Air Quality Issues at the Port of Oakland

Jean Roggenkamp, Bay Area Air Quality Management District, jroggenkamp@baaqmd.gov

The Bay Area Air Quality Management District (Air District) is the regional agency in the San Francisco Bay Area charged with ensuring that the Bay Area public breathes healthy air. One of the most pressing air quality impacts in the Bay Area is adverse health effects from breathing tiny particles emitted from diesel engines (diesel particulate matter or diesel PM). The California Air Resources Board (CARB) has identified diesel PM as a toxic air contaminant (TAC). Goods movement by truck, train, ship, and locomotive into, out of and around the Bay Area's ports is a significant source of diesel PM. The Air District initiated the Community Air Risk Evaluation (CARE) Program in 2004 to evaluate and reduce health risks associated with exposure to outdoor toxic air contaminants (TAC) in the Bay Area. The program emphasizes diesel PM which is the primary TAC of concern. The CARE program includes research, analysis, community involvement, interagency collaboration and specific actions to reduce TACs and improve public health. The CARE program analysis indicates that the West Oakland community, adjacent to the Port of Oakland, experiences some of the highest health risks from TACs in the region. In addition, a Health Risk Assessment conducted by CARB, including diesel PM emissions from Port operations, rail yard operations and other sources in West Oakland, indicates that the West Oakland community is exposed to diesel PM ambient concentrations that are almost three times higher than the average background diesel PM in the Bay Area. To reduce the health impacts, the Air District is initiating regulatory enforcement of CARB's emission reduction regulations applicable to cargo handling equipment, drayage trucks, ocean going vessels, and other port-related sources. In addition, the Air District is awarding grant funding to retrofit or replace older, more polluting equipment operating at the Port.

Session: Ports — Economic Benefits & Effects on the Estuary

Benefits & Challenges of Dredging

Thomas Scheeler, Port of West Sacramento, toms@ictyofwestsacramento.org

Background

The Port of Sacramento (now Port of West Sacramento) first opened in 1963 after the completion of the Sacramento River Deep Water Ship Channel. This ship channel project starts at the town of Collinsville at the foot of Montezuma Hills and proceeds up through the Sacramento River, Cache Slough and for 25 miles in manmade portion of the ship channel. The ship channel varies from 200' to 250' in bottom width and is 30' deep. The Port is not a container port but rather handles bulk (loose, free flowing cargo) and breakbulk (bagged rice and fertilizer, bundled lumber, etc.). Historically the Port has handled mostly agricultural and agriculturally-related cargoes ie woodchips, rice, fertilizer, hay cubes, beet pulp pellets, almonds. It has handled what is term "industrial bulks" ie calcined clay, calcined coke, various raw ores, etc. More recently, as part of a new 'green port" policy, the Port has pursued cargoes that have environmental benefit ie Primafuel Alternative Fuel Import and Production, Enligna Wood Pellet Production and Export, West Coast Metals Recycling. These projects have a broader environmental benefit as well as diversifying the cargo base of the Port.

Sacramento River Deep Water Ship Channel

Dredging- definition: process of excavating materials underwater. It is used to deepen waterways, harbors, and docks.

Dredge materials (sediments) are not inherently bad or contaminated. Each area to be dredged must be sampled and tested to establish the impacts that past exposures have on the dredging operations and placement of the dredged sediments.

Maintenance dredging takes place annually in one or more portions of the ship channel depending on size of rain season and hence river flow and amount of sloughing that occurs in the manmade channel. Typically, 100,000 to 200,000 cubic yards of material is dredged and place upland along the ship channel on placement sites owned by the Port, Corps or private property that has dredge placement easements. All dredging is performed by cutter head suction dredge which creates a slurry that is pumped to the placement site via dredge pipe.

In the Sacramento River, the ship channel is a relatively small "cut" into the river bottom. The river in the area of Rio Vista might be 2000-3000' wide with a depth of 20-25'. The current ship channel is 250' wide and 30' deep. Even the deepened channel will be 300' wide and 35' deep, so as can be seen, dredging in the natural river portion of the ship channel effects a relatively small portion of the river bottom. This is less true as you

proceed up into Cache Slough and the manmade portion of the ship channel where the ship channel occupies a greater portion of the overall waterway.

