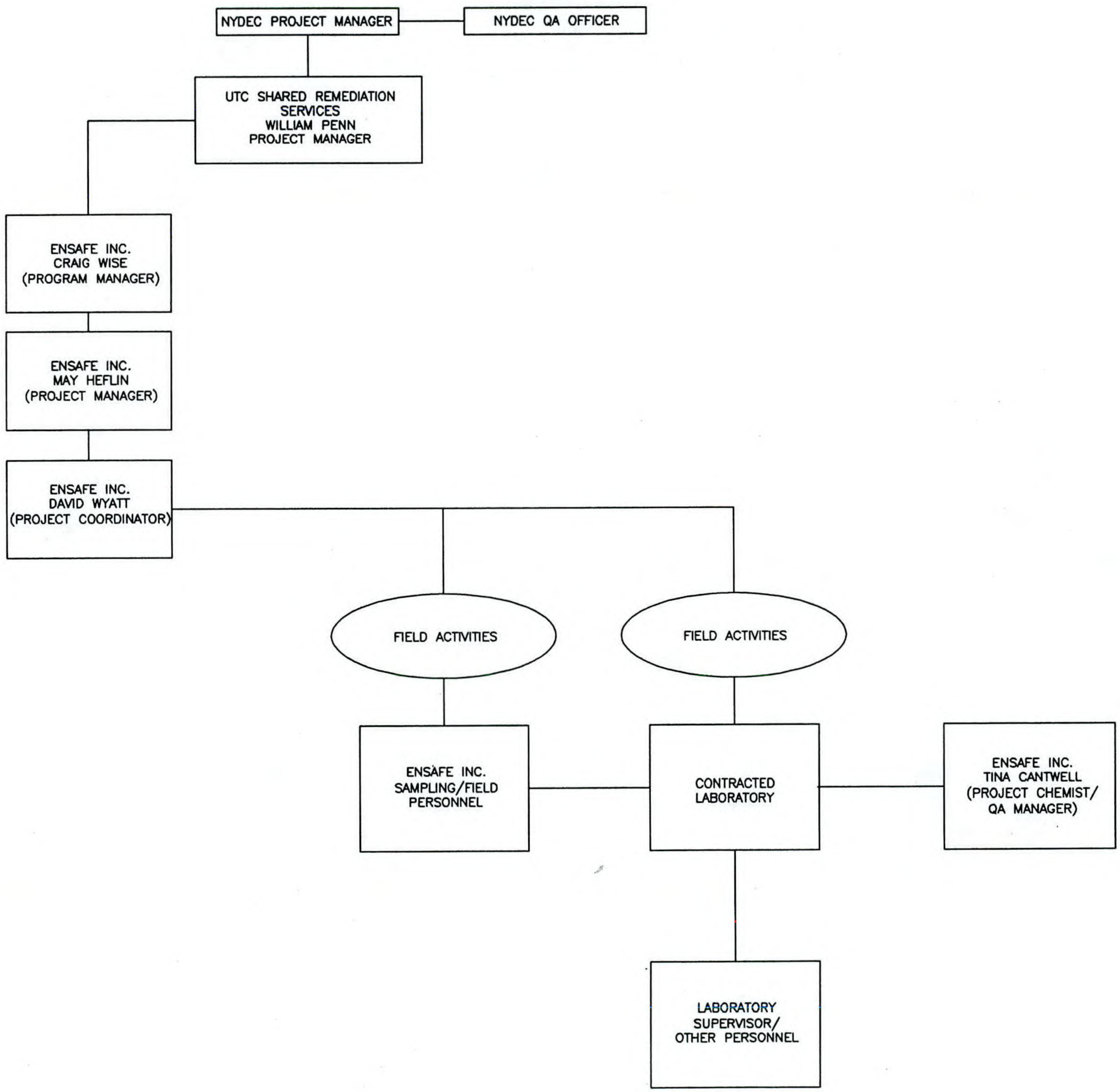
New York State Department of Environmental Conservation (NYSDEC) Project Manager

A-4 PROJECT/TASK ORGANIZATION

This QAPP documents the planning, implementation, and assessment procedures for sampling sediment in Sanders Creek in the vicinity of the Carrier Corporation Thompson Road facility, Syracuse, New York. Site information and requirements for sediment sampling are outlined in the NYSDEC Consent Order CO 7-20051118-4 (the order) of February 13, 2006.

This QAPP addresses one-time sediment sample collection activities to be conducted in the vicinity of the site, as required by NYSDEC, which will be conducted by EnSafe Inc. personnel. The laboratory analyses will be conducted by a laboratory certified by the New York State Department of Health. Figure 1 is a project organizational chart that outlines the specific organization of this project.

FIGURE 1–PROJECT ORGANIZATION



As Carrier's subcontractor for this project, EnSafe Inc. will be responsible for implementing the project. The EnSafe Project Manager, May Heflin, is responsible for project implementation and has the authority to commit the resources necessary to meet project objectives and requirements. The Project Manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully and will also be responsible for maintaining the official, approved QAPP. The Project Manager will work closely with the EnSafe Project Coordinator, David Wyatt, to see that project tasks are appropriately completed. The Project Manager will primarily be responsible for all EnSafe Inc project activities. The EnSafe Program Manager, Craig Wise, will also report directly to Carrier and will provide the major point of contact and control for matters concerning the project. The EnSafe Quality Assurance (QA) Manager, Tina Cantwell, will be responsible for ensuring that all EnSafe procedures for this project are being followed. The QA Manager, who is independent of data generation activities, will be responsible for the adherence to all quality assurance/quality control (QA/QC) as defined in the QAPP and will recommend and implement corrective measures and perform audits for proper performance and compliance with the QAPP, as necessary. The EnSafe field technical staff for this project will be drawn from EnSafe's pool of corporate resources. The technical team will be utilized to gather and analyze data and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

The laboratory subcontractor will be responsible for furnishing all equipment, supplies, and personnel needed to accomplish the analytical requirements specified in this QAPP. The contracted laboratory will be approved and Certified by the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP).

