ATTACHMENT A
TO CONSENT DECREE MODIFICATION NO. 1

MODIFIED SCOPE OF WATER COLUMN MONITORING

The following revisions are made to the *Statement of Work (SOW) for Remedial Action and Operations, Maintenance and Monitoring* and the attachments thereto (which together constitute Appendix B to the Consent Decree) to reflect the revised scope of water column monitoring to be implemented by the General Electric Company (GE) during Phase 1 of the Remedial Action (RA) and in the off-season following completion of Phase 1. In addition, in the event that GE notifies the U.S. Environmental Protection Agency (EPA), pursuant to the Consent Decree, that it will perform Phase 2 of the RA, the water column monitoring to be performed during Phase 2 will be governed by this revised scope of monitoring, subject to modifications specified by EPA following the completion of Phase 1 and prior to GE's notification to EPA as to whether it will perform Phase 2 pursuant to the Consent Decree.

A. Changes to SOW for Remedial Action and Operations, Maintenance and Monitoring:

1. In Section 1, the following sentence is added at the end of the first paragraph (on page 1-1): "References herein to the Consent Decree and its attachments shall refer to those documents as amended by Consent Decree Modification No. 1, including Attachment A thereto."

2. In Section 2.3.2.1, the third sentence of that subsection (on page 2-9) is amended to read as follows: "The RAM QAPP shall be consistent with the Remedial Action Monitoring Scope (RA Monitoring Scope), which is attached hereto as Attachment B and incorporated herein, as amended by the revisions to the RA Monitoring Scope set forth in Attachment A to Consent Decree Modification No. 1."

3. In Section 2.3.2.1, in the listing of Additional Quality Assurance/Quality Control (QA/QC) Procedures on page 2-12, all references to the RA Monitoring Scope (Attachment B to the SOW) shall refer to that document as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1.

4. In Section 2.3.2.2.2, the third sentence of that subsection (on page 2-15) is amended to read as follows: "The Phase 1 Performance Standards Compliance Plan shall be consistent with the Performance Standards Compliance Plan Scope (PSCP Scope), which is attached hereto as Attachment C and incorporated herein, as amended by the revisions to the PSCP Scope set forth in Attachment A to Consent Decree Modification No. 1."

B. Changes to Remedial Action Monitoring Scope (Attachment B to SOW):

1. In Section 1, the first full paragraph on page 1-2 is revised by deleting the first sentence and deleting the reference to the Phase 2 EMP [Environmental Monitoring Plan] in the last sentence.

2. In Section 2, in the opening paragraph (on page 2-1), the following note is added after the first sentence: "(Note: The Water Column Monitoring Program has been revised from that described in the original RA Monitoring Scope (dated September 2005) to reflect a subsequent agreement between GE and EPA relating to the scope of this program. That agreement is set forth in Attachment A to Consent Decree Modification No. 1.)"

3. Sections 2.1 through 2.5 are deleted in their entirety and replaced with the text set forth in Exhibit A-1 attached hereto.

4. Section 2.6 ("Public Water Supply Monitoring") is deleted in its entirety.

5. In Section 2.8, the fourth bullet in the second paragraph is revised to read as follows: "In the event that any single sample shows a total PCB concentration at or above the Standard Level of 500 ng/L at a far-field station, that result shall be reported promptly to EPA, NYSDEC, NYSDOH, and the downstream public water suppliers in the Upper Hudson River, but no later than 3 hours after receipt of the laboratory data showing such a result."

6. In Section 8, the following sentence is added at the end of the third paragraph (on page 8-1): "It also describes an additional special study that GE shall conduct during Phase 1 relating to the fixed-point near-field monitoring procedures specified in the *EPS*, Volume 2."

7. A new Section 8.3 is added at the end of Section 8, as set forth in Exhibit A-2 attached hereto.

8. The following references are added to the list of References in Section 9:

   BBL. 2006. *Phase 1 Final Design Report*. Hudson River PCBs Superfund Site. Prepared for General Electric Company, Albany, NY. March.

   Parsons. 2007. *Remedial Action Health and Safety Plan*. Hudson River PCBs Superfund Site. Prepared for General Electric Company, Albany, NY.

C. Changes to Performance Standards Compliance Plan Scope (Attachment C to SOW):

1. In Section 2.2 ("Routine Monitoring") (on page 2-3), the reference to subsections 2.2 through 2.4 of the RA Monitoring Scope is revised to refer to subsections 2.2 through 2.4 of the RA Monitoring Scope as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1.

2. Section 2.3 ("Contingency Monitoring") (on page 2-4) is revised to read as follows: "In the event that the routine monitoring shows PCB concentrations at or above the Standard Level of 500 ng/L at the Thompson Island and/or Schuylerville far-field monitoring station(s), GE shall conduct the additional sampling and analytical activities specified for that situation in subsections 2.2.2.2, 2.2.2.3 and 2.4.2 of the RA Monitoring Scope as

amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1. In addition, if the routine monitoring shows PCB concentrations at or exceeding 350 ng/L at the Waterford far-field monitoring station, GE shall conduct the additional monitoring at the Lower Hudson River stations that is specified for that situation in subsection 2.2.2.6 and 2.4.2 of the RA Monitoring Scope as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1."

3. Section 2.6 ("Special Studies") (on page 2-8) is deleted in its entirety and replaced with the following:

2.6 Special Studies

GE will perform five special studies related to PCB resuspension and monitoring. Details for three of the special studies – on near-field release mechanism; non-target area downstream contamination; and fixed-point near-field monitoring – are described in Section 8 of the RA Monitoring Scope as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1. The other two studies – on development of a relationship between TSS and a real-time surrogate measurement and on the testing of automated water samplers – are described in work plans that were submitted to and approved by EPA, and have been performed by GE. These studies will be considered complete upon resolution of a number of questions that EPA has raised about them, as well as resolution of issues concerning the equipment and representativeness of the data, subject to EPA review and approval. The results of the study on a TSS surrogate relationship will be provided as part of the Phase 1 RAM QAPP. The results of the study of automated samplers have been incorporated into the revisions to the RA Monitoring Scope set forth in Attachment A to Consent Decree Modification No. 1, and details on the use of such samplers during Phase 1 will be provided in the Phase 1 RAM QAPP.

4. In Section 7.1 ("Overview of Standard"), the first sentence and first bullet under "Health (water source) standards at far-field stations" (on page 7-2) are revised to read as follows:

The WQ requirements (pp. 2 & 8 EPA January 2005) set forth the following standards for far-field stations (as modified in Attachment A to Consent Decree Modification No. 1 regarding the stations to which the standards apply):

- The following water quality standards, which apply to the total form and are not hardness-dependent, should not be exceeded at any of the Thompson Island, Schuylerville, or Waterford fixed far-field stations:
  - Cadmium (total): 5 µg/L;
  - Chromium (total): 50 µg/L;
  - Mercury (total): 0.7 µg/L; and
  - Lead (total): 15 µg/L (New York State Department of Health [NYSDOH] action level), with a "trigger level" of 10 µg/L at Schuylerville and Waterford.

5. In Section 7.2 ("Routine Monitoring") (on page 7-2), the first sentence is revised to read as follows: "GE shall conduct the routine near-field and far-field monitoring for metals and water quality parameters (i.e., pH, DO, temperature, turbidity, suspended solids, hardness, conductivity) described in subsections 2.2 through 2.4 of the RA Monitoring Scope as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1."

6. In Section 7.3 ("Contingency Monitoring") (on page 7-3), the first sentence is deleted in its entirety and replaced with the following: "In the event that the routine monitoring shows an exceedance of an applicable standard at a near-field monitoring station, GE shall conduct the contingency monitoring specified for that situation in subsection 2.2.1.2 and 2.4.4 of the RA Monitoring Scope as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1. In the event that the routine monitoring shows an exceedance of an applicable standard (or the trigger level for total lead) at a far-field monitoring station, GE shall conduct the contingency monitoring specified for that situation in subsections 2.2.2.8 and 2.4.4 of the RA Monitoring Scope as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1."

7. In Section 7.4 ("Contingency Actions/Responses"), the first sentence in the last paragraph of that section (on the top of page 7-5) is revised to read as follows: "In addition, if a trigger level of 10 µg/L total lead (~ 70% of the action level) is exceeded by a single water column sample at the Schuylerville or Waterford station, GE shall promptly notify EPA, NYSDEC, NYSDOH and the water suppliers, but no later than 3 hours after receipt of the laboratory results."

8. In Section 7.5 ("Responses to Observations of Distressed or Dying Fish") (on page 7-5), the second sentence is revised to read as follows: "GE shall also assess the cause(s) of the situation; and if the cause can be determined and is project-related, GE shall conduct increased monitoring for metals and additional water quality parameters, where appropriate (as provided in the January 7, 2005 WQ requirements letter to GE at p. 8), using the procedures for such monitoring provided in the RA Monitoring Scope as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1, and shall propose an appropriate response to EPA, following the same requirements and subject to the same qualifications specified in subsection 7.4 for an exceedance of water quality standards."