In 1989, a project to deepen the ship channel to 35' was begun. The harbor at the Port and the first 8 miles of ship channel were deepened before the project was suspended due to unresolved issues concerning the relocation of PGE gas lines and the lack of local share to match the federal dollars. These issues have since been resolved and the Port and the Corps of Engineers have been working on a Limited Re-evaluation Report (LRR) for a number of years. This LRR will re-examine the project's economics and will include species that have been listed since dredging was halted. The study is proceeding well, with a draft document projected to be available May 2010. Anticipating an accepted report, the current schedule is to continue the deepening dredging starting in mid-2011 and complete the dredging in Fall 2013. The deepening project has received broad local, regional and federal support and is in the President's 2010 budget as well in the 2010 appropriation bills of both houses of Congress. The channel deepening is projected to produce 6.4M cubic yards of material and be placed upland in current dredge placement sites along the ship channel.

Benefits

- Maintenance Dredging- maintains current project depth to allow complete utilization of the ship channel and Port.
- Deepening Dredging

  This deepening project is vital to the long term viability of the Port by allowing the ever increasing larger ships to call upon the Port of West Sacramento. This economy of scale of increased tonnage helps to offset the increasing costs of fuel and overall ship operating costs.

  Provides an environmentally beneficial means of moving cargo to the interior of California. Helps to reduce the number of trucks on congested freeway corridors benefitting air quality and freeway safety.
- Both Maintenance and Deepening Dredging provide dredge material for potential reuse in flood levee repair/upgrade as well as habitat restoration projects. There is a growing number of habitat restoration projects within the Bay, California and the world, where dredged sediments (dredge material) has been used as the principle material in creating these projects.

Challenges

The ever increasing concern for the health of the Delta, the declining fish populations and the desire for habitat restoration, creates challenges and beneficial opportunities for dredging and dredged sediments.

- The current dredge window is August 1 through October 31 on the Sacramento Ship Channel. This is primarily driven by the issue of Delta smelt and potential entrainment in the dredge suction. Monitoring is conducted by Resource's team and if fish are found in proximity to the dredging site and if fish are impacted, dredging is stopped.

- Other species (longfin smelt, green sturgeon, salmon) also become factors in the consideration of dredging practices and acceptable operational windows.
- The concern of methylation of sediments placed in wetlands is still being addressed and scientifically analyzed.
- Central Valley Regional Water Quality Control Board working with the Delta Long Term Management Strategy (DLTMS) group, has made significant progress in considering the necessary placement site and sediment testing that is needed to evaluate the beneficial reuse of dredge material. Beneficial reuse is essential to the longterm, continual operation of navigation channels in the Delta to full project depth, so a longterm plan for these dredge materials must be established.

Conclusion

Regulatory and funding challenges make both maintenance dredging and deepening dredging challenging. The environmental and ancillary benefits of moving cargo to the interior of California by the navigation channels needs to be recognized along with responsibly managing the environmental aspects of these operations. An improved, strong and responsible capability to conduct international trade helps to support California's world class economy. A vibrant maritime industry in California helps to provide the jobs and funds and through dredging, the material, to improve the economy, environment and the flood protection of California.

Key Words - *Dredging; reuse;*

Session: Ports — Economic Benefits & Effects on the Estuary

Today's Issues in Dredging and the Use of Dredged Material for S.F. Bay Tidal Wetland Restoration: Port, Regulatory, and Natural Resource Perspectives Session

Brenda Goeden, Dredging Program Manager for San Francisco Bay Conservation and Development Commission,

The game of dredging and disposal of dredged "spoils" has changed. Once thought of only as way to move the muck out of ship channels and reclaim marshes for development has become a highly orchestrated activity that can provide valuable sediment to restore these same marshes and nourish sandy beaches. As the community realizes the value of this resource, access to Ports and marinas are still maintained, and living resources still needed to protected. New challenges arise associated with getting the sediment to restoration sites, costs of doing the work, and finding innovative techniques that create a viable combination for a wide variety of stakeholders whose cooperation and resources are needed for success. This talk will touch on issues for dredging projects, endangered species, essential fish habitat, beneficial reuse and regional sediment management in the Bay Area.