A-5 PROBLEM DEFINITION/BACKGROUND

A 1997 RCRA Facility Assessment Report (RFA) summarized a visual site inspection in which 17 Solid Waste Management Units (SWMUs) and two Areas of Concern (AOCs) were identified at the Thompson Road facility. AOC E, identified by the NYSDEC during the RFI process, included the polychlorinated biphenyls (PCBs) found to occur in Sanders Creek.

This QAPP documents how specific QA/QC activities will be applied during the sampling activities to be conducted at AOC E – PCBs in Sanders Creek. The purpose of this sampling is to determine whether there are PCBs in sediment in Sanders Creek downstream from the facility (between Court Street and the creeks confluence with Ley Creek) contain PCBs. To this end, this

QAPP defines the minimum field and laboratory QA, and the methodological and reporting requirements to be used for this project, as specified in the Carrier order as well as the NYSDEC Program Policy DSHM-HW-05-15, *Quality Assurance Project Plans.* This QAPP has been prepared in accordance with the specifications of *EPA Requirements for Quality Assurance Project Plans,* (United States Environmental Protection Agency [USEPA], March 2001).

A-6 PROJECT/TASK DESCRIPTION

This purpose of this project is to identify the extent of the PCB-impacted sediment in Sanders Creek downstream from the facility. Sediment from up to five locations within Sanders Creek downstream from the facility will be sampled. All sediment samples collected will be analyzed for PCBs and the data collected will be used to comply with the specifications of the order.

Sanders Creek Sediment Sampling Locations

Figure 2 of the Sediment Sampling Work Plan (April 2009) shows the proposed sediment sampling locations.

A-7 QUALITY OBJECTIVES AND CRITERIA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that are scientifically valid at levels that are sufficient to meet data quality objectives (DQOs). Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, preventive maintenance of field equipment, and corrective action are described in sections of this QAPP.

In combination, QA/QC represents a set of procedures designed to produce analytical data of known and measurable quality. A useful distinction between QA and QC can be made as follows: QC represents the set of measurement procedures (spikes, blanks, replicates, calibration, etc.) used to provide overall evidence of the quality of a particular analytical batch; QA represents the set of procedures used to ensure that this evidence is available and used properly to evaluate and, if necessary, to qualify the data quality.

A-7.1 Data Quality Objectives

The QA objectives during the site-wide monitoring will be to ensure that the data meet the DQOs which were developed for the Carrier facility to ensure data of known and acceptable quality are produced to comply with the order. The following sections describe the DQO process for the site-wide monitoring.

A-7.1.1 State the Problem

PCB-impacted sediment has been identified in Sanders Creek as it flows along the northern boundary of the Carrier facility, down to and just beyond Court Street. A corrective action (dredging) has been conditionally approved by the NYSDEC, pending some changes and/or clarifications to the Corrective Measures Study submitted in September 2008. Prior to implementing the corrective measure, Carrier will extend the sediment sampling study area in Sanders Creek to its confluence with Ley Creek, so that future nature and extent investigations are not required after a corrective action has been implemented. This DQO process discusses the objectives that must be met to identify the extent of contamination in Sanders Creek and to comply with the NYSDEC order.

A-7.1.2 Identify the Decision

Analytical data obtained from sediment samples from Sanders Creek will be provided to the NYSDEC to determine:

- Whether any of the investigated areas will require corrective action.

A brief summary of the investigative areas, the objectives for each area and the investigative approach are provided in Table 1.

A-7.1.3 Identify Inputs to the Decision

Inputs include analytical results and regulatory guidance. Table 1 provides the reporting limits and analytical site screening objectives for sediment analysis. To assess whether PCBs are migrating to Sanders Creek, the remedial goal for the source area is that significant levels of PCBs are no longer migrating through the storm sewers, per the NYSDEC order.

Table 1
Data Quality Objective Summary

SWMU or Investigation Area	State the Problem	Identify the Decision	Define the Study Boundaries
Sediment in Sanders Creek (AOC E)	In 2000 and 2001, sampling results for sediment and crayfish samples taken upgradient and along the facility boundary indicated PCBs, attributable to the Carrier facility are present at levels of concern and that PCBs are bioavailable. Results from sediment samples previously collected in Sanders Creek upgradient from and along the facility's northern boundary are assumed to be viable. Sediment samples from the 0 to 6 inch interval will be collected downstream from the Thompson Road culvert/bridge. A corrective measure (dredging) has been conditionally approved for the studied area, pending some changes/clarifications to the CMS submitted in September 2008. NYSDEC suggested, in their comments to the CMS, that further downstream investigations may be necessary in the future to ascertain if sediments there are also contaminated with PCBs.	To assess whether PCBs are present in Sander's Creek downstream from the facility. The remedial goal for the source area is that significant levels of PCBs are no longer migrating through the storm sewers, and subsequently into Sanders Creek.	Sediment samples will be collected from accessible areas of Sanders Creek downstream from the site (west of the Court Street Bridge to the creeks confluence with Ley Creek). Depositional areas within the creek, along the water's edge, and in the immediate area of the creek channel will be chosen for sampling. Carrier will conduct the downstream sediment sampling in Sanders Creek so that the corrective measure implemented will target those areas believed to be affected by PCBs emanating from the Carrier facility.