9. In Section 7.6 ("Notifications and Reporting") (on page 7-5), the reference to subsection 2.7 of the RA Monitoring Scope is changed to subsection 2.8 of the RA Monitoring Scope.

D. Changes to Remedial Action Community Health and Safety Program Scope (RA CHASP Scope) (Attachment D to SOW):

1. In Section 3.5 ("Water Quality Complaints") (on page 3-4), the third sentence of the first paragraph of the section is revised to read as follows: "If review of these data indicates an exceedance of such an action level, GE shall conduct the increased monitoring required by

the RA Monitoring Scope, as amended by the revisions thereto set forth in Attachment A to Consent Decree Modification No. 1, and shall conduct the other contingency or response actions specified in the PSCP Scope."

EXHIBIT A-1

REVISIONS TO SECTIONS 2.1 THROUGH 2.5 OF REMEDIAL ACTION MONITORING SCOPE

2.1 Objectives, Criteria, and Parameters Subject to Monitoring

2.1.1 Resuspension Standard

The objectives of the Resuspension Standard (as stated in *EPS*, Volume 1, p. 37) are to:

- Maintain polychlorinated biphenyl (PCB) concentrations in the water column at or below the federal drinking water Maximum Contaminant Level (MCL) of 500 ng/L to protect downstream municipal intakes;
- Minimize the release of PCBs from sediment during remedial dredging; and
- Minimize the export of PCBs to downstream areas, including the Lower Hudson.

The EPA has designated threshold criteria to trigger contingency monitoring and engineering evaluation and controls to reduce the release of PCBs from dredge areas so that the objectives are met. There are three levels of such criteria – known as the Evaluation Level, Control Level, and Resuspension Standard Threshold Level (the Standard Level). These criteria are applied at near-field stations, located within 300 meters (m) of the dredging activities, and at far-field stations, located more than 1 mile downstream of the dredging activity. The applicable criteria are summarized in Table 2-1 of Volume 1 of the *EPS* and are as follows (specified separately for near-field and far-field stations):

Near-Field Criteria

Evaluation Level

Under the *EPS* (Section 4.1.1 Volume 2, pp. 87-92), the Evaluation Level would be exceeded if any of the following conditions occurs:

- "The sustained suspended solids concentration above ambient conditions at a location 300 m downstream (i.e., near-field monitoring) of the dredging operation or 150 m downstream from any suspended solids control measure (e.g., silt curtain) exceeds 100 mg/L for River Sections 1 and 3 and 60 mg/L for River Section 2. To exceed this criterion, this condition must exist on average for six hours or for the daily dredging period (whichever is shorter). Suspended solids are measured continuously by surrogate or every three hours by discrete samples."

- "The sustained suspended solids concentration above ambient conditions at the near-field side channel station or the 100 m downstream station exceeds 700 mg/L. To exceed this criterion, this condition must exist for more than three hours on average measured continuously or a confirmed occurrence of a concentration greater than 700 mg/L when suspended solids are measured every three hours by discrete samples." This provision has been modified as described in Section 2.2.1.4.

Control Level

Under the *EPS* (Section 4.1.2 Volume 2, pp. 93-95), the Control Level would be exceeded if any of the following conditions occurs:

- "The sustained suspended solids concentration above ambient conditions at a location 300 meters downstream (i.e., near-field monitoring) of the dredging operation or 150 meters downstream from any suspended solids control measure (e.g., silt curtain) exceeds 100 mg/L for River Sections 1 and 3 and 60 mg/L for River Section 2. To exceed this criterion, this condition must exist for a period corresponding to the daily dredging period (6 hours or longer) or 24 hours if the operation runs continuously (whichever is shorter) on average. Suspended solids are measured continuously by surrogate or every three hours by discrete samples." The last sentence has been modified by the revised scope of sampling described in Section 2.2.1.1.

Far-Field Criteria

Evaluation Level

Under the EPS (Section 4.1.1 Volume 2, pp. 87-92), the Evaluation Level would be exceeded if any of the following conditions occurs:

- "The net increase in Total PCB mass transport due to dredging-related activities at any downstream far-field monitoring station exceeds 300 g/day for a seven-day running average."

- "The net increase in Tri+ PCB mass transport due to dredging-related activities at any downstream far-field monitoring station exceeds 100 g/day for a seven-day running average."
- "The sustained suspended solids concentration above ambient conditions at a far-field station exceeds 12 mg/L. To exceed this criterion, this condition must exist on average for 6 hours or a period corresponding to the daily dredging period (whichever is shorter). Suspended solids are measured continuously by turbidity (or an alternate surrogate) or every three hours by discrete samples."

Control Level

Under the *EPS* (Section 4.1.2 Volume 2, pp. 93-95), the Control Level would be exceeded if any of the following conditions occurs:

- "The Total PCB concentration during dredging-related activities at any downstream far-field monitoring station exceeds 350 ng/L for a seven-day running average."
- "The net increase in Total PCB mass transport due to dredging-related activities at any downstream far-field monitoring station exceeds 600 g/day on average over a seven-day period."
- "The net increase in Tri+ PCB mass transport due to dredging-related activities at any downstream far-field monitoring station exceeds 200 g/day on average over a seven-day period."
- "The net increase in PCB mass transport due to dredging-related activities measured at the downstream far-field monitoring stations exceeds 65 kg/year Total PCBs or 22 kg/year Tri+ PCBs."
- "The sustained suspended solids concentration above ambient conditions at a far-field station exceeds 24 mg/L. To exceed this criterion, this condition must exist for a period corresponding to the daily dredging period (six hours or longer) or 24 hours if the operation runs continuously (whichever is shorter) on average. Suspended solids are measured continuously by surrogate or every three hours by discrete samples."

Standard Level

Under the *EPS* (Section 4.1.3 Volume 2, p. 98), the Standard Level is "a confirmed occurrence of 500 ng/L Total PCBs, measured at any main stem far-field station. To exceed the standard threshold, an initial result greater than or equal to 500 ng/L Total PCBs must be confirmed by the average concentration of four samples collected within 48 hours of the first sample. The standard threshold does not apply to far-field station measurements if the station is within one mile of the remediation." The requirement for confirmation by four samples has been modified, as described in Section 2.2.2.3, by a requirement that, to

exceed the standard threshold, an initial result greater than or equal to 500 ng/L Total PCBs must be confirmed by the average concentration of triplicate samples collected within 24 hours of the first sample.

2.1.2 WQ Requirements

The EPA, in consultation with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH), has specified water quality standards for a number of constituents that are not subject to the EPS and that will be monitored for compliance during Phase 1 of the Remedial Action. The objectives of these WQ requirements are:

- Protection of aquatic species via Aquatic Acute standards;
- Protection of drinking water supplies via Health (Water Source) standards; and
- Protection of drinking water supplies via New York State Department of Health (NYSDOH) action levels.

Aquatic Acute Water Quality Standards at Near-Field Stations

The *WQC Substantive Requirements* (pp. 1 & 2) set forth the following standards for near-field stations:

- "Aquatic standards (some of which are hardness-dependent) apply to the dissolved form. Hardness varies along the length of the project area and will result in a range of calculated standards. For example, based on limited available data, average hardness values from Corinth and Waterford range from 18 ppm to 55 ppm respectively. The resulting ranges of water quality standards are as follows (where applicable, the formulas for calculating the standards are in brackets):
  - cadmium – Aquatic Acute A(A): 0.6 µg/L to 2.0 µg/L [(0.85) exp(1.128[ln (ppm hardness)] – 3.6867)]
  - lead – Aquatic Acute A(A): 14.4 µg/L to 50.4 µg/L [{1.46203 – [ln (hardness) (0.145712)]} exp (1.273 [ln (hardness)] – 1.052)]
  - chromium – Aquatic Acute A(A): 140 µg/L to 349 µg/L [(0.316) exp (0.819 ln (ppm hardness)) + 3.7256)]
  - chromium (hexavalent) – Aquatic Acute A(A): 16 µg/L
  - mercury – Aquatic Acute A(A): 1.4 µg/L"

- "Water quality standards for pH and dissolved oxygen are specified in NYCRR Title 6, Chapter X, Part 703.3.
  - pH shall not be less than 6.5 nor more than 8.5.
  - Dissolved oxygen for non-trout waters:
    - The minimum daily average shall not be less than 5.0 mg/L.
    - At no time shall the dissolved oxygen concentration be less than 4.0 mg/L."

