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United States
Environmental Protection Agency
New England Region
1 Congress Street
Boston, MA 02114

EPA Begins Review of GE's Corrective Measures Study for the GE/Housatonic River Site, Rest of River and Accepts Informal Public Input

EPA is conducting its review of GE's Corrective Measures Study (CMS). The purpose of the CMS is to evaluate potentially applicable technologies and 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.

There are three categories of actions being evaluated:

- Management of in-place sediment and riverbank soil,
- Management of in-place floodplain soil, and
- Treatment and disposition (materials that have been removed).

In addition, the CMS contains GE's recommendation as to which alternative it believes best meets the criteria and objectives.

As described on the back page, EPA will be reviewing GE's CMS, including GE's recommendation and input received from the public, before EPA develops and proposes its preferred remedial alternative for public comment.

The CMS process is described in detail in EPA's October 2007 Fact Sheet.

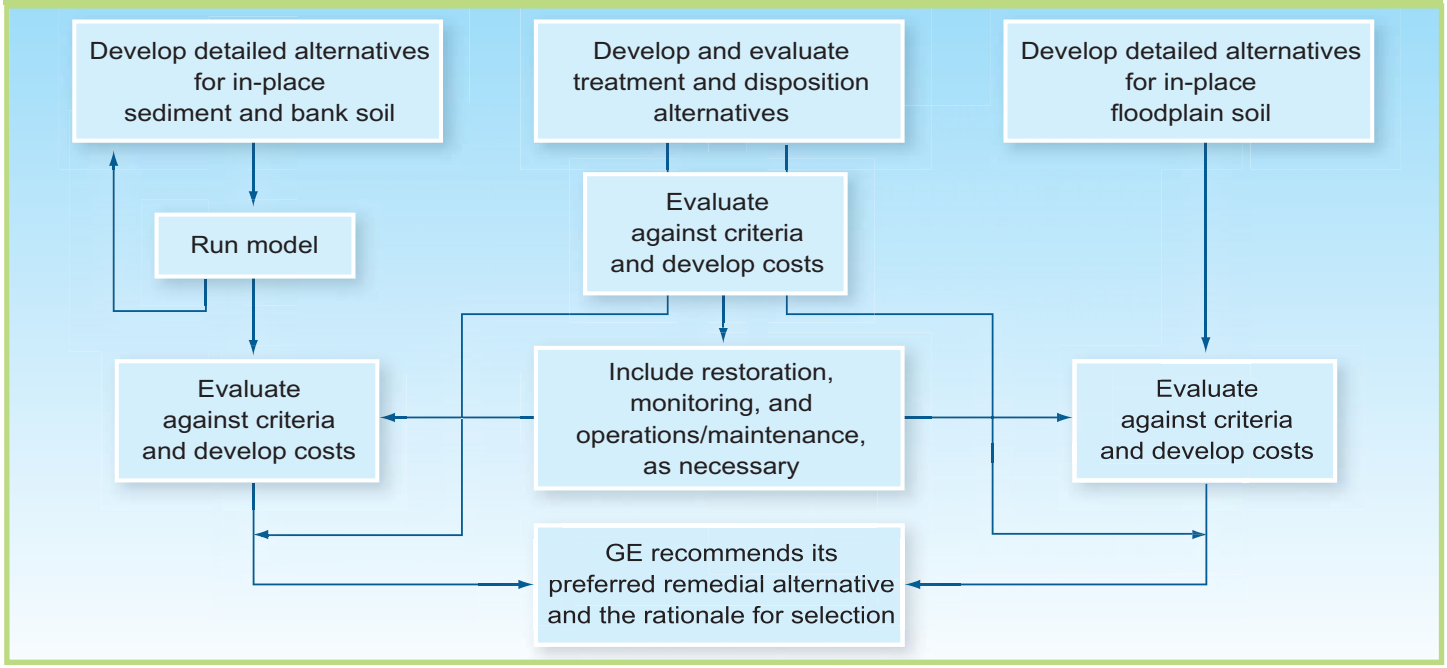
Schedule For Corrective Measures Study (CMS)

GE Submits CMS
March 21, 2008

EPA Outreach
March 2008 through May 2008
Ongoing meetings with local governments and interest groups upon request

EPA Begins Informal Public Input Period
March 22, 2008

Process for GE Conducting the CMS



What is the Corrective Measures Study?

