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

July 11, 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 CMS Proposal Supplement, and Model Code Proposal, and Approval of the Addendum to Supplement

Dear Mr. Silfer:

EPA has completed its review of GE's report entitled *"Housatonic River – Rest of River Corrective Measures Study Proposal Supplement"* (hereinafter "Supplement") submitted May 11, 2007, the *Corrective Measures Study Proposal – Addendum to Supplement* (hereinafter "Addendum") submitted May 31, 2007, and the *Corrective Measures Study Proposal – Model Code* (hereinafter "Model Code Proposal") submitted May 14, 2007. GE submitted the Supplement and Addendum as directed by EPA in response to several of the conditions contained within EPA's April 13, 2007 conditional approval of the document entitled "*Housatonic River – Rest of River Corrective Measures Study Proposal"* (hereinafter "Proposal") submitted on February 27, 2007. These documents and other submittals are required pursuant to the Reissued RCRA Permit for the GE-Pittsfield/Housatonic River Site ("Permit"), which is Appendix G to the Site Consent Decree. In addition, GE intends to submit an additional proposal regarding East Branch Current and Future Boundary Conditions. EPA will review this submittal separately.

With respect to workplans or other submittals related to the CMS Proposal other than the CMS Proposal Supplement, the Addendum, or the Model Code Proposal, nothing in any of the approval and/or conditional approvals in this letter shall be interpreted to supersede the approval, the conditions in a conditional approval, or the disapproval of such GE submittals, unless expressly stated as such by EPA. EPA reserves all its review and compliance rights under the Consent Decree regarding such GE submittals.

Pursuant to Paragraph 73 of the CD, EPA, after consultation with the Massachusetts Department of Environmental Protection (Mass DEP) and Connecticut Department of Environmental Protection (CTDEP), approves the Addendum and conditionally approves the Supplement and Model Code Proposal subject to the following conditions.

Supplement

1. Further Justification for Corrective Measure Alternatives for Reaches 9 – 16

EPA agrees with the conclusions presented in the discussion and evaluation of the alternatives considered for Reaches 9 – 16. However, GE shall note in the CMS that institutional controls (including but not limited to fencing, fish consumption advisories, conditional solutions) may be a component of a remedy in which Monitored Natural Recovery is the primary response action, and GE shall evaluate the need for such controls in the evaluation of this response action.

2. Further Justification for Screening of *In Situ* Treatment Technologies

EPA agrees with the conclusions presented in the discussion and evaluation of *in situ* treatment technologies for river sediment and floodplain soil. Review of this section by both EPA's Office of Research and Development and Office of Superfund Remediation and Technology Innovation notes that while there are no viable *in situ* technologies applicable to these site conditions or contaminants, some of the information cited in this section is inaccurate or out of date. However, the conclusion would remain unchanged that *in situ* technologies should not be retained for further consideration in the CMS

3. Plan for Conducting Phase 1 Cultural Resources Evaluation

The Work Plan for conducting the Phase 1 Cultural Resources Evaluation ("Phase I Evaluation") as presented in Appendix A to the Supplement is acceptable and EPA will not require submittal of a revised Work Plan as a condition of the approval of the Supplement. In the conduct of the Phase I Evaluation, however, the following additions and modifications shall be incorporated by GE:

- For the Phase I Evaluation, the Archaeological Area of Potential Effects ("APE") is equivalent to the entire Rest of River ("ROR") in Reaches 5 through 8 (i.e., within the 1 mg/kg isopleth (approximately the 10-year floodplain) for Reaches 5 and 6, and the 100-year floodplain for Reaches 7 and 8). The Historic Architectural APE is slightly larger because it encompasses areas from which the project might be visible and/or which might be indirectly impacted by project activities. The APE for the Phase I Cultural Resources Assessment ("Phase I CRA") shall be defined early in the Phase I Evaluation report, with reference to the ROR site. GE shall note that the APE will be revisited if significant staging or other support activities become necessary outside of the currently defined APE.

- It shall be demonstrated in the Phase I CRA that the individuals conducting the Assessment have worked previously in Massachusetts. Credentials shall be submitted to EPA and the Massachusetts Historical Commission and the SHPO for approval prior to initiation of work.

