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GE Corporate
Environmental Programs

John G. Haggard
Engineering Project Manager
Hudson River

General Electric Company
1 Computer Drive South, Albany, NY 12205
518 458-6619 Dial Comm: 8*920-9000
Fax: 518 458-6247

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Douglas J. Tomchuk
Emergency and Remedial Response Division
U. S. Environmental Protection Agency
26 Federal Plaza, Room 747
New York, NY 10278

RE: HUDSON RIVER REASSESSMENT: EPA MODELING EFFORTS

Dear Mr. Tomchuk:

This letter responds to several issues raised at the March 24, 1994 Scientific and Technical Committee meeting at which the modeling to be conducted as part of the Reassessment RI/FS of the Hudson River PCBs site was discussed. The following comments also respond to the technical memoranda that were attached to your letters of January 31 and March 8, 1994 to members of the Scientific and Technical Committee.

GE believes that, by beginning the modeling effort, EPA and its contractors have taken an important step in performing the Reassessment RI/FS. That first step, however, will not lead to scientifically meaningful results unless the modeling work is continually re-evaluated and closely reviewed. As such, GE's primary concern about the modeling effort is that there be a continuing and constructive dialogue on all issues relevant to modeling.

Specifically, GE requests periodic meetings with EPA's modeling contractors to discuss and to review significant technical issues such as data interpretation, modeling, assumptions and parameters, and model calibration and verification. We believe that the March 24 meeting was a useful opportunity to begin such an on-going technical dialogue and that regular meetings between GE and EPA's contractors will significantly benefit the entire modeling effort.

To continue this constructive technical dialogue, GE offers a number of technical comments arising from the March 24th meeting and from the memoranda prepared by EPA's contractor. Upon review of these comments by EPA and its contractors, a meeting to discuss these comments and to provide an update on current programs and issues would be warranted. Given the current schedule of events, a meeting in early to mid-July would be useful. Another meeting in September to review modeling progress and issues is also suggested. This would

allow some interaction on this important project prior to the release of the Interim Modeling Report scheduled for release in December 1994.

GE's principal comments and questions arising from the March 24 meeting and from the review of the memorandum prepared by EPA's Modeling contractor are summarized below:

A. General Considerations:

1. The way the model and its results will be used as a decision-making tool need to be described. Specifically, how will the model results be used in the risk assessment and feasibility study? GE believes the following issues need to be considered:

a. Background Concentrations:

How will the upstream source be treated in the future projections? Will it be assumed the contribution approaches zero? If remediation of the upstream source is only partially successful or takes a significant period of time, how will this be considered? As with most watersheds there is also a PCB background level that may be controlled by atmospheric deposition which results in long-term background concentrations approaching 5-10 parts per trillion PCB. How will this be taken into account during the modeling effort?

b. Timing:

When will projections for the no-action scenarios begin? The baseline risk assessment will require projections of PCB fish levels over a 30 year period (i.e., exposure period). The Record of Decision will not be issued until 1996. Therefore, projections for no-action should start no earlier than 1996 and proceed forward for 30 years. For remediation scenarios, the projections, both with and without remediation, will need to start after the remediation is complete. Therefore, the estimated time of completion for remediation needs to be factored into the model.

c. Future Water Flow Conditions:

To make future projections, a hydrograph will need to be assumed. What hydrograph will be employed? When a high flow event is modeled, where will the event occur? The probability of such an event occurring immediately is small and is a worst case assumption. The event should be placed as some point after remediation (or the assumed point after no-action scenario is modeled) to be conservative, yet realistic.

d. High Flow Scenario:

Reference is made to both 100 and 500 year flood events being modeled. Which scenario is to be used? Given the short-period over which flow data is available, the development of a 500 year flood hydrograph is frought with uncertainty. Additionally, given the lack of any records for this magnitude of a flow event and the fact that calibration of the model will occur at much lower flows, would the projections be scientifically defensible, since the flows during such an event are well outside the calibration range in the model? Given the exceedingly small probability of such an event, will the results have any utility in decision-making for the project? Since one goal of the model should be to determine what if any benefit remediation might have, the high flow event scenario should not only be run under the no-action scenario, but also after a remediation scenario so that a true comparison of action vs. no-action can occur.

2. While the basic modeling code is well known, the details of the use of the model to conditions specific to the Hudson River are subject to enormous interpretation and judgment, and will have dramatic results on the outcome. GE requests that upon successful calibration and before any projections into the future are made, that the model code, as modified for the project, with all the associated input files be made available. Given the complexity of the model, this will allow proper review that would be nearly impossible if the only opportunity for detailed review occurs during the comment period provided on the proposed plan.

B. Fate and Transport Model

1. The concept of selecting three to five congeners to trace the fate and transport of PCBs from the sediment is an interesting one, but it requires greater explication for a meaningful assessment. For example, Dr. John Brown of GE has done extensive work in this area and may be able to provide insights and assistance in evaluating and/or implementing this idea. We assume, moreover, that the modelers will in any event trace the fate and transport of not only the three to five selected congeners, but also total PCB levels.

2. The modelers apparently intend to calibrate their model with the 1990-92 data and to verify the model with the 1984-93 data. The modelers stated at the March 24 meeting that the 1977 data are not suitable for verifying the model, in part due to floods and the dam removal in the early and mid-1970s. Rather than ignoring this important data set, however, the modelers should find ways to incorporate it in the model. This is a particularly important, because the 1984 sediment data are taken only from the Thompson Island Pool, the 1977 sediment data provide an essential benchmark for modeling the entire Upper River. In addition using the 1977 to 1984 data will provide an indispensable check on the sediment balance in the Thompson Island Pool. Finally, using this portion of the database will permit verification of the combined PCB fate and transport model and food chain analysis over a 17

year period when both water and fish concentrations were changing rapidly. This verification is required to test that the impacts of water column and sediment have been appropriately differentiated over the time scale of decades required of the analysis. Increased confidence in the model and its results will derive from the use of available data sets.

