

Notes from the Regional Sediment Evaluation Team Annual Meeting
October 18, 2012, Galaxy Room, US Army Corps of Engineers, Seattle District Office

Introductions: Lt Col Kevin Stoll, Deputy District Engineer, US Army Corps of Engineers, Seattle District, gave introductory remarks for the Corps. He mentioned that the SEF covers the entire Pacific Northwest; it is truly collaborative far-reaching process. Holding the meeting in Seattle this year reaches another part of the region. The SEF uses best available science, has regional flexibility, and incorporates adaptive management, which has added so much to sediment evaluation. The annual review provides a public forum to update the public and give them an opportunity for input. The Corps has to balance environmental protection with the need for commerce and economic needs. Challenged with limited resources, the Corps still supports beneficial use of dredged material and clean-up in the aquatic environment. Commerce and navigation must be maintained in an environmentally sound manner, but these two things can be balanced. He thanked people for attending.

Teena Reichgott, USEPA Region 10, office of Ecosystems Tribal and Public Affairs also welcomed people to the meeting. The RSET, now turning ten years old, is co-chaired by the Corps and EPA. Original task was develop a Regional sediment testing manual for regional consistency This is a strong and lasting partnership, and all of the RSET agencies participated in the writing of the manual and its implementation. The manual has been in use since mid-2009. This is our 3rd annual meeting and the first one being held in the Puget Sound area. It provides a clear set of testing procedures and a predictable process for users. We are committed to see dredging and disposal that protects the aquatic environment. We want to continue to refine and update the manual using the best available science and policy, with participation from the public. Additional research is needed in some areas such as bioaccumulation and developing a risk management strategy for making decisions on disposal and in-water exposure of sediments with bioaccumulative contaminants. There is a full agenda today and we hope to have a productive meeting with good discussion of the issues

Meeting attendees introduced themselves to the group.

Lauran Warner, USACE: overview of DMMP projects during the 2012 dredging year (June 16, 2011 to June 15, 2012). This was a relatively active year for the Dredged Material Management Office (DMMO) due in part to the USACE goal of evaluating every navigational channel. There were a total of 24 projects evaluated, 13 of which resulted in suitability determinations. Other types of evaluations included dioxin (1), volume revision (5), recency (3), anti-degradation (1), ranking (1), and progress memo (1). Of the 24 completed actions, 14 had chemical testing, 10 included dioxin testing, 2 had bioassay testing, and there was no bioaccumulation testing. Lauran provided maps showing the state-wide extent of projects.

Most material was found suitable for open-water disposal. Of the total 24 projects evaluated by the DMMO, half were entirely suitable for open water disposal. Two projects (Port of Tacoma and Bellingham Bay) had DMMU failures based on dioxin alone. Two other projects included DMMUs with dioxin failures but also failures of other chemicals of concern. Five projects passed dioxin testing. Projects with either all material or a portion of the material deemed unsuitable for open-water disposal and their reasons are listed below:

- Harbor Village Marina, Lake Washington; PCBs, dioxins
- Lafarge NA, Duwamish River; PCBs, dioxins
- Port of Tacoma, Husky Terminal; Dioxins
- Seattle Iron & Metals, Duwamish River; PCBs, dioxins

- USACE, Duwamish Navigation Channel; Bioassays
- Bellingham Federal Channel; Dioxins
- Lakeshore Marina, Lake Chelan (?) Pesticides.

Half of the above projects with unsuitable material were associated with the Duwamish. Several new projects are in the pipeline for Puget Sound and the Columbia River, in addition to a navigation improvement study in Grays Harbor.

Lauren displayed the links to the new DMMO web site at Seattle district, and where different information is, and the Portland district web site. Justine asked her to highlight where the sediment reference material section was. Eric Braun noted the Portland district site link is where the RSET web site resides for people's information and Lauren said they would make the link clearer.

James McMillan, USACE Portland district: summary of Portland Sediment Evaluation Team activities for 2012. The PSET, consisting of six agencies, reviews sediment evaluations in the Portland district area, including Oregon and the lower Columbia. PSET revised its SAP guidance in August 2012. The PSET also has changed its name from the PRG this year. The team has operated since 2007. This year, the team has reviewed 36 projects and wrote decision memoranda on 30 projects. Numbers of projects reviewed has gone down in the last 3 years. Tests for 107,500 cy were reviewed; all but less than 1000 cy were found suitable (Nehalem, OR). On one other non-dredging project involving sediment, sediment at a restoration project near Cannon Beach Oregon was also unsuitable. The Corps' navigation program projects reviewed this year include SAPs for Desdemona channel realignment (Columbia River), Siuslaw and Rogue Rivers (Florence & Gold Beach, OR), and several Corps' restoration projects in the Willamette basin. Characterization reports were reviewed for Old Mouth of the Cowlitz (Longview WA) Siuslaw; Coos Bay channel deepening; pending characterization reviews at Coquille (Bandon OR) and Umpqua (Reedsport, OR). Coos Bay deepening was by far the largest volume reviewed (7 million cy, plus rock). Coquille and Umpqua are about 1 mcy over 7 years. To wind up, James showed his contact information, and the link for the Portland district sediment evaluation web page.