- If Figure 1 of the Work Plan, or the equivalent, is used in the Phase I CRA report, the legend on the figure shall clearly indicate that the two areas shown (i.e., 1 mg/kg isopleth and 100-yr floodplain) together comprise the APE.

- The evaluation of potential visual impacts to resources outside the Historical APE shall be expanded to include other potential impacts such as those due to noise, vibration, and increased traffic.

- The Massachusetts Board of Underwater Archaeological Resources (MBUAR), at a minimum, shall be added to the bulleted list of information sources.

- There are known contacts for Native American Tribes in the area. These shall be specifically listed as sources of information for TCPs in the area, along with the MBUAR and the SHPO. A list of contacts has been included in this conditional approval letter as Attachment 1.

- Consistent with USACE–New England District practice, areas shall be classified as having "low, moderate, or high" potential to contain archaeological sites, instead of the "no", "low", or "high" classifications proposed in the Addendum.

- To facilitate review and assist in maintaining confidentiality consistent with the National Historic Preservation Act, the Phase I CRA report shall be submitted as a stand-alone document, not included as part of the CMS Report.

4. Methodology for Developing Target Floodplain Soil Concentrations for Mink

The overall approach to the development of target floodplain soil concentrations that would be protective of mink populations is acceptable, with the specific exceptions noted below, which are hereby established as conditions applying to EPA's approval of the Supplement. In addition to the specific conditions, there is some confusion in the Supplement regarding the equations and/or parameters in several of the equations used to determine the weighted average dietary exposure for mink. In spite of these apparent errors, EPA believes that the approach remains valid and these exceptions are inadvertent errors either in the equations themselves or in the definitions of the parameters provided in the text and tables. Accordingly, it is not necessary for GE to resubmit this portion of the Supplement; however, EPA requests that GE examine the document carefully, and GE shall correct these errors prior to developing target sediment/soil concentrations in the CMS. Specific examples of these issues are noted below, however this list is not intended to be exhaustive and all equations and parameter definitions should be reviewed carefully.

- EPA does not agree with GE's plan to adjust the target sediment and/or floodplain concentration(s) for mink to account for foraging outside the floodplain. The extent of the floodplain in Reaches 5 and 6 is sufficiently large that the assumption of 100% residence is appropriately conservative for mink, particularly female mink, and especially during the reproductive period when the exposure to contaminants in the floodplain is most important. GE shall not adjust the calculated target concentrations on this basis.

- Similarly, EPA does not agree with GE's plan to average the exposure concentrations across Reaches 5 and 6, which could inappropriately fail to consider impacts to mink whose foraging range does not exceed the area of a single subreach. As noted in the species profile for mink in the ERA (WESTON, 2004), female mink have been documented to have home ranges as small as 19.3 and 50.4 acres, and linear home ranges as small as 0.7 mile. All of these ranges are well within the extent of a single subreach. GE shall not average exposure concentrations over more than a single subreach (except that due to limited floodplain, Reach 6 may be combined with Reach 5C).

- EPA disagrees with the use of the median as a measure of central tendency for establishing BSAFs and BAFs in the bioaccumulation model. While EPA agrees that the median is an appropriate measure of central tendency for highly skewed distributions in some applications, the purpose of a BSAF or BAF is to quantify the long-term ratio between the exposure media and the concentration in the biological tissues modeled. Because mink and other animals average their exposure spatially and temporally during feeding, the median will not account for bioaccumulation that occurs in the tails of the exposure distribution, even though such exposure can contribute significantly to total uptake. Use of the mean as the measure of central tendency will account for exposures throughout the entire range of the observed exposure distribution. Accordingly, GE shall use the mean as the measure of central tendency in the calculation of BSAFs and BAFs.

- Use of a spatially averaged FOC concentration for sediments in Reaches 5 and 6 obscures the order-of-magnitude difference in FOC between upstream and downstream sediments. Evaluation of exposure on the scale of subreaches, as discussed above, is appropriate and shall be conducted.

- It is assumed that a table similar to Table 5-9 will be included in the CMS Report. If so, GE shall specify "not achievable" rather than "0.0" for sediment concentrations that would (mathematically) require a negative soil concentration to achieve the IMPGs.

