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Sources Pathways and Loading Workgroup Meeting

May 22nd, 2007 10 am – 4 pm
SFEI Downstairs Conference Room
7770 Pardee Lane 1st Floor
Oakland CA 94621

Minutes

10:05 am

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Welcome

Lester McKee, SFEI called the meeting to order and welcomed the group. He explained the objective of the meeting was to get WG feed back in a number of technical reports were have been writing and most importantly to discuss special and pilot studies proposals in so far. He made a specific welcome address to Dr. Michael Stenstrom, UCLA, Professor in Civil and Environmental Engineering and Dr. Eric Stein from SCCWRP, both of whom have agreed to provide external review and oversight on WG activities and products. Dr Barbara Mahler, USGS Texas, could not attend the meeting but has agreed to provide a greater reviewer role and is intending to attend the 2nd meeting of the year (likely October or November).

Attendees (n=24): John Oram, SFEI; Jon Konnan, BASMAA; Lester McKee, SFEI (Chair); Richard Looker, RWQCB; Trish Mulvey, Clean South Bay/SFEI Board member; Paul Salop, AMS; Mike Connor, SFEI; Meg Sedlak, SFEI; James Downing, CSJ; Jim McGrath, SFEI Board member; Neil Ganju USGS, Sacramento; Jay Davis, SFEI; Eric Stein, SCCWRP; Don Yee, SFEI; Terry Cooke, URS; Rebecca Verity, URS; Christine Werme, Consultant; Rand Eads, RiverMtrics; Jon Leatherbarrow, SFEI/ PhD candidate UCD; Katie Harrold, SFEI; Mike Stenstrom, UCLA; Tom Hall, EOA; Peter Mangarella, GeoSyntec; Eric Dunlavey, CSJ; Jamison Crosby, Contra Costa Clean Water Prog.; Ben Greenfield, SFEI.

10:10 am

Item #1

Trace element loads in urbanized watersheds and the potential for treatment of NPS loads

Lester McKee gave a presentation on trace metal loadings in the Guadalupe River during WYs 2003, 2004, and 2005. At the May 2006 WG meeting it became evident that the WG needed further information of the trace element work we did in Guadalupe. At the November 2006 WG meeting, members suggested that we should continually strive to make our work more relevant for informing management decisions. This presentation provided a contribution to these two requests by presenting a detailed synthesis of trace metal concentrations and loads in Guadalupe River and touching upon the potential for treatment control of loads. Discussion and questions included how we calculated FWMC. Lester answered that FWMC was calculated by dividing total wet season loads by total wet season discharge. Eric S suggested doing a more sophisticated analysis of data from the literature and somehow weighting it for % development. Lester agreed that would be a good idea but that it might not fit into the current work effort. Trish M asked about sources of Cd and about the trend. Perhaps the trend is associated with the reduction of the use of Cd in paint and batteries? Jim M commented the some of the outliers in the trend might be to do with different rates of urbanization. Lester had removed “non-urbanized” from the data set before looking at trends. Jim M commented that Guadalupe is “rapidly urbanizing”. Mike S commented that for Cd, the indication of the trend might be associated with just one outlier point. Neil G commented that the 2% error for SSC might be a little low citing the standard methods that suggest 10% is likely and that it changes with concentration. Trish asked us to comment of the Ag analysis and difficulties. Don responded saying the major problem is that we are near detection limits.

Action Items:

- Lester to determine what the cause of the Cd trend might be.
- Lester to test the Cd trend after removing the outlier on the left of the graph
- Lester to check our duplicate data to see if 2% is correct

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10:45 am

Item #2

Concentrations and loads of polychlorinated biphenyls and organochlorine pesticides in the urbanized Guadalupe River watershed, California, USA

