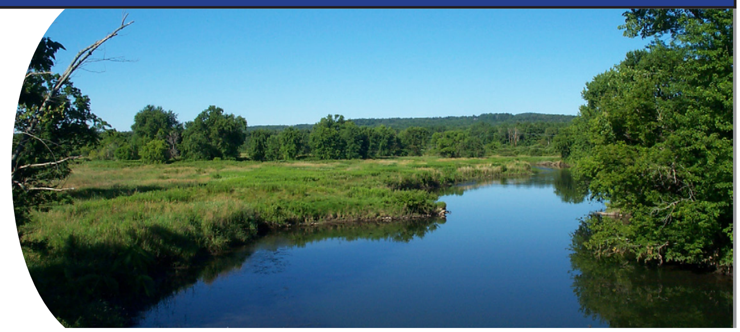
Housatonic River Mini Workshops

Mini Workshop Three:

Exploring Alternatives for Cleanup
Remediation, Restoration, Alternatives, and Environmentally Sensible Remediation Concepts



All Workshops • 5:30pm - 8:30pm

TUE. APRIL 5	WED. APRIL 6	TONIGHT
Mini Workshop One: Why Working with River Processes Matters *History, Ecology, and PCBs*	Mini Workshop Two: Getting the Facts on PCBs *Human Health Risks, Ecological Risks, and PCBs*	Mini Workshop Three: Exploring Alternatives for Cleanup *Remediation, Restoration, Alternatives, and Environmentally Sensible Remediation Concepts*

Public Charrette • 8:30am - 5:30pm

SAT. MAY 7

The Community Contributes
A Practical, All-Day, Hands-On Workshop for the Community to Better Understand the "Rest of River" Issues, to Explore the Pros and Cons of the Alternatives, and for EPA to Hear the Community's Ideas

All events will be held at Shakespeare & Co., 70 Kemble Street, Lenox, MA

This Workbook contains key information and materials being presented at the Mini Workshop. Additional information and full presentations will be available at:
www.housatonicworkshops.org

United States Environmental Protection Agency
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Suite 100
Boston, MA 02109-3912

Dear Friends,

It is my pleasure to welcome you to this important series of workshops regarding the Housatonic River. First, I would like to thank you for taking the time to participate in these important public engagement and education programs. I am keenly aware of the high level of interest in EPA's upcoming decision about the scope and type of work that will be required of GE in the "Rest of River" portion of the Housatonic, as the river winds south from Pittsfield through Berkshire County and Connecticut. I have been very impressed with everyone's commitment to the River and its connection to the people in the communities through which it flows. There is a lot at stake – including protecting the character of the Housatonic and making the right decisions for current and future generations to safely enjoy the river environment.

EPA has designed this series of workshops and subsequent charrette not only to help you better understand what we've learned about the River and the PCB contamination but to also help us better understand your views as we move forward in our decision-making process. I am committed to making decisions based on sound science, and based on the best available information. I am also committed to an open, inclusive and transparent process that allows the communities of the Berkshires and Connecticut to weigh in with their concerns and priorities. These workshops are important steps towards that goal.

EPA hopes to use what we learn from you and others at these workshops to aid in our ongoing evaluation of cleanup options. We also hope that, through this process, you gain a broader understanding of the numerous technical and policy issues at hand. After EPA issues our formal cleanup proposal, all members of the public will, once again, have an opportunity to comment on the proposal. EPA will then review those comments and make our final cleanup decision. I will ensure that whatever plan EPA ultimately decides is best, it will be implemented by GE in a manner that is sensitive to the unique character of the river and to the community.

Thank you again for attending and I hope you find these workshops informative and worthwhile.

