

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
New England Office – Region I
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023**

April 13, 2007

Mr. Andrew T. Silfer, P.E.
General Electric Company
159 Plastics Avenue
Pittsfield, Massachusetts 01201

Sent via US Mail and Electronic Mail

RE: EPA's Conditional Approval of the Corrective Measures Study Proposal

Dear Mr. Silfer:

EPA has completed its review of GE's report entitled "*Housatonic River - Rest of River Corrective Measures Study Proposal*" (hereinafter Proposal) submitted February 27, 2007. GE submitted the proposal to fulfill the requirement outlined in Appendix G to the Consent Decree (the Reissued RCRA permit). EPA recognizes that GE will be submitting a Model Input Addendum on April 15, 2007 as an interim deliverable. EPA will review that Addendum separately. In addition, GE shall submit a Supplement to the Proposal (hereinafter Supplement) as indicated in the conditions listed below, which EPA will review separately. Nothing in this conditional approval shall be interpreted to supersede the approval, conditions in a conditional approval, or disapproval of that Addendum, or of the Supplement to the Proposal.

Pursuant to Paragraph 73 of the CD, EPA, after consultation with the Massachusetts Department of Environmental Protection (MassDEP) and Connecticut Department of Environmental Protection (CTDEP), approves the Proposal subject to the following conditions:

General Conditions

1. GE shall provide further justification and discussion (in the Supplement) of the corrective measure alternatives for Reaches 9 through 16. Table 5-1 shall reflect the alternatives retained for Reaches 5 through 16.
2. GE shall provide further justification and discussion (in the Supplement) of the screening of *in situ* treatment technologies for sediment and soil.
3. GE shall submit (in the Supplement) a plan for conducting a Phase 1 Cultural Resource Evaluation as required for compliance with Section 106 of the National Historic Preservation Act (NHPA).
4. For each alternative being considered in the CMS evaluation, GE shall include restoration requirements commensurate with the alternative being considered. Such requirements shall be subject to the Evaluation Requirements together with the relevant alternative. For purposes of this Condition and all other Conditions in this letter, “alternative” shall include components of alternatives.
5. For each alternative being considered in the CMS evaluation, GE shall include operation, maintenance, and monitoring requirements commensurate with the alternative being considered in the CMS evaluation. Such requirements shall be subject to the Evaluation Requirements together with the relevant alternative.
6. Note that the RAOs are not directly tied to the criteria in the Evaluation Requirements, therefore the RAOs for either protection of human health or for the ecological receptors do not equate to the definition of overall protection of human health and the environment (see Condition 10).
7. GE shall revise the RAO for Human Health to read as follows: “Reduce the cancer risk and noncancer health hazard for humans (defined as achieving concentrations that do not

pose unacceptable risks using EPA's cancer risk range of 1×10^{-6} to 1×10^{-4} and a non-cancer Hazard Index of 1) from exposure to PCBs in dietary items, floodplain soil, and/or sediment in the Rest of River.”.

8. GE shall revise the RAO for the Environment to read as follows: “Reduce the risks to ecological receptors from exposure to PCBs in dietary items, floodplain soil, and/or sediment in the Rest of River to levels that will result in the recovery and maintenance of healthy local populations and communities of biota.” The discussion of the RAO shall not include the potential impacts of the remedy. This is addressed under the “overall protection of human health and the environment.” (See Condition 10).
9. GE shall add a third preliminary Remedial Action Objective, as follows: “Eliminate/minimize the long-term downstream transport of PCBs in the Rest of River. The objective of this RAO is to reduce the transport of PCBs from the highly contaminated upper reaches of the river to downstream reaches, as quickly as possible and over the long-term. This RAO also includes the control of sources of releases to the river.”
10. References to the definition of “Overall Protection of Human Health and the Environment” shall include discussion of how the alternative provides adequate protection, including consideration of the evaluation of the long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs as described in the preamble to the NCP.
11. Discussion of Control of Sources of Releases shall include in the examples dam failure/maintenance.
12. The Proposal does not discuss how the effects of the corrective measure alternatives on riverine processes will be evaluated and how such processes will be managed in the long term. GE shall include in the CMS a discussion of the process for evaluating how such

features as natural erosion of banks, lateral movement of banks, and bedload movement will be affected by each of the corrective measure alternatives.

