Second Five-Year Review Report
Hudson River PCBs Superfund Site

APPENDIX 9

STATUS OF REMEDIAL ACTIVITIES

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SECOND FIVE YEAR REVIEW REPORT
HUDSON RIVER PCBs SUPERFUND SITE

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1 STATUS OF IMPLEMENTATION

This Appendix describes the status of the remedial actions selected by EPA in the September 1984 and February 2002 Records of Decision (RODs) for the Hudson River PCBs Site. These remedial actions are the subject of this Second Five Year Review (FYR).

EPA is addressing the Site in discrete phases or components known as operable units (OUs). The 1984 Record of Decision (ROD) for the first OU (OU1) provided for the in-place containment of the "remnant deposits"[1] and a treatability study of the Waterford Water Works to determine whether upgrades or alterations of the facilities were needed. The 1984 ROD also included an interim "no action" decision for PCB-contaminated sediments in the Upper Hudson River. The 2002 ROD for the second OU (OU2) selected dredging to address polychlorinated biphenyl (PCB) contaminated in-place sediments of the Upper Hudson River, as well as monitored natural attenuation (MNA) of PCB contamination that remains in the river after dredging.

In addition to OU1 and OU2, there have been other response actions at the Site that are not addressed in this FYR. In 1999, EPA removed approximately 4,400 tons of contaminated soil from Roger's Island under CERCLA's removal action authority. Additionally, General Electric Company (GE) has conducted Superfund removal actions in the floodplain of the Upper Hudson River under an administrative consent order with EPA, and under a separate administrative consent order GE currently is performing a remedial investigation and feasibility study of PCB contamination in the Upper Hudson River 100-year floodplain from Baker's Falls in Hudson Falls, New York to the Federal Dam in Troy, New York. EPA plans to issue a separate ROD for the floodplain following GE's completion of the RI/FS.

[1] The remnant deposits are PCB-contaminated sediment deposits along the banks of the Hudson River upstream of Fort Edward that became exposed when the water level dropped following removal of the Fort Edward dam.

This Appendix separately discusses the remedial activities conducted for OU1 and OU2, with activities and events discussed chronologically for each OU. The implementation of institutional controls for each OU is discussed at the end of this Appendix.

1.1 OU1

1.1.1 Remnant Deposits

The New York State Department of Environmental Conservation (NYSDEC) prepared preliminary design documents for the construction of the in-place containment of the exposed Remnant Deposits. Pursuant to an Administrative Order on Consent issued by EPA on September 27, 1989, GE prepared a construction plan and other related plans for in-place containment of Remnant Deposits 2 through 5. (Remnant Deposit 1 originally appeared as an island, but due to flooding in 1976 and 1983 most of the exposed sediment associated with this deposit site was scoured.) The final cap system, which included GE's refinements to the design, consisted of (in ascending order) a sand/fill bedding layer, a custom designed geosynthetic clay liner (GCL) composite located at the top of the 100-year flood zone, a sand drainage layer, and a topsoil and vegetative cover. The cap system modification also included a gas collection and venting system.

In October 1989, and pursuant to an EPA Administrative Order, GE began OU1 construction activities with the clearing of vegetation and construction of access roads. On July 21, 1990, the United States District Court for the Northern District of New York approved a Consent Decree between the United States and GE in which GE agreed to perform EPA's in-place containment remedy for the Remnant Deposits and to perform post-construction monitoring.

It was determined during design meetings among EPA, NYSDEC, and the New York State Department of Health (NYSDOH) that areas of the Remnant Deposits with PCB concentrations exceeding 5 ppm should be capped. GE delineated the 5 ppm boundary between June and September 1990. The areas of cover typically extended at least five feet beyond the limits of the 5 ppm boundary.

The sand/fill bedding layer (6 inches) was placed first to provide a uniform surface for the GCL and to bridge soft/unstable subsoil zones. The GCL consisted of two layers of reinforcing geotextile and a low-permeability layer. The geotextile distributes the load of subsequent cap components over the soft foundation soils as a way to minimize the potential for differential cap settlement and/or subsidence. The bottom geotextile acts as a gas collection layer, which conveys the gas to a passive gas venting system. Some methane gas is anticipated to be generated by organic sediment decomposition. Overlying the GCL is a drainage sand layer (12 inches) which intercepts infiltrating precipitation and conveys it off-site. The topsoil and vegetative cover layers (6 inches) protect the cap system from erosion. The vegetative cover system consists of perennial and annual grasses. The cap surfaces are generally flat sloped (approximately 3.5 percent), thereby minimizing overland flow velocities of storm runoff and further reducing the potential for cap system erosion.

The banks of the Remnant Deposits along the Hudson River were stabilized with riprap to protect them from erosive forces. The riprap extends at least two feet above the Hudson River's 100- year flood elevation and was sized to withstand the river flow velocities associated with such an event. The cap system at OU1, and subsequent maintenance of the cap system, limits the exposure of ecological receptors to contaminants.

A perimeter drainage channel system was constructed around each site to divert off-site precipitation runoff, thereby reducing the potential for cap erosion. Where required (Remnant Deposits 2, 3, and 4), stream transfer channels were constructed to convey upland streams over the sites. The stream transfer channels have a high-density polyethylene membrane liner as additional protection. These channels have riprap linings in place of the topsoil/vegetative cover components. The perimeter drainage and stream transfer channels are designed for the peak flow associated with a 100-year storm event.

The construction of the in-place containment of Remnant Deposit sites 2 - 5 was completed by May 1991. Remedial efforts were not conducted at Remnant Deposit 1 due to the impracticality of capping the island and as the majority of that deposit had already washed

downstream. The 2002 ROD recognized that a large flow event could possibly release an additional portion of the PCBs that might remain at Remnant Deposit 1, and therefore called for follow-up sampling of this area to determine whether the deposit needed to be remediated. However, during a visit to the Remnant Deposits site with GE, NYSDEC and NYSDOH personnel on April 4, 2012, EPA observed that sediment would not likely be present at Remnant Deposit 1 in an amount sufficient for sample collection.

In accordance with the 1990 Consent Decree, GE developed a maintenance plan for post-closure of Remnant Deposits 2, 3, 4, and 5. The maintenance plan calls for a site inspection that documents the components of the OU1 remedy's continuing performance. Inspections of the site access road, roadway conditions, diversion ditches, roadway side slopes, and culverts are conducted by GE and are reported in biannual reports to EPA. For Remnant Deposits 2-5, site security, vegetative cover, and site drainage are repaired as necessary. The maintenance plan also calls for an inspection after a rain event that produces at least 2-1/2 inches of rain in a 24-hour period.

1.1.2 Waterford Water Works

The 1984 ROD called for a treatability study at the Waterford Water Works to determine whether upgrades or alterations to the Waterford Water Works water treatment facilities were needed for PCBs. Treated drinking water from the Waterford supply system rarely exceeded 0.1 parts per billion (ppb) of PCBs at the time of the 1984 ROD. Based on 35 samples collected by New York State, the concentration of PCBs in Waterford drinking water averaged 0.06 ppb. However, analysis of the river water quality indicated incidents where PCB concentrations had exceeded 1 ppb (the maximum allowable exposure promulgated by the NYSDOH at the time), thus generating concern that a more thorough evaluation was needed.