A-7.1.4 Define the Study Boundaries

Sediment sample locations in each investigative area were based on the data gaps from previous investigations. Proposed sediment sample locations are shown on Figure 2 of the work plan.

A-7.1.5 Develop a Decision Rule

If monitoring indicates that the remedial requirements are not met, then the area will be evaluated for corrective measures.

A-7.1.6 Specify Limits on Decision Errors

- The null hypothesis is that each of the areas investigated (or to be investigated) is not contaminated. Sampling and analyses was/will be performed based on historical uses in the area. This sampling and analysis was/is performed to determine if contamination was/is present, and if found, the nature and extent of contamination was/will be determined.

- A sampling design error occurs when the data collection design does not capture the complete variability within the area of investigation to the extent appropriate for a decision to be made. This could potentially lead to the extent of contamination not being defined properly and/or corrective measures not adequately treating the true problem area.

- A false rejection decision error may occur if a limited amount of sampling and analysis is performed, causing a broader area of contamination to be outlined. This may result in additional expense related to corrective measures implementation.

While the possibilities of make decision errors cannot be totally eliminated, the occurrence of such errors can be minimized by developing better work plans.

A-7.1.7 Optimize the Design for Obtaining Data

The sampling plan for each area of investigation is based on reasonable sample numbers for the size used area. The analytical methods or analysis of the soil and groundwater samples are USEPA approved, definitive analytical methods, which satisfy the decision criteria (Step 5.5). The design has been and will be used to focus all sampling and analysis activities on the decision (Step 5.2) in an efficient and cost-effective manner.

A-7.2 Measurement Performance Criteria

Performance criteria selected for the analytical measurement systems will ensure the project objectives in Section A-7.1 are met. The following paragraphs provide performance criteria for the project specific analytical measurement systems.

A-7.2.1 Precision

Precision measures the reproducibility of measurements and methods, and is defined for qualitative data as a group of values' variability compared with its average value. To assess the precision of the measurement systems used in this project, sediment field duplicates will be obtained and analyzed with the samples collected. Precision of laboratory analysis will be assessed by comparing the analytical results between Matrix Spike/Matrix Spike and Duplicate Samples (MS/MSD). The relative percent difference (RPD) will be calculated for each pair of duplicate analysis using the following equation:

$$RPD = \frac{(S - D)}{(S + D)/2} x\ 100$$

Where:

S = sample result
D = duplicate result

A-7.2.2 Accuracy

Accuracy is the degree to which a given result agrees with the true value. The accuracy of an entire measurement system is an indication of any bias that exists. Spiked sample results provide information needed to assess the accuracy of analyses. Specifically, surrogate spike, MS/MSD, and laboratory control sample (LCS) percent recoveries (%Rs) are used to assess accuracy. Every organic sample is spiked with known quantities of nontarget surrogate compounds. Five percent of all samples analyzed are spiked with target chemicals for the MS/MSD. If the calculated %Rs for the known spike concentrations are within defined control limits set by each method, the reported sample concentrations are considered accurate. Accuracy is calculated using the following equation.

$$\%R = \frac{(SSR - SR)}{SA} x100$$

Where:

SSR	=	spike sample recovery
SR	=	sample recovery
SA	=	concentration of spike added

A-7.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependant upon the proper design of the sampling program and proper laboratory protocol. The sampling approach was designed to provide data representative of site conditions and the number of sampling points was selected based requirements set forth in the order. During development of this approach, consideration was given to past waste disposal practices, existing analytical data, physical setting, and processes previously and currently used at the facility. The sampling approach was discussed in the Work Plan. Representativeness will be satisfied by insuring that, the Sediment Sampling Plan, QAPP, and USEPA protocols are followed, proper sampling technique are used, proper analytical procedure are followed, and holding times of the samples are not exceeded by the laboratory.

A-7.2.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability is also dependent on similar QA objectives. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring proper sampling techniques are used.

The objective of this QA/QC plan is to produce a high level of comparability between data sets. Heterogeneous investigative samples make it difficult to obtain consistently high comparability values. However, the use of standard methods for sampling and analysis (USEPA protocols), reporting data in standard units, and using standard and comprehensive reporting formats will optimize the potential for high levels of data comparability.

A-7.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions. It is expected that 100% of the planned sampling points will be collected. All sediment sampling locations within Sanders Creek are expected to be accessible. The completeness goal for field measurements will be greater than 90%. Laboratory analysis for this project will have a completeness goal greater than 95% to account for unanticipated results that may be rejected during data validation. Completeness can be calculated using the following equation.

$$\%Completeness = \frac{No.\ of\ Valid\ Tests}{Total\ Tests\ Taken} x100$$

A-7.2.6 Sensitivity

Sensitivity is the measure of the concentration at which an analytical method can positively identify and report analytical results. The sensitivity of a given method is commonly referred to as the detection limit. Definitions for common detection limits are defined below.

- Method detection limit (MDL) is a statistically determined concentration. It is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.

- Method reporting limit (MRL) is a multiple of the MDL and is regarded as the minimum level of target analyte in a sample that can be reliably achieved within specified limits of precision and accuracy. The MRL is variable and highly matrix-dependent.

The sensitivity goal (or MDL) for laboratory measurements reported for this project shall be lower than the NYSDEC remedial goal/criteria of 0.1 parts per million (ppm).

