ATTACHMENT 5
STATEMENT OF BASIS FOR EPA'S PROPOSED REMEDIAL ACTION FOR THE HOUSATONIC RIVER "REST OF RIVER," RELEASED JUNE 2014 (STATEMENT OF BASIS OR STMT/BASIS)

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Statement of Basis for EPA's Proposed Remedial Action for the Housatonic River "Rest of River"

THE RIVER *The Housatonic River is contaminated with polychlorinated biphenyls (PCBs) released from the General Electric Company (GE) facility in Pittsfield, MA. The entire site consists of the 254-acre GE facility; the Housatonic River and its banks and floodplains from Pittsfield, MA, to Long Island Sound; and other contaminated areas. Under a federal Consent Decree, GE is required to address contamination throughout the site, including in the River.*

YOUR OPINION COUNTS: OPPORTUNITIES TO COMMENT

EPA is accepting public comment on this proposal from June 25, 2014 through August 8, 2014. EPA's Proposed Remedial Action is based on current information and the cleanup plan could change in response to public comment or new information. The following two public informational meetings will include a presentation describing the Proposed Remedial Action, followed by a question and answer session. EPA will begin a formal public comment period on June 25, 2014. Near the end of the public comment period, EPA will schedule a Public Hearing where the public will have an opportunity to make oral comments during this Hearing for EPA to consider. You may also submit written comments – see page 43 to find out how.

For further information about these meetings, call Kelsey O'Neil of EPA's Community Affairs office at 617-918-1003, or toll-free at 1-888-372-7341.

Public Informational Meeting
Wednesday, June 18, 2014 at 6:00 pm at Lenox Memorial Middle/High School, Lenox, MA
Public Informational Meeting
Tuesday, June 24, 2014 at 6:00 pm at Kent Town Hall, Kent, CT
Public Hearing
date/time/location to be determined

SUMMARY:

After careful study of the impacts of PCBs released to the Housatonic River from the GE-Pittsfield/Housatonic River site in Pittsfield, MA, and in consideration of the contaminant reduction accomplished by cleanup activities at other parts of the site, EPA proposes the following cleanup actions, known as corrective measures, or remedial action, for the "Rest of River" component of the GE-Pittsfield/Housatonic River site. EPA's Proposed Remedial Action was developed after consultation with Massachusetts Departments of Environmental Protection (MassDEP) and Fish and Game (MassDFG) and the Connecticut Department of Energy and Environmental Protection (CT DEEP).This Statement of Basis, in conjunction with the Draft Modification to the Reissued RCRA Permit, constitute EPA's "Proposed Plan" or "Proposed Cleanup Plan," setting forth EPA's Proposed Remedial Action for the Rest of River and Operation and Maintenance (O&M) as prescribed by Paragraph 22.n. of the Consent Decree (termed the "Proposed Remedial Action" or "Proposed Cleanup Plan" throughout this document) to address polychlorinated biphenyl (PCB) contamination in river sediment, banks and floodplain soil, and biota which poses an unacceptable risk to human health and the environment.

In addition to addressing risks in the areas slated for cleanup, the Proposed Remedial Action also includes provisions to reduce downstream transport of PCBs, relax or remove fish consumption advisories, and to avoid, minimize and/or mitigate adverse impacts to state-listed species and their habitats regulated under the Massachusetts Endangered Species Act (MESA), and

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the ecosystem, a part of which has been designated as a state Area of Critical Environmental Concern (ACEC). In addition, an Adaptive Management approach is proposed to ensure that the cleanup is performed using the best available technologies and methods. EPA also proposes that contaminated material be shipped off-site to existing licensed facilities for disposal.

Consistent with actions at other contaminated sediment sites, this Proposed Remedial Action relies on a combination of cleanup approaches that apply to specific "reaches" of the river, as described below:

- Removing and capping PCB-contaminated sediment in some reaches in the Housatonic River.
- Monitoring natural recovery in some reaches in the Housatonic River.
- Removing PCB-contaminated soil from some areas in the 10-year floodplain adjacent to the river, including vernal pools, and restoring affected areas.
- Stabilizing PCB-contaminated erodible river banks that are a source of PCBs that could be transported downstream, focusing on the use of bioengineering techniques in restoring any disturbed banks.
- Transporting and disposing of all excavated contaminated soil and sediment off-site at existing licensed facilities approved to receive such soil and sediment.
- Placing restrictions (Institutional Controls) on eating fish, waterfowl, and other biota where PCB tissue concentrations pose an unacceptable risk unless/until such consumption advisories are no longer needed, as well as restricting other activities that could potentially expose remaining contamination.
- Establishing procedures to address PCB contamination associated with future work.
- Maintaining remedy components and monitoring over the long-term to assess the effectiveness of the cleanup and recovery of the river and floodplain.
- Establishing mechanisms for additional response actions if land uses change (e.g. dam removal, changes in floodplain land use)
- Conducting periodic reviews following the cleanup to evaluate the effectiveness and adequacy of the cleanup in protecting human health and the environment.

The cost of the Proposed Remedial Action is estimated at $613 million and will take approximately 13 years to implement. A more detailed description of the Proposed Remedial Action begins on page 3.

SCOPE OF THIS DOCUMENT

This document, in conjunction with the Draft Modification to the Reissued RCRA Permit ("Draft Permit"), satisfies the requirements set forth in the law, regulations, and Consent Decree governing this matter, United States, et. al., v General Electric Company, CA No. 99-30225 (D. Mass) (entered Oct. 27, 2000) ("CD" or "Decree") for a RCRA "Statement of Basis," 40 C.F.R. §124.7. Namely, this document, together with the Draft Permit, describes the derivation of the Performance Standards in the Draft Permit and the associated remedial actionor corrective measures necessary to meet the Performance Standards to address PCBs and any other hazardous waste, constituents or substances that have migrated from the GE facility to surface water, sediment, floodplain and bank soil, and biota in the Rest of River. The Draft Permit also includes the identification of the applicable or relevant and appropriate requirements (ARARs) under federal or state law that must be met by such corrective measures, and where EPA proposes to waive any such ARARs, the basis for such waiver.

The Proposed Remedial Action is based upon the information included in EPA's Administrative Record which can be reviewed at the information repositories identified on page 42 of this document. An index of the Administrative Record can be found at www.epa.gov/region1/ge/proposedcleanupplan.html.

Using the information in the Administrative Record, EPA has evaluated different combinations of cleanup alternatives for river sediment/ banks and floodplain soil to remove, contain, monitor and/or treat PCB contaminated material to protect

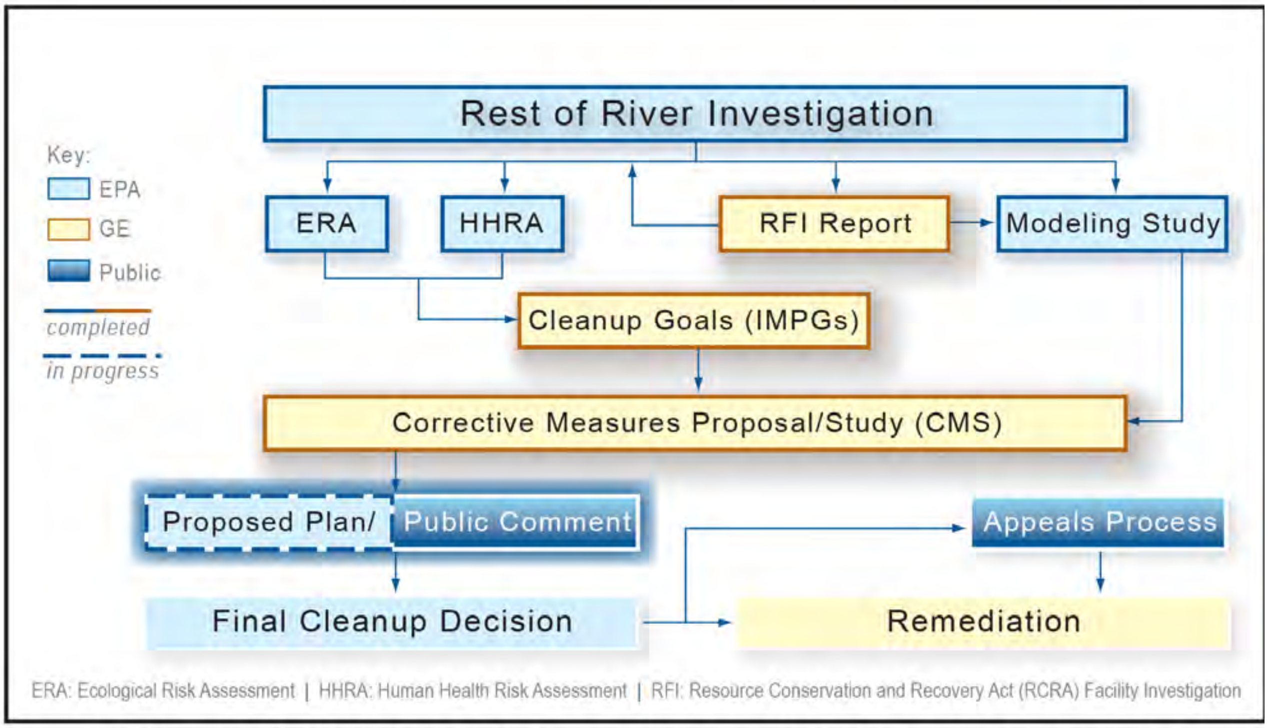


FIGURE 1 SUMMARY OF REST OF RIVER CONSENT DECREE PROCESS

human health and the environment from exposure to contaminated soil, sediment, surface water and biota, control sources of releases, and attain (or waive) ARARs. The wide range of the various combinations of cleanup alternatives that were evaluated for Rest of River are summarized in this document beginning on page 18, as well as the cleanup or remedial action that EPA is proposing for public comment ("Proposed Remedial Action").

WHERE WE ARE IN THE CLEANUP PROCESS

EPA proposed the site to the Superfund National Priorities List (NPL) in September 1997. The federal and state government agencies, the City of Pittsfield, the Pittsfield Economic Development Authority, and GE entered into negotiations late in 1997 in an attempt to reach a comprehensive settlement to address contamination at and from the GE facility. These negotiations resulted in a CD approved by the court on October 27, 2000. This CD governs the cleanup of the site.

In the CD, the river is to be addressed in three stages:

1. The first half-mile cleanup area adjacent to GE's former Pittsfield plant, completed by GE in 2002;
2. The next one and one-half miles (1.5 mile), which was cleaned up under EPA's direction with a cost-sharing agreement with GE, completed in 2007;
3. The "Rest of River", extending from the end of the 1.5 mile cleanup, at the confluence of the East and West Branches of the Housatonic River at Fred Garner Park in Pittsfield, through Massachusetts and Connecticut. This third stage is the subject of this Proposed Cleanup Plan.

The CD did not include a specific cleanup plan for Rest of River but rather identified a process for selecting a remedial action as illustrated in Figure 1. As part of this process, this Statement of Basis is to be issued along with a Draft Modification to the Reissued RCRA Permit, and EPA's Proposed Remedial Action must be issued for public comment. Following the public comment process and other requirements outlined in the CD, EPA will issue a response to public comments and a final Modification of the Reissued RCRA Permit ("the Final Permit"). The Final Permit could be different from the Proposed Remedial Action, depending upon information that EPA considers as a result of public comments.

A CLOSER LOOK AT EPA'S CLEANUP PLAN

The Rest of River at the GE-Pittsfield/Housatonic River Site is broken into a series of reaches, designated as Reaches 5 through 16, that contain sediment and riverbank soil contaminated with PCBs. In addition, areas with PCB-contaminated soil greater than 1 milligram per kilogram (mg/kg) in the floodplain adjacent to these reaches are also included in the Rest of River study area. Figures 2 and 3 show the location of the various river reaches and the floodplain areas of the site.

Based on its careful evaluation of a range of alternatives using the nine criteria specified in the RCRA Permit, EPA is proposing for public comment the Rest of River cleanup outlined below. EPA's preferred alternative or Proposed Remedial Action is Combination Alternative 9 (SED9/FP4 MOD with TD1). Combination Alternative 9 requires excavation and capping/restoration of sediment, river banks and floodplain soil in certain areas to protect human health and the environment while seeking to avoid, minimize or mitigate unacceptable impacts to state-listed species and their habitats and the Area of Critical Environmental Concern ("ACEC"). The Proposed Remedial Action also includes disposal of all excavated contaminated soil and sediment off-site at existing licensed facilities approved to receive such soil and sediment, with a preference to maximize transport via rail. The proposed Performance Standards and corrective measures required to implement this cleanup are outlined in the Draft Permit. EPA's Proposed Remedial Action was developed in consultation with MassDEP, MassDFG, and CT DEEP.

River Sediment and Banks

The following corrective measures and performance standards for river sediment and banks are being proposed by EPA to: reduce risks to humans from consumption of fish and waterfowl; reduce risks from direct contact to sediments; reduce ecological risks; and to control the sources of releases to reduce downstream transport of PCBs. Specific Performance Standards and benchmarks for fish tissue and waterfowl concentrations, soil and sediment concentrations, and downstream transport, and the basis for these, have been included in the Draft Permit. EPA is specifically seeking comment on the appropriateness of these or alternative numerical standards. These Performance Standards and benchmarks apply throughout the Rest of River.

In this Proposed Remedial Action, removal of PCB-contaminated sediment is required in a number of areas followed by the placement of a cap. Specifically, an engineered cap will be designed to physically and chemically isolate the residual PCBs in sediment and provide habitat for aquatic plants and animals and reduce downstream transport of PCBs. A more detailed description of the design of the engineered caps is provided on page 8.

Reach 5A

In Reach 5A, the 5 miles from the confluence of the East and West Branches of the Housatonic (at Fred Garner Park in Pittsfield) to the Pittsfield wastewater treatment plant, the Proposed Cleanup Plan requires the removal of river bed sediment throughout Reach 5A and soil in eroding river banks contaminated with more than 5 mg/kg PCBs, capping of the river bed, and stabilization of contaminated erodible river banks. Additional data will be collected to better quantify the concentrations of PCBs in river banks and locations of erodible river banks and to determine the cap thickness and removal depth in the river.

A focus of the river bank work will be to reduce the mobilization of PCBs into the river from the erosion of contaminated banks while maintaining the dynamic nature of the River. For banks that need to be addressed, reconstruction and stabilization of remediated banks can be achieved in a number of different ways, including using the principles of bio-engineering and natural channel design. See the information outlined on page 5 of this document regarding these concepts. Activities in the banks will follow the hierarchy below of most preferred to least preferred methods:

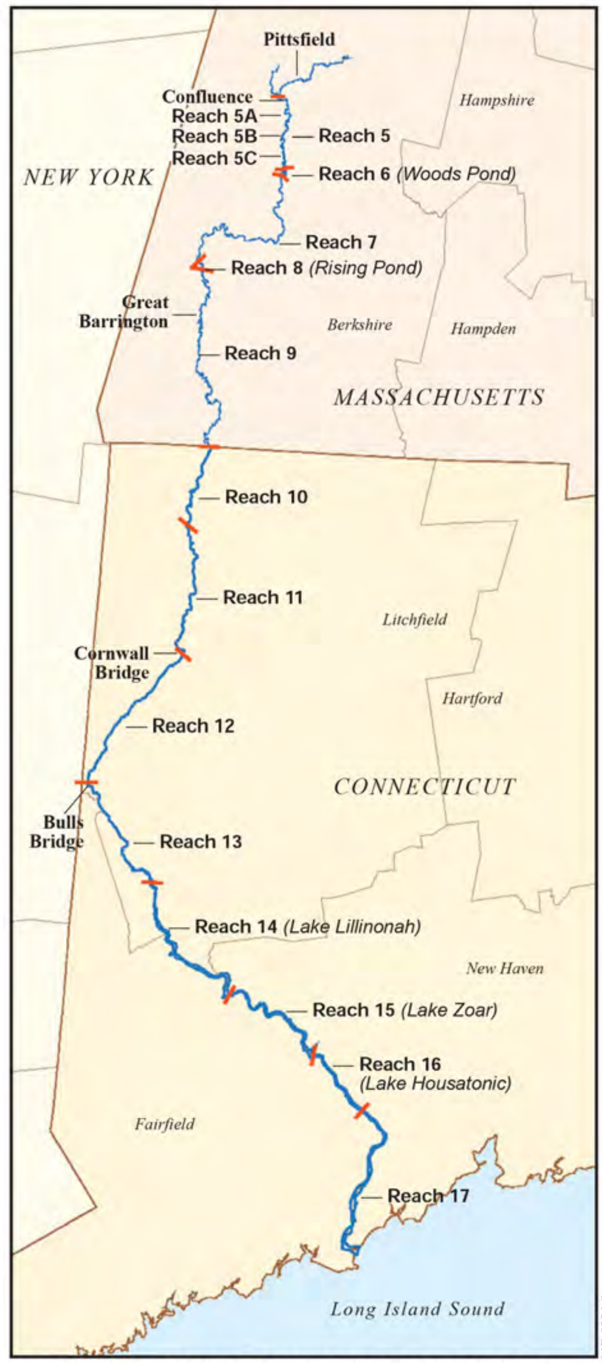
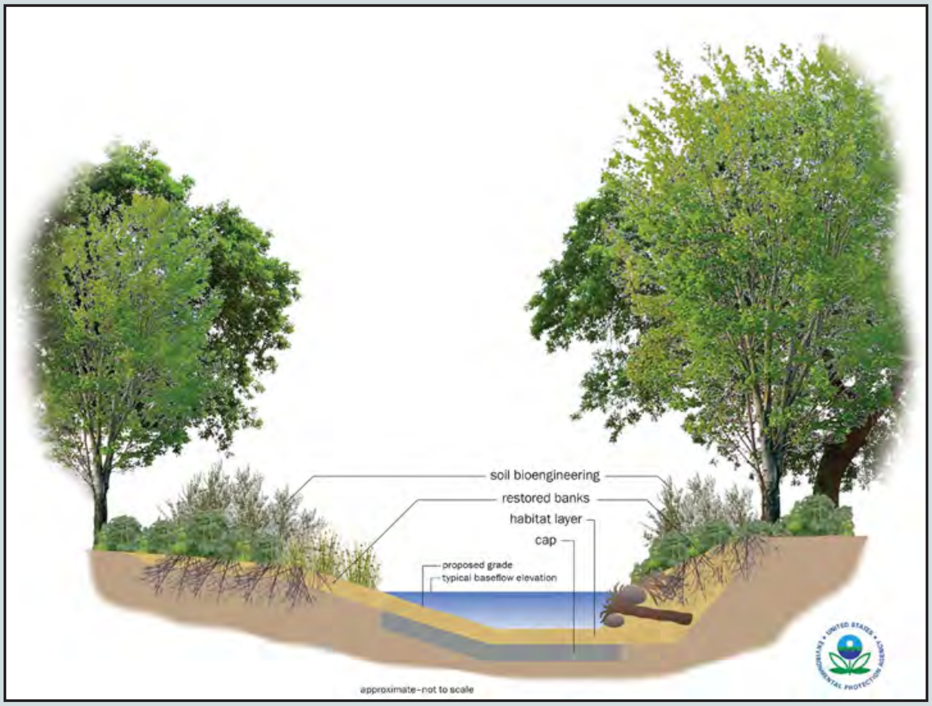


FIGURE 2 HOUSATONIC RIVER, REACHES 5 THROUGH 17

NATURAL CHANNEL DESIGN AND BIOENGINEERING

Over the past 200 years, the Housatonic River ecosystem has undergone a history of channel disturbances and channel relocations, and as a result, there is evidence of bank erosion which contributes a significant amount of sediment and associated PCBs to the river system. The Housatonic River is currently recovering from these past disturbances, and over time, the river will approach sustainable dynamic equilibrium.

Natural channel design is a method of stream restoration that attempts to create a stable stream channel that is capable of balancing flows and sediment loads by accelerating the trajectory towards a sustainable, dynamic equilibrium by working with the stream processes. A naturally stable stream channel maintains its dimension, pattern and profile such that the stream does not degrade (erode) nor aggrade (rise). One tool that is often used in natural channel design is the Bank Assessment for Non-point source Consequences of Sediment (BANCS) model which assesses the erodibility of the river banks, as further described in the Draft Permit.



Another tool that is often used when dealing with eroding banks is bioengineering, which combines biological and engineering concepts. Rather than stabilizing an eroding or unstable bank solely with rock, bioengineering techniques combine the natural elements of the site, such as rock, soil, trees, and other native vegetation, to create a complex mix of material to rebuild the banks. Once the vegetation has established itself, the need for maintenance is reduced or completely eliminated.

1. Where possible, the goal is to leave banks intact with no disturbance or excavation. (i.e., where they do not exceed the criteria outlined in the draft Permit).
2. Reconstruct remediated banks with bio-engineering "soft" techniques;
3. Reconstruct remediated banks with an engineered cap extending into the river bank covered with a bio-engineering/"soft" layer;
4. Place rip-rap cap or hard armoring on surface of banks (e.g. this approach may be necessary in areas where infrastructure such as bridges and culverts must be protected).

