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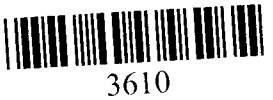

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Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates[1]

This standard is issued under the fixed designation E 1706; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods cover procedures for testing freshwater organisms in the laboratory to evaluate the toxicity of contaminants associated with whole sediments. Sediments may be collected from the field or spiked with compounds in the laboratory.

1.1.1 These test methods are for two toxicity test organisms, the amphipod *Hyalella azteca* (*H. azteca*) (see 13.1.2) and the midge *Chironomus tentans* (*C. tentans*) (see 14.1.2). The toxicity tests are conducted for 10 days in 300-mL chambers containing 100 mL of sediment and 175 mL of overlying water. Overlying water is renewed daily and test organisms are fed during the toxicity tests. Endpoints for the toxicity tests are survival or growth. These test methods describe procedures for testing freshwater sediments; however, estuarine sediments (up to 15 ‰ salinity) can also be tested with *H. azteca*. In addition to the 10-day toxicity test methods outlined in 13.1.2 and 14.1.2, general procedures are also described for conducting sediment toxicity tests with *H. azteca* (see 13.1.2) and *C. tentans* (see 14.1.2).

1.1.2 Guidance for conducting sediment toxicity tests is outlined in Annex A1 for *Chironomus riparius*, in Annex A2 for *Daphnia magna* and *Ceriodaphnia dubia*, in Annex A3 for *Hexagenia* spp., in Annex A4 for *Tubifex tubifex*, and in Annex A5 for the *Diporeia* spp. Paragraph 1.6 outlines the data that will be needed before test methods are developed from the guidance outlined in Annexes A1 to A5 for these test organisms. General procedures described in Sections 1 to 14 for sediment testing with *H. azteca* and *C. tentans* are also applicable for sediment testing with the test organisms described in Annex A1 to A5.

1.2 Procedures outlined in these test methods are based primarily on procedures described in the United States Environmental Protection Agency (USEPA) **(1, 2, 3)**,[2] Ankley et al **(4)**, Phipps et al **(5)**, Brooke et al **(6)**, Call et al **(7, 8)**, and Lee et al **(9)**.

1.3 Additional research and methods development are now in progress to: *(1)* evaluate additional test organisms, *(2)* develop standard chronic sediment toxicity tests (for example, 28-day exposures with *H. azteca*), *(3)* develop formulated sediment, *(4)* refine sediment dilution procedures, *(5)* refine sediment toxicity identification evaluation (TIE) procedures **(10)**, *(6)* refine sediment spiking procedures, and *(7)* produce additional data on confirmation of responses in laboratory tests with natural populations of benthic organisms. Additionally, many of the critical issues necessary for interpretation of test results are the subject of continuing research including the influence of feeding on bioavailability, nutritional requirements of the test organisms, and additional performance criteria for organism health. See Section 6 for additional detail. This information will be described in future editions of these test methods.

1.4 The USEPA **(1)** also describes 28-day bioaccumulation methods for *Lumbriculus variegatus*.

1.5 Results of tests, even those with the same species, using procedures different from those described in these test methods may not be comparable and using these different procedures may alter bioavailability. Comparison of results obtained using modified versions of these procedures might provide useful information concerning new concepts and procedures for conducting sediment tests with aquatic organisms. If tests are conducted with procedures different from those described in these test methods, additional tests are required to determine comparability of results. General procedures described in these test methods might be useful for conducting tests with other aquatic organisms; however, modifications may be necessary.

1.6 *Selection of Toxicity Testing Organisms:*

1.6.1 The choice of a test organism has a major influence on the relevance, success, and interpretation of a test. Furthermore, no one organism is best suited for all sediments. The following criteria were considered when selecting test organisms to be described in this test method (Table 1 and Guide E 1525). A test organism should: *(1)* have a toxicological data base demonstrating relative sensitivity and discrimination to a range of contaminants of interest in sediment, *(2)* have a database for interlaboratory comparisons of procedures (for example, round-robin studies), *(3)* be in direct contact with sediment, *(4)* be readily available through culture or from field collection, *(5)* be easily maintained in the laboratory, *(6)* be easily identified, *(7)* be ecologically or economically important, *(8)* have a broad geographical distribution, be indigenous (either present or historical) to the site being evaluated, or have a niche similar to organisms of concern, (for example, similar feeding guild or behavior to the indigenous organisms), *(9)* be tolerant of a broad range of sediment physicochemical characteristics (for example, grain size), and *(10)* be compatible with selected exposure methods and endpoints. The method should also

[1] These test methods are under the jurisdiction of ASTM Committee E-47 on Biological Effects and Environmental Fate and are the direct responsibility of Subcommittee E47.03 on Sediment Toxicology.

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[2] The boldface numbers in parentheses refer to the list of references at the end of this standard.