NYSDEC, with funding provided by EPA, conducted the treatability study at the Waterford Water Works. The study was released in 1990 and found that PCB concentrations in treated water were below analytical detection limits and met standards applicable to public water supplies.

1.2 OU2

1.2.1 Upper Hudson River Sediments

In December 1989, EPA announced its decision to initiate a detailed Reassessment RI/Feasibility Study (FS) of the interim no-action decision for the Upper Hudson River sediments. The Reassessment RI/FS was divided into three phases. Phase 1 consisted primarily of a review of existing data and was completed in August 1991. Phase 2, which included the collection and analysis of new data as well as modeling studies and human health and ecological risk assessments and peer reviews, began in December 1991 and concluded in November 2000. Phase 3, known as the FS, formally began in September 1998 and was released concurrently with the Proposed Plan in December 2000. In the February 2002 ROD, EPA selected a remedy for OU2 that included the removal and off-site disposal of approximately 2.65 million cubic yards of PCB-contaminated sediments from the Upper Hudson River and monitored natural attenuation of PCB contamination that remains in the river after dredging. The selected remedy is further outlined in Section 2 of this FYR report.

Pursuant to a July 23, 2002, Administrative Order on Consent (Index No. CERCLA-02-2002-2023) with EPA, GE conducted an extensive sediment sampling program that was designed to provide data needed determine the precise areas of the Upper Hudson River to be dredged in OU2. The company collected sediment samples from approximately 6,300 locations for this program in 2002 and 2003. On August 13, 2003, EPA signed Administrative Order on Consent for Remedial Design and Cost Recovery, Index No. CERCLA-02-2003-2027, in which GE agreed, among other things, to perform remedial design activities needed for implementation of the remedial action selected in the 2002 ROD. Approximately 3,600 additional sediment locations were sampled between 2004 and 2008.

In April 2004, EPA issued peer-reviewed Engineering Performance Standards (EPS), which included a Resuspension Standard, a Residuals Standard, and a Productivity Standard. These performance standards were designed to promote accountability and

ensure that the cleanup meets the human health and environmental protection objectives set forth in the 2002 ROD. In May 2004, EPA issued Quality of Life Performance Standards (QoLPS), which included standards governing air quality, odor, noise, lighting, and navigation impacts. These standards were developed in consultation with New York State and with public input and are consistent with applicable federal and state laws. Additionally, in January 2005, EPA, working with NYSDEC and NYSDOH, issued a set of Substantive Water Quality (WQ) Requirements governing: (1) in-river release of constituents not subject to the EPS and (2) discharges of treated water from the sediment processing facility to the Champlain Canal. On September 14, 2006, EPA provided GE with requirements relating to the discharges of non-contact storm water from the processing facility to Bond Creek.

In October 2005, GE and EPA executed a Consent Decree with an accompanying statement of work (SOW) requiring GE to perform Phase 1 of the remedial action. Phase 1 was to be implemented initially at less than full-scale and included an extensive monitoring program. The Consent Decree provided, among other things, that, after the completion of Phase 1, EPA and GE would each prepare a Phase 1 Evaluation Report that would evaluate the Phase 1 dredging relative to the EPS, and, as appropriate, propose changes to those standards. Following the peer review of the Phase 1 Evaluation Reports, the Consent Decree called for EPA to notify GE of EPA's decision on any changes to the EPS, QoLPS, SOW, or the scope of Phase 2, after which GE would elect whether to perform Phase 2 under the Consent Decree. The SOW and its attachments (Critical Phase 1 Design Elements, Remedial Action Monitoring Scope, Performance Standards Compliance Plan Scope, Remedial Action Community Health and Safety Plan Scope, Operation, Maintenance and Monitoring Scope, and Certification Unit (CU)/Certification Forms) outlined a number of requirements for the implementation of Phase 1. Data gathered during Phase 1 were expected to enable EPA to determine if adjustments were needed to Phase 2 operations or to the performance standards.

The court approved the Consent Decree on November 2, 2006 (Civil Action No. 1:05 CV-01270, U.S. District Court for the Northern District of New York). In January 2009, GE

and EPA agreed to a modification of the Consent Decree that provided for GE's reimbursement of costs incurred by EPA in providing an alternate water supply and water treatment to downstream water suppliers and included a revised scope of the water quality monitoring program for Phase 1.

1.2.2 Pre-Dredging Phase 1 Activities

Between March 2006 and May 2009, GE submitted and EPA approved a Final Design Report for Phase 1 and Remedial Action Work Plans (RAWPs) for the construction of the sediment processing facility, an associated rail yard, the on-river support facilities and for the performance of Phase 1 dredging, processing facility operations, and subsequent habitat replacement/ reconstruction in Phase 1 dredge areas.

On April 23, 2007, construction activities began at the sediment processing facility located on a more than 100-acre site between the Champlain Canal and the main rail line in Fort Edward, New York. Three support facilities, a work support marina in Moreau, general support property in Fort Edward, and a backfill/cap material barge loading area in Moreau were constructed to support the remedial action. Construction of the sediment processing facility was substantially completed by January 2009.

The 2002 ROD states that during the sediment dredging, EPA would increase monitoring at public water systems that use the Hudson River as a drinking water source as a way to evaluate the potential for increased PCB levels in the river resulting from dredging operations. EPA provided funding to the NYSDOH's Bureau of Water Supply Protection to develop and implement monitoring of these public water supplies (PWS) prior to and during dredging. PWSs included in the monitoring program were Halfmoon Water District, Waterford Water Works, Poughkeepsie City/Town, Rhinebeck Village Water, and Port Ewen, all of which drew water directly from the Hudson River prior to the start of dredging. At the time, Stillwater Village utilized groundwater that was under the direct influence of the Hudson River. Additionally, Green Island, which operates an infiltration gallery in the Hudson River as the system's primary raw water source, was monitored under the program.

In the spring, summer, and fall (primary dredging months) of 2008, NYSDOH conducted its baseline pre-dredging sampling event with the collection of pre-treatment and treatment samples from all seven PWSs. Water sample results were all below the Maximum Contaminant Level (MCL) (500 parts per trillion (ppt) for PCBs in drinking water.

1.2.3 Phase 1

Phase 1 dredging was designed with the goal of dredging, dewatering, and disposing of 265,000 cubic yards of sediments from 18 CUs encompassing 90 acres within River Section 1. These areas included the northern portion of Thompson Island Pool (TIP) on the north, south, east and west sides of Rogers Island, as well as the area of river near Griffin Island, between RM 190.4 and RM 189.9. Phase 1 dredging began on May 15, 2009, with the removal of sediments from the river utilizing mechanical dredges with enclosed environmental clamshell buckets. Sediments were then transported by barge to the Fort Edward sediment processing facility. After sediment removal, dredged areas were backfilled or capped in accordance with EPA-approved design, the requirements of the Residuals Performance Standard, and, in some cases, by agreement between EPA and GE. At the sediment processing facility, dredged sediments went through a multi-stage dewatering process before being loaded into railcars for off-site transport to a permitted disposal landfill.