Based on review of the historical data, routine monitoring for compliance with the foregoing Aquatic Acute standards for dissolved metals shall be limited to analyses for dissolved cadmium and lead, with total cadmium and lead analyses performed as well. It is expected that the monitoring of lead and cadmium should adequately represent the metals associated with sediment resuspension. The EPA, GE, and NYSDEC will evaluate whether mercury and chromium concentrations are adequately represented by lead and cadmium concentrations based on the Baseline Monitoring Program (BMP) data, Treatability Study data, any additional sediment data that become available, and/or water column data collected during Phase 1. Based on evaluation of these data, these monitoring requirements may be modified upon agreement of EPA (after consultation with NYSDEC) and GE. GE shall report the analytical results for the entire target analyte list (TAL) of metals (dissolved form) that are analyzed by EPA Method 200.8 (which exclude mercury and hexavalent chromium, which are analyzed by separate methods – see subsection 2.4.4), as well as total lead and cadmium. As discussed further in subsection 2.4.4, if monitoring indicates that the dissolved cadmium and/or lead concentrations exceed the above standards, GE shall collect, analyze, and report the results of samples (in both dissolved and total form) for the entire TAL suite of metals. If, during in-water activities, distressed or dying fish are observed, GE shall conduct increased monitoring for metals and additional water quality parameters, where appropriate, in accordance with the PSCP Scope (Section 7.5) and *WQ Substantive Requirements* (p. 8).

Health (Water Source) Standards at Far-Field Stations

The *WQ Substantive Requirements* (p. 2) set forth the following Health (Water Source) standards for cadmium, chromium, and mercury and the following action level for lead (as modified in Attachment A to Consent Decree Modification No. 1 regarding the stations to which they apply). These standards and action levels are based on total form and are not hardness dependent, and they are not to be exceeded at any of the Thompson Island, Schuylerville, or Waterford far-field stations.

- Cadmium (total): 5.0 μg/L.
- Chromium (total): 50 μg/L.
- Mercury (total): 0.7 μg/L.
- Lead (total): 15.0 μg/L (NYSDOH action level).

In addition, the WQ requirements (as modified in Attachment A to Consent Decree Modification No. 1) incorporate the NYSDOH's trigger level of 10 μg/L total lead for two far-field stations (Schuylerville and Waterford) to protect water suppliers and the public, and state that if that trigger level is exceeded, certain notification and/or response actions must be taken, as described in the PSCP and its Scope.

Determination of an exceedance of the above standards and action level requires a "confirmed occurrence" – i.e., four subsequent samples exceeding the standard/action level, each representing a 6-hour composite, as specified in the *WQ Substantive Requirements* (p. 7).

Based on review of the historical data, routine monitoring for compliance with the foregoing standards and action/trigger levels shall be limited to analyses for total cadmium and lead, with dissolved cadmium and lead analyses performed as well. It is expected that the monitoring of lead and cadmium should adequately represent the metals associated with sediment resuspension. EPA, GE, and NYSDEC will evaluate whether mercury and chromium concentrations are adequately represented by lead and cadmium concentrations based on the BMP data, Treatability Study data, any additional sediment data that become available, and/or water column data collected during Phase 1. Based on evaluation of these data, these monitoring requirements may be modified upon agreement of EPA (after consultation with NYSDEC) and GE. GE shall report the analytical results for all TAL metals (total form) that are analyzed by EPA Method 200.8 (i.e., excluding mercury and hexavalent chromium, which are analyzed by separate methods – see subsection 2.4.4), as well as dissolved cadmium and lead. As discussed further in subsection 2.4.4, if monitoring indicates that the total cadmium concentration exceeds the cadmium standard or that the total lead concentration exceeds the lead action or trigger level, GE shall collect, analyze, and report the results of samples (in both dissolved and total form) for the entire TAL suite of metals. If, during in-water activities, distressed or dying fish are observed, GE shall conduct increased monitoring for metals and additional water quality parameters, where appropriate, in accordance with the PSCP Scope (Section 7.5) and *WQ Substantive Requirements* (p. 8).

2.2 Monitoring Locations and Frequency

GE shall sample at the near-field and far-field monitoring locations and frequency specified in the *EPS* Volume 2, Sections 4.2.4, 4.2.5 and 4.2.6, except for modifications approved by EPA and documented herein.

Monitoring will be required for at least the remedial operations listed below. Other operations related to dredging may be included as well (*EPS* Volume 2, p. 102):

- Dredging
- Debris removal
- Resuspension control equipment removal
- Cap placement
- Backfill placement
- Installation of containment devices other than silt curtains (sheet piling and other structural devices requiring heavy equipment operation and disturbance of the river bottom)
- Shoreline excavation and restoration

The following remedial operation will not require near-field monitoring:

- Silt curtain placement

2.2.1 Near-Field Monitoring

Near-field monitoring is associated with individual remedial operations and will move as the monitored operation moves. GE shall monitor each remedial operation using buoys deployed upstream and downstream of the operation and a boat moving along transects oriented perpendicular and parallel to the direction of flow, as described below. GE shall conduct monitoring every day that the remedial operations are active, subject to a potential reduction in the scope of the metals monitoring program as described in Section 2.2.1.5.

The monitoring program described in this section applies to the Northern Thompson Island Pool (NTIP) dredging areas. The remedial operations conducted in the EGIA (and part of NTIP later in the construction season) will be monitored as part of a special study described in Section 8.3.

2.2.1.1 Buoy Monitoring

Continuous monitoring for TSS, metals, hardness, dissolved oxygen, temperature, turbidity, conductivity, and pH shall be performed by GE using buoys equipped with automated samplers and direct reading probes. One buoy will be placed approximately 100 m upstream of each remedial operation, and a second buoy shall be placed approximately 300 m downstream (or 150 m downstream of the most exterior downstream resuspension barrier). The actual positions of the buoys may deviate from the specified distances as necessary to keep them in accessible locations (e.g., adequate water depth to collect data and allow servicing by boat). The downstream buoy shall be relocated up to two times per day to keep it within the plume identified by the real-time turbidity data obtained during the boat-run transects (Section 2.2.1.2). The 100 m upstream buoy shall be relocated up to two times per day to keep it in a position that is approximately 100 m upstream and the same distance from shore as the monitored operation. These requirements are based on the current design which anticipates dredging to occur in nominal 50-foot by 100-foot cells oriented with the long axis parallel to flow at the rate of one cell per day. In the event that the actual cell size, orientation, or rate is substantially different, additional adjustments of the buoy locations may be required.

These buoys shall be equipped with water quality sondes and automatic water samplers. These automatic samplers shall be programmed to collect four 6-hour composite samples for TSS analysis per day. Samplers deployed on these buoys shall also be programmed to collect one 24-hour composite sample for hardness and metals analyses.

An additional buoy shall be located upstream of all remedial activity to provide background metals data for all operations during Phase 1, along with background TSS data for operations located in the East Channel at Rogers Island (see Section 2.2.1.3). This buoy shall be equipped with a water quality sonde and an automatic water sampler to collect 24-hour composite water samples for TSS, metals, and hardness analyses.

The method and frequency of reporting the data from the automated buoy monitoring stations will be presented in the Phase 1 RAM QAPP, subject to review and approval by EPA.

2.2.1.2 Transect Monitoring

The transect locations are dictated by the near-field criteria and are described in this subsection (except for the East Channel of Rogers Island, which is discussed separately in Section 2.2.1.3). The upstream perpendicular transect shall be located about 100 m upstream of the dredging activity and shall extend from shore to shore (within the navigational limits of the survey vessel, which shall be specified with a draft of 2 feet or less) to provide water quality data for the water entering the dredging area. To monitor for resuspension caused by workboats, GE shall place a parallel transect adjacent to the dredging activity, at the edge of the main channel adjacent to the principal location of boat and barge activity supporting the dredging activity. The parallel transect shall be located reasonably close to workboat activity (approximately 10 m away from the dredging operation), subject to the safety procedures described in the *Remedial Action Health and Safety Plan* (RA HASP; Parsons, 2007, or any updated version) and shall run from the upstream cross-channel transect to the first perpendicular transect placed downstream of the dredging operation. The downstream perpendicular transect nearest the dredging activity (100 m downstream of the activity or 50 m downstream of the most exterior resuspension control system) shall extend from shore to shore (as defined above). The 50 m or 100 m distance will be determined along a line beginning at the location of the dredge and running parallel to the centerline of flow. The transect further downstream shall be located approximately 300 m downstream of the dredging operation or 150 m downstream of the most exterior downstream resuspension barrier, following the same distance determination basis used for the 100 m transect. This transect shall also extend from shore to shore (as defined above). The locations of these transects will be adjusted, as necessary, once per day during the daytime.

GE shall use a boat-mounted continuous-reading water quality sonde to monitor the TSS plume generated by the operation being monitored . The data obtained during the transect monitoring will be uploaded to the project database twice per day (i.e., after each transect run). In the event that a dredging area is isolated by a resuspension control barrier, an additional monitoring location shall be added within the control barrier. The distances from the remedial operations are approximate and the location of the near-field transects may be changed in the field to better capture the plume, if EPA approves the change.

If remedial operations are located in close proximity to one another, it may not be practical to monitor the individual operations. In such cases, a single transect set (one upstream perpendicular, one parallel, and two downstream perpendicular) will be used to monitor the multiple operations, subject to the requirements for reduction in the near-field monitoring locations specified in the *EPS* Volume 2, Section 4.2.5. Decisions to modify the sampling scheme in this manner must be documented in the weekly reports.