13. GE shall not use the wood frog model to assess the reduction of risk to the amphibian receptors. The wood frog population model is not appropriate for evaluating risks to the amphibian community as a whole. In addition to assessing reduction of risk to amphibians in vernal pool habitats, GE shall assess reduction of risk to amphibians from exposure to PCBs in the backwater habitat.
14. Reasonable assumptions can be made regarding the items in the mink diet using the assumptions made in the ERA. GE shall provide an evaluation of protection of mink (by comparison to the IMPG) in the CMS. GE shall submit (in the Supplement) a proposed methodology (similar to that proposed for Insectivorous Birds in Appendix B) using the assumptions in the ERA for determining floodplain soil PCB concentrations consistent with the IMPGs for mink.
15. GE shall not assume the use of average PCB concentrations over the entire PSA to assess final compliance with IMPGs for ecological receptors (unless appropriate given the foraging area). Averaging areas shall be consistent with the appropriate habitat(s) and foraging areas for the representative species for which the IMPG was established.
16. All discussions of effectiveness and implementability must include the evaluation for both human health and ecological receptors.
17. If erodible banks are identified in locations other than Reaches 5A and 5B they shall be included in the evaluation of alternatives as necessary.
18. The text of the Proposal places undue emphasis (e.g. Page 5-36) on selected portions of EPA guidance that discuss the balancing of environmental damage from implementation of remedial alternatives with risk. EPA notes that the EPA guidance also states (as indicated in footnote 34) that “Conversely, leaving persistent and/or bioaccumulative

contaminants in place where they may serve as a continuing source of substantial exposure, may also not be appropriate.” Note that PCBs are both persistent and bioaccumulative.

19. In any discussion or application of the Evaluation Criteria, (including GE’s recommended remedial alternative), GE shall not disproportionately weight any one or more of the Selection Decision Factors.
20. References to the Conceptual Model for the site and/or specifics of the Conceptual Model shall include references to EPA’s Final Model Documentation Report in addition to references to the Supplemental RCRA Facility Investigation Report.
21. The depth of sediment removal evaluated in the alternatives shall not be limited to the bare minimum required for engineering considerations, but must include a safety factor. In general, the depth of sediment removal shall be a minimum of 2 to 3 feet. In the Supplement, GE shall revise the depths of removal, note the depths in the revised Table 5-1, and provide a rationale for the depths.
22. EPA agrees that the CMS evaluation may proceed considering solely the impounded areas of Reach 7 for Sediment Alternatives 6, 7 and 8, however EPA recognizes that active remediation in additional areas may need to be considered in remedy selection. In addition, GE shall include all subreaches of Reach 7 when evaluating MNR.
23. Sediment Alternative 7 shall be revised to evaluate removal in Reaches 7 and 8 to 3 mg/kg, the IMPG for benthic invertebrates. GE shall reflect this change in the revised Table 5-1 in the Supplement.
24. The depth of floodplain soil removal in “heavily used” areas shall be increased to 3 ft in alternatives FP 3 through FP 7. In addition, while the evaluation of floodplain soil removal to 1 foot in non-heavily used areas is adequate for the CMS evaluation, EPA

recognizes that there may be other circumstances that may require active remediation of soil to depths exceeding 1 foot in remedy selection.

25. Definition of “heavily used” areas (as described in alternative FP-3) is adequate for the purpose of evaluation of alternatives in the Proposal; however, for purposes of remedy selection, EPA recognizes that “heavily used” areas may not be limited to those parcels identified currently by GE.
26. EPA does not agree with GE’s characterization of the National Research Council’s (NRC) report on EPA’s draft Dioxin Reassessment Report. The NRC found that while toxic equivalency factors (TEFs) are uncertain, and better uncertainty analysis of the TEF method is needed, nonetheless the method provides a reasonable, scientifically justifiable, and widely accepted methodology for estimation of the relative toxicity of dioxins and dioxin-like PCB congeners. EPA does not approve Appendix A of the Proposal.
27. EPA does not agree with GE’s characterization of the ability to reliably quantify relationships between total PCB concentrations and TEQ for Rest of River or in application of the model framework. However, EPA agrees that for the purpose of evaluating alternatives in the Proposal, use of total PCB concentrations is acceptable.
28. GE shall evaluate sediment/bank and floodplain alternatives in concert with the applicable management of materials alternatives when applying the Evaluation Criteria.
29. GE shall apply the Evaluation Criteria in the CMS to each alternative and each sediment/bank area, except where the alternatives being considered are sufficiently similar to warrant aggregation. However, costs shall be provided for each alternative and area, or provided in such a manner that costs can be derived for any independently implementable portion of an alternative. Costs must include capital costs, costs associated with operation and maintenance, and present worth costs as required in the Permit.

30. EPA requests that GE conduct a treatability study on chemical extraction using sediment/soil of varying types and PCB concentrations from the Housatonic River/floodplain. EPA also requests that a work plan for the treatability study be included in the Supplement.

