



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

JACOB K. JAVITS FEDERAL BUILDING

NEW YORK, NEW YORK 10278

**HUDSON RIVER PCBs SITE
REASSESSMENT RI/FS**

**SCIENTIFIC AND TECHNICAL COMMITTEE
TUESDAY, OCTOBER 19, 1993
ALBANY, NEW YORK**

MINUTES

On October 19, 1993, a meeting of the Scientific and Technical Committee (STC) for the Hudson River PCBs Site Reassessment RI/FS was held at the Comfort Inn/Airport in Albany, New York. The purpose of the meeting was to provide STC members with: 1) information regarding the geophysical survey of the Hudson River bottom, and 2) the proposed low resolution coring program. The following STC members were in attendance:

Anne Secord	US FWS
John Davis	NYS Att'y Gen'l
Robert Dexter	EVS Consultants
Jay Field	NOAA
Frank Reilly	Ebasco
Dan Abramowicz	GE Corp. R&D
George Putman	SUNY-Albany
Richard Bopp	RPI
Leonard Frost	USGS-WRD
Ron Sloan	NYSDEC

Also attending and participating were:

Doug Tomchuk	US EPA
Sander Bonvell	TAMS
Ed Garvey	TAMS
John Haggard	GE
Jim Rhea	O'Brien & Gere
Mark Behan	Behan Communications
Bill Ports	NYSDEC
Bob Montione	NYSDOH
Roger Flood	SUNY-Stony Brook

The only exception to the planned agenda (attached) was the absence of Dr. William Nicholson who was to serve as moderator. Doug Tomchuk said he had not talked to Dr. Nicholson in a while and did not know why he was absent.

The meeting was started with an introduction from Doug Tomchuk who explained that the purpose of the meeting was to present, discuss, and receive comments on: 1) the results of the geophysical survey of the river bottom performed by Roger Flood of SUNY- Stony Brook's Marine Sciences Research Center; and 2) the proposed low resolution coring program to be performed by TAMS Consultants, Inc. this Fall.

Mr. Tomchuk suggested that committee members introduce themselves and briefly describe their work or interests with regard to this project. He began by discussing a letter he received from Brian Bush (a committee member from NYSDOH who could not be present) regarding multi-plate studies and the uptake/capture of both Aroclors 1242 and 1254 as far south as Poughkeepsie, New York.

Leonard Frost discussed aspects of his sampling and analysis program, and handed out graphs correlating PCB concentrations in Hudson River water from Fort Edward, Stillwater and Waterford during the period from June 1992 to May 1993. Since the material was only in the provisional draft form subject to revision, and is pending approval from the Director of the USGS, it was only for informational purposes and is not to be quoted or released. This material is not attached to these minutes. Mr. Frost indicated that flow measurements from the Waterford and Stillwater locations were not ready yet but would be presented in the annual report due in late spring.

Richard Bopp discussed the collection of large volume water samples, transects, and integrated water samples collected over sixteen day periods every other day from four sites along the Upper Hudson. The sampling is essentially finished for the six or seven sampling events along the six or seven transects, and the data are beginning to arrive from the laboratory. Ancillary information was also collected for conductivity, suspended particle concentrations and DOC (dissolved organic carbon). Dr. Bopp is also evaluating cesium 137 and other radionuclide data from the high resolution cores to establish a depositional history.

George Putman has been looking at the relationships between river discharge and sediment transport based predominantly on USGS data. The data have been plotted but are not yet ready for presentation. The data indicate that the major PCB source, at least since 1979, has been from above Fort Edward. The main sediment source has been from tributaries but they cannot resolve the degree of scouring effects.

Dan Abramowicz reported on several studies regarding PCB biodegradation:

- A field test is being performed at the Housatonic River where GE is stimulating PCB (Aroclor 1260) dechlorination in situ. Unlike the Hudson River site, there is no natural PCB dechlorination in the environment at this site, and they have been able to stimulate the indigenous (microbial) populations. The study will require about another year before publication.
- Another study involves genetics and expanding the ability of aerobic organisms to degrade PCBs by site directed mutagenesis. This involves altering the DNA structures of the genes responsible for PCB degradation. The work is currently in publication and is expected to come out in about a month. This is thought to be original work.