The purpose of the Corrective Measures Study (CMS) performed by GE as required under the Consent Decree (CD) is to evaluate potentially applicable technologies and cleanup alternatives for the Rest of River to reduce risk to human health and the environment from exposure to PCBs. The CMS for Rest of River follows the process approved in the CMS Proposal (CMS-P) and described in the Reissued RCRA Permit (Permit), including the technologies to be considered, the range of alternatives to be evaluated, and the process and criteria used for evaluation.

The various technologies (discussed on the facing page) that were retained after screening in the CMS-P are applicable to one or more of three categories of remedial actions:

- In-place sediment and riverbank soil
- In-place floodplain soil
- Treatment and disposition (materials that have been removed)

The evaluation criteria were first applied separately to in-place sediment and riverbank soil alternatives and then to in-place floodplain soil alternatives. Then, the criteria were applied to treatment and disposition alternatives (including materials handling specific to removal alternatives). This process is shown in the figure on the front of this Fact Sheet.

An important component of the evaluation is the application of the mathematical model framework developed by EPA. The model framework was used to evaluate the effectiveness of each sediment alternative, and the time frame necessary to achieve the Interim Media Protection Goals (IMPGs).

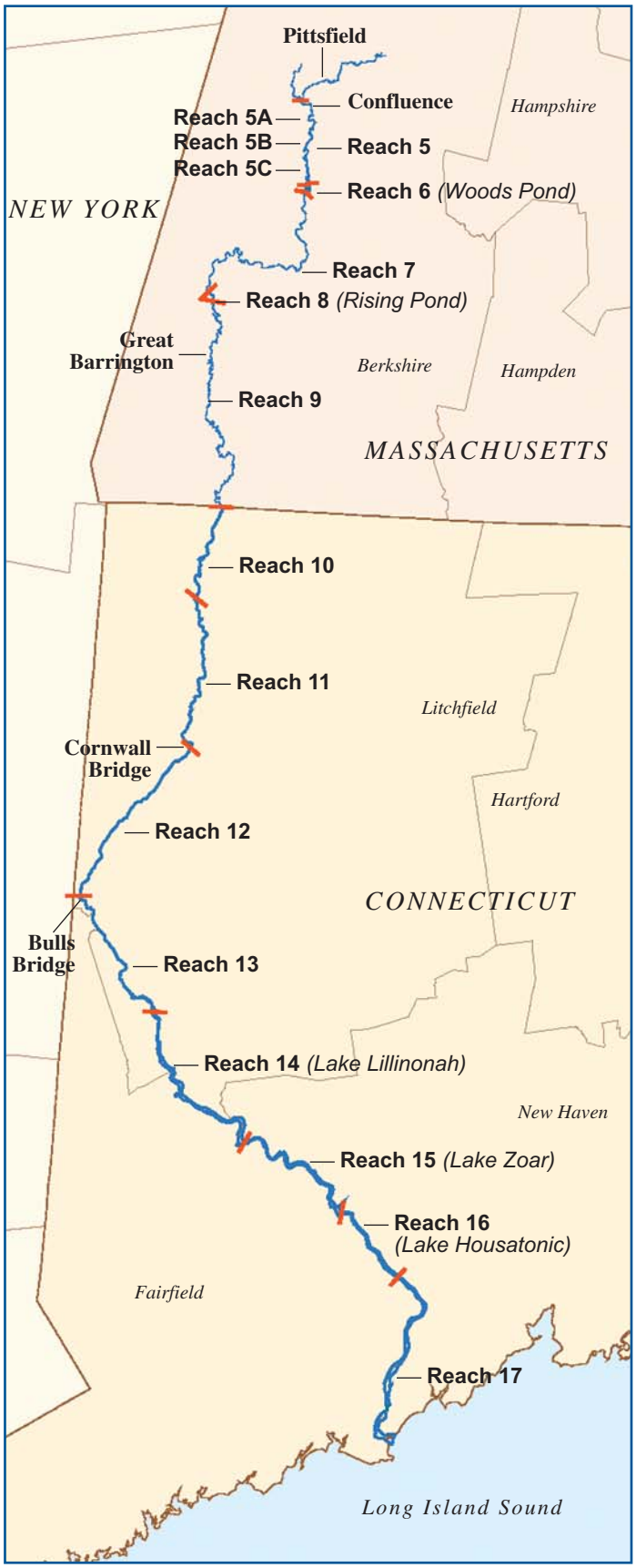
Estimates of the costs, volumes of sediment/soil, and PCB mass associated with the various alternatives are provided in the CMS, and summarized in this Fact Sheet.