Eric Braun, USACE Northwestern Division: summary of Walla Walla District Sediment testing.

Walla Walla District staff was unable to attend the meeting due to travel budget constraints. Eric provided an update on the Programmatic Sediment Management Plan (PSMP) and Environmental Impact Statement (EIS) being prepared by the Corps to evaluate ways to manage sediment in lower Snake River reservoirs to meet authorized project purposes. Sediment sampling was conducted to characterize sediment in the federal navigation channel and at port facilities for the EIS and the sediment evaluation report was provided to the DMMO on 10 October 2012 to evaluate suitability for in-water disposal. The schedule for the project slipped and the current plan is to release the Draft EIS in December 2012 and include the proposed dredging action for the federal navigation channel and Ports of Lewiston, ID and Clarkston, WA in the EIS. The sampling was initially conducted to gather information for the EIS and not specifically as a dredging action but the Corps felt it should be adequate to characterize sediment for the dredging action.

James McMillan, USACE Portland District: Characterizing the Post-Dredge Surface: Comparison of In-Situ (Pre-dredge) and Post-Dredge Grab Samples at Three Sites in the Willamette River, Portland Harbor, Oregon.

James presented a study (other authors included Michelle Hollis [Port of Portland], Jonathan Freedman [EPA] and Laura Inouye [Ecology]) comparing sediment contaminant concentrations of pre-dredging

core samples of sediment that would be exposed by dredging with post-dredge grab samples at the new surface level after dredging. Data from three sites were examined to determine how well pre-dredge sampling predicted the contaminant concentrations on the actual post-dredge surface. The working hypothesis was that pre-dredge core samples may not account for such processes as fallback, mixing and natural deposition. Conclusions included: the in-situ PDS core sample generally often-over-predict post-dredge contaminant levels; depending on site conditions and patterns of contamination, but that the in-situ PDS sample may under-predict the post-dredge condition. The study recommended that when available, consider historic information and knowledge of site conditions to help predict PDS chemistry and potentially reduce the sampling burden.

Questions: Would make sense to do more samples on side slopes? James replied that maybe that would be warranted. Other questions posed included: did using a closed bucket at some sites reduce residuals? Have other studies corroborated these results?

Lyndal Johnson, NOAA Fisheries Northwest Fisheries Science Center Seattle, WA: PAH Sediment Screening for the Protection of Fish: A Draft Framework. Sediment quality guidelines are typically based on invertebrate bioassays and designed for protection of benthic organisms. Consequently, while such guidelines may be good tools for preserving the fish prey base, they are not necessarily protective of direct effects on fish themselves. This is a particular concern for threatened and endangered species, which should be protected not only against lethal exposures, but sub-lethal injury as well. The Regional Sediment Evaluation Framework proposes tissue residue values (TRVs) as a tool for the development sediment guidelines that will be protective of fish. For bioaccumulative contaminants, TRVs are a viable approach but there are some limitations in translating to sediment values. However, polycyclic aromatic hydrocarbons (PAHs) are metabolized by fish and have only limited accumulation in tissues, even though they have many documented toxic effects. Thus, TRVs are not appropriate guidelines for PAH exposure in fish. Instead, the Northwest Fisheries Science Center is proposing an alternative framework using sediment screening levels (SLs) based on direct correlation of sediment PAH levels with biological effects in fish, dietary PAH thresholds, and levels of PAH metabolites in bile of fish. The dietary effects thresholds and bile metabolite levels may be used as additional information for the derivation of SLs, as well as in additional testing performed when SLs are exceeded, such as bioaccumulation testing or site specific risk assessment. One initial suggestion from the Science Center is a 200ng/g SL level 2A and around 3µg/mg for level 2B. This presentation reviews information on PAH concentrations in sediments, diet, and bile and associated biological effects in fish, and this information is used to describe a preliminary framework for PAH sediment evaluation for fish. Next steps if we determined we should move forward would be to complete a white paper, after which NOAA would conduct internal review, and then present it to RSET for incorporation into SEF. A TRV framework would have to consider which classes of chemical to focus on.

Questions: Fred Felleman – Presentation made no reference to Mr. Incargano's work with herring at NOAA about PAHs, and also Randy Carman's research at WDOE, looking to develop a bioassay for herring. She didn't include exposures to herring because a lot of it is waterborne. There is also herring egg data from Puget Sound that could be incorporated into a comprehensive framework. Lyndal Johnson acknowledged this was a good comment.