- GE has been surveying the degree and breadth of dechlorination using about 1000 cores from a high resolution, congener specific study.
- GE had detected metabolites from aerobic PCB biodegradation in the Hudson River. This stemmed from last year's caisson studies which hinted at such processes. Taking undisturbed cores from the river bottom back to the laboratory, GE has detected such metabolites in all samples containing PCBs. Based on this and similar studies from other sites, this appears to be a much broader process than originally believed. Some of this work has already been published.
- GE is looking at the microbial fate from the upstream source. An "interesting perturbation" in the system has resulted in large discharges of "undechlorinated" Aroclor 1242. GE has set up microcosms in the laboratory to study dechlorination in the subsurface and degradation in the surface to get a handle on rates of microbial degradation. The study involves no mixing, no inoculations, and no nutrients. Hudson River sediment brought into the lab is spiked with Aroclor 1242 and the results are recorded. Just preliminary results at this time.

Frank Reilly (formerly with the Corps of Engineers, Waterways Experimentation in Vicksburg), and now Manager of Environmental Sciences and Risk Assessment for Ebasco, is researching bioaccumulation of contaminants from sediments and comparative ecological risk assessment of sediment contaminants, particularly sediment genotoxicity.

Bob Dexter is "providing a review of what 's going on."

Jay Field helped Ron Sloan/NYSDEC collect fish during this past summer and NOAA will be funding fish analyses using EPA's methods to increase the data base for assessment during the ecological risk assessment.

John Davis worked with Mr. Sloan and Mr. Field during fish collection, and has been working with NYSDEC to "staunch the flow of PCBs from the Hudson Falls area." Mr. Davis is also working with the Army Corps of Engineers/Delaware regarding the transport of large chlorinated organics in sediments at sites around the country which has resulted in some "interesting physical chemistry."

Anne Secord's interests concern PCB impacts to birds in terms of reproductive success and chromosome damage.

Mr. Tomchuk discussed a project he is working on regarding contacting other EPA project managers who have similar PCB contaminated sediment sites to put together a summary of such information.

Next Mr. Tomchuk introduced Dr. Roger Flood who discussed in detail his geophysical studies to evaluate the Hudson River bottom over a 13 mile stretch from Baker's Fall to Lock 5, including the section from the Thompson Island Dam to Fort Miller. Sediment types in terms of gravel, fine sediment, coarse sediment, etc. were mapped along the river bottom, using the NYSDEC 1984 sediment classification based on grabs and cores. PCBs are linked with sediment dynamics and distribution. The objectives and methods of the geophysical studies include:

OBJECTIVES

- River Bottom Imaging - qualitative, perhaps quantitative
- Sediment Type Distribution - beyond that obtained from point samples
- Sediment Process Insight - erosion, accumulation
- Contaminant Distribution - "hot spots"
- Resuspension - future flood event impacts
- Expand Area of Study - beyond the Thompson Island Pool
- GIS Base & Layer - base map and layered representation

METHODS

- Side Scan Sonar (100 KHz & 500 KHz) - primary tool
- Sub-bottom Profile (7 KHz) - sediment layering
- Echosounder (208 KHz) - water depth and elevation of river bed
- Confirmatory Sampling - approx. 180 grab or core samples, based on sonar findings
- Navigation (to approximately 1 meter resolution)

The study was scheduled to begin in early Winter 1991, but after three days in the field the river froze, and work was suspended until April 1992 with sampling taking place predominantly during May and June, 1992. Ocean Surveys, Inc. supplied boats and navigational equipment, and performed the survey for the river study. Forty different areas were mapped in terms of river bottom morphology using geophysics.

Side scan sonar consisted of towing a transducer under the boat below the water surface while sweeping a sound beam to the side. The sound beam is reflected off the target and picked up by the sonar detection equipment. The incoming sound beam is converted into a voltage which is displayed by a graphic recorder against time. The information is digitized, computer enhanced, and merged with the navigation information to provide map points on the average of every 0.2 feet. A median filter was used to reduce data and remove noise for sonar points about every 0.8 feet. Other techniques such as destriping (at 500 KHz) and shading correction were used to remove interferences and make the recorded images more uniform. A good deal of the presentation dealt with computerization of the image records, and discussions of pixel resolution and principal component analysis. Other questions and answers involved the influence of sediment size upon reflectivity, compensation for the slope of the bottom of the river, continuity within a textured area, wavelength vs. grain size, and grain size variability. Although there is a "fair bit" of variability, Dr. Flood indicated that it did not seem to be productive to detail small scale variability.

