

CONTROL ID:

SESSION CATEGORY: 2059

SESSION: Digging deep into sediment toxicity testing methods

PRESENTATION TYPE: Platform, invited talk

Abstract

TITLE: Development of Reduced Sediment Volume Test Procedures for the Estuarine Amphipod *Leptocheirus plumulosus*

AUTHORS (FIRST NAME, LAST NAME): Kennedy AJ, Stanley JK, Farrar JD, Steevens JA, Mount DR, Bridges TS

INSTITUTIONS (ALL):

ABSTRACT BODY:

limit: 2500 characters Current count: 2236 characters / 372 words

The sediment volume requirements of toxicity and bioaccumulation bioassays affect the cost of the assessment related to field collection, transportation, storage, disposal and labor associated with organism recovery at bioassay termination. Our objective was to assess four reduced sediment volume modifications of the standard U.S. Environmental Protection Agency's 10-d acute *Leptocheirus plumulosus* method that utilizes 1000 ml beakers containing 20 organisms. Additional benefits of reduced volume methods include reductions in the amount of expensive chemicals (e.g., nanomaterials) required in sediment spiking studies to obtain desired concentrations or chemicals with strict disposal requirements (e.g., radio-labeled chemicals). This study evaluated the effects of smaller beaker size (250 and 100 ml) and associated sediment volume and organism loading density (10 and 20 organisms) on test method responsiveness using sediments contaminated with polycyclic aromatic hydrocarbons, lead and mineral oil. Control survival was generally compromised in 250 (78 – 88%) and 100 ml (66 – 83%) beakers containing 20 organisms but improved when these beakers contained only 10 organisms (84 – 94%), suggesting a density related effect. The LC50 values (in mg/kg) generated in exposure to Pb-spiked sediment were similar for the 1000 mL-20 organisms (3969 [3107-4442]), 250 mL-10 organisms (3825 [3462-4112]) and 250 mL-20 organisms (3810 [no limits]) treatments. However, LC50 values were lowered and variable for the 100 mL-10 organism (3295 [1722-4537]) and 100mL-10 organism (3411 [896-4356]) treatments, although salinity drift was an issue in smaller beakers. The ability of statistical tests to resolve differences relative to the control may be compromised through use of the alternate methods, as incidental mortality may increase intra-treatment variability when fewer organisms are used per exposure chamber. The minimum significant difference in the standard method (22.1 – 26.0 %) was similar to 250 mL beakers with 20 (24.8 – 27.1 %) and 10 (25.4 – 27.3 %) organisms but increased for 100 ml beakers containing 20 (30.7 – 32.6 %) and 10 (28.6 – 33.1 %) organisms. Our results suggest that the standard method offers the advantages of greater statistical power, consistent results and stable water quality. However, a modification using a 250 ml beaker containing 10 organisms was of comparable utility, although salinity should be carefully tracked. *This abstract does not necessarily reflect US EPA policy.*

KEYWORDS:

Abstract Details

Presentation Type Preference: Willing to present if preferred presentation type choice is not

met.

Requested Submission: Lisa Taylor, Environment Canada

Student Presentation Award:

Public E-Mail Address: Alan.J.Kennedy@usace.army.mil