Helen Bottcher, EPA - We've seen poor correlation around the country between dry weight concentrations of PAHs in sediment and toxicity in bioassay tests. Relation correlation improves if organic carbon is normalized, or with porewater data, so why still use dry weight?

Answer - more dry weight data available but organic carbon normalizing could indeed show better correlation. We could examine PSDDA monitoring data, if porewater data is available. But no question this would help.

Metals are a concern in stormwater, with elevated metals at ASARCO, or copper concentrations high in all around the Sound. Could these tools you've developed for stomach contents and biliary fats be used to identify levels in metals? Biliary fats are really PAH related, specific to them. Our lab has not worked with metals. We have worked on waterborne copper and olfactory function & behavior in salmon, but translating that to sediment exposure could be very difficult for copper and other metals.

James McMillan – With the SEF we look at total PAHs in dredged material, and we also look at individual PAHs. Can you say which PAHs are having an effect in the species you are observing effects in (most critical)?

Some carcinogenic PAHs known to cause liver disease could be more important than others, but we've used total PAHs because there is such a strong correlation between all the PAHs present that it is difficult to identify which individual chemicals are the driver.

Justine Barton, USEPA Region 10: Regional Sediment Reference Material. A regional reserve of sediment reference material is now available for use when dioxins or PCBs are a concern. It was developed by the DMMP agencies with EPA support. It provides dredgers a QA/QC tool -- a repository of known sediment reference material which can be analyzed concurrently with environmental samples at dredge sites. It targets regionally important chemicals of concern (dioxins & PCBs) and is an independent, stand alone material from local waters, not meant to be directly linked to a specific location. Sediment was collected from locations where past results showed that dioxins and PCBs were levels close to screening levels. The sediment reference material can be requested through contacts at the Corps' DMMO, USEPA and Washington Department of Ecology.

Sean Blocker, Unit Mgr for EPA Environmental Cleanup Site Cleanup Unit 3: Status of Duwamish Superfund cleanup. Presentation covered the early action cleanups and the harbor wide cleanup for Duwamish. Site is five miles long, runs from Kellogg Island to the turning basin. North fork CSO and Duwamish Diagonal early actions are done. Slip 4 was finished in fall 2011, dredged sediment with contaminated PCBs, capped and completed habitat restoration and monitoring, which showed very low levels PCBs remaining. Boeing Plant 2 will be a "digout" down to 20' (230kcy), to where PCB concentrations drop to 12 ppb OC normalized, using extended arm excavators, as they work cleaner than clamshells. At Jorgenson, 40kcy, will be excavated, down to sediments that meet SQS, starting fall 2014 and will include excavating a lagoon, November 2012. At Terminal 117 14kcy yards will be excavated, at Kent, another 6kcy (2013-2014). The Corps is working on draft FS, just about done. It is a combination of remedies, dredging capping, enhanced and monitored natural recovery, costing \$300 m and taking 7 years. The FS will be out for review in 1/13. Sediments are being moved by rail to eastern Washington.

Questions: Justine Barton asked about rehandling.

Reply – it will be done at LaFarge although it is not large enough, possibly later at Crawley site if problems are resolved there. Some material is contaminated enough to transport to subtitle C or E hazardous waste landfills, all by rail.

Brian Pearleberg: Why did you select an articulating arm with clamshell?

Reply: They were used recently in locations like Hylebos and this showed that they resuspend less material (2-3% vs. 8-11%) than a clamshell because they operate slower. This will limit any “re-cleanup”.

Question: Jonathan Freedman – where structural remedies might be located?

Reply – there are several areas but design still needs to be done

Helen Pressley – why didn’t you start upstream and work downstream to limit recontamination?

Reply – we are doing that, aside from the very earliest removals by others.

Laura Inouye, (Ecology): Department of Ecology’s Sediment standards. Ecology is proposing changes to Parts 2 and 5 of the SMS: definitions and sediment cleanup standards. Changes to Part 5 are to human health protection and background concentrations, chemical and biological criteria for freshwater sediments.

Why changes are necessary: The rule should be protective, legally defensible and implementable. There presently is a lack of clarity and inconsistency, which causes delay and increased cost. The plan is to allow “hot spot” cleanups to be started more quickly than at present, and to still achieve the same long term cleanup results.

Ecology received considerable public input. It started in 2007 when the RSET started working on benthic toxicity guidelines for fresh water. Three advisory committees formed (2010-11) to review issue papers and evaluate public comment, and draft rule language got additional peer review (2011).

Revisions designed to better address bioaccumulative chemicals in cleanup (human health risk and assessment, to integrate SMS and MTCA, and adopt numerical chemical and biological benthic FW criteria; also to clarify cleanup criteria and source control requirements.

For cleanup, Ecology proposes a two tier framework; lower tier is sediment cleanup objective, upper tier is cleanup screening level. Described how levels would be derived.