Specific Conditions

Section 1

31. Page 1-4 second bullet – There is a typographical error in the last sentence, this should read Section 5.

Section 2

32. Page 2-4 Table 2-1 – Lakes Lillinonah, Zoar and Housatonic are assigned to the incorrect reach designations.
33. Pages 2-16/17 – Note that the 1 ½ Mile Removal was performed under a cost-sharing agreement between EPA and GE.

Note that the number of impermeable sheetpile walls installed on the north side of the river as part of the ½ Mile Removal Action is 6. Inclusion of the sheetpile wall installed during the Building 68 Removal Action makes the total 7.

Note that sediment was not excavated to a depth of 14 feet to achieve spatial average PCB concentrations of less than 1 mg/kg but to remove NAPL. Sediment was excavated to depths of up to 3.5 feet to achieve a residual average concentration of 1 mg/kg.

Note that sediment and bank removal activities began in September 2002 and were completed in March of 2006, a total of 43 months.

34. Page 2-22 –Note that the ONSITE EPA data are biased low (see Appendix A.1 to the FMD).
35. Page 2-23 – It appears that the footnote does not reflect the post-remediation PCB concentrations of non detect. GE shall clarify this in any future references in the CMS.
36. Page 2-26 – All sediment and biota data shall be used when evaluating alternatives below Rising Pond Dam in the Supplement and in the CMS.
37. Page 2-27 – Refer to comments below (Section 5, page 5-29) regarding the ratio of contaminant concentrations in whole body/fillet.

38. Page 2-28 – The statement that the fate, transport, and bioaccumulation model does not predict TEQ concentrations in any media is not entirely correct. FCM has the ability to simulate individual PCB congeners and could therefore be used in conjunction with the TEF method to calculate TEQ concentrations in biota.
39. Page 2-30 – It is unclear if the statement that PCB uptake in fish in Rising Pond may be more linked to water column sources is intended to mean that the water column sources in Rising Pond are more important than the sediment sources, or that water column sources in Rising Pond are more important than in other more upstream areas of the Rest of River. EPA agrees with the latter interpretation but does not agree that the former is true for all species.

Section 3

40. Page 3-6 clarification for the footnote – GE shall use the same use category for a parcel as that designated in the HHRA in the CMS.
41. Page 3-7 – “The IMPGs were derived based on the assumption that they would be applied as averages, rather than as not-to-exceed values, consistent with the approach used in the Direct Contact Assessment in the HHRA.” While EPA agrees that this interpretation is correct, calculation of such averages must be performed appropriately and in compliance with applicable EPA guidance in the CMS. See comments on Appendix D for more detail.
42. Page 3-9 – EPA notes that while the MATCs represent the best available site-specific PCB threshold that could be identified for a receptor group as noted in the ERA, there are often receptors within a group that may be considered to be more sensitive than the representative species (e.g. for amphibians, salamanders could be expected to be more sensitive than the representative species, wood frogs). The uncertainties associated with the protectiveness of the MATCs for other potentially more sensitive species are noted in the ERA.
43. Page 3-10 – Amphibians – Media to be evaluated in the CMS shall include backwater sediment in addition to vernal pool soil/sediment.
44. Page 3-11 – While EPA agrees that it is correct that the average concentration is of concern for most receptor groups (across the appropriate spatial scale of foraging area) because of the integration of the diet of the species across the area, this is not true for the benthic invertebrates. Averaging areas used in the CMS shall be consistent with foraging areas as identified in the ERA but due to practical implementation considerations, shall not be smaller than the spatial bins (e.g. in the case of benthic invertebrates).
45. Page 3-14 – In addition to noting that the back-calculations of soil concentrations use the same assumptions and exposure variables used in the HHRA, GE shall also acknowledge in the CMS Report that the equations themselves are identical to those used in the HHRA.

46. Page 3-18 – The site-specific BSAF proposed for use in the conversion of the dietary IMPG for wood duck to a corresponding sediment PCB concentration was derived solely from the *Lumbriculus* laboratory bioaccumulation study. Additional site-specific sources of information, such as the tree swallow stomach content data and the D-net invertebrate tissue samples, as well as the FCM model results, are available and provide a more comprehensive means of developing this BSAF. GE shall use these additional data resources in the CMS Report to develop the BSAF.

The foraging range of wood duck is approximately 1 km from their nest site, as discussed in the ERA. Accordingly, averaging of concentrations over the entire PSA to evaluate the effectiveness of corrective measure alternatives in controlling risk to insectivorous birds is inappropriate. GE shall use appropriately smaller subareas in performing this evaluation in the CMS Report.

The approach to developing sediment and floodplain soil concentrations that are protective of insectivorous birds effectively assumes that the bioaccumulation of PCBs is equivalent across the entire study area. This assumption is contrary to the findings of the modeling study, which indicated that bioavailability of contaminants varies significantly among subreaches. Reliable modeling of contaminant bioaccumulation requires evaluation at the subreach level and shall be performed for the CMS Report.

