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Standard Guide for Preparing Weathered Samples of Oil Using a Rotary Evaporator¹

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1. Scope

1.1 This guide summarizes methods to produce representative residual oil following evaporative weathering using a rotary evaporator.

1.1.1 The results of this guide can provide weathered oil samples for further study and characterization.

1.2 This guide covers general procedures for artificial weathering of oil by using rotary evaporation devices and does not cover all possible procedures that may be applicable to this topic.

1.3 The accuracy of this guide depends very much on the representative nature of the oil sample used. Certain oils can have different properties depending on their chemical contents at the time a sample is taken.

1.4 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard.

1.5 *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.*

1.6 *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.*

2. Referenced Documents

2.1 *ASTM Standards*:²

F3337 Guide for Taking Property and Behavior Measure-

ments on Weathered Fractions of Oil

3. Summary of Guide

3.1 Oil is evaporatively weathered to at least three stages with the first stage being fresh oil, the second being intermediate, and the final stage being extensive. Extensive weathering is reasonably maximum weathering, for example, ten days equivalent or with little change in properties occurring in the final substages of weathering. For this guide, accelerated weathering is applied for 48 h.

3.1.1 An exception is some residual fuel oils that have limited volatile content and do not have evaporative mass loss greater than 5 % over the 48 h period of the procedure. For these products, an intermediate weathered sample may not be informative.

3.2 Subsamples of the oil are taken at each weathering stage and further analysis can be performed on the samples.

4. Significance and Use

4.1 A standard procedure is necessary to prepare samples of oils or petroleum products at different oil weathering stages with compositional distribution that is representative of weathered spilled oil.

4.2 This procedure uses standardized equipment and test procedures.

4.3 This procedure should be performed at the stages of weathering corresponding to the spill conditions of interest.

5. Interferences and Sources of Error

5.1 Large proportions of inorganic substances in the oil sample, such as water and sediment that are produced with the oil at source, can distort the evaporation profile of the bulk hydrocarbons. Water and sediment are typically removed during crude petroleum processing; however, if the oil sample is sourced upstream of this step, then it is necessary to decant the water before weathering to obtain an accurate value for hydrocarbon mass loss. The mass percentage of sediment shall then be determined separately to adjust the initial mass of