Curt Spalding
Regional Administrator

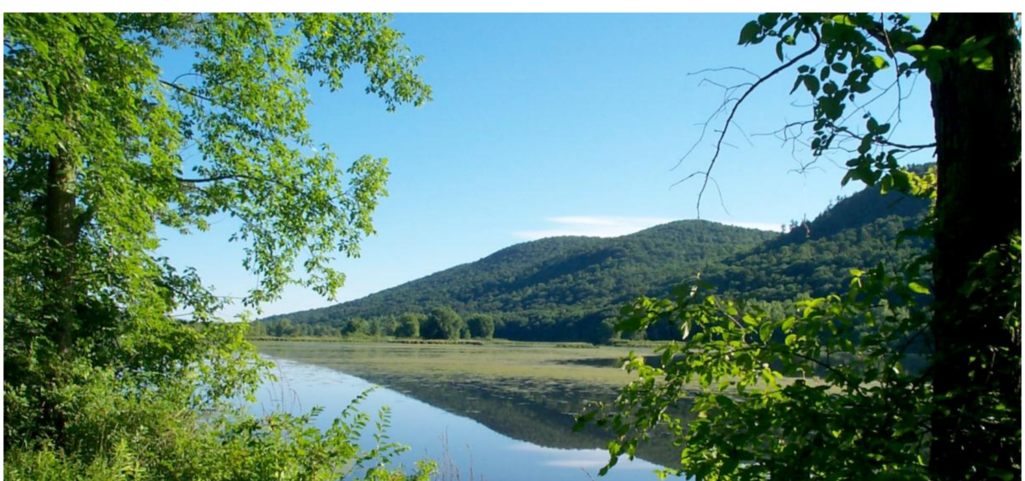
LEARN MORE AT: www.epa.gov/region1/ge

Tonight's Agenda

- **Welcome and Introduction; EPA's Public Outreach and Decision Making Criteria** – Curt Spalding, *EPA Regional Administrator*
- **Panelists' Introduction** – Steve Shapiro, *Certus Strategies*
- **Presentation One: Remediation Technologies and Techniques** – Michael Palermo, Ph.D, *Mike Palermo Consulting, Inc.*
  - *Brief Q&A*
- **Presentation Two: Restoration Techniques** – Keith Bowers, *Biohabitats, Inc.*
  - *Brief Q&A*

Brief Break

- **Presentation Three: Alternatives and Technologies** – Bob Cianciarulo, *EPA Chief, Massachusetts Superfund Section*
  - *Brief Q&A*
- **Presentation Four: Environmentally Sensible Remediation Concepts** – Susan C. Svirsky*, EPA Project Manager, Rest of River*
  - *Brief Q&A*
- **Q&A – Full Panel**
- **Conclusion/Wrap-Up**



Please register for May 7 Public Charrette on Registration form or at www.HousatonicWorkshops.org!

EPA's Public Outreach and Decision Making Criteria

Under the Consent Decree for the GE Housatonic River Site, GE was required to submit its Corrective Measures Study (CMS) to evaluate cleanup alternatives for the Rest of River to reduce risk to human health and the environment from PCBs, and to prevent further downstream transport of PCBs. The initial CMS was submitted in March 2008. After receiving public input, EPA submitted comments to GE on the CMS. GE then submitted the Revised CMS (RCMS) in October of 2010. In the RCMS, GE evaluated 10 sediment alternatives, 9 floodplain alternatives, and 5 treatment and disposal alternatives.

EPA held an informal public input period on the RCMS, and the comment period closed on January 31, 2011. EPA has now begun its decision making process for the cleanup of the Rest of River, considering the RCMS, other relevant information, and public input.

As part of its public input process, EPA's consultant held a series of interviews with stakeholders regarding their view of the process and information needs. An outgrowth of these interviews is this series of mini workshops designed to address the information needs identified by the stakeholders. The goal of the workshops is to provide a better understanding of the issues associated with selecting a cleanup for Rest of River. In addition, an all-day hands-on session, or charrette, will be held on May 7th for stakeholders to learn and interact regarding the Rest of River cleanup.

Please keep in mind that under the terms of the Consent Decree, EPA must evaluate all cleanup alternatives against the following 9 criteria:

General Standards

- Overall protection of human health and the environment
- Control of sources of releases
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Selection Decision Factors

- Long-term reliability and effectiveness
- Attainment of Interim Media Protection Goals (IMPGs, or cleanup goals)
- Reduction of toxicity, mobility, volume
- Short-term effectiveness
- Implementability
- Cost

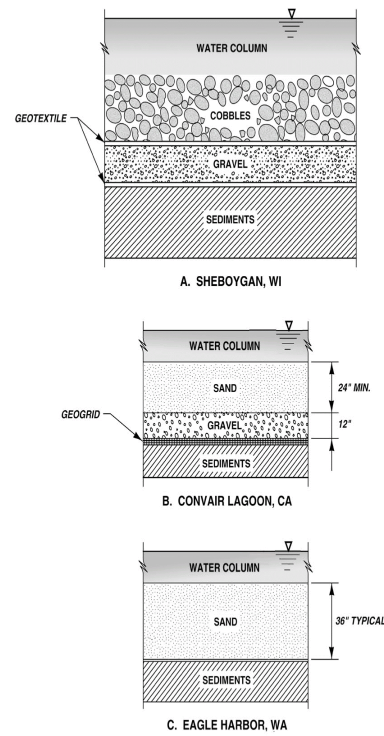
For additional information see "EPA's Cleanup Decision Process" and "Cleanup Alternatives in the Revised CMS" information sheets at http://www.epa.gov/ne/ge/thesite/restofriver-reports.html#CommunityUpdates.

Presentation One: Remediation Technologies and Techniques

Michael R. Palermo, Ph.D, *Mike Palermo Consulting, Inc.*

The basic techniques and technologies for sediment remediation are well established. These include non-removal options, such as monitored natural recovery and *in-situ* (in place) capping, and removal options, such as dredging with containment, and dredging with sediment treatment. Other remedies involve combinations of these options. All of these options have been applied to sediment remediation projects in the US, and there is considerable field experience with such projects. This summary provides a basic description of the options for sediment remediation and the associated technical considerations.