Approximately 35 percent of the processed sediments were shipped by the end of the 2009 Phase 1 dredging season. These processed sediments were sent to Waste Control Specialists, LLC (WCS) in Andrews, Texas. In a letter dated May 7, 2010, GE notified EPA that the agreement with WCS had been terminated because WCS was unable to meet GE's contractual requirements during 2009. The remaining processed materials were temporarily stored at the sediment processing facility and subsequently transported by rail to an alternate approved disposal facility in 2010. Remaining Phase 1 processed sediments were shipped to Clean Harbors Grassy Mountain, LLC in Grassy Mountain, Utah, US Ecology Idaho, Inc. in Grand View, Idaho, and Wayne Disposal, Inc. in Bellville, Michigan. Water produced through the dewatering process was treated and discharged into the Champlain Canal in accordance with the applicable Substantive WQ Requirements.

Extensive sampling and monitoring were conducted throughout Phase 1 in accordance with the Phase 1 Performance Standards Compliance Plan and the Remedial Action Monitoring Plan in order to assess achievement of established Phase 1 EPS, QoLPS, and Substantive WQ Requirements. In Phase 1, there were 19 exceedances of the QoLPS for air quality out of a total of 796 samples collected at the processing facility (2.4 percent). At the dredge corridor, there were 81 air standard exceedances out of a total of 1846 samples collected (4.4 percent). There were 103 exceedances of the QoLPS for noise out of a total of 37,500 one hour measurements (0.3%). There were three exceedances of the light QoLPS, and no recorded exceedances of the QoLPS for either odor or navigation. GE addressed exceedances of the standards by performing response actions pursuant to the Performance Standards Compliance Plan (PSCP).

Phase 1 dredging was completed in 10 of the planned 18 CUs, which encompassed 48 acres versus the originally-planned 90 acres. Dredging and backfilling were completed in the fall of 2009 and resulted in a total of 286,000 cubic yards of sediment being removed from the 10 CUs.

Dredging of the navigation channel was performed in the areas within the navigation channel where dredging was necessary to meet the vessel draft requirements. This was done to implement the remedy while avoiding the hindrance of canal traffic. As a result approximately 1,500 cubic yards of material were removed from the Champlain Canal between locks 7 and 8 during Phase 1.

A unique challenge in 2009 was the dredging of CUs 17 and 18. In these CUs, sheet piles were installed to partition the river in an effort to reduce PCB air emissions during dredging. Sediments dredged form this area were dredged within the sheet pile area, transloaded from a barge within the sheet pile area to a barge located outside the area, and then transported four miles north to the Fort Edward processing facility .

In March 2010, both EPA and GE completed individual Final Phase 1 Evaluation Reports. EPA's report detailed the effectiveness of the first phase of dredging, as well as the

challenges encountered during the first dredging season. It also laid out EPA's proposed modifications to the EPS for dredging resuspension, residuals, and productivity for the second phase of the project. GE's Phase 1 Evaluation Report concluded that the EPS were not and could not be met simultaneously in Phase 1 and needed to be modified for Phase 2. GE's report included the Company's proposed modifications to the EPS for Phase 2.

The EPA Phase 1 Evaluation Report indicated that three significant guideposts for success during Phase 1 were achieved. These were:

- Both sediment volume and the PCB mass removed in Phase 1 met or exceeded the amounts initially estimated for the Phase 1 portion of the project. The mass of PCBs removed was equivalent to the planned mass of 20,000 kg for all 18 originally planned Phase 1 CUs, and represented an 80 percent increase in PCB removal over what was expected for the 10 CUs (11,000 kg) dredged in Phase 1.
- There were few shut-downs due to exceedances of the Resuspension Standard, with limited impact on dredging productivity. Fish tissue impacts were limited to within 2 to 3 miles downstream of the TIP, and the data did not indicate any measurable negative impacts to fish or water quality in the Lower River.
- 75 percent of the adjusted area (which includes structure and shoreline setbacks) was completed and closed in compliance with the Residuals Standard, although it was necessary to cap portions of several CUs that were not in compliance with the Residuals Standards due to schedule constraints (close of the canal navigation season) at the end of the dredging season (approximately 25 percent of the adjusted area). The Residuals Standard proved to be an effective tool to identify and manage previously uncharacterized inventory.

These successes were achieved despite complications experienced during the Phase 1 effort, including an inaccurate estimate of the depth of contamination (DoC), extensive wood debris that interfered with the ability to dredge to the DoC, high river flows, shallow navigation channels, and limitations on dredged sediment transport and processing.

EPA's Phase 1 Evaluation Report determined that problems encountered during Phase 1 were manageable. Although the timely completion of the project continued to be an important consideration, EPA recommended that the Productivity Standard could be modified to allow EPA, at its discretion, to extend the Phase 2 schedule in order to accommodate conditions beyond the control of EPA and GE (such as extreme river flows, force majeure, or the discovery of significant additional inventory to be removed) without impacting the overall benefits of the project. EPA also expressed that the Residuals Standard should be streamlined and simplified and that scow unloading should be refined by making additional equipment for unloading scows available at the wharf. Additionally, EPA recommended that the time during which dredged areas are left open before capping or backfilling would be minimized.

Significant effort was taken to ensure that the remedy was implemented in a protective manner during Phase 1. The establishment and monitoring of the EPS and QoLPS proved to be effective tools in helping to protect the community while meeting the remedial goals of the project. In order to ensure that the remedy would not have negative impacts on water supplies downstream of the dredging, EPA also constructed an alternate water supply line to provide the towns of Waterford and Halfmoon with water from the City of Troy, which does not obtain its water from the Hudson River. EPA also agreed to pay a portion of Waterford's and Halfmoon's increased costs of obtaining water from Troy during the dredging project.

NYSDOH continued its monitoring program of PWSs from May through November 2009 to measure PCB concentrations in water samples from PWSs during Phase 1; however, only PWSs in the Lower Hudson were monitored because of operational changes to the applicable PWSs in the Upper Hudson River. The Village of Stillwater was not included in the program because it used a GAC system to treat its water. Waterford Water Works and Halfmoon Water District also were not included as both supplies were obtaining their water from Troy. All samples collected at the four Lower River PWSs (Poughkeepsie, Rhinebeck Village Water, Green Island, and Port Ewen) taken in 2009 were found to have PCB concentrations below the MCL.