- Equation 2, interpreted as written, would indicate that the concentration of PCBs in aquatic birds is equal to the weighted concentration in the aquatic and terrestrial diet of those birds, which is clearly incorrect. Parameters C_{aba} and C_{abt} in this equation appear to be incorrectly defined in Table 5-1 and parameters P_{aba} and P_{abt} do not appear in Table 5-1.

- The value for $BSAF_{ab}$ presented in Table 5-1 is inconsistent with the value for the same parameter presented in Table 5-5.

- Equation 5 indicates that the units for BAF are kg organic carbon/kg lipid, but the text states that "typically bioaccumulation factors (BAFs) for soil are not based on normalized tissue and soil concentrations." It appears that the units are incorrectly labeled in this equation.

- Equations 15 and 16 incorrectly refer to sediment, rather than soil, concentrations.

5. Additional Justification of Production Rates

EPA continues to have concerns regarding the production rates listed in Table 5-2 of the CMS Proposal and Table 8-1 of the Supplement. As noted by GE in the Supplement, these tables are based on the same assumptions concerning basic daily production when dredging is occurring (the "effective daily production rate" as defined below), and generate the same annual production amounts. They differ only in that Table 5-2 spreads out this production over the entire 365 days in a year, and Table 8-1 calculates daily production based on the assumed operating time of 198 days/year (22 days/month and 9 months/year).

EPA believes that some of the concerns regarding production rates may be a result of inconsistent use of terminology, and will therefore consistently use the following terms as defined below in the discussion that follows:

- **Effective daily production rate:** A production rate that is achieved when equipment is in operation at the site, with no adjustments made for work stoppages. This rate is derived from actual operational considerations, as discussed below. The effective daily production rate is used to develop the annual production rate based on the assumption that the annual work schedule consists of a 9-month working season, working 22 days per month, i.e., 198 days per year of actual operation. The units for this rate are typically cy/day of actual operation.

- **Annual production rate:** The product of the effective daily production rate times 198 working days per year. The units for this rate are typically cy/year.

- **Annualized daily production rate:** A production rate that is sustainable on a long-term (yearly) basis, taking into consideration non-working time due to holidays and weekends, weather and flow conditions, equipment failure, logistical considerations, and other such factors that result in work stoppages. The annualized production rate is equivalent to the annual production rate divided by 365 days/yr. The units for this rate are typically cy/day.

Additional definitions not included in the following discussion, but provided here to avoid further confusion in future discussions of this issue include:

- **Annualized areal production rate:** The annualized daily production rate divided by the proposed depth of cut for the reach (spatial bin, grid cell, etc.) of the river in which operations are being conducted. The units are typically square meters/year.

- **Effective areal production rate:** The effective daily production rate divided by the proposed depth of cut for the reach (spatial bin, grid cell, etc.) of the river in which operations are being conducted. The units are typically square meters/day of actual operation.

Regardless of whether production is depicted in terms of the effective daily production rates or annualized production rates, the underlying assumptions for areal and volume-based daily production when dredging must be valid in order to provide useful input to the model. For wet dredging EPA believes the approach used in the CMS Proposal and Supplemental is flawed because it works backward from an annual production rate that is established with insufficient justification. The more defensible approach is to start from an effective daily production rate based on such factors as bucket size, cycle time, and logistical considerations, and then to generate a realistic annualized production rate by factoring in hourly and seasonal working assumptions. All assumptions used in this approach must be compared with EPA and USACE guidance to ensure realism. In addition, because of the numerous site-specific uncertainties inherent in this estimation process, EPA believes it is not possible to realistically distinguish between production rates that apply to dredging/excavation depths of less than 2 ft of sediment vs. rates that would apply to depths of greater than 2 ft. Accordingly, only a single production rate range (for all depths) shall be developed for each technology.

EPA believes that the true upper-bound production rate for both wet dredging and dry excavation must be based on two simultaneous operations for most reaches of the river. The simulation is intended to provide a true range of outcomes based on the appropriate lower- and upper-bound assumptions, and GE provides no basis for its assumption that the use of multiple dredges will not be feasible.