Session: Ports — Economic Benefits & Effects on the Estuary

Regulating Contaminants of Emerging Concern

Thomas Mumley, SF Bay Water Board, tmumley@waterboards.ca.gov

Regulating contaminants of emerging concern (CECs) is a challenge due to the ever increasing number of manufactured new chemicals and products coupled with limited information on the environmental risk of many chemicals. Fortunately, we have a number of regulatory tools available and in use in California, particularly in the Bay Area to respond to the challenge. Several California agencies have a role in regulating CECs including the Department of Toxic Substances Control, the Department of Pesticide Regulation, the Office of Environmental Health Hazard Assessment, and the State and Regional Water Boards. Water Boards' actions that are relevant to CECs in the Estuary include establishing water quality standards that reflect "safe" thresholds of pollutants in water, sediment and/or biota and controlling discharges of pollutants from specific or categorical sources. The Water Boards may also require investigations and assessment of water quality associated with CECs. Regulatory actions depend on the state of our knowledge about CECs and key questions drive investigations to gain knowledge. These include: is a chemical present in the environment (water, sediment, and/or biota), is it present at level that poses a risk to humans or biota, what are its sources, pathways, and loadings, and are they controllable. In the Bay Area, we have the Regional Monitoring Program, which provides a means to investigate CECs. We also have municipalities that have been willing to take proactive actions to address pharmaceuticals and personal care products that end up in the Bay. These and other recent and ongoing efforts to address flame retardants, pesticides (pyrethroids), and pharmaceuticals and personal care products illustrate how CECs are or may be regulated.

Key Words - *Contaminants; CECs; regulations*

Session: Contaminants of Emerging Concern in the Estuary

Flame Retardant Chemicals in San Francisco Bay: More than Just PBDEs

Susan Klosterhaus, San Francisco Estuary Institute, susan@sfei.org
Heather Stapleton, Duke University, heather.stapleton@duke.edu
Alex Konstantinov, Wellington Laboratories, alex@well-labs.com
Denise Greig, GreigD@TMMC.org

Since the 1970s large volumes of polybrominated diphenyl ethers (PBDEs) have been produced globally and added to consumer products such as furniture, textiles, and electronic equipment to increase their resistance to fire. PBDEs have since become ubiquitous contaminants and studies have documented their potential for adverse impacts on wildlife and human health. Penta- and octaBDE have been phased out and DecaBDE has been banned in a few US states and Europe. As a result of these restrictions, alternative chemicals are being used to meet consumer product flammability standards. Little toxicity and environmental fate information exists for these alternatives and assessments to determine their potential impacts have been challenging because basic information on their use, and in some cases their structural identities, are not readily available. In 2008 a study was conducted to determine the concentrations of several current use flame retardants in harbor seals, cormorant eggs, sport fish, mussels, and sediment collected from San Francisco Bay. In addition to PBDEs, three other chemicals were detected, with most concentrations orders of magnitude below those for PBDEs. Biosolids collected from Bay Area wastewater treatment facilities and house dust samples were also analyzed and provide an indication of the potential for these chemicals to migrate out of consumer products and enter aquatic environments. Tris(1,3-dichloro-2-propyl) phosphate (TDCPP), a chemical phased out of use in children's pajamas in the late 1970s due to health concerns, and the brominated chemicals in Firemaster 550, were detected in dust and biosolids and are known replacements for PentaBDE in furniture foam. Concentrations of these alternatives in biosolids were within range of PBDE concentrations. TDCPP dust concentrations were equal or greater than PBDE concentrations in most samples. TDCPP was also detected in Bay sediments at concentrations equal or greater than concentrations of BDE 209, the main component of DecaBDE.

Key Words - *flame retardants; PBDEs*

Session: Contaminants of Emerging Concern in the Estuary

Pyrethroid Pesticides in the Delta: We Can't Just Blame Agriculture any More.

Donald Weston, University of California, Berkeley, dweston@berkeley.edu

Over the past ten years, Californians have been in transition from relying on organophosphate insecticides for agricultural and urban pest control, to use of pyrethroids. Though both classes of insecticides are now used in agriculture, urban pest control relies largely on pyrethroids. Recent data has shown pyrethroids to be a concern for toxicity in the water column, not only sediment toxicity as has been known for several years Some of the environmental toxicity consequences long recognized as associated with organophosphates, are now appearing as a consequence of pyrethroid use, but they are appearing in urban-dominated water bodes, rather than agriculture-dominated water bodies. We have recently found pyrethroid-related toxicity in surface waters following rain events in urbanized water bodies ranging in size from small creeks up to lengthy stretches of the American River. The Sacramento and San Joaquin Rivers do not yet show evidence of effects over considerable distances, but there have been isolated samples of concern in both rivers. Our recent sampling has allowed comparisons among various pyrethroid sources. Agricultural discharges occasionally contain pyrethroids at concentrations acutely toxic to aquatic life, but do so far less frequently and at far lower concentrations than urban stormwater runoff. Urban runoff commonly contains pyrethroids at ten times acutely toxic concentrations, and we find much the same result in every municipality tested. Municipal wastewater treatment effluent can also demonstrate pyrethroid-related toxicity, and is an additional source of the compounds from urban environments.