The near-field transect monitoring shall be conducted from a survey boat equipped with a continuous-reading water quality sonde, water sampling equipment, and a global positioning system (GPS). Transects will be monitored two times per day during a daylight work shift on every day that a remedial operation is active. Night-time transect monitoring will not be conducted; however, night-time data shall be obtained from continuous monitoring that will be conducted using the buoys described in Section 2.2.1.1. Additionally, any PCB-releases during night-time hours will be captured in the composite sampling conducted at the far-field stations.

GE shall collect one TSS sample per transect run (i.e., two samples per transect per day, or a total of six samples per operation per day) manually at the point along each transect that exhibits the highest turbidity value. The TSS data from the 50 m or 100 m downstream transect and the 10 m side transects will be used for confirmation of the calculated TSS values, based on turbidity measurements, that are used to assess compliance with the EPS TSS criteria applicable at those distances, as discussed in Section 2.2.1.4. In addition, the six discrete TSS samples collected by boat each day, together with 6-hour composite TSS sample collected from each buoy monitor per day, will be used to update and refine the TSS/turbidity relationship developed to allow use of turbidity measurements as a surrogate for TSS. This relationship will be presented in the RAM QAPP.

GE shall also collect metals samples twice per day from the 300 m downstream transect (or 150 m downstream transect where resuspension barriers are used) at a location along the transect that exhibits the highest turbidity value.

If the 24-hour composite metals samples collected from the downstream buoys or the transect metals samples indicate that one or more of the Aquatic Acute standards have been exceeded, GE shall collect additional samples for metals analysis during four transect runs per day around the dredging operation where the exceedance was observed. This additional contingent sampling shall consists of the manual collection of four samples per day from the transect 300 m downstream of the dredging operation if no

resuspension barriers are used or the 150 m downstream transect if resuspension barriers are used. These samples shall be collected at the point along the transect that exhibits the highest turbidity value. If a plume cannot be identified, the samples shall be collected at a point that is approximately the same distance from shore as the operation that is being monitored. In this situation, all samples collected from the area around the dredging operation in question (including both the 24-hour composite samples from the downstream buoys and the grab samples collected from the transects) shall be analyzed for the entire TAL suite of metals in both total and dissolved form, as well as hardness, until such time as the metals concentrations fall below the standards (see Section 2.4.4).

2.2.1.3 Rogers Island East Channel

The Phase 1 Final Design Report (BBL, 2006) calls for isolation of the East Channel of Rogers Island by a rock wall at the upstream end of the island and a silt containment system at the downstream end of the island. Because of the unique nature of this portion of the design, GE shall conduct near-field monitoring of remedial activities in the East Channel of Rogers Island using a boat moving along a single transect located about 25 m downstream of the silt containment system and following the procedures for the 300 m downstream transect that are described in Section 2.2.1.2.

Additionally, three monitoring buoys will be deployed by GE to monitor operations in the East Channel. One buoy will be located within the contained area in the vicinity of the wastewater treatment facility discharge. The other two buoys will be deployed downstream of the silt curtain in close proximity to the transect location. The buoys will be equipped with continuous-recording WQ sondes and automatic samplers. The samplers will be programmed to collect one 24-hour composite sample per day for hardness/metals analysis and four 6-hour composite samples per day for TSS analysis. Background conditions for the East Channel will be determined using the upstream buoy described in Section 2.2.1.1.

2.2.1.4 Application of Near-Field Data to EPS and WQ Criteria

Compliance with the 150 or 300 m downstream EPS criterion for TSS shall be assessed using data collected by the buoy located downstream of each operation. The criterion is specified as a 6-hour average TSS concentration. To obtain the appropriate data, 6-hour composite samples shall be collected for TSS analysis.

GE shall assess compliance with the 50 or 100 m downstream and the 10 m side channel TSS criteria using TSS concentrations calculated from turbidity measurements made on the applicable transects, based on the TSS/turbidity relationship. Turbidity measurements provide near-real time results that can be correlated with dredging activities thereby permitting the association of dredging activities with any observed exceedances. The samples for TSS analysis which will be collected at the point where the highest turbidity was measured will be used to provide affirmation of the turbidity observations. Values exceeding 700 mg/L TSS for both transect runs during a day will constitute a confirmed exceedance of the EPA criterion. During the transect runs at the near-field side channel or at 100 m downstream, a turbidity value equivalent to 700 mg/L TSS or greater will prompt a closer look at the data obtained at the 300 m downstream buoy and a review of the dredge operations. Furthermore, if concentrations at the near-field side channel transect or the 100 m downstream transect suddenly increase to levels above the TSS equivalent of 700 mg/L, having routinely been lower than this threshold, a detailed review and possible adjustment to the dredging operation will be made.

Real-time turbidity data will also be transmitted to the data management system every 15 minutes from near-field monitoring buoys and used to estimate a 6-hour TSS average using the TSS/turbidity relationship. These real-time data will be made available to the dredging contractor to inform dredging operations and aid in improving best management practices.

For the East Channel at Rogers Island, the two buoys located adjacent to the downstream transect shall be considered to be the 150 m downstream buoys for assessing compliance with the EPS TSS criteria.

Compliance with the WQ requirements for metals shall be assessed using data obtained from the 24-hour composite samples collected from the buoys located downstream of each operation and the manually collected samples obtained from the transects. Compliance with the remaining WQ requirements (dissolved oxygen and pH) shall be assessed using data collected from the downstream buoys and the boat-run transects.

2.2.1.5 Changes to Near-Field Program During Phase 1

Consistent with the *WQ Substantive Requirements* (pp. 5-6), if data on metals collected during the first month of Phase 1 dredging show that the concentrations of metals are substantially below the applicable water quality standards, the scope of the metals sampling program described above will be reduced for the

remainder of Phase 1, with the scope of such reduction subject to approval by EPA after consultation with NYSDEC. For purposes of the foregoing sentence, concentrations of metals will be considered to be substantially below the applicable standards so long as, for each metal monitored, the mean value for downstream samples over the first month is less than 20% of the standard, and no individual value exceeds 50% of the standard. In addition, in the event that an individual value is greater than 50% but less than 75% of the standard, EPA and GE will evaluate the situation for a potential reduction in the scope of the metals sampling program; and if EPA agrees, such a reduction will be made. The sampling program will not be scaled back until the effectiveness of the automated sampler is demonstrated under actual dredging conditions.

Furthermore, after any such reduction in the metals monitoring program, in the event that a single metals sample shows a concentration greater than 70% of the Aquatic Acute standard for any regulated metal in subsequent near-field or far-field monitoring results, the metals sample collection program will return to the initial program described above (i.e., two transects per day plus buoy sampling) until metals levels are shown to return to pre-event conditions for a period of at least one week. Additionally, the metals monitoring program will return to the initial sampling frequency when dredging is being performed in an area (if any) identified by EPA as having high metals concentrations**.** Finally, if there is any exceedance of the Aquatic Acute standards, monitoring will be increased as described in Section 2.2.1.2.

Other adjustments to the monitoring program described above may also be appropriate, and will be presented to EPA for review and approval in the form of correction action memoranda (CAMs).

2.2.2 Far-Field Monitoring

GE shall begin the far-field monitoring program described herein one week before the commencement of operations in the river for a given season and shall conduct that program until water quality returns to average baseline conditions but no later than two weeks after dredging operations have ceased for that season. The far-field stations shall coincide with the stations established for the BMP, except where such stations need to be relocated to accommodate automated sampling. A correction may need to be applied to the baseline data to properly determine compliance with the load-based resuspension criteria. The correction factor will be developed during baseline based on additional data collection and analysis (GE's baseline automated sampler study). The far-field stations include a background station at Bakers Falls

and the following five Upper Hudson River stations that will be used to assess achievement of the applicable far-field criteria:

- Rogers Island (River Mile [RM] 194.5);
- Thompson Island (RM 187.5);
- Schuylerville (RM 181.4);
- Stillwater (RM 168.4); and
- Waterford (RM 156.0).

Two additional far-field stations shall be located in the Lower Hudson River at Albany (RM 140) and Poughkeepsie (RM 77). A third station at the Mohawk River at Cohoes, which has historically shown low levels of PCB, shall be monitored every other month. EPA has approved this deviation from the *EPS* (i.e., contingency monitoring is not required); however, EPA may require higher frequency sampling during Phase 1, if warranted, at the Mohawk River station (e.g., concentrations are greater on average than measured during baseline).

