Port Angeles Harbor Sediment Characterization Study February 2012: Port Angeles Harbor Sediment Investigation Report and Supplemental Data Evaluation to the Sediment Investigation Report Comments by: Environmental Stewardship Concepts, LLC May 22, 2012

These comments were prepared on behalf of the Olympic Environmental Council (OEC).

Introduction

The Port Angeles Harbor Sediment Characterization study involves two major documents: the *Sediment Investigation Report* (SIR) and the *Supplemental Data Evaluation to the Sediment Investigation Report*. The SIR has eleven appendices (Appendix A-K), which include several important reports, such as the *Sediment Trend Analysis Report*, *Human Health and Ecological Risk Assessment*, and *Geomorphic Report,* and others. As indicated from the number of documents involved in this effort, there is a large amount of information presented to characterize the sediment of the Port Angeles Harbor. The Harbor has a long industrial history, and the data from previous studies investigating the impact on terrestrial and aquatic environments have been incorporated into this effort. Contaminants of potential concern (COPCs) remain a problem; analyzed sediments indicate they continue to exceed quality criteria for protection of human and ecological health.

Recommendations

The major omission from the investigation is the lack of specific water quality measures in the water overlying the wood debris area. The bottom water needs to be measured to assess oxygen, carbon dioxide (measured as dissolved carbon dioxide) and pH, along with chemicals leaching from the wood debris. Such sampling can be conducted this summer, and repeated one time in late summer or early fall, prior to winter conditions.

The Ecology data on hypoxia in the harbor can be used as reference to guide the design of such a sampling effort.

Sediment Investigation Report (SIR)
General Comments

This report makes an important contribution to understanding how anthropogenic activities, largely from the former Rayonier Mill site, contributed to the degradation of Port Angeles Harbor, including raising risks to human health and the environment. With limited resources, the investigation provides high quality data on sediment chemistry across the harbor, focusing on areas used by the former Rayonier Mill operations.

The characterization of the Port Angeles Harbor sediments is comprehensive and fills some gaps in previous studies regarding toxic chemicals and wood debris, with some related chemicals. However, the analysis of the major objectives of this study, identifying and quantifying wood debris and COPCs (toxic chemicals) in the harbor, indicated that the two types of contamination are not co-located with great fidelity (i.e. large amounts of wood debris did not also show high COPC concentrations). As this question was an important component of the investigation, further studies will need to be conducted or previous studies re-done, to better understand the occurrence of COPCs in the harbor.

The examination of chemical fingerprints is important and applies newer analysis and computational approaches to the investigation of complex contamination conditions, such as Port Angeles Harbor. The report accurately uses the sediment chemistry data to compare chemical profiles in a "fingerprinting" analysis that seeks to associate combinations of chemicals among sample sites. This method and the resulting analysis are commendable and the outcome provides important information for a better understanding of the harbor conditions.

The report describes two types of contamination problems:
1) the toxic chemicals in sediments and biota, including the risks to ecological receptors and the risks to human health from those chemicals;

2) woody debris that has direct and indirect effects on ecosystems and the chemicals that derive from the wood debris.

One of the major problems with wood debris contamination is that this material is organic and decomposes, releasing chemicals and altering ambient conditions. The decomposition of organic material in aquatic systems is the basic process underlying eutrophication, the over-enrichment of an aquatic system with organic matter, especially nutrients (nitrogen and phosphorous) summarized and described by the National Research Council (NRC. 2000. Clean Coastal Waters. National Academy Press, Washington DC. 405 pp). Excess organic matter decomposes (via bacterial action), thereby consuming oxygen and producing carbon dioxide. Carbon dioxide reacts with water to form carbonic acid. Even though carbonic acid is a weak acid and seawater is buffered, sufficient addition of carbon dioxide can and will cause water pH to decline (become more acidic). The hypoxia is accompanied by hypercapnia and acidic conditions.

The State of Washington recognized the problem with hypoxia in listing Port Angeles Harbor as impaired by low oxygen conditions in the 303 (d) report in 2009.

Two further consequences of simultaneous hypoxic and acidic waters is a change in the ambient conditions under which the wood debris is exposed. The acidic waters will enhance leaching of toxic chemicals, particularly metals such as mercury and other metals, out of the wood debris.

The sediment investigation did not examine the water that overlies the woody debris to determine the extent to which decomposition has altered ambient conditions, further degraded the habitat, and limited the growth and abundance of benthic flora and fauna.

The sediment report examined the possible risks from the chemicals, but not the interactions of the chemicals among themselves, nor combined with hypoxic conditions. There are few analytical tools to examine such combined risks, either as multiple stressors or as cumulative risks, which

are not the same problems. Briefly, multiple stressors refers to several different agents acting at the same time and place, such as toxic chemicals combined with temperature changes and/or exotic species. Cumulative risk assessment addresses multiple stresses and the properties of the system (human or ecological) that affect the response to the stresses. The co-occurrence of hypoxia and toxic chemicals in the benthic habitat certainly increases the effects of either, and may have a synergistic effect. The quantitative result would be a lower toxicity threshold for the combined exposures than predicted for the toxic chemicals alone.