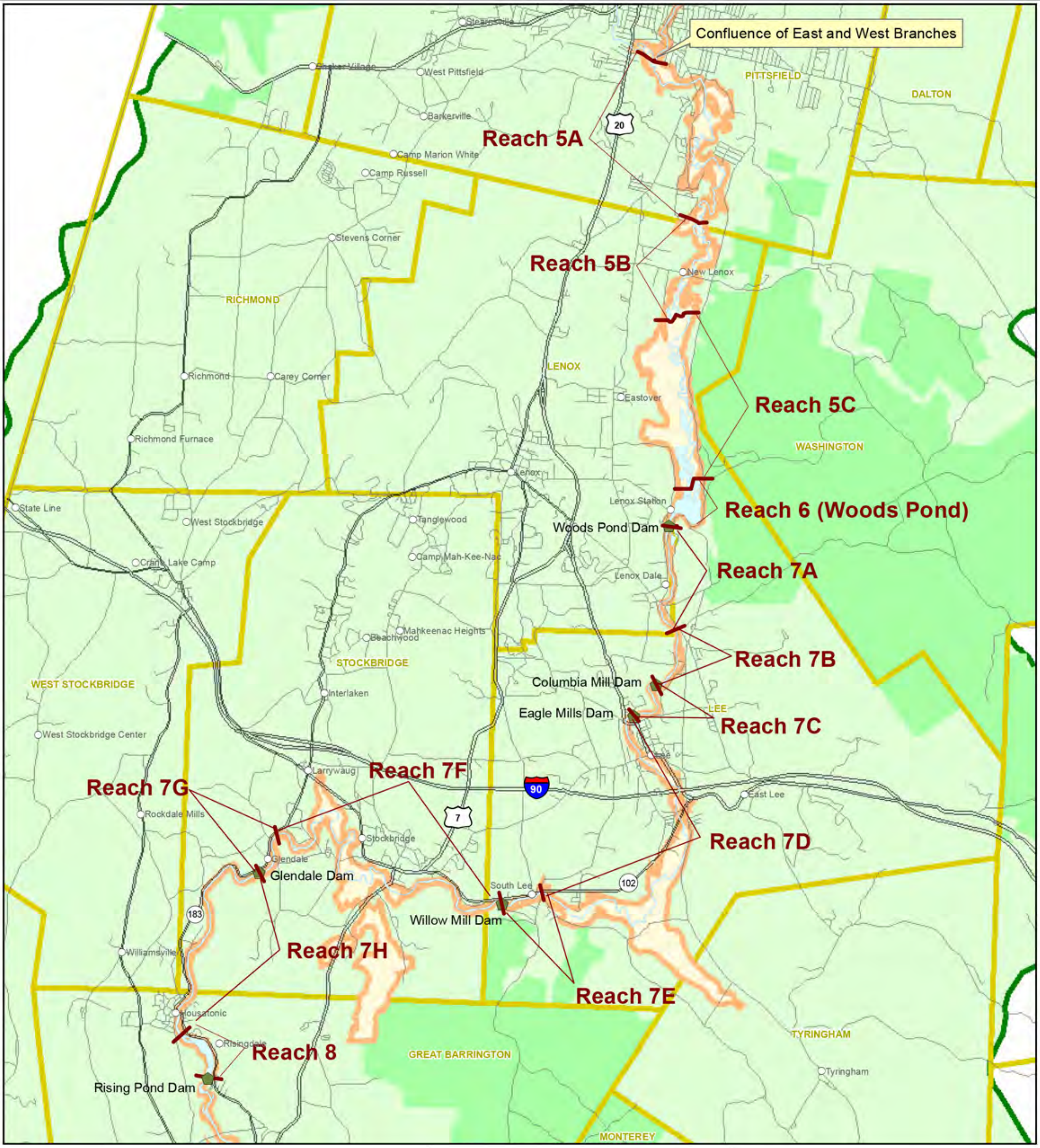
Reach 5B

In Reach 5B (the 2 miles of river from the Pittsfield wastewater treatment plant to Roaring Brook in Lenox, MA), the Proposed Cleanup Plan requires the excavation and restoration of areas of river bed and banks that exceed the reach-specific Performance Standard of 50 mg/kg PCBs. Additional data will be collected to determine the location of PCB concentrations in sediment and banks that exceed 50 mg/kg that would be targeted for remediation. Any excavated Reach 5B riverbanks would be restored using the hierarchy listed under Reach 5A.

In addition, this component of the remedy includes a provision for a pilot study regarding Enhanced Monitored Natural Recovery (Enhanced MNR or EMNR) throughout Reach 5B. This pilot study would be performed to evaluate the effectiveness of using sediment amendments such as activated carbon to reduce the bioavailability of PCBs. Following the review of the pilot study results, and through an adaptive management framework, the use of amendments will be applied to all of Reach 5B.

Reach 5C

In Reach 5C (the 3 miles between Roaring Brook and the headwaters of Woods Pond), the Proposed Cleanup Plan



LEGEND:

- Town/City
- Roads
- Reach Division Line
- Housatonic River
- State Park
- Municipal Boundary
- 10-Year Floodplain

N W E S

1 0.5 0 1 Miles

0.85 0.425 0 0.85 Kilometers

GE- Pittsfield/Housatonic River Site
Rest of River

FIGURE 3
HOUSATONIC RIVER,
PRIMARY STUDY AREA
(REACHES 5 AND 6) AND
REACHES 7 AND 8

File: Y:\gepitt\mxds\era_reaches_update_april2014.mxd, 4/11/2014 3:16:24 PM, ricksc requires removal of river bed sediment followed by capping residual PCBs in sediment. Riverbanks in this reach generally are not eroding and will be left intact, unless disturbed by other remediation activities.

Backwaters Adjacent To Reaches 5 Through 7

There are a series of backwater areas adjacent to the river in Reaches 5, 6, and 7. EPA's Proposed Cleanup Plan requires the removal of contaminated sediment in Backwaters to allow a cap to be placed over PCBs that exceed an average of 1 mg/kg. Some portions of backwaters designated as having high-quality habitat for state-listed species (known as "Core Area 1 habitat") will not be remediated except in discrete areas with PCB concentrations greater than 50 mg/kg PCBs. Additional data will be collected to assess PCB concentrations in the backwaters to determine areas for cleanup. EPA will also require that a pilot study be conducted to determine if other approaches, such as the addition of activated carbon, would be useful in reducing the bioavailability of PCBs in the backwater areas which are not actively remediated (i.e. Core Area 1 habitat).

Woods Pond (Reach 6)

In Reach 6 (Woods Pond), the Proposed Cleanup Plan specifies the removal of contaminated sediment and the placement of a cap, with the design generally providing a minimum water depth of six feet in the pond with shallower water depths in the near-shore areas. In addition to reducing risks from fish (and other biota) consumption and ecological risks, this action in Woods Pond will reduce risk to people from direct contact with the sediment. It also will remove a significant mass of PCBs, reducing the potential for release of PCB contaminated sediments in the case of dam failure, and increasing the PCB-trapping efficiency of Woods Pond, thus assisting in reducing downstream transport of PCBs. Reach 6 will be monitored over the long term following the cleanup and, if substantial PCBs accumulate in the pond, removal of the accumulated sediment will be required. In addition to soliciting comments on the overall Proposed Cleanup Plan, EPA is also soliciting comments on other options for Woods Pond that could accomplish similar reductions in risk and downstream transport and could also be suitable under the nine criteria.

Columbia Mill Impoundment (Reach 7B), Eagle Mill Impoundment (Reach 7C), Willow Mill Impoundment (Reach 7E), and Glendale Impoundment (Reach 7G)

This component of EPA's Proposed Cleanup Plan addresses the impoundments behind the four dams in Reach 7 (Columbia Mill Dam, Eagle Mill Dam, Willow Mill Dam and Glendale Dam (Reaches 7B, 7C, 7E, and 7G, respectively). EPA is proposing a number of potential approaches to better integrate the cleanup with potential dam or impoundment use, maintenance, or removal. First, if dam maintenance or removal is planned, the Proposed Cleanup Plan provides for GE to work with those planning work on these dams, to fund sampling and analysis, and take responsibility for the incremental costs associated with the assessment, removal, management, and disposal of PCBs. Dam removal itself is not a component of this cleanup plan and would be conducted by others in coordination with GE and appropriate State and Federal agencies. If no dam removal plans have materialized by the time that GE would otherwise be required to move forward with remediation of these impoundments, sediment would be removed from the river bed prior to placement of a cap to sequester remaining contamination exceeding an average of 1 mg/kg PCBs. In such a case, as part of Institutional Controls, GE would remain responsible for incremental costs due to PCBs for future dam work. Final removal depths, locations, and engineered cap configurations will be determined during remedial design. An additional option, in lieu of capping, would allow GE to excavate the sediment in each impoundment to meet an average of 1 mg/kg PCBs throughout the impoundments.

Rising Pond (Reach 8)

In Reach 8 (Rising Pond), removal of contaminated sediment is required prior to placement of a cap to sequester remaining contamination in areas that exceed 1 mg/kg PCBs. Additional data will be collected to assess PCB concentrations in Rising Pond to determine areas for cleanup. In lieu of capping, GE could excavate the sediment in Rising Pond to meet an average of 1 mg/kg PCBs throughout the pond.

Flowing Sub- reaches in Reach 7 and Reaches 9 through 16

Monitored Natural Recovery (MNR) will be implemented in the flowing sub-reaches in Reach 7 between Woods Pond and Rising Pond (7A, 7D, 7F, and 7H) as well as Reaches 9 through 16 (from Rising Pond Dam through Connecticut). Rather than requiring active measures such as excavation or capping, MNR typically relies on physical, chemical, and biological processes to isolate, destroy, or otherwise reduce exposure to, or toxicity of, contaminants in sediment and to achieve Performance Standards. For this site, MNR is generally occurring by the physical processes of sedimentation and dilution of upstream sources. In addition, the progressive increase in river flow and associated solids from tributaries located downstream of Rising Pond naturally attenuate PCB concentrations in sediments as they combine with PCB-impacted upstream water and solids. The effects of MNR are exhibited in decreasing trends in fish and benthic invertebrate PCB levels that have been observed in in reaches 9-16 during the last 25 years. Long-term monitoring in both Massachusetts and Connecticut is a necessary component of MNR to ensure that risk reduction and ecological recovery by natural processes are continuing to occur as expected and downstream transport and biota Performance Standards are met; and there is progress towards the long-term biota benchmarks outlined in the Draft Permit.

Engineered Cap Design

Several components of EPA's Proposed Cleanup Plan require construction of an engineered cap. In each area to be capped, sediment would be removed to allow the placement of an engineered cap to the final grades determined to be appropriate during design of the remedy, generally to the pre-existing grade. Each cap will likely consist of a mixing layer, a chemical isolation layer to minimize PCB migration up through the cap, a filter layer (if necessary), a protective layer (to prevent disruption and erosion of the chemical isolation layer and exposure of the underlying contaminated sediment), a bioturbation layer, and a habitat layer. See Panel 1 of Figure 4 for an example of the composition of an engineered cap. During remedial design it will be determined if certain cap component layers can be combined, additional cap components are necessary, or other cap configurations are appropriate.

Specific engineered cap Performance Standards and design principles have been included in the Draft Permit. Cap thickness affects the dredge/excavation depth required (and thus, the volume of contaminated sediment required to be transported and disposed of off-site). There is value in minimizing the total cap thickness while ensuring that the cap will, over the long-term, be successful in physically isolating residual PCBs from human and environmental receptors and protecting against future downstream transport. In that context, EPA has proposed Engineered Cap Performance Standards that do not specify particular thicknesses and are flexible enough to allow for construction of caps that are protective, permanent, and implementable and are suitable under conditions that may be associated with climate change, while still being designed to minimize cap thickness. Cap thickness may also be minimized to the extent that one layer of material can satisfy more than one functional requirement such as mixing, chemical isolation, erosion protection, bioturbation, or habitat functions, as well as through other means.

The thickness of the engineered cap will determine the depth of sediment removal in most reaches and the final grade of the sediment bed determined to be appropriate during design of the remedy. Generally, it is expected that in most areas the sediment bed elevation will be returned to that which was present prior to removal. This concept is illustrated in Panels 2 and 3 of Figure 4.

Floodplains And Vernal Pools

These components of the Proposed Cleanup Plan would be performed in the floodplain in Reaches 5 through 8 concurrent with the nearby sediment cleanup activities described above. These cleanup actions will reduce ecological risk and direct contact risk to humans. The specific risk-based cleanup standards that apply to each exposure area within the floodplain are identified in the Draft Permit (see Figures 3 through 5 and Tables 1 through 5 in the Draft Permit). In general, the process to implement the cleanup in the floodplain includes:

- Gathering additional information, including further delineation of PCB concentrations, to support the final cleanup design.
- Avoiding, minimizing or mitigating impacts to state-listed species and their habitats, as identified by the Commonwealth in Core Areas.
- Removing floodplain soil with PCB concentrations exceeding the cleanup standards to a depth of one foot, except in frequently used subareas, which will be excavated to three feet.
- Restoring the excavated floodplain areas, including removing access roads, staging areas and other areas affected by the cleanup.

During the Human Health Risk Assessment, EPA determined that certain areas of the floodplain constituted "frequently used subareas" that were subject to more intense use patterns than other areas and thus are proposed to undergo additional cleanup beyond that required for other direct contact exposure pathways (see the third bullet above). EPA is also soliciting comment from the public on the areas identified in Figure 5 of the Draft Permit as those that are frequently or heavily used.

This Proposed Cleanup Plan includes an adaptive management framework for the cleanup of vernal pools. Three different approaches would be implemented concurrently in an initial subset of vernal pools:

- Conventional cleanup methods (e.g., excavation and reconstruction) in a group of pools (8 to 10) would be used to achieve the vernal pool soil/sediment cleanup level of 3.3 mg/kg followed by active restoration. Pools which occur within Core Area 1 habitat will be excluded from consideration in this initial set of vernal pools.
- A pilot study would be conducted in a second group of vernal pools to evaluate the effectiveness of a sediment amendment such as activated carbon in reducing the bioavailability of PCBs to biota and the impacts of the amendment on these pools.
- A pilot study using an innovative method would also be conducted in a third group of vernal pools.

Based on the outcome of the first phase of vernal pool remediation and restoration, EPA will determine how and where

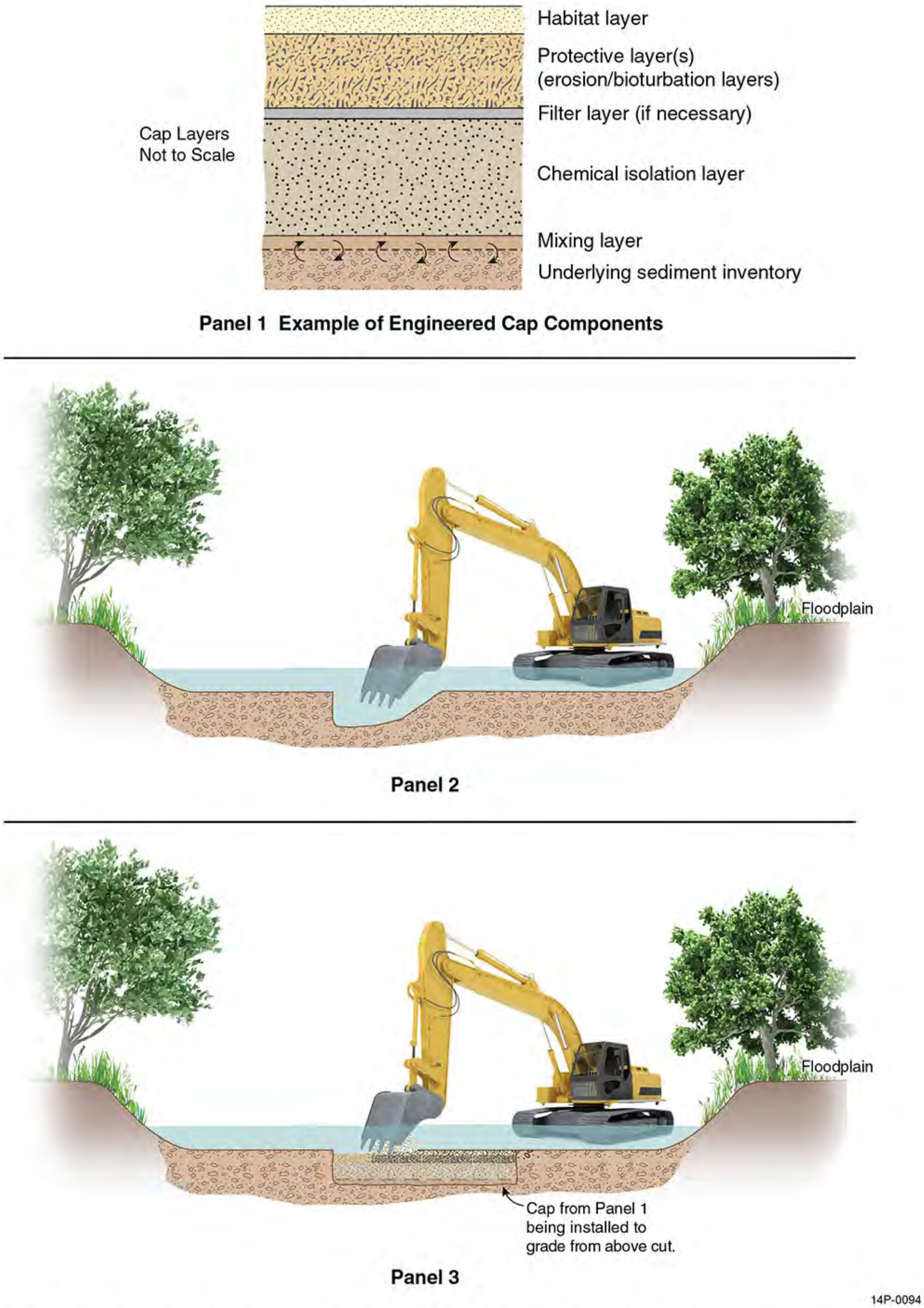


FIGURE 4 EXAMPLE OF ENGINEERED CAP COMPONENTS AND PLACEMENT

additional vernal pool remediation will occur to meet the vernal pool-specific cleanup level of 3.3 mg/kg PCBs in soil/sediment. For remediation of vernal pools in Core Areas, the approach that will be generally used is to avoid excavation in vernal pools within Core Area 1 and to minimize impacts of remediation, on a case-by-case basis, of vernal pools within Core Areas 2 and 3.

Restoration

A restoration program will be required to address the impacts of the cleanup on state-listed species and their habitats and on the floodplain, river bottom and banks, impoundments, and vernal pools with the broad objective to return, to the extent feasible and consistent with the remediation requirements, the functions, values, characteristics, species use, and other ecological attributes existing prior to remediation. This program will include surveying pre-remediation conditions, establishing restoration objectives and evaluation criteria to measure success, and requiring coordination of restoration with remedial activities, post-remediation restoration actions, monitoring and maintenance.

Off-Site Disposal of Contaminated Sediment and Soil

All contaminated soil and sediment will be disposed of off-site at existing licensed facilities approved to receive such soil and sediment. EPA's Proposed Cleanup Plan includes maximizing the use of rail to transport contaminated material to existing off-site licensed facilities approved to receive such soil and sediment.

Monitoring, Maintenance, Inspections, Periodic Reviews, and Institutional Controls

The baseline and long-term monitoring programs are major components of the proposed action in both the areas with sediment and soil removal and areas subject to MNR. Robust monitoring programs will be implemented in Massachusetts and Connecticut to evaluate the effectiveness of the remedial actions in achieving Performance Standards and reducing the risks posed by PCBs. Maintenance of the remedy in the river bed and banks and floodplain will be required to ensure that the Performance Standards continue to be met in the future. Monitoring and maintenance activities will also be performed to ensure that residual PCB-contaminated soil does not cause unacceptable levels of PCB transport downstream.

Institutional controls, such as biota consumption advisories, will be implemented to advise people against eating fish or waterfowl or other biota where PCB concentrations pose an unacceptable risk for consumption, as well as restricting other activities that could potentially expose remaining contamination. In all areas where unrestricted use is not achieved, institutional controls will be put in place to restrict or place conditions on activities that would cause unacceptable risks, such as disturbance of caps, excavation in floodplain areas, or future maintenance or removal of dams. In addition, GE will be responsible for (1) the cost of any investigation or materials handling and disposal necessary in connection with maintenance work or to implement a change in use (e.g. removal or maintenance of dams or change in property use including agricultural uses) that could otherwise lead to unacceptable risks or (2) further cleanup to meet Performance Standards associated with the new use.

ADAPTIVE MANAGEMENT

Adaptive management is a process that allows a project management team to adapt and optimize project activities as they are implemented to account for new information, changing conditions, and additional opportunities such as innovative technologies. Adaptive management is intended to facilitate a process that endeavors to minimize cost and maximize the environmental benefits achieved by the actions taken.

EPA envisions that the corrective measures identified in the Proposed Remedial Action will be implemented in a phased manner using such an adaptive management approach. This approach will be administered during design and construction activities (including restoration), to adapt and optimize project activities to account for "lessons learned," new information and data, changing conditions, pilot studies, and additional opportunities that may present themselves over the duration of the project.

In accordance with CERCLA and the CD, periodic reviews (every five years) would also be conducted to evaluate the effectiveness and adequacy of the remedial measures in protecting human health and the environment.

Potential Community Impacts

While many of the cleanup areas in Rest of River are located in relatively undeveloped areas, there are some that are in close proximity to residential neighborhoods where the proposed work would temporarily impact the surrounding communities. Potential impacts during construction could include air quality, odors, noise, lighting, traffic, impacts on local infrastructure (such as roads and bridges), impacts on cultural resources, and restrictions on use of the river for recreation or other uses. The relatively undeveloped areas are, in large part, owned by the Commonwealth of Massachusetts for their biological diversity and wildlife-dependent outdoor recreation, as well as an adjoining wildlife area owned by the Massachusetts Audubon Society.

During remedial design, various measures will be evaluated and subsequently implemented to reduce these potential impacts on surrounding neighborhoods and communities. For example, instead of having all neighborhoods affected at once, the work would be done in phases working generally north to south, and temporary haul roads would be built to limit use of local roads and reduce construction traffic as much as possible.

To ensure careful coordination and enhanced safety for residents, GE will be required to work closely with EPA, and in consultation with the appropriate city and town officials, in developing management strategies and plans to guide the cleanup work.

General Implementation Schedule and Cost

In order to expeditiously and efficiently complete the proposed remediation, EPA expects that several phases of the remedy will be conducted concurrently to speed the overall completion of construction. Sediment and floodplain work, including vernal pools, will begin in Reach 5A and proceed downstream. Concurrently to starting work at Reach 5A, work will also begin at Woods Pond and proceed downstream to Rising Pond, however placement of the engineered caps (if necessary) in the downstream impoundments will not occur until all remediation has been completed upstream. See Figure 5. Additional data collection, baseline assessments, and pilot studies will begin as early in the process as practicable. It is also expected that, using an adaptive management approach, the work will be phased, with each phase designed and implemented individually. Under this approach, while construction work is proceeding in one stretch of the river, planning and design work, as well as review of activities conducted to date will be ongoing for subsequent phases of work.

Note, the provisions to coordinate any required cleanup work in the Reach 7 Impoundments with plans for dam use, removal, or maintenance activities could lead to a change in the timing of work in any of those impoundments.