In addition, GE made a recommendation for consideration by EPA as to which remedial alternative(s) for sediment/banks, floodplain soil, and treatment and disposition of materials in their opinion best meet the evaluation criteria.

Where is the "Rest of River"?

The area known as the "Rest of River" includes the main stem of the Housatonic River and its floodplain from the Confluence of the East and West Branches in Pittsfield, MA, downstream to the Derby-Shelton Dam in CT, which is the downstream end of Reach 16 (see map to the right).

For the purposes of evaluation and discussion in the EPA studies and the CMS, the Rest of River has been divided into 17 reaches. EPA and GE studies show that the greatest mass of PCBs is located within Reaches 5 and 6, the 10 1/2 miles of river and floodplain between the Confluence and Woods Pond Dam.



Rest of River

Description of the Technologies Evaluated in the CMS

Technologies retained in the initial screening that were considered in the CMS are described below. Many of these technologies can be applied to in-place sediment, riverbanks, and floodplain soil. The treatment and disposition technologies apply to material after it has been removed from the river, banks, or floodplain. All alternatives (except No Action [NA]) possibly will require engineering and/or institutional controls. All alternatives include a restoration (except NA and MNR), operation, maintenance and monitoring component (except NA).

No Action The No Action (NA) response does not include any active or passive remediation or long-term monitoring. EPA requires that a No Action response be considered at every site.

Engineering/Institutional Controls There are four general types of institutional controls to reduce exposure to humans: 1. governmental (e.g., fish advisories); 2. proprietary (e.g., deed restriction); 3. enforcement (e.g., provisions in the CD); and 4. informational (e.g., public education).

Monitored Natural Recovery (MNR) MNR is a response action that relies on ongoing, naturally occurring processes (including physical, biological, and/or chemical mechanisms) to contain, destroy, or otherwise reduce the bioavailability or toxicity of contaminants in sediment, with monitoring to assess the rate of recovery. MNR may also include enhancements, such as thin-layer capping, to accelerate the rate of recovery.

Removal Removal techniques include mechanical excavation in the "dry" as was performed for the 2 miles of the East Branch that have already been cleaned up, or removal in the "wet," commonly referred to as dredging. Excavation in the dry is typically performed using conventional excavation equipment. Dredging may be conducted using either mechanical or hydraulic equipment. Removal of sediment or bank/floodplain soil often is coupled with backfilling using clean material to meet original elevations and contain any residual PCBs, and also requires one or more treatment and disposition alternatives for implementation.

Capping This technology requires the placement of a layer of clean material over the in-place contaminated sediment/soil, at a thickness suitable to create a clean bioavailable zone and to isolate the contaminated material. Depending on site-specific objectives, the cap design may include materials to enhance the isolation (e.g., geotextiles) or sorption of contaminants (e.g., organic carbon), and a protective layer (e.g., armor stone) to prevent erosion.