Monitored Natural Recovery (MNR) is a remedial option that relies on natural processes to contain or reduce the bioavailability or toxicity of sediments left in place. Processes that result in natural recovery include burial and in-place dilution following deposition of clean sediment and biodegradation or physical and/or chemical (abiotic) transformation processes which convert the contaminants to less-toxic forms. There are criteria established for what sites may be candidates for selecting MNR[1]. MNR is not a "no action" alternative because by definition it includes source control (such as burial) and an appropriate monitoring program to ensure the processes are effective. In some cases, MNR is enhanced by the addition of a thin layer of sand, often referred to as Enhanced MNR or Thin Layer Capping (TLC). MNR is a common component of remedies with a combination of actions, *i.e.,* at sites addressed by capping or dredging in areas of higher contamination, with MNR for areas of lower contamination. The major disadvantages of MNR are that contaminated sediment is left in the aquatic environment for the long time it takes natural processes to reduce risks, and there is the potential for future disruption of buried contaminants by storms, floods, or other events. Therefore, a rigorous evaluation of the likelihood of these events occurring must be a component in selecting MNR.



The design of an in-situ cap depends on the specific conditions of the site

In-Situ Capping (ISC) is an active remediation option in which a layer of clean isolating material (usually clean sediment or soil) is placed to contain and stabilize the contaminated sediment in place. A variety of capping materials and cap placement techniques are available. Monitoring data collected from a number of projects has indicated capping, in most cases, is a highly effective remedy. However, the potential for extreme events such as storms, floods, or earthquakes to disrupt a cap must be carefully examined and addressed in the design of an ISC, including appropriately conservative safety margins. There is also the disadvantage that contaminated material remains in the aquatic environment. As sediment remedies have become more commonplace and have a documented history, ISC has gained increased acceptance as an effective and efficient remedial option in recent

[1] See http://www.epa.gov/superfund/health/conmedia/sediment/guidance.htm

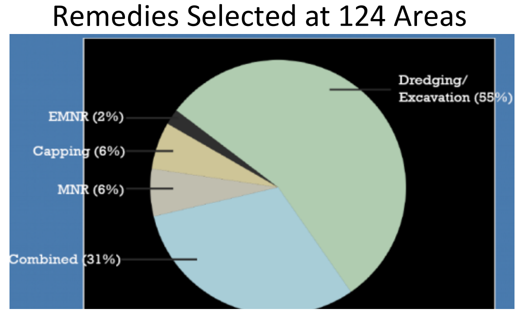
years; it has been implemented as a remedy component at a number of major sites, including the Fox, Hudson, and Housatonic Rivers.

Environmental Dredging, including both dredging and/or dry excavation, is the most common approach for sediment remediation in the US. Removal of contaminated sediment (or in the case of wetlands, soil) provides an advantage in that the contaminants are permanently removed from the aquatic environment. The removal process for dry excavation uses conventional earth moving equipment, and the removal efficiency or effectiveness of such operations is not debated. However, the effectiveness of dredging must be carefully evaluated. The major considerations for evaluating the effectiveness of dredging include the risk of re-suspension of sediment during the dredging process, which can lead to the release of contaminants, and the residual contaminated sediment left in place following dredging.

While removal of the sediment mass is straightforward, addressing re-suspension and residual contamination remaining after dredging can be more complex. Consequently, the definition of success for older environmental dredging projects has been the subject of some debate, however for most newer projects it is now better understood. There are a variety of engineering controls that may be used, including isolating the dredging area from the waterbody using silt curtains, and in some cases, sheet pile enclosures. The selection of appropriate dredging equipment and the compatibility of equipment with the selected disposal option is also an important factor, and may conflict with goals related to re-suspension. Equipment normally used for navigation dredging can and is often used for remediation projects, but US and international dredge designers, manufacturers, and dredging contractors are also using a variety of innovative hydraulic and mechanical dredges especially designed for environmental work to directly address the issue of resuspension and residual management.