Using the assumptions established in the Corrective Measures Study (CMS), construction is expected to take 13 years to complete. The estimated total cost for the preferred cleanup plan including sediment and floodplain remediation, off-site transportation and disposal at facilities approved to receive such soil and sediment, as well as operation, maintenance, and monitoring is approximately $613 million.

WHY EPA IS PROPOSING THIS CLEANUP PLAN

Based on the information in the Administrative Record, including the RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS), EPA believes that the Proposed Remedial Action or the Proposed Cleanup Plan best suits the Permit evaluation criteria. The Draft Permit includes the Performance Standards and corrective measures necessary to meet the Performance Standards to address unacceptable risks to human health and the environment, and reduce the potential for downstream transport of PCBs, while minimizing adverse impacts to state-listed species and their habitats and being sensitive to the characteristics of the Rest of River and related biodiversity which formed the basis of the ACEC designation in a portion of the study area. Also based on this analysis, certain areas in the river and floodplain will be left undisturbed, including a large part of Reach 5B. The Proposed Remedial Action also removes and disposes off-site of large volumes of PCB-contaminated sediment and soil, from both the River itself, and the associated floodplain. The Proposed Cleanup Plan provides for the isolation of PCB contaminated sediments to reduce the risk to human health and the environment. Any remaining contamination will be monitored over the long term to evaluate the continued effectiveness of the remedy.

Based on information currently available, EPA believes the Proposed Remedial Action meets the General Standards for Corrective Measures and provides the best balance of tradeoffs among the other alternatives with respect to the relevant criteria. EPA also expects the Proposed Remedial Action to (1) control the sources of releases so as to reduce or eliminate, to the maximum extent practicable, further releases that may pose a threat to human health and the environment; (2) attain the Performance Standards; (3) comply with applicable standards for management of wastes; and (4) be protective of human health and the environment; (5) comply with ARARs (or justify a waiver); (6) be cost-effective; (7) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (8) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

EXPECTED OUTCOME OF THE PROPOSED REMEDIATION

The cleanup reduces unacceptable human health risks from direct contact with sediment and floodplain soil. In addition, the cleanup is expected to result in reductions in biota concentrations to allow increased human consumption of fish and other biota taken from the river within a short time after remediation is completed, and to greatly reduce the downstream transport of PCBs. This should result in further reductions in PCB levels in fish in both Massachusetts and Connecticut, which, over time, should allow the consumption of additional fish meals or increased consumption of other biota.

The sediment and river bank cleanup will reduce risk to ecological receptors from exposure to PCBs by capping and removal

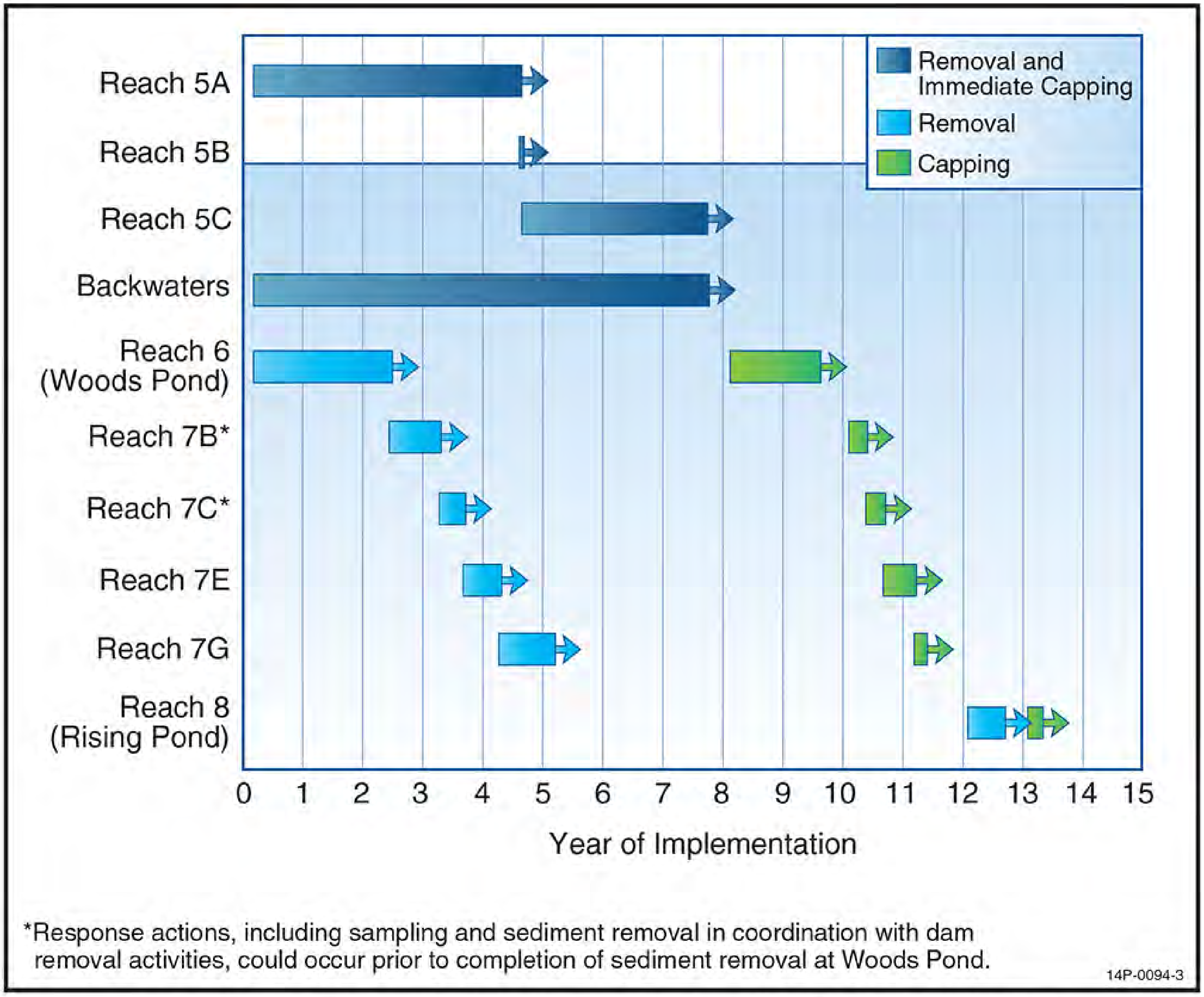


FIGURE 5 ESTIMATED TIMELINE TO IMPLEMENTATION OF CLEANUP GE-PITTSFIELD/HOUSATONIC RIVER SITE REST OF RIVER

of PCBs and thereby reducing the exposure of ecological receptors to PCBs. The floodplain and vernal pool remediation components of the Proposed Cleanup Plan are designed to reduce risk for ecological receptors while being sensitive to adverse impacts to state-listed species and their habitat.

EPA's Proposed Cleanup Plan will require restoration to address the adverse impacts to the river bed, banks, wetlands and floodplain caused by the remediation. Engineered Caps in the river bed will be required to include a habitat layer to assist the recovery of aquatic organisms. Impacted river banks will be restored using bioengineering wherever possible and appropriate. Areas of the floodplain that are cleaned up or that are disturbed for temporary remedial infrastructure (such as access roads) will be restored. Vernal pools will be carefully monitored prior to and following cleanup to assess recovery and the need for further work. Restoration of impacted wetland habitat is expected to be effective and reliable. Specific restoration techniques will be implemented, evaluated and assessed and modified as necessary using an adaptive management approach.

SITE DESCRIPTION

The Rest of River includes approximately 125 miles of river over 12 river reaches (Reaches 5 through 16, as shown in Figures 2 and 3) in Massachusetts and Connecticut and associated floodplain within the 1 mg/kg isopleth (approximated by the 10-year floodplain within the first 10 ½ miles). Reaches 5 through 8 flow through the towns of Pittsfield, Lenox, Lee, Stockbridge, and Great Barrington, Massachusetts (upstream to downstream). Reach 9 flows through Sheffield, Massachusetts and Reaches 10 through 16 are in Connecticut, from Canaan downstream to Derby.

The first 10 ½-mile stretch starting at the confluence of the East and West Branches to Woods Pond Dam is referred to as Reaches 5 and 6. This stretch of the River (Reaches 5 and 6) is the most contaminated portion of river addressed in this Proposed Remedial Action and is estimated to contain approximately 90% of the mass of PCBs that remain in the river system (river and floodplains). The channel in this area is typically 60 to 90 feet (ft) wide (and occasionally as narrow as 40 ft or as wide as 125 ft), bordered by an extensive floodplain, and has a meandering pattern with numerous oxbows and backwaters. This dynamic characteristic of the River, combined with the intact, undeveloped floodplains, generates and maintains a diverse mosaic of natural communities, including wetlands and fisheries and wildlife species and habitats.

Eroding contaminated riverbanks are a significant source of PCBs in Reach 5, currently contributing an estimated 45% of the PCB load to the river and therefore are an important consideration in evaluating remedial alternatives. The floodplain is primarily associated with Reach 5, is up to 3,600 feet wide and encompasses approximately 1,000 acres. Almost all of the Primary Study Area (PSA), including Reach 5, is mapped by the Commonwealth as priority habitat for state-listed species protected under MESA, including areas with dense concentrations of overlapping habitat for eight (8) or more state-listed species. Woods Pond (Reach 6), the first impoundment downstream of the GE facility, is a shallow 60-acre impoundment that was formed by the construction of a dam in the late 1800s. Downstream of Reach 6, the impoundments along Reach 7 and 8 also continue to be important sources of PCBs to downstream transport and are contributing sources to biota consumption advisories in those impoundments and in areas further downstream. These impoundments include Columbia Mill Impoundment (Reach 7B), Eagle Mill Impoundment (Reach 7C), Willow Mill Impoundment (Reach 7E), Glendale Impoundment (Reach 7G), and Rising Pond (Reach 8).

Below Reach 8, PCB concentrations in all media drop off significantly in the remaining downstream reaches. However, fish consumption advisories and risks to wildlife that eat fish remain in place along the Housatonic River below Reach 8 into Connecticut.

Site History

The industrial history of the Housatonic River floodplain dates from the late 1700s and includes the development of paper mills, blast furnaces, wool factories, and grist mills, along with agriculture and home construction to accommodate both permanent and seasonal population growth. This industrial and agricultural history was accompanied by substantial changes to the Housatonic River. Much of the river was modified and realigned and the floodplain cleared. Several impoundments were created both upstream of and within the site, altering the natural flow regime of the river.

The Housatonic River, its sediment, floodplain, and biota are contaminated with PCBs released from the GE facility located in Pittsfield, MA. The 254-acre facility is the only major source of the PCBs found in the Housatonic River sediment through Reach 16 and in floodplain soil. Although GE conducted various activities at the Pittsfield facility, the activities conducted by the Transformer Division (construction and repair of electrical transformers using dielectric fluids, some of which contained PCBs) were the primary source of PCB contamination. According to GE reports, from 1932 through 1977, releases of PCBs reached the wastewater and stormwater systems associated with the facility and then were discharged/released to the East Branch of the Housatonic River and to Silver Lake, a 26-acre lake adjacent to the GE facility, as well as other environmental media, including soil and groundwater. PCBs are presently discharged into the Housatonic River from GE's Pittsfield facility and are regulated under a National Pollution Discharge Elimination System (NPDES) discharge permit.

PCBs were initially discovered in sediment and fish in impoundments along the Housatonic River in Connecticut in the mid-1970s. Since that time, numerous investigations have been conducted by EPA, GE, and others to assess the presence and extent of PCBs and other hazardous substances in various media. PCBs detected in Housatonic River floodplain soil, sediment, and biota show little degradation over time in any media.

The State of Connecticut posted a fish consumption advisory for most of the Connecticut section of the river in 1977 as a result of the PCB contamination. In 1982, the Massachusetts Department of Public Health (MassDPH) issued a consumption advisory for fish, frogs, and turtles. In 1999, MassDPH issued a waterfowl consumption advisory from Pittsfield to Great Barrington due to PCB concentrations in wood ducks and mallards collected by EPA above Woods Pond (Reach 6).

Approximately 818 acres of riparian area and floodplain within Reaches 5 and 6 are owned by the Commonwealth, acting through the Department of Fish and Game and its Division of Fisheries and Wildlife, for its biological diversity and wildlife-dependent outdoor recreation. In addition, a large portion of the PSA was designated an Area of Critical Environmental Concern (ACEC) by Massachusetts in 2009.

The GE-Pittsfield/Housatonic River site has been subject to regulatory investigations dating back to the early 1980s, including the issuance by EPA of a Resource Conservation and Recovery Act (RCRA) Corrective Action Permit, which became effective in 1994 and two Administrative Consent Orders (ACOs) entered into between GE and the Massachusetts Department of Environmental Protection in 1990. In 1997, EPA proposed listing the Site on the National Priorities List (NPL) of uncontrolled hazardous waste sites. In 2000, a settlement (memorialized in a Consent Decree (CD)) was finalized with GE that included an extensive plan to address contamination at and from the GE facility. Pursuant to this CD, significant work has been done at and near the GE facility as well as in the Reaches of the River closest to the GE plant. Twenty separate removal action areas were identified in the CD as areas requiring cleanup as well as five groundwater management areas, and the first two miles of the Housatonic River. To date, cleanup construction has been completed at 18 of the 20 removal action areas and in the first two miles of the River, while investigation and cleanup work continues at the groundwater management areas and the remaining two removal action areas.

Community Involvement

Throughout the duration of the Rest of River project, EPA has kept the local community and other interested stakeholders up to date on various project investigations and activities. In May 2012, EPA published a status report, entitled Potential Remediation Approaches to the GE-Pittsfield-Housatonic River Site "Rest of River" PCB Contamination, summarizing the results of EPA's technical discussions with the states of Connecticut and Massachusetts and EPA's thinking regarding cleanup strategies. A series of public meetings were held in 2012 to outline the information contained in that document.

Prior to issuing the Status Report, EPA issued Fact Sheets regarding the following topics:

- The human health and ecological risks (June 2003, summarized again in August 2009)
- The Corrective Measures Study (October 2007, March 2008, and September 2008)
- An overview of PCBs, their properties, effects, and fate and transport (January 2011)
- EPA's Cleanup Decision Process (April 2011)
- A description of the alternatives being evaluated in the Revised CMS (April 2011)

In addition, in April/May 2011, EPA held a series of workshops for the public on Rest of River topics, culminating in an all-day "charrette" to discuss different considerations related to the Rest of River.

EPA holds regular meetings with the Citizens Coordinating Council to update them on the Rest of River as well as the other activities at the GE site. EPA has held an informal public input period for deliverables generated for Rest of River and continues to place documents for the entire site on its website and to maintain repositories throughout the affected communities.

In addition, between August 2012 and December 2013, EPA held extensive discussions with GE regarding potential remedial approaches for the Rest of River. The EPA/GE discussions, which are described further in the Administrative Record, included discussion of potential remedial components linked with potential forbearance by GE of its ability to challenge a proposed or final remedy. The EPA/GE discussions concluded in December 2013 without reaching agreement.

WHY CLEANUP IS NEEDED

Past practices at the GE facility resulted in contamination of Housatonic River sediment, floodplain soil, and biota including fish and other animals. PCBs contaminated the floodplain by the movement of contaminated sediment onto the floodplain during times of high water. Based upon risk assessments conducted by EPA, PCBs in the Housatonic River sediment, floodplain soil, and biota pose unacceptable risks to both human and ecological populations.

How PCBs Affect Your Health

PCBs have been demonstrated to cause a wide variety of adverse health effects. PCBs have been shown to cause cancer in animals and are classified as probable human carcinogens. Studies in humans provide evidence for potential carcinogenic and non-carcinogenic effects of PCBs. PCBs have also been shown to cause a number of serious non-cancer health effects in animals, including effects on the immune system, reproductive system, nervous system, endocrine system and other organs.

Risk to Humans and Animals

Just because contamination exists does not mean the environment or people are at risk. One has to have exposure to the contaminant to have a potential risk. Exposure occurs when people or other living organisms eat, drink, breathe or have direct skin contact with a contaminant. Based on existing or reasonably anticipated future land use at a site, EPA develops different possible exposure scenarios to determine potential risk, appropriate cleanup levels for contaminants, and potential cleanup approaches.

Human health and ecological risk assessments have been prepared by EPA for the site. These risk assessments use a number of contamination exposure scenarios to determine if and where there are current or potential future unacceptable risks. A complete discussion of the risks posed at the site can be found in the final Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA). EPA has also developed a number of fact sheets which outline the findings of the risk assessments, released in June 2003 (Human Health Risk Assessment), July 2003 (Ecological Risk Assessment) and August 2009 (summarizing both risk assessments). These and other fact sheets can all be found at EPA's website at www.epa.gov/ne/ge.

Human Health

People in Massachusetts have the potential for exposure to the site's contaminants through eating fish from the river and having contact with site sediment and floodplain soil, and through potential future agricultural land use. In Connecticut, the risk is mainly centered on eating fish from the river. Overall, the risk assessment determined that the exposure pathways outlined below pose an unacceptable risk: Figures 6 and 7 also provide a summary of cancer risks and non-cancer risks for the various pathways evaluated in the HHRA.

In the HHRA, risks are presented as numbers. Cancer Risk is the increased probability, or chance, of additional cases of cancer in an exposed population as a result of exposure to chemicals at a site. In the reports for this site, a 1 in 1,000,000 chance is written as 1E-06 or 1×10^{-6}. Non-Cancer Risk is a comparison of an allowable exposure to the amount of exposure estimated at a site. The comparison is called the Hazard Index (HI).

$$\textbf{HI} = \frac{\textbf{(site exposure)}}{\textbf{(allowable exposure)}}$$

An HI greater than 1 indicates that the site exposure exceeds the allowable exposure. Acceptable Risks for cancer are considered by EPA to be less than 1 in 1,000,000. Between a 1 in 1,000,000 (1×10^{-6}) and a 1 in 10,000 (1×10^{-4}) chance, EPA looks at the site-specific factors affecting risk and the uncertainties with the estimate. For non-cancer health effects, an HI less than 1 means people are unlikely to be harmed.

Unacceptable Risk from Consumption of Fish and Waterfowl

The Housatonic River in Massachusetts and Connecticut is currently under various state restrictions regarding the consumption of fish and other animals from the river due to the PCB contamination. Although current advisories are assumed to reduce the amount of fish and other biota that some people eat, there may be others who do not follow the advisories and consume fish from the Housatonic River. The fish and waterfowl consumption portion of the HHRA evaluated cancer and non-cancer risks to individuals consuming quantities of these foods that would be anticipated in the absence of restrictions, as required by EPA guidance. In calculating risks, values were established for the various factors, such as fish meals per year, amount of fish per meal, cooking method, etc., that determine the amount of an individual's exposure to PCBs from consuming fish caught in the River. Some of these values were established using site-specific data and others were assigned based on national EPA risk assessment guidance. This evaluation was done for both average and "maximally exposed" individuals, and a similar procedure was followed for waterfowl consumption. For fish, it was assumed that the maximally exposed individual consumes approximately 50 fish meals per year from the Housatonic River, and for the average person, it was assumed that they consume 7 meals per year from the Housatonic River.

The unacceptable risks identified in the HHRA for the maximally exposed individual are summarized below:

- Cancer risks from consuming PCB-contaminated fish and waterfowl greatly exceed EPA's risk range in Massachusetts (River Reaches 5 through 8). The cancer risks in Massachusetts are greater than those in Connecticut; with risk estimates in Massachusetts reaches as high as two in 1,000 (2×10^{-3}) for consumption of fish and one in 1,000 (1×10^{-3}) for consumption of waterfowl.

- Non-cancer risks from consuming fish and waterfowl greatly exceed EPA's threshold of a Hazard Index (HI) of 1 in River Reaches 5 through 16. The non-cancer risks in Massachusetts are greater than those in Connecticut, with HIs in Massachusetts reaches as high as 120 for consumption of fish and 76 for consumption of waterfowl.

- Although the amount of frogs and turtles consumed was assumed to be much less than fish and waterfowl, concentrations of PCBs in these species would also result in unacceptable risk if consumed in large quantities.

Unacceptable Risks from Direct Contact with River Sediment

Eight areas along the Housatonic River between Reaches 5 and 8 (in Massachusetts) were evaluated for risk due to exposure to PCBs in sediment. Risks were based on recreational activities that had contact with the sediment, such as wading, swimming, fishing, waterfowl hunting, canoeing, natural history classes, and other activities. The unacceptable risks from direct contact to river sediment for the maximally exposed individual are summarized below:

- Non-cancer HIs exceeded EPA's threshold of 1 in Woods Pond (Reach 6) and in portions of Reach 5C and Reach 5D backwaters, and Glendale Dam Impoundment (Reach 7G), with HIs as high as 3.5.