In 2010, EPA's and GE's Phase 1 Evaluation Reports were made available to the public during the peer review process (described in more detail below). The public was invited to make comments on the reports directly to the independent peer review panel, which convened twice in a public setting in Saratoga Springs. Stakeholders were also given the opportunity to meet with senior level EPA managers prior to EPA making a final determination on the changes to the EPA QoLPS, SOW, or the scope of Phase 2. Certain stakeholders expressed an interest in increasing the size of the dredge target areas in River Sections 2 and 3, in order to account for the fact that, based on the design sampling, PCB concentrations in non-target areas are higher than EPA anticipated in the ROD. Other stakeholders expressed their support for GE's arguments as set forth in its Phase 1 Evaluation Report. EPA evaluated these claims and determined that the remedy selected in the 2002 ROD was still expected to achieve its objectives, and the stakeholder's comments did not support a modification of the scope of Phase 2.

GE conducted habitat replacement/reconstruction in the Phase 1 dredge areas in 2010 and 2011. These activities were completed in July 2011. On August 15, 2011, EPA approved GE's Certification of Completion of Phase 1 Field Activities.

1.2.4 Phase 1 Peer Review

In accordance with Paragraph 14 of the Consent Decree and EPA's Peer Review Handbook (EPA Science Policy Council Handbook: Peer Review, December 2000), a "contractor-run peer review" was conducted to review both EPA's and GE's Phase 1 Evaluation Reports. The independent peer review panel was given a set of four charge questions to address in its review of the documents. The questions were as follows:

- Does the experience in Phase 1 show that each of the Phase 1 EPS can consistently be met individually and simultaneously?
- If not, and if EPA and/or GE has proposed modified EPS, does the experience in Phase 1 and any other evidence before the panel show that it will be practicable to consistently and simultaneously meet the EPS that are being proposed for Phase 2?

- If the experience in Phase 1 and other evidence before the panel does not show that it will be practicable to consistently and simultaneously meet the EPS that are being proposed for Phase 2, can the Phase 1 EPS be modified so that they could consistently be met in Phase 2, and, if so, how?
- If EPA and/or GE has proposed modifications to the monitoring and sampling program for Phase 2, are the proposed modifications adequate and practicable for determining whether the Phase 2 EPS will be met?

The Peer Review Panel was not charged with evaluating whether the remedial action will, or may, achieve the human health and/or environmental objectives of the 2002 ROD or whether Phase 2 should be implemented. Paragraph 14.c of the Consent Decree specified the process for selecting a Peer Review Panel to evaluate the Phase 1 Evaluation Reports and address the charge questions. Based on an agreed-upon selection process, the following seven panelists were selected in September 2009 based on expertise and the absence of conflicts of interests:

- Todd Bridges, U.S. Army Corps of Engineers, Engineer Research and Development Center
- Richard Fox, Natural Resource Technology, Inc.
- Paul Fuglevand, Dalton, Olmstead & Fuglevand, Inc.
- Gregory Hartman, Dalton, Olmstead & Fuglevand, Inc.
- Victor Magar, ENVIRON International Corporation
- Paul Schroeder, U.S. Army Corps of Engineers, Engineer Research and Development Center
- Timothy Thompson, Science and Engineering for the Environment, LLC

Prior to the end of Phase 1 dredging, EPA and GE had provided the panel members with a tour of the Site so that they could see the Phase 1 operations first-hand.

On February 17 and 18, 2010, the Phase 1 Peer Review Panel held an Introductory Session to hear presentations from EPA and GE regarding information gained during Phase 1 of the dredging project, and EPA and GE submitted their respective Phase 1 Evaluation

Reports to the Peer Review Panel in March 2010, and subsequently provided the panel with supplemental information requested by the panel. EPA and GE proposed modifications to the EPS based on information gathered and the outcome of the Phase 1 dredging. As mentioned above, the public was given the opportunity to review and provide comments to the Peer Review Panel on both the EPA and GE reports, and the Peer Review Panel publicly discussed its views on the reports in early May 2010.

The panel members' individual views on the charge questions were compiled into a report that underwent factual review by EPA and GE and was provided to the public for informational purposes in mid-August 2010.

On September 10, 2010, the Peer Review Panel released its "Peer Review of Phase 1 Dredging Final Report," in which the panel members answered the charge questions. The Peer Review Panel found that the 2004 EPS for Resuspension, Residuals, and Productivity were not met individually or simultaneously during Phase 1 and could not be met in Phase 2 without substantive changes. The Panel concluded that neither EPA's nor GE's proposed modified EPS would support the successful execution of Phase 2.

Consequently, the Panel developed and recommended the implementation of modified EPS and best management practices. One of the major issues demonstrated in Phase 1 was that the Residuals Standard had a substantial impact on project success and on the interaction with the Resuspension Standard and the Productivity Standard. The Panel expressed that a key obstacle to simultaneously achieving the EPS involved incomplete DoC characterization combined with adherence to the 2004 EPS residual target levels. As a result, the Residuals Standard affected both the Resuspension Standard and Productivity Standard. Repeated dredge passes and prolonged exposure of PCBs in sediments in the CUs resulted in increased PCB resuspension and release. In its report, the Panel proposed that if the DoC is better characterized, and a focus is placed on not leaving the CU sediments exposed for a prolonged period, the bulk of PCB inventory could be removed during Phase 2.

For Phase 2, the Panel proposed that the Resuspension Standard and Productivity Standard should be based on metrics consistent with Phase 1. The Panel did not believe, however, that dredging activities should be interrupted if the targets are not achieved during Phase 2 Year 1. The Panel also recommended the use of Adaptive Management to set realistic goals based on the lessons learned during implementation, allowing for completion of the project while continuously reviewing past project data to determine the best course of action if problems arose.

1.2.5 Phase 2 Decision

On December 17, 2010, EPA transmitted a letter to GE, pursuant to paragraph 15.b of the Consent Decree, that notified GE of EPA's "decision regarding changes, if any, to the Phase 1 Engineering Performance Standards, the Phase 1 Quality of Life Performance Standards, the [Statement of Work ("SOW")], and the scope of Phase 2 ("Phase 2 Decision")." On December 31, 2010, GE formally notified EPA that it would conduct Phase 2 pursuant to the Consent Decree. On August 15, 2011, the United States Department of Justice filed in the United States District Court a modification to the Consent Decree which revised certain provisions to address EPA's Phase 2 Decision.

The Phase 2 Decision included changes in methodology to improve sampling in order to obtain a better characterization of the DoC. GE would additionally be required to adjust the DoC calculations to account for variability encountered in establishing the DoC. As a result, GE agreed to sample sediment cores that under the 2002-2003 Sediment Sampling and Analysis Program (SSAP) had a less than a 60 percent recovery rate. In 2010, GE began the Supplemental Engineering Data Compilation (SEDC) Program where a total of 640 core locations were sampled. In 2011, a total of 590 core locations were sampled. 500 core locations were targeted for the 2012 SEDC Program, which covered CUs 71-100. Results from the SEDC Program have been generally consistent with EPA's understanding of PCB distribution in the river.