Jon Leatherbarrow, SFEI gave a presentation on PCBs and OC Pesticides in the Guadalupe River during WYs 2003, 2004, 2005, and 2006. Concentrations and loads have been measured in Guadalupe River over four years. The question is, are they typical of other urbanized watersheds in the world and what do the patterns we see in the hydrograph and in the congeners and degradation products tell us about sources and most importantly, is the Guadalupe River representative of typical urban areas and useful for extrapolating to other Bay Area watersheds? Paul S commented about the continued use of PCBs and the linkage to other projects (SFEIs Prop 13 project). Richard L commented on the need to test residuals on the regressions if confidence intervals of the regression equations would be used. Eric asked about the rainfall in the watershed – is it possible to get localized rainfall? Lester answered yes: depending on the direction of the storm we have seen watershed wide, mountain dominated and city dominated rainfall during storms. Eric commented that it would be good to develop a model to tease out rainfall distribution, intensity, and size versus number of storms and antecedent conditions. Eric said they do see relationships between accumulated rainfall, rainfall intensity and particle concentrations. Lester M said we don't see a pattern with accumulated rainfall and Hg but we have not check it for the other contaminants. Jim M asked for clarification on sample 311. Jon L said it is because of a fresh source. James D commented about the use of arochlors in many uses but he knows of know info in the use in businesses. Mike S suggested we could use aerial photographs to snoop around through time – worked for MTBE in the city of Santa Monica. Jim M was excited about this type of detective work. Richard L asked if it is possible to check the patterns for other storms. Jon said yes. Eric S asked what does the congener pattern look like for SJ wastewater? Mike S suggested the use of continuous measurement of EC to better understand source water – to help understand congener patterns. EC is useful because TDS is ubiquitous so it tells us about not raining earlier parts of storms (high) and (low) raining diluted later parts of storms. Richard L suggested using a tracer indicative of reduced condition (e.g. a reduced form of a metal) to track near versus far channel sources or for sources that may have been subject to reducing conditions (e.g. buried). Mike S suggested there could be some chance of progress in that area. Mike S asked about filter size. Lester had discussed this with the labs 3-4 years ago he could not remember the nominal size. Rand commented about filters also and agreed with Mike that we need to check this. Jon K asked about PCB dechlorination and also about the pattern of DDE.

Action Items:

- Jon to fix the way he has calculated the FWMC to be consistent with Lester's method
- Jon to test the residuals of the regressions
- Jon to check for any influence of accumulated rainfall (see Stein et al paper in ES&T)
- Jon to test other storms for congener patterns
- Jon to compare GR to SJ waste water congener patterns
- Lester to add continuous measurement of EC to future loading studies
- Lester to check (again) with labs on filter size

11:30 am

Item #3

Measurements of Mercury Concentrations and Loads in a Large River System Tributary to San Francisco Bay, California, USA

- Lester presented on Hg in flow waters on the Sacramento River at Mallard Island (on behalf of Nicole D who had to be out in the field to capture first flush runoff from ag irrigations waters). Concentrations and loads have been measured at Mallard Island on the Sacramento River for the past 5 years. Prior to WY 2005, we only made observations during floods of low magnitude (<150,000 cfs). Based on a review of data from Chris Foe (R5 RWQCB), we had presented a hypothesis that even larger loads would occur during "Yolo Bypass events" when contaminated sediments would pass through the system from mining areas. The WG urged us to continue to study the system and be ready to react with additional resources should a large flood occur. Such