3. An unanswered question from the March 24 meeting pertains to the need, in determining the horizontal segmentation of the model, to consider how certain remedial scenarios will be stimulated. Specifically, the segmentation of the model must be of a scale to permit the realistic simulation of various sediment removal options. Additionally, it appears that the fate and transport model will not take into account lateral variations in sediment PCB levels or properties across the channel (i.e., one dimensional model). Since the PCBs are located predominately in areas near the shore, how can a remediation scenario be realistically simulated? The modelers should provide additional information on how their model segmentation will permit accurate modeling of such remedial scenarios.

C. Food Chain Model

1. The proposed use of predator-prey bioaccumulation ratios in the food chain model raises a host of issues. For example, it is unclear how such ratios will be determined. Not only do there appear to be insufficient site-specific data to determine such ratios, the planned approach relies on a bioaccumulation model (the FGETS model) that has not been calibrated to the Hudson River and is thus inappropriate for this purpose. In addition, the proper distribution of predator-prey ratios needs to be determined, and the time-variable nature of such ratios needs to be considered. In general, the description of this aspect of the food chain model needs to be greatly expanded.

2. All available data should be used to calibrate and/or verify the food chain model. This means that the food chain model should incorporate all of the observed fish data (not just the last few years) and should account for changes in homolog distributions in fish over time.

3. It is unclear how the food chain model will be linked with the fate and transport model. The food chain model should be run (and calibrated with observed fish data) using, as its input, output from the fate and transport model.

D. Sediment Resuspension Model

1. Although the modelers recognize the need for site-specific resuspension coefficients and parameters (e.g., critical shear stress) for this model, there appears to be no specific plan to collect such data from the Upper Hudson River (or, more specifically, the Thompson Island Pool). The use of site-specific data to determine sediment resuspension parameters is essential to the reliability of the model, because the use of parameters generated at other sites may lead to erroneous results.

2. The sediment resuspension model should be validated with data from a flood that contains multiple high-flow events within a short time period (e.g., two high-flow events in a 25-day period). This point was made by Dr. George Putman of SUNY-Albany at the March 24 meeting. Such a verification will ensure that the model properly accounts for erosion and deposits from tributaries and properly correlates scour and PCB levels.

3. Additional detail needs to be provided on the way in which the sediment resuspension model will be linked to the fate and transport model. For example, the fate and transport model is based on correlation's which may be valid under low or average flow conditions (e.g., partitioning), but which may be invalid under high flow conditions. To ensure that the model's parameters properly account for changes in flow, the fate and transport model should be calibrated and verified over a range of flow rates. Moreover, the time-scale over which the model runs significantly affects the accuracy with which the model handles the physical and chemical interaction between PCBs in the water column and PCBs in the sediment bed.

E. Lower River:

1. The modelers propose to utilize the Thomann model in the lower river and to link it to output from the upper river model. After the model base calibration is reviewed, a review of the findings should be discussed before the model is abandoned or applied.

2. GE has developed the most significant database on PCB levels in sediments in the lower Hudson River. This information has been supplied to EPA. Since the data were generated utilizing capillary column analytical techniques, and were not generated until after Thomann's model was complete, these data will need to be factored into the recalibration of the model.

3. The modelers will attempt to use the Thomann model to describe PCB uptake in the migratory striped bass. Given the fact that the striped bass spend very little time in the Hudson river and pick up a significant body burden of contamination outside the Hudson River the validity of such an effort is highly questionable. This issue has been described in more detail in GE's comments on EPA's Phase 1 Report. A review of this issue is warranted prior to initiating this work. This is particularly important in light of the recently released data on PCB levels in striped bass in 1992 and 1993 in the lower Hudson River.

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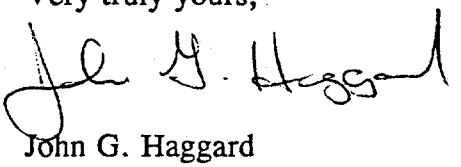
As a final thought on the modeling effort, GE encourages the EPA team to continually re-evaluate the modeling level-of-effort and the potential ultimate use of the model in the decision-making process. While all parties hope that the effort will result in a tool that allows projections of future river conditions to be made with a reasonable level of certainty,

there is a real possibility that the modeling will not achieve this goal. I am reminded of a statement made during a recent conference where a certain environmental issue was described as being extremely complex, yet endlessly interesting. The dynamics of PCBs in the Hudson River system certainly has these characteristics, and all parties need to be on guard to ensure that the project retains focus. Specifically, EPAs modeling team should be encouraged to make rational determinations as to whether additional analysis of the existing data with the model is warranted or whether additional data be collected to better understand the fundamental transport processes in the Hudson River and to verify actual recovery rates now that controls have been placed on the upstream source. This modeling analysis can result in endless study and investigation, yet not be conducive to decisions.

GE appreciates the opportunity to comment on and participate in EPA's modeling work. As with our prior substantive correspondence, please place a copy of this letter in the administrative record. I look forward to your response to our request for a continuing technical dialogue on modeling issues.

Very truly yours,



John G. Haggard
Engineering Project Manager

cc: Al DiBernardo, TAMS Consultants
Paul W. Rogers, Limno-Tech, Inc.
Jerry Cura, Menzie-Cura & Associates, Inc.
Jon Butcher, CADMUS
David Merrill, Gradient
Bill Ports, NYSDEC
Ron Sloan, NYSDEC