In the two months or so since the sediment report was released to the public, two actions at the federal level have enhanced the toxicological database for chemicals at this site. The two chemicals are dioxin (and related compounds) and lead. In February 2012, EPA published a non-cancer health reference dose for dioxin (and related chemicals), referred to as the Reference Dose (RfD). The value published by EPA is lower by 30% than the previous number which had been used by ATSDR and on several specific projects by EPA. The toxicity of lead was recently recognized by CDC as greater than previously acknowledged, by a factor of two. As a result, CDC now uses a blood lead level of 5.0 ug/dL as the level of concern for children's exposure, a decrease of 50% from the previous level of concern of 10 ug/dL. These two changes, taken together, mean that the health risks from site contaminants are greater than predicted in the risk assessment in the sediment report.

Specific Comments:

SIR Appendix G - Human Health and Ecological Risk Assessment

Human Health Risk Assessment

Section 2.2

- The history of the site should include that the K-Ply manufacturing facility reopened in 2010 under new ownership as Penply, then closed in early 2012.
- This section should also indicate that pulp and paper mill effluents continue to be discharged into the harbor today, as Nippon mill is still in operation.

Section 2.4

- The Municipal Works need to be better characterized, and should include the exact number of the “several stormwater outfalls”. A description of each type of outfall should be included to distinguish between the different point sources to the Harbor.

Section 3.0

- Clearly define each sediment type that is being considered in the human health and ecological risk assessments (beach/intertidal, subsurface, and marine). Include an explanation of why the exposure to each type is different.
- Additional exposure pathways should be considered. Ingestion and dermal contact with surface water and inhalation of volatiles from sediment were not evaluated for persons exposed.

Section 3.1.4

- The *Frequency of Detection* section indicates that numerous SVOCs had maximum detection limits greater than the screening level; the list should be included in this section.

Section 3.2

- Please indicate in which Human Receptor group residential users who regularly fish would fall under.
- The *Revised Conceptual Site Model for Human Receptors* states different groups of receptors than those listed in the *Screening Values* section. This is potentially confusing to the reader and should state why there is a difference.

Section 3.6.4

- As there is no human toxicity data for resin compounds, another similar contaminant should be used to quantitatively evaluate the potential risk of exposure.

Section 3.6.6

- There is, in fact, a toxicity value for lead which has recently been lowered. The blood lead level of concern for children has been lowered from 10 micrograms/deciliter to a reference value of 5 micrograms/deciliter by the CDC. This change should be reflected in the IEUBK modeling of lead exposure used in this human health risk assessment. The resulting lowering of the lead level of concern will

result in a greater risk from lead exposures.

Ecological Risk Assessment

Section 4.2.3.1

- Every ecological sample collected at the Harbor was not also collected at the reference site, Dungeness Bay. This section states that surrogate samples were used instead. This adds a considerable level of uncertainty when comparing conditions between the Port Angeles Harbor site and the reference site.

Section 4.5

- Although chlorinated pesticides, such as DDT which has been banned in the U.S. due to causing harmful effects to wildlife, are identified as contaminants of potential concern (COPCs) at the site, there are no data available for these contaminants in fish whole-body samples.

Section 4.6.1.2

- Wildlife exposure was not estimated for COPCs without reference values, including organic acids, motor oil, and diesel fuel.

Section 4.6.1.3

- A very limited amount of fish (five) and plant (two) samples were used to assess risk to other animals that consume these fish and plants.

Figure 2-4

- The tissue sample locations are too limited to adequately characterize the potential exposure harbor-wide.
- Ecological samples were collected in localized areas within the harbor, and therefore do not necessarily fully characterize harbor-wide contamination.

Supplemental Data Evaluation to the Sediment Investigation Report

General Comments:

Please explain how information and results in this report will be incorporated into the larger Sediments Investigation Report.

Specific Comments:

Section 2.2

- This section states that an interpolation method was used to estimate "values at unknown locations." As these estimations were used to further analyze the extent and impact of contamination in the harbor, the exact amount of estimated points and the percentage of estimated points to the complete dataset should be defined in this report.

Section 3.1

- The Human Health and Ecological Risk Assessments, conducted as part of the Port Angeles Harbor Sediments Investigation Study, rely on Dungeness Bay as a reference site. Section 3.1, however, states that, "The small number of sampling points from Dungeness Bay studies and the limited number of analytes investigated in Freshwater Bay (polychlorinated biphenyl [PCB] congeners and dioxin/furan congeners) make these data sets alone insufficient for calculating BTVs [background threshold values] for most COPCs." How does this lack of data affect the usefulness of the HHRA and ERA? Will these studies be redone considering any additional samples from the Dungeness Bay area?

Section 3.3

- This section states that the Model Toxics Control Act (MTCA) does "not specify a minimum number of samples for defining sediment BTVs." Please specify any protocol that will be followed to establish BTVs for this particular case.

Section 4.1

- This section describes the principal component analysis fingerprinting methodology. The PCA groups correlated congeners together to create one component. Please discuss the uncertainty that this generalization creates. How much does this affect the accuracy of the fingerprinting method?

Section 8.0

- Data gaps and additional data needs are listed in Section 8.0 and described throughout the report. Will any additional sampling activities be conducted to fill these data gaps? As is, the PCB congener analysis is incomplete and likely underestimates concentrations. Additional data is needed to provide sufficient background levels, and an alternate fingerprinting analysis should be conducted as well. Please explain how these gaps will be addressed.

Funding for this product was provided by a Public Participation Grant from the Washington State Department of Ecology. Grant funding does not constitute endorsement of opinions or recommendations expressed herein.