Disposal of the dredged material is a necessary component of any environmental dredging option and can often be a controversial, complex and expensive component of dredging. Disposal options include confinement, pre-treatment, or treatment. Confined Disposal Facilities (CDFs) and Contained Aquatic Disposal (CAD) sites are commonly used for contaminated sediments from navigation dredging and have also been used for remediation projects. However, the most common containment option in the US for contaminated sediments dredged for purposes of remediation has been disposal in upland landfills

Remedies Selected at 124 Areas



PCBs are involved at about 50% of the Sites; cleanup/ action levels range from approx. 0.1 to 4000 mg/kg

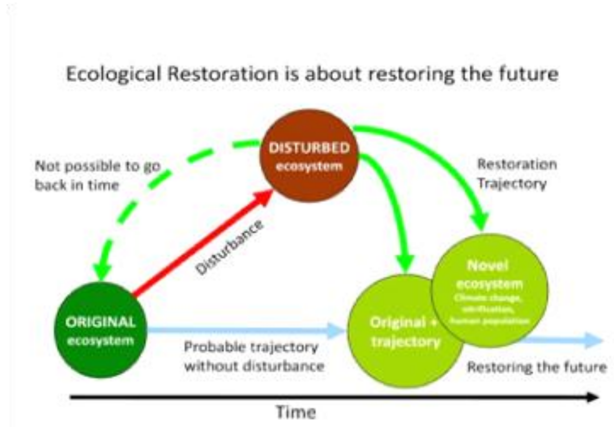
Remedy selection should give appropriate attention to: 1) site-specific considerations such as hydrodynamics, adjacent resources and infrastructure, water depths, and other factors which may influence the risks and costs of a given approach; 2) project-specific considerations such as the volume of contaminated materials or areas to be addressed, the regulatory framework under which the project is being implemented, and other factors which may dictate feasible and cost-effective solutions; and 3) sediment-specific considerations such as the type of contaminants, contaminant concentrations, physical properties of the sediments. Ultimately, experience has shown that, for large or complex sites, combinations of options are often the most desirable remedies.

Presentation Two: Restoration Techniques

Keith Bowers, *Biohabitats, Inc.*

"Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."

– Society for Ecological Restoration (SER), 2004

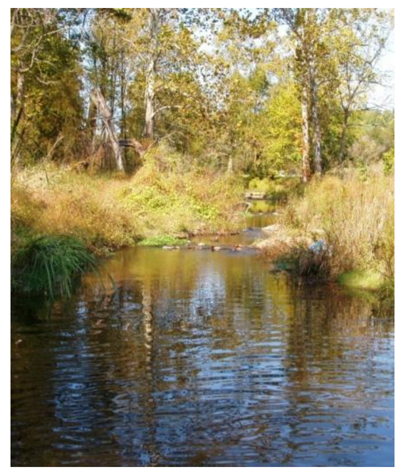


ECOLOGICAL RESTORATION AND RECOVERY

Ecological restoration initiates or accelerates the recovery of an ecosystem. Active ecological restoration "sets the stage" for natural, passive restoration processes to take over, and can reduce the time needed for recovery from many decades to years.

EVOLUTION OF RIVER RESTORATION

Around the world, ecological restoration has gained recognition as a valuable tool to repair landscapes that have been impacted by human activities.



- Early coordinated stream restoration efforts focused on patching sections of channel
- Early missteps resulted when practitioners mischaracterized systems based on overly simplistic understandings of stream processes
- Current restoration efforts emphasize the need for a better understanding of geomorphic and ecologic history
- More holistic approaches to restoration consider broader contexts – both in time and space
- Focuses on: credible scientific, economic, and social evaluation; understanding the physical and biological context; establishing a more resilient and self-sustaining system; setting measurable goals; and monitoring to maximize learning from past efforts

RIVER RESTORATION EXAMPLES

Many examples of successful restoration projects exist in different settings and spatial scales. Demonstrated restoration successes of impacted sites throughout the world have shown that it is possible to restore both the appearance and ecological function of areas after they are disrupted. A few examples include:

(Source: Utah Reclamation, Mitigation and Conservation Commission)

- Provo River Restoration Project, UT – Similar in size to the Housatonic River, the purpose was to restore the river form and ecological function to recover fish, wildlife and recreational angling losses caused by federal water projects in Utah. The restoration consisted of creating a multiple-thread, meandering river channel, and reconnecting the river to existing remnants of the historic secondary channels.

- Nine Mile Run River Restoration Project, PA – US Army Corps of Engineers partnered with the City of Pittsburgh to restore over a mile of aquatic habitat by reconnecting the stream to its floodplain, eliminating leachate from an adjacent slag dump, reducing fish migration barriers, creating meanders and step pools, stabilizing eroding slopes using vegetation or soil bioengineering, managing invasive vegetative species, and enhancing/enlarging wetlands.

(Source: © John Moyer)

RESTORATION AND RECOVERY ALONG THE HOUSATONIC RIVER AND FLOODPLAIN

The Housatonic River appears to be a pristine natural river system that has evolved by meandering over millennia. Some fear that disrupting these natural processes will result in irreparable harm to the ecosystem. However, analysis of historical documents and maps of the River reveals a history of alterations in the River associated with a number of human activities. An altered river channel is inherently unstable due to factors such as the increase in channel gradient and stream power associated with a shortened stream length if the river is straightened.