REST OF RIVER STUDY TIMELINE

Mid 1970s	PCBs detected in sediment in the Connecticut section of the Housatonic River
1977	State of Connecticut issues a report summarizing PCB contamination in fish in Connecticut
1980-1982	Massachusetts and GE agree on an Administrative Consent Order directing GE to investigate the Housatonic River; GE conducts initial sampling and characterization of PCBs in the Housatonic River in Massachusetts
1983	GE submits report on investigation of contamination in fish in Connecticut impoundments
1985	GE submits a report on potential remedial actions and potential disposal sites for PCB-contaminated sediment located in the River between the GE facility and Woods Pond
1985	GE submits a report on screening of remedial alternatives for Connecticut impoundments
1986	GE submits a report with additional information on wet dredging techniques, a five year plan for biodegradation and a sediment sampling plan
1988-1989	GE submits reports on investigations into the potential effectiveness of velocity and sedimentation control methods
1990	GE undertakes a Comprehensive Site Investigation for the Housatonic River
1991	GE submits a Comprehensive Site Investigation Report
	EPA issues GE a RCRA Permit, which includes the Housatonic River. Several parties appeal the Permit
1994	RCRA Permit is reissued and becomes effective
	GE initiates additional investigations of the Housatonic River under the State ACO and EPA RCRA Permit
1996	GE submits first RCRA Facility Investigation Report for the Housatonic River
1997	EPA proposes site for inclusion on the Superfund National Priorities List (NPL)
1997-1999	GE conducts remediation and restoration activities of sediment and riverbank soil in a 550-foot section of the East Branch of the River adjacent to GE facility
1998	GE and EPA initiate further studies of the Rest of River
1999	GE initiates riverbank soil and sediment remediation activities in a ½-mile stretch of the East Branch Housatonic River adjacent to their facility
2000	Court Approves Consent Decree governing Site cleanup and establishing process for Rest of River Study
2002	GE completes the riverbank soil and sediment remediation and restoration activities in the ½-mile stretch of the Housatonic River adjacent to their facility; EPA initiates riverbank soil and sediment remediation in the next 1.5 Mile stretch of the River
2003	GE completes RCRA Facility Investigation Report for the Rest of River
2005	EPA completes Peer-Reviewed Human Health & Ecological Risk Assessments for the Rest of River
2006	EPA completes peer reviewed Watershed, Fate & Transport, and Food Chain Model Framework GE completes Interim Media Protection Goals (IMPG) Document
	EPA completes remediation and restoration activities in the 1.5 mile stretch of the East Branch of the Housatonic River from the GE facility to the confluence of the East and West Branches of the Housatonic River
2007	GE's submits Corrective Measures Study Proposal for the Rest of River
2008	GE submits First Draft Corrective Measures Study (CMS) for EPA, State and Public Review
	EPA Provides Comment to GE on Draft CMS
2009	GE responds, in part, to EPA's comments; GE's response presented to Public for comment
	GE submits Revised CMS Proposal to evaluate additional alternatives, after EPA, State, and Public Review, EPA approves
2009	GE conducts remediation and restoration activities of sediment and riverbank soil in a 600-foot section of the West Branch of the Housatonic River
2010	GE submits Revised/Supplemental CMS for EPA, State, and Public Review
2011	EPA holds series of workshops and "Charette" to engage public in remedy selection process
	EPA presents potential proposed remedy to EPA's National Remedy Review Board (NRRB) and Contaminated Sediments Technical Advisory Group (CSTAG)
	Facilitated technical discussions among EPA and States initiated
2012	Facilitated technical discussions among EPA and States concluded; Status Report entitled "Potential Remediation Approaches to the GE-Pittsfield-Housatonic River Site 'Rest of River' PCB Contamination" released
	Technical discussions with GE initiated
2013	Technical discussions with GE conclude
2014	EPA conditionally approves GE's Revised/Supplemental CMS
	EPA Proposes Cleanup Plan, Statement of Basis, and Draft Modification to the Reissued RCRA Permit for Public Comment

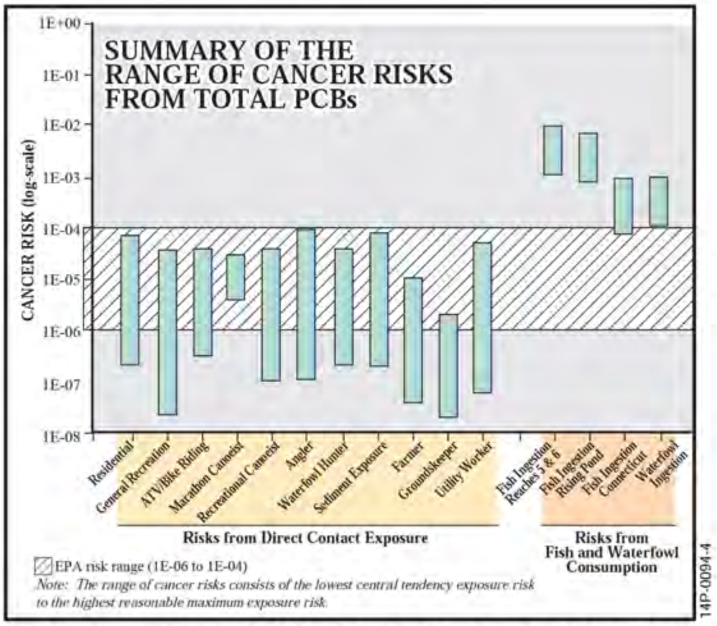


FIGURE 6 SUMMARY OF THE RANGE OF CANCER RISKS FROM TOTAL PCBs

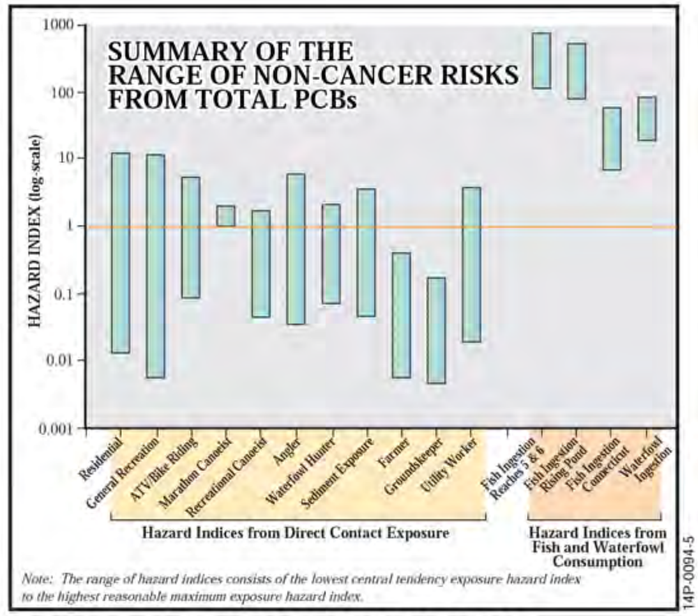


FIGURE 7 SUMMARY OF THE RANGE OF NON-CANCER RISKS FROM TOTAL PCBs

Based on the data collected, unacceptable risks from direct contact with river sediment in Connecticut are not expected.

Unacceptable Risks from Direct Contact with Floodplain Soil

The floodplain along the Housatonic River in Massachusetts was divided into 90 separate "exposure areas", two-thirds of them between Reaches 5 and 6. Each area was evaluated for risk due to exposure to PCBs in floodplain soil. Specific exposure scenarios were evaluated for each area (e.g., recreational uses, farming). The amount of exposure depended upon the accessibility of a particular area. If people spend more time in a more contaminated part of an exposure area, the risks will be higher. The unacceptable risks from direct contact to floodplain soils for the maximally exposed individual are summarized below:

- Non-cancer HIs from exposure to PCBs in soil exceeded the EPA threshold of 1 in 13 of the 90 exposure areas as well as in 11 sub-areas, and in 5 of the subareas which are expected to be more heavily used, with HIs as high as 16.
- Of the 90 exposure areas, 41 areas had cancer risks greater than 1 in 100,000, as well as in 13 subareas and in 10 frequently used subareas, which are subject to more intense use patterns than other areas.

Risk from Consumption of Agricultural Products Grown in the Floodplain

The agricultural portion of the HHRA evaluated risks from consuming commercial (from a facility in the Rest of River area) and backyard (home grown) meat, dairy, and produce as well as risks associated with home gardens. It also provided an estimate of the risk associated with consuming other food sources such as deer and wild edible plants.

The unacceptable risks identified in the HHRA for the maximally exposed individual are summarized below:

- For commercial farm families who consume their products or crops and for backyard agricultural uses (assuming that all feed and crops and grazing are in soil with average PCB soil concentrations of less than 2 mg/kg), cancer risks from PCBs are within EPA's Risk Range, and non-cancer HIs are below EPA's threshold. However, if average soil concentrations are higher in areas used by animals or in areas where feed or crops are grown, both cancer and non-cancer risks are likely.

Based on current land use, no remediation is required. However, should additional areas of the floodplain be used for agriculture in the future, the risk will need to be reevaluated.

Unacceptable Environmental Risks

Fish and wildlife are exposed to PCBs in sediment on the bottom of the river and backwaters, or floodplain and vernal pool soil or within the water column. PCBs are also in the tissue and organs of animals living in the contaminated river and the floodplain. Predatory fish and wildlife feed on contaminated animals or organisms such as forage fish, crayfish or larval stages of aquatic insects that live in the sediment (benthic invertebrates) or animals in the floodplain are at risk from their foraging activities.

Risks from PCB exposure in the soil, sediment, and diet were evaluated in the ERA for eight different groups of organisms that reside in the Housatonic River and its floodplain; three of these were aquatic (benthic invertebrates, amphibians, and fish) and five were wildlife (insect-eating birds, fish-eating birds, fish-eating mammals, other mammals, and Special Status Species (e.g., endangered or threatened). Whenever possible, three distinct lines of evidence were evaluated to best assess risk (site-specific field studies, site-specific toxicity studies, and adverse effects reported in the literature). Based on the weight of evidence in this evaluation, the following unacceptable ecological risks were identified in Massachusetts in Reaches 5 and 6 and are described as high or intermediate:

- PCBs in sediment and prey, as well as in the floodplain and vernal pools adjacent to those areas, posed high risk to amphibians and piscivorous (fish-eating) mammals. Risk was also high for some insectivorous birds, such as wood duck;
- Risk was intermediate to high for benthic invertebrates, organisms that live in and on river sediment and form the base of the food chain;
- Risk was high for exposure to prey for bald eagle and American bittern, two birds selected to represent the Threatened & Endangered (T&E) species, and intermediate for a T&E mammal species (small-footed myotis, a bat); and
- Risk was intermediate for piscivorous birds (osprey and belted kingfisher), and for omnivorous and carnivorous mammals (red fox and short-tailed shrew).

In addition, in limited areas downstream of Woods Pond to Rising Pond in Reaches 7 and 8, exposure to PCBs leads to potential risks to benthic invertebrates, amphibians, trout, piscivorous mammals, and bald eagles. In Connecticut, exposures to PCBs cause potential risks to wildlife that eat fish.

DESCRIPTION OF CLEANUP OBJECTIVES AND ALTERNATIVES CONSIDERED

The cleanup alternatives were developed to address the following cleanup objectives:

- Reduce the cancer risk and non-cancer risk for humans (defined as achieving concentrations that do not pose unacceptable risks using EPA's cancer risk range of one in one million to one in 10,000 (10^{-6} to 10^{-4}) and a non-cancer HI of 1) from exposure to PCBs in dietary items (primarily fish and duck), floodplain soil, and/or sediment in the Rest of River.
- Reduce the risk to ecological receptors from exposure to PCBs.
- Reduce the long-term downstream transport of PCBs in the Rest of River. This objective also includes the control of sources of releases to the river.

To meet these objectives, EPA has proposed Performance Standards, corrective measures, and identified ARARs for the Rest of River which are outlined in more detail in the Draft Permit. Cleanup alternatives were developed and evaluated by GE in the Corrective Measures Study (CMS). EPA has supplemented the analysis conducted by GE with additional supporting documentation. The cleanup options, or remedial alternatives, that were evaluated in detail and were considered for the Rest of River are summarized below.

Development of Cleanup Alternatives

Eleven alternatives were developed for addressing contamination in sediment and riverbanks. The 11 alternatives are termed SED 1 through SED 9, SED 9 MOD, and SED 10. These alternatives encompass a broad range of options from no action to the removal of over 2 million cubic yards of sediment and up to 35,000 cubic yards of riverbank soil. Ten alternatives (FP 1 through FP 4, FP 4 MOD, and FP 5 through FP 9) addressing PCB contamination in floodplain soil in the Rest of River were also developed. All of the floodplain alternatives involve removal of different volumes of contaminated floodplain soil and placement of backfill except FP 1, the no action alternative.

As part of the site study, a range of potential cleanup goals, known as Interim Media Protection Goals (IMPGs) were developed as one of the factors to use in the comparison of remedial alternatives. In addition to the IMPGs, it is important to note that certain specific numerical Performance Standards, which may differ from the IMPGs, are being proposed in the Draft Modification to the Reissued RCRA Permit to be met as part of the remedy. To develop a range of cleanup alternatives, different options for cleanup goals were used to address potential cancer risk to human health. The cleanup goal options for human health used by EPA to develop alternatives are within the range of what EPA considers to be protective. Human health cleanup goals are based upon reducing risk to within acceptable levels (to within EPA's 10^{-6} to 10^{-4} cancer risk range and/or non-cancer Hazard Index of one). Similarly, a range of IMPGs for ecological receptors were also developed.

The Performance Standards and corrective measures for EPA's Proposed Cleanup Plan are discussed generally in the section entitled "A Closer Look at EPA's Proposed Cleanup Plan" and outlined in specific terms in the Draft Permit.

More detail on these individual options to address sediment, riverbanks, and floodplain soil can be found in the Administrative Record.

Combined Sediment and Floodplain Soil Alternatives

The remedy for the Rest of River will necessarily involve both sediment and floodplain components. In order to more easily explain and compare the alternatives, the individual sediment and floodplain alternatives have been combined into nine comprehensive alternatives for all contaminated material (floodplain soil/sediment). The Combination Alternatives (or Combinations), listed below, were designed to span the full range of remedial actions in terms of removal volumes, methods, and affected areas:

Combination Alternative 1: SED1/FP 1
(the "no action" alternative)
Combination Alternative 2: SED 2/FP 1
Combination Alternative 3: SED 3/FP 3
Combination Alternative 4: SED 5/FP 4
Combination Alternative 5: SED 6/FP 4
Combination Alternative 6: SED 8/FP 7
Combination Alternative 7: SED 9/FP 8
Combination Alternative 8: SED 10/FP 9
Combination Alternative 9: SED 9 MOD/FP 4 MOD
(EPA's Proposed Remedial Action)

A matrix showing each combination alternative broken down by river reach and floodplain is shown in Table 1. Table 2 outlines estimated volumes, timeframe, and acres addressed for each of the combinations. Please note that the terms "Combination Alternative 1" through "Combination Alternative 9" are used to simplify the discussion and analysis for the reader of this document. In other technical documents that are part of the Administrative Record, the various individual sediment and floodplain alternatives are typically referred to using their corresponding "SED" and "FP" designations.

The evaluation of cleanup alternatives for Rest of River was based on eleven sediment alternatives, ten floodplain alternatives, and five treatment/disposition alternatives. In the proposed RCRA Permit modification and in GE's Revised CMS submittal, alternatives have been analyzed through the use of combination alternatives for sediment and floodplain. These combined alternatives recognize the interrelated nature of the sediment and floodplain cleanup, infrastructure, and thus the interrelated nature of decision-making for the proposed remedy. As such, the combination alternatives are designed to make review of the many possible combinations of different approaches more manageable for the public. Nonetheless, EPA is soliciting public input on each component of the Proposed Cleanup Plan, and reviewers may comment on individual sediment or floodplain components, or on different potential combinations of sediment and floodplain remediation that are not part of the nine Combinations discussed below. Note, for all of the alternatives presented below the values for the areas affected by remediation, amount of sediment or soil to be removed, durations, and costs are estimates for comparison purposes only.

<u>Combination Alternative 1</u>

Combination Alternative 1 is a combination of Sediment Alternative SED 1 and Floodplain Alternative FP 1. This alternative involves no action in either the river or the floodplain. Combination Alternative 1 does not involve the excavation or capping of any contaminated soil and sediment. Since there is no active remedy construction, this alternative does not take any time to implement. Contamination remains in the River above safe levels for human health and ecological receptors and is expected to remain that way for over 250 years and there are no measures to prevent exposure. There is no cost associated with this alternative.

<u>Combination Alternative 2</u>

Combination Alternative 2 is a combination of Sediment Alternative SED 2 and Floodplain Alternative FP 1. This alternative involves monitored natural recovery (MNR) in all River reaches (Reaches 5 through 16) and no action in the floodplain. Combination Alternative 2 does not involve the excavation or capping of any contaminated soil and sediment. Since there is no active remedy construction, this alternative does not take any time to implement (not including the duration of monitoring). Contamination remains in the River and floodplain above risk-based levels (IMPGs) for human health and ecological receptors and is expected to remain that way for over 250 years. Human exposure in the interim is addressed by Institutional Controls. The cost for this alternative is estimated at $5 million[1] .

<u>Combination Alternative 3</u>

Combination Alternative 3 is a combination of Sediment Alternative SED 3 and Floodplain Alternative FP 3. This alternative involves removal of approximately 2 feet of river bed sediment followed by capping in Reach 5A; bank soil removal and stabilization of Reach 5A and 5B river banks; a combination of thin layer capping (often referred to as enhanced MNR or EMNR) and MNR in Reach 5C; thin layer capping/EMNR in Reach 6 (Woods Pond); and, MNR in all other River reaches (Reach 5B, Backwaters, and Reaches 7 through 16).

For the floodplain, Combination Alternative 3 involves the removal of one foot of contaminated soil with subsequent backfilling to meet a human-health based cleanup target based on 10^{-4} cancer risk or non-cancer HI = 1 (whichever is lower) plus additional cleanup to a depth of 3 feet in certain frequently used areas to achieve a human-health based cleanup target based on 10^{-5} cancer risk or non-cancer HI = 1 (whichever is lower). This alternative also includes additional floodplain

Table 1
Combination Alternatives Matrix

Combination Alternative	Reach 5A	Reach 5B	Reach 5 Erodible Banks	Reach 5C	Reach 5 Backwaters	Reach 6 Woods Pond	Reach 7 Impoundments	Reach 7 Channel	Reach 8 Rising Pond	Reaches 9-16	Floodplain
1 (SED1/FP1)	No Action	No Action	No Action	No Action	No Action	No Action	No Action	No Action	No Action	No Action	No Action
2 (SED 2/ FP 1)	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	No Action
3 (SED 3/FP 3)	2 ft removal with capping	MNR	Removal/ stabilization	Combination of TLC and MNR	MNR	TLC	MNR	MNR	MNR	MNR	Remove/replace top 12 inches to 10-4 ICR or HI = 1; In frequently used areas remove/replace top 3 feet to 10-5; Additional floodplain excavation to achieve the less strict ecological risk-based IMPGs; Remove/replace vernal pool soils > 5.6 mg/kg
4 (SED 5/FP 4)	2 ft removal with capping	2 ft removal with capping	Removal/ stabilization	Combination of 2 ft removal with capping (in shallow areas) and capping (in deeper areas)	Combination of TLC and MNR	Combination of 1.5 ft removal with capping in shallow areas and capping in deep area	MNR	MNR	TLC	MNR	Remove/replace top 12 inches to 10-5 ICR or HI = 1; In frequently used areas remove/replace top 3 feet to 10-5; Additional floodplain excavation to achieve the less strict ecological risk-based IMPGs; Remove/replace vernal pool soils > 5.6 mg/kg
5 (SED 6/ FP4)	2 ft removal with capping	2 ft removal with capping	Removal/ stabilization	2 ft removal with capping	Removal of sediments in >50 mg/kg in top 1 ft (with capping/ backfill); TLC for remainder >1 mg/kg	Combination of 1.5 ft removal with capping in shallow areas and capping in deep area	TLC	MNR	Combination of TLC in shallow areas and capping in deep areas	MNR	Remove/replace top 12 inches to 10-5 ICR or HI = 1; In frequently used areas remove/replace top 3 feet to 10-5; Additional floodplain excavation to achieve the less strict ecological risk-based IMPGs; Remove/replace vernal pool soils > 5.6 mg/kg
6 (SED 8/ FP 7)	Removal to 1 mg/kg depth horizon with backfill	Removal to 1 mg/kg depth horizon with backfill	Removal/ stabilization	Removal to 1 mg/kg depth horizon with backfill	Removal to 1 mg/kg depth horizon with backfill	Removal to 1 mg/kg depth horizon with backfill	Removal to 1 mg/kg depth horizon with backfill	MNR	Removal to 1 mg/kg depth horizon with backfill	MNR	Remove/replace top 12 inches to 10-6 ICR but not <2 ppm; In frequently used areas remove/replace top 3 feet to 10-6; Additional floodplain excavation to achieve the more strict ecological risk-based IMPGs; Remove/replace vernal pool soils > 3.3 mg/kg
7 (SED 9/ FP 8)	2 ft removal with capping	2 ft removal with capping	Removal/ stabilization	2 ft removal with capping in upper reach and 1.5 ft removal with capping in lower reach	Combination of sediment removal with capping and capping without removal	3.5 ft removal and capping in shallow areas and 1 ft removal and capping in deep areas	Removal depths of 1 to 1.5 ft with capping	MNR	Removal depths from 1 to 1.5 ft with capping	MNR	Remove/replace top 12 inches to 10-5 ICR or HI = 1; In frequently used areas remove/replace top 3 feet to 10-5; Remove/replace vernal pool soils > 3.3 mg/kg; Remove/replace any additional soils in top 12 inches > 50 mg/kg
8 (SED 10/ FP 9)	2 ft removal capping in selected areas	MNR	Removal/stabilization in selected areas	MNR	MNR	Removal of 2.5 ft in areas > 13 mg/kg in top 6 inches	MNR	MNR	MNR	MNR	Remove/replace top 12 inches to 10-4 ICR or HI = 1; In frequently used areas remove/replace top 3 feet to 10-4
9 (SED 9/ FP 4 MOD)	2.5 ft removal and capping	Removal and backfill of areas > 50 mg/kg and EMNR in remainder of reach	Removal/ stabilization of erodible river banks in Reach 5A and banks in reach 5B w/PCBs > 50mg/kg	2 ft removal with capping	Combination of 1 ft removal and capping in areas > 1 mg/kg, excluding certain high priority habitat	Combination of removal with capping ranging from 4 to 7 ft of removal based on water depth	Coordinate w/ dam removal; Removal depths of 1 to 1.5 ft with capping; or cleanup to 1 mg/kg	MNR	Removal depths of 1 to 1.5 ft with capping or cleanup to 1 mg/kg	MNR	Remove/replace top 12 inches to 10-5 ICR or HI = 1; Except in in high priority habitat areas, then remove/replace top 12 inches to 10-4 ICR or HI = 1; In frequently used areas remove/replace top 3 feet to 10-5; Remove/replace vernal pool soils > 3.3 mg/kg

Note: Sediment removal depths specified in this table are approximate and are for volume/cost estimation and for comparison purposes only. Actual removal depths would be determined in accordance with the Modification of the Reissued RCRA Permit.