Bank Stabilization Stabilization of the banks is required when the potential remains for erosion of in-place contaminated bank soil. Stabilization techniques range from bioengineering to hard engineering (e.g., armor stone), and the use of a particular technique is dependent on bank slope/stability and water velocities.

Dewatering/Water Treatment Dewatering and/or water treatment is often a necessary step in the handling of materials that are removed, particularly sediment, to facilitate treatment and/or disposal of the material.

Removal – Excavation in the "Dry"

***Ex-Situ* Stabilization** This technology is being included in the evaluation for potential use in sediment/soil handling as a means of dewatering, reducing the leachability of contaminants, or to modify the structural properties of the material. This involves mixing the sediment/soil with a stabilizing agent (e.g., Portland cement, lime, kiln dust, fly ash).

Chemical Extraction Mechanical separation methods combined with an extraction fluid can potentially be used to desorb PCBs from sediment/soil after removal, resulting in a large reduction in the volume of contaminated material. At EPA's request, GE is performing a study of the effectiveness and implementability of this technology on site-specific sediment and soil samples. The potential for reuse of the material after treatment is a significant consideration with this technology.

Thermal Desorption Thermal desorption separates the PCBs from the sediment/soil by adding heat to the material. The heat then volatilizes the PCBs, which are then condensed as a liquid, captured, and/or destroyed in an afterburner, resulting in a large reduction in the volume of contaminated material. The potential for reuse of the material after treatment is a significant consideration with this technology.

Confined Disposal Facility (CDF) CDFs involve the placement of contaminated sediment/soil in an engineered structure constructed in a nearshore environment in such a way as to permanently isolate the PCBs from the environment.

Upland Disposal Facility After dewatering, sediment/soil is placed in an engineered upland landfill typically constructed in close proximity to the river but outside the floodplain. The facility is engineered appropriately to permanently isolate the PCBs.

Off-Site Disposal Facility After dewatering and pretreatment to achieve other requirements of the disposal facility, sediment/soil would be transported to an existing, licensed off-site landfill.

Contents of GE's CMS Report

GE's CMS Report includes the following sections:

Introduction
A discussion of the report structure, and the technologies and processes to be evaluated.

Description of Evaluation Criteria
A review of the three General Standards and six Selection Decision Factors that are used to evaluate the alternatives.

Approach to Evaluating Alternatives for Sediments and Riverbanks
A presentation of the details of the eight sediment alternatives and how the model was used in the evaluation.

Analysis of Remedial Alternatives for Sediments and Riverbanks
The detailed analysis of each of the eight alternatives using the nine Evaluation Criteria, concluding with a comparative evaluation.

Approach to Evaluating Remedial Alternatives for Floodplain Soils
A discussion of issues relative to the floodplain soil alternatives, including averaging areas, achievement of IMPGs, areal extent, and removal volumes.

Analysis of Remedial Alternatives for Floodplain Soils
The detailed analysis of each of the seven alternatives using the nine Evaluation Criteria, concluding with a comparative evaluation.

Analysis of Remedial Alternatives for Treatment and Disposition (TD) of Removed Sediments and Soils
A detailed evaluation of each of the five retained TD alternatives using the nine Evaluation Criteria, concluding with a comparative evaluation.

Combined Cost Estimates
Separate presentations of cost estimates for the sediment alternatives and associated TD alternatives, and the floodplain alternatives and associated TD alternatives, respectively. Costs are presented as Total Costs (summarized on Page 7) and as Present Worth cost estimates.

Conclusions and Recommendations
A presentation of the conclusions of the CMS Report, including GE's Recommended Alternative.