Based on these and other considerations, EPA establishes the following conditions relative to the range of production rates to be used in the simulations:

- GE shall use only a single range of production rates for mechanical and hydraulic dredging in the wet, and mechanical dredging in the dry, respectively.

- The upper-bound production rate shall be based on the assumption of two simultaneous operations (i.e., either two dredges or two dry excavation cells) for those river reaches where simultaneous operations are possible.

- Based on EPA's calculations, using reasonable assumptions (including the potential for two simultaneous operations), experience from other sites, and applicable guidance where available, the applicable range of annualized daily production rates for mechanical/hydraulic wet dredging was determined to be 150 to 400 cy/d, which is equivalent to an annual production rate range of 54,750 cy to 146,000 cy. This equates to a range of effective daily production rates of 275 to 740 cy/day. For dry excavation, the original range of annualized daily production rates provided by GE in Table 5-2 of the CMS-P of 60 to 170 cy/d is acceptable, but the upper end of the range requires modification upward to account for the potential for two simultaneous operations. GE shall use these production rates as bounding values for simulating the grid cell-wise seasonal progress of the remediation in the model runs.

GE proposed in the Table 8-1 of the Supplement to use one effective areal production rate for use in the model and did not account for the varying sediment excavation depths identified in Table 5-1 of the Addendum. GE shall, in addition to using revised effective daily production rates as described above, calculate separate effective areal production rates based on the different removal depths identified in Table 5-1 of the Addendum.

6. Page 7-2: For its CMS evaluations, and for future submittals, GE shall, instead of following the language of the last clause of the first full paragraph, follow the language of the Reissued RCRA Permit, as follows: "… in consideration of the Selection Decision Factors**, including** a balancing of those factors against one another."

7. Section 2-5, Page 2-15, Proposed ARARs Associated with MNR for Reaches 9-16: GE shall revise Section 2-5 as follows:

A. Chemical-specific ARARs – (b) Add "numeric" between "the" and "Massachusetts water quality criteria"; (c) Add "numeric" between "the" and "Connecticut water quality criteria".

B. Location and Action-specific ARARs – GE proposes to not include location-specific and action-specific ARARs because the proposed alternative does not include active remediation. However, the monitoring which would be performed as part of monitored natural recovery requires particular actions, in particular locations. Two examples are as follows: a. if in performance of monitoring, GE must use or traverse a wetland or floodplain area, GE would need to comply with ARARs associated with wetlands or floodplains; b. GE would have to comply with the handling requirements for hazardous or solid waste of RCRA or toxic substances of TSCA if such requirements apply to substances involved in the sampling by GE.

GE shall submit ARARs associated with MNR for Reaches 9-16 in the CMS that include such Location and Action-Specific ARARs related to the Monitoring component of MNR.

C. GE shall list as Location-specific "To Be Considered" the following: Massachusetts Department of Public Health, Center for Environmental Health, Waterfowl Consumption

Advisory; Massachusetts Department of Public Health, Center for Environmental Health, Freshwater Fish Consumption Advisory List, Housatonic River (also includes frogs and turtles); and Connecticut Department of Public Health, 2006 Advisory for Eating Fish from Connecticut Waterbodies.

D. In addition to the alternative of MNR for Reaches 9-16, GE shall incorporate the conditions in Condition 6.A, B, and C into its Corrective Measures Study presentation of ARARs for all alternatives evaluated therein.

Model Code Proposal

As discussed during a conference call between, EPA, GE, and their contractors HQI and QEA (respectively) on June 12, 2007 and on subsequent dates ending July 3, 2007, (the outcome of these conversations is documented in Attachment 2), EPA agrees with the code modifications with the correction of the bugs and/or approaches as agreed to in the Attachment.

This Conditional Approval of the Supplement and Model Code Proposal and approval of the Addendum does not alter GE's requirement to submit the Corrective Measures Study Report and all other submittals under the terms of the Permit. As provided in the Compliance Schedule set out in Attachment B to Appendix G, in the future EPA will consider the need for an alternative schedule for the submittal of the CMS Report upon demonstration by GE of the need for such an alternative schedule.