MNR – Monitored Natural Recovery
EMNR – Enhanced Monitored Natural Recovery
ICR – Incremental Cancer Risk
IMPGs – Interim Media Protection Goals
TLC – Thin-Layer Capping

Table 2
Comparison of Combination Alternatives

Combination:	1	2	3	4	5	6	7	8	9
	SED 1/ FP 1	SED 2/ FP 1	SED 3/ FP 3	SED 5/ FP 4	SED 6/ FP 4	SED 8/ FP 7	SED 9/ FP 8	SED 10/ FP 9	SED 9 MOD/ FP 4 MOD[1]
Sediment Removal Volume (cubic yards (cy))	0	0	134,000	377,000	521,000	2,252,000	886,000	235,000	890,000
Bank Soil Removal Volume (cy)	0	0	35,000	35,000	35,000	35,000	35,000	6,700	25,000
Sediment Capping after Removal (acres)	0	0	42	126	178	0	333	20	298
Sediment Backfill after Removal (acres)	0	0	0	0	0	351	0	0	0
Sediment Capping without Removal (acres)	0	0	0	60	45	0	3	0	0
Thin Layer Capping (acres)	0	0	97	102	112	0	0	0	0
Floodplain Soil Removal Volume (cy)	0	0	74,000	121,000	121,000	615,000	177,000	26,000	75,000
Floodplain Acres Excavated (acres)	0	0	44	72	72	377	108	14	45
Total Soil/Sediment Volume Removal (cy)	0	0	243,000	533,000	677,000	2,902,000	1,098,000	267,700	990,000
Estimated PCB Mass Removed (pounds)	0	0	21,700	33,300	37,300	94,100	53,100	13,900	46,970
Estimated Time to Implement (years)	0	0	10	18	21	52	14	5	13

Notes: Monitored Natural Recovery (MNR) is a component of all Combinations except Combination Alternative 1.

Volumes and areas specified in this table are approximate and are for volume/cost estimation and for comparison purposes only. Actual volumes and areas will be determined in accordance with the Modification of the Reissued RCRA Permit.

[1] Combination 9 sediment removal and capping estimates based upon capping of four Reach 7 impoundments, which is one possible outcome of the cleanup approach proposed for these impoundments.

excavation to achieve the less stringent ecological risk-based numerical values (IMPGs).

Combination Alternative 3 involves the excavation of approximately 134,000 cubic yards of sediment, 35,000 cubic yards of bank soil and 74,000 cubic yards of floodplain soil. This alternative involves the excavation of approximately 44 acres of floodplain area and also includes the capping of 42 acres of river bed after excavation, and 97 acres of thin-layer capping of sediment. Institutional Controls, long-term operation, monitoring, and maintenance are also components of this alternative. This alternative is estimated to take 10 years to implement. The cost for this alternative is estimated at $177 million, excluding costs for transportation or disposal of excavated soil or sediment.

Combination Alternative 4

Combination Alternative 4 is a combination of Sediment Alternative SED 5 and Floodplain Alternative FP 4. This alternative involves removal of approximately 2 feet of river bed sediment followed by capping in Reaches 5A and 5B; bank soil removal and stabilization of Reach 5A and 5B river banks; a combination of 2 foot removal followed by capping (in shallower areas) and capping (in deeper areas) in Reach 5C; a combination of thin layer capping/EMNR and MNR in the Backwaters; a combination of 1.5 foot removal with capping in shallow areas and capping (without sediment removal) in deeper areas of Reach 6 (Woods Pond); thin layer capping/EMNR in Reach 8 (Rising Pond) and MNR in all other River reaches (Reach 7 and Reaches 9 through 16).

For the floodplain, Combination Alternative 4 involves the removal of one foot of contaminated soil with subsequent backfilling to meet a human-health based cleanup target based on 10^{-5} cancer risk or non-cancer HI = 1 (whichever is lower). This alternative also includes additional floodplain excavation to achieve the less stringent ecological risk-based numerical values.

Combination Alternative 4 involves the excavation of approximately 377,000 cubic yards of sediment, 35,000 cubic yards of bank soil and 121,000 cubic yards of floodplain soil. This alternative involves the excavation of approximately 72 acres of floodplain area and also includes the capping of 126 acres of river bed after excavation, 60 additional acres of river bed capping in areas not slated for excavation, and 102 acres of thin-layer capping of sediment. Institutional Controls, long-term operation, monitoring, and maintenance are also components of this alternative. This alternative is estimated to take 18 years to implement. The cost for this alternative is estimated at $319 million, excluding costs for transportation or disposal of excavated soil or sediment

[1]All cost estimates referenced in this document are in total 2010 dollars, for present worth values, see Table 6.

Combination Alternative 5

Combination Alternative 5 is a combination of Sediment Alternative SED 6 and Floodplain Alternative FP 4. This alternative involves removal of approximately 2 feet of river bed sediment followed by capping in Reaches 5A, 5B, and 5C; bank soil removal and stabilization of Reach 5A and 5B river banks; one foot removal followed by capping in areas of Backwaters exceeding 50 mg/kg PCBs; 1.5 foot removal with capping in shallow areas and capping (without sediment removal) in deeper areas of Reach 6 (Woods Pond); thin layer capping/EMNR in the Reach 7 impoundments; a combination of thin layer capping/EMNR in shallow areas and capping in deep areas of Rising Pond (Reach 8); and, MNR in all other River reaches (Reach 7 channel and Reaches 9 through 16).

For the floodplain, Combination Alternative 5 involves the removal of one foot of contaminated soil with subsequent backfilling to meet a human-health based cleanup target based on 10^{-5} cancer risk or non-cancer HI = 1 (whichever is lower). This alternative also includes floodplain excavation to achieve the less stringent ecological risk-based numerical values.

Combination Alternative 5 involves the excavation of approximately 521,000 cubic yards of sediment, 35,000 cubic yards of bank soil and 121,000 cubic yards of floodplain soil. This alternative involves the excavation of approximately 72 acres of floodplain area and also includes the capping of 178 acres of river bed after excavation, 45 additional acres of river bed capping in areas not slated for excavation, and 112 acres of thin-layer capping of sediment. Institutional Controls, long-term operation, monitoring, and maintenance are also components of this alternative. This alternative is estimated to take 21 years to implement. The cost for this alternative is estimated at $397 million, excluding costs for transportation or disposal of excavated soil or sediment.

Combination Alternative 6

Combination Alternative 6 is a combination of Sediment Alternative SED 8 and Floodplain Alternative FP 7. This alternative involves removal of river bed sediment in Reaches 5A, 5B, and 5C, Backwaters, Woods Pond, the Reach 7 impoundments, and Rising Pond to meet a PCB concentration of 1 mg/kg followed by backfill; bank soil removal and stabilization of Reach 5A and 5B river banks; and, MNR in all other River reaches (Reach 7 channel and Reaches 9 through 16).

For the floodplain, Combination Alternative 6 involves the removal of one foot of contaminated soil with subsequent backfilling to meet a human-health based cleanup target based on a 10^{-6} cancer risk or non-cancer HI = 1 (whichever is lower). This alternative also includes floodplain excavation to achieve the more stringent ecological risk-based numerical values.

Combination Alternative 6 involves the excavation of approximately 2,252,000 cubic yards of sediment, 35,000 cubic yards of bank soil and 121,000 cubic yards of floodplain soil. This alternative involves the excavation of approximately 387 acres of floodplain area and also includes the backfill of 351 acres of river bed after excavation. Institutional Controls, long-term operation, monitoring, and maintenance are also components of this alternative. This alternative is estimated to take 52 years to implement. The cost for this alternative is estimated at $917 million, excluding costs for transportation or disposal of excavated soil or sediment.

<u>Combination Alternative 7</u>

Combination Alternative 7 is a combination of Sediment Alternative SED 9 and Floodplain Alternative FP 8. This alternative involves removal of approximately 2 feet of river bed sediment followed by capping in Reaches 5A, 5B, and 5C; bank soil removal and stabilization of Reach 5A and 5B river banks; a combination of one foot removal followed by capping or capping without removal in areas of the Backwaters exceeding 1 mg/kg PCBs; one to 3.5 foot removal followed by capping in Reach 6 (Woods Pond); one to 1.5 foot removal followed by capping in the Reach 7 impoundments and Rising Pond (Reach 8); and, MNR in all other River reaches (Reach 7 channel and Reaches 9 through 16). This alternative differs from the other sediment removal alternatives in that: (1) all sediment removal and capping work, including in Reaches 5A and 5B, would be performed in the "wet" by equipment operating in the river (either on the river bottom or on barges), and (2) removal of the sediment in Backwaters and Reaches 6, 7, and 8 would be performed concurrently with removal activities in the Reach 5 channel. However, capping in those reaches would be delayed, where necessary, until after all the removal/capping activities in Reach 5 have been completed.

For the floodplain, Combination Alternative 7 involves the removal of one foot of contaminated soil with subsequent backfilling to meet a human-health based cleanup target based on 10^{-5} cancer risk or non-cancer HI = 1 (whichever is lower) and additional removal of soils exceeding 50 mg/kg PCBs. This alternative also includes floodplain and vernal pool excavation to achieve the more stringent ecological risk-based numerical values.

Combination Alternative 7 involves the excavation of approximately 886,000 cubic yards of sediment, 35,000 cubic yards of bank soil and 177,000 cubic yards of floodplain soil. This alternative involves the excavation of approximately 108 acres of floodplain area and also includes the capping of 333 acres of river bed after excavation, and 3 additional acres of river bed capping in areas not slated for excavation. Institutional Controls, long-term operation, monitoring, and maintenance are also components of this alternative. This alternative is estimated to take 14 years to implement. The cost for this alternative is estimated at $394 million, excluding costs for transportation or disposal of excavated soil or sediment.

<u>Combination Alternative 8</u>

Combination Alternative 8 is a combination of Sediment Alternative SED 10 and Floodplain Alternative FP 9. This alternative involves removal of approximately 2 feet of river bed sediment followed by capping in select areas of Reach 5A and MNR in the remainder of Reach 5A; bank soil removal and stabilization of Reach 5A and 5B river banks; a combination of 2.5 foot removal in areas with PCB concentrations greater than 13 mg/kg in the top 6 inches, without subsequent capping or backfilling, and MNR in other areas of Woods Pond; and MNR in all other River reaches (Reach 5B, Reach 5C, Backwaters, and Reaches 7 through 16).

For the floodplain, Combination Alternative 8 involves the removal of one foot of contaminated soil with subsequent backfilling to meet a human-health based cleanup target based on 10^{-4} cancer risk or non-cancer HI = 1 (whichever is lower) plus additional cleanup to a depth of 3 feet in certain frequently used areas to achieve a human-health based cleanup target based on 10^{-5} cancer risk or non-cancer HI = 1 (whichever is lower).

Combination Alternative 8 involves the excavation of approximately 236,000 cubic yards of sediment, 35,000 cubic yards of bank soil and 26,000 cubic yards of floodplain soil. This alternative involves the excavation of approximately 14 acres of floodplain area and also includes the capping of 20 acres of river bed after excavation. Institutional Controls, long-term operation, monitoring, and maintenance are also components of this alternative. This alternative is estimated to take 5 years to implement. The cost for this alternative is estimated at $94 million, excluding costs for transportation or disposal of excavated soil or sediment.

<u>Combination Alternative 9</u>

<u>EPA's Preferred Alternative (Proposed Remedial Action)</u>

Combination Alternative 9 is a combination of Sediment Alternative SED 9 MOD and Floodplain Alternative FP 4 MOD. This alternative involves removal of river bed sediment followed by capping in Reaches 5A and 5C; bank soil removal and stabilization of PCB-contaminated erodible Reach 5A river banks; excavation of Reach 5B river bed and bank areas exceeding 50 mg/kg PCBs with EMNR (using activated carbon or other sediment amendment) for remaining areas of Reach 5B sediment; a combination of one foot removal followed by capping of the Backwaters exceeding 1 mg/kg PCBs, excluding certain high priority habitat areas; one to seven foot removal followed by capping in Reach 6 (Woods Pond); excavation and/or capping to address Reach 7 impoundments and Rising Pond (Reach 8), as discussed above; and, MNR in all other River reaches (Reach 7 channel and Reaches 9 through 16).

EPA's May 2012 status report entitled "Potential Remediation Approaches to the GE-Pittsfield/Housatonic River Site 'Rest of River' PCB Contamination" (the Status Report) highlighted the objectives of addressing the unacceptable risks posed by PCBs and of minimizing the amount of bank excavation to preserve the dynamic character and related biodiversity and habitats of the river. To that end, the Status Report proposed a remedial approach that, based on data collected prior to the issuance of the permit, would result in an amount of bank excavation in Reach 5A of 3.5 miles, and an amount of bank excavation in Reach 5B of 0.2 miles. Under any alternative, the actual remediation amounts would be determined during remedial design. If the new data to be collected identified the need for greater bank excavation, then the foregoing amounts of bank excavation would change based on new data. Under Combination Alternative 9, the corrective measures for the river banks would be designed and implemented to achieve Performance Standards while minimizing impacts on river dynamics and other ecological processes, and on the abundance of state-listed and other wildlife species and the diversity of their habitats that are supported by the existing river ecosystem.

This alternative is similar to Combination Alternative 7 and differs from the other sediment removal alternatives in that: (1) all sediment removal and capping work, including in Reaches 5A and 5B, would be performed in the "wet" by equipment operating in the river (either on the river bottom or on barges); and (2) removal of the sediment in the Backwaters and Reaches 6, 7, and 8 would be performed concurrently with removal activities in the Reach 5 channel. However, capping in those reaches would be delayed, where necessary, until after all the removal/capping activities in Reach 5 have been completed. It is important to note that the sediment removal depths outlined above, for the most part, were derived based upon certain assumptions on the estimated cap thicknesses in the various reaches of the river. As outlined in the section entitled "Engineered Cap Design" above, specific cap designs and thicknesses will be determined based upon additional evaluations in the future. Thus, the volume and cost estimates for this alternative outlined below could be reduced should a thinner cap be deemed appropriate.

For the floodplain, Combination Alternative 9 involves the removal of one foot of contaminated soil with subsequent backfilling to meet a human-health based cleanup target based on 10^{-5} cancer risk or non-cancer HI = 1 (whichever is lower) while providing for avoidance, minimization, or mitigation of impacts in priority habitat areas for state-listed species of concern by establishing a secondary remediation target to meet a human-health based cleanup target based on 10^{-4} cancer risk or non-cancer HI = 1 (whichever is lower) in high priority habitat areas. This alternative also includes additional cleanup to a depth of 3 feet in certain frequently used areas to achieve a human-health based cleanup target based on 10^{-5} cancer risk or non-cancer HI = 1 (whichever is lower). This alternative also includes vernal pool excavation to achieve the more stringent ecological risk-based cleanup target for amphibians.

This alternative also provides for a phased, adaptive management approach to all remediation activities. For vernal pool remediation, this also includes the pilot testing of non-excavation cleanup methods described previously.

Combination Alternative 9 involves the excavation of approximately 890,000 cubic yards of sediment, 25,000 cubic yards of bank soil and 75,000 cubic yards of floodplain soil. This alternative involves the excavation of approximately 45 acres of floodplain area and also includes the capping of approximately 298 acres of river bed after excavation to reduce the amount of PCBs transported downstream. Pilot studies, Institutional Controls, long-term operation, monitoring, and maintenance are also components of this alternative. Additionally, this alternative includes provisions for GE to maintain responsibility for the incremental costs incurred due to the potential impacts of PCBs on authorized activities within the Massachusetts and Connecticut portions of the river. This alternative is estimated to take 13 years to implement. The cost for this alternative is estimated at $326 million, excluding costs for transportation or disposal of excavated soil or sediment.

Treatment/Disposition Alternatives

Five alternatives were developed for treatment and/or disposition (TD) of removed sediment, riverbank soil, and floodplain soil from the Rest of River. These alternatives are as follows:

- TD 1: Off-Site Disposal in Existing Licensed Landfill(s) (EPA's Preferred Alternative)
- TD 2: Local Disposal in Confined Disposal Facility (CDF)
- TD 3: Local Disposal in an On-Site Upland Disposal Facility
- TD 4: Chemical Extraction
- TD 5: Thermal Desorption

Alternative TD 1, disposal in an existing off-site licensed landfill or landfills, would involve the transportation of removed sediment and floodplain soil to commercial solid waste and/or TSCA-licensed landfill(s) for disposal. In the CMS, GE evaluated transport of contaminated material by trucks. In its comments, EPA required that GE provide an evaluation of rail transport in the Revised CMS. GE provided a qualitative evaluation and concluded that rail transport would be technically feasible; therefore transportation could be conducted either by trucks or by rail. However GE did not provide cost information. EPA further evaluated the feasibility of rail and developed a cost estimate. This modification is also referred to in this document as TD 1 RR. The estimated cost for this alternative ranges from $55 to $832 million for disposal via truck and $52 to $787 million for disposal via rail, depending on which Combination Alternative it is paired with. For the preferred sediment/floodplain alternative, the estimated cost of disposal via truck is $308 million and via rail is $287 million.

Massachusetts' requirements regarding the disposal of contaminated soil and sediment have not been included as ARARs for Alternative TD 1 since ARARs apply only to on-site activities and the Proposed Remedial Action requires that all contaminated soil and sediment be disposed of off-site at existing licensed facilities approved to receive such soil and sediment.

Alternative TD 2, disposition in a local in-water Confined Disposal Facility/Facilities (CDF), would involve the placement of dredged sediments in a CDF or CDFs located within the river or backwater area. A CDF is an engineered structure consisting of dikes or other structures that extend above an adjacent water surface and enclose a disposal area for containment of dredged sediments. Disposal of material that exceeds the capacity of the CDFs would be disposed of in existing off-site licensed landfills. The potential locations evaluated as part of this alternative are shown in Figure 8. The estimated cost for this alternative ranges from $100 to $510 million, depending on which Combination Alternative it is paired with; with EPA's preferred Combination, this alternative is estimated to cost $317 million.

Alternative TD 3, disposition in a local on-site Upland Disposal Facility or Facilities, would involve the permanent disposition of removed sediment/soil at an Upland Disposal Facility constructed in close proximity to the River, but outside the 500-year floodplain. The removed sediment and soil would be loaded into trucks at the staging areas, covered, and transported over on-site and local roadways to a nearby Upland Disposal Facility. Three potential locations for an Upland Disposal Facility were identified and evaluated by GE in the CMS. These sites are located near Woods Pond, Forest Street in Lee, and Rising Pond (referred to, respectively, as the Woods Pond, Forest Street, and Rising Pond Sites). The potential locations evaluated as part of this alternative are shown in Figure 8. The estimated cost for this alternative ranges from $36 to $201 million, depending on which Combination Alternative it is paired with; with EPA's preferred Combination, this alternative is estimated to cost $100 million.

Alternative TD 4, chemical extraction of PCBs from removed sediment/soil, involves treatment of the removed sediments and soils by a technology known as chemical extraction. In general terms, chemical extraction is the process of mixing an extraction fluid/solvent with removed sediment and soil, so that PCBs in the sediment or soil are preferentially transferred into the extraction fluid. The resulting PCB-contaminated fluid is then treated or disposed of off-site along with treated sediments. The estimated cost for this alternative ranges from $89 to $999 million, depending on which Combination Alternative it is paired with; with EPA's preferred Combination, this alternative is estimated to cost $399 million.

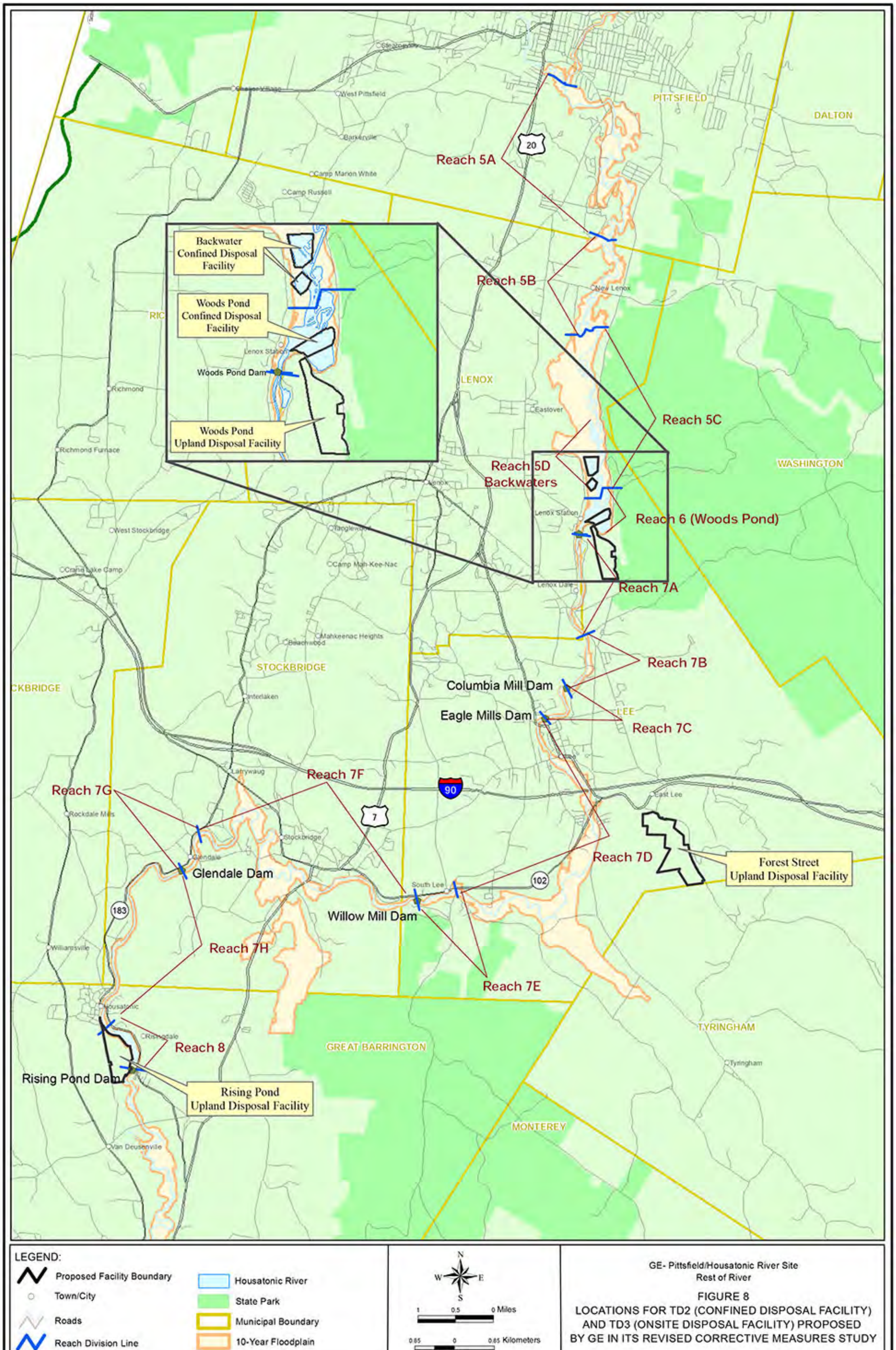
Alternative TD 5, thermal desorption of PCBs from removed sediment/soil, would involve treatment of the removed sediments and soils by a technology known as thermal desorption. Thermal desorption removes contaminants by raising the temperature of the contaminated material to transfer the contaminants from the sediment or soil to a gas stream. The gas stream is then treated to remove particulates and the organic contaminants. The material that remains is then sent to an appropriate treatment/disposal facility. Treated sediments or soils may then be disposed of in an appropriate disposal facility or potentially reused, depending on its chemical concentrations and physical characteristics. The estimated cost for this alternative ranges from $103 million to $1.53 billion, depending on which Combination Alternative it is paired with and how much material is reused; with EPA's preferred Combination Alternative, this alternative is estimated to cost between $515 and $540 million.