Section 4

47. Page 4-1 – GE shall include a flow chart of the overall Corrective Measures evaluation process in the Supplement. GE shall include more detailed flow charts of the alternatives analysis in the CMS.
48. Page 4-4 to 4-5 – In the CMS, it shall be recognized that the vast majority of institutional controls are not effective for ecological exposures and may in some cases have limitations for humans.
49. Page 4-8 – Implementability – EPA notes for the Proposal that review of implementability includes the use of the river by not only humans but ecological receptors. Any references to implementability in the CMS shall include the use by ecological receptors as well as humans.
50. Page 4-9 – Thin-layer capping – No citation is provided to support the discussion of the benthic response to thin layer versus other capping/removal techniques. EPA does not believe that this is an advantage of thin layer capping over other capping and removal/replacement techniques.

In the discussion of implementability, no mention is made of the need for access agreements as is done in the discussion of engineered caps.

51. Page 4-11 – Mechanical dredging in the wet – The discussion of effectiveness of mechanical dredging (as well as the subsequent discussion of hydraulic dredging on Page 4-14) overemphasizes negative impacts associated with this technique, without the balanced presentation of the benefits which have been observed at other sites.
52. Pages 4-12/4-13 – Mechanical excavation in the dry – EPA believes that it is a mischaracterization to say that mechanical excavation in the dry had difficulties in consistently achieving low residual PCB concentrations in the surface sediments in the 1 ½ Mile and ½ Mile Removal Actions. Difficulties only occurred when NAPL was encountered, a condition not expected to occur in the Rest of River. Note that the ½ Mile Removal was a depth-based action, there was no objective to have low residuals, therefore the conclusion that they were not achieved is misleading. In the 1 ½ Mile Removal Action 11 post-excavation samples were collected, PCBs were not detected in 9 of the samples and in the remaining two samples, PCB concentrations were less than 1 mg/kg.
53. Page 4-18 – Any discussion of implementation of capping techniques in the CMS shall acknowledge the need to evaluate and comply with flood storage requirements and consideration and discussion of potential alteration of wetland hydrology. These considerations shall also be acknowledged and evaluated in the evaluation of Confined Disposal Facilities and any other technology for which they are applicable.
54. Page 4-23 –Evaluation of Removal and Replacement of Bank Soil in the CMS – GE shall include the use of bioengineering techniques as a possible component of bank restoration.
55. Page 4-33 – GE shall modify the language used in the CMS to read “To change a property use so as to trigger that obligation, the owner must obtain *any* necessary governmental approvals...”
- Implementability – GE shall modify the language used in the CMS to note that the use of Conditional Solutions is dependent on the commitment of GE to perform further cleanup; otherwise, the use of Conditional Solutions would be both technically and administratively implementable.
56. Page 4-36 – EPA notes that the discussion of implementability of removal/replacement incorrectly states there are more difficulties than with other technologies that require the same access and/or removal of wetland vegetation (such as the discussion of capping on page 4-38).
57. Page 4-41 – Note that the discussion of Effectiveness/Implementability of physical immobilization does not recognize the same accessibility issues and wetland disruption required to effectively mix the substance with the floodplain soil as discussed for other technologies.
58. Page 4-49 – Exclusion of the use of geotubes – EPA recognizes the need to select a representative technology from technology options. GE notes that other technologies

including thickeners and settling basins may be considered in the remedial design. GE shall not eliminate the potential reconsideration of geotubes as well.

59. Page 4-60 – Screening of thermal destruction – EPA does not believe that it is appropriate to include consideration of community acceptance under either the primary screening for general implementability or under the secondary screening for effectiveness and implementability. However, EPA recognizes that, following EPA guidance, a representative technology is to be selected, and agrees that thermal desorption has been appropriately retained as the representative technology for *Ex Situ* Thermal Treatment.
60. Page 4-62 – Any reference in the CMS to loss of aquatic and/or floodplain habitat shall include recognition that mitigation must be considered.

Section 5

61. Page 5-5 – Natural recovery processes have not been observed in Woods Pond as shown by no statistically significant decline in PCB concentrations measured over time, as was discussed in EPA’s FMD.
62. Page 5-14 – Temporal Scale of the Model Simulation. EPA agrees that a model simulation of 52 years (2 cycles of the EPA Model Validation hydrograph) or a minimum of 30 years following completion of remediation is an acceptable duration for model simulations, with the use of a function to project the model trajectory further in time. However, the statement that “an approximate ‘steady state’ condition” will have been achieved after this length of time is inaccurate based upon analysis of the continuation of the model runs performed for Model Validation.