Additionally, in the Phase 2 Decision, EPA notified GE that, for the Residuals Standard, a maximum of two dredge passes would be implemented (except in the case of TPCB[2] concentrations ≥500 mg/kg, discussed below), followed by backfill or capping as appropriate. The goal of the Residuals Standard was to achieve the Elevation of Contamination in the dredged areas, and to achieve the ROD cleanup objective of 1 mg/kg Tri+ PCB[3] concentration in the top six inches of post-dredging cores in a CU. The post-dredging sampling allowed for investigation of both dredging-related residuals (e.g., sediments that escaped the dredge during removal and resettled or re-deposited) and potential "missed inventory" (i.e., the original "inventory" of contaminated sediment targeted for removal by the ROD, concentrations greater than 6.0 mg/kg Tri+ PCBs below the top 6" of the post-dredge surface). An initial re-dredging pass was required in nodes where high concentrations of PCBs were identified in the residuals, inventory was identified, concentrations in the top 6" caused the sediment arithmetic average to exceed 1 mg/kg Tri+ PCB, or the shoreline areas where concentrations exceeded 50 mg/kg TPCBs. In circumstances when concentrations of PCBs are encountered at or above 500 mg/kg TPCBs after the second dredging pass, EPA would require a third pass. Capping was required after the second pass in areas that continued to exceed these requirements. EPA set limits on capping at certain percentages of sampling locations, known as "nodes," based on dredging progress. Nodes were excluded from this limit if they were taken in areas of bedrock, clay, shoreline, structural offsets, or cultural resource offsets. The nodes that were not excluded were affected by the limit and are called "counted nodes." The total capped area during Phase 2 (not including the excluded area) was 7.7 percent of the total area dredged, which was less than the allowable EPA maximum standard of 11 percent of the total area dredged during Phase 2. In addition, the total area capped that has PCB

[2] Total PCBs represents the sum of all measured PCB congeners. PCBs are a group of chemicals consisting of 209 individual compounds known as congeners. The congeners can have from one to ten chlorine atoms per molecule, each with its own set of chemical properties.

[3] Tri + PCBs represents the sum of all measured PCB congeners with three or more chlorine atoms per molecule. PCBs are a group of chemicals consisting of 209 individual compounds known as congeners. The congeners can have from one to ten chlorine atoms per molecule, each with its own set of chemical properties.

"inventory" present (*i.e.*, Tri+ PCB contamination greater than or equal to 6.0 mg/kg) in any 6-inch core segment below the top 6-inch segment was 1.1 percent, which is less than the EPA allowable maximum of 3 percent of the total area capped in Phase 2.

EPA set the Productivity Standard for Phase 2 at a minimum of 350,000 cubic yards of sediment to be dredged each year. This Productivity Standard was based on experience in Phase 1. The Panel recommended turning the Productivity Standard into a secondary Standard behind the Residuals and Resuspension Standards, so that Residuals and Resuspension would not be negatively impacted because of Productivity requirements.

For the Resuspension Standard, if at a designated measuring location, the concentration exceeded 500 ppt TPCBs for 5 days out of any 7, GE could be required to take steps that could include a temporary slowdown of operations or a temporary shutdown of operations. The amount of PCBs allowed to travel downstream should not exceed 2 percent of the total amount of PCBs actually excavated from river bottom as measured at the first designated location downstream of where dredging is taking place. At Waterford, the farthest downstream measuring station, the load should not exceed 1 percent of the amount excavated. If these limits were exceeded for 14 consecutive days, then GE could be required to slow down operations temporarily.

EPA's Phase 2 Decision also incorporated the concept of adaptive management into the cleanup. As the Peer Review Panel recommended, EPA needed to be able to adapt to new information and make or require changes through adaptive management in order to achieve the expected benefits of the project. The approach included the annual reassessment of the EPS based on each prior year's data, routine reassessment of dredging operations, best management practices, and dredging performance with regard to the EPS. The objectives of the adaptive management approach are to maintain or improve the efficiency of the project, mitigate short-term impacts as needed, help ensure that the remedy is successfully completed consistent with the ROD, and that the targets and objectives set forth in the ROD are met. The adaptive management approach additionally includes other project activities such as habitat reconstruction and the quality of life standards. EPA met with GE in January

before each Phase 2 dredge season to review potential adaptive management changes for the upcoming dredging season.

1.2.6 Phase 2

GE initiated Phase 2 dredging on June 6, 2011. Dredging was initially scheduled to begin in early May 2011. However, dredging was delayed due to a historic 100-year flood event that caused the flow rate of the river to rise above 50,000 cubic feet per second (CFS). Once flow rates subsided to 12,000 CFS in early June, GE began the dredging season 24 hours a day and 6 days per week. During dredging, up to three dredge platforms with 5-cubic yard dredge buckets were concurrently operating on the Upper Hudson River. During the Phase 2 Year 1 dredging season, there were 19 hopper barges and 17 tugboats operating at one time (fewer than Phase 1 in-river operations) while continuing to meet the Productivity Standard.

1.2.6.1 Summary of Operations During Each Year of Dredging

2011: A total of 363,332 cubic yards of sediment, at approximately 1.25 tons per cubic yard, were removed during the Phase 2 Year 1 dredging season, which exceeded the Phase 2 Productivity Standard. 670 barges were unloaded at the processing facility, which represented a total of 27,200 kg TPCB mass removed. Processed sediments were shipped to US Ecology Idaho, Inc. in Grand View, Idaho, and Wayne Disposal, Inc. in Bellville, Michigan, for disposal.

Phase 2 Year 1 was marked by improved compliance with the EPS and QoLPS as compared to Phase 1. There were 8 exceedances of the QoLPS for air quality out of a total of 214 samples collected at the processing facility (4%) and just 7 of the 1069 samples collected at the dredge corridor exceeded the standard (< 1%). The air quality standard was very conservative, and results approaching or above the exceedance level prompted EPA and GE to take action to mitigate the exceedance. There were 16 exceedances of the QoLPS for noise out of a total of 1847 measurements (< 1%). There were no QoLPS exceedances for light, odor, and navigation during the 2011 dredging season. Compliance with the

Residuals Standard resulted in approximately 3 percent of counted nodes capped. None of the caps installed in 2011 were installed over PCB "inventory"..

The dredging was consistently in compliance with the Resuspension Standard throughout Phase 2 Year 1, with two exceedances recorded out of 614 samples. After Phase 1, EPA questioned whether the Thompson Island automated monitoring station was configured in a way that would allow for collection of representative samples. The collective data set from this station, which analyzed duplicate samples when initial values were over the MCL for TPCBs in drinking water, indicated that the duplicate sample results were inconsistent. Further inspection at this station revealed that the intakes were covered with weeds and/or mud, which could have biased the sample results. After discussions between EPA and GE, a new Thompson Island buoy station was deployed above the Thompson Island Dam. Results from the new station were more consistent, which further supported EPA's concerns about collecting representative samples from the original automated Thompson Island station. Utilizing the lines of evidence from EPA's data review and experiences with the automated station during Phase 1 and the early of part of Phase 2 Year 1, EPA and GE decided to discontinue data collection at this automated station.