A-7.2.7 Summary of Matrix Types, Analytical Methods, and QA Targets

Table 2 summarizes the analytes, detection limits, and action levels for the Sediment Sampling Plan. Routine QA targets listed in the contracted laboratory's New York State approved Quality Assurance Plan (QAP) will be used to assess precision and accuracy of analytical data generated for this effort (Table 3). The QAP outlines the laboratory's capabilities, the routinely used QC measures, the routine QA targets for precision and accuracy, and all documentation, calibration and maintenance activities that are necessary to produce data of a known and acceptable quality.

Table 2
Analytes, Detection Limits, and Action Levels

Chemical Abstract Services No	Analyte Name	Method Reporting Limit [a]	Method Detection Limit [a]	NYSDEC Standard [b]	Units
Sediment Samples					
12674-11-2	Aroclor 1016	34	7.6		µg/kg
11104-28-2	Aroclor 1221	34	7.8		µg/kg
11141-16-5	Aroclor 1232	34	7.8		µg/kg
53469-21-9	Aroclor 1242	34	5.2	1,000 [b]	µg/kg
12672-29-6	Aroclor 1248	34	9.1		µg/kg
11097-69-1	Aroclor 1254	34	8.3		µg/kg
11096-82-5	Aroclor 1260	34	5.5		µg/kg

Notes:

[a] Reporting limits and method detection limits for sediment samples samples were developed in 2006 by Accutest Laboratories and are subject to change throughout the life of the project

[b]. New York State Department of Environmental Conservation recommended surface soil cleanup objective, Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels — TAGM #4046, January 24, 1994.

[c]. Remedial goal as outlined in the February 13, 2006 Consent Order CO 7-20051118-4.

Table 3
Laboratory Accuracy and Precision Report

Chemical Abstract Services No	Analyte Name	Method Reporting Limit [a]	Method Detection Limit [a]	MS/MSD Accuracy[b]	MS/MSD Precision[b]	LCS Accuracy
Sediment Samples						
12674-11-2	Aroclor 1016	34	7.6	43-161	19	68-138
11104-28-2	Aroclor 1221	34	7.8	70-130	10	70-130
11141-16-5	Aroclor 1232	34	7.8	70-130	10	70-130
53469-21-9	Aroclor 1242	34	5.2	70-130	10	70-130
12672-29-6	Aroclor 1248	34	9.1	70-130	10	70-130
11097-69-1	Aroclor 1254	34	8.3	70-130	10	70-130
11096-82-5	Aroclor 1260	34	5.5	37-164	24	66-136
877-09-8	Tetrachloro-m-xylene					37-140
2051-24-3	Decachlorobiphenyl					40-151

Notes:

[a] Reporting limits and method detection limits for sediment samples were developed in 2006 by Accutest Laboratories and are subject to change throughout the life of the project.

[b] MS/MSD accuracy and precision and LCS Accuracy for sediment samples developed by Accutest Laboratories in 2006 and are subject to change throughout the life of the project.

[c] Per Method 8082, precision and accuracy is performed for Aroclor 1016 and 1260 to represent all Aroclors.

A-8 SPECIAL TRAINING/CERTIFICATION

Sampling personnel will have current Hazardous Waste Operations and Emergency Response training/certifications as required by Title 29 Code of Federal Regulations 1910.120. Sample collection personnel shall be trained in proper sample collection methods.

A-9 DOCUMENTS AND RECORDS

The records for this project will include miscellaneous correspondence, field logs and field data worksheets, laboratory analytical reports, and draft and final reports. The final report will be submitted to UTC-Carrier, who will then submit the report to the NYSDEC project manager.

A field log will be maintained as the primary documentation of the actual site conditions and field activities. It will be maintained concurrently with the conduct of the field activities by the Project Coordinator or his/her designee. Specific information to be included in the field log includes:

- Date, time, and description of site conditions
- Date, time, and description of work activities
- Names of team members present
- Names, time of arrival, and time of departure of any visitors
- Number, type, date, time, and identification of any samples collected
- Records of field measurements, including calibration data and reference to corresponding sample identification numbers
- Health and Safety data, including site data (e.g. organic vapor, explosimeter, oxygen, etc. measurements), and any deviation from established standard operating procedures
- Any unusual circumstances, occurrences or QAPP deviations

The field log will consist of a bound, waterproof log book containing numbered pages. Entries will be made in the field log using waterproof ink. No pages will be removed from the field logbook for any reason. When corrections or revisions are necessary, these will be made by drawing a single line through the original entry in such a manner that the original entry remains legible. Corrections will then be made along side or above the original entry. All corrections and revisions will be initialed and dated by the individual making them. At the completion of the field activities, the field log will be returned to the Project Manager as a part of the permanent project record.

One laboratory analytical report will be generated for all the samples received by the laboratory. The analytical data report will include an original signed report of the analytical results, a narrative report about the analysis, original complete chain-of-custody forms, and any other documentation received with the samples. A summary of the calibration data, and laboratory QC data will also be included in the analytical report. The raw analytical data (e.g., instrument printouts and manual records) will be available to the NYSDEC upon request. The Project Manager shall retain copies of all analytical reports generated.

The Project Manager shall retain copies of all updates and revisions of this QAPP and disseminate updated versions, as appropriate. The Project Manager shall also retain copies of all sampling procedures and analytical procedures used for collection and analysis of project samples, and/or copies of all laboratory analytical reports and correspondence with the laboratories. In addition, the Project Manager shall retain copies of all management report and copies of all communications to and from outside agencies and other interested parties. All reports generated electronically shall be saved on EnSafe Inc.'s network, which is backed-up on a nightly basis.