To further project the 52-year model simulations to estimate time to achieve IMPGs, GE shall demonstrate the appropriateness of the selected function and provide detail sufficient to verify the methodology used for these projections in the CMS.

63. Page 5-17 – The proposed use of a biota-sediment accumulation factor (BSAF) based on smallmouth bass data to estimate fish tissue concentrations in the Bulls Bridge impoundment from sediment concentrations predicted by the CT 1-D model is overly simplistic, does not use the historical data available for other species, and ignores the availability of the calibrated and validated bioaccumulation model FCM. The life history of smallmouth bass indicates their exposure is less directly related to sediment contaminant concentrations than many other fish species, introducing considerable uncertainty into the development of a BSAF that would be applicable to all fish species.

GE shall use the calibrated and validated FCM model to simulate the bioaccumulation of contaminants by fish in the CT impoundments. Results for non-modeled species can be extrapolated from the FCM predator model, which was parameterized using largemouth bass. Inputs to the FCM model shall include particulate phase PCB concentrations in surface sediment and suspended particulate matter (POM). Concentrations in the dissolved phases may be estimated using 3-phase partitioning equations. The model shall

be run using data from periods for which there are tissue data to evaluate the reasonableness of the calculation.

64. Page 5-20 – Note that EPA completed the 1 ½ Mile Removal of sediment and bank soil in March of 2006. The major limitation of the data available for the year following completion of the removal is the lack of data at high flows.
65. Page 5-23 – EPA agrees that the values for the parameters provided in the bulleted list are site-specific and subject to uncertainty. While some of the values for these parameters are provided in the CMS Proposal, others are being provided in the Addendum to be submitted to EPA by April 15, 2007. To best characterize the model estimates of metrics of interest in evaluating the performance of the proposed alternatives, GE shall conduct model simulations in the CMS using alternative values for some of these parameters as specified by EPA in this letter or in the response to the Addendum. This will result in two model estimates for some parameters. Model simulations using these bounding estimates will be expected to incorporate the uncertainty surrounding these values.

In addition to developing attenuation factors for estimating PCB concentrations in Lake Lillinonah and Lake Zoar, GE shall also develop attenuation factors and PCB concentrations estimates for Lake Housatonic.

66. Page 5-24 and Table 5-2 – Production Rates – The text states that the production rates in Table 5-2 are based on rates from similar projects where remedies have been completed and for the upper two miles of the Housatonic. The annualized production rates for hydraulic dredging in the table are very low, from 70 to 220 cy/day (9 to 28 cy/hr for an 8 hour day). The mechanical dredging rates also are low, from 60 to 240 cy/day (8 to 30 cy/hr for an 8 hour day). EPA believes that a more realistic low-end production rate for wet mechanical dredging is 282 cy/day (assuming the smallest bucket size listed in the EPA 2005 guidance). This rate would increase with an increase in bucket size or use of multiple buckets. Similarly, a more realistic low-end production rate for hydraulic dredging is 397 cy/day. This rate assumes the smallest diameter pipe/dredge (15 cm) used in the EPA 2005 guidance. These annual average estimates assume dredging for 8 hours per day, 22 days per month, and 9 months of the year.

Production can be defined in terms of the operating production rate (the rate during time periods of active dredge operation) or effective production rate (the rate considering effective hours per day, days per week, and weeks per dredging season). The text states the rates in Table 5-2 are based on an annual production rate, converted to a daily rate. This wording implies the table values are considering the effective time, but may be a rate spread over an entire year (which would be inappropriate considering a possible winter shutdown or other shutdowns, e.g. high flows). EPA believes that it is better to evaluate effective time, to include a seasonal shutdown, and calculate the required dredging seasons to do the job. GE shall estimate removal over dredging seasons rather than full years in the modeling exercise as well as for evaluations of schedule and costs.

GE shall provide in the Supplement specifics on the assumptions of operating production rates, projects from which rates have been estimated, and effective time in hours, days, and weeks used to calculate the effective production rate over a season.