After the 2011 dredging season, GE proposed equipment modifications at the processing facility which included an expansion of the coarse material staging area, construction of a second gravity thickener, and construction of a second barge unloading station. EPA agreed to these modifications and the second unloading station was completed and became operational in May 2012. The coarse material staging areas also became operational for the 2012 dredging season.

Dredging in 2011 included two unique features. First was the dredging near Special Area 13 (a dredge spoil disposal area on the western shore of the Hudson river in Moreau, New York), an area of cultural significance that required engineering offsets to protect historic timber cribs that had been installed as part of the construction and maintenance of the barge canal. Second, CU 24 was a hot spot with a significant amount of debris. In this area crews dredged deeper than originally anticipated because the improved sample techniques

identified during the peer review had helped identify PCBs beneath the debris, requiring more sediments to be removed. It was in areas such as these where the volume of sediments dredged exceeded the design estimates.

2012: A total of 663,265 cubic yards of sediment were removed during the Phase 2 Year 2 dredging season, which exceeded the Phase 2 Productivity Standard. 1,270 barges were unloaded at the processing facility which represented a total of 33,370 kg TPCB mass removed. Processed sediments were shipped to Clean Harbors Lone Mountain Landfill in Waynoka, Oklahoma, Tunnel Hill Reclamation Landfill in New Lexington, Ohio, and Wayne Disposal, Inc. in Bellville, Michigan, for disposal.

Phase 2 Year 2 was the year with the highest number of air quality QoLPS exceedances at both the dredge corridor and processing facility. There were 31 exceedances out of a total of 223 samples collected at the processing facility (14%) and 81 out of a total of 2263 samples collected at the dredge corridor (4%) exceeded the standard. The likely cause for these exceedances was the dredging of higher concentration sediments in backwater areas. As these higher air concentrations were encountered, BMPs were implemented to mitigate the impacts and some of the concentrations typically would return to normal levels quickly. Just three out of the 1275 (< 1%) readings exceeded the QoLPS for noise, and there were no QoLPS exceedances for light, odor, or navigation. Compliance with the Residuals Standard resulted in approximately 5 percent of cumulative (Phase 2 Years 1 and 2) counted nodes capped and 0.16% of cumulative counted inventory nodes capped. The dredging was consistently in compliance with the Resuspension Standard throughout Phase 2 Year 2, with four exceedances recorded out of 545 readings.

On May 10, 2012, EPA approved GE's proposed plan for the characterization, processing, and disposal of non-Toxic Substances and Control Act (TSCA) sediments (i.e. sediments containing <50 mg/kg TPCBs). GE submitted an addendum to the RAWP, specifying TSCA/Non-TSCA identification procedures, segregation and handling protocols, size separation processes, sampling, staging procedures, and reporting formats. This procedure was a component of the material processing for the remainder of Phase 2.

On October 16, 2012, EPA approved GE's plans for site-specific dredging operations in 2012 for the West Griffin Island Area. This area was environmentally sensitive due to the presence of a large amount of invasive species (spp. *Trapa natans*, or water chestnut) and NYSDEC freshwater wetlands. These special operations included the extended use of seine nets to prevent free-floating water chestnut material from migrating downriver of removal operations and site-specific backfill and shallow-draft dredging operations.

Three Sisters Island (CUs 35 and 36) was dredged during this year. High sediment PCB concentrations and shallow drafts required special techniques in this area. Dredging crews were vigilant to implement best management practices to minimize potential downwind air impacts.

2013: A total of 628,057 cubic yards of sediment was removed during the Phase 2 Year 3 dredging season, which exceeded the Phase 2 Productivity Standard. A total of 1,124 barges were unloaded at the processing facility which represented a total of 32,460 kg TPCB mass removed. Processed sediments were shipped to Clean Harbors Lone Mountain Landfill in Waynoka, Oklahoma, Tunnel Hill Reclamation Landfill in New Lexington, Ohio, and Wayne Disposal, Inc. in Bellville, Michigan, for disposal.

Phase 2 Year 3 was marked by improved compliance with the EPS and QoLPS. The QoLPS for air quality had a reduction in exceedances at both the processing facility and the dredge corridor. There were 18 exceedances out of a total of 192 samples collected at the processing facility (9%) and 41 of the 1987 samples collected at the dredge corridor (2%) exceeded the standard. Just two out of the 1481 (< 1%) readings exceeded the QoLPS for noise, and there were no QoLPS exceedances for light, odor, and navigation. Compliance with the Residuals Standard resulted in approximately 6 percent of cumulative (Phase 2 years 1, 2, and 3) counted nodes capped and 0.34% of cumulative counted inventory nodes capped. The dredging was consistently in compliance with the Resuspension Standard throughout Phase 2 Year 3, with one exceedance recorded out of 562 readings.

2013 saw dredging in four unique areas: West Griffin Island, Hot Spot 28, the Schuylerville Boat Works and CU 100.

- West Griffin Island is a shallow wetland area that functions as a backwater. Dredging in this area required special techniques, including a significant amount of access dredging and some dredging from the shoreline. Loaded barges were transloaded at this area to full size barges for transport to the processing facility.
- Hot Spot 28 (CUs 67-70) contained some of the areas of highest concentrations addressed in Phase 2. While dredging occurred in this area, crews were vigilant to implement best management practices to minimize potential downwind air impacts. This area was also the location of a significant cultural resource: an historic dock connected to the former Lock 6. The dock was located partially within the dredge footprint, requiring additional effort to document archaeologically relevant information about the resource prior to disposal.
- The Schuylerville Boat Works (CU 77) is an area near the west shore just north of Lock 5. Dredging in this area was significantly deeper than previously anticipated (as much as 15 feet deep) as contamination was found much deeper after the first dredging pass.
- CUs 99 and 100 were dredged during this year with the understanding that significant travel times for loaded barges across the project area would decrease production. CUs 99 and 100 are at the southern end of the project area, and crews began dredging CUs 99 and 100 in 2013 to reduce the number of long travel-time barge trips (and potential delays) in the last year of dredging. Special tugboats were used to make the 14-hour one-way trip from Troy to Fort Edward.

2014: A total of 582,917 cubic yards of sediment were removed during the Phase 2 Year 4 dredging season, which exceeded the Phase 2 Productivity Standard. A total of 869 barges were unloaded at the processing facility which represented a total of 26,570 kg TPCB mass removed. Processed sediments were shipped to Clean Harbors Lone Mountain Landfill in Waynoka, Oklahoma, Tunnel Hill Reclamation Landfill in New Lexington, Ohio, and Wayne Disposal, Inc. in Bellville, Michigan, for disposal.

Phase 2 Year 4 was marked by improved compliance with the EPS and QoLPS. The QoLPS for air quality had a reduction in exceedances at both the processing facility and the dredge corridor. There were 4 exceedances out of a total of 202 samples collected at the processing facility (2%) and 2 out of a total of 2330 samples collected at the dredge corridor (< 1%) exceeded the standard. There were no QoLPS exceedances for noise, light, odor, and navigation. Compliance with the Residuals Standard resulted in approximately 7.5 cumulative (Phase 2 years 1, 2, 3, and 4) counted nodes capped and 0.5% of cumulative counted inventory nodes capped. The dredging was consistently in compliance with the Resuspension Standard throughout Phase 2 Year 4, with zero exceedances recorded out of 361 readings.

