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APPENDIX A

Comments by the General Electric Company on the U.S. Environmental Protection Agency's Phase 2A Sampling and Analysis Plan

Hudson River Reassessment RI/FS

September 24, 1991

General Electric Company
Corporate Environmental Programs

INTRODUCTION

The General Electric Company submits these comments/questions on the Phase 2A sampling and analysis plan (Hudson River RI/FS) to the EPA. The comments are arranged by page and paragraph or section number. Due to the lack of; detail, a Quality Assurance Project Plan (QAPP) a description of specific analytical technologies, and clear, well define project objectives (i.e. data quality objectives - DQO's) it was difficult to tell if the proposed effects would yield acceptable or useful data. The problem is magnified since the majority of the data collection technologies are best described as research methods.

SPECIFIC TECHNICAL COMMENTS

Page 1, Par. 3: The Quality Assurance Project Plan is not included in the sampling plan. Additionally, a number of critical analytical techniques are not included. GE requests that these missing components be supplied to GE for comment and review prior to implementation of the sampling or analysis.

Page 1, Objective: This section of the work plan is very general and does not appear to meet the basic requirements of EPA DQO guidance. EPA must complete a DQO analysis for the sampling before expending large amounts of EPA's limited resources. Also, EPA claims that certain data must be collected now. GE does not see how this could be true given the large number of potential data needs identified in the Phase I report and the very few data collection activities given here. This seems particularly true of the side-scan sonar survey which could be conducted in the future, if it is really needed (see related comments below).

Page 2, List of Data Gaps: EPA lists 9 general data needs. These "data gaps" as given, are of little use in defining the implementation level data quality objectives that are needed in this type of sampling plan. A number of questions for each data category come to mind.

Item 1 - What is the specific purpose of determining the current PCB concentrations (including congeners) in the sediment? Does EPA want to make any comparison to historical data? Is EPA interested in average concentration (depth integrated) or in surficial levels? Will the congener data be used to evaluate the occurrence and extent of in situ biodegradation (see Item 4)? What analytical method is required? What precision and accuracy is needed and why? Do all measurements have to be congener-specific or can a mix of total and congener-specific analysis be obtained?

Does EPA want to determine the current "Hot Spot" distribution (see Item 9)?

Item 2 - Why is EPA proposing to collect total and congener-specific PCB concentrations in the water column? What method will be employed for analysis? What is the required accuracy and precision and why? Are the sampling and analysis techniques going to allow comparisons to the historical data? What frequency of sampling is needed during scouring events? Is it important to sample the rising and falling limb of the hydrograph?

Item 3 - On what time scale is EPA interested in looking at PCB congener and total variations and why (storm, seasonal, diurnal, long term trend)? What media will be investigated and why?

Item 4 - What specific testing will be performed to determine the rate and extent of in situ biodegradation? Will different approaches be employed in the upper and lower river sediments? Will there be an attempt to determine both aerobic and anaerobic components?

Item 5 - Given the remnant deposits remedy has just been completed, how long does EPA believe it will take for the water quality to show improvements (instantaneously, months, years)? How will EPA collect data sufficient to separate the "risks" from the source above Route 197 and those below Route 197? Should sampling occur along shore, mid-channel, or both? Is it necessary to monitor for PCB congeners or are total PCB levels sufficient?

Item 6 - By estimating current mass in the river, how is EPA evaluating the possible duration of PCB effects on water quality? Is availability for transport an issue? How will EPA determine the mass of PCB's? How accurately does this need to be known?

Item 7 - What is the purpose of estimating shoreline soil and sediment PCB levels? How does EPA define shoreline sediment and soils (on the bank, in the water, above the bank)? How accurately will these concentrations be defined and what spatial resolution will be used? Is this data needed for a part of the river or all the upper and lower river (and why)?

Item 8 - Why does EPA want current airborne levels? Is it possible to estimate values from first principles and water column values prior to deciding whether or not

field sampling should occur (i.e. conservative screening study)? What sampling and analytical methods would be used? What detection limit would be required?

Item 9 - Did "Hot Spots" as defined by NYDEC (from the 1977 data) exist? Do they still exist? How does EPA define a "Hot Spot" (PCB level, distribution with depth and spatially)? Will average PCB levels in various river segments be determined? What is the statistical basis for a sampling program? How will this data be used (risk assessment, feasibility study, etc.)?

