



**Hudson River
Baseline Monitoring Program
Scoping Document**

Prepared for:



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SECTION 1

PURPOSE

This Baseline Monitoring Program Scoping Document (BMPSD) has been prepared on behalf of General Electric Company (GE) as part of the remedial design to implement the February 2002 Record of Decision (ROD) for the Hudson River PCBs Site issued by the U.S. Environmental Protection Agency (USEPA) (USEPA 2002). The BMPSD describes the scope of the river monitoring activities that will be conducted during the design phase of the project (hereafter referred to as “baseline monitoring”). Detailed information on the baseline monitoring program, including the rationale for each monitoring component and Data Quality Objectives, will be described in a Quality Assurance Project Plan (QAPP), which will be submitted as a deliverable under the Remedial Design Administrative Order on Consent. Monitoring will be conducted in accordance with the Community Health and Safety Plan (CHASP) and an updated Health and Safety Plan (HASP).

The BMPSD describes the river monitoring that will occur between 30 days after approval of the QAPP and the time dredging begins. During the program GE may propose for USEPA review and approval changes to this program based upon the information gained during implementation. The overall goals of the monitoring are to:

- establish pre-dredging conditions for use in evaluating achievement of performance standards during the dredging project; and
- provide data on PCB levels in fish and water to allow the evaluation of long-term recovery trends.

It should be noted that no sediment sampling is occurring under the Baseline Monitoring Program, but pre-dredging sediment sampling is being conducted under the Sediment Sampling Administrative Order on Consent (AOC).

SECTION 2 METHODS

2.1 PROGRAM ELEMENTS

2.1.1 Routine Water Column Monitoring

The following locations comprise the Upper Hudson River routine water column monitoring stations:

- Bakers Falls;
- Rogers Island (RM 194.2);
- Thompson Island Dam (TID; RM 188.5);
- Schuylerville (RM 181.4);
- Stillwater (RM 168.5);
- Lock 1 (RM 153.9);
- Waterford (RM 156.5); and
- Mohawk River at Cohoes.

Whole water samples will be collected weekly at all Hudson River stations to establish the baseline PCB flux during the dredging season for use in determining compliance with resuspension performance standards during dredging. At Stillwater and Lock 1 (see Section 2.1.5.1), collections will occur from May to November, the anticipated dredging season. At TID, collection will occur from March to November. The March and April data will be collected to establish the baseline PCB load during the higher flow conditions typical of these months. At Bakers Falls, Rogers Island, Schuylerville, and Waterford, the March and April data will be collected to establish the baseline PCB load during the higher flow conditions typical of these months. Weekly collection will occur year round, as possible (ice cover, severe winter weather conditions and safety concerns may prevent certain winter collections). Collection of samples during December-April is required at Bakers Falls and Rogers Island to satisfy the requirements for the Post Construction Remnant Deposit Monitoring Program (PCRDMP). Sampling year-

round at the Schuylerville, Waterford, and Mohawk stations will generate data to compute baseline annual loads to assess the effectiveness of the remedy in reducing the PCB load within the Upper Hudson River and to the Lower River. The Mohawk station will be sampled monthly.

Bakers Falls sampling will be reduced to monthly after the first year if concentrations are uniformly low. Samples will be taken weekly across a transect positioned upstream of Lock 1 for 7 months (May-November) during the 2004 field season. If the data exhibit a strong correlation with data from the Waterford station, the Lock 1 station will be abandoned.

Sampling will consist of single-day upstream to downstream sampling, except during pseudo-time of travel (TOT) sampling weeks, which will occur once per month (May – November) during the 2004 field season (See Section 2.1.5.3). A single composite sample will be generated for each station. Centroid samples will be collected at Bakers Fall because significant lateral gradients are not expected at this background station. At Rogers Island, samples will be taken in the centroid of the east and west channel. Transect sampling will occur at all other stations to capture possible lateral gradients and refine the PCB load determination. Water column samples will be collected by immersing a glass sample container and lowering it through the water column as it fills. Sampling will occur at 6 equal-flow locations over the cross section at TID and Schuylerville and 5 locations at the other stations. The entire sample volume from each location along the transect will be combined to generate a single composite sample for each monitoring station. Collection of “1-liter” water samples for PCB analysis will be accomplished by filling a smaller sample container (transect sample container volume will equal to 1/5 or 1/6 of the total sample volume depending on number of samples per transect) at each sample transect location and transferring the sample to an amber glass sample container. This process will be repeated at each transect location using the same smaller sample container. The empty sample container used to collect the sample will be transported to the laboratory along with the 1-liter water sample. The empty sample container will be rinsed with hexane and the hexane rinsate will be combined with the sample extract prior to PCB analysis.