Sincerely,

Susan C Svirsky

Susan C. Svirsky, Project Manager
Rest of River

Attachments

cc: Mike Carroll, GE
Rod McLaren, GE
Kevin Mooney, GE
James Bieke, Goodwin Procter
Susan Steenstrup, MADEP
Anna Symington, MADEP
Dale Young, MAEOEA
James Milkey, MA AG
Don Frankel, US DOJ
Susan Peterson, CTDEP
Kenneth Munney, USFWS
Ken Finkelstein, NOAA
Holly Inglis, EPA
Tim Conway, EPA
Dean Tagliaferro, EPA
K.C. Mitkevicius, USACE
Mayor James Ruberto, City of Pittsfield
Thomas J. Hickey, PEDA
Scott Campbell, Weston Solutions
Linda Palmieri, Weston Solutions
Public Information Repositories

Attachment 1

Tribal and Other Contacts for Cultural Resources Evaluation

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

Ms. Cheryl Andrews-Maltais, Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Ms. Kathleen Knowles, Tribal Historic Preservation Officer
Mashantucket Pequot Tribe
110 Pequot Trail, Post Office Box 3180
Mashantucket, Connecticut 06339-3180

Ms. Sherry White, Tribal Historic Preservation Officer
C/o Stockbridge-Munsee Community
Post Office Box 70
Bowler, Wisconsin 54416

Attachment 2

Code Bugs and Comments

1. On line 66 of input.for, declaration of character variable CDUM was removed and should be reinserted.
   Outcome - QEA will reinsert the variable declaration

2. On line 5487 of input.for, for loop counter L, the starting index specified as letter I is uninitialized. Should be replaced with 2 instead.
   Outcome - QEA will modify the code as recommended

3. In rembedctrl.for, line 398, K=KBR should be K=KBT(L). This is a bug that manifests itself only in the case of removal and replacement with an engineered cap.
   Outcome - QEA will modify the code as recommended (Note that this bug did not seem to produce any problems in either HydroQual or QEA's test runs)

4. SEDFRLS, SNDFRLS, and TOXFRLS should be initialized to 0 in input.for before REM.RESTART is read in.
   Outcome - QEA will add code to initialize these variables

5. The "if-block" between lines 89 and 93 of subroutine remcalrls.for assigns an incorrect depth to the variable "DPTH". When called to compute the depth averaging for PCB release, the variable assigned to "DPTH" is the depth of residual averaging. Conversely, when called to calculate the residual concentration, the variable assigned to "DPTH" is the depth of removal, (or the cap thickness, depending on the remediation technology).
   Outcome - QEA agrees that this is a bug and will fix as recommended

6. The PCB flux released during dredging, PCB mass removed during dredging, PCB mass associated with cap/backfill material introduced to the system, and PCB mass retained in the system via cap/backfill concentrations calculated from a residual need to be tabulated so that we can run external mass-balance/box-model type analyses.
   Outcome - QEA will add code for such tabulations

7. The remediation code is somewhat generic in its structure and the processes involved in the specific remediation technologies are differentiated only by the inputs. Therefore it would be desirable to have error traps to avoid the possibility of erroneous inputs for a given remediation technology (e.g. a check to ensure that the release factor *RLSCF1* is input as 0 for dry excavation and capping, a check to ensure that the depth of removal *REMDEPTH* and the depth for calculating residual concentrations *RSDDEPTH* are set to the same values for removal and backfill etc.)
   Outcome - QEA agrees that such checks are desirable. A list of checks is included as the last page of this document. QEA will incorporate these checks into a separate program, which will be run on the model inputs.

8. Bed armoring is proposed to represented by including an additional non-cohesive sediment class with particle diameter large enough to prevent erosion. However, introducing an additional sediment class with a larger particle diameter will change the model response because the minimum layer thickness is a function of the maximum particle diameter. We can achieve the same objective (having a non-erodable layer of non-cohesives) by setting the diameter of the additional sediment class to the same value as the largest non-cohesive class in the existing model but with the critical shear stress for resuspension (TAUR on card 42) set to a large positive value. A similar approach was used with NC4 in the downstream model.