67. Page 5-25 – Assumption of PCB concentration in “clean” backfill material – GE shall perform model simulations in the CMS using the proposed PCB concentration of 0.021 mg/kg (½ the detection limit), as well as simulations using 0 mg/kg PCB.
68. Page 5-26/5-27 – It is unclear if residual and resuspension concentrations are based on model grid cell-specific simulated PCB concentrations or those calculated at the level of a spatial bin. GE shall indicate in the Supplement the scale at which these concentrations will be determined and/or applied.
69. Page 5-26/5-27 – Discussion of the placement of the thin layer cap assumes no instantaneous mixing with the underlying sediment. The same assumption shall be made for placement of backfill or engineered caps. As demonstrated by GE’s preliminary work at Silver Lake, proper placement of cap material/backfill (e.g. thin lifts) can result in little to no mixing.
70. Page 5-27 – EPA agrees that the resuspension rates for dredging (1% for hydraulic dredging and 2% mechanical dredging) are reasonable for use in the CMS evaluation. It is EPA’s understanding that these values are appropriate in the absence of silt curtains, and resuspension could potentially be reduced with the use of these engineering controls. In the modeling exercise, this shall be explicitly recognized in the discussion of model results. Such controls shall be considered if either of these techniques is selected as a component of the remedy.

In addition, there is no discussion of the release of solids that would occur concurrent with any release of PCBs. GE shall represent the resuspension of both solids and PCBs in the model simulations, and shall represent the composition of the solids consistent with the vertically averaged solids composition across the dredge cut.

It should be noted that the reference Alcoa, 2006 is not publicly available and therefore EPA could not verify the statement made regarding post-placement concentrations being higher than the source material.

71. Page 5-28 – There is a typographical error at the bottom of the page, the reference to evaluation criteria should read Section 5.2.4.
72. Page 5-29 – Water column metrics shall include PCB concentrations at the two locations proposed and for Bulls Bridge, and Lake Lillinonah, Lake Zoar, and Lake Housatonic (from the CT analysis).

The sediment metric shall be calculated for the subreach-specific FCM exposure concentration as simulated by EFDC. It is unclear from the text if sediment

concentrations are proposed to be calculated for Lake Housatonic. GE shall calculate these concentrations.

The proposed ratio of 1.7 for conversion of predicted whole-body wet weight PCB concentrations in largemouth bass to equivalent fillet wet weight PCB concentrations was developed using a very limited portion of the site-specific data. The uncertainty in the extensive EPA data set on largemouth bass tissue concentrations claimed in the Proposal is more properly interpreted as indicating high variability in this relationship and should not be used as a reason to discount these data in developing a site-specific average ratio. The results of Amrhein et al. (1999) cited in support of the 1.7 conversion factor are inconsistent with other published studies (Burman and Rygwelski 2006; RETEC 2002). EPA's analysis of the more comprehensive data set, excluding a small number of data points with questionable lipid results, indicates a representative ratio for largemouth bass to be approximately 5, which is consistent with the cited studies. GE shall use the wet weight ratio of 5:1 to convert modeled whole-body PCB concentrations for largemouth bass to their equivalent fillet concentration for comparison with human health IMPGs for fish consumption.

Assumptions for fish abundance, size, species preferences, etc. used in the CMS shall be the same as those identified in the ERA.

73. Page 5-35 – Note that the EPA point of departure for making cleanup decisions is 1×10^{-6} .
74. Page 5-35 – The last paragraph on this page acknowledges that evaluation of the extent to which corrective measure alternatives protect the environment will include consideration of whether local populations use all or part of the Rest of River as their habitat or home range. If used in the CMS Report, GE shall modify this and similar statements to acknowledge that some receptor populations may have a home range that is smaller than the Rest of River and that such smaller home ranges shall be considered in the evaluation as appropriate.
75. Page 5-37 – ARARs – EPA disagrees with GE's statement to limit its review to enacted or promulgated requirements, not agency guidance, advisories or policies. GE's limitation excludes the category of standards referred to as To Be Considered, or "TBCs". The TBCs, while not promulgated standards, are part of the ARAR analysis pursuant to EPA's guidance, and shall be identified as such.

EPA has not provided comments on ARARs that might apply to Reaches 9 through 16 at this time. GE shall propose ARARs (in the Supplement) that are relevant to the alternatives for Reaches 9 through 16 discussed in the Supplement provided in response to General Condition 1.

Table 5-3 – Applicable or Relevant and Appropriate Requirements (ARARS) – EPA notes that this is a Preliminary List of ARARs and the final determination on ARARs will be made at the time of EPA's final decision. GE shall make the following changes to the Preliminary List of ARARs:

I. Potential Chemical-Specific ARARs

A. 2nd bullet: revise to read “water quality *criteria*”

B. Delete 1st bullet

Include the following as To Be Considered (“TBC”):

- Cancer Slope Factors – the guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants;
- Reference Doses – the guidance values used to evaluate the potential non-carcinogenic hazard caused by exposure to contaminants; and
- PCBs: Cancer Dose – Response Assessment and Application to Environmental Mixtures – the guidance for the Agency’s reassessment of the carcinogenicity of PCBs. It includes revised slope factors for PCBs based on the pathway of exposure.

II. Potential Location-Specific ARARs

Merge A. and B, they have the same ARARs.