B-1 SAMPLING PROCESS DESIGN

Sample collection points and a justification for these points are described in the Sediment Sampling Plan. The Sampling Plan provides more specific information regarding site history, rational, and sample locations. The following sections provide a summary of the sampling design for this project.

Schedule

Sediment sampling are proposed to be conducted in the mid to late summer months (June through August) of 2009.

Proposed Samples

Table 4 outlines the proposed samples and analytical methods for sediment samples collected. Sample locations and quantities were previously provided in Section A-6. Samples collected and submitted to the laboratory for analyses are critical in fulfilling the order.

Table 4
Proposed Critical Samples and Analytical Methods

Parameter	Analytical Method	Location to be Analyzed
Sediment Samples		
PCBs	SW-846 Method 8082	Up to 4 locations: 1 sample east of the Court Street culvert/bridge, 1 sample on either side of the Mautz Road — Deer Road culvert, and 1 sample at the confluence with Ley Creek.

Notes:
Analytical methods from *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), Third Edition, Update III, (USEPA, December 1996).

B-2 SAMPLING METHODS

This section describes the data-collection requirements for groundwater and sediment monitoring activities. Detailed sampling procedures are outlined in the Sampling and Analysis Plan (SAP) and are summarized in this section.

Sediment Sampling Equipment

Table 5 details the field equipment that will be used to collect sediment samples within Sanders Creek.

Table 5
Sediment Field Sampling Equipment

Equipment Description	Use
Stainless steel trowels, spoons spatulas	Collect sediment for sampling
Stainless steel hand auger	Collect sediment for sampling
PVC or stainless steel poles	Collect sediment for sampling
Stainless steel mixing bowls	Composite sediment samples.

Sediment Sampling Procedures

Accumulated sediment will be sampled using stainless steel spoons or spatulas. The sediment in the 0 to 6-inch depth within five representative depositional environments (channels, bars, riffles, banks, etc.) in Sanders Creek will be collected. Each sampling location will be documented and photographed. Samples will be placed into a stainless steel bowl and homogenized prior to filling sample containers. After homogenization, sediment will be placed into one pre-cleaned and certified 4 or 8 ounce glass container with Teflon lid. Filled containers will be properly labeled and immediately placed into coolers and chilled.

B-3 SAMPLE HANDLING AND CUSTODY

Sample Handling and Management

Samples will be collected and preserved in certified, pre-cleaned containers provided by the contracted analytical laboratory. Table 6 shows the sample containers, preservation and holding times required for samples collected during this sampling effort.

Table 6
Sample Containers, Preservation, and Holding Times

Analytical Method	Matrix	Container Type	Sample Volume	Preservation	Holding Time
SW-846 8082	Sediment	glass (Teflon lined septum)	4 or 8 ounce	4°C,	Preparation within 14 days; Analysis 40 days after preparation

Sample Identification

All samples collected in the course of a project will be identified by a unique sample identification code. That identification code will be recorded on the sample label affixed to the sample container, in the field log and on the analytical chain-of-custody form. The sample identification code will be used to track each sample as well as cross-reference sample data with other activities.

A sample identification label will be affixed directly to each sample container to document activities associated with collection of that specific sample. Sample labels will be completed in waterproof ink at the time of sample collection by the individual(s) collecting the samples. Specific information to be recorded on each sample label includes the following information:

- Site name and location
- Date and time of sample collection
- Type of analysis to be performed
- Preservation
- Sample identification number

Packaging Samples

All samples must be packed so as to avoid breakage during transport and prevent cross-contamination. Samples should be packaged in a clean sample cooler in good condition. The samples will be wrapped in bubble wrap or other suitable packaging materials to prevent breakage and the containers inside the cooler will be packed such that the bottles will not touch each other. For sediment samples, cooling material (e.g., bagged ice, blue ice) will be placed around and between the samples to chill the samples to 4 °C (+/- 2 °C). Any remaining space in the cooler will be filled with additional inert packaging material. A temperature blank will be included in each sample cooler. Each cooler will be sealed with tape and custody seals so that the cooler cannot be opened without breaking the seal.

Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.
A sample or evidence file is under your custody if:

- The item is in actual possession of a person
- The item is in the view of the person after being in actual possession of the person
- The item was in actual physical possession but is locked up to prevent tampering
- The item is in a designated and identified secure area

Field-Specific Custody Procedures

The field sampling team will be responsible for the care and custody of the collected samples until they are properly dispatched. The Project Coordinator will review all field activities to ensure/confirm that proper custody procedures are followed during the field activities. The Project Coordinator or field personnel will complete a chain-of-custody form to accompany each cooler shipped from the field to the laboratory. The following sections describe the specific field custody procedures.

Initiation of Chain-of-Custody Field Procedures

The laboratory, which is the source of the custody train, will provide pre-cleaned containers in accordance with USEPA bottle cleaning requirements. Bottle lot documentation, in the form of bar codes, is affixed to each bottle and is traceable throughout the containers' lifespan. Containers are sent into the field with chain-of-custody documentation which is kept with the containers during field efforts. The containers will remain in the custody of EnSafe during sampling and will be sent to the laboratory using the chain-of-custody procedures described in this section. The field sampler is personally responsible for the care and custody of the samples until they are transferred. The sampler will keep a written record of the sampling operation and the samples' identities. The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the chain of custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

- All bottles will be identified by use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis. Sample labels are to be completed for each sample using waterproof ink unless prohibited by weather conditions. The label must remain legible and attached to the sample bottle, even when wet.