Evaluation Criteria Used in the CMS

Remedial Action Objectives (RAOs) are specified in the CMS. RAOs are broad statements of the objectives of the remedial action. There are three RAOs for the CMS that can be summarized as:

- Reduction of risks to human health
- Reduction of risks to the environment
- Elimination/minimization of long-term downstream transport of PCBs and control of sources of release to the river

There are three **General Standards** specified in the Permit:

1. Overall Protection of Human Health and the Environment
2. Control of Sources of Releases (how each alternative would reduce/minimize possible further releases)
3. Compliance with Applicable or Relevant and Appropriate Federal and State Requirements (ARARs)

In addition, there are six **Selection Decision Factors** specified in the Permit:

1. Long-Term Reliability and Effectiveness
   - Magnitude of residual risk
   - Adequacy and reliability
   - Potential long-term adverse impacts on human health and the environment
2. Attainment of IMPGs
3. Reduction of Toxicity, Mobility, and Volume
   - Treatment process used and materials treated
   - Amount of hazardous materials destroyed or treated
   - Degree of expected reduction in toxicity, mobility, or volume
   - Degree to which treatment is irreversible
   - Type and quantity of residuals remaining after treatment
4. Short-Term Effectiveness
5. Implementability
   - Ability to construct and operate the technology
   - Reliability of the technology
   - Regulatory and zoning restrictions
   - Ease of undertaking additional corrective measures, if necessary
   - Ability to monitor the effectiveness of the remedy
   - Coordination with other agencies
   - Availability of suitable on-site or off-site treatment, storage, and disposal facilities and specialists
   - Availability of prospective technologies
6. Cost
   - Capital costs
   - Operating and maintenance costs
   - Present worth costs

In-Place Sediment Alternatives Evaluated in the CMS

Alt.	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
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 ft removal with capping	MNR	Removal/ stabilization	Combination of TLC and MNR	MNR	TLC	MNR	MNR	MNR	MNR
SED 4	2 ft removal with capping	Combination of 2 ft removal with capping and TLC (per depth and velocity)	Removal/ stabilization	Combination of TLC (in shallow and depositional areas) and capping (in deeper areas)	Combination of TLC and MNR	Combination of 1.5 ft removal with capping in shallow areas and TLC in deep area	MNR	MNR	MNR	MNR
SED 5	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
SED 6	2 ft removal with capping	2 ft removal with capping	Removal/ stabilization	2 ft removal with capping	Removal of sediments >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
SED 7	3-3.5 ft removal with backfill	2.5 ft removal with backfill	Removal/ stabilization	2 ft removal with capping	Removal of sediments >10 mg/kg in top 1 ft (with capping/backfill); TLC for remainder >1 mg/kg	Combination of 2.5 ft 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 ft (with capping/ backfill); TLC for remainder >1 mg/kg	MNR	Combination of removal of higher PCB levels (e.g.,>3 mg/kg) in top 1.5 ft (with capping/ backfill); TLC 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	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

Notes: MNR - *Monitored Natural Recovery* | TLC - *Thin-Layer Capping*

In-Place Riverbank Alternatives *(considered in connection with Sediment Alternatives)*

No Action Remove/Replace Bank Soil Stabilize Riverbank

GE's Summary of Sediment Alternative Volumes, Areas, and Durations

	SED 1 / SED 2	SED 3	SED 4	SED 5	SED 6	SED 7	SED 8
Removal volume (yd^3)	—	167,000	295,000	410,000	554,000	793,000	2,250,000
Capping after removal (acres)	—	42	91	126	178	146	—
Backfill after removal (acres)	—	—	—	—	—	69	340
Capping without removal (acres)	—	—	37	60	45	45	—
Thin-layer capping (acres)	—	97	119	101	101	65	—
Total surface area (acres)	—	139	247	288	324	325	340
Construction duration (years)	0	10	15	18	21	25	51

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

The evaluation of alternatives and estimates of cost in this Fact Sheet were prepared by the General Electric Company, and do not necessarily reflect the views of the U.S. Environmental Protection Agency. EPA received the CMS Report for review on March 21, 2008.