From the 500 KHz study, a rough correlation of grain size to the digital number could be made with a correlation coefficient, r^2 , equal to about 0.5; similarly, the 100 KHz showed less confidence and more scatter with an r^2 equal to about 0.3.

The sub-bottom profile study at 7 KHz was used to classify sediment approximately every 15 feet or so. This method does not work well in 5 feet or less of water. Glacial laminated sediments were discovered in 5 or 6 areas along the river that go deeper than other areas and appear to be overlain by more recent sediment deposits. Fine grain sediments appear to be introduced into the river system from tributaries. Dredged material also shows up with this technique.

Dr. Flood presented slides of photographs of most of the 40 areas of study and, beginning at the north end of the study, performed a section by section coverage and geophysical analysis of the complete study area. This detail is not presented herein in these minutes, but a few items should be noted. It was confirmed that there is no sediment behind Baker's Falls, just rock. It was mentioned by Mr. Haggard that an old dam is submerged in front of the new dam. Mounded remnant material could be distinguished just before the rapids. At Roger's Island, a few places were less reflective but the role of topography is unknown; the sediment appears coarser on the west side and finer on the east side.

X-rays of sediment cores were also shown; fine grained, varved sediments show up as shiny because they are compacted. Wood chips were found in some cores at a depth of 25 centimeters.

In some areas of the river, mounds were observed that were about 2 to 10 feet high and 20 feet in diameter.

Flow variations along the river caused by the narrowing and widening of the river appear to be correlated with lower PCB levels in areas of higher velocities, and higher PCB levels in areas of lower velocities (based in part on 1985 data by Zimmie, et al.)

Dr. Abramowicz asked Dr. Flood which of the original objectives he thought the study had met. Dr. Flood responded that the objectives of imaging, sediment type characterization, and gaining insight into sediment processes were met. Contaminant distribution was correlated to sediment types at high PCB concentration but Dr. Flood felt that he required more expertise in this area. The objective of resuspension was not met, and he is far from concluding which areas can or will not erode, although in certain areas it becomes obvious that, say, sediments are trapped behind rocks. Dr. Flood indicated that he was "moderately pleased" with the overall results.

Dr. Abramowicz brought up the question of whether Dr. Flood's data could be made available. Mr. Tomchuk replied that he wasn't sure how the data could be disseminated since there is so much of it and the format of the data would be difficult to copy. There may also be contractual problems associated with distributing the data. Dr. Flood indicated that there is no more on-going work for him since June of this year due to contractual issues. However, from a technical perspective he suggested that CD-ROM would be a reasonable alternative for data distribution although this would be limited to those who possessed the technology. Dr. Flood was unsure at this time whether the files themselves, or the resources needed to copy the data, were tied up in contractual issues.

There was a general consensus among Messrs. Abramowicz, Haggard and Dexter that a professional opinion and comment on this work could not be performed without a more thorough review of the data. Mr. Tomchuk indicated that this would be difficult for two reasons. Firstly, EPA does not release preliminary data, and secondly, it is not the purpose of the Scientific and Technical Committee to necessarily review every bit of information at the same detailed level as the primary researcher. The purpose of these meetings is to comment on the material as it is presented.

The meeting next shifted to a presentation by Edward Garvey of TAMS Consultants, Inc. of the philosophical approach to the low resolution coring program scheduled for the Fall. Mr. Garvey presented the following objectives to this study:

OBJECTIVES

- Thompson Island Pool - to establish a technically defensible estimate of the current PCB sediment mass in the TI Pool and to validate the 1984 NYSDEC study
- Thompson Island Dam to Lock 2 - to establish an improved estimate of PCB sediment mass for previously identified "hot spots" in this region representing the majority of the original inventory estimate

Dr. Abramowicz questioned whether the first objective could be met; based on the opinions of statisticians he has talked to, the 1984 NYSDEC study did not have sufficient sampling density and too much variability exists with that data. Therefore, it would be impossible to confirm the previous study and meet this first objective. Mr. Garvey took exception to that and considers that the 1984 study was acceptable in terms of sampling on the scale of Superfund sites and provides a level of precision that is sufficient for purposes of evaluating such items as geochemical cycles and biological impacts. While one could argue sample heterogeneity, a kriging analysis did suggest a relationship to the data and it appears the data are sufficient for the purpose of the feasibility study and the risk assessment.