Key Words - *pesticides; toxicity; water quality*

Session: Contaminants of Emerging Concern in the Estuary

The Ubiquitous Distribution of Alkylphenols: The Next Emerging Wave of Endocrine Disruptors along Coastal Waters

Lars Tomanek, California Polytechnic State University, ltomanek@calpoly.edu
Jennifer Diehl, California Polytechnic State University, manzanitamomma@yahoo.com
Sarah Johnson, California Polytechnic State University, esquiba@aol.com

As part of an ecosystem-based management project in Morro Bay, California, we investigated the health of the mud-dwelling arrow goby, Clevelandia ios. Due to repeated observations of visible gonadal tumors (about 6%) we examined gobies histopathologically and found a high incidence of gonadal and liver tissue pathologies (100%), including gonadal and liver tumors. Germ cell tumors and severe lipidosis in liver tissue are indicative of exposure to organic pollutants. We analyzed 230 goby livers for levels of more than 60 organic pollutants that are commonly found in estuaries along the Pacific coast of North America. We found moderately high levels of DDE and extremely high levels of nonylphenol (NP). NP is a known endocrine disruptor and the dominant degradation product of alkylphenol ethoxylates, man-made chemicals that are widely used in a number of industrial and household products. Due to its hydrophobic nature NP tends to adhere to organic matter and persist in anaerobic environments. Further analysis of arrow gobies and oyster populations (Crassostrea gigas) along the West coast showed that there are high levels of NP in a number of estuaries. In order to detect the source of NP contamination in Morro Bay we also collected water and sediment samples from the bay and two potential point sources. Our findings suggest that NP enters the estuary through the effluent of both waste water treatment plants and septic systems and accumulates in estuarine sediment. In addition, we observed a several-fold bioaccumulation up trophic levels within the fish community in Morro Bay.

Key Words - *emerging pollutants, endocrine disruption, tumorigenesis*

Session: Contaminants of Emerging Concern in the Estuary

Exposure and Effect Considerations for Pharmaceuticals and Personal Care Products in Aquatic Ecosystems

Bryan Brooks, Baylor University, bryan_brooks@baylor.edu

Flows of rivers, streams, and riverine zones in reservoirs and estuaries that are dominated by effluent discharges from wastewater treatment plants (WWTP) are generally considered worst case scenarios for studying the environmental impacts of pharmaceuticals and personal care products (PPCPs). PPCPs are considered classes of "emerging" environmental contaminants that in recent years have received unprecedented attention from the media and the scientific and regulatory communities. In addition to being introduced to the environment through centralized and decentralized WWTP discharges, PPCPs may also be transported to aquatic systems following land application of biosolids and effluents from WWTPs, and livestock husbandry practices in agricultural settings. Whereas the majority of research efforts to date have included standardized toxicity screening and developing analytical methodologies with GC/MSMS, LC/MSMS and (more recently) LC/TOF-MS to support environmental monitoring activities, recent studies are focusing on PPCP source tracking, chemical fate, mechanistic and comparative ecotoxicology and ecological risk assessment approaches. PPCPs often possess physiochemical (e.g., ionizable compounds) and biological (e.g., therapeutics are designed to target specific biomolecules, pathways) properties that differ from many historical contaminants, presenting unique challenges to environmental scientists. For example, current efforts are examining how existing models ranging from fugacity based fate predictions to traditional ecotoxicology assays and risk assessment paradigms may need to be modified to define environmental impacts of PPCPs. This presentation will provide current and future perspectives on the state-of-the-science of PPCPs in the environment, including a summary of research needs to support environmental monitoring, fate, effects and risk assessment activities. Compared to inland waters PPCP exposure and effects in estuarine systems are less understood.