   Outcome - QEA agrees with the assessment and will adopt the recommended approach

9. Having the depth of averaging for PCB release/residual calculation limited to only whole layers depending on whether more than 50% of a given layer is within the depth of averaging will be problematic in cases where the model has eroded to 2 layers, with the bottom layer being relatively thick (>1m).

   Outcome - QEA will address this issue by adding a test to the process used to setup model input for the next year from model results for the end of the preceding year. For grid cells scheduled for remediation in the subsequent year, the bottom-most layer will be subdivided into several thinner layers, if the remediation depth will likely extend into the bottom-most layer.

10. In case of removal and replacement with an engineered cap, the thickness of the armored cap layer is restricted to the surface layer which is variable.

   Outcome - QEA will simulate an armored cap by specifying 100% immobile solids (NC4) throughout the entire depth of removal. QEA will monitor the results to check that this change doesn't introduce unexpected behavior.

11. The engineered cap option does not include some of the features described in the CMS (e.g. an impermeable geofabric, clay, AquaBlok^{TM}, amended sediment with a sorptive media such as organic carbon or organoclay).

   Outcome - Calculations indicate that the upward diffusion of PCBs through an engineered cap will take sufficiently long, so that biological exposure concentrations and fluxes to the water column will not be impacted by the proposed approach for representing an engineered cap. No additional modifications are necessary to address this issue.

12. The remediation scheduling algorithm does not work correctly in cases where there is an overlap in the remediation time-period for different cells. This will not be an issue if remediation in a new cell is initiated only after the completion of remediation in the preceding cell.

   Outcome - QEA confirmed that the remediation schedule will not have overlapping periods of remediation in different cells. Remediation in a new cell will be initiated only after remediation of the preceding cell is completed. Therefore, no change to the scheduling algorithm is required.

13. The determination of sediment layers for inclusion in calculating the PCB mass for release to the water column is performed at the initiation of remediation. However, the determination of sediment layers for inclusion in the calculation of PCB residual concentration as well as the calculation of the depth of removal, is performed at the end of the remediation time period. If during the duration of remediation the cell undergoes erosion/deposition resulting in a change in the sediment layering, the sediment layers used for calculating PCB release may end up being different from the sediment layers used for depth of removal and for PCB residual concentration.

    Outcome - QEA will modify the code to determine the sediment layers for all three calculations at the same time.

14. In the case of wet hydraulic excavation and wet mechanical excavation (the only two cases with a release of PCBs and solids to the water column as a result of remediation activities), the model does not deduct the solids (as well as PCBs) released from the sediment inventory. The solids released to the water column can deposit in the originating cell, causing the surface layer to grow in thickness. This represents an additional source of solids into the system (i.e. the model does not maintain mass balance). In addition, the scenario described in the preceding bullet may occur as well.

    Outcome - QEA will modify the code such that the sediment layering and its associated properties (grain size distribution, bulk density, and porosity) at the end of the remediation period reverts back to what it was at the beginning of the remediation period. This approach neglects changes introduced due to erosion/deposition processes during the remediation period (and therefore does not maintain mass balance). However, the sediment mass taken out of or introduced into the system in this fashion will be tabulated and can thus be tracked.

15. For the case of engineered capping, what the code currently does is inconsistent with what was described in QEA's remediation code memo. The memo described assigning the PCB concentration in the cap material as a fraction of the PCB concentration in the sediment surface (top 6"). However, the code assigns the PCB mass in the cap material as a fraction of the PCB mass in the sediment surface (top 6").

    Outcome - QEA indicated that the documentation in the remediation code memo was inconsistent with what was programmed. The documentation for the remediation code will be modified to indicate that the PCB mass in the cap material will be set to a fraction of the PCB mass in the sediment surface (top 6").