Mr. Haggard asked why we need to know this (i.e., the revised mass estimate) and how will this new estimate be used for the risk assessment and the feasibility study. Mr. Garvey responded that from a geochemical perspective this would aid in understanding the drive of the flux of PCBs to the overlying water column. In terms of risk assessment, a revised estimate would support the impact that shoreline or near shore sediments could have on human pathway exposures. In terms of a scouring effect or a catastrophic event, or if the sediment needs to be removed, the mass of sediment PCBs needs to be known to evaluate impacts. Mr. Garvey also mentioned the importance of these data to the ecological risk assessment from the perspective of exposure to biota and other parts of the ecosystem depending on the part of the Thompson Island Pool affected.

Mr. Putman asked if a distinction is being made between sediment mass and PCB mass determination. The answer to this is essentially yes; kriging analysis has been performed on both PCB concentration/mass data and sediment mass data, since such analyses must specify an effective depth of penetration. In response to whether the data in the inventory being evaluated was that originally determined by Mark Brown, et al., the answer was yes.

Mr. Garvey indicated that based on the side-scan sonar results, there are a few "hot spots" below the Thompson Island Dam that will be looked at to refine, on a limited basis, the NYSDEC "hot spot" determinations and a few other spots that have not been sufficiently sampled previously. Mr. Garvey then proceeded to discuss how these objectives translate into the following project goals:

GOALS

Thompson Island Pool

- Confirm the applicability of the 1984 NYSDEC survey to current conditions.
- Expand the 1984 database by exploring a limited number of near shore areas not previously studied. Most of the 1984 data was limited to no closer than 60 feet from shore; evidence from NYSDEC, 1991 General Electric data, and the high resolution coring results indicate high PCB concentrations within 20 to 30 feet from shore that have not been investigated by NYSDEC.

Thompson Island Dam to Lock 2

- Refine the 1977 NYSDEC estimates of PCB mass in a limited number of previously identified "hot spots"
- Examining one or two zones identified by side-scan sonar as fine grain material exhibiting all the classic characteristics of what a "hot spot" should look like.

TECHNICAL APPROACH

- Thompson Island Pool - use the 1984 NYSDEC survey results, interpretation of the side-scan sonar study, 1990/1991 GE data, and confirmatory sampling surveys, to select a range of sites to reoccupy, core and analyze for comparison with the original survey. The original Phase 2 Work Plan to verify 3 to 5 "hot spots" would require approximately 100 sampling points per "hot spot" which would mean verification using a large number of points for analysis previously using a significantly lesser number of points. A different approach has been decided upon wherein 3 to 5 sampling points in an area not necessarily related to a "hot spot" will be selected on the basis of points in the vicinity of all comparable values, and homogeneity will try to be determined within a given defined area.
- Thompson Island Dam to Lock 5 - based on the 1977 survey of sediment mass, the side-scan sonar survey, and confirmatory sampling, lay out a sampling grid (8 to 10 spots per "hot spot") and collect sediment cores from "hot spot" areas estimated to represent substantial PCB mass.
- Lock 5 to Lock 2 - Based on the 1977 survey estimates and recent reconnaissance, examine 2 "hot spots" representing the majority of "hot spot" PCB mass in this region. Simple grid of about 10 points per area. This will quadruple the number of data points currently available to define this area.

Mr. Dexter wanted to clarify that these proposed studies will collect additional information to confirm that the data collected during the 1984 NYSDEC study are applicable today, and that the proposed study is not trying to improve on the sufficiency of that historic data. Mr. Dexter thought that the approach was biasing the results to test only for a particular type of information from a homogeneous area that may not be entirely translatable to the entire data set, but he wasn't sure.

Mr. Garvey said that he appreciated this, and that the original intent was to lay out a random grid over the old NYSDEC sampling area and to compare the mean of the results. However, even on a scale of 25 points, the NYSDEC data had a standard deviation that was equal to or comparable to about half of the mean value, if not the mean value itself. Mr. Dexter felt that Mr. Garvey was arguing against himself. If there is so much variability that one cannot make a statistical comparison of "then and now" that has any power, then how can the 1984 NYSDEC data have enough power to determine what the "hot spots" are?