GE is operating an automated sampling station at Lock 5 (RM 182.3) on a pilot basis in accordance with the *Scope of Work for Pilot Studies for Automated Near- and Far-Field Water Column Sampling* (QEA, 2005b). This automated station shall replace the Schuylerville BMP station after appropriate testing is completed, subject to EPA approval. Automated samplers shall also be used at Thompson Island and Waterford. Sampling at Rogers Island shall be conducted upstream of all dredging operations at a location approximately ¼ mile upstream of the current station. Sampling at Rogers Island shall be performed manually on a weekly basis under routine conditions, but shall be increased to daily sampling for a minimum of 2 days in the event of an exceedance of the 500 ng/l standard level at Thompson Island or Schuylerville, as described in Section 2.2.2.2. Stillwater shall also be sampled manually on a weekly basis. The Thompson Island and Waterford automated sampling stations are currently being designed. The Schuylerville automated station has been, and the Thompson Island station will be, constructed such that water can be automatically sampled from a number of locations along a cross-sectional transect and water quality parameters can be monitored continuously. The Waterford station is being designed to collect representative data; however, river conditions and concerns raised by the New York State Canal Corporation preclude sample collection along a cross-sectional transect at this location. Given the

distance of travel from the dredging operations to this station, it is anticipated that the cross-sectional concentration of PCBs will be well mixed. Thus, collecting a single sample at a point in the river should be representative of average conditions along the cross-section at this station. This relationship will be verified during the BMP. Once the automated stations have been constructed and tested, and EPA has reviewed the test data and approved use of the stations for the BMP, automated sampling techniques shall replace manual BMP sampling protocols at these far-field locations. However, GE shall maintain the capability to perform manual sampling on a daily basis under routine monitoring conditions, using the BMP sampling protocols, in the event that an automated station fails or is off-line for maintenance under such conditions.

Monitoring for assessment of the far-field criteria shall be conducted at each downstream far-field station that is a minimum of 1 mile away from the dredging activity. The Thompson Island station will be the nearest representative downstream far-field station for the entire Phase 1 dredging program because this program will terminate at about RM 189.8. The Thompson Island station will serve as a compliance check point for near-field exceedances of TSS at the Evaluation and Control Levels (*EPS* Volume 2, p. 117, "Exceedance of the Near-Field Resuspension Criteria"). Following Phase 1, recommendations for modification of the RAMP during Phase 2 (if necessary) will be developed based on the data from Phase 1.

In the event that dredging occurs in more than one river section, effectively creating two nearest far-field stations, this standard applies in the same manner to both stations. That is, the far-field concentration criteria apply to both stations equally. Given the various uncertainties in load estimation, no pro-rating of the standard for the upper station will be required, although GE could consider doing so, as needed. This means that any of the far-field stations can dictate response actions. In the event that dredging operations move to a location less than one mile upstream of a far-field monitoring point, the next downstream far-field station will become the representative far-field station for the operation. The nearer far-field station will continue to be monitored at the routine level, not to judge compliance with the standard, but rather to provide data to allow comparison of the far-field station to the new far-field compliance station.

Rogers Island will serve as the upstream far-field station that will be used to assess PCB load contributions originating upstream of the remediation area. The statistical criteria for this assessment shall utilize those described in the *EPS* (Volume 2, Section 4.1.4.3) and will be included in the PSCP and Phase 1 RAM QAPP.

2.2.2.1 Bakers Falls

To provide upstream data for application of some of the resuspension criteria, monthly background samples shall be collected at Bakers Falls for PCB, TSS, dissolved organic carbon (DOC), and particulate organic carbon (POC) analysis. These samples shall be collected using the manual BMP sampling protocol. Discrete measurements of water quality parameters (turbidity, temperature, pH, conductivity and dissolved oxygen) will be taken at the time of sample collection. The sampling results shall be reported within 7 days of collection.

2.2.2.2 Rogers Island

Weekly PCB, TSS, DOC, and POC samples shall be collected at Rogers Island using the BMP manual sampling technique. Water quality parameters (turbidity, temperature, pH, dissolved oxygen, and conductivity) shall be monitored during each sampling event at the Rogers Island station. The sampling results shall be reported within 7 days of collection.

In the event that PCB concentrations equal or exceed 500 ng/L at Thompson Island and/or Schuylerville, a sample shall be collected as soon as practicable at Rogers Island, but no later than the next day. Once per day sampling shall continue for a minimum of two days to confirm that the increase is not related to upstream activities. These sampling results shall be reported within 24 hours of collection. If these sample results indicate that the downstream increases in PCB concentration are not related to upstream loading, sampling will return to weekly at Rogers Island.

2.2.2.3 Thompson Island, Schuylerville, and Waterford

GE shall conduct routine monitoring at the Thompson Island, Schuylerville, and Waterford stations at a frequency sufficient (aliquots collected once per hour at a minimum) to verify that short-term (1 hour or more) elevated dredging-induced releases do not pass that far-field station undetected. To meet this requirement, continuous monitoring shall be performed for DO, pH, conductivity, temperature, and turbidity. A surrogate relationship between TSS and turbidity shall be in place prior to Phase 1 and shall be presented in the Phase 1 RAM QAPP. Daily composite PCB, metals, TSS, DOC, and POC samples shall be collected at these stations, with results from Thompson Island reported within 8 hours of collection for PCBs (using an Aroclor-based analytical method, as described below) to the maximum

extent practicable and 24 hours of collection for other constituents, those from Schuylerville reported within 24 hours of collection, and those from Waterford reported within 72 hours of collection. (See also Sections 2.2.2.4 and 2.4.2 regarding PCB analytical methods and turnaround times.) Modeling indicates that a 1-hour long dredging release that originates from the furthest downstream point of the Phase 1 areas in River Section 1 will result in elevating the concentrations of monitored parameters at the Thompson Island station for several hours due to dispersion.

Sample aliquots shall be obtained at a frequency that is appropriate for the amount of sample required over the sampling period, consistent with the capabilities of the automated sampling equipment. Since the representativeness of samples will increase as the frequency of collection of sample aliquots increases, the capabilities of the automatic samplers have been assessed, and the highest sample collection frequency that can be practically achieved on a routine basis (hourly aliquots) shall be used. These aliquots shall be used to form 24-hour composites. This sampling frequency will ensure that multiple measurements will occur during the minimum release of interest.

In the event that the Thompson Island automated station fails, 12-hour composite samples shall be collected at the Schuylerville station and shall be submitted for PCB analysis using an Aroclor PCB analytical method with a rapid turnaround time (8 hours to the maximum extent practicable) in lieu of the modified Green Bay Method. If manual sampling is conducted at Thompson Island or Schuylerville due to a failure or maintenance of the automated sampling station, the daily discrete sample shall be collected with consideration of time of travel from dredging operations.

If the Standard Level of 500 ng/L has been reached or exceeded at the Thompson Island station or Schuylerville station, the daily composite samples from these two stations shall be submitted in triplicate, and the results of these analyses shall be reported within 8 hours for Thompson Island (to the maximum extent practicable) or 24 hours for Schuylerville. If the average concentration of the triplicate samples collected within the first 24 hours after the initial result confirms that the concentration is equal to or greater than 500 ng/L, the appropriate notification and contingency measures for a confirmed exceedance of the Standard Level shall be implemented in accordance with the PSCP and RA CHASP.

During any times that the Towns of Waterford and Halfmoon are obtaining water from Troy on a full-time basis during dredging and that carbon treatment is installed at the Village of Stillwater water supply system during dredging, the PCB analytical methods and turnaround times described above in this section shall not apply and shall be replaced with the following: Analyses of PCBs using an Aroclor-based

method at Thompson Island (and if necessary, Schuylerville) will not be required, and samples from all stations shall be analyzed for PCBs using the modified Green Bay Method. PCB analytical results shall be reported within 24 hours of collection for Thompson Island and Schuylerville and within 72 hours of collection for Waterford. After the first month of dredging and data collection, the turnaround time of 24 hours at Schuylerville shall be evaluated for possible reduction to 72 hours, subject to EPA approval (except that if the Thompson Island automated station fails, the analytical results of the samples from Schuylerville shall be reported within 24 hours of collection).

The routine monitoring for metals at these far-field stations, as well as the contingency monitoring to be conducted in the event of an exceedance of an applicable criterion, were discussed in Section 2.1.2 and are also described in Section 2.2.2.8.

2.2.2.4 Water Supply Notification Sampling

Water supply notification sampling has been designed to obtain PCB data in sufficient time to allow the Towns of Waterford and Halfmoon to switch over to Troy water should PCB concentrations be detected at or above 500 ng/L at Thompson Island. The sampling procedures described in this section will not be required during times that the Towns of Waterford and Halfmoon are obtaining water from Troy on a full-time basis.

GE shall track flow in the Upper Hudson River and shall estimate the time of travel between the Phase 1 dredge areas and the downstream water intakes at Halfmoon and Waterford for the period of composite sample collection beginning at the start of sample collection. The procedures for estimating time of travel will be included in the Phase 1 RAM QAPP and will be reviewed and revised as necessary for the Phase 2 RAM QAPP. If the estimated time of travel from the Thompson Island station to the Halfmoon water intake over the first 12 hours of compositing is less than 36 hours (i.e., if the average river flow at Fort Edward is greater than about 8,000 cfs or if the flow rate is less than 8,000 cfs but the hydrograph is increasing), GE shall terminate the compositing at Thompson Island at 12 hours, and shall collect and analyze two 12-hour composite samples on that day, using the same Aroclor-based PCB analytical method used routinely at this station. As noted above, in the event that the automated sampler at Thompson Island fails, GE shall collect 12-hour composite samples at Schuylerville and submit them for Aroclor PCB analysis in lieu of PCB analysis using the modified Green Bay Method.