To provide a means to translate between the historical record of PCB concentrations at TID and Schuylerville and the proposed baseline data, the historical single point sampling

locations at TID (TID-PRW2) and Schuylerville will be sampled simultaneously with the transect sampling. This dual sampling will be conducted monthly for the first 12 months of the program and result in collecting 9 samples at TID-PRW2 and 12 samples at Schuylerville.

The routine measurements on water samples will include PCBs, total suspended solids (TSS), turbidity, suspended organic carbon, and dissolved organic carbon (DOC). TSS will be quantified using the USGS “suspended sediment” sampling and analysis method (whole water sample) at all stations. PCBs will be quantified by single, whole water extraction, with the exception of a monthly (May – November) Dissolved/Particulate Phase PCB study conducted during the 2004 field season (see Section 2.1.5.4).

Selected nutrients (TKN, Nitrate, Nitrite, Total P), Total Analyte List (TAL) metals, and dioxins/furans will be measured in a subset of the water samples to establish reference concentrations prior to dredging. Nutrients will be monitored each sampling round at all Upper Hudson River stations for 7 months (May – November) during the 2004 field season; metals will be monitored every other sampling round at all Upper Hudson River stations for the duration of the program. Dioxins and furans will be sampled once per month for 7 months (May-November) during the 2004 field season at Rogers Island, TID, Schuylerville, Stillwater, and Waterford.

Surface water quality (SWQ) measurements will be taken for each surface water sample. These measurements will be made for temperature, specific-conductivity, pH, turbidity, and dissolved oxygen (DO) using a probe. Associated measurements will be made for river flow and rainfall. Flow measurements are needed to calculate PCB load which is partially related to water temperature. Data from operating USGS flow gages will be used to satisfy the flow monitoring requirement. Rainfall monitoring will help establish a relationship between turbidity and meteorological events. Data from existing meteorological stations will be used to satisfy the rainfall monitoring requirement.

During the months of May and June, suspended solids samples will be collected two times per week at the TID and Schuylerville stations (once during the routine weekly monitoring and one other day during the week) using the sampling protocols discussed above. If after the

first year of twice weekly sampling at TID and Schuylerville it is determined that the variability in the suspended solids data is greater than that observed in the historical record, then the frequency of monitoring will be increased to three times per week for the final year of baseline monitoring. These suspended solids measurements will provide USEPA with information on suspended solids variability to be used for evaluating compliance with the resuspension performance standard.

2.1.2 Waterford High Flow Sampling

Centroid, vertically-composited whole water samples will be collected during the spring high flow period at Waterford. High flow conditions are defined as flow at Fort Edward exceeding 15,000 cfs or peak flow at Waterford expected to reach 22,500 cfs. Samples will be collected at 2000 cfs increments along the hydrograph to the extent that sampling is practicable. Sampling will be limited to the rising limb of the hydrograph and two rounds of sampling after the peak.

PCBs, TSS, temperature, specific conductivity, turbidity, suspended organic carbon, and DOC will be measured to provide an assessment of baseline conditions potentially useful for comparison to conditions during the dredging operation, and river flow measurements will be taken to facilitate the calculation of PCB and TSS loads.

2.1.3 Lower Hudson Water Column Monitoring

The following stations comprise the Lower Hudson River water column monitoring stations:

- Albany/Troy; and
- Poughkeepsie.

Data from the Albany/Troy station will provide a baseline to assess the remedy effectiveness. Data from the Poughkeepsie station will provide a baseline in the vicinity of the

principal Lower Hudson water intake. Samples will be collected monthly for 7 months (May – November) per year. Vertically stratified composite samples will be taken at the centroid of the river at these sampling stations.

PCBs and TSS will be measured. SWQ measurements also will be taken for each surface water sample. These measurements will be made for temperature, specific-conductivity, pH, turbidity, and DO using a probe.