- 1st bullet: shorten to “Clean Water Act – EPA’s Section 404 and implementing regulations at 40 C.F.R. 230”
- 2nd bullet: Delete the Corps of Engineers regulations
- Add bullet: “Rivers and Harbors Act, Section 10”
- Add bullet: “RCRA and State Standards for Hazardous Waste Facilities in floodplains”
- Add bullet: State standard(s) for dams

III. Potential Action-Specific ARARs

A. Sediment/soil excavation, backfilling/restoration, and/or in situ containment

Federal ARARs

- Insert “TSCA 761.61(c)”
- 2nd bullet: Shorten to “TSCA regulations on decontamination”
- 3rd bullet: Typo in RCRA
- 4th bullet: Delete, already listed in location-specific ARARs
- 5th bullet: Delete the bullet on the Corps 404 regulations
- 6th bullet: shorten to “Clean Water Act – Section 402 and implementing regulations”
- add bullet: TSCA PCB Spill Cleanup Policy

State ARARs

- 2nd bullet: shorten to “Massachusetts Clean Water Act and implementing regulations”

- 3rd bullet: shorten to “Massachusetts air pollution control regulations”

B. Temporary On-Site Accumulation and/or Storage of Excavated Sediments or Soils

Federal ARARs

- 4th bullet: shorten to “Clean Water Act – NPDES regulations”
- Delete 5th and 6th bullets

State ARARs

- 2d bullet: shorten to “Massachusetts solid waste management regulations”
- 3d bullet: shorten to “Massachusetts hazardous waste management regulations”
- 4th bullet: shorten to “Massachusetts Clean Water Act, and implementing regulations”
- 5th bullet: shorten to “Massachusetts air pollution control regulations”

C. Ex Situ Physical or Chemical Treatment at On-Site Facility

Federal ARARs

- 1st bullet: shorten to “RCRA regulations for hazardous waste management facilities”
- 2nd bullet: shorten to “Clean Water Act – NPDES regulations”
- Add 3rd bullet: TSCA PCB remediation standards

State ARARs

- 3rd bullet: shorten to “Massachusetts hazardous waste management regulations”
- 4th bullet: shorten to “Massachusetts air pollution control regulations”
- Delete bullets 5 and 6 – they are part of the hazardous waste regulations.

D. Ex Situ Thermal Desorption at On-site Facility

Federal ARARs

- 1st bullet: delete, per comment above re NAAQS.
- Add 4th bullet: TSCA remediation standard and TSCA incineration standard

State ARARs

- 4th bullet: shorten to “Massachusetts hazardous waste management regulations”
- 5th bullet: delete as it is included in the 4th bullet.

E. Local Disposal of Excavated Sediments or Soils

Federal ARARs

- 2nd bullet: shorten to “TSCA regulations on decontamination”
- 3rd bullet: shorten to “RCRA regulations for hazardous waste management facilities”
- 4th bullet: shorten to “RCRA land disposal restrictions”

- 5th bullet: shorten to “NPDES regulations”
- delete 6th bullet – already covered in location-specific
- delete 7th bullet – Corps regulations

State ARARs

- 3rd bullet: shorten to “Massachusetts hazardous waste management regulations for landfills.”
- 4th bullet: shorten to “Massachusetts Clean Water Act – NPDES requirements.
- 5th bullet: shorten to “Massachusetts air pollution control regulations”.

Other Potential Remedial Components: For all the potential remedial components being screened, GE shall identify potential ARARs, or highlight that such remedy components are considered within other remedy components, including but not limited to:

- rechannelization;
- thin layer capping;
- engineered barriers within thin layer capping;
- stabilization of banks;
- revetment mats;
- in situ treatment - physical immobilization;
- other remedy components required to be evaluated pursuant to this conditional approval.

76. Page 5-39/5-57 – Long-Term Reliability and Effectiveness – Under the discussion of Magnitude of Residual Risk, GE shall also consider “the volume or concentration of contaminants in waste, media, or treatment residuals remaining on the site. The characteristics of the residuals should be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.” (*Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, EPA 1988)

Under the discussion of adequacy and reliability of the alternative, GE shall also consider an “assessment of the potential need to replace technical components of the alternative, such as a cap, a slurry wall, or a treatment system; and the potential exposure pathway and the risks posed should the remedial action need replacement.” (EPA 1988)

77. Page 5-40/5-57 – Under the discussion of Potential Long-Term Adverse Impacts, GE shall eliminate the following factors from the evaluation criteria: c) any adverse impacts on biota and their habitat, including impacts that might disrupt local populations or impair the sustainability of local populations; d) any long-term impacts on the natural environment and aesthetics, including consideration of the uses of the area for recreational or other activities.