Early in 2014, GE and EPA discussed the dredging of Reach 7, also known as the Landlocked Area. This area, near Fort Miller, is bounded by dams to the north and south and is not accessible by vessels from the main channel of the river. This area is bypassed by the New York State Canal Corporation (NYSCC) Champlain Canal land cut to the east, allowing connection between the TIP and the Northumberland Pool. After discussing the logistical and technical challenges related to the area, GE submitted design and work plans for EPA's approval. On May 7, 2014, following consultation with NYSDEC and the NYSCC, EPA approved GE's construction plan for the Reach 7 Isthmus Transload Area. This was a narrow strip of land between the Landlocked Area and the Champlain Canal, where two excavators would transfer sediments from barges in the Landlocked Area onto barges in the canal for transport to the sediment processing facility.

EPA approved GE's construction plan for the Reach 7 Landlocked Barge Loading Area on June 12, 2014. This barge loading area was located in Fort Miller and used for backfill loading, storage, and equipment needed for work in the Landlocked Area. The barge loading area was constructed in a manner that avoided a historic building site on the property. Dredging began in the Landlocked Area (CUs 61-66) after GE constructed in the loading facilities. The unique challenges of dredging in the Landlocked Area required a site-specific design and work plan. Because of the time required to produce the site-specific design and work plan and to otherwise prepare for dredging in the Landlocked

Area, dredging in the navigable portion of the river bypassed the Landlocked Area, with the Landlocked Area being dredged after the CUs immediately downstream. This dredging out of sequence resulted in significant vessel traffic in the landlocked area in 2014 and 2015, while the surrounding CUs were dredged in 2013. Although this increased vessel traffic lead to resuspension of contaminated sediments, the amount of released PCBs that flowed from the Upper Hudson to the Lower Hudson River was 0.7% of the PCB mass removed, which is less than the allowable resuspension standard of 1 percent.

In 2014, GE agreed to conduct a special study to evaluate the processing methods for fish collected for the project. Through 2003, fish collection for the project was conducted by NYSDEC using its standard fillet protocol. GE began to sample fish in 2004 under the Baseline Monitoring Program. In 2012, EPA and NYSDEC discovered that GE's laboratory was not using the NYSDEC standard fillet technique for processing fish. The technique used by GE did not include the ribcage in the fish fillet being sampled, while the NYSDEC standard fillet protocol requires the rib cage to be included in the sample. .

The special study involved the processing of 130 black bass collected as part of the annual Remedial Action Monitoring Plan fish sampling. For the study, fillets would be collected from both sides of each fish: one with the ribcage and one without. The side of the fish (left or right) with the ribcage included would alternate between individual fish. The purpose of the study was to compare potential differences of PCB and lipid concentrations between fillets that included the ribcage and fillets that did not include the ribcage. The study was designed such that if the margin of error between rib-in and rib-out was less than 20% of the average of lipid-normalized PCB concentrations with a 95% level of confidence, then the measurements were considered interchangeable. This objective was based on the fish monitoring program's ability to see a minimum detectable difference of 20% for time point comparisons for lipid-normalized PCB concentrations. The results of the special study showed that, on a lipid-normalized basis, the rib-out results were within approximately 8% of the rib-in data (range of 6-10%). Because this difference was lower than the objective of a 20% detectable difference, the measurements are considered interchangeable. Since the differences in processing techniques between NYSDEC and GE's lab were discovered,

and in close consultation with New York State, EPA and GE have revised and approved the fish sample collection and processing protocols to conform with New York State protocols.

2015: A total of 230,399 cubic yards of sediment were removed during the Phase 2 Year 5 dredging season. The sediments dredged in 2015 were the last of the sediments identified for removal in the Final Design Reports. Also dredged in this year was an additional area adjacent to CU-1 based on discussions between GE and EPA. A total of 327 barges were unloaded at the processing facility which represented a total of 8,185 kg TPCB mass removed. Processed sediments were shipped to Clean Harbors Lone Mountain Landfill in Waynoka, Oklahoma and Tunnel Hill Reclamation Landfill in New Lexington, Ohio, for disposal.

Phase 2 Year 5 was marked by improved compliance with the EPS and QoLPS. There were no exceedances of the QoLPS for air quality at both the processing facility and the dredge corridor, and there were no QoLPS exceedances for noise, light, odor, and navigation. Compliance with the Residuals Standard resulted in approximately 8 percent of cumulative (Phase 2 year 1, 2, 3,4, and 5) counted nodes capped and 0.51% of cumulative counted inventory nodes capped. The dredging was consistently in compliance with the Resuspension Standard throughout Phase 2 Year 5, with zero exceedances recorded out of 408 readings.

Dredging during Phase 2 Year 5 occurred in a number of challenging areas. Dredging in the Landlock Area was completed, and on August 6, 2015, EPA approved GE's Remedial Action Work Plan for Certification Unit (CU) 60, the last dredge area in River Section 1. This area was located in close proximity to the Thompson Island Dam. Dredging in CU 60 was completed with a number of special safety requirements, including dredging from land and using a dedicated transloading facility to transfer dredged sediments from the river to the Champlain Canal land cut for final transport to the sediment processing facility. The CU 60 transloading area, Reach 7 Isthmus Transloading Facility and Reach 7 Landlock Barge Loading Area were all demobilized in 2015.

On October 14, 2015, EPA approved GE's proposal for access and special requirements for one of the dredge areas in River Section 3, Certification Unit 95, also known as Quack Island. This dredge area was located in close proximity to a bald eagle nest, requiring scheduling coordination and zones of restricted activities to avoid affecting the eagles. In addition, this certification unit was located in two separate areas of shallow water depth, requiring access dredging, the removal of boulders, milling of bedrock, construction of a land access facility, dredging from land, and the use of vessels with shallow drafts to accomplish the dredging. Two additional dredge areas in River Section 3 contained cultural resources requiring special monitoring and documentation.

1.2.6.2 Additional Phase 2 Operations

Deposition Studies

In 2011, 2012, and 2013, GE conducted deposition studies in River Section 1, River Section 2, and River Section 3 (respectively) based on the 2010 Peer Review recommendations. The purpose of these studies was to determine whether the deposition of PCBs resuspended during dredging was affecting surface sediment PCB concentrations. Surface sediment samples were collected using a transect approach from the top 2 inches in the dredge prisms and areas outside of the dredge prisms. The study of all three river sections involved the collection of samples from approximately 350 locations using surface collection techniques (grabs using Ekman and Van Veen sampling devices) to establish the concentrations of PCBs in surface sediments. Samples were collected in river sections 1, 2, and 3 in years 2011, 2012, and 2013 respectively. The studies concluded that PCB deposition was not having a measureable impact on surface sediment PCB concentrations. Additional information on the results of this study can be found in Appendix 4.