(Source: City of Pittsfield Department of Public Works and Utilities)

Over time, straightened river channels may undergo a series of channel adjustments that ultimately lead to the return to a stable meandering riverbed and banks that approximate the pre-disturbance condition. Active ecological restoration can accelerate the full recovery not only of past human impacts, but also of impacts caused by remediation, often in a few decades.

At Newell Street in Pittsfield, photographs show that vegetation along the River was removed in both the 1940s and 1990s. These photos demonstrate that the River can reestablish channel and riparian function relatively quickly following first the clearing in 1940 and then remediation in 1999. Active ecological restoration can accelerate the full recovery from remediation. As shown in the photographs below and as observed, not only was there a recovery following the river channelization efforts in the 1940's, but a decade after remediation in 1999, significant vegetative growth and recovery again occurred at Newell Street with active restoration.

1940

1999

2009

Presentation Three: Alternatives and Technologies

Bob Cianciarulo, *EPA Chief, Massachusetts Superfund Section*

For additional information see "EPA's Cleanup Decision Process" and "Cleanup Alternatives in the Revised CMS" info sheets.

GENERAL ELECTRIC'S SUMMARY OF SEDIMENT ALTERNATIVES

Alt.	Reach 5A	Reach 5B	Reach 5A/5B Banks	Reach 5C	Reach 5 Backwaters	Reach 6 (Woods Pond)	Reach 7 Impoundments	Reach 7 Channel	Reach 8 (Rising Pond)	Reaches 9 - 16
SED 1	No action	No action	No action	No action	No action	No action	No action	No action	No action	No action
SED 2	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR
SED 3	2-foot removal with capping	MNR	Stabilization/ bank soil removal	Combination of thin-layer capping and MNR	MNR	Thin-layer capping	MNR	MNR	MNR	MNR
SED 4	2-foot removal with capping	Combination of 2-foot removal with capping and thin-layer capping (dep. on depth & velocity)	Stabilization/ bank soil removal	Combination of thin-layer capping (in shallow and depositional areas) and capping (in deeper areas)	Combination of thin-layer capping and MNR	Combination of 1.5-foot removal with capping in shallow areas and thin-layer capping in deep area	MNR	MNR	MNR	MNR
SED 5	2-foot removal with capping	2-foot removal with capping	Stabilization/ bank soil removal	Combination of 2-foot removal with capping (in shallow areas) and capping (in deeper areas)	Combination of thin-layer capping and MNR	Combination of 1.5-foot removal with capping in shallow areas and capping in deep area	MNR	MNR	Thin-layer capping	MNR
SED 6	2-foot removal with capping	2-foot removal with capping	Stabilization/ bank soil removal	2-foot removal with capping	Removal of sediments >50 mg/kg in top 1 foot (with capping[2]); thin-layer capping for remainder >1 mg/kg	Combination of 1.5-foot removal with capping in shallow areas and capping in deep area	Thin-layer capping	MNR	Combination of thin-layer capping in shallow areas and capping in deep areas	MNR
SED 7	3- to 3.5-foot removal with backfill	2.5-foot removal with backfill	Stabilization/ bank soil removal	2-foot removal with capping	Removal of sediments >10 mg/kg in top 1 foot (with capping[2]); thin-layer capping for remainder >1 mg/kg	Combination of 2.5-foot removal with capping in shallow areas and capping in deep area	Removal of higher PCB levels (e.g., >3 mg/kg) in top 1.5 feet (with capping[2]); thin-layer capping for remainder >1 mg/kg	MNR	Comb. of removal of higher PCB levels (e.g., >3 mg/kg) in top 1.5 feet (with capping[2]) & thin-layer capping in shallow areas and capping in deep areas	MNR
SED 8	Removal to 1 mg/kg depth horizon with backfill	Removal to 1 mg/kg depth horizon with backfill	Stabilization/ bank soil removal	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
SED 9	2-foot removal with capping	2-foot removal with capping	Stabilization/ bank soil removal	Combination of 2-foot removal with capping (in shallow areas) and 1.5-foot removal with capping (in deeper areas)	In areas with sediments >1 mg/kg, combination of 1-foot removal with capping (areas with water < 4 feet) and capping w/o removal (areas with water > 4 feet)	Combination of 3.5-foot removal with 1-foot cap in shallow areas and 1-foot removal with capping to grade in deep area	Combination of 1.5-foot removal with capping (in areas of high bottom shear stress) and 1-foot removal with capping (in areas of low bottom shear stress)	MNR	Combination of 1.5-foot removal with capping (in areas of high bottom shear stress) and 1-foot removal with capping (in areas of low bottom shear stress	MNR
SED 10	2-foot removal with capping in select areas; MNR in remaining areas	MNR	Stabilization/ bank soil removal in select areas	MNR	MNR	2.5-foot removal where sediments generally >13 mg/kg in top 6 inches; MNR in remainder	MNR	MNR	MNR	MNR

MNR Monitored Natural Recovery, mg/kg milligram per kilogram.

