ISSUE PAPER

MODIFICATIONS TO HOLDING TIME FOR BIOLOGICAL TESTING

Prepared by David Kendall and David Fox (Corps of Engineers) for the PSDDA agencies.

INTRODUCTION

PSDDA bioassays must be performed within an established time limit. This time limit, or "holding time", has been established to ensure that biological testing results reflect the in-situ conditions at the proposed dredging site. Natural processes, such as chemical and biological degradation, speciation and volatilization, can alter the chemical composition of a sediment if proper storage conditions and holding times are not met. PSDDA currently requires that biological testing be initiated within six weeks of sediment collection. Sediments must be stored at 4 degrees C and, if biological testing does not commence within two weeks of sampling, sediments must be stored under a nitrogen atmosphere.

A recommended two-week holding time for bioassay sediment is indicated in the Puget Sound Protocols and Guidelines. However, the Protocols and Guidelines are currently under revision to recognize that regulatory and management programs using a tiered testing strategy will not be able to meet that guideline.

PROBLEM IDENTIFICATION

Under PSDDA guidelines, biological testing may be performed concurrently with chemical testing, or tiered testing may be chosen. Tiered testing generally allows greater economy, as only those sediment samples which exceed chemical screening levels must undergo biological testing. The problem is that chemical testing takes time. Laboratories many times face backlogs of samples to be tested (PSDDA samples comprise only a small fraction of the typical lab's business). Often chemical testing results are not available for 4-6 weeks after sampling has been completed.

To provide smooth biological testing, a minimum of two weeks in good weather and three weeks in bad, should be allowed for startup. Organisms must be obtained (and cultured if necessary), conditioned and equilibrated prior to testing. The experimental apparatus must be set up. Reference and control sediments must be obtained.

Both chemical and biological testing practitioners feel harried to get their tests completed or started, respectively. In several cases in the past year, dredging consultants were pressed right against the 42 day holding time, trying to get last minute data from chemical labs, while trying to get biological testing geared up. This situation not only produces stress for all involved but drives up costs because dredging applicants are forced to pay premium prices for chemical testing to get a faster turnaround, and biological testing labs charge higher prices due to the uncertainty with the number of samples to be run and the short lead times provided by dredging applicants. These factors reduce the cost effectiveness of tiered testing.

Tiered testing must remain a viable option to keep PSDDA testing costs down. This problem will continue as long as a six week holding time remains in effect. Results from recent studies have provided evidence needed in extending holding times for biological testing.

PROPOSED MODIFICATION

It is proposed that the holding time for sediments undergoing biological testing be extended to eight weeks. Data supporting this change are provided in the following documents. A study prepared for EPA on the effect of holding times on response in the amphipod test, *Neanthes* biomass test, and the microtox test (B1). The study showed for all three bioassays, there was no observed decrease in toxicity even beyond 8 weeks, and changes when noted were associated with increased toxicity with increasing holding time. These results are further corroborated by a recent study by the Corps' Waterways Experiment Station conducted for the New York District Corps of Engineer (B2). Holding times extending beyond 4 to 8 weeks showed no decrease in toxicity, but did show some evidence of increased toxicity. From a regulatory perspective, an increase in toxicity would be more environmentally conservative, with the increased risk of a sediment sample (i.e., a dredged material management unit) exceeding disposal guidelines for unconfined, open-water disposal being carried by the applicant. In conclusion, these two studies indicate that an increase in holding time for biological analyses to eight weeks is justified.

REFERENCES

B1. Becker, D. S. and T. Ginn. 1990 (Draft). Effects of Sediment Holding Time on Sediment Toxicity. Prepared for U.S. EPA, Region 10, Office of Puget Sound. By PTI Environmental Services, Bellevue, WA.

B2. Tatum, Henry E., D. L. Brandon, C. L. Lee, A. S. Jarvis, R. G. Rhett. 1991. Effects on Sediment Toxicity, Bioaccumulation Potential, and Chemistry. Miscellaneous Paper EL-91-2, US Army Engineers Waterways Experiment Station, Vicksburg, MS.