Dredging upstream of CU 1

In the 2012 Five-Year Review Report, EPA stated that "[t]he NYSCC has requested that EPA consider performing additional sampling adjacent to [north of] CU1 to determine if additional sediment qualifies for dredging." Although sediments in this area did not meet the ROD criteria for dredging, EPA requested that GE dredge in this area due to

navigational considerations in the Fort Edward Yacht Basin. The area was dredged and the sediments were processed at the processing facility and the area was backfilled with a chemical isolation layer.

Access Dredging

The 2012 Five-Year Review Report included as a follow-up item the potential for access dredging to be part of continued Phase 2 operations. Access dredging was included in the 2014 and 2015 design plans to access shallow draft areas that required dredging. Due to shallow water, dredging outside of CU boundaries was required for 14 CUs in River Section 2 and River Section 3 in order to obtain access to these CUs.

Short Term Impacts from Operations

Dredging in multiple river sections, while transporting dredge materials to the upstream facility, resulted in significant simultaneous activity occurring throughout the project area during dredging. These activities included more than 90,000 barges miles logged, over 5,000 barges unloaded, and more than 20,000 trips through the NYSCC locks. As EPA anticipated, the sum of these project activities resulted in anticipated localized increases in PCB levels in water, and therefore in fish tissue PCBs. PCB levels in the water column and fish were closely monitored throughout the implementation of the project and engineering adjustments were made as necessary in order to control resuspension. A more detailed discussion on the differences between actual implementation and those initial assumptions is presented in Appendix 8.

The remedial activities have had short-term impacts on aquatic and wildlife habitats of the Upper Hudson River. An important aspect of the remedy required that, where appropriate, a habitat replacement and reconstruction program should be implemented for submerged aquatic vegetation, wetlands, and unconsolidated river bottom. The primary goal of this program is to replace the functions of the Upper Hudson River habitats impacted by the dredging. This program was implemented in accordance with state and federal requirements to mitigate impacts to those resources through an adaptive management framework. Monitoring and maintenance of habitat replacement and reconstruction work

will continue during Operation, Maintenance and Monitoring. The State, federal natural resource trustees, and the public have been given, and continue to have, opportunities to provide input or feedback regarding the habitat replacement and reconstruction work. The Phase 2 habitat replacement and reconstruction work began in 2010 (i.e., in the year following the 2009 Phase 1 dredging) and initial planting was completed in 2016 (subject to EPA's approval of GE's Remedial Action Report). A monitoring program is in place for Phase 1 and Phase 2 areas to verify the attainment of the habitat replacement objectives.

Demobilization of the Fort Edward Sediment Processing/Transfer Facility

With the completion of dredging began the demobilization and restoration of the Sediment Processing Facility and on-river facilities. EPA approved the demobilization plans after submitting the plans for public input in November 2015. Demobilization and restoration of the on-river facilities have been completed, and the sediment processing facility demobilization and restoration was completed in December 2016. Activities for demobilization and restoration of the sediment processing facility included stormwater basin removal and reconfiguration, cleaning asphalt, concrete, structures and infrastructure, and removal of some buildings. Environmental sampling was conducted by GE to confirm decontamination procedures. In addition, EPA collected confirmation samples of soil, water (groundwater, stormwater, and underdrain water), sediment, equipment, and concrete/paving. Equipment wipe sampling results generally met the unrestricted use criteria laid out in the EPA-approved demobilization plan, and equipment was resold or scrapped. Some equipment or components of equipment that were found to have unacceptable levels of PCBs after decontamination were disposed of with other PCB-containing material, while other equipment that met criteria for low-occupancy use were shipped offsite for reuse. The asphalt floors of the Filter Cake Enclosures and concrete/asphalt joints and joint sealants throughout the facility did not meet the unrestricted use criteria described in the demobilization plan. As a result, the floors were milled using an asphalt milling machine and later re-paved, and the joints were cut with a saw and contaminated material was vacuumed out of the saw cuts, with all removed material disposed of offsite. The stormwater system samples and other environmental media samples met the EPA-approved unrestricted use criteria.

In December 2016 GE terminated its lease with WCC, the owner of the largest portion of the processing/transfer facility property. EPA currently owns the properties upon which the wharf and access road were constructed. EPA will transfer ownership of the wharf back to NYSCC, and is working with the State, WCC and local governments regarding the transfer of the facility access road.

Remedial Action Report

On December 23, 2016, GE submitted to EPA a Remedial Action Report which included the company's request for EPA to certify that GE has completed the "Remedial Action," including the dredging called for in the 2002 ROD, as required by the consent decree. GE's Remedial Action Report has been provided to all state and federal agencies that will participate in the review of the report, including the National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, and NYSDEC. EPA also distributed the report to the public through the project's Community Advisory Group. EPA has begun its review of the report but does not anticipate responding to GE's request for certification before the Second Five-Year Review is complete.

GE will remain obligated under the consent decree to, among other things, monitor conditions in the Hudson River and maintain the remedy (such as to maintain restored habitat and, as needed, repair underwater caps on contaminated sediment) even if EPA issues the certification.

1.2.7 Institutional Controls Implementation

1.2.7.1 OU1

The 1984 ROD did not identify institutional controls for the Remnant Deposits (OU1). As identified in the 2012 Five Year Review, an institutional control needs to be implemented that would ensure future use of the remnant properties would be limited to uses and activities that would not compromise the integrity of the cap system and will not result in unsafe exposures to contaminants for those using the park. To date, the controls have not

been implemented. EPA will work with NYSDEC to identify the owner(s) of the properties as a precursor to implementing the institutional control.

1.2.7.2 OU2

The 2002 ROD included institutional controls in the form of fish consumption advisories and fishing restrictions until the relevant remediation goals are met. In 1975, NYSDOH began issuing fish consumption health advisories due to levels of PCBs in fish, and in 1976 NYSDEC banned all fishing in the Upper Hudson and banned most commercial fishing in the Lower Hudson. NYSDEC reopened the Upper Hudson River to "catch-and-release sportfishing" in 1995.

NYSDOH's 2016 "Health Advice on Eating Sportfish and Game" includes the following specifications:

- Women of childbearing age (under 50 years old) and children (under 15 years old) should not eat fish or crabs from the Hudson River from the Corinth Dam to the New York City Battery.
- Women over 50 years old and men over the age of 15 are advised to not eat any fish from the Route 9 Bridge Dam in Glens Falls to the Troy Dam. From Bakers Falls to the Troy Dam, the NYSDEC catch-and-release regulations apply. Table 2, which is from the NYSDOH's *Hudson River Fish Advisory Outreach Project*, summarizes the advisories relative to women over the age of 50 and men over the age of 15.

These advisories apply to the tributaries and connected water of the Hudson River if there are no dams, falls or barriers to stop the fish from moving upstream. Additional Information about these institutional controls can be found in Appendix 13 (Improvements to NYSDOH Outreach and Communication Regarding Fish Advisories and Fishing Restrictions).