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Standard Guide for Selection of Resident Species as Test Organisms for Aquatic and Sediment Toxicity Tests¹

This standard is issued under the fixed designation E1850; 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 guide along with Guide E1192 and guidance from the U.S. Environmental Protection Agency (1,2)² covers the use of resident species in toxicity testing, particularly if site-specific information is desired. For example, in those systems where particular species are considered to be economically or aesthetically important, it might be more appropriate to utilize resident species for testing (3). For this reason, the USEPA allows development of site-specific chemical standards, using resident species, in order to reflect local conditions (1). This guide is designed to guide the selection of resident species for use as test organisms in aquatic and sediment toxicity tests. It presupposes that the user is familiar with the taxonomy of aquatic and benthic species and has some field experience.

1.2 Because toxicological information is often limited for many aquatic species, it is assumed that the majority of testing applications will be acute tests. Therefore, much of the guidance presented in this guide pertaining to the species selection process is applicable when acute toxicity testing is the desired goal. However, the principles discussed in this guide pertain to chronic toxicity test applications as well, although it should be clearly understood that such testing requires substantially greater effort, time, and resources than acute testing.

1.3 The procedures for selecting resident species in toxicity testing are necessarily general at this time because information is often lacking for specific taxa or groups of taxa. This guide attempts to give specific information when appropriate.

1.4 This guide is not intended to be inclusive. References listed provide a starting point from which to approach the literature. This guide deals solely with aquatic toxicity test

situations. Terrestrial, arboreal, or atmospheric species are not considered in this guide.

1.5 This guide is arranged as follows:

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1.6 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use. All safety precautions and health-related practices are the responsibility of the user. Specific safety practices are suggested in Section 8.

1.7 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

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

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² The boldface numbers given in parentheses refer to a list of references at the end of the text.

2. Referenced Documents

2.1 ASTM Standards:³

- D4229 Practice for Conducting Static Acute Toxicity Tests on Waste-Waters with *Daphnia* (Withdrawn 1988)⁴
- D4401 Practice for Collecting Benthic Macroinvertebrates With Petersen Grab Sampler (Withdrawn 2003)⁴
- D4407 Practice for Collecting Benthic Macroinvertebrates With Orange Peel Grab Sampler (Withdrawn 2003)⁴
- D4556 Guide for Selecting Stream-Net Sampling Devices for Collecting Benthic Macroinvertebrates (Withdrawn 2003)⁴
- D4557 Practice for Collecting Benthic Macroinvertebrates with Surber and Related Type Samplers (Withdrawn 2003)⁴
- D4558 Practice for Collecting Benthic Macroinvertebrates With Drift Nets (Withdrawn 2003)⁴
- E724 Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Four Species of Saltwater Bivalve Molluscs
- E729 Guide for Conducting Acute Toxicity Tests on Test Materials with Fishes, Macroinvertebrates, and Amphibians
- E1191 Guide for Conducting Life-Cycle Toxicity Tests with Saltwater Mysids
- E1192 Guide for Conducting Acute Toxicity Tests on Aqueous Ambient Samples and Effluents with Fishes, Macroinvertebrates, and Amphibians
- E1193 Guide for Conducting *Daphnia magna* Life-Cycle Toxicity Tests
- E1210 Practice for Fluorescent Liquid Penetrant Testing Using the Hydrophilic Post-Emulsification Process
- E1218 Guide for Conducting Static Toxicity Tests with Microalgae
- E1241 Guide for Conducting Early Life-Stage Toxicity Tests with Fishes
- E1367 Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Invertebrates
- E1383 Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates (Withdrawn 1995)⁴
- E1415 Guide for Conducting Static Toxicity Tests With *Lemna gibba* G3
- E1440 Guide for Acute Toxicity Test with the Rotifer *Brachionus*
- E1463 Guide for Conducting Static and Flow-Through Acute Toxicity Tests With Mysids From the West Coast of the United States
- E1498 Guide for Conducting Sexual Reproduction Tests with Seaweeds
- E1525 Guide for Designing Biological Tests with Sediments
- E1562 Guide for Conducting Acute, Chronic, and Life-Cycle Aquatic Toxicity Tests with Polychaetous Annelids

- E1563 Guide for Conducting Static Acute Toxicity Tests with Echinoid Embryos
- E1611 Guide for Conducting Sediment Toxicity Tests with Polychaetous Annelids
- E1688 Guide for Determination of the Bioaccumulation of Sediment-Associated Contaminants by Benthic Invertebrates
- E1706 Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates (Withdrawn 2019)⁴
- E1913 Guide for Conducting Static, Axenic, 14-Day Phytotoxicity Tests in Test Tubes with the Submersed Aquatic Macrophyte, *Myriophyllum sibiricum* Komarov (Withdrawn 2012)⁴
- E1924 Guide for Conducting Toxicity Tests with Bioluminescent Dinoflagellates (Withdrawn 2013)⁴
- E2122 Guide for Conducting In-situ Field Bioassays With Caged Bivalves

3. Terminology

3.1 *Definitions*: The words “must,” “should,” “may,” “can,” and “might” have very specific meanings in this guide. “Must” is used to express an absolute requirement. “Should” is used to state that the specified condition is recommended and ought to be met if possible. Although a violation of one “should” is rarely a serious matter, violation of several will often render the results questionable. Terms such as “desirable,” or “might be desirable” are used in conjunction with less important factors. “May” is used to mean “is (are allowed to),” “can” is used to mean “is (are) able to,” and “might” is used to mean “could possibly.” Thus, the classic distinction between “may” and “can” is preserved, and “might” is never used as a synonym for either “may” or “can.”

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *impaired water body or site*—a body of water or site which exhibits decreased structural or functional biological integrity, or both, given the geomorphic habitat available. This is typically measured as a decrease in the number of species present or decreased biological productivity compared to sites similar in size and habitat and having few anthropogenic influences.

3.2.2 *indigenous species*—a species that is likely to occur at a specified site for some portion of its life span as a native species.

3.2.3 *key species*—a species that is of special concern for ecological or economic reasons.

3.2.4 *resident species*—a species that is present at a specified site for some portion of its life span.

3.2.5 *surrogate species*—a species that can be studied to produce results to estimate toxicity responses of other species that are not tested directly (4). Frequently, published standard testing procedures, established through nationally recognized agencies or societies such as ASTM, OECD, Environment Canada, and USEPA, have been developed for these species.

4. Summary of Guide

4.1 A list of resident species is compiled from published literature on the natural history of the area, bioassessments of

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ The last approved version of this historical standard is referenced on www.astm.org.