



Standard Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates¹

This standard is issued under the fixed designation E1706; 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 This test method covers 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 Test methods are described for two toxicity test organisms, the amphipod *Hyaella azteca* (*H. azteca*) (see 13.1.2) and the midge *Chironomus dilutus* (formerly known as *C. tentans*; Shobanov et al. 1999.(1) (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 10-day toxicity tests are survival and growth. These test methods describe procedures for testing freshwater sediments; however, estuarine sediments (up to 15 ppt salinity) can also be tested with *H. azteca*. In addition to the 10-day toxicity test method outlined in 13.1.2 and 14.1.2, general procedures are also described for conducting 10-day sediment toxicity tests with *H. azteca* (see 13.1.2) and *C. dilutus* (see 14.1.2).

NOTE 1—Morphological comparison of populations of *Chironomus* (*Camptochironomus*) *tentans* (Fabricius) from Europe, Asia, and North America have confirmed cytogenetic evidence that two distinct species inhabit the Palearctic and Nearctic under this name. The Palearctic species is the true *C. tentans* and the Nearctic populations constitute a new species described under the name *Chironomus* (*Camptochironomus*) *dilutus* (Shobanov et al. 1999 (1)).”

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. Guidance is also provided in Annex A6 for conducting long-term sediment toxicity tests with *H. azteca* by measuring effects on survival, growth, and reproduc-

tion. Guidance is also provided in Annex A7 for conducting long-term sediment toxicity tests with *C. dilutus* by measuring effects on survival, growth, emergence, and reproduction. 1.6 outlines the data that will be needed before test methods are developed from the guidance outlined in Annex A1 to Annex A7 for these test organisms. General procedures described in Sections 1 – 14 for sediment testing with *H. azteca* and *C. dilutus* are also applicable for sediment testing with the test organisms described in Annex A1 to Annex A7.

1.2 Procedures outlined in this test method are based primarily on procedures described in the United States Environmental Protection Agency (USEPA) (2-9)², Test Method E1367, and Guides E1391, E1525 and E1688.

1.3 Additional research and methods development are now in progress to: (1) evaluate additional test organisms, (2) further evaluate the use of formulated sediment, (3) refine sediment dilution procedures, (4) refine sediment toxicity identification evaluation (TIE) procedures (10), (5) refine sediment spiking procedures, (6) develop *in situ* toxicity tests to assess sediment toxicity and bioaccumulation under field conditions, (7) evaluate relative sensitivities of endpoints measured in tests, (8) develop methods for new species, (9) evaluate relationships between toxicity and bioaccumulation, and (10) produce additional data on confirmation of responses in laboratory tests with natural populations of benthic organisms. Some issues that may be considered in 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 this standard.

1.4 The USEPA (2) and Guide E1688 also describes 28-day bioaccumulation methods for the oligochaete *Lumbriculus variegatus*.

1.5 Results of tests, even those with the same species, using procedures different from those described in the test method may not be comparable and using these different procedures

¹ This test method is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and are the direct responsibility of Subcommittee E50.47 on Biological Effects and Environmental Fate.

Current edition approved Sept. 1, 2010. Published January 2011. Originally approved in 1995. Last previous edition approved in 2005 as E1706 – 05^{ε1}. DOI: 10.1520/E1706-05R10.

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

*A Summary of Changes section appears at the end of this standard