- Samples are accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to the permanent laboratory, or to/from a secure storage area.

- Samples will be properly packaged and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample cooler. The original chain-of-custody form will accompany the shipment. At least one copy of the form will be retained by the sampler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory.

- Ideally, samples will be transported to the laboratory the same day the samples are collected in the field by overnight carrier. In some instances, samples may be retained by the sampler beyond the sample collection day. In these instances, the samples will be shipped and the laboratory will be informed, if necessary, so that sample-holding times will not be exceeded.

Official custody of samples must be maintained and documented from collection until completion of analysis. Chain of custody will be documented. The chain-of-custody procedures can provide an accurate record to trace a sample's possession and handling. Sampling personnel will record the following minimum information on the chain-of-custody form:

- Sample identification number and location
- Signatures of any individuals with control over samples
- Date and time of collection
- Any preservatives used in the samples
- Additional comments, (e.g., air-bill numbers, request for faster turnaround time)
- Total number of sample containers and the required analysis

Laboratory Chain-of-Custody Procedures

The laboratory sample custodian shall inspect the samples and record any problems encountered on the chain-of-custody form or internal laboratory "discrepancy report." The sample custodian shall inspect and record the following:

- Condition of shipping container

- Temperature of shipping container

- Condition of sample containers

- Condition (including presence or absence) of custody seals on shipping containers
- Presence or absence of chain-of-custody records
- Conflicting chain of custody and sample container information
- Preservation
- Resolution of problems or discrepancies (e.g., absent documents, conflicting information, broken custody seals, broken/leaking samples, etc.)

The sample custodian shall sign all chain-of-custody forms and discrepancy reports. The laboratory will contact the Project Coordinator, Project Manager, and/or QA Manager to resolve any discrepancies and/or problems upon sample receipt. Samples will be properly identified, logged in, and assigned the correct analyses. In addition, the sample chain of custody will be maintained during the sample receiving and analytical processes at all times.

The laboratory will have a specific method for maintaining identification of samples while they are in the laboratory, including sample containers, extraction/digestion vessel, and sample extract/digestate containers. The laboratory identifier shall be cross-referenced with the field sample identifier on the laboratory reports.

All samples will be maintained in a secure location and will be stored in appropriate areas to maintain proper preservation requirements. After sample analyses are complete, the laboratory may discard samples only with the concurrence of the Project Manager or as the contract stipulates. If sample is discarded, the time and date of disposal must be recorded. Analytical data is to be kept secured and released to authorized personnel only.

Final Evidence File Custody Procedure

The final evidence file will be the central repository for all documents that constitute evidence relevant to sampling and analysis activities as described in this QAPP. EnSafe Inc. will be the custodian of the evidence file and will maintain the contents of evidence files for the site, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews. The evidence file will be kept in a secured, limited access area that is under EnSafe Inc.'s custody. The final evidence file will include at a minimum:

- Field logbooks and other field records
- Field data and data deliverables
- Photographs
- Drawings
- Soil boring logs
- Laboratory data deliverables
- Data validation reports
- Data assessment reports
- Progress reports, QA reports, interim project reports, and all other reports generated
- All custody documentation (forms, air bills, etc.)
- Correspondence and other records relevant to the project

The evidence file will be maintained for a minimum of three years past the submittal data of the final report.

B-4 ANALYTICAL METHODS

Standard SW-846 sampling methods that have been evaluated and approved for use in complying with the RCRA regulations will be used to analyze both the sediment samples collected. These methods are specified in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), Third Edition Update III (USEPA, December, 1996). Table 7 outlines the methods to be used for the sampling. Non-critical field measurement methods and instrumentation was previously discussed in Section B-1.

Table 7
Laboratory Analytical Methods

Method	Application	Target Analytes
SW-846 8082 USEPA Region 1	PCBs by Gas Chromatography	PCBs

Notes:
SW-846 = *Test Methods for the Evaluation of Solid Wastes, SW-846,* Third Edition. (USEPA, December 1996). Office of Solid Waste and Emergency Response.
PCBs = Polychlorinated Biphenyls

A copy of the laboratory data in level "B" format will be provided in electronic format to the NYSDEC for review.

B-5 QUALITY CONTROL

Level of Quality Control Effort

Field QC samples will be collected at the specified frequencies stated in the following sections. Precision will be assessed by evaluating the results of the duplicate and matrix spike duplicate samples. Accuracy will be assessed by evaluating the analyses of the field blanks and equipment rinsate blanks (if collected). Table 8 lists the QA/QC samples that will be collected from each site during the sampling event. The types of QA/QC samples that will be utilized during the annual monitoring activities are discussed below.

Table 8
Quality Assurance/Quality Control Samples

Event	Site Area	QA/QC Samples
Sanders Creek Downstream Sediment Sampling	Up to 4 locations: 1 sample east of the Court Street culvert/bridge, 1 sample on either side of the Mautz Road — Deer Road culvert, and 1 sample at the confluence with Ley Creek.	1 Field Duplicate Sample 1 Matrix Spike/Matrix Spike Duplicate 1 Precleaned or Field-Cleaned Equipment Blank*

* Precleaned or field-cleaned equipment will be collected one per sampling event. As such, a precleaned equipment blank will be collected if new, nondedicated equipment is used in the sample collection process. A field-cleaned equipment blank will be collected if any field decontamination is performed, with sampling equipment reused at a different sampling point.

Quality Control Samples

Quality control samples that are pertinent to this sampling effort are discussed below.