HOW DOES EPA CHOOSE A FINAL CLEANUP PLAN?

Before making its recommendation, EPA coordinated with the Commonwealth of Massachusetts and the State of Connecticut regarding potential cleanup approaches. EPA worked closely with the States on the development of the Performance Standards, corrective measures and identification of ARARs prior to the issuance of this plan to the public.

EPA also held extensive discussions with GE, and solicited input from the community through workshops and public meetings. The timeline of these events is summarized elsewhere in this document and information exchanged in these discussions is also contained in the Administrative Record. The States, GE, and the public also have the opportunity to comment on the Proposed Remedial Action during the public comment period.

EPA used nine criteria that were established in the Permit to compare alternatives, and propose and select a final cleanup plan. Of the nine criteria, Overall Protection of Human Health



GE- Pittsfield/Housatonic River Site
Rest of River

FIGURE 8
LOCATIONS FOR TD2 (CONFINED DISPOSAL FACILITY) AND TD3 (ONSITE DISPOSAL FACILITY) PROPOSED BY GE IN ITS REVISED CORRECTIVE MEASURES STUDY

File: Y:\gepitt\mxds\CDF_landfills_inset.mxd ricksc 4/11/2014 and the Environment, Compliance with Applicable or Relevant and Appropriate Federal and State Requirements (known as "ARARs"), and Control of Sources of Releases are the three General Standards for Corrective Measures. In addition, EPA considered six other Selection Decision Factors; those factors are as follows: Long-Term Reliability and Effectiveness, Attainment of Interim Media Protection Goals; Reduction of Toxicity, Mobility or Volume; Short- Term Effectiveness; Implementability; and Cost. Following are definitions of the nine criteria from the Permit.

General Standards for Corrective Measures

1. Overall Protection of Human Health and the Environment: How each alternative or combination of alternatives would provide human health and environmental protection, taking into account EPA's Human Health and Ecological Risk Assessments.
2. Control of Sources of Releases: How each alternative or combination of alternatives would reduce or minimize possible further releases, including (but not limited to) the extent to which each alternative would mitigate the effects of a flood that could cause contaminated sediments to become available for human or ecological exposure.
3. Compliance with Applicable or Relevant and Appropriate Federal and State Requirements (ARARs): How each alternative or combination of alternatives would meet such requirements or, when such a requirement would not be met, the basis for a waiver under CERCLA and the National Contingency Plan ("NCP"), per the Consent Decree.

Selection Decision Factors

4. Long-Term Reliability and Effectiveness:
   a. Magnitude of residual risk, including (but not limited to) the extent to which each alternative would mitigate long-term potential exposure to residual contamination, and the extent to which and time over which each alternative would reduce the level of exposure to contaminants;

   b. Adequacy and reliability of each alternative or combination of alternatives, including (i) operation, monitoring, and maintenance requirements; (ii) availability of labor and materials needed for operation, monitoring, and maintenance; (iii) whether the technologies have been used under analogous conditions; and (iv) whether the combination of technologies (if any) have been used together effectively; and

   c. Any potential long-term adverse impacts of each alternative or combination of alternatives on human health or the environment, including (but not limited to) potential exposure routes and potentially affected populations, any impacts of dewatering and disposal facilities on human health or the environment, any impacts on wetlands or other environmentally sensitive areas, and any measures that may be employed to mitigate such impacts.

5. Attainment of Interim Media Protection Goals (IMPGs): The ability of each alternative or combination of alternatives to achieve the Interim Media Protection Goals, including (if applicable) the time period in which each alternative would result in the attainment of the IMPGs and an evaluation of whether and the extent to which each alternative would accelerate such attainment compared to natural processes. Note that these IMPGs were used in the comparison of remedial alternatives and are not necessarily the same as the Performance Standards or Cleanup Standards proposed in the Draft Modification to the Reissued RCRA Permit required to be met as part of the remedy.

6. Reduction of Toxicity, Mobility, or Volume of Wastes:
   a. If applicable, treatment process used and materials treated;

   b. If applicable, amount of hazardous materials destroyed or treated;

   c. If applicable, degree of expected reductions in toxicity, mobility, or volume;

   d. If applicable, degree to which treatment is irreversible; and

   e. If applicable, type and quantity of residuals remaining after treatment.

7. Short-Term Effectiveness: Impacts to nearby communities, workers, or the environment during implementation of each alternative, including (but not limited to) risks associated with excavation, transportation, dewatering, disposal, or containment of sediments, soils, or other materials containing hazardous constituents.

8. Implementability:
   a. Ability to construct and operate the technology, taking into account any relevant site characteristics;

   b. Reliability of the technology;

   c. Regulatory and zoning restrictions;

   d. Ease of undertaking additional corrective measures if necessary;

   e. Ability to monitor effectiveness of remedy;

f. Coordination with other agencies;

g. Availability of suitable on-site or off-site treatment, storage and disposal facilities and specialists; and,

h. Availability of prospective technologies.

9. Cost:
   a. Capital costs;
   b. Operating and maintenance costs; and,
   c. Present worth costs.

Personnel from the Massachusetts Department of Environmental Protection, the Massachusetts Department of Fish and Game, and the Connecticut Department of Energy and Environmental Protection have been consulted extensively as EPA was preparing this cleanup proposal. Formal state and community input on the Proposed Cleanup Plan received during the public comment period will be considered prior to EPA issuing a final cleanup plan.

COMPARATIVE ANALYSIS OF COMBINED SEDIMENT/FLOODPLAIN ALTERNATIVES

This section presents a summary of a comparative evaluation of the nine combination alternatives for river sediment and floodplain soil using the Permit criteria. A more detailed evaluation of the criteria is in the Administrative Record.

Overall Protection of Human Health and the Environment

This criterion was evaluated taking into account the HHRA and ERA. Combination Alternative 1 provides no protection of human health and the environment. Combination Alternatives 2 and 8 do not adequately meet IMPGs for humans or ecological receptors and are, therefore not protective of human health and the environment in the long term.

In addition, Combination Alternatives 1, 2, and 8 would not meet the federal and state water quality criterion for freshwater aquatic life and therefore would not be protective of the environment. None of the alternatives analyzed would achieve the federal and state water quality criterion for human consumption of organisms in any of the Massachusetts reaches while Combinations 1, 2, 3, and 8 would not achieve this criterion in any Connecticut impoundments. Combinations 4, 5, 6, 7, and 9 would restore water quality consistent with this criterion in significant segments of the river in Connecticut, based on estimates of meeting this criterion in the future in 50% or more of the Connecticut impoundments. See “Compliance with Federal and State ARARs” for further discussion regarding water quality criteria.

Combination Alternatives 6, 7, and 9 would provide the highest level of protection to human health and the environment because the largest volume of sediment and floodplain soil would be addressed (by a combination of removal and capping in place, or amended with activated carbon to reduce the bioavailability of PCBs) and downstream transport would be reduced to the greatest extent. Combination Alternatives 3, 4 and 5 would also provide protection. However, more contaminated sediment would remain in place in the river under these alternatives under thin layer caps or subject to MNR. As a result, there is a greater chance additional releases of contaminants could occur in the future under these Alternatives. While thin layer capping has been used successfully at other sites across the nation, site-specific conditions (e.g., higher PCB concentrations and higher flows) have raised concerns about its suitability for the Housatonic River. In addition, Combinations 1, 2, 3, 4, 5, and 8 leave more contaminated floodplain soil in place thereby decreasing the overall protectiveness of these Alternatives. Unless measures are undertaken to preserve the dynamic, meandering character of the river and avoid, minimize and mitigate impacts to state-listed species habitat, Combination Alternatives that require extensive excavation in these ecological resources, including state-listed habitats (such as Combination 6) may result in less overall protection of the environment. By employing a more targeted remediation approach, Combination 9 provides the best balance between addressing human health risks and ecological risks and negative impacts of remedial work on the river’s ecosystem, including its array of state-listed species habitats. Those Combination Alternatives that have minimal or no impact to state-listed species (Combinations 1, 2, or 8) have much less cleanup than Combination 9 and thus provide reduced overall protection for risks to human health and the environment.

Combination Alternatives 2 through 9 rely to varying degrees on Institutional Controls throughout the river in both Massachusetts and Connecticut to be protective of human health in the long term. Those alternatives that rely more extensively on these controls (Combinations 2 and 8) over longer timeframes and larger areas have more uncertainty that they will protect human health in the long term, and such controls provide no protection for ecological risks. Those alternatives (Combinations 6, 7, and 9) that rely on these controls over shorter timeframes or smaller areas have higher overall protection of human health.

Control of Sources of Releases

A computer model was used to predict the reductions in the mass of PCBs passing Woods Pond and Rising Pond Dams, respectively, and the reductions in the mass of PCBs transported from the river to the floodplain versus today’s conditions in Reaches 5 and 6[2]. These results are summarized in Table 3 for each Combination. Table 3 also shows trapping efficiency for solids in Woods Pond for each Combination.

As additional sources are controlled by permanently removing and/or capping PCB-contaminated sediment and reducing the contribution of PCBs from the contaminated eroding banks, significant additional reductions in PCB mass transport in the river and transport to the floodplain occurs. As a result, Combination Alternatives 1, 2 and 8 do the least to control releases. While Combination Alternatives 6 and 7 do the most to control releases, Combination Alternatives 3, 4, 5 and 9 also provide significant control of releases.

Combinations 7, 8, and 9 nearly double the solids trapping efficiency of Woods Pond when compared to the other Combinations. PCBs are attached to solids that move through the river system. Therefore, the increase in trapping of solids in Woods Pond is a mechanism to reduce downstream migration of PCBs. It is estimated that 25% of the mass of PCBs in the river sediment are within Woods Pond. Combinations 7 and 9, and to a lesser extent, Combination 8, also control sources of releases by removing a significant mass of PCBs from behind the Woods Pond dam. In the event of a serious breach or failure of the dam, the release of PCBs downstream would be less for these alternatives (7 through 9) than for Combinations 1 through 6 that rely primarily on capping or MNR.

The different combinations are expected to have different responses in the occurrence of an extreme flood event. Combinations 1 and 2 will have no different response than what would be expected to occur under current conditions as there is no active remediation. In this case, PCB-contaminated sediment and soil from eroding banks are expected to be released and mobilized downstream. Combination 8 is expected to result in similar, but slightly less downstream transport as it has only a small area in Reach 5A which is addressed with an engineering approach, and residual PCBs in Woods Pond are not capped. Combination 3 will result in slightly less transport than the previous alternatives, however the use of a thin-layer cap in Reach 5C and Woods Pond, and MNR in Reach 5B, the Backwaters and Reach 7 impoundments is not expected to adequately control sources of releases in an extreme event. Combinations 4 and 5 are expected to provide adequate protection in an extreme event in Reaches 5 and 6 but the use of thin-layer capping and backfill in the downstream reaches provides a high level of uncertainty in performance during such an event. Combination 6 followed by Combination 7 are expected to provide the highest level of protection of all the combinations during an extreme event as they provide the greatest amount of remediation with corresponding engineering controls. Combination 9 is expected to provide adequate protection in an extreme storm event in all reaches, with the exception of Reach 5B which is subject to MNR and therefore bed sediment and bank soil may erode and be transported downstream. However, the areas of the highest PCB concentrations in Reach 5B will be removed.

Compliance With Federal and State ARARs

A summary of some of the more significant chemical-, location-, and action-specific ARARs is included below.

Chemical-Specific ARARs

Chemical-specific ARARs include federal and state water quality criteria for PCBs. These criteria are the freshwater chronic aquatic life criterion of 0.014 micrograms per liter (ug/L) and the human health criterion (based on consumption of water and/or organisms) of 0.000064 ug/L (or 0.064 parts per trillion).

Combination Alternatives 1, 2, and 8 would not achieve the federal and state water quality criteria for freshwater aquatic life in Massachusetts (but would in Connecticut). Combination Alternatives 3-7 and 9 would achieve these criteria in all reaches of the river.

None of the alternatives would achieve the federal and state water quality criteria for human consumption of water and organisms in the any of the Massachusetts reaches. Combinations 1, 2, 3, and 8 would not achieve this criterion in any Connecticut impoundments. Based on modeling, Combination Alternatives 4, 6, 7, and 9 would restore water quality consistent with this criterion in 50% or more of the Connecticut impoundments. Because the water quality criteria for human consumption of organisms (0.000064 ug/L) is not expected to be met in the River in Massachusetts under any of the alternatives evaluated, EPA is proposing to waive this criterion under both Federal and State ARARs as technically impracticable in Reaches 5 through 9. As a modified Performance Standard for this waived criterion, the project will be required to meet the Biota Performance Standard and the Downstream Transport Performance Standard in the Permit.

Current modeling shows Combination Alternatives 7 and 9 will achieve the 0.000064 ug/L criterion in at least 3 of the 4 Connecticut impoundments. However, the results from the Connecticut model are very uncertain due to the empirical, semi-quantitative nature of the analyses. As such, it is not possible to predict with certainty attainment or nonattainment of the human health criterion based on human consumption

[2] The initial (i.e., current) annual PCB mass values used in the model are 20 kg/yr passing Woods Pond Dam, 19 kg/yr passing Rising Pond Dam, and 12 kg/yr transported from the river to the floodplain in Reaches 5 and 6.

Table 3

Percent Reduction in Annual PCB Mass Passing Woods Pond and Rising Pond Dams and Transported to the Reach 5/6 Floodplain and Solids Trapping Efficiency for Woods Pond for Combinations of Alternatives (relative to current conditions)

Combination:	1	2	3	4	5	6	7	8	9
Location	SED 1/ FP 1	SED 2/ FP 1	SED 3/ FP 3	SED 5/ FP 4	SED 6/ FP 4	SED 8/ FP 7	SED 9/ FP 8	SED 10/ FP 9	SED 9 MOD/ FP 4 MOD
Percent Reduction in Annual PCB Mass									
Woods Pond Dam	37%	37%	94%	97%	97%	98%	97%	62%	89%
Rising Pond Dam	41%	41%	87%	93%	95%	96%	96%	62%	89%
Reach 5/6 Floodplain	50%	50%	97%	98%	98%	99%	98%	68%	92%
Solids Trapping Efficiency for Woods Pond									
Solids Trapping Efficiency of Woods Pond	15%	15%	13%	15%	15%	15%	26%	24%	30%

of water and organisms of 0.000064 ug/L in Connecticut (Reaches 10 through 16). Thus, no waiver is being proposed for Connecticut at this time.

Location-Specific and Action-Specific ARARs
All Combination Alternatives meet action-specific ARARs.

Combination Alternatives 3 - 9 would involve temporary destruction of wetlands and a discharge of dredged or fill material into waters of the state and/or U.S. Of the alternatives providing adequate risk reduction (Combinations 6, 7, and 9), Combination Alternative 9, is the least damaging practicable alternative under the Clean Water Act and State and other federal wetlands requirements. See additional information under Wetland and Floodplain Impacts elsewhere in this document. The Massachusetts Endangered Species Act (MESA), M.G.L. c. 131A, is applicable to all active alternatives (Combination Alternatives 3-9). MESA and its regulations at 321 CMR 10.00 were promulgated to conserve and protect state-listed species and their habitats. Unacceptable levels of PCBs are present in such habitat areas in the Rest of River. During the implementation of the Proposed Remedial Action, the removal of PCBs from the Rest of River is anticipated to provide a benefit to state-listed species inhabiting the area due to the reduction in adverse effects to ecological receptors from the PCBs. In overseeing the response actions, EPA, in coordination with the Division of Fisheries and Wildlife in the Massachusetts Department of Fish and Game, which administers MESA, will require that implementation of the corrective measures avoid, minimize and mitigate impacts to state-listed species and their habitats, as required by MESA. In particular, the proposed corrective measures for backwaters, floodplain soils and vernal pools each include a set of protocols to help evaluate how best to avoid, minimize and mitigate impacts as part of floodplain soil/vernal pool remediation.

Long-Term Reliability and Effectiveness

Combination Alternatives 1 and 2 would provide no or little long-term reliability and effectiveness as no actions or few actions would be taken to mitigate long-term exposure to contamination or reduce the level of exposure to contaminants. All other Combination Alternatives provide varying degrees of long-term reliability and effectiveness through active cleanup and Institutional Controls to mitigate longterm exposure to contamination and reduce the level of exposure to contaminants. Of these cleanup alternatives, those Combination Alternatives that remove the most contaminated soil and sediment (Combination Alternative 6, followed by Combination Alternatives 7 and 9) provide the best long-term reliability and effectiveness because the magnitude of the residual risk that remains is much lower than those alternatives that leave significantly more contaminated material in place (Combination Alternatives 3, 4, and 8, and to a certain extent, Combination 5).

However, Combination Alternatives that fundamentally impact the dynamic, meandering character of the river or require extensive excavation in habitats supporting state-listed species (such as Combinations 6 and 7) may result in reduced long-term effectiveness because of potential long-term adverse effect on the environment. As a result, Combination 9, which includes more excavation than most alternatives, but also provides the most measures and procedures to preserve and protect the river's sensitive ecosystem, including its array of state-listed species habitats, provides the best balance in terms of reducing residual risk and minimizing long-term ecological impacts. All active alternatives would require restoration and compliance with relevant ARARs to mitigate the impacts of the remediation. Restoration is expected to be effective and reliable, returning habitats to their pre-remediation state for all active alternatives on a timeframe appropriate for the type of habitat being restored (e.g. a floodplain forest will take longer than an emergent wetland). Where a considerable amount of soil or sediment remains unaddressed or under a thin-layer cap (Alternatives 1, 2, 3, 4, 5, and 8), there would be a greater potential for contaminated material to move downstream. As a result, the long-term reliability and effectiveness of these alternatives is based significantly on long-term maintenance, monitoring and Institutional Controls. Institutional Controls in this situation (for large areas and long time frames) are difficult to monitor and enforce and are not appropriate in managing ecological risks. As a result, those alternatives that rely more heavily on these controls and on monitoring and maintenance (Combinations 1, 2, 3, 4, 5, and 8) may not be adequate and would be less reliable in the long-term compared to other, more active alternatives (such as Combinations 6, 7, and 9). Combinations 6, 7, and 9 are also more reliable in the long-term based on their removal of a large mass of PCBs from behind Woods Pond dam.

Finally, because all active alternatives (Combinations 3-9) rely on essentially the same components, there is no significant difference between these alternatives in terms of availability of labor and materials needed for operation, monitoring, and maintenance. In addition, the components in all active alternatives have been used effectively together under comparable conditions.

With regard to timeframes to reduce exposure to contaminants, see the discussion under "Attainment of IMPGs" below.

Attainment of IMPGs

As part of the Corrective Measures Study process, human health Interim Media Protection Goals (IMPGs) were developed to address cancer risk and non-cancer risk for the following three major routes of exposure:

- Direct contact with sediment and floodplain soil.
- Consumption of fish and waterfowl.
- Consumption of agricultural products.

Current land use in the floodplain no longer includes any agricultural exposures; these IMPGs would be considered if future uses were to change to agriculture.

Two sets of ecological IMPGs were also developed: more stringent "lower-bound" IMPGs and less stringent "upper-bound" IMPGs.

An evaluation of whether, and to what extent, each alternative would achieve IMPGs or whether an alternative would accelerate attainment of the cleanup levels when compared to natural processes, or in this case Combinations 1 and 2, was conducted.

For human health direct contact risk, Combinations 3-9 meet many more IMPGs in more floodplain and sediment areas than do Combinations 1 and 2.

For human fish consumption, most IMPGs would continue to be exceeded for greater than 250 years under Combinations 1, 2, 3, and 8 in Massachusetts. All other alternatives meet some of the IMPGs far sooner than these Combinations in many reaches, including downstream in CT, within a relatively short time after completion of work in a particular river reach. A full evaluation of each alternative's performance regarding fish consumption based IMPGs can be found in the Administrative Record, see Figure 9 for a representative example. Table 4 shows the modeled average fish fillet PCB concentrations at the end of the 52-year modeling period, and Table 5 provides estimated reductions (by percentage) for the Combination Alternatives.

For ecological receptors, some of the upper- or lower-bound IMPGs are attained in the some of the exposure areas for Combinations 1, 2, 3, and 8. By definition, Combinations 4 and 5 are designed to meet the upper-bound ecological IMPGs (with some lower-bound IMPGs being achieved for some receptors) and Combinations 6 and 7 are designed to meet the lower-bound (more stringent) ecological IMPGs. While each alternative represents a different balance between risk reduction and habitat protection, EPA has determined that Combination 9 provides the best balance between meeting the ecological IMPGs while minimizing and mitigating the impact of the remedy on the river's ecosystem and its array of state-listed species and habitats.

Reduction of Toxicity, Mobility, or Volume of Wastes

Treatment is not part of any of the major components (removal and capping) of the active Combination Alternatives, except to the extent that use of activated carbon or other sediment amendment is used to reduce toxicity in soils or sediment.

The degree to which the Combination Alternatives would reduce the toxicity, mobility, or volume (TMV) of PCBs is discussed below.

Reduction of Toxicity: None of the Combination Alternatives with the exception of Combination 9 includes any treatment processes that would reduce the toxicity of PCBs in the sediment or soil. Combination 9 requires the addition of an amendment such as activated carbon in certain components of the remedy, including vernal pools, Reach 5B sediment, and Backwaters. The addition of such an amendment is expected to reduce toxicity. Since none of the other Combinations provide for this treatment, Combination 9 surpasses all other alternatives in the amount of materials treated and the degree of reductions in toxicity due to treatment.