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an event did occur in WY 2006 and our hypothesis has not been rejected. Although we can see an elevated signal that we attribute to mining waste, we argue that clean water derived from atmospheric deposition still dominates the pattern of concentrations we see at Mallard Island. Neil suggested we plot the source water ratios against Hg concentrations or particle concentrations. Richard suggested we also plot the ratios against the organics. Jim M commented about how much Hg could be from mining. Lester said from memory the USGS literature says about 70% of 40,000,000 kg? Richard L asked about the wet deposition data. Lester said we used both BA data and published Stedding et al data (they show the same thing). Mike S asked if we could use isotopes to look at sources. Lester commented that that had been discussed many years ago at the 1st RMP Hg workshop. From memory because most of the Hg is from one mining area (Guadalupe), the isotope method may not work but perhaps there are conflicting opinions on that. Mike S countered with the suggestion that we should at least be able to see the difference between the mines and the atmosphere. Jim M commented on the Hg sediment concentration spikes and said the hypothesis for the cause is cleaning out historic bed sediment sources. Again look at the ratios of the source waters to see if Cache creek could be the cause. Mike S suggested our hypotheses on the relationship between area and yield works for urbanized land use. If Hg is natural we would expect a positive slope. Lester disagreed – the hypothesis is based on well established work on suspended sediments. Eric S also questioned this and Lester sent him some literature on the subject (after the meeting). Don commented that there are Hg air numbers from Sequoia NP and Corvallis. Terry C commented that there are studies from Florida on Hg spiked rain. Don commented that there is a CFWG proposal to study isotopes in rain to learn more about methylation potential? There were also comments on the conceptual model saying the atmospheric deposition would fall on the ag and then the ag runoff would get to the Sac River.

Action Items:

- Nicole to test if there is a relationship between the ratio of source waters to Hg concentrations in water and water column sediment
- Jon L to test if there is a relationship between the ratio of source waters to PCB/OC Pest concentrations in water and water column sediment
- Nicole to check the USGS literature for the mass of Hg used in mining
- Nicole to get the Sequoia NP and Corvallis Hg deposition data and compare
- Nicole to review the unit export literature to determine why some fall of the expected relationship between area and export

1:00 pm

Item #4

A Mass Budget of PBDEs in San Francisco Bay, CA

John Oram gave a presentation on behalf of him and his coauthors. California, and in particular, San Francisco Bay, is a known global PBDE hot spot; concentrations in seals, falcons, fish, bivalves, and humans are among the highest or the highest ever reported anywhere in the world. There have been perhaps zero previous studies of loads in rivers and only a few studies on wastewater loads. Given there is differential take-up of specific congeners by organisms and that each loading source exhibits a unique congener pattern, management of a system like San Francisco Bay will require an understanding of these patterns. A mass balance provides such an analysis. Paul S asked is PBDE in all plastics and textiles. John said no and clarified saying in nylon clothing, computer cases, TVs etc, vinyl in cars. Trish M suggested we edit Bay to Bay Area. Eric S suggested we check the muscle watch data for PBDEs. Jay D commented that there is evidence that PBDE concentrations may be leveling off. Someone commented that dissolved conc (indicated by lower brominated congeners) at Mallard should vary with discharge – John said yes it does. Eric S asked for a clarification on the confidence in extrapolation. Lester said it was based on area but that no matter how we did it (urban area) or ratios with PCBs we get the same rough number. Eric S again supported developing a model to do the extrapolation. Eric S also asked about the treatment level of wastewater? John said all tertiary. Lester said the three plants account for 65% of the total based on flow. Mike S asked about the loss terms in the model and said your choice will influence the outcomes drastically. Particularly the sink terms. Eric S commented that we might be underestimating BDE 209 by

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not accounting for dissolved when using the FWMC method at Mallard. Eric S asked if the model accounts for bioaccumulation. John said no. Terry C asked did it incorporate atmospheric. John said yes. Mike S asked – have there been published degradation rates in wastewater. John said no but could check again.

Action Items:

- John to check the use of the term Bay versus Bay Area
- John to check muscle watch data for PBDEs
- John to think through the potential for underestimation of BDE 209 loads using FWMC and Mallard Island
- John to check for published degradation rates in wastewater
- John to check the flows from the plants and also factor in secondary to the scaling of wastewater loads