Precleaned Equipment Blanks

Precleaned equipment blanks monitor onsite sampling environment, sampling equipment decontamination, sample container cleaning, the suitability of sample preservatives and analyte-free water, and sample transport and storage conditions. A precleaned equipment blank will be collected on sampling equipment that has been brought to the site precleaned and ready for use. If equipment is not cleaned in the field, a precleaned equipment blank is not required.

Field-Cleaned Equipment Blanks

If equipment is not cleaned in the field an equipment blank is not required. Field-cleaned equipment blanks monitor onsite sampling environment, sampling equipment decontamination, sample container cleaning, the suitability of sample preservatives and analyte-free water, and sample transport and storage conditions. A field-cleaned equipment blank will be collected on sampling equipment that has been cleaned in the field (i.e., between sampling points) and reused at additional sample points.

Field Blanks

Field blanks monitor onsite sampling environment, sample container cleaning, the suitability of sample preservatives and analyte-free water, and sample transport and storage conditions. Prepare field blanks by pouring analyte-free water into sample containers for each parameter set to be collected. Field blanks are not required if precleaned or field-cleaned equipment blanks are collected.

Duplicate Sample

Duplicate samples are field samples obtained from one location. They are divided into separate containers and are treated as separate samples throughout the remaining sample handling and analytical processes. Duplicate samples are used to assess total error (precision) associated with sample heterogeneity, sample methodology, and analytical procedures. Soil duplicate samples are homogenized in a precleaned intermediate vessel (e.g., mixing bowl prior to being split). Duplicates are collected, preserved, transported, and documented in the same manner as the samples. Different sample identifications are used for duplicates than for original samples.

Matrix Spike and Matrix Spike Duplicate Samples (MS/MSDs)

MS/MSD are environmental samples that are spiked in the laboratory with a known concentration of a target analyte(s) to verify percent recoveries. MS/MSDs are primarily used to check sample matrix interferences, precision, and accuracy. They can also be used to monitor laboratory performance. MS/MSDs are required to be performed by laboratories per the analytical methods at a frequency of 1 per 20 samples analyzed. Sediment MS/MSDs are collected using the same procedures for duplicate samples; however, triplicate volume is not required. MS/MSDs must be identified using the same identification as the parent sample and must be identified on the chain of custody to inform the laboratory that the sample is intended to be used for spiking. Samples chosen for spiking should be representative of the matrix indicative of site conditions. MS/MSDs should be collected, preserved, transported, and documented in the same manner as the samples.

Surrogate Spikes

Surrogate spikes are also used to determine the accuracy of the analytical method with respect to the matrix under investigation. Surrogate spike compounds are compounds similar in chemical nature to the target compounds, but would not be expected in affected media (i.e., radioisotopically labeled compounds, etc.). These compounds are introduced into each sample before analysis. By comparing the reported results for these compounds with the quantities introduced, a percent recovery can be determined. The percent recovery data are subsequently used to assess the accuracy of results for target compounds within each specific sample. Surrogate spike analyses will be performed by the laboratory on each sample analyzed for organic parameters, but extra sample volume will not be required.

Control Limits

Control limits are the maximum and/or minimum values defining a range for a specific parameter, as outlined within each analytical procedure, and are considered to satisfactorily meet QC criteria. When the parameter falls outside that range, the procedure is considered to be out of control. Formulas for calculating precision and bias associated with QC samples were previously described in Section A-7.2. These formulas will be used to assess whether precision and accuracy of analytical results are in control. Whenever the analytical procedure is or becomes out of control which will render the results unusable, corrective action should be taken to bring the analysis back into control. The corrective action should include: (1) finding the cause of the problem, (2) correcting the problem, (3) demonstrating the problem has been corrected by reanalyzing appropriate laboratory reference samples, if necessary, and (4) repeating the analyses of any investigative samples that may have been affected by the control problem, if necessary.

Exceptions will be made, on a case-specific basis. If the control limit is technically impracticable for a particular sample or analysis, documentation and narrative explanation should be submitted with the data report and raw data. The documentation must include evidence that a good-faith effort was made to meet the control limit.

B-6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Field measurement equipment will be checked for operation in accordance with the manufacturer's specifications. This includes battery checks, routine replacement of membranes, and cleaning of conductivity electrodes. All equipment will be inspected when first handed out and when returned from use for damage. Equipment used to gather, generate, or measure environmental data will be calibrated within the frequency stipulated by the manufacturer's instructions and/or analytical method in such a manner that accuracy and reproducibility of results are consistent. Prior to use, field-measuring equipment will be examined to certify that it is in operating condition. Field personnel will be responsible for inspecting equipment before use and they will follow the manufacturer's instructions for assembly, operation, and maintenance of field instruments and equipment. They will verify that the calibration requirements have been met for the instruments used and that all equipment is in proper working condition prior to use. The preventive maintenance of field equipment is described in detail in the associated manufacturer's equipment manuals. Records of equipment maintenance will be maintained by the field logbook. Maintenance records for leased equipment must be kept by the vendor and made available upon request.

Laboratory preventive maintenance will be implemented in accordance with the Laboratory QA Plan and associated Standard Operating Procedures (SOPs). At a minimum, all major instrumentation will have associated records and logbooks, including schedules and criteria for maintenance.

B-7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Calibration is the process by which the correlation between instrument response and actual value of a measured parameter is determined. Field personnel will document acceptable calibration and calibration verification for each instrument unit and field test or analysis, linking this record with affected sample measurements. Field equipment will be calibrated according to manufacturer's specifications.