Bank Erosion Remapping

Based on preliminary results from a long-term run (Demo run 1 from the FMD, run for ~70 years), it was recognized that changes in bed elevation due to bank erosion and mass failure had resulted in conditions in some grid cells such that no further erosion would be expected to occur at these locations. This happens because the bank erosion and mass failure rate is a constant over time regardless of the decreasing bank elevation. The mass failure component, as implemented in EFDC, was conceptualized as a flux of solids to the river on the falling limb of an out-of-bank storm event, with failure occurring due to excessive pore-pressure along a shear plane in the saturated bank soil. It is reasonable to expect that mass failure occurs only beyond a threshold pore-pressure i.e. a threshold differential between the bank and channel elevations. This issue was discussed with GE and QEA during the meeting in January 2007, and it was recognized that bank erosion and mass failure in the PSA would likely continue at the long-term rate, except the erosion processes would shift to an adjacent location. It was decided that such a shift in the erosion locations could be represented by periodically reviewing the erosion sites and remapping them. Therefore, the long-term run was analyzed to look at the temporal change in the difference in elevation between the bank and the channel cells. Seventeen cells (of a total of 261 cells with bank erosion) were identified where the difference between the bank and the channel cells had decreased to less than 1m over two cycles of the 26-year hydrograph. These erosion sites were shifted to cells immediately upstream or downstream of the original location. It is proposed that the remapping be performed at the end of the first 26-year cycle. During the CMS, QEA will review the remapped bank erosion map and the bank stabilization algorithm in the remediation code to ensure that the remapping is consistent with the bank stabilization that has been performed up to that point in the simulation. In addition, during this review, a set of eleven locations were identified where the difference between the bank and the channel cells at model initialization is less than 1m. In discussion with QEA, it was decided to shift these erosion sites as well to be consistent with the criteria used for bank erosion remapping. HydroQual will provide the revised bank erosion inputs to QEA, which will then be implemented by QEA.

Input Checks

1. For simulation of Thin Layer Capping, REMTECH = TLC,
   a. Solids and PCB Release Factor, RLSCF1 should be 0
   b. PCB Residual Factor, RSDCF1 should be 0
   c. PCB concentration in cap material, RSDCF2 should have a non-zero value
   d. Cap Thickness, REMDEPTH should have a non-zero value
   e. Depth of vertical averaging for residual PCB calculation, RSDDEPTH should be 0
   f. Bed Armoring flag, REMARMOR should be 0

2. For simulation of Engineered Capping without prior removal, REMTECH = ECAP,
   a. Solids and PCB Release Factor, RLSCF1 should be 0
   b. PCB Residual Factor, RSDCF1 should have a non-zero value
   c. PCB concentration in cap material, RSDCF2 should be 0
   d. Cap Thickness, REMDEPTH should have a non-zero value
   e. Depth of vertical averaging for residual PCB calculation, RSDDEPTH should have a non-zero value
   g. Bed Armoring flag, REMARMOR should be 1

3. For simulation of Dry Excavation with Replacement with Backfill or Engineered Cap, REMTECH = DRYMCH,
   a. Solids and PCB Release Factor, RLSCF1 should be 0
   b. PCB Residual Factor, RSDCF1 should be 0
   c. PCB concentration in backfill material, RSDCF2 should have a non-zero value
   d. Removal Depth, REMDEPTH should have a non-zero value
   e. Depth of vertical averaging for residual PCB calculation, RSDDEPTH should have a non-zero value equal to REMDEPTH
   h. Bed Armoring flag, REMARMOR should be 0 or 1

4. For simulation of Wet Hydraulic or Mechanical Excavation with Replacement with Backfill or Engineered Cap, REMTECH = WETHYD or WETMECH,
   a. Solids and PCB Release Factor, RLSCF1 should have a non-zero value
   b. PCB Residual Factor, RSDCF1 should have a non-zero value
   c. PCB concentration in backfill material, RSDCF2 should be 0
   d. Removal Depth, REMDEPTH should have a non-zero value
   e. Depth of vertical averaging for residual PCB calculation, RSDDEPTH should have a non-zero value equal to REMDEPTH
   i. Bed Armoring flag, REMARMOR should be 0 or 1

5. For simulation of Monitored Natural Recovery, REMTECH = MNR,
   a. Solids and PCB Release Factor, RLSCF1 should be 0
   b. PCB Residual Factor, RSDCF1 should be 0
   c. PCB concentration in backfill material, RSDCF2 should be 0
   d. Removal Depth, REMDEPTH should be 0
   e. Depth of vertical averaging for residual PCB calculation, RSDDEPTH should be 0
   f. Bed Armoring flag, REMARMOR should be 0