GENERAL ELECTRIC'S SUMMARY OF SEDIMENT ALTERNATIVE VOLUMES, AREAS, AND DURATIONS

	SED 1/2	SED 3	SED 4	SED 5	SED 6	SED 7	SED 8	SED 9	SED 10
Sediment removal volume (cubic yards [cy])	0	134,000	262,000	377,000	521,000	770,000	2,252,000	886,000	235,000
Bank soil removal volume (cy)	0	35,000	35,000	35,000	35,000	35,000	35,000	35,000	6,700
Capping after removal (acres)	0	42	91	126	178	150	0	333	20
Backfill after removal (acres)	0	0	0	0	0	69	351	0	0
Capping without removal (acres)	0	0	37	60	45	45	0	3	0
Thin-layer capping (acres)	0	97	119	102	112	72	0	0	0
Time to implement (years)	0	10	15	18	21	26	52	14	5

Note: MNR would be a component of all alternatives except SED 1.

GENERAL ELECTRIC'S SUMMARY OF FLOODPLAIN ALTERNATIVES

Alternative	Description
FP 1	No action.
FP 2	Soil removal/backfilling to achieve the health-based IMPGs based on 10-4 cancer risk or on non-cancer (whichever is lower).
FP 3	Same as FP 2 except: (a) in certain frequently used areas, soil removal/backfilling to achieve the health-based IMPGs based on 10-5 cancer risk or on non-cancer (whichever is lower); and (b) supplemental remediation to achieve upper-bound IMPGs for ecological receptors.
FP 4	Soil removal/backfilling to achieve the health-based IMPGs based on 10-5 cancer risk or on non-cancer (whichever is lower). Supplemental remediation to achieve upper-bound IMPGs for ecological receptors.
FP 5	Removal of soils that contain PCB concentrations of 50 mg/kg or greater, with backfilling.
FP 6	Removal of soils that contain PCB concentrations of 25 mg/kg or greater, with backfilling.
FP 7	Soil removal/backfilling to achieve the health-based IMPGs based on 10-6 cancer risk , but no lower than 2mg/kg for direct human contact (level specified in Consent Decree as the standard for residential use). Supplemental remediation to achieve lower-bound IMPGs for ecological receptors.
FP 8	Soil removal/backfilling to achieve the health-based IMPGs based on 10-5 cancer risk or on non-cancer (whichever is lower). Supplemental remediation in vernal pools to achieve lower-bound IMPG for amphibians. Additional removal of all remaining soils that contain PCB concentrations of 50 mg/kg or greater, with backfilling.
FP 9	Same as FP2 with additional soil removal/backfilling to achieve the health-based RME IMPGs based on 10-4 cancer risk or on non-cancer (whichever is lower) in top 3 feet in certain heavily used subareas.

Notes: 1. The health-based IMPGs refer to the IMPGs that were based on EPA's "Reasonable Maximum Exposure"assumptions in its Human Health Risk Assessment. 2. For all alternatives, the remediation described applies to the top foot of soil, except that FP3 through FP 9 also involve additional remediation in certain heavily used subareas as necessary to achieve criteria in the top 3 feet of soil.

GENERAL ELECTRIC'S SUMMARY OF FLOODPLAIN ALTERNATIVE VOLUMES AND AREAS

	FP1	FP2	FP3	FP4	FP5	FP6	FP7	FP8	FP9
Removal volume (cy)	0	22,000	74,000	121,000	104,000	320,000	631,000	177,000	26,000
Removal area (acres)	0	13	44	72	63	197	387	108	14

GENERAL ELECTRIC'S COST ESTIMATES FOR SED/FP/TD COMBINATIONS

Alternative	TD1	TD2[2]	TD3[3]	TD4	TD5[4]
	Off-Site Disposal	Confined Disposal Facility	Upland Disposal Facility	Chemical Extraction	Thermal Desorption
SED 2/FP 1	$5 M	NA	$5 M	$5 M	$5 M
SED 3/FP 3	$251 M	NA	$204 - 228 M	$274 M	$337 - 366 M
SED 5/FP 4	$483 M	NA	$362 - 402 M	$509 M	$679 - 709 M
SED 6/FP4	$612 M	$487 M	$444 - 493 M	$619 M	$860 - 891 M
SED 8/FP7	$1,740 M	$1,337 M	$1,160 M	$1,826 M	$2,866 - 3,026 M
SED 9/FP8	$729 M	$558 M	$435 - 512 M	$662 M	$1,132 - 1,175 M
SED 10/FP 9	$183 M	NA	$121 - 146 M	$181 M	$283 - 290 M

[1] Cost are give in 2010 dollars; $M = million dollars [2] Where applicable, estimated costs assume placement in CDFs of certain hydraulically dredged sediments and off-site disposal for remaining excavated materials. [3] Range depends on location of Upland Disposal Facility. For sediment-floodplain alternatives in which the removal volume exceeds the capacity of the Upland Disposal Facility at a given location, cost estimates were made only for the location(s) where that entire volume of material could be disposed of. [4] Low end of range assumes reuse in floodplain of half of treated floodplain soils and off-site disposal of remaining treated materials; high end of range assumes off-site disposal of all treated material.