Reduction of Mobility: Combination Alternatives 1 and 2 do not reduce the mobility of PCBs in the river. Combination Alternatives 3-9 reduce mobility through removal, capping, backfilling, thin-layer capping, and/or bank stabilization activities. Of those active remedies, Combination Alternative 6 provides the greatest reductions in mobility followed by alternatives 7 and 9. Alternatives 3 and 8 provide the least reduction in mobility of contaminants, while Alternatives 4 and 5 provide more reduction than Alternatives 3 and 8, but less than Alternatives 6, 7, and 9.

Reduction of Volume: Combination Alternatives 1 and 2 do not reduce the volume of PCBs in the river and floodplain. Combination Alternatives 3-9 reduce the volume of PCB-contaminated sediment, bank soil, and floodplain soil in the Rest of River through permanent removal of the material. Table 2 includes a summary of the approximate removal volume and corresponding PCB mass that would be removed under each alternative.

Short-Term Effectiveness

As no active remediation is proposed for Combinations 1 or 2, these would not result in any short-term risks to on-site workers or adverse effects to the environment or community during implementation. For the alternatives involving construction work (Combinations 3-9), the estimated durations of construction for the alternatives evaluated range from five years (Combination 8) to 52 years (Combination 7). Because any remediation would be conducted using a phased approach, these impacts would be spread out over the remedial action period and area, and thus, would not last for the entire duration of the project in all affected areas. Combinations 3-9 all have potential short-term impacts such as truck traffic, dust, and noise. Combinations 7 and 9 also have the potential for short-term increases in PCB concentrations in fish and/or surface water during and immediately after construction in Reach 5A. Phased construction, dust suppression techniques, and perimeter air monitoring, and other engineering controls would be undertaken to address potential risks from construction to the community. Standard safety measures would be taken to protect workers as part of any cleanup work. The alternatives that limit active remediation (Combinations 3 and 8) would have fewer short-term impacts than the alternatives that propose remediation across several reaches (Combinations 4, 5, 7, and 9), while more significant impacts would be likely with Combination 6 due to the amount of material being removed and the duration of the work, as this is the most extensive and lengthy alternative evaluated. Short term impacts to the environment would be expected to be commensurate with the areal extent and volume of soil/sediment addressed. Thus, Combinations 3, 4, 5, 8, and 9 would be expected to have fewer adverse short-term impacts than Combinations 6 or 7 based on their extent of river and floodplain remediation. Estimated construction durations for the various alternatives are included in Table 2.

Implementability

Combination 1 does not present any implementability issues since no action is being taken. Combination 2, which relies on monitoring and institutional controls, has no construction-related implementability issues. Otherwise, the implementability of Combinations 3 through 9 includes the following considerations:

Combinations 3 through 9 are readily able to be constructed and operated, relying on established technologies, though the larger the scope of the remedy, the greater the effort required to construct. The equipment, materials, procedures, personnel and technologies anticipated for Combinations 3 through 9 are all readily available. Combination 9 relies on the use of activated carbon or other sediment amendment in certain portions of the river, backwaters, and vernal pools, which should be readily available. Combination 9 also provides for an adaptive management approach which includes evaluating the use of new or emerging innovative technology during the phased implementation of the remedy.

Those alternatives that rely to a greater extent on capping, MNR and Institutional Controls (such as Combinations 2 and 8) are less reliable than those alternatives that rely more on removal of contamination. While the scale of necessary temporary staging areas or access roads varies depending on the extent of remediation within each Combination, no Combination would involve complications that would serve to make it less desirable under this criterion.

In addition, habitat restoration techniques that would be a component of Combinations 3 through 9 are available and have been used successfully at other sites. Restoration can reliably re-establish pre-remediation conditions for these habitats over the timeframes of the various alternatives, which range from five (Combination 8) to 52 years (Combination 6), using a phased and adaptive management approach. Post-remediation monitoring and maintenance will ensure that the selected restoration

Table 4 Modeled Subreach Average Fish (Fillet) PCB Concentrations at End of Model Projection Period

Combination:		1	2	3	4	5	6	7	8	9
Reach	Initial Conc.	SED 1/ FP 1	SED 2/ FP 1	SED 3/ FP 3	SED 5/ FP 4	SED 6/ FP 4	SED 8/ FP 7	SED 9/ FP 8	SED 10/ FP 9	SED 9 MOD/ FP 4 MOD
	Fish PCB Concentration (mg/kg wet weight)									
Reach 5A	*18*	7.3	7.3	0.3	0.3	0.3	0.2	0.3	4.2	0.3
Reach 5B	*17*	9.3	9.3	3.0	0.2	0.2	0.2	0.3	6.6	3.5[3]
Reach 5C	*14*	7.4	7.4	1.8	0.2	0.2	0.1	0.2	5.8	0.8
Reach 5D (Backwaters)	*22*	9.5	9.5	6.3	0.4	0.4	0.3	0.4	11	1.1
Reach 6	*15*	8.6	8.6	0.7	0.2	0.2	0.1	0.2	3.7	0.7
Reach 7	*6.4 -13*	2.8 - 6.4	2.8 - 6.4	0.7 - 2.1	0.4 - 1.6	0.2 - 0.7	0.1 - 0.6	0.2 - 0.7	1.9 - 4.4	0.4 - 1.4
Reach 8	*6.3*	3.6	3.6	1.6	0.3	0.2	0.2	0.2	2.7	0.4
Connecticut (Bulls Bridge Dam Impoundment)	*0.4*	0.2	0.2	0.04	0.01	0.009	0.007	0.009	0.1	0.02

Notes:
1. PCB concentrations shown (except for the initial concentrations) represent subreach-average values predicted by EPA's model at the end of the model projection period (81 years for Combination 6, 52 years for all other combinations).
2. Values shown as ranges in Reach 7 represent the range of modeled PCB concentrations at the end of the projection within each of the Reach 7 subreaches. For Combination 9, the Reach 7 reductions were calculated separately by subreach. Individual subreach initial concentrations were not provided by GE in the CMS, so reductions shown for Combination 9 were calculated from EPA model results.
3. For Combination 9, the Reach 5B PCB concentrations do not factor in the use of an amendment, such as activated carbon. The use of this amendment is expected to reduce fillet PCB concentrations to less than the 3.5 mg/kg predicted by the modeling; the modeling does not factor in the effects of the amendment.
4. The results from the Connecticut model are very uncertain due to the empirical, semi-quantitative nature of the analysis.

Table 5 Percent Reductions in Fish PCB Concentrations for Combinations of Alternatives

Combination:	1	2	3	4	5	6	7	8	9
Reach	SED 1/ FP 1	SED 2/ FP 1	SED 3/ FP 3	SED 5/ FP 4	SED 6/ FP 4	SED 8/ FP 7	SED 9/ FP 8	SED 10/ FP 9	SED 9 MOD/ FP 4 MOD
	Percent Reduction in Fish PCB Concentration Relative to Initial Conditions								
Reach 5A	60%	60%	99%	99%	99%	99%	98%	77%	99%
Reach 5B	47%	47%	83%	99%	99%	99%	98%	62%	80%
Reach 5C	48%	48%	87%	99%	99%	99%	99%	59%	94%
Reach 5D (Backwaters)	57%	57%	72%	98%	98%	99%	98%	51%	95%
Reach 6	44%	44%	95%	99%	99%	99%	99%	76%	95%
Reach 7	45 - 63%	45 - 63%	80 - 91%	84 - 97%	94 - 98%	94 - 99%	93 - 98%	59 - 75%	86 - 95%
Reach 8	43%	43%	75%	95%	97%	97%	96%	57%	94%
Connecticut (Bulls Bridge Dam Impoundment)	60%	60%	91%	97%	98%	98%	98%	73%	95%
Percent Reduction in Fish PCB Concentration Relative to Combination 1 or Combination 2 (MNR)									
Reach 5A			96%	96%	96%	97%	96%	42%	96%
Reach 5B			68%	98%	98%	98%	97%	29%	61%
Reach 5C			76%	97%	97%	99%	97%	22%	89%
Reach 5D (Backwaters)			34%	96%	96%	97%	96%	-16%	89%
Reach 6			92%	98%	98%	99%	98%	57%	91%
Reach 7			67 - 75%	75 - 86%	89 - 93%	91 - 96%	89 - 93%	31 - 32%	75 - 88%
Reach 8			56%	92%	94%	94%	94%	25%	87%
Connecticut (Bulls Bridge Dam Impoundment)			80%	95%	96%	97%	96%	50%	81%

Notes:
1. Percent reduction represents the change in annual average PCB concentrations predicted by EPA's model between the beginning and the end of the projection period.
2. The results from the Connecticut model are very uncertain due to the empirical, semi-quantitative nature of the analysis.

WHAT'S THE DIFFERENCE BETWEEN IMPGS AND PERFORMANCE STANDARDS?

This Statement of Basis and the Draft Modification of the RCRA Permit include discussion of two related measures for the Rest of River remedy – the Interim Media Protection Goals (IMPGs), and the Performance Standards.

In the investigation of Rest of River, EPA completed a Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment. Taking into account the conclusions of the risk assessments, GE was required to propose IMPGs, which consist of preliminary goals that are shown to be protective of human health and the environment, and which served as points of departure in evaluating potential corrective measures in the Corrective Measures Study. Most of these IMPGs were identified as residual PCB concentrations in sediment, soil, or environmental media (like fish fillet tissue) across numerous risk-based benchmarks, including cancer risk (at 10^{-6}, 10^{-5}, and 10^{-4} risk levels) across a number of exposure scenarios (residential, recreational, etc.), non-cancer risks, and ecological risks calculated at an "upper bound" (less stringent) and "lower bound" (more stringent) risk level. The discussion in the "Comparative Analysis of Combined Sediment/Floodplain Alternatives" in this document includes a discussion of how each alternative performs in attaining these various IMPGs.

In the Draft Permit, EPA adopts certain of these IMPGs as Performance Standards. GE will be required to meet these and other Performance Standards as part of the remedy, as outlined in more detail in the Draft Permit. See Section II as well as Tables 1 through 4 of the Draft Permit for specific details.

One example of the relationship of the IMPGs and the Performance Standards is the following. In the HHRA, EPA evaluated risks to humans from consuming PCB-contaminated fish tissue. GE used the information from the HHRA to develop the IMPGs for fish consumption, which are presented as a range of concentrations associated with different risk levels that correspond to different consumers and to different points on the EPA risk range. IMPGs were developed for both deterministic and probabilistic risk analyses. The range of concentrations for probabilistic IMPGs is shown on Figure 9. EPA selected one point in this range of concentrations to serve as the Performance Standard for fish consumption, the PCB concentration of 1.5 mg/kg in fish fillet tissue which is associated with the non-cancer probabilistic risk for the average adult fish consumer who is assumed to consume 14 fish meals per year, half of those from the Housatonic River. This Performance Standard is met when fish fillet concentrations are less than 1.5 mg/kg in all Reaches. Other fish tissue IMPGs were retained as benchmarks in the Draft Permit, whereas other IMPGs for fish tissue were not carried over into the Permit.

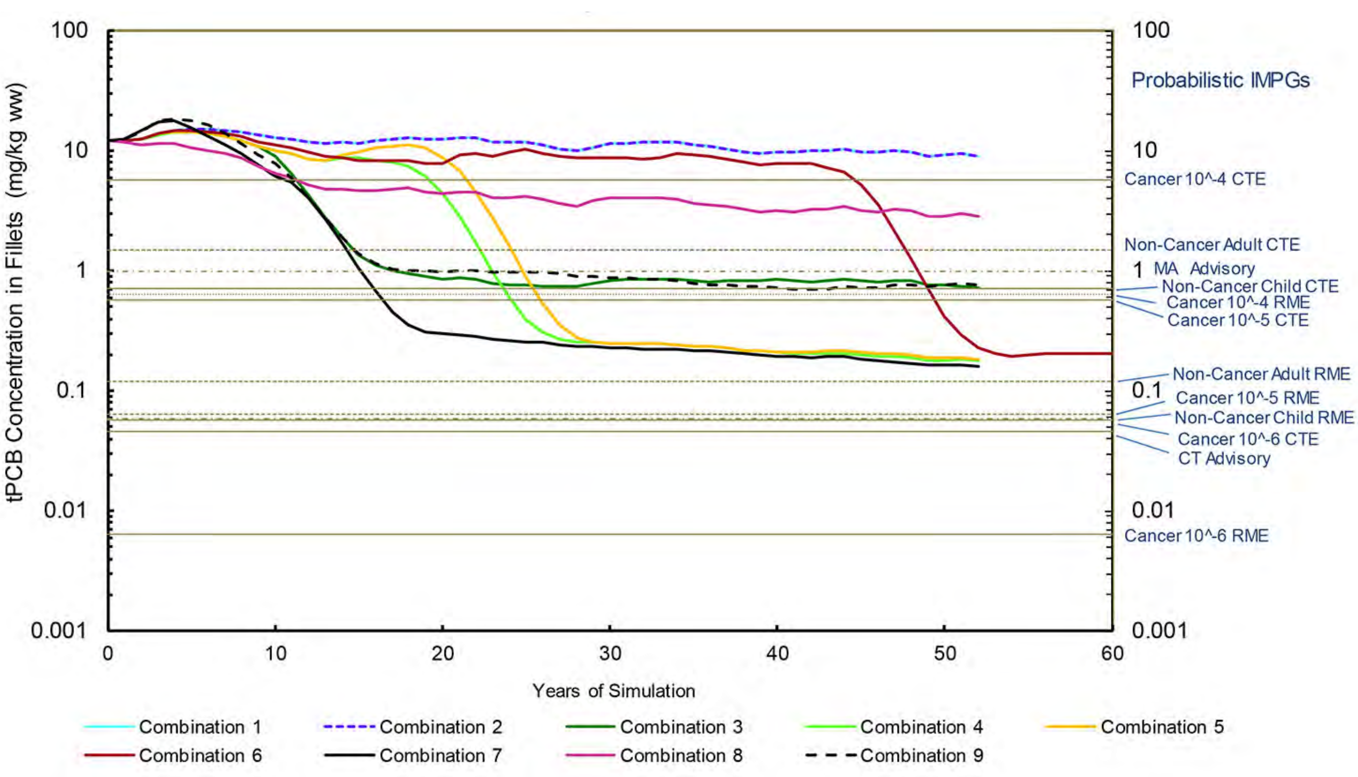


Figure 9
Average Fillet PCB Concentrations in Largemouth Bass (Average for Fish Ages 5 to 9)
Compared to Probabilistic IMPGs

techniques reestablish the prior conditions and functions of the affected habitats.

None of the Combinations preclude the implementation of additional corrective measures if deemed necessary. Additional corrective actions, such as cap or bank repairs, if necessary, should provide the same implementation challenges for all active alternatives.

EPA anticipates a robust monitoring program to monitor the effectiveness of the remedy. Each of the components of the active remedy combinations (Combinations 3-9) can be monitored effectively. However, alternatives that have little or no active remediation are less reliable, therefore, they would require more extensive monitoring.

No regulatory and/or zoning restrictions are known that would affect the implementability of the sediment/floodplain Combinations. Implementation of all alternatives (except alternatives 1 and 2) would require GE to obtain access from all property owners. Issues associated with obtaining access would be similar for alternatives 3-9, except that alternative 9 avoids the large-scale use of sheet pile and large cranes, which may facilitate access negotiations.

-All of the combinations would require coordination with EPA and state agencies to ensure compliance with state ARARs. In addition, implementation of Institutional Controls, obtaining access to State and municipally-owned properties, conducting public/community outreach programs and implementing biota consumption advisories will require both state and local coordination. The alternatives that require a greater extent of remediation and a longer implementation time would likely require more extensive and prolonged coordination activities. However, implementation of Institutional Controls where less remediation is performed would require more extensive Institutional Controls.

Lastly, regulatory and zoning restrictions, state and local coordination related to treatment, storage and disposal facilities, and the availability of suitable of such facilities and specialists is discussed below in the evaluation of Treatment/Disposition alternatives.

Cost

Estimated total and present worth for all of the Combination Alternatives are presented in Table 6. In addition, costs associated with these Combinations coupled with the Treatment/ Disposal Alternatives can be found in Table 7. The costs are based primarily on information available at the time of the estimate and are based on GE's unit cost estimates provided in GE's Revised CMS. As shown in Table 6, Combination 1 is the least costly alternative while Combination 6 is the most costly. For purposes of direct comparison of treatment and disposal costs associated with EPA's preferred sediment and floodplain alternative, total treatment/disposal costs for Combination Alternative 9 have also been included in Table 7.

COMPARATIVE ANALYSIS OF TREATMENT/ DISPOSITION ALTERNATIVES

This section presents a summary of a comparative evaluation of the five alternatives for treatment and/or disposal of excavated contaminated river sediment and floodplain soil using the same criteria that were used for the sediment/floodplain combination alternatives. All five alternatives would involve disposition of the sediment, riverbank soil, and floodplain soil in a disposal facility, either directly or after treatment. The three alternatives involving disposal only are TD 1/TD 1 RR (off-site disposal in permitted landfill(s)), TD 2 (on-site in a Confined Disposal Facility (CDF)), and TD 3 (on-site in upland disposal facility or facilities). The other two alternatives would involve treatment, either by a chemical extraction process (TD 4) or by thermal desorption (TD 5), followed by disposition of the byproducts of the treatment and the treated soil/sediment.

Overall Protection of Human Health and the Environment

TD 1, 3 and 5 would provide high levels of protection to human health and the environment because all excavated contaminated material would either be removed from the site (TD 1), contained in an upland disposal facility (TD 3), or treated to levels safe for off-site disposal or potential reuse (TD5). TD 2 could also provide human health protection as long as monitoring, maintenance and/or Institutional Controls are effective in the long term, in order to avoid negative impacts to the river system. Alternative TD 4 (chemical extraction) may not be able to effectively treat PCB contamination from the site, calling into question the protectiveness of this alternative.

Control of Sources of Releases

All the treatment/disposal alternatives would control the potential for PCB-contaminated sediment and soil to be released and transported within the river or onto the floodplain, although some alternatives would provide more effective control of such releases than others. TD 1 best meets this criterion, followed by TD 3.

Under TD 1, placement of the removed PCB-contaminated sediment and soil into a licensed off-site landfill or landfills would effectively isolate those materials from being released into the Housatonic River and associated floodplain. Under TD 2, there is a potential for releases of sediment into the river during the CDF construction process. TD 3 would address future releases through the placement of the materials in an upland disposal facility that will have a double liner and the implementation of a long-term monitoring and maintenance program. Placement of the PCB-contaminated sediment and soil into an upland disposal facility could effectively isolate the removed materials from being released into the environment. However, there is the potential for PCB releases to the Housatonic watershed if the landfills are not properly operated, monitored and maintained. Under TD 4 and TD 5, the potential for the PCB-contaminated sediment and soil to be released within the river or onto the floodplain during treatment operations would be minimal as long as these facilities are properly operated and maintained.

Compliance with Federal and State ARARs

The ARARs identified for the treatment/disposal alternatives are discussed in more detail in the Administrative Record. Each of the TD alternatives would involve moving the sediment, bank soil, and floodplain soil from the point of excavation to the treatment/disposition point. Of all the disposal alternatives (TD 1, TD 2, TD 3), only TD 1 complies with all State ARARs. TD 4 and TD 5 could potentially meet all ARARs. TD 2 will not meet, without limitation, wetland and floodplain requirements; and not all potential locations of TD 2 or TD 3 will meet the requirements of 310 CMR 30.700, 310 CMR 16.40(3)(4), and/or 990 CMR 5.04, which prohibit, without limitation, hazardous waste and solid waste facilities in an Area of Critical Environmental Concern ("ACEC") or adjacent to or in close proximity to an ACEC such that it would fail to protect the outstanding resources of an ACEC.

Long-Term Reliability and Effectiveness

TD 1, 4, and 5 result in the greatest reductions in residual risk. With TD 1, all material is removed from the site and sent to an offsite disposal facility; with TD 4 and TD 5, all material that was treated but did not reach safe PCB levels would be removed from the site and sent to an offsite disposal facility. Contamination remains on-site untreated under TD 2 and TD 3 and therefore the residual risk is greater under these alternatives. However, TD 3 would permanently isolate those materials from direct contact with human and ecological receptors in a secure location outside the floodplain. Under TD 4 and TD 5, residual risk is decreased because treatment reduces the levels of contaminants, however the reductions may not be to levels allowing for unrestricted reuse.

There are considerable differences in the adequacy and reliability of the five treatment/disposal alternatives. TD 1 is adequate and reliable because it does not rely on operation, monitoring, and maintenance requirements (except at the receiving facility) to adequately and reliably address the contamination. The other alternatives rely on operation, monitoring, and maintenance requirements to address the contamination remaining onsite to be effective in the long-term. Both TD 4 and TD 5 rely on these requirements to ensure that material is safely treated to acceptable concentrations. TD 2 and TD 3 rely particularly on monitoring and maintenance in the long

Table 6 Cost Summary for Combinations of Sediment and Floodplain Alternatives

Combination:	1	2	3	4	5	6	7	8	9
	SED 1/FP 1	SED 2/ FP 1	SED 3/ FP 3	SED 5/ FP 4	SED 6/ FP 4	SED 8/ FP 7	SED 9/ FP 8	SED 10/ FP 9	SED 9 MOD/FP 4 MOD
Total Capital Costs	0	0	$167 M	$307 M	$384 M	$900 M	$381 M	$84 M	$314 M
Total Operations Monitoring and Maintenance Costs	0	$5 M	$10 M	$12 M	$13 M	$17 M	$13 M	$10 M	$12 M
Total Cost for Alternative (excluding Transportation and Disposal)	**0**	**$5 M**	**$177 M**	**$319 M**	**$397 M**	**$917 M**	**$394 M**	**$94 M**	**$326 M**
Total Present Worth	0	$1.8 M	$133 M	$193 M	$219 M	$300 M	$251 M	$78 M	$228 M

Notes:

1. All costs are in 2010 dollars. $ M = million dollars.
2. Total capital costs are for engineering, labor, equipment, and materials associated with implementation.
3. Total OMM costs include cost for monitoring, post-construction inspections and repair activities (if necessary), long-term monitoring (fish, sediment, water column, visual), and for the maintenance of institutional controls and EREs.
4. Total present worth cost is based on using a discount factor of 7%, considering the length of the construction period and an OMM period of 100 years on a reach-specific basis.
5. Estimates do not include costs for treatment or disposition of any soil/sediment removed; those costs are outlined below (see Table 7).

term to ensure that material remains adequately contained, and TD3 may require long-term transport of leachate to the GE facility in Pittsfield or construction of a separate facility to treat leachate.

