ACTIVITIES TO PROVIDE BETTER REFERENCE AREAS

STATUS REPORT

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PROBLEM IDENTIFICATION

1. Reference sediments are used to account for physical effects of sediments (as opposed to chemical) and are required to perform sediment bioassays in the PSDDA program. In particular, the interpretation of the amphipod test is thought to be affected by grain size. Sediments are a complex mixture and many factors may affect toxicity responses of bioassay organisms to reference and project sediments. PSDDA specifies that reference sediment grain size match test sediment grain size, and also specifies performance standards (maximum allowable moralities) in reference sediments. The Department of Ecology is devising criteria for the selection of reference areas.

The following topics still require effort by the PSDDA agencies:

- improve reference area performance in tests, both by eliminating unexpected failures in reference, and by making it easier/less expensive for applicants to find areas with a suitable grain size distribution (within 5-10% of test sediment)

- study reference areas to improve knowledge of physical, biological and chemical characteristics.

Ideally, at some point in the future, the expected response for each PSDDA-required bioassay organism will be known for various grain sizes. At that time reference sediments may no longer be required.

2. During the past year, PSDDA agencies have attempted to improve reference area performance by gathering/providing better, more complete information on reference areas and by compiling information when reference area testing is performed. Department of Ecology funded a report entitled, "Interim Performance Standards for Puget Sound Reference Areas," June 1989. Interim performance standards for chemical variables were generally defined as the 90th percentile values for frequency distributions of chemical concentrations in potential reference areas (upper limits for the concentrations of chemicals in acceptable reference samples). The amphipod bioassay was quantitatively used, while other available information was qualitatively used to identify interim reference areas. Interim reference areas identified in the report were Carr Inlet, Dabob Bay, Samish Bay, and Sequim Bay. These are the same reference areas specified in the Phase I Evaluation Procedures Technical Appendix (EPTA).

The Department of Ecology's Puget Sound Ambient Monitoring Program (PSAMP) produced a report entitled, "Marine Sediment Monitoring," January 1990. This program is performing Sound-wide background analyses of areas away from contaminant sources (status and trends work). A number of samples were taken in areas under consideration for reference areas. This information is included in their report, and has also been transferred to the Puget Sound Water Quality Authority's Geographic Information System (GIS).

PROPOSED RESOLUTION

1. **New Reference Areas**. Project proponents have suggested a number of other potential reference sediment collection sites. These sites may be utilized if:

- biological tests are initially run using the proposed reference area along with an already recognized reference area

- and/or chemistry (PSDDA contaminants of concern) analysis is performed for the proposed area.

The PSDDA agencies are discussing needed information for new reference sites. Once a project proponent has gathered this initial information, or PSDDA agencies are satisfied that enough confirmatory information exists for a new reference area, the project proponent may reuse the area without additional testing. PSDDA agencies will consider information developed through PSAMP and other programs as well. A tool such as the PSWQA GIS maps or the PSDDA database can be used to convey the information to applicants.

2. **Mixing Sediments**. In order to obtain a reference sediment grain size match within 5-10% of the test sediment fine-grained fraction, mixing sediments from known reference areas has been suggested. Over the next year, the PSDDA agencies will continue to look into this issue. Current literature seems to indicate that increased handling (mixing or remixing) of material results in increased toxicity. In conduction with upcoming Federal projects, some studies will compare artificially blended (mixed) sediments with natural sediments.

3. **Additional Work by Ecology**. Additional work on reference areas funded by Ecology and EPA (PSEP). This study will look at Carr Inlet, Samish Bay, and Useless Bay. The study will cover 7 grain sizes and 1 water depth. No organics or benthic sampling/analyses will be performed. Tests run will include amphipod, oyster larvae/echinoderm, Neanthes, saline microtox, grain size, and TOC.

REFERENCES

PSDDA Management Plan Report, September 1989, section 5.6, pp. 5-32 to 5-34.

PSDDA Evaluation Procedures Technical Appendix Phase 1, June 1988, pp.II-68.

DeWitt, T.H.. G.R. Ditsworth, and R.C Swartz. 1988. Effects of Natural Sediment Features on Survival of the Phoxocephalid Amphipod, *Rhepoxynius abronius*. Mar. Environ. Res. 25:99-124.

Pastorok, RA, R. Sonnerup, JJ. Greene, M.A. Jacobson, L B. Read, and R.C Barrick. 1989 (June). Interim Performance Standards for Puget Sound Reference Areas. Report submitted by PTI Environmental Services Inc. to Ecology.