Page 3, Flood Scenario Data: The additional data required for examining the effects of a major flood are described in a general way and it is difficult to see how the EPA proposed program will yield the necessary data. A number of questions come to mind when considering the items listed by EPA:

Item 1 - Should EPA first determine what spatial distribution of sediment will be mobilized before determining what the mass of PCB's that will be mobilized? What depth of sediment is of concern? Can compositing of samples occur? Do we need total PCB or congener-specific data?

Item 2 - Is it necessary to estimate the contamination characteristics just spatially or is the contamination as a function of depth a concern? If depth is of concern, what depth? How accurately do the values have to be determined (spatial resolution as well as accuracy of point estimates)? What is the flood scenario (magnitude and recurrence interval)? What does the flood hydrograph look like and how important is this? Are the river hydraulics adequately known?

Item 3 - What are the bed scour characteristics of interest and why? Over what portion of the river is this information necessary? Are both bed load and suspended load being considered? What spatial resolution is necessary? How will bed armoring be considered? What depth of bed is of interest? Does scour characterization need to occur for material below the surface? Are any laboratory studies needed?

Page 3, par. 2: It is stated that it is important to perform congener-specific analysis so possible sources of PCB's and the occurrence of biodegradation can be evaluated. GE concurs this is important since the presence of higher chlorinated levels of PCB's are a good indication of non-GE sources. However, the converse test is not true, that being

the presence of lower chlorinated levels is definitely due to GE. Firstly, the process of anaerobic biodegradation tends to reduce the level of chlorination of a PCB making a higher chlorinated PCB mixture appear more like a lower chlorinated PCB mixture. Secondly, the lighter chlorinated PCB's were the most widely used. Therefore, concluding based on a congener pattern alone that a PCB is from GE would be indefensible.

Page 3, Par. 4: In May of 1991, EPA performed a test of a research data collection technology (side-scan sonar). In the future, GE requests that EPA at least have the courtesy to notify interested parties of such activities. GE also request an opportunity to overview all field activities. Furthermore, on occasion, if adequate sample volumes are available, GE may wish to split samples for independent analysis. This will require a minimal coordination effort on EPA's part.

Page 4, Sec. 3.1: GE has established an extensive network of control points in the upper river and EPA should utilize this in field work. GE will be glad to meet with EPA and share this data at EPA's convenience. With respect to the datums being employed, GE has evaluated the use of the North American Datum (NAD83) and found problems with this and suggest that NAD2 is more appropriate. The earth is not a true sphere; it is an oblate spheroid. The North American Datum of 1927 (NAD27) used the Clark ellipsoid of 1886 to represent this effect. Many of the control points were surveyed in the mid-to-late 1900's and the errors introduced are well known and recognized today.

By contrast, the more accurate NAD83 is based upon both earth and satellite measurements. If no historical data existed for the Hudson River project, and we were not interested in spatial trends, the NAD83 projection would be an excellent selection. However, we have a vast historical database that references NAD27. The following data sets reference NAD27 ground control: 1977 shoreline maps, NYSDEC 1977 sediment data; 1983 EPA sediment data, and the 1977 and 1983 bathymetric surveys.

Conversion programs between NAD27 and NAD83 are ineffective. They distort and propagate errors that may exist in NAD27. For the Upper Hudson errors in converting between NAD27 and NAD83 can be as great as 50 feet.

Page 4, Section 3.2: EPA proposes that a nonstandard indirect technique be employed to study the morphology and sediment texture distribution (i.e. side-scan sonar). A exploratory survey was conducted and the results are presented in

Appendix A-2 of the Phase 2A sampling plan. Additionally, EPA is proposing a bathymetric survey and a sub-bottom profiling survey. EPA should not perform the bathymetric survey but should rather use the data being collected by GE. It appears that the sub-bottom profiling survey will be used to determine the thickness of sediments and the side-scan sonar will yield data on sediment textures and bed morphology.

With respect to the side-scan sonar, EPA does not present any information on this technology. It does not appear that the technique has ever been employed in similar situations. It has been used in geotechnical construction activities where gross textural and spatial changes are required. The exploratory survey performed in May of this year yielded, at best, qualitative results on bed morphology and did not yield any confirmed information on sediment texture distribution. Even the conclusions in the report (appendix A-2) as given by Dr. Roger Flood are tentative: "We stress that these data have been in hand for only about three weeks, and that our statements here are thus only preliminary, subject to revision, and designed to provoke discussion into the underlying causes of sediment and PCB variability". This is certainly not a vote of confidence for the technology, yet it is the only information offered by EPA to support the use of this technology..