All composite samples collected from Thompson Island (and those collected from Schuylerville for Aroclor PCB analysis if the Thompson Island automated sampler fails) shall be submitted to the laboratory within two hours of the collection of the last aliquot. These samples shall be analyzed for Aroclor PCBs and the results reported within approximately 8 hours, to the maximum extent practicable. At a minimum, the data shall be provided during normal working hours if practicable, and such that, to the maximum extent practicable, at least 4 hours advance notice prior to the estimated arrival of a contaminated water parcel at the downstream water supply intakes is provided to EPA, NYSDEC, NYSDOH, and the water suppliers. GE shall have adequate backup monitoring systems in place, and shall require its laboratories to have backup analytical systems in place, so as to minimize the potential for delays in obtaining the data to provide timely notification to the public water suppliers.

If GE notifies EPA, pursuant to Paragraph 15.c of the Consent Decree, that it will perform Phase 2 of the Remedial Action, then for Phase 2 dredging that is performed upstream of the Halfmoon and Waterford intakes, GE shall estimate the time of travel between the Phase 2 dredge areas and those intakes, and shall perform water supply notification sampling in accordance with the requirements set forth above, subject to any modifications to such requirements that EPA makes after completion of the Phase 1 dredging but before GE notifies EPA, pursuant to the Consent Decree, whether it will perform Phase 2.

2.2.2.5 Stillwater

The Stillwater station shall be sampled by GE manually on a weekly basis using the BMP protocols (i.e., collection of vertically integrated aliquots from five equal discharge increment locations). The results of the analyses shall be reported within 7 days.

2.2.2.6 Lower Hudson River and Mohawk River

The Lower Hudson River stations at Albany and Poughkeepsie shall be sampled every four weeks (*EPS* Volume 2 p. 115) using the manual BMP sampling protocol (i.e., vertically-integrated sampling at a centroid location). (This low frequency is contingent on the results of the BMP showing Total PCB concentrations less than 100 ng/L on average to allow a margin of safety for the public water supplies [*EPS* Volume 2 p. 115].) The results of the analyses shall be reported within 7 days.

If a single sample equals or exceeds 350 ng/L of total PCBs at Waterford, the sampling frequency shall be increased to weekly at Albany and maintained at that level until the conditions for reverting to routine monitoring are met as specified in Section 4.3 of the *EPS* (Reverting to Lower Action Levels). Sampling frequency at Poughkeepsie shall also be increased to weekly when PCB concentrations measured at Albany exceed at least 350 ng/L. GE shall collect samples for PCBs, DOC, POC and suspended solids. Water quality parameters will be measured on each sample (turbidity, temperature, pH, conductivity and dissolved oxygen). The results of these analyses shall be reported within 24 hours.

The Mohawk River station shall be sampled once every other month from May through November to maintain the historical record; these samples shall be collected manually from a centroid location and shall be vertically integrated. If the PCB concentrations at Albany are shown to exceed those at Waterford, GE shall collect a grab sample at the Mohawk River at Cohoes to investigate whether the Mohawk is the source of elevated PCB levels in the Lower Hudson River. If sampling indicates that PCB levels in the Mohawk River have increased significantly, the Mohawk River station shall be sampled at the same frequency as the Albany and Poughkeepsie stations during Phase 1. The results of the analyses shall be reported in accordance with standard laboratory turnaround time.

2.2.2.7 Dredging in Additional Locations

The above-described monitoring contingencies are for remediation of River Section 1 more than one mile upstream from the Thompson Island monitoring location. During dredging in River Sections 2 and 3, the two stations downstream of the dredging will have the parameters, frequency, sampling methods, and turn-around times associated with the Thompson Island and Schuylerville as described above, and stations below these stations will have the parameters, frequency, sampling methods and turn around times associated with Stillwater and Waterford, also as described above (*EPS* Vol. 2 p. 113).

If the remediation is conducted simultaneously in more than one river section, more than two stations are representative. If there were an accidental release in a section that was not undergoing remediation at that time, the two stations at least one mile downstream of the accidental release would be representative until the situation was resolved. Representative stations must always be more than one mile downstream from the source of the resuspended material. In the event that a far-field suspended solids resuspension criterion is exceeded, the far-field station would be monitored for PCBs (*EPS* Volume 2 p. 113).

2.2.2.8 Monitoring for Parameters Under WQ Requirements

To comply with the WQ Health (Water Source) standard, daily composite samples shall be routinely collected for metals analysis at Thompson Island, Schuylerville, and Waterford, with sample aliquots collected at a frequency of once per hour. In the event of an exceedance of an applicable standard (or the trigger level for lead), the sampling frequency shall be increased to four composites per day with sufficient volume collected to analyze for dissolved and total metals (see Section 2.4.4). If manual monitoring is implemented due to automated station failure or maintenance, discrete sampling shall be conducted with consideration of time of travel. The results of TSS samples collected in conjunction with Resuspension Standard monitoring may substitute for those required for WQ requirements, provided that the number of samples and timing of sample collection corresponds to those collected for metals analyses. Continuous turbidity monitoring for the WQ requirements shall be performed in conjunction with monitoring for the Resuspension Standard. Analytical results for metals shall be reported within 24 hours of collection at Thompson Island and Schuylerville and 72 hours at Waterford.

2.3 Sampling Methods

The design of the sampling program is based on the need to meet the following objectives:

Objectives for Far-Field Monitoring in the Upper Hudson

- Provide a set of data to demonstrate compliance with the Resuspension Standard Total and Tri+ PCB concentration thresholds.
- Provide a set of data to demonstrate compliance with the WQ requirements.
- Provide a means to rapidly assess water column Total PCB levels so that EPA can advise public water suppliers when water column concentrations are expected to approach or exceed the federal MCL (i.e., 500 ng/L) during the remediation.
- Provide a set of data to demonstrate compliance with the Total PCB load components of the Resuspension Standard (i.e., 300 g/day and 600 g/day).
- Determine the primary means of PCB release via dredging-related activities.
- Determine the baseline Total PCB levels entering River Section 1 from upstream sources.

- Determine ancillary remediation-related effects on the river (e.g., barge traffic-related resuspension, spillage during transit or off-loading of sediment) that may occur in areas that are not captured by the nearest representative far-field station.

Objectives for Near-Field Monitoring in the Upper Hudson

- Provide a real-time indication of suspended solids release in the near field.
- Provide a set of data to demonstrate compliance with the WQ requirements.
- Determine the amount of suspended solids released by the remedial operations to provide an indication of PCB export.
- Verify that the NYSDEC surface water quality regulations are not violated during the remediation.

Additional Monitoring Objectives

- Monitoring in the Lower Hudson to examine the effect of Upper Hudson dredging activities on Lower Hudson PCB concentrations.
- Verify the selection of the monitoring locations.
- Non-Target Area Monitoring: Determine the degree and extent of contamination resulting from the remedial operations downstream from the target areas. (See Section 8.)

Adjustments to the sampling program shall be made through CAMs, subject to EPA approval.

No splitting of water samples is permissible for any measurements that must accurately reflect the suspended solids content. If duplicate samples are required, the sample bottles for the duplicate and sample analysis can be deployed at once or in series to generate co-located samples. Sample bottles for PCB and suspended solids analysis should be deployed simultaneously if possible (*EPS* Volume 2 p. 110).

During the BMP, GE has conducted testing of automated sampling systems for both near-field and far-field monitoring and has submitted a summary report on those pilot studies to EPA on February 1, 2008. These studies will be considered complete upon resolution of a number of questions that EPA has raised

about them, as well as resolution of issues concerning the equipment and representativeness of the data, subject to EPA review and approval. In addition, GE is continuing to operate the far-field automated pilot sampler. Based on the results of these tests, the Phase 1 RAM QAPP will provide necessary details on the sampling program. In the event that the automated samplers are not able to provide data of adequate quality to address the Resuspension Standard, the Phase 1 RAM QAPP will provide an alternate monitoring method to evaluate compliance with the Resuspension Standard monitoring requirements. In this case, the Phase 1 RAM QAPP will provide for the collection of data required at the routine level, and GE shall use best efforts to propose a program to address the objectives of the Resuspension Standard at higher action levels. In addition, the Phase 1 RAM QAPP will specify contingencies in the event of automated sampler failure during dredging.