2.1.4 Upper Hudson River Fish Monitoring

Annual fish surveys will be conducted in the Upper Hudson once per year from each of the River Sections at the stations listed below:

- Feeder Dam Pool (1 location);
- TID (multiple stations);
- Northumberland/Fort Miller Pools (multiple stations);
- Stillwater Pool (multiple stations); and
- Albany/Troy (1 location).

The Feeder Dam Pool will serve as a reference location for the system. Multiple locations will be sampled in Thompson Island and Stillwater pools to determine if the historical sampling locations are representative of the reach average. Fish samples will be collected from the combined Northumberland/Fort Miller Pools in a similar manner. A minimum number of fish samples (approximately 5) will be targeted per river mile [maximum of 20 (Feeder Dam and Albany/Troy)], 25 (Northumberland/Fort Miller), or 30 (Thompson Island and Stillwater) samples per each species per pool.

Fish collections will consist of black bass (largemouth/smallmouth bass), yellow/brown bullhead, yearling pumpkinseed, yellow perch, and spottail shiner. Other forage fish will be substituted if spottail shiners are not available. These species cover a range of association with sediments, including sport fish consumed by humans and forage fish consumed by wildlife.

While the Albany/Troy station is actually located in the Lower Hudson, it is included with the Upper Hudson Fish Monitoring program. One modification at the Albany/Troy station is that both yellow and white perch will be collected (10 each), instead of collecting just yellow perch.

Standard sampling methods including netting, electroshocking, and angling will be used to collect target species. The edible portions for humans and wildlife will be monitored; filets for bass, bullhead, and perch, individual whole body for pumpkinseed and whole body composites for spottail shiners, or other forage fish species.

Bass, bullhead, and perch will be collected in the spring from all stations. Pumpkinseed and forage fish will be targeted in the fall at all locations. PCBs and percent lipid will be measured to monitor baseline PCB levels in fish. Mercury, dioxins and furans, and organochlorine pesticides will be analyzed one time during the program in 10% of the total number of adult fish samples. The weight and length of collected fish will also be measured to assess fish condition.

2.1.5 Special Surface Water Studies

Special studies, with the exception of the velocity profile study, will be scheduled such that all data are collected during the same calendar year.

2.1.5.1 Lock 1

Samples will be taken weekly at a transect upstream of Lock 1 for 7 months (May-November) during the 2004 field season. If the data exhibit a strong correlation with data from the Waterford station, the Lock 1 station will be abandoned.

2.1.5.2 Velocity Profile Study

A velocity profile study will be conducted at each routine monitoring station during the first few months of the program to refine the equal-flow sampling locations. Velocity

measurements will be taken along each transect in conjunction with routine monitoring events until sufficient data have been collected to reasonably establish equal-flow sampling locations.

2.1.5.3 Time of Travel

Pseudo-TOT sampling will take place monthly at the routine monitoring stations in the Upper Hudson River for 7 months (May-November) during the 2004 field season. This special study is aimed at assessing the value of attempting to sample a single parcel of water as it traverses the Upper Hudson River. It is termed a “pseudo-TOT” study because true TOT sampling is impractical due to continual changes in river flow and the need to avoid health and safety risks that would be associated with attempts to sample at night. Sampling will be restricted to Monday-Friday during daylight hours to alleviate worker scheduling and safety logistics. The sampling schedule will be developed to come as close as possible to sampling a single water parcel without violating the sampling time constraints. This type of sampling will continue beyond 2004 if the data show the value of this technique as compared to single day sampling.

2.1.5.4 Dissolved/Particulate PCB Study

A Dissolved/Particulate Phase PCB study will be conducted at TID and Schuylerville to provide an updated baseline of PCB partitioning between particulate and dissolved phases. Knowledge of how PCBs are distributed between particulate and dissolved phases under baseline conditions may provide a means to evaluate the cause of potential high PCB levels during remedial action. Once per month (May-November) during the 2004 field season, high volume composites will be field-filtered at these 2 stations and separate extractions and PCB analyses will be performed on the water and particulates. The Dissolved/Particulate Phase PCB study will coincide with TOT sampling.

2.2 ANALYTICAL TESTING PROGRAM

The Baseline Monitoring Program will involve analysis of water and fish samples for chemical and physical parameters. Table 1 identifies the extraction and analytical procedures to be used for each analyte.