Some of the conclusions of the survey report seem exaggerated. With respect to the ability to differentiate sediment types and contaminant areas it seems to be inconclusive. It did appear to show bed morphology. The report did not show that the sub-bottom profiling system had any utility in the river.

The problems and potential limitations of this technology was also discussed at the July 11, 1991 meeting of the EPA Scientific and Technical Committee. A transcript of the meeting was prepared. The relevant portions related to the presentation by Dr. Flood are enclosed. During the discussion a number of important points were brought up:

1. What is measured by the technology is the reflectivity of the river bottom.

2. The reflectivity depends on a number of variables including surface slope, presence of gas, sediment grain size and presumably other factors such as density, stratification, etc.

3. The cost of the survey is estimated to be approximately $200,000.

4. Two sonic frequencies are used; 100 kilohertz and 500 kilohertz. The 500 kilohertz frequency has a wavelength of approximately 3 millimeters. The 100 kilohertz wavelength would have a wavelength of approximately 5 times greater (15 millimeters).

5. The grain sizes of interest, in terms of a strong correlation to PCB, are very much smaller that the wavelengths being used, so a useful relationship with frequency might be difficult to develop.

6. A rule of thumb is that the depth resolution for side-scan sonar is approximately 1 wavelength (3-15 millimeters).

7. It is not clear what the relationship between frequencies, reflectivity and grain size are for the sediment in the Hudson.

8. It is not clear side-scan sonar can differentiate grain size in enough detail to allow those "fine-grained" sediments that may have a relationship to PCB to be differentiate from the grain sizes that do not.

9. Work like that proposed by EPA is an active area for research for people who use sonar.

Based on the discussion during the meeting on July 11, the lack of useful results for the exploratory survey and, the lack of documentation presented by EPA, it is difficult to be optimistic that an additional, costly, extensive side-scan sonar or sub-bottom profiling survey will yield any significant useful information on the distribution of sediment texture within the river that will have relevance to the PCB content of the sediment. Additionally, the technique will only "see" material to a depth of approximately 0.1 - 0.5 inches. A significant threshold issue then is to determine how important vertical variability of the sediments might be in the Hudson River. GE strongly recommends that EPA not move forward with this technique at this time. The unconfirmed conclusions of the field test should be supported by real data. If EPA has additional data that would support the use of this technology, it is suggested they make it available (administrative record?) to interested parties and try to answer the following questions:

1. Does a relationship between texture and PCB composition exist?

2. Has the use of multi-frequency sonar been used to differentiate sediments in the size range of interest?

3. Does the property being measure (reflectivity at two different frequencies) have a theoretical connection to grain size?

4. Is the relationship between the reflectivity and the grain size and the grain size and PCB content significant?

5. What is the benefit of having detailed river bed morphology? Would this be an issue for the feasibility study or for the risk assessment?

6. What do we know about vertical variability of the texture in the sediment column?

EPA needs to clearly define the data quality objectives for this study and to carefully evaluate whether the techniques proposed to fill the data needs will work. The proposed sub-bottom profiling survey and side-scan sonar survey point out the problems that can occur not only when the data needs are poorly defined, but also when the methodologies to fulfill the data needs are poorly documented or researched. GE hopes EPA does not consider the costs of the exploratory research program recoverable under the Superfund program.

Page 7, Section 3.3: The use of confirmatory sampling is a required part of properly designed geophysical survey program. However, GE believes EPA should not implement this portion of the program at this time until further investigation and documentation of the geophysical techniques occur.

Page 7, Section 3.3, Bullets: The following specific comments and questions apply to the specifics of the confirmatory sampling:

- What classification scheme will be employed to classify sediment texture?

- The x-raying of cores will occur. Where is this procedure documented/validated and what will the density variations be used for (i.e. why do this?)?

- Why will redox potential be measured in the confirmatory core? How will the redox potential be measure? It might be useful to measure the redox potential in cores that have congener-specific PCB analysis to see if a

correlation with Eh and PCB alteration (biodegradation) pattern exists. The use of Eh probes can be very difficult when solids are present and if the data is really needed, EPA should consider measuring both ferrous and ferric iron (or another couple)content of sediment pore water.

- Please provide a copy of the grain-sized distribution measurement technique for review and comment.

- What is the purpose of measuring total carbon and total nitrogen on 250 confirmatory sediment samples? What is the purpose of measuring total carbon on 50 confirmatory core samples?

- The samples are to be stored for a year and then either discarded or air dried for long-term storage. Would the samples be better preserved if they were frozen? If the samples contain greater than 50 ppm of PCB can these samples be stored greater than one (1) year? Can they be discarded? How will EPA handle investigatory-derived waste during this investigation?