Presentation Four: Environmentally Sensible Remediation Concepts

Susan C. Svirsky*, EPA Project Manager, Rest of River*

EPA has begun its decision making process for the cleanup of the Housatonic "Rest of River" considering the RCMS, other relevant information, and public input. Under the terms of the Consent Decree, EPA must evaluate all cleanup alternatives against 9 criteria in selecting its proposed alternative:

<u>General Standards</u>

- Overall protection of human health and the environment
- Control of sources of releases
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

<u>Selection Decision Factors</u>

- Long-term reliability and effectiveness
- Attainment of Interim Media Protection Goals (IMPGs, or cleanup goals)
- Reduction of toxicity, mobility, volume
- Short-term effectiveness
- Implementability
- Cost

Cleanup alternatives range from taking no action to other alternatives with different levels of active remediation. EPA believes that if an active remedy is chosen, it then must be implemented using environmentally sensible remediation concepts. Some of these concepts are discussed below.

<u>PCB Contamination and Risk Reduction</u>

PCBs in the Rest of River and associated floodplain pose a risk to human health and are harming many species of wildlife. These risks and harm will continue as the PCBs are not degrading or being permanently buried in the foreseeable future.

<u>River Processes</u>

The Rest of River has been altered by humans in the past for agriculture, industry, transportation, and other uses. These alterations included straightening or relocating the River channel, altering the connection of the River to the floodplain, clearing the floodplain, and changing the load of sediment washing into the River. The River is seeking to regain its equilibrium from the past activities. Any cleanup must work with the River and floodplain, not against it.

<u>Species/Habitats of Concern and Cultural Resources</u>

Any active cleanup must be implemented with care for both the issue of species and habitats of concern and the potential for impacts to cultural resources such as Native American relics. With regard to the species of concern, any cleanup should be implemented in such a manner as to avoid impacts to the species of concern where practicable, or otherwise minimize or mitigate any impacts. Any cleanup must also have a component whereby cultural resources are researched, and during implementation any resources that are identified are documented and/or preserved.

Downstream Impacts

PCB concentrations are highest in the first 30 miles of Rest of River, with concentrations from the Confluence to Woods Pond similar to those originally measured in the 1 ½ Mile Reach, which is located above the Confluence, and has since been cleaned up.

However, PCBs continue to impact the River further downstream below Rising Pond, resulting in fish consumption advisories in both Massachusetts and Connecticut, concerns regarding sediment management associated with structures in the River such as dams and bridges, and degraded water quality that has resulted in the River being on Connecticut's Clean Water Act List of Impaired Waters. During any active remediation it is expected that there would be some short-term impacts associated with resuspension that may potentially be measurable outside the area to be remediated. Appropriate engineering controls must be used to ensure that any such impacts would be minimized and do not result in a permanent degradation of the River quality downstream.

Quality of Life

Implementation of any active remedy must be done in a way that minimizes any adverse economic impacts to the community as well as impacts to nearby property owners. Careful consideration must be given to optimize the routing of vehicles or other means of transportation. A mechanism must be in place for interaction with and input from affected property owners and other stakeholders. Thought must be given to allow for recreational opportunities to continue during the remediation.

Other Considerations

Implementation of any active remedy must be approached with a surgical mindset.

- Any cleanup and associated infrastructure (such as roads, staging areas, equipment, etc.) must be designed to have the smallest footprint possible, and impacts to any given area be minimized in duration.
- Thought should be given within any risk reduction strategy if there are circumstances where cleanup may have a disproportional impact relative to risk to address some specific contaminated areas, if risk reduction can be obtained in other, less intrusive locations.
- Habitat restoration must be considered hand-in-hand with any cleanup design, with consultation with stakeholders, oversight by professionals, and tailored to the specific habitat that is affected.
- Restoration goals and timeframes need to be clearly communicated among all parties, and monitoring the success of restoration efforts is essential.

Adaptive Management

As any active cleanup would take place over a period of years, this would provide the opportunity to stage the design and implementation to allow for a critical review of the work and the ability to incorporate any lessons learned in the subsequent work. This would also provide for the opportunity to consider new technologies and/or equipment if they become available.