The laboratory will calibrate analytical instruments in accordance with the USEPA's published methods, the Laboratory QA Plan, and associated SOPs.

B-8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Consumables such as bags, plastic sheeting, aluminum foil, gloves, tape, etc., are expected to be used during the sampling efforts. No special requirements are needed or expected for consumables or rental equipment/supplies. Supplies and consumables needed for sampling will be properly inspected and decontaminated prior to use by the field samplers. Consumables, such as standards, needed for field measurements will be inspected prior to use and only those that have not exceeded their shelf life will be used. The laboratory's SOPs incorporate procedures for critical supplies and consumables, including standard supply sources, acceptance criteria, for tracking and retrieving these materials.

B-9 NON-DIRECT MEASURMENTS

No data or information from non-measurement sources are expected to be used for this project.

B-10 DATA MANAGEMENT

Data for this project will be produced in two locations: onsite and at the contracted laboratory. Data collected onsite will be recorded on field data worksheets and/or in field logbooks. These field data worksheets and logbooks will become a part of the project file. Laboratory data will be submitted by the contracted laboratory within 30 calendar days of the laboratory's receipt of the samples. The Project Manager will be responsible for ensuring the analytical report meets the requirements specified in the order. All field records and the analytical report will be submitted to the Project Manager.

C-1 ASSESSMENTS AND RESPONSE ACTIONS

Due to the limited duration of the sampling events, no audits are anticipated.

C-2 REPORTS TO MANAGEMENT

Internal Reports

The Project QA Manager or Project Coordinator will provide status reports to the Project Manager. The reports will address the items outlined as follows:

- QA activities and quality of collected data,
- Equipment calibration and preventive maintenance activities,
- Results of data precision and accuracy calculations,
- Evaluation of data completeness, and
- QA problems and recommended and/or implemented corrective actions, and results of corrective action taken.

Analytical reports will be generated by the contracted laboratory within 30 calendar days after receipt of the samples who will then forward the analytical information to the Project Manager, or designee.

External Reports

Due to the short duration of this project, the only external reports to management will be a final project report, a field activities report and an analytical data report for all the samples. The final project report will be generated by the Project Manager, or designee, for inclusion in the project file at the completion of the project. This report will include a summary description of all project activities; a summary of all data, a discussion of any problems encountered and associated corrective actions, a discussion of the conclusions drawn from the results of this project and the rationale for those conclusions, and the results of the data quality assessment.

Draft and final reports will be delivered to Carrier per a mutually acceptable schedule between Carrier and EnSafe Inc. Carrier will be responsible for delivering the final reports to the NYSDEC.

D-1 DATA REVIEW, VERIFICATION, AND VALIDATION

Data will be accepted if they meet the following criteria:

- Field data sheets are complete
- Field data and laboratory data were validated
- Actual sample locations and collection procedures match the proposed sample locations and collection procedures identified in sections B-1 and B-2, respectively
- Sample handling procedures documented on chain-of-custody forms, the field activity report, and case narrative match the proposed sample handling procedures identified in sections B-2 and B-3 (e.g., water samples were acid preserved, holding times not exceeded)
- Field QC was conducted as planned and meets the acceptance criteria in section B-5

Data generated by project activities will be reviewed against the data quality objectives cited in Section A-7 and the QA/QC practices cited in Section B-5. Data will be separated into three categories: data meeting all data quality objectives, data meeting failing precision or recovery criteria, and data failing to meet accuracy criteria. Data meeting all data quality objectives, but with failures of QA/QC practices will be set aside until the impact of the failure on data quality is determined. Once determined, the data will be moved into either the first category or the last category.

Data falling in the first category is considered usable by the project. Data falling in the last category is considered not usable. Data falling in the second category will have all aspects assessed. If sufficient evidence is found supporting data quality for use in this project, the data will be moved to the first category, but will be flagged as estimated (with a J-flag) as per USEPA guidelines. The Project Manager will evaluate the cause of the data failures and make the decision whether to discard the data or re-sample.

Copies of data validation reports will be provided electronically to the NYSDEC.

D-2 VERIFICATION AND VALIDATION METHODS

The field data package will include all logbooks, field records, and measurements obtained onsite. The package will be verified by conducting:

- A review of the field data compiled on sampling logs for completeness. Failure in this area may result in the data being invalidated for the intent of the project.

- Verification that field equipment blanks and trip blanks were properly prepared, identified, and analyzed. Failure in this area may compromise the analytical data package and result in some data being considered qualitative or invalid.

- A check on field analyses for equipment calibration and condition. Failure in this area may result in the field measurements being invalid.

- A review of the chain-of-custody forms for proper completion, signatures of field personnel, and the laboratory sample custodian, and dates. Failure in this area may result in the data being invalid for the purpose of the project.

The Project Coordinator will review/validate the field data and any problems identified during this process will be reported to the Project Manager, who will include this information in the Management Report, as necessary. The contracted laboratory will review/validate the laboratory data according to their SOPs. Any problems identified during this process will be reported in the analytical data report.

D-3 RECONCILIATION WITH USER REQUIREMENTS

Once the data results are compiled, the QA Manager, or designee, will review the data to determine if they fall within the acceptance limits as defined in this QAPP. Completeness will also be evaluated to determine if the completeness goal for this project has been met. If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded and re-sampling may occur. The Project Manager will evaluate the cause of the failure (if possible) and make the decision whether to discard the data and re-sample.

REFERENCES

Code of Federal Regulations. Title 29, Part 1910.120.

Code of Federal Regulations. Title 40, Part 264 Appendix IX.

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