



**Contaminant Fate Workgroup Meeting
September 15, 2005
Meeting Minutes**

Attendees: Joel Baker (University of Maryland), Terry Cooke (URS Corporation), Jay Davis (SFEI), Ben Greenfield (SFEI), Frank Gobas (SFU), Andy Gunther (AMS), Tom Grieb (Tetra Tech), Katherine Heidel (Tetra Tech), Fred Hetzel (SFRWQCB), Richard Looker (SFRWQCB), Tom McKone (UC-Berkeley, LBNL), Bill Mills (Tetra Tech), John Oram (SFEI), Meg Sedlak (SFEI), Keith Stolzenbach (UCLA), Don Yee (SFEI)

Introduction and Review of Agenda

Meg Sedlak opened the meeting with a brief explanation of the day's agenda and how it related to April's CFWG meeting.

Update on the Multi-box Model

John Oram presented background information on the multi-box model (version 2.0b) including modifications that had been made to the model in the Spring and the advantages of the multi-box model over the one-box model. Richard Looker commented that the multi-box model was calibrated based on bathymetric changes, not suspended sediment concentrations (SSC), and there is some uncertainty associated with forecasting of bathymetry. Andy Gunther of AMS stated that this would argue for additional bathymetry work on a regular basis.

John Oram explained that the multi-box model was an improvement on the one-box model because it included spatial loadings from tributaries. It was noted that the model overestimated surface concentrations as compared to NOAA/EMAP data, particularly for the South Bay. The group speculated that this might be a result of the loading factor, which assumes a certain load based on population irrespective of land use. Several individuals noted that the South Bay was relatively undeveloped during the peak PCB usage and, therefore, the concentration in sediments based on the current population would likely result in an overestimation. It was recommended that John Oram compare the loading rates in the model to the loads estimated by Lester McKee in his Guadalupe and Mallard Island studies.

Another advantage of the multi-box model is that it includes degradation of PCBs. John Oram indicated that one of the uncertainties in the model was the degradation rate constant for PCBs. Degradation constants for individual congeners vary dramatically.

John indicated that the model uses a literature rate for one congener (congener 118). Joel Baker noted that this is probably not reflective of what is occurring in the estuary because degradation is a function of a variety of conditions including the concentration of PCBs and environment (anaerobic or aerobic). Based on his experience with the Hudson River, Joel Baker felt that the degradation loss predicted by the model was too high (approximately 30 to 40 percent). The workgroup recommended that multiple congeners be evaluated.

Tetra Tech's Comments on the Multi-box Model

Tetra Tech reviewed the model to verify that the model is consistent with the stated assumptions and to assure that it can be run on different operating systems (e.g., Windows, Linux, etc.). No significant issues were identified by Tetra Tech. Tetra Tech made several comments including:

- A report documenting the current model should be prepared.
 - John Oram will prepare new documentation.
- Review and modify historic inputs
 - John Oram will review.
- Investigate sea level rise
 - It was decided that while this was interesting conceptually, it was out of the scope of the current work.
- SSC are overestimated in South Bay. As indicated previously, the model can either be calibrated to suspended solid concentrations or bathymetry but not both. Because changes in the estuary sediment conditions are more important than predicting SSC, the USGS optimized the model for bathymetric changes.
 - It was decided that changes to the sediment model would be evaluated and if need be, conducted by USGS.
- Spin-up may be artificially affecting PCB transport. Tetra Tech indicated that the time it takes the model to come into equilibrium (spin-up) is approximately 20 years. Sediment mass transport during this period is highly uncertain. This potentially translates into unrealistic PCB transport during the spin-up period.
 - Alternative initialization conditions will be investigated by John Oram. One possibility is to not introduce PCBs until after the spin-up period.
- Hindcast overpredicts PCBs in water column and surface sediment. The model overpredicts the SSC for certain areas of the north bay. Joel Baker suggested that John Oram could look at the ratio of water to sediment PCB concentrations in the model and the field results to determine whether this overprediction was due the loading function. He expressed concern that until some artifacts of the model (e.g. the very high modeled SSC in LSB) are understood, loading adjustments to get better model fits may not be appropriate. Don Yee commented that the RMP data was taken from the spine of the channel and would likely have a lower SSC than that calculated for the entire box (shallows and channel). The RMP has since moved to a randomized design in which the shallows are sampled. Those more recent measurements, though higher than historical RMP data, do not entirely explain the difference in modeled and measured SSC.
 - The consensus from the group was that SFEI would conduct additional calibration exercises by comparing field data to model results.