78. Page 5-40/5-57 – Reduction of Toxicity, Mobility, or Volume – For each alternative evaluated, GE shall include an estimate of the mass of PCBs, and area and volume removed/treated.

GE shall also evaluate “the type and quantity of treatment residuals that will remain following treatment”, and “whether the alternative would satisfy the statutory preference for treatment as a principal element” (EPA 1988).

79. Page 5-43 – If used in the CMS Report, Figures 5-2a and 5-2b shall be modified to include Reach 9 farm properties.

Although it is true that short-tailed shrew habitat is widespread throughout the floodplain, it is not appropriate to consider the entire floodplain as a single averaging area for evaluating the effectiveness of corrective measure alternatives in protecting shrew populations. Because the home range of shrews is much smaller than the Rest of River floodplain, such averaging may result in an alternative being considered protective when, in fact, some shrew populations may remain impacted. In the CMS Report, GE shall evaluate appropriate averaging areas for the omnivorous/carnivorous mammal receptor group.

80. Page 5-52 – EPA does not agree that use of the spatially weighted arithmetic mean is appropriate for determining the EPC if the data are “sufficiently dense, uniform, and representative.” EPA guidance specifically notes that the maximum measured concentration may be used as the EPC in place of the 95% UCL in such circumstances, but does not allow the use of the mean. All EPCs in the CMS Report shall be determined according to EPA guidance and shall be either the 95% UCL or the maximum measured concentration (under certain circumstances).

81. Page 5-53 – The averaging areas employed for evaluation of corrective measures for floodplain soil must relate specifically to the appropriate habitats, home ranges, and/or foraging ranges for representative species applicable to each IMPG. Averaging over the entire floodplain is only acceptable for species that will be exposed over the entire floodplain (see also General Comment 14, above). In the CMS Report, GE shall use averaging areas that are appropriate for the species/receptor groups under consideration.

Appendix B

82. Page B-3 – The determination of lipid content for aquatic invertebrates ignores the findings of the EPA bioaccumulation study (Appendix C.1 of the FMD), which indicated a lipid content of approximately 1.5% for invertebrates. GE shall re-evaluate the lipid content for aquatic invertebrates using the information in the FMD as well as a broader range of applicable studies from the scientific literature.

83. Page B-3 – Use of a single TOC concentration for surface sediments throughout the Rest of River is inappropriate given the documented differences in TOC among subreaches. In the CMS Report, GE shall incorporate subreach-specific TOC values in this calculation; such values shall be developed from the full range of the site-specific data.

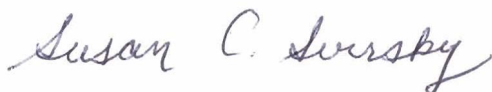
84. Page B-3 – The rationale for exclusion of data from Location 15 in developing the BAF is inadequate. GE shall either use site-specific data from all locations sampled or provide adequate justification for the exclusion of data from this location.
85. Page B-4 – As noted above, the development of a BSAF for insectivorous birds shall be based on more than the *Lumbriculus* bioaccumulation study. In addition, GE shall discuss in the CMS Report the applicability of equilibrium partitioning theory to the low-TOC sediments in Reach 5A, noting any uncertainties or limitations of the approach in that reach and their effects on the conclusions.

Appendix D

86. Page D-5 – The discussion of methods for incorporating the fraction of farm property in the floodplain into the evaluations discussed in this section explicitly acknowledges that existing farms may be no longer used for farming in the future, but fails to similarly acknowledge that new farms may appear and/or the proportion of the area of existing farms in the floodplain may change over time. GE shall include in the CMS Report a discussion of these potential changes and consider such potential changes in the evaluation of corrective measure alternatives.
87. Page D-5 – According to EPA guidance, use of the maximum measured contaminant concentration in place of the 95% UCL is only valid when the data consist of a reasonable number of representative samples. The Proposal does not discuss the data quality objectives associated with determining that the data are consistent with the use of the maximum measured concentration in place of the 95% UCL. Such discussion and quantitative criteria for making this determination shall be presented in the CMS Report.
88. Page D-6 – EPA guidance does not provide for the use of the arithmetic mean as the EPC for human health exposure under any conditions, and GE shall not use the arithmetic mean as the EPC in the CMS Report.

This conditional approval letter for the Proposal initiates GE's requirement to submit the Corrective Measures Study Report within 180 days under the terms of Appendix G of the Consent Decree (the Reissued RCRA Permit). In addition, GE shall concurrently submit the Supplement to the Corrective Measures Study Proposal within 30 days of receipt of this letter as specified in the conditions above for EPA review and approval.

Please contact me if you have any questions.



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Rest of River

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