Floodplain Alternatives Evaluated in the CMS

In-Place Floodplain Soil Alternatives

Alt.	Human Health Interim Media Protection Goal	Ecological Interim Media Protection Goal
FP 1	No Action	No Action
FP 2	Remove/replace top 12 inches to 10^{-4} ICR or HI = 1	As determined to be appropriate in addition to human health action
FP 3	Remove/replace top 12 inches to 10^{-4} ICR or HI = 1, except high-use areas to 10^{-5}	As determined to be appropriate in addition to human health action
FP 4	Remove/replace top 12 inches to 10^{-5} ICR or HI = 1	As determined to be appropriate in addition to human health action
FP 5	Remove/replace top 12 inches ≥50 ppm	As determined to be appropriate in addition to human health action
FP 6	Remove/replace top 12 inches ≥25 ppm	As determined to be appropriate in addition to human health action
FP 7	Remove/replace top 12 inches to 10^{-6} ICR but not <2 ppm	As determined to be appropriate in addition to human health action

ICR: Incremental Cancer Risk | FP 3 through FP 7 include removal to 3 feet in heavily used subareas.

GE's Summary of Floodplain Alternative Volumes, Areas, and Durations

	FP 1	FP 2	FP 3	FP 4	FP 5	FP 6	FP 7
Removal Volume (yd^3)	0	17,000	60,000	99,000	100,000	316,000	570,000
Removal Area (acres)	0	11	38	62	60	194	350
Years to Implement	0	1	3	4	4	13	22

Treatment and Disposition (TD) Alternatives Evaluated in the CMS *(after removal)*

- Dewatering/water treatment
- *Ex-situ* stabilization

} *Materials handling*

- Chemical extraction
- Thermal desorption
- Confined disposal facility (CDF) – local disposal
- Upland disposal facility – local disposal
- Off-site permitted landfill

What are IMPGs?

An Interim Media Protection Goal (IMPG) is a media-specific cleanup goal for human health or ecological receptors that is determined by EPA to be protective. The IMPGs for the Rest of River were derived by GE, taking into account information in the Peer-Reviewed Human Health and Ecological Risk Assessments performed by EPA. The IMPGs for human health are expressed as the media-specific concentration of PCBs that results in an incremental cancer risk (ICR) from exposure ranging from 10^{-4} (1 in 10,000) to 10^{-6} (1 in 1,000,000), or as a noncancer risk exceeding a Hazard Index (HI) of 1.

The ecological IMPGs are typically expressed as a Maximum Acceptable Threshold Concentration (MATC) below which no significant risk to ecological receptors is expected. The IMPG Proposal prepared by GE and approved by EPA in 2006 provides a more detailed description of the derivation and meaning of the IMPGs.

The evaluation of alternatives and estimates of cost in this Fact Sheet were prepared by the General Electric Company, and do not necessarily reflect the views of the U.S. Environmental Protection Agency. EPA received the CMS Report for review on March 21, 2008.

GE's Summary of the Costs of the Alternatives Including Treatment and Disposition

Cost Estimates for SED/TD Combinations (in Total 2008 Dollars)

Alternative	TD 1 Off-Site Disposal	TD 2 Confined Disposal Facility	TD 3 Upland Disposal Facility	TD 4 Chemical Extraction	TD 5 Thermal Desorption
SED 1	NA	NA	NA	NA	NA
SED 2	$10 M	NA	$10 M	$10 M	$10 M
SED 3	$195 M	NA	$154 M	$238 M	$216 M
SED 4	$304 M	NA	$232 M	$357 M	$324 M
SED 5	$372 M	NA	$273 M	$436 M	$399 M
SED 6	$482 M	$396 M	$334 M	$499 M	$502 M
SED 7	$614 M	$497 M	$399 M	$624 M	$629 M
SED 8	$1,260 M	$875 M	$695 M	$1,366 M	$1,385 M