Freshwater criteria go from 2 tier narrative standard to biological & chemical criteria based on benthic community protection. Biological results override chemical.

Other Part V changes to RI / FS procedures, remedy selection. Revisions will cause change in source control requirements for the liable party during cleanup.

Timeline – Target date for rule adoption – Jan / Feb 2013, implementation in summer 2013, Guidance also to be drafted by then (Sediment Clean-up User Manual, **SCUM II**).

The rule revision website which contains supporting documentation can be found at <http://www.ecy.wa.gov/programs/tcp/regs/2011-SMS/2011-SMS-hp.html>.

Questions: Evaluating bioaccumulation potential is one of the biggest difficulties

Reply: Being addressed in human health and eco risk assessment section. Human risk is more often the driver. ODEQ guidance went from tissue to sediment concentrations below quant limits, so we go to the highest of Practical Quantitation Limit (PQL), risk, or background.

Question – Are the FW standards set or any changes?

Reply - Don’t anticipate changes but shouldn’t be used until promulgation.

Tom Wang, Anchor QEA: – dredging Best Management Practices (BMPs): Examples from Navigation Dredging Projects at Contaminated Sites;.

Overview – contaminant releases during dredging; BMP drivers, types of BMPs. Water Quality monitoring didn't always look at impacts from the release of contaminants – release rates, elutriate testing. Closed buckets, hydraulic excavators and silk curtains were prevalent in the past, now less so. Earlier projects like Duwamish Diagonal, lacked contractor oversight. Fish tissue concentrations however, have decreased over time. For the Hudson River cleanup no one knew how controls would work. Cofferdams, closed buckets, curtains, good positioning etc... were tried but 2-3% of contaminants were lost even with the very tightest controls, and detected way downstream showing in particulates and dissolved portion. Two references for BMPs for dredging were identified, one from the Corps' Engineer Research and Design Center (ERDC) and one from PIANC. Based on review, no particular BMP stood out as more effective than the others. Effectiveness is highly variable and the operator is often more important than the equipment used.

Sediment resuspension considerations – BMPs are dependent on site conditions, equipment, difficult to get TSS info real time; turbidity is only a surrogate. Ambient conditions can sometimes be worse for numerous reasons (propwash), than a dredging project. So we are going to have residuals, how do we deal with it? Advocated balanced approach, considering operating costs as well as turbidity standard. Operator skill is equally important to equipment

Operational controls helps can drive up price of dredging. Spill prevention is not complicated. Better to give performance criteria than specify measures.

Disposal and capping controls: rotating split hull barge. Gentle bucket work can control turbidity. Spraying clean capping material off the barge. Unit costs should be related to production rate.

Integrate BMPs into project design; they should not be independent of it. Advocate a holistic and adaptive management approach. The more we monitor, the more we find the 5 NTU criterion is not being met at some point in the water column. Does this always benefit the environment?

Question – is there a longer term effort to look at things like downstream impacts in sediment? Yes – at Diagonal it was found area around capping area was more contaminated than when we found it. Residuals are often significant. No measures seem foolproof.

Question: How does dredge positioning help with preventing resuspension? It ensures dredge is not going too deep into finer material, digging adjacent to structures, near eelgrass beds. Monitoring frequency can range from daily in contaminated sites to weekly.

Justine Barton –Were you involved in a project where adaptive management could respond in an agile way to what was going on? EWW – exceedances; we tried closed buckets etc, but then did a suspension and hydroacoustic study showed only small parts of the plume were a problem. Open bucket ended up being better. Silk curtains did not work there, water was found to be too deep.

Question” Dewatering – would hay bales help? What works? Watertight barges. Visual inspections Fred Felleman: Did you demonstrate that a closed bucket is actually less effective, or was it that it was just digging into a more contaminated site? Actually both buckets were used in the same conditions. What is the mechanism for the release, disturbance or leaking out of bucket? Closed buckets actually

scrape more on the bottom, and can result in more resuspension at the bottom but less washing out in the upper water column.

Fred Felleman- Corps protocol of burying dirtier material first, placing cleaner material on top - don't your findings suggest this is not such a good idea?

Tom - Everything that goes out to open water is suitable. True, we start with material with slightly higher levels, place that down first. This is a BMP, but all the material is suitable.

Eric Braun – Asked if there any other comments from the audience; we left a space at the end of the agenda for public comment.

Questions: Interested in knowing if the site specific fish consumption criteria will be addressed by tribes. What if tribes don't have their own data? Laura said she was unsure, it would need to be addressed by the clean-up program.

We will prepare notes / transcript. Presentations will be available on the RSET website, as will the notes. We haven't talked about where the next RSET annual meeting should take place. The plan is to hold the meeting in different locations to allow as many people from the region to attend as possible.