Dr. Abramowicz questioned that if 80 samples are needed now to confirm what 20 samples showed previously, then how could the previous data have been technically defensible? It doesn't seem as though there were enough samples taken previously during the 1984 study. Mr. Garvey countered that this would be true if you were trying to confirm a single "hot spot". However, the Thompson Island Pool is being looked at as a single zone, and rather than looking at, say, five mass estimates within the Pool requiring 80 points per "hot spot", the whole Pool will be assessed looking at one mass estimate using 70 to 80 points. Dr. Abramowicz did not understand how this would be more accurate. Mr. Garvey

stated that the assumption is that whatever has happened to one sediment spot within the pool (on some limited basis) has probably happened to all of them, and they are looking to see if there is a net loss in the sediment inventory. Based on statistics and the kriging analysis, this is probably as good as it's going to get. Dr. Abramowicz agreed but said that leads to a different conclusion and does not imply that you know what the number is.

In response to Mr. Dexter's comment that Mr. Garvey has been using terms such as "refine" or "make a little better", Mr. Garvey stated that many of the hot spots below the Thompson Island Dam were identified by only 2 or 3 samples fifteen years ago, and since then there have been events which could have perturbed the river system such as the major flood of 1979. If an effort is going to be made to go after these areas and learn more about them comparable to the 1984 effort, then we need to know whether that effort is warranted. Mr. Tomchuk stated that even NYSDEC sees the need for more sampling in those areas during remedial design, and that this is typical of Superfund sites.

Dr. Abramowicz discussed that "hot spot" #5 was "sampled to death"; 150 cores were collected and GE did not feel it was enough to determine the [PCB] mass of this spot accurately. Mr. Garvey said that this particular hot spot was shown by side-scan sonar to be a fine grained zone that is not homogeneous on the scale of the river, and is only a fine grained sliver of an area along the bank of the river. Similar arguments were made by GE representatives for other areas investigated by GE; even their study of 200 samples per "hot spot" in the Thompson Island Pool was not sufficient to spatially map out the PCB distribution.

Mr. Garvey then showed a slide of the proposed 4-inch wide, three-feet long core that would be collected; the top 2 centimeters would be collected for Be⁷ analysis to evaluate recent deposition, and each of the next 12-inch sections would be tested for: PCBs, grain size, total carbon/total nitrogen (as an indicator of wood cellulose), total organic carbon, total Kjeldahl nitrogen, bulk density and percent solids. Finally the bottom 5-inches would be analyzed for Cs¹³⁷ to evaluate historical deposition. Based on the high resolution coring in the Thompson Island Pool, it appears that 2 1/2 to 5 inches of sediment have accumulated since the 1984 NYSDEC survey.

There was an overall question (Rhea, Abramowicz) on how one could compare "then and now" if dechlorination has occurred over the past ten years. Dr. Abramowicz stated that since quantitation of dechlorination was not feasible 10 years ago using packed column gas chromatography, there is only one quantitative point in time so far for this type of evaluation (the 1991 GE data). Mr. Putnam didn't see how the variability issue could be resolved; there are too many unknowns.

Mr. Tomchuk summarized this section of the meeting by stating that there seems to be a disagreement over the approach to the low resolution coring program. EPA expected criticism but still feels that the proposal is feasible. Dr. Rhea suggested that GE data be used by EPA to improve the scale of the study to justify its basis.

The meeting ended with a general discussion of the frustration by some committee members in not being able to have data available to them for further review, such as the side-scan sonar data and kriging analysis. There was question as to whether a critical evaluation of the material could be made by the volunteer members of the committee. Mr. Tomchuk reminded everyone that the purpose of the committee is not to have everyone review everything in detail, but that the review is to be made just as it was today at the meeting. This has been, and will continue to be, the format of these meetings.



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TUESDAY, OCTOBER 19, 1993
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AGENDA

Welcome and Introduction
(5 minutes)

Douglas Tomchuk, USEPA
Project Manager

Current Hudson River and/or
PCB Research and Studies
(45 minutes)

STC Membership
Dr. William Nicholson
Mt. Sinai Medical Center

Side-Scan Sonar and Other
Geophysical Surveys
Presentation and Discussion
(2.5 hours)

Roger Flood,
SUNY - Stony Brook

Lunch Break (1 hour)

Proposed Low Resolution
Coring Program
Presentation and Discussion
(1.5 hours)

Ed Garvey, TAMS

Summary
(15 minutes)

Dr. William Nicholson
Mt. Sinai Medical Center

Adjourn

Observers will only be allowed to participate if the STC membership
has a specific question of a particular observer.