2.2.1 Water Samples

Extraction and analysis techniques for PCBs in Hudson River water have been customized based on whether sampling stations require lower detection limit methods. The procedures to be employed are modifications to existing USEPA methods to improve sensitivity and/or to take advantage of current extraction technology. Brief descriptions of the extraction and analytical methods for routine (1 L) and large volume (4-8 L) samples are described below.

1. Extraction Method: USEPA Method 3535 – Solid Phase Extraction

Routine 1-liter water samples:

Hudson River water column samples that are 1-liter in volume will be extracted by utilizing SW846 Method 3535, which is a solid phase extraction technique. The water sample will be extracted using styrene divinylbenzene extraction disks. A Horizon Technology SPE-DEX® 4790 automated extraction system will be employed to automatically pre-clean and activate the SPE disk, extract the water sample, and elute the PCBs from the disk into a collection vessel for further processing. The extract will undergo solvent exchange and clean-up procedures prior to analysis.

Large volume water samples:

For Hudson River sampling sites that require lower detection limits a larger volume (4 to 8 liters) of water will be collected to achieve a 1 ng/l detection limit. The extraction employed will be SW846 Method 3535 (solid phase extraction). The water sample will be extracted using styrene divinylbenzene extraction disks. A Horizon Technology SPE-DEX® 4790 automated extraction system will be employed to automatically pre-clean and activate the SPE disk, extract the water sample, and elute the PCBs from the disk into a collection vessel for further processing. The automated system has the capability to extract multi-liter samples. The extract will undergo solvent exchange and clean-up procedures prior to analysis.

2. Determinative Method: USEPA GLNPO Green Bay Mass Balance Method

Analysis method for routine 1-liter water samples:

A congener-specific method will be employed to quantify PCB totals in routine 1-liter water samples. This method follows guidelines established in the following methods:

“Quality Assurance Plan Green Bay Mass Balance Study I. PCBs and Dieldrin, USEPA Great Lakes National Program Office, Final Draft, December 11, 1987.”

“Standard Operating Procedure for the Gas Chromatographic Analysis of Hydrophobic Organic Contaminant Extracts from Great Lakes Water Samples USEPA GLNPO Organics: SOP-10, 6/1/94.”

This method is in current use for the GE weekly water-column monitoring program.

Analysis method for large volume water samples:

A congener-specific method will be employed to quantify PCB totals in the large volume water samples. The method to be employed is the same as above for the routine 1-liter water samples with several modifications to increase detection sensitivity. To achieve lower detection sensitivity the GC/ECD system has been optimized to be able to calibrate 10 times lower than the current established method. The enhanced sensitivity will not impact the ability to achieve comparable results between the low and normal detection limit methods.

2.2.2 Validation of Green Bay Method

Given that the procedures for extraction and analysis of water samples to be employed for the BMP are modifications to existing USEPA methods, the level of validation necessary must only be sufficient to demonstrate the applicability of the method to the intended use. The validation of the methods will include the following:

- Method modification development – the modifications to the existing methods will be determined and experimental operating conditions refined to meet the intended objective.
- Preparation of Standard Operating Procedures (SOPs) – Extraction and/or analytical SOPs will be prepared to document the methods and provide the sample preparation and instrument quality control measures and acceptance criteria to be used to monitor the analysis.
- Spike Analysis of Target Compounds – Analysis of spike samples that include the target compounds of interest will be performed to demonstrate the performance and utility of the method through acceptable compound recovery and precision.
- Method Detection Limit Study – The sensitivity of the methods will be documented through a Method Detection Limit Study performed in accordance with 40 CFR Part 136, Appendix B.
- Upon completion of method validation by the laboratory, GE will prepare a blind spike performance evaluation (PE) sample for the candidate laboratory to analyze to provide an independent verification of the Green Bay method validation. The PE will be specified by GE and contain specific congeners representative of those typically encountered in a Hudson River environmental sample. The laboratory will sum the individual congener results on a homolog and total basis. An assessment of individual congener performance will be completed, however, validation of the method will be based on a comparison to the blind spike known homolog and total PCB values.

2.2.3 Fish Samples

All fish samples will be analyzed using USEPA Method 8082 Aroclor sum method, modified for the analysis of fish as used in the NYSDEC Biota Monitoring Program. The Green Bay Congener method will be performed on 10% of the total number of samples. No validation of the Green Bay Congener method will be required prior to sample analysis for fish tissue samples.