Presentation 1 - Biography

Michael R. Palermo, Ph.D., P.E. President
Mike Palermo Consulting, Inc., Durham, NC

Dr. Mike Palermo is a consulting engineer with extensive internationally recognized experience in dredged material management and contaminated sediment remediation. For the majority of his career, Dr. Palermo served with the U.S. Army Corps of Engineers as a Research Civil Engineer and Director of the Center for Contaminated Sediments at the Engineer Research and Development Center (ERDC) at the Waterways Experiment Station (WES), where he managed and conducted both research and applied studies for the USACE, EPA, DOJ, NOAA, U.S. Navy, and others. He also managed the WES/ERDC research focus area for contaminated sediments. Since entering private practice in 2003, he has provided design services and technical review and oversight for clients, both in the U.S. and abroad, on a wide range of sediment remediation and navigation projects involving contaminated sediments including sediment mega-sites such as the Hudson River, Housatonic River, Fox River, Portland Harbor, and Onondaga Lake. In his role on the Housatonic River Project Dr. Palermo serves as Senior Reviewer and technical resource for issues related to sediment dredging, capping, and dredged material management. Dr. Palermo is a Registered Professional Engineer and a member of the Western Dredging Association (WEDA), International Navigation Association (PIANC), and American Society of Civil Engineers (ASCE). He has served on the adjunct faculty at Texas A&M University and Mississippi State University and is also Associate Editor for the WEDA Journal of Dredging Engineering. He has authored numerous publications in the area of dredging and dredged material disposal technology and remediation of contaminated sediments. He is a lead author of USACE, EPA, and international guidance documents pertaining to contaminated sediments, including the USEPA 1998 Guidance for In-Situ Subaqueous Capping of Contaminated Sediment, USEPA 2005 Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, and the USACE/USEPA 2008 Technical Guidelines for Environmental Dredging of Contaminated Sediments.

Presentation 2 - Biography

Keith Bowers, RLA, PWS President and Founder
Biohabitats, Inc., North Charleston, SC

Mr. Keith Bowers is the President and Founder of Biohabitats, Inc., one of the premier firms specializing in environmental restoration, conservation planning and regenerative design. He is an internationally recognized landscape architect who has planned, designed, and managed the construction of over 200 ecological restoration projects throughout the United States. Mr. Bowers also teaches ecological restoration seminars and workshops and participates on numerous industry panels. He is currently serving as Chairman of the Board for the Society for Ecological Restoration International. For the Housatonic River Project, he has a lead role in evaluating remedial alternatives with respect to their ecological restoration components, and provides senior level expertise in the feasibility and expected effectiveness of proposed restoration plans and techniques. He also assists in community outreach and meeting facilitation.

Presentation 3 – Biography

Bob Cianciarulo, Chief, Massachusetts Superfund Section
Office of Site Remediation and Restoration, EPA New England

Bob Cianciarulo is Chief of the Massachusetts Superfund Section in EPA's New England Regional Office. In that capacity, he supervises a group of fourteen Remedial Project Managers (RPMs) overseeing investigation, cleanup, and monitoring of Superfund National Priorities List (NPL) sites in Massachusetts. In his over 20 years with EPA, Mr. Cianciarulo has served as a RCRA hazardous waste inspector, a project manager in both RCRA Corrective Action and in Superfund, and in the region's Brownfields program. Prior to his current position, he served as Chief of Region I's Superfund Technical Support and Site Assessment Section. Mr. Cianciarulo has a degree in Chemical Engineering from the University of Lowell (MA).

Presentation 4 - Biography

Susan C. Svirsky, EPA Project Manager
Rest of River

Ms. Svirsky has worked for EPA for over 30 years in many different capacities. She graduated with a degree in Wildlife Ecology from the University of Maine and subsequently worked for Maine Inland Fisheries and Wildlife. From there, she began her career at EPA in the Water Quality Monitoring Program in Washington, D.C. Upon returning to New England, she worked with EPA in various roles, including serving as the chair of the multi-agency regional Superfund Ecological Assessment Team. In this role Ms. Svirsky began her work with contaminated sediment site assessment, cleanup, and restoration, with a particular focus on PCB-contaminated sites, and participated in national guidance development. Her involvement with the GE-Housatonic River site began over 14 years ago. This involvement led to her becoming the Project Manager for Rest of River, overseeing all of the data collection, risk assessment, modeling, and Corrective Measures Study activities. In addition, Ms. Svirsky has taught sessions on ecological risk assessment and restoration of contaminated sediment sites, and has authored numerous technical papers on these issues as well as those associated with Rest of River.

Notes

www.epa.gov/region1/ge

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STATE AND LOCAL RESOURCES

Berkshire Athenaeum Public Library
(413) 499-9480

Cornwall Public Library
(860) 672-6874

Kent Memorial Library
(860) 927-3761

Housatonic Valley Association
(860) 672-6678

Massachusetts DEP
(413) 784-1100

Connecticut DEP
(860) 424-3854