Session: Contaminants of Emerging Concern in the Estuary

Other Places, Other Approaches

Chris Sommers, EOA, Inc., csommers@eoainc.com

The accumulation of trash in San Francisco Bay (Bay) and its tributaries is a major concern for municipal stormwater managers and non-governmental organizations. Despite a multitude of resources allocated over the years by local municipalities for trash control and management, it is only recently that trash has come to the forefront of water quality management. Recent evaluations of water quality conditions in local creeks and Bay shorelines by public agencies have resulted in a new emphasis on reducing trash loadings to receiving waters. In 2008, the San Francisco Bay Regional Water Quality Control Board (Water Board) proposed that 26 Bay area water bodies (creeks and shorelines) be placed on the 303 (d) list for trash impairment. Additionally, the Water Board intends to include specific language in the upcoming Regional Municipal NPDES Permit for Stormwater, which will require local municipalities to significantly reduce the current levels of trash discharged to creeks and ultimately the Bay.

In October 2006, the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) developed a *Trash Management and Effectiveness Assessment Strategy* to serve as a guide for conducting urban runoff trash management and assessment activities. A key component of the *Strategy* is the selection and implementation of trash control measures. As a first step in understanding what structural options and institutional approaches exist for controlling trash from being discharged from the urban landscape to urban runoff conveyance systems, SCVURPPP developed the *Trash BMP Tool Box* in September 2007. In an effort to continue to enhance our understanding of innovative and cost effective trash control options and supplement information presented in the *Tool Box*, SCVURPPP staff recently conducted an expanded literature review on trash management approaches implemented around the world. This review revealed several innovative ideas to reduce trash in water bodies from locales outside of California. Case studies summarizing a subset of these novel approaches, including cost-effective institutional controls will be presented.

Key Words - *Trash; Litter; Pollution Prevention; Stormwater; Urban Runoff*

Session: Trash: Upstream and Downstream Solutions

State and Local Policy Measures for Taking Out the Trash

Miriam Gordon, Clean Water Action, mgordon@cleanwater.org

Since 85% of marine debris comes from land-based sources and most of the land-based discharges are comprised of packaging and single-use disposable goods, a key solution to trash in marine waters is prevention of packaging waste and other commonly-littered items. Packaging waste comprises approximately 30% of the solid waste management stream in the United States. Reducing this waste stream is perhaps the biggest challenge to solving the marine debris problem, but with this success will come other significant benefits, including significant reductions of greenhouse gas emissions and multiple life cycle benefits associated with preserving natural resources.

To date, California has largely failed at implementing the source reduction goal for solid waste set forth in AB 939, the Integrated Waste Management Act of 1989. Although the Act established the goals of Reducing, Reusing and Recycling (the 3Rs), the regulations have largely focused on diverting waste from landfills and ignored the need to prevent its generation at the outset. Neither has any other state successfully reduced the generation of solid waste. We look to Europe and the 33 nations that have implemented producer take-back programs for packaging waste and find that strict producer responsibility programs can be successful in slowing (but not reversing) the rate of generation of solid waste, better than any system in place in the U.S.

The State of California has recognized prevention needs to be a primary goal of reducing marine litter. First, the California Coastal Commission published an Action Plan for Reducing Discharges of Land-Based Marine Debris (2005). Subsequently, the Ocean Protection Council (OPC) adopted a resolution to reduce marine debris (2007) and followed that with publication of an Implementation Strategy to Reduce Marine Litter (2008). This year, 5 bills were introduced in the California Legislature and sponsored by the Clean Seas Coalition. These bills, as a package, would implement the 3 top priorities articulated by the OPC Implementation Strategy: (1) implement producer take-back for packaging; (2) ban litter-prone items that are significant components of marine debris-where alternative materials exist; and (3) impose fees on litter-pronte items.

Much of the impetus for these legislative strategies comes from the local level. Several municipalities have adopted resolutions in support of Extended Producer Responsibility. To date, 33 jurisidictions have adopted bans on polystryene food take-out containers. Many jurisdictions have opted to ban the distribution of free carry-out bags at the grocery store- although the imposition of fees is currently prohbiited by state law. Additional creative strategies to prevent and reduce convenience food and packaging waste are needed and are being created.

Meanwhile, the packaging and plastics industry has launched a formidable opposition, spending millions on Life Cycle Analysis, defining "sustainable packaging," and launching significant lobbying and public education campaigns to convince citizens and

policy-makers that plastics are "too valuable to waste." In California, the groundswell of support for coastal and watershed protection at the local level is a significant driver of change. What we see repeatedly is that the creative solutions come from the local level and the state eventually, grudgingly, follows.

Key Words - *Marine debris; marine litter; prevention; state and local policy*

Session: Trash: Upstream and Downstream Solutions