2.3.1 Near-Field Monitoring

Near-field monitoring requires the collection of water column monitoring data for field parameters (temperature, specific conductance, pH, DO, turbidity), TSS, metals, and hardness. Field parameters shall be acquired using a YSI 6000 Series multi-parameter sonde (or equivalent). This instrument shall be operated from a boat as it travels along the monitoring transects. The sonde shall be deployed at a conservative depth in the water column (i.e., toward the bottom of the water column) at ~ 75% of the water column depth or a minimum of 2 feet off the bottom. TSS, hardness, and metals samples shall be collected manually at the same depth at which the water quality monitoring probes are deployed, such that these samples may be directly compared to the concurrent turbidity measurements.

2.3.1.1 Demonstration of Near-Field Automated Samplers during Phase 1

As noted Section 2.3 above, GE has conducted a pilot study during the BMP to demonstrate the utility of automatic samplers for near-field monitoring. That study is largely completed, although work is ongoing to verify the effectiveness of the water quality sondes and data uploading. As discussed in Section 2.2.1.1, automated sampling will be conducted at the near-field buoy monitors during Phase 1 to obtain data on water quality parameters and metals. This automated sampling will also be used to verify that the automatic samplers meet the requirements of the EPS and to support modifications or maintenance of the systems that may be needed to meet those requirements.

During Phase 1, GE shall determine the long-term calibration and stability of continuous water quality monitoring probes. The procedures for doing so shall be specified in the Phase 1 RAMP QAPP, based on the results of the near-field monitoring station pilot test. In addition, near-field continuous monitors shall be checked daily for problems such as bio-fouling and damage (*EPS* Volume 2, p. 106).

2.3.2 Far-Field Monitoring

At the automated far-field stations, water shall be pumped continuously through the system from several sampling inlets located along a cross-river transect. The water from each sampling location shall be combined and continuous water quality monitoring measurements shall be made on this combined stream using in-line probes located near the automated systems sampling port. In this way, the continuous water quality measurements will be representative of conditions at the time the sample aliquots are collected. As described in Section 2.2.2, sample aliquots shall be collected from the combined stream using an automated sampler (ISCO or equivalent) at the highest frequency that can be practically achieved, at a minimum every 60 minutes, to form station composite samples. This departure from the monitoring requirements of the standard is acceptable to EPA as long as the automated samplers are shown to meet the data quality objectives specified in the EPS.

At the Bakers Falls, Rogers Island, Stillwater, Albany, Poughkeepsie, and Mohawk River stations, sampling shall be performed using the manual BMP sampling protocol.

2.3.2.1 Demonstration of Far-Field Automated Samplers during Phase 1

As noted Section 2.3 above, GE has conducted a pilot study during the BMP to demonstrate the utility of automated samplers for far-field monitoring. That study involved operation of an automated sampling station at Lock 5. This study is largely completed, although work is ongoing to verify the effectiveness of modifications to sample collection methods to address volatilization of lower chlorinated PCBs during collection, and GE is continuing to operate the automated pilot station at Lock 5. As discussed above, this automated sampler will be used during Phase 1 as the Schuylerville monitoring station, and automated samplers will also be used at the Thompson Island and Waterford stations. This automated sampling during Phase 1 shall also be used to verify that the automated samplers at the far-field stations meet the requirements of the EPS. The results of this sampling may indicate that modifications or maintenance of the systems is required. The DQOs and sampling requirements are described below:

Determine whether the automated samplers collect a sample that is comparable to the vertically integrated grab samples under construction conditions. These samples are necessary to determine if the automated sampler collects a representative sample, even though the samplers do not collect a vertically integrated sample. This sampling is not required if the samplers are located in an area that EPA agrees is likely to be well mixed.

If the Thompson Island station is located above the dam, the Phase 1 RAM QAPP will address the issue of vertical integration and comparability with the original Thompson Island Dam station. If needed, paired samples shall be collected during Phase 1.

Determine the integrity of the samples collected with automated samplers. Determine if the sampling devices are aging or corrupted by biofilms. This test must be completed on each station because construction may differ from one station to another and the degree of biofilm development may differ depending on local conditions such as the location of CSOs.

Samples shall be collected from each intake line at the pump house while timing the sample to match discrete samples collected at the intake ports to the automated sampler. Both the pump house samples and the intake point samples will be composited, generating a single sample for the intakes and a single sample from the pump house. This sampling will be conducted during Phase 1 at all automated far-field stations at a frequency to be proposed by GE in the Phase 1 RAM QAPP for EPA approval based on review of the automated sampler data collected during baseline. Each of these samples shall be analyzed for TSS, PCB and metals (where measured for WQ requirements) throughout Phase 1. The results of the sampling will be assessed using a control chart method based on the absolute difference between the measurements and the relative percent difference. If the data appear to have a bias, the sampling apparatus will be modified (such as by increasing the flow) and samples will be collected with the modified sampler.

In addition, pressure testing of the lines will be conducted at a frequency that will be proposed by GE in the RAM QAPP for EPA approval based on review of the automated sampler data collected during baseline.

Determine the long-term calibration and stability of continuous water quality monitoring probes.

During sampling to assess the integrity of the automated samplers over time, water quality data shall be collected continuously in the river at each pump intake and in the corresponding pump discharge in the pump house for a minimum of one half hour during the manual sampling to be conducted in conjunction with the automated sampling. The samples will be measured for turbidity, particle distribution, DO, pH, conductivity and temperature. The results of the sampling will be assessed using a control chart method based on the absolute difference between the measurements and the relative percent difference.

2.4 Analytical Methods

GE shall analyze the samples according to the requirements of the *EPS* Volume 2, Section 4.2.6, except for modifications presented herein and unless EPA agrees to other modifications. Adjustments to the sampling program shall be made through corrective action memoranda (CAMs) subject to EPA approval.

The analytical methods will need to be sensitive enough to measure water column concentrations of PCBs at each station. For Total and Tri+ PCBs, a PCB analytical method with a detection limit low enough to detect expected PCB concentrations at Bakers Falls, Rogers Island, and Waterford is required (*EPS* Volume 2, p. 103). The current PCB analytical methods specified in the BMP QAPP (QEA and ESI, 2004) are expected to meet detection limit requirements during remedial action.

The analytical methods chosen for this program must meet or exceed the specifications of the methods used in the BMP in terms of precision, sensitivity, accuracy, representativeness, comparability, and completeness. The same analytical methods chosen for each station will be maintained at each station throughout the program for consistency (*EPS* Volume 2, p. 103).

The requirements specified above shall not apply to samples analyzed using an Aroclor PCB analytical method with an accelerated turnaround time. However, this method shall be performed using procedures that will provide a method detection limit of 60 ng/L or lower. The quality assurance procedures and the requirements for precision, sensitivity, accuracy, representativeness, comparability, and completeness to be used for the samples analyzed by this method shall be specified in the Phase 1 RAM QAPP.

2.4.1 Suspended Solids

Suspended solids analysis shall be conducted using EPA Method 160.2 with modifications to be consistent with American Society for Testing and Materials (ASTM) Method D 3977-97, with a 24-hour turnaround time at near-field monitoring stations. At far-field monitoring stations, turnaround times for TSS samples shall be the same as those specified for PCB samples from the same stations, except that the turnaround time for TSS samples collected from the Thompson Island station shall be 24 hours.

2.4.2 PCBs

All samples collected during Phase 1 at Thompson Island (and those collected at Schuylerville if the automated station at Thompson Island fails) shall be analyzed for PCB Aroclors using a method with a rapid turnaround time. The turnaround time for receipt of the analytical results for these samples shall, to the maximum extent practicable, be 8 hours or less from the time that the last aliquot is collected until the results are reported from the laboratory, and allow at least 4 hours advance warning, within normal working hours if practicable, to EPA, NYSDEC, NYSDOH, and the downstream water suppliers prior to the estimated arrival of a contaminated water parcel at the downstream water supply intakes. GE shall have adequate backup monitoring systems in place, and shall require its laboratories to have backup analytical systems in place, in order to minimize the potential for delays in obtaining the data to provide timely notifications to the public water suppliers.

Samples from Thompson Island will also be analyzed for PCBs by the modified Green Bay Method (mGBM) twice per week and results reported within 7 days of collection. These data will be collected for QA/QC purposes and will not be used to determine compliance with the criteria in the Resuspension Standard or for notification to downstream water suppliers. EPA may elect to reduce or eliminate these additional analyses after reviewing initial results.

All other samples collected for PCB analysis during Phase 1 shall be analyzed for whole water PCBs using the mGBM and extraction protocols used during the BMP. Routine samples collected at Schuylerville shall have a 24-hour turnaround time from the time that the last aliquot is collected until the results are reported from the laboratory, to the extent that such turnaround time is feasible.

During any times that the Towns of Waterford and Halfmoon are obtaining water from Troy on a full-time basis during dredging and that carbon treatment is installed at the Village of Stillwater water supply system during dredging, the PCB analytical methods and turnaround times described above for Thompson

Island and Schuylerville shall not apply and shall be replaced with the following: Analyses of PCBs using an Aroclor-based method at Thompson Island (and if necessary, Schuylerville) will not be required, and samples from both stations shall be analyzed for PCBs using the mGBM. PCB analytical results shall be reported within 24 hours of collection for Thompson Island and Schuylerville. After the first month of dredging and data collection, the turnaround time of 24 hours at Schuylerville shall be evaluated for possible reduction to 72 hours, subject to EPA approval (except that if the Thompson Island automated station fails, the analytical results from Schuylerville shall be reported within 24 hours of collection).