2.3 QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance/Quality Control (QA/QC) will be assessed for all aspects of the project, including field, laboratory, and data management activities. This section provides a general description of the QA/QC program. Details of the program will be presented in the QAPP.

2.3.1 Field QA/QC Assessment

QA/QC samples will be collected in the field to allow evaluation of data quality. Field QA/QC samples for water column samples include equipment rinse blanks, and the collection of blind duplicate and matrix spike samples. Fish sampling does not facilitate the use of field QA/QC samples (e.g., duplicates) as part of the study design; all QA/QC samples for the fish sampling program will be generated in the laboratory. For water samples, field QA/QC samples will be generated at the rate of 1 per every 20 environmental samples or one per sampling event when less than 20 samples are collected.

2.3.2 Laboratory QA/QC Procedures

QA/QC samples prepared in the laboratory include method blanks, laboratory control spikes (LCS), matrix spikes, duplicates, and temperature blanks. Performance evaluation samples, used as part of the Sediment Sampling and Analysis Program QA/QC, will not be included in the Baseline Monitoring Program.

Method blanks will be prepared and analyzed by the contract laboratory at a rate of at least one per analytical batch. Method blanks will consist of laboratory-prepared blank water processed along with the batch of environmental samples including all manipulations performed on actual samples. The method blank will be prepared and analyzed before analysis of the associated environmental samples.

LCS will be analyzed at the rate of 5% or one per sample batch of up to 20 samples. Laboratory control spikes consist of laboratory-fortified method blanks.

Matrix spikes will be run at a rate of 5% or 1 per sample batch up of up to 20 samples. Matrix spikes consist of water samples fortified with known quantities of analytes that are not expected to be in the matrix.

Standard Reference Materials (SRMs) are available for PCB Aroclors in fish tissue, and will be used at the rate of one per sample batch of up to 50 samples that the laboratory is analyzing PCBs in fish tissue by modified Method 8082.

Duplicate samples of water or fish homogenate will be run at a rate of 5% or 1 per sample batch up of up to 20 samples. A blind duplicate water sample is collected in the field to facilitate this requirement. For fish samples, the homogenate is split.

Temperature blanks will be prepared and sent in the sample coolers on location to enable the laboratory to monitor the temperature of the coolers (and samples) upon receipt at the laboratory. A temperature blank will be provided in each cooler sent from the laboratory to the field.

2.3.3 Data Verification/Validation

Sample analysis and batch quality control results will be delivered in an Electronic Data Deliverable (EDD) for batch loading into the project database. Analytical results for all samples will also be provided in a full data package in a scanned electronic media (Adobe® Acrobat / .pdf file).

Automated electronic data verification will be performed on 100% of the data using the batch quality control results provided by the laboratories in the EDD. The specific measures evaluated during verification and the associated criteria will be discussed in the QAPP. They include:

- holding times;
- accuracy (by evaluating laboratory control sample (LCS) recovery);
- matrix spike/matrix spike duplicate (MS/MSD) recoveries;
- precision (by evaluating laboratory duplicate results);
- field duplicate sample precision;
- blank contamination (laboratory method blanks and field generated blanks); and
- surrogate compound recoveries.

Upon completion of data verification, ten percent of all data will be validated to identify the usability of the data for conducting assessments required to satisfy project objectives. Data validation involves identifying the technical usability of the data for making decisions pertaining to satisfying the project objectives. The QAPP will provide the specific validation procedures and explain how the packages to be validated will be selected.

Based upon the quality assurance review of the analytical data, specific codes will be placed next to results in the database to provide an indication of the quantitative and qualitative reliability of the results. These qualifier codes will serve as an indication of qualitative and quantitative reliability. The definitions for the data qualifier codes will be included in the QAPP.

2.4 EXTRACT AND SAMPLE ARCHIVE PROCEDURES

Sample extracts for PCB analysis and homogenized tissue from fish samples will be held (frozen at $<-10^{\circ}\text{C}$) from each calendar year of the Baseline Monitoring Program until such time as USEPA has approved the calendar year Data Summary Report. USEPA will have the option of obtaining some or all of the archived samples extracts pursuant to the Remedial Design AOC.

SECTION 3

SCHEDULE

This monitoring program will commence 30 days after USEPA approval of the QAPP and will continue in accordance with the timing specified in this document.

GE will provide annual Data Summary Reports that document the data collected in the previous calendar year. These reports will be submitted by April 1st of the following year.