Cost Estimates for FP/TD Combinations (in Total 2008 Dollars)

Alternative	TD 1 Off-Site Disposal	TD 2 Confined Disposal Facility	TD 3 Upland Disposal Facility	TD 4 Chemical Extraction	TD 5A Thermal Desorption (with Reuse)	TD 5B Thermal Desorption (without Reuse)
FP 1	NA	NA	NA	NA	NA	NA
FP 2	$15 M	NA	$15 M	$34 M	$22 M	$23 M
FP 3	$46 M	NA	$30 M	$65 M	$42 M	$49 M
FP 4	$71 M	NA	$49 M	$92 M	$64 M	$75 M
FP 5	$82 M	NA	$47 M	$90 M	$62 M	$73 M
FP 6	$193 M	NA	$128 M	$242 M	$180 M	$215 M
FP 7	$310 M	NA	$202 M	$403 M	$311 M	$374 M

GE's Recommended Alternatives

As required by the RCRA Permit, GE presents in the CMS Report its conclusions as to which remedial alternatives, in its opinion, are "best suited" to meet the Evaluation Criteria described on Page 4. GE has concluded that the combination of alternatives SED 3, FP 3, and a local upland disposal facility is best suited to meet the criteria.

These alternatives involve the removal of approximately 167,000 yd^3 (~250,000 tons) with capping of river sediment and bank soil over 42 acres of the river between the Confluence and the vicinity of New Lenox Road (approximately 5 miles), MNR in Reach 5B (approximately 2 miles) and the upper 1.8 miles of Reach 5C, and placement of a thin-layer cap in an additional 97 acres of river in the downstream portion of Reach 5C (approximately 1.5 miles) and Woods Pond, with MNR in the remaining areas. In addition, these alternatives include removal of approximately 60,000 yd^3 (~90,000 tons) of soil from 38 acres of the floodplain. The river sediment and bank and floodplain soil removed would be contained in an upland disposal facility located in an area near the river but outside of the 100-year floodplain. GE estimates that following design and site preparation, these alternatives could be implemented within 10 years at a cost of approximately $184 million. In GE's discussion of its recommended alternatives, GE states that "given GE's reservation of rights [in the CMS Report], this Report does not constitute a proposal to implement these alternatives."

This is GE's recommendation. As described on the following page, EPA will be reviewing GE's CMS, including this recommendation and input received from the public and state agencies, before EPA develops and proposes its preferred remedial alternative for public comment.

Process After EPA Receives the CMS

Because this fact sheet cannot contain all of the information provided by GE in the CMS, EPA encourages interested parties to review the CMS for more information.

EPA will evaluate the CMS developed by GE and GE's recommended alternative, considering the criteria described on page 4, and input received from the public and state agencies. EPA may then approve, conditionally approve, or disapprove the CMS. If EPA conditionally approves the CMS, GE will need to revise the CMS to meet EPA's conditions and/or requirements. If EPA disapproves the CMS, then GE must address the deficiencies or EPA will make the modifications to the CMS.

Based upon the information provided in the CMS, EPA will then develop a preferred remedial alternative or set of alternatives (Preferred Alternative). This Preferred Alternative will undergo Regional and National EPA review for consistency with remedies implemented or proposed for other hazardous waste sites and the degree of achievement of the criteria.

After these reviews, EPA will propose the Preferred Alternative for formal public comment as a draft modification to the RCRA Permit. Following closure of the public comment period, EPA will consider the comments received and issue a final decision and a Responsiveness Summary addressing the comments received.