- The plan states "required" sample handling procedures for Superfund sites will be followed, including chain-of-custody forms, etc. This lack of detail is clearly inadequate to meet the EPA requirements as specified in RI/FS guidance (see earlier discussion).

Page 8, Section 3.4: The capabilities of the high resolution coring program seem to be over sold. One use is stated as being to finger print, based on congener mixtures and "determine the relative contribution of various sources to the total PCB loads at any given location in the River". There is no explanation on what technique will be used to conclude that a given PCB mixture in a given strata comes from a particular source. The difficulty on just determining the type of Aroclors that may have been present is difficult since environmental PCB samples are effected by biological, chemical, and physical process that make it difficult to determine what the original source might have been. Additionally, there was so much use of PCB in the Hudson Valley from numerous sources that it will be impossible to determine, from PCB measurements alone, what the type of PCB was and what the actual source was. It would appear that what the data will give is the relative change in PCB in relative time at a single location in the river. GE believes extrapolation of conclusions to the entire river or to absolute PCB loading levels or to absolute time is a difficult task that will require additional data beyond that from isolated sediment cores within the river.

Page 8, Par. 3: Cores should be taken in areas suspected to be PCB sources, particularly in the lower river. It is not clear where in the river cross section the cores will be taken. Will they be taken as close to a potential shore source as possible, or near the channel? What selection criteria is being used?

Page 9, Par. 3: What method of PCB analysis will be used? What is the purpose of the total carbon, total nitrogen, total organic carbon, and grain size distribution? Will any duplicate cores be obtained?

Page 9, Par. 3: If "uninterpretable" cores are obtained, GE believes the raw data should be reported. Data that does not fit a conceptual model often show the model may be inappropriate or need refinement.

Page 10, Par. 1: EPA proposes to determine the effect of the recent remnants remediation on water column PCB levels by performing a limited number of sampling events. As previously communicated to EPA, GE believes that this information is necessary to determine the "base load" of PCB's so that a proper "baseline" risk assessment for the river sediments (reported purpose of the RRI/FS) can be prepared. The program proposed by EPA may be too limited to achieve the stated objective. Particularly, the time frame during which monitoring will occur is very limited and conclusions concerning the effectiveness of the remnants remediation will be based on a very limited data base and therefore suspect.

An additional problem is that EPA has already agreed that GE should perform the monitoring in the vicinity of the remnant deposits. GE is also monitoring on at least a weekly basis at eight (8) stations in the upper Hudson River. In light of this, monitoring by EPA will be redundant and GE should not be asked to reimburse costs incurred by EPA or its representatives in performing such monitoring. EPA should allow GE to continue both monitoring programs and utilize the data in the RRI/FS.

Page 11, Par. 2: Monitoring on only seven occasions is of limited value. A long term monitoring program should be developed and implemented and coordinated with the on going U.S. Geological Survey (USGS) program, the GE remnant deposits monitoring program and, the GE upper river monitoring program. The existing data base has shown significant seasonal variation in PCB concentrations and a monitoring program limited to a small portion of one year will be of limited value. What is the exact purpose of the monitoring?

Page 11, Bullet 3: What procedures will be followed for the measurement of pH, DO, and specific conductance. Why will this parameters be measured? What QA/QC will apply?

Page 11, Bullet 4: It is stated that 20 liter water samples will be obtained for the analysis of PCB's. Appendix B has a bit more detail on the sampling procedure. With respect to this the following questions/comments apply:

- Physically, how will the samples be collected (pump, jars, etc.)?
- The historical USGS data is based on depth integrated samples at specific river points. The method proposed by EPA is to take separate samples along the river cross section and composite the samples. This change in sampling procedure may make the data sets noncomparable. Additionally, the use of depth integrated sampling of the main channel should yield data more representative of the entire upstream section of the river (PCB flux) as opposed to isolated near shore areas where one sample may only be representative of the very small area where the sample was taken. If it is EPA objective to investigate individual sediment areas and determine flux of PCB from these areas a significant change in the sampling plan will be required.
- The purpose of using 20 liter samples is not discussed. Presumably this will be done to try to lower the PCB detection limit. What is the detection limit that will be achieved by the method in question? Has the method been validated? Which laboratory will be contracted to handle the large sample? Is this an accepted EPA method? GE has been able to utilize more routine methods in a commercial laboratory to achieve acceptable levels of detection.

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