Labor and materials are available for operation, monitoring, and maintenance for all of these alternatives. While TD 1, 2, 3 have been used under similar conditions, TD 4 has not been demonstrated at full scale on sediment and soil representative of those in the Rest of River. TD 5 has been used to treat PCB-contaminated soil but only in limited cases for treatment of sediment, thereby creating some uncertainty regarding the adequacy and reliability of this alternative.

None of the alternatives are expected to have long-term adverse impacts on human health, however TD 2 will have significant long-term impacts on wetlands and floodplain areas. TD 3 may have long-term environmental impacts depending upon where the upland facility is located.

Attainment of IMPGs

Attainment of IMPGs is directly applicable to the sediment and floodplain remediation approaches outlined and evaluated for the various Combination Alternatives discussed earlier in this document. IMPG attainment is not directly applicable to the transportation and disposal alternatives, thus EPA did not conduct a comparative analysis for these alternatives for this criterion.

Reduction of Toxicity, Mobility, or Volume

Reduction of Toxicity: TD 1 through TD 3 would not include any treatment processes that would reduce the toxicity of, or directly affect, PCB concentrations in the removed sediment and soil. TD 4 and TD 5 would incorporate treatment processes that can, to varying degrees, reduce concentrations of PCBs. Under TD 4, the chemical treatment process would reduce the toxicity of the sediment and soil by permanently removing some PCBs from these materials but likely will not reduce concentrations to levels allowing reuse of the material, and as such would still require landfilling. Under TD 5, the thermal desorption system would reduce the toxicity of the PCB-contaminated sediment and soil by permanently removing PCBs from these materials. The PCBs in the liquid stream would be sent to a licensed off-site disposal facility for additional treatment. The degree of expected reduction in toxicity, and the amount of hazardous materials to be destroyed or treated are dependent on the sediment/floodplain alternatives selected, with Combinations 3 through 9 providing varying levels of expected removal of PCBs from the River and floodplain. For TD4 and TD5, the treatment process would be irreversible and the reduction in toxicity would be permanent.

Reduction of Mobility: All of the alternatives would reduce the mobility of PCBs in the sediment and soil. In TD 1, TD 2, and TD 3, these materials would be removed and disposed of in off-site permitted landfill(s) (TD 1) or contained within on-site CDF(s) (TD 2) or an on-site upland disposal facility (TD 3). TD 4 and TD 5 would reduce the mobility of PCBs present in the sediment/soil via ex-situ chemical extraction or thermal desorption.

Reduction of Volume: TD 1, TD 2, and TD 3 would not reduce the volume of PCB-contaminated material, although, TD 1 would reduce the volume of material that remains at the Site. For TD 4, treatment of sediment/soil would reduce the volume of PCBs present in those materials by transferring some of the PCBs to an aqueous waste stream for subsequent treatment. PCB-contaminated sludge would be generated from the wastewater treatment system and would be sent to a permitted off-site facility for disposal. For TD 5, treatment of sediment/soil in the thermal desorption system would reduce the volume of PCBs present in those materials, with the liquid condensate transported to an off-site facility for destruction.

Short-Term Effectiveness

Each of the alternatives has the potential for short-term impacts to the community. Alternatives that require on-site treatment (TD 4 and TD 5) require operation of a treatment facility, which would have air emissions albeit at very low levels, which could be treated prior to discharge if needed to meet regulatory levels. Alternatives that require on-site containment (TD 2 and TD 3) would also have additional short-term impacts to the areas and community surrounding the disposal sites. Construction of such facilities will temporarily increase community impacts during the time work is done in these areas. The alternative with off-site disposal (TD 1/TD 1 RR) will have short-term impacts during transport of the waste material; however, the impacts of truck traffic may be greatly reduced by reliance on rail transportation. The short-term impacts to workers are all relatively the same under all alternatives. All alternatives have the potential for accidental releases of various PCB-contaminated materials during transportation to off-site or local disposal or treatment facilities. However, actions will be taken to prevent these potential releases. All alternatives would require truck traffic. TD 1 and TD 4 require transportation of the most material, followed closely by TD 5, then TD 3. Depending on the location of the upland disposal facility under TD 3, TD 3 may have truck traffic comparable to TD 1. The impacts of truck traffic may be greatly reduced by reliance on rail transportation, consistent with EPA's intention to maximize use of rail.

There are also some differences in impacts to the environment under the different alternatives. TD 2 through TD 5 could cause permanent loss of habitat and loss or displacement of wildlife in the area depending upon where the disposal or treatment facility is located. TD 1 would have fewer impacts on the environment than the other alternatives.

Implementability

The implementability of TD1 through TD5 includes the following considerations:

All of the alternatives are readily able to be constructed and operated, with the acknowledgement that for off-site disposal via rail, some of the rail lines will need to be upgraded.
The reliability of technologies depends on the specific alternative. TD 1 and TD 3 are both reliable landfilling technologies. CDFs (TD 2) have been implemented at many locations and have been shown to be reliable when constructed and operated properly. For both TD 4 and TD 5, there are several uncertainties regarding the reliability of full-scale application of both chemical and thermal processes to sediment (e.g., moisture content), particularly with some of the volumes associated with the sediment alternatives.

Regarding regulatory and zoning requirements and coordination with other agencies, the existing licensed off-site facility in TD 1 would already have satisfied regulatory requirements. Coordination with state and local agencies would be required to site the rail loading facility. Both state and local communities have expressed a strong preference for rail, which should facilitate resolution of any remaining regulatory, zoning, access or facility siting issues.

TD 2 could raise issues in accounting for sufficient flood storage compensation at the appropriate elevations/areas to provide for construction of a CDF(s) large enough to hold the necessary sediment disposal volumes, and permanent access to the CDF(s) would be required for inspections and maintenance. As discussed in the Compliance with Federal and State ARARs section above, TD 3 would have significant issues with the ACEC regulations, the Massachusetts Hazardous Waste Facility Site Safety Council Regulations, and the site suitability criteria in the Commonwealth's Site Assignment Regulations for Solid Waste Facilities. In addition, TD 2 and TD 3 would both require extensive coordination with state and local officials, increasing the period of time before these could be implemented, and both TD 2 and TD 3 would likely encounter significant local and state opposition that may render these alternatives more difficult, and potentially not feasible, to implement.

TD 4 and 5 would require access to large areas for the construction and operation of a treatment facility. Locating such a facility would require coordination would state and local agencies. Other access and zoning issues may also be present. Since state and local officials have expressed a strong preference for off-site disposal, these alternatives may encounter significant opposition, thus rendering these alternatives difficult to implement.

Regarding the availability of licensed off-site disposal facilities (TD 1) while the current universe of facilities is sufficient, there are uncertainties regarding the future availability of the necessary capacity in off-site landfills for the alternatives that have larger volumes and longer durations.

For TD 2 and TD 3, the availability of on-site disposal facilities may be limited by opposition from state and local officials and regulatory issues, as discussed above. However, if these obstacles are overcome, there is sufficient availability of facilities for TD 3. There may be limitations on the capacity of CDF(s) depending on the combination alternative selected.

Regarding the ease of undertaking additional corrective measures, if necessary, if additional wastes were generated as part of future actions, it is likely that the facilities constructed under TD 2 through TD 5 would no longer be available for additional treatment and/or disposal. While it may be technically feasible to expand an upland disposal facility after closure (TD 3), it would likely be administratively difficult and not cost-effective to implement this option. Thus, TD 1 is the most implementable in this regard.

TD 1 through TD 5 all can be monitored effectively. TD 1 would require the least amount of monitoring. TD 2 and TD 3 would require extensive long-term monitoring to ensure the integrity and effectiveness of the disposal facility(s). TD 4 and TD 5 would require extensive monitoring of the treatment facilities during treatment operations.

Cost

The estimated cost ranges for each treatment/disposal alternative, including total capital cost, estimated annual maintenance and monitoring cost, and total estimated present worth are summarized in Table 7. These costs are expressed as ranges since they account for treatment or disposal of a wide range of volumes depending on the sediment and floodplain remediation approach selected. As shown in Table 7. TD 3 is the least costly alternative while TD 4 and TD 5 are the most costly. For purposes of direct comparison of treatment and disposal costs associated with EPA's preferred sediment and floodplain alternative, total and present worth treatment/disposal costs for Combination Alternative 9 are also included in Table 7.

Table 7 Cost Summary for Treatment/Disposition Alternatives

	TD 1	TD 1 RR	TD 2	TD 3	TD 4	TD 5 (with reuse)	TD 5 (without reuse)
Total Capital Costs	0	$300,000	$6 – 20 M	$10 – 67 M	$17 – 20 M	$20 – 232 M	$20 – 232 M
Total Disposal, Operations, Monitoring, and Maintenance Costs	$55 – 832 M	$52 – 787 M	$94 – 490 M	$26 – 134 M	$72 - 979 M	$83 – 1,216 M	$86 – 1,293 M
Total Cost for Alternative	**$55 – 832 M**	**$52 – 787 M**	**$100 – 510 M**	**$36 – 201 M**	**$89 – 999 M**	**$103 – 1,450 M**	**$106 – 1,530 M**
Total Present Worth	$40 – 220 M	$38 - 210 M	$46 – 131 M	$17 – 49 M	$70 – 286 M	$81 – 569 M	$83 – 590 M
Total TD Cost for Combination 9	**$308 M**	**$287 M**	**$317 M**	**$100 M**	**$399 M**	**$515 M**	**$540 M**
Total Present Worth for Combination 9 TD Cost	$196 M	$183 M	$85 M	$33 M	$170 M	$280 M	$295 M

Notes:

1. All costs are in 2010 dollars, except total present worth values. $ M = million dollars,
2. The fraction of TSCA material has been assumed to be 35%. A density of 1.62 tons per cubic yard was assumed.
3. The Massachusetts hazardous waste transport fee is not included in these estimates. The fee would potentially apply to TSCA material transported off-site via truck. This fee would potentially apply to TD-1, and portions of TD-2, TD-4 and TD-5. The fee is currently $56.25 per ton, including a vehicle identification fee. For TD 1 for Combination 9, the total fee is estimated to be $31.3 million. The fee is not applicable to off-site disposal via rail (TD 1 RR).
4. With the exception of TD 2, the ranges of costs presented are the minimum and maximum anticipated costs based on the potential range of volumes that would be potentially removed under the sediment and floodplain soil alternatives (191,000 cubic yards to 2.9 million cubic yards). For TD 2, the lower-bound costs are based on the combined volume of SED 6 and FP 2 and the upper-bound costs are based on the combined volume of SED 8 and FP 7, with material not placed in the CDF(s) assumed to be transported off-site for non-TSCA disposal. Thus, the upper-bound costs, but not the lower-bound costs, for TD 2 are comparable to the costs for the other alternatives.
5. Total capital costs are for engineering, labor, equipment, and materials associated with implementation.
6. Total operations costs consist of the total of the average annual costs for operation, placement, and/or treatment of sediment and/or soil, estimated for the range of durations for implementing the alternatives.
7. Total monitoring and maintenance costs are for performance of post-closure monitoring and maintenance programs of 100 years for TD 2 and TD 3 and 5 years for TD 4 and TD 5.
8. Total present worth cost is based on using a discount factor of 7%, considering the range of total potential durations for the alternative, and post-closure monitoring and maintenance periods of 100 years for TD 2 and TD 3 and 5 years for TD 4 and TD 5.
9. For TD 5 with reuse, it is assumed that approximately 50% of the floodplain soil treated by thermal desorption would be reused on-site and that all remaining materials would be transported off-site for disposal.
10. Costs for TD 3 do not include the very likely extensive costs associated with the approval process required for an on-site landfill.

EPA IS ASKING FOR PUBLIC COMMENT ON THE FOLLOWING PROPOSED REGULATORY DETERMINATIONS

Wetland Impacts

The cleanup plan proposed by EPA includes activities that impact wetlands, including vernal pools. Before EPA can select a cleanup plan that will impact wetlands, Section 404 of the Clean Water Act and Executive Order 11990 (Protection of Wetlands) require that EPA make a determination that there is no practicable alternative to conducting work that will impact wetlands. EPA has determined that because significant levels of contamination exist in wetlands within the site's cleanup areas, there is no practicable alternative to conducting work in these wetlands.

For those wetland areas that would be impacted by cleanup activities, EPA is also required to make a determination that the cleanup alternatives that are conducted are the least environmentally damaging practicable alternatives. EPA has determined that the proposed cleanup alternative (Combination Alternative 9) is the least environmentally damaging practicable alternative.

EPA would minimize potential harm and avoid adverse impacts on wetland resources, to the extent practical, by using best management practices to minimize harmful impacts on the wetlands, wildlife or habitat. Wetlands would be restored and/or replicated nearby consistent with the requirements of federal and state wetlands protection laws.

A more detailed discussion of this determination is in the Wetlands/Floodplain Analysis that is part of the Administrative Record.

Floodplain Impacts

For any cleanup alternative with impacts on the floodplain, EPA is required to determine whether the activities proposed will result in occupancy or modification of the floodplain, and if so, before EPA can select such a cleanup alternative, Executive Order 11988 (Floodplain Management) requires EPA to make a determination that there is no practicable alternative to doing so.

Portions of the Proposed Remedial Action will take place in floodplains. As described in the Proposed Remedial Action, the Rest of River area includes many contaminated floodplains. In addition, for other components of the Proposed Remedial Action, such as excavation and capping of the riverbed sediments, support activities are proposed to take place in the floodplain, such as use of temporary access roads to access the contaminated riverbed and to transport contaminated soil and sediment away from the project areas, as well as establishing staging areas for contaminated material. These features would not be permanent, and would be restored after remediation.

EPA has considered alternatives to avoid potential adverse effects in the floodplains. Based on its evaluation of the alternatives identified in the revised Corrective Measures Study, EPA has determined that there is no practicable alternative to the activities that take place in the floodplain in the proposed alternative. To reduce the levels of PCB contamination in floodplain to acceptable levels, there is no practicable alternative to excavation of the limited amount of floodplain soil as identified in the Proposed Cleanup Plan. In addition, with respect to road construction and other ancillary support areas such as staging areas for excavated soils and sediments, such construction of roads and ancillary support areas would not be permanent, and would be restored after remediation. To the extent that the limited activities to remove PCB contamination from the floodplain, and the support activities for other proposed Rest of River remediation activities are considered occupancy and modification of the floodplains, EPA has determined there is no practicable alternative to occupancy and modification.

The activities in the proposed Cleanup Plan that affect the floodplain are not permanent, and would be subject to mitigation following remediation. Section II.B.3 of the draft Permit Modification, Restoration of Impacted Areas, provides specific requirements for GE to address areas such as floodplain areas that have been impacted by remediation activities. In addition, the Proposed Cleanup Plan is designed to minimize impacts on flood storage capacity from cleanup activities within the 100-year floodplain. For example, the engineered cap proposed in Reach 5 of the River will be designed and placed so that it will not decrease flood storage capacity. In addition, among the applicable or relevant and appropriate requirements ("ARARs") that must be complied with for the project is compliance with standards on floodplain management, to ensure, among other requirements, that activities will not cause a loss of flood storage capacity or increase in water surface elevation or velocity.

A more detailed discussion of this determination is in the Wetlands/Floodplain Analysis that is part of the Administrative Record.

Technical Impracticability Determination of Certain Water Quality Criteria

The federal and state water quality criteria standard for PCBs for human consumption of organisms is 0.000064 micrograms per liter (ug/L). Under any of the alternatives evaluated, these criteria are not expected to be met in the River in Massachusetts.

Therefore, EPA, with concurrence from MassDEP, proposes waiving these criteria within Reaches 5 through 9 (the portion of the site in Massachusetts) because achievement of the federal and state water quality criteria for human consumption of organisms is technically impracticable from an engineering perspective under Section 121(d)(4)(C) of the Comprehensive Environmental Response, Compensation, and Liability Act. Meeting these criteria is not feasible from an engineering perspective because current engineering methods cannot be reasonably implemented to achieve these levels in surface water in Massachusetts. As a modified Performance Standard for this waived criterion, the project will be required to meet the Biota Performance Standard and the Downstream Transport Performance Standard in the Permit.

These criteria are not being waived in Connecticut because they can potentially be met in the future. Such a waiver may be considered in the future should it become apparent that these criteria cannot be met based on technical impracticability. The federal and state water quality criteria based on freshwater aquatic life, 0.014 ug/L, is believed to be achievable throughout the river and will apply to this cleanup action.

Proposed Finding: PCB Cleanup is Protective

Pursuant to regulations implementing the Toxic Substances Control Act at 40 C.F.R. Section 761.61, EPA has made a draft determination that the proposed manner of sampling, storage, cleanup and disposal of PCBs outlined in the Draft Permit, including the Performance Standards and associated corrective measures to meet the Performance Standards outlined therein, will not pose an unreasonable risk of injury to health or the environment. See Attachment D to the Draft Permit for the draft determination.

FOR MORE DETAILED INFORMATION

The Administrative Record, which includes all documents that EPA has considered or relied upon in proposing this cleanup plan, is available for public review and comment at the following locations:

EPA Records and Information Center
5 Post Office Square, First Floor
Boston, MA 02109-3912
617-918-1440

EPA c/o Weston Solutions
10 Lyman Street
Pittsfield, MA 01201
413-442-4224

The Administrative Record will also be available at the following locations:

Berkshire Athenaeum Public Library
Reference Department
Pittsfield, MA 01201
413-499-9480

Cornwall Public Library
Cornwall, CT 06796
(860) 672-6874

Housatonic Valley Association
Cornwall Bridge, CT 06754
(860) 672-6678

Massachusetts Department of Environmental Protection
436 Dwight Street
Springfield, MA 01103
413-784-1100

Connecticut Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106
860-424-3854

Information is also available for review on-line at www.epa.gov/region1/ge

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PUBLIC COMMENT PERIOD

EPA will accept public comments during a formal comment period on the Proposed Remedial Action. This comment period is currently slated to run from June 25, 2014 through August 8, 2014. EPA considers these comments to improve its cleanup approach. During the formal comment period, EPA will accept written comments via mail, email, and fax. Additionally, verbal comments may be made during the formal Public Hearing, where all offered comments will be recorded. EPA will hold a brief informational meeting prior to the start of the formal Public Hearing. EPA will not respond to comments during the formal Public Hearing. See the cover page of this document for information regarding informational meetings and the Public Hearing.

EPA will review the transcript of formal comments received during the Public Hearing, and written comments received during the formal comment period, before making a final cleanup decision. EPA will then prepare a written response to the formal written and oral comments received. Any formal comments will become part of the official public record. The transcript of comments and EPA's written responses will be issued in a document called a Responsiveness Summary when EPA releases the Final Modification to the Reissued RCRA Permit. The Responsiveness Summary and Final Permit will be made available to the public on-line, at the Information Repositories, and at the EPA Records Center (see addresses below). EPA will announce the final decision on the cleanup plan through the local media and via EPA's website.

SEND US YOUR COMMENTS

Provide EPA with your written comments about the Proposed Cleanup Plan.

Please email (r1housatonic@epa.gov), fax (617-918-0028) or mail comments, postmarked no later than
Friday, August 8, 2014 to:

Dean Tagliaferro
EPA New England
c/o Weston Solutions
10 Lyman Street
Pittsfield, MA 01201

ACRONYMS

ACEC........ Area of Critical Environmental Concern
ARARs........ Applicable or Relevant and Appropriate Requirements
CERCLA........ Comprehensive Environmental Response, Compensation, and Liability Act
CMS........ Corrective Measures Study
CTDEEP........ Connecticut Dept. of Energy and Environmental Protection
CWA........ Clean Water Act
EMNR........ Enhanced Monitored Natural Recovery
IMPGs........ Interim Media Protection Goals
MassDEP........ Massachusetts Department of Environmental Protection
MassDFG........ Massachusetts Department of Fish & Game
NCP........ National Contingency Plan
MNR........ Monitored Natural Recovery
PCBs........ Polychlorinated Biphenyls
RCRA........ Resource Conservation and Recovery Act

LEARN MORE AT: www.epa.gov/region1/ge

EPA's Draft Modification to the Reissued RCRA Permit as well as other supporting documentation are available at www.epa.gov/region1/ge/proposedcleanupplan.html

HIGHLIGHTS OF PROPOSED CLEANUP PLAN

EPA is proposing a cleanup plan consisting of a combination of targeted soil and sediment removal, riverbed capping, and monitored natural recovery to address risks posed by PCBs. This Proposed Cleanup Plan is expected to achieve the following outcomes:

- Reduce risks to children and adults from direct contact with soil and sediment;
- Reduce soil contamination in the floodplain to levels which allow continued recreational use without unacceptable risk;
- Reduce PCB concentrations in fish to levels that allow increased consumption of fish caught from the River in Massachusetts and Connecticut, and reduce impact to affected communities relying on the fish for economic considerations or cultural practices;
- Reduce the potential movement of PCBs from the river onto the floodplain, from the banks into the River, and from upstream to downstream locations, including the downstream transport into Connecticut;
- Reduce contamination and risk for ecological receptors (fish, wildlife, and other organisms) in the river, backwaters, floodplain, and vernal pools;
- Reduce PCB surface water and sediment concentrations by addressing PCB sources in sediment and soil to advance future compliance with water quality standards in Massachusetts and Connecticut and attainment of the highest possible use of the River consistent with the Clean Water Act;
- Reduce the mass of PCBs in Housatonic River sediment and floodplain soil available for exposure and downstream transport;
- Provide flexibility to address potential removal of dams in the river, changes in floodplain use over time, and consideration of new technologies that may be useful in the future;
- Transport of all contaminated soil and sediments off-site to existing licensed facilities approved to receive such soil and sediment, thereby avoiding the need to construct new landfills in the watershed;
- Protect and preserve the unique ecological characteristics of the Upper Housatonic Watershed in conducting remedial efforts; and,
- Establish procedures to address PCB contamination associated with future work.