Prior to issuing the final remedy decision, as required by the Permit, EPA will notify GE of the final decision, and GE has the right to invoke administrative dispute resolution. Upon resolution of GE's dispute (if invoked), EPA will issue a modification to the Permit. This final cleanup decision is then subject to appeal by GE and the public for review by EPA's Environmental Appeals Board (EAB) and subsequently the U.S. Court of Appeals. During appeals, there are provisions for design of the remedy to take place as the appeals progress.

Upon completion of all appeals, GE is required to implement and pay for the remedial action under CERCLA authority and the Consent Decree.

For more information on the CMS, the CMS Proposal, and the CMS process, go to: www.epa.gov/ne/ge or visit an Information Repository.

If you have any questions regarding the CMS, contact:

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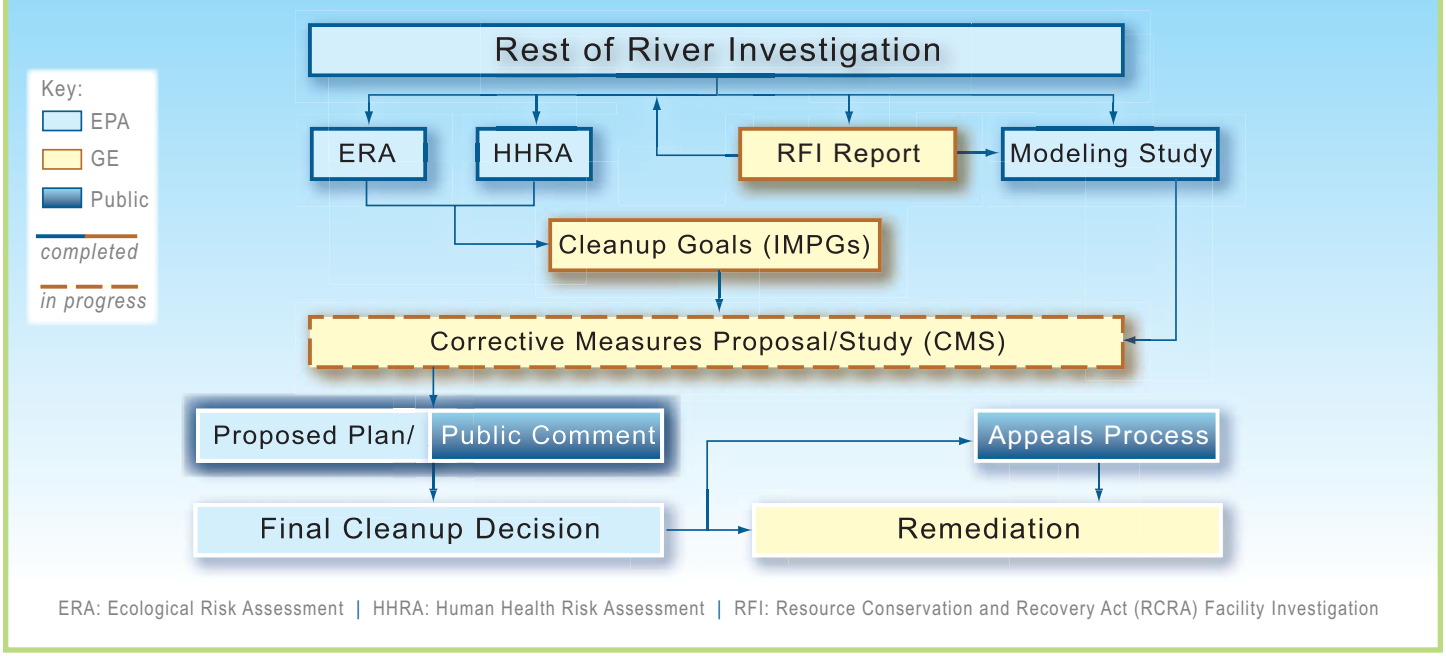
Rest of River Consent Decree Process



ERA: Ecological Risk Assessment | HHRA: Human Health Risk Assessment | RFI: Resource Conservation and Recovery Act (RCRA) Facility Investigation

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