- Multiple congeners should be evaluated.
 - John Oram indicated that additional congeners would be evaluated.

Tom Grieb of Tetra Tech gave a brief presentation on how the sensitivity analyses will be conducted. Tetra Tech will use a Monte-Carlo type uncertainty analysis. Tom Grieb indicated that the group will need to decide on critical performance criteria (e.g. ranges of acceptable output). The group suggested that the performance criteria be developed from the field data available (e.g., NOAA EMAP data and cores). The group agreed that the model needed further calibration before the sensitivity analyses could be undertaken.

Draft Sediment Sampling Plan

Don Yee gave a presentation on the Draft Sediment Coring Plan that is proposed for the Fall 2005. Workgroup members received a draft of the coring plan prior to the meeting. Don Yee discussed the objectives for the sampling: to estimate future loads; to estimate historic loadings; to characterize contamination with depth; and to provide data for parameterization of the model. Don Yee briefly outlined the sampling plan (e.g., 17 cores to be advanced in four segments of the estuary with different erosional/depositional regimes). Don Yee indicated that the coring work was being consolidated into one event rather than two as had been initially proposed.

The group discussed the collection of cores in the Guadalupe wetland area. Tom Grieb was uncertain as to value of these cores because they are likely to reflect recent management actions (e.g., dredging of river/tidal area) rather than historical deposition. Terry Cooke indicated that it might be possible to find areas that were undisturbed (e.g., Triangle Marsh). A discussion ensued regarding the utility of deep bay versus wetland cores. Deep bay cores tend to integrate contamination and processes; wetland cores may show changes more rapidly but tend to be reflective of local sources. Richard Looker indicated that he was interested in seeing deep bay cores.

Fred Hetzel requested that at least one core be collected in the depositional area between Richmond and Oakland. Keith Stolzenbach requested that Don prepare a map showing the proposed locations of the cores superimposed on the depositional regimes.

Andy Gunther queried the advisory panel about whether the coring sampling event should wait until additional information was available regarding the sensitivity analyses or to assemble local expertise (to refine questions of sampling methodology and micro-scale sampling location to maximize the probability of achieving the most important objectives). The technical advisory panel strongly recommended that the coring proceed. All felt that the data would be extremely useful irrespective of the modeling effort, and that the plan's timeline be directed by needs to address scientific questions, not by the multibox model sensitivity analysis.

Andy Gunther indicated that he would revise the scope of work for the sampling plan and redistribute.

Contaminant Workgroup Five-Year Plan

A discussion of the five-year plan was postponed in the interest of time. Meg Sedlak briefly presented the activities for 2006 that would be conducted under the auspices of the CFWG. These activities included the coring sampling event (\$100,000) and review of the multi-box project (\$20,000). The CFWG advisory panel approved these expenditures.

Ms. Sedlak briefly outlined future studies to be undertaken by CFWG and requested input from the panel for other ideas.

Sediment Quality Objectives

Ben Greenfield gave a brief presentation on how the food web model developed by Frank Gobas had been applied to the development of Sediment Quality Objectives for the State of California. The model is being used to determine sediment concentrations that will be protection of human health and wildlife. The State will promulgate the objectives in 2007.

Mercury Model

Tom McKone presented the findings from a recently published fugacity model of three mercury species for the Bay. The model is divided into compartments such as sediment, water, air, into which mercury is transferred and then speciated into mercury, divalent mercury, and methylmercury. Tom McKone indicated that a substantial load of mercury is present in air; however, its flux through the system is quite high. Richard Looker commented that the methylmercury concentration was a small portion of the total mass and therefore you could almost ignore this component for an overall mercury mass balance. Tom McKone noted that one of the primary model assumptions, equilibrium among mercury species, was predicated on very long residence times relative to transformation processes, which work best when the defined system is very large (i.e. the entire Bay and surrounding watersheds).

The workgroup adjourned at approximately 3:30 pm.