Samples shall be processed in batches to provide some daily measure of QA/QC (e.g., laboratory control spikes and continuing calibration standards). However, given the field and laboratory logistics required to provide results within 8 or 24 hours, it will not be possible for the initial analytical results to have undergone the standard QA/QC procedures. All PCB samples shall be subject to electronic verification and a subset (minimum 5%) will be subject to manual validation. The validation will be frontloaded in order to assess the analyses early in the season. The QA/QC details for PCB analytical samples will be provided in the Phase 1 RAM QAPP.

At Waterford PCB results shall be reported within 72 hours of collection. At Bakers Falls, Rogers Island, Stillwater, Albany, and Poughkeepsie, PCB results shall be reported within 7 days of collection, with two exceptions:

1) If PCB concentrations equal to or in excess of 500 ng/L are measured at Thompson Island or Schuylerville, additional samples collected from Rogers Island and the daily routine sample collected at Waterford shall be reported within 24 hours of collection.
2) If PCB concentrations equal to or exceeding 350 ng/L are measured at Waterford, PCB results from samples collected from Albany shall be reported within 24 hours of collection.

PCB results from the Mohawk River shall be reported in accordance with the laboratory's standard turnaround time.

The details of the QA/QC procedure will be provided in the Phase 1 RAM QAPP and will be reviewed and revised as necessary for the Phase 2 RAM QAPP.

2.4.3 Organic Carbon

Samples shall be analyzed for DOC and POC using EPA Method 415.1, as described in the BMP QAPP (QEA and ESI, 2004). Sample turnaround times will be the same as for PCBs at each station.

2.4.4 Metals and Hardness

Metals analysis for the WQ requirements shall be conducted using EPA Method 200.8, with the exception of mercury, which will be analyzed using EPA Method 1631, and hexavalent chromium, which will be analyzed using colorimetric Method SW-846 7196A (although Method SW-846 7199 may be used as an alternate procedure for samples when interference exists with the colorimetric Method SW-846 7196A). Each metals composite shall be considered a sample upon the collection of the last aliquot. As discussed in Section 2.1.2, samples from near- and far-field stations shall be analyzed for total and dissolved cadmium and lead under routine conditions. In the event of an exceedance of an applicable metals standard in either the near field or the far field, the subsequent samples collected for metals analysis from such location(s) shall be analyzed for the suite of total and dissolved metals subject to the applicable set of standards, until such time as the metals concentrations fall below the standards. If, during in-water activities, distressed or dying fish are observed, GE shall conduct increased monitoring for metals (total and dissolved) and additional water quality parameters, where appropriate, in accordance with the PSCP Scope (Section 7.5) and *WQ Substantive Requirements* (p. 8). At that time, routine metals monitoring shall resume. Hardness analysis shall be conducted on near-field samples using EPA Method 130.2. At near-field monitoring stations, turnaround time for metals and hardness analyses shall be 24 hours. At far-field monitoring stations, turnaround times for metals and hardness analyses shall be the same as those specified for PCB samples from the same stations, except that the turnaround time for such samples collected from the Thompson Island station shall be 24 hours. The amount and type of QA/QC procedures will be delineated in the Phase 1 RAM QAPP.

2.5 Off-Season Water Column Monitoring

In the off-season when dredging activities have ceased, the sampling schedule currently being followed under the BMP shall continue, with certain modifications. Specifically, this sampling shall include routine weekly sampling for PCBs, TSS, DOC, and POC at Rogers Island, Thompson Island, and Waterford (to the extent that weather and river conditions allow), monthly sampling at Bakers Falls and at

the Lower Hudson River stations at Albany and Poughkeepsie, and every other month at the Mohawk River. Metals sampling shall not be conducted during the off-season. If PCB loading at Thompson Island is significantly above baseline levels, weekly sampling shall be added at Schuylerville. For purposes of this determination, PCB loading at Thompson Island shall be considered to be significantly above baseline if the average PCB load at that station after one month of off-season monitoring (beginning when water quality returns to average baseline conditions but no later than two weeks after all in-river operations cease) is above the 95% prediction limit based on BMP data. The results from all these analyses shall be reported in accordance with standard laboratory turnaround times.

EXHIBIT A-2

NEW SECTION 8.3 OF REMEDIAL ACTION MONITORING SCOPE

8.3 Fixed-Point Near-Field Monitoring

A special study of the fixed-point near-field monitoring procedures described in *EPS* Volume 2 shall be conducted around a single dredging operation throughout Phase 1. Initially, the remedial operations that occur in the EGIA will be monitored by this special study; upon completion of the activities in the EGIA, operations within NTIP will be proposed by GE, for EPA approval, for continuing this special study for the remainder of Phase 1. GE shall perform this monitoring at the five locations specified in the *EPS* (Volume 2, Section 4.2.4.2), as described below. These locations are dictated by the near-field criteria. This study will examine each operation individually (e.g., production dredging, residual dredging, debris removal, backfilling) to the extent possible. However, the EGIA is relatively small and located on only one side of the river; therefore, it may not permit the study of individual operations under all conditions. It is expected that this special study will rotate among the operations on a weekly basis, to the extent that such operations are otherwise being conducted.

A single background station shall be located about 100 m upstream of the dredging activity on the centerline of flow through the area of dredging activity to provide water quality data for the water entering the dredging area. To monitor for resuspension caused by workboats, a single station shall be placed adjacent to the dredging activity, in the side channel downstream of the principal location of boat and barge activity supporting the dredging activity. The side channel station shall be located reasonably close to workboat activity (approximately 10 m away from the dredging operation), subject to the safety procedures described in the RA HASP (Parsons, 2007, or any updated version). Three stations shall be placed downstream of the dredging operation in an approximately triangular distribution to provide reasonable assurance that a resuspension plume will not escape the near field undetected. The station nearest the dredging activity (100 m downstream of the activity or 50 m downstream of the most exterior resuspension control system) shall be located along the estimated centerline of flow from the dredging activity. This will be defined as a line beginning at the location of the dredge and running parallel to the centerline of flow. The two stations further downstream shall be located to either side of the centerline along a cross-flow transect spaced as appropriate to monitor the plume. These stations shall be located approximately 300 m downstream of the dredging operation or 150 m downstream of the most exterior downstream resuspension barrier.

The locations of these stations shall be assessed daily and adjusted as necessary to maintain their position as described above (e.g., for the upstream and three downstream stations, relative to the centerline of flow through the dredging activities). A boat-mounted continuous turbidity probe shall be used to assess the location of any observable plume to ensure that the downstream compliance stations are located within the plume. In the event that a dredging area is isolated by a resuspension control barrier, a sixth monitoring location shall be added within the control barrier. The distances from the remedial operations are approximate and the location of these near-field stations may be changed in the field to better capture the plume, if EPA approves the change.

During the special study, continuous monitoring shall be performed for dissolved oxygen, conductivity, temperature, pH, and turbidity at each station. In addition, the routine sampling shall include the collection of one TSS sample per day from each station to refine and update the TSS/turbidity relationship, and the collection of one 24-hour composite sample per day (consisting of hourly aliquots) from the upstream station and the two stations located 300 m downstream of the dredging operation (or 150 m downstream if a resuspension barrier is used) for analysis of hardness, dissolved metals, and total lead and cadmium. (If an automated station fails, two depth-integrated discrete samples shall be collected per station per day.) If the turbidity measurements indicate that a TSS criterion has been exceeded, two TSS samples per day shall be collected at the station with the exceedance until such time as the station meets the applicable TSS criterion. In the event that either of the downstream stations shows an exceedance of the Acute Aquatic standards, the sampling frequency for metals shall be increased to four 6-hour composite samples per day (consisting of hourly aliquots) at the upstream station and each of the 300 m (or 150 m) downstream stations (or, if an automated sampler fails, four depth-integrated discrete samples at each of these stations per day). In that event, all samples shall be analyzed for the full TAL suite of dissolved and total metals. This increased sampling shall be continued until such time as the station is in compliance and EPA has authorized a return to routine monitoring. Also, the routine metals monitoring conducted as part of this special study is subject to a reduction in scope after one month of Phase 1 dredging in a given area (EGIA or NTIP), using the same criteria and subject to the same conditions discussed in Section 2.2.1.5, including the criteria for returning to the initial program.

The data from this special study shall be subject to the same reporting requirements specified for the other Phase 1 monitoring data in Section 2.8. The results of this special study, as well as the results of the other near-field monitoring activities described in Section 2, will be evaluated upon completion of Phase 1. The design of the Phase 2 near-field program will take the results of this evaluation into consideration.