1:15 pm

Item#5

Zone 4 Line A - Small Tributaries Loading Study #2 in Hayward

Rand Eads and Lester McKee have a presentation on recent (week old) preliminary results from this new study. In 2000, 2001, and 2002, a series of WG desktop study reports provided a recommended work plan for the SPLWG and recommended that a network of six observation watersheds be developed. The WG revisited priorities during the development of a new 5-year work plan (McKee, 2005) and again recommended further loading studies. A fundamental question is: Are the current estimates of loads to the Bay (based on extrapolation from Guadalupe data (organics) and literature (Hg) valid or are they underestimated? Initiation of the Z4LA study addresses this question. Eric S asked is the TTS triggered with flow. Rand says turbidity is the main trigger. Neil G asked how was flow measured? Rand and Lester said using a pressure transducer and a Marsh McBurny flow meter. Eric S asked about rainfall. Rand said, very little rainfall and low intensity (Lester says 65% of normal) yet we saw amazing responses a foot or more of runoff for only a few 10th of an inch. Eric S asked if we could have the data logger control the time interval of capture. Rand says no. Mike S recommended we add EC to help determine the source of water. Eric S suggested we pull the general permits to see what is in the watershed that might be contributing to the dry weather flows. Paul S suggested we look at storm drain maps to get some understanding of the sources and relationships to our sampling site. Neil G commented that GS and density could be influencing the turbidity SSC relationships. Mike S commented on oils and grease. HCs in paint, thinners. OC related well to oil and grease whereas the others did not. Also relationships would change through the storm sequence. Eric S and Mike S suggested the trace element concentrations are low compared to SoCal stormwater. Lester said they look low compared to Guadalupe as well. Organics are also lower but Mike C reminded the group that this was a 65% rainfall year. Discussion turned to the oil on the surface during floods. Paul S suggested this is a newly industrialized watershed. Lester agreed except for a small pocket. Jay D commented that there might be significant mass associated with the oil slicks on the surface. Discussion turned to what to focus on next year. The options included:

1. Collect many more water samples (same list of analytes)
2. Collect a few more water samples (increase number of analytes)
3. Do a pilot study on the neighboring watershed
4. Give the funds back to the TRC to reallocate

The WG rejected option 3 and 4 outright. The WG generally favored more samples and more duplicates. The analytes to add include grain size, EC, and dissolved fractions on a few samples under a range of flow conditions. Lester argued for adding a few analyses for nutrients, keeping PAHs given the increasing interest, and developing a model to drive interpretation of the data. The WG had mixed feelings on this. The WG generally thought pyrethroids, dioxins and furans and perfluorinated compounds should remain a lower priority.

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- Lester to explore the cost of adding continuous measurement of EC to next years analytic list
- Lester to request the permits in the watershed
- Lester to use storm drain maps to explore source areas
- Lester to report any illicit Q when it is seen
- Lester to explore the cost of adding grain size and density to next years study
- Lester to attempt to sample the oil slicks during WY 2008 high flow and have the samples analyzed for trace organics and Hg.

3:00 pm

Item #6

Review of proposals for SPL special and pilot studies

- Context: The RMP has funds for special and pilot studies available for small projects in 2008-2009. In 2008, there is about \$310k available. The following list represents concepts for consideration through the SPLWG. NOTE, the TRC and SC approved funding the small tributaries loadings work through the base program.

Study No.	Name	Submitted By	Budget	WG Review
#1	Methylmercury loading inventory for SF Bay	Lester McKee and RMP staff (SFEI)	\$22,000	SPLWG
#2	Cross-sectional variability at Mallard Island	Neil Ganju and Dave Schoellhamer (USGS)	\$54,000	SPLWG ⁺
#3	Analysis of PBDEs in sediments, biota, and storm water adjacent to autoshrredder waste facilities	Paul Salop (AMS) and Ben Greenfield (SFEI)	\$73,000	SPLWG ⁺
#4	Guadalupe River Watershed Model Development	John Oram, Lester McKee, RMP staff (SFEI)	\$85,000	SPLWG ⁺
#5	Watershed specific sediment loads – a new estimate for predicting sediment quality	Lester McKee and RMP staff (SFEI)	\$32,000	SPLWG ⁺

The minutes for this component of the meeting are captured in modifications for the special and pilot studies proposals listed above.

Adjourn: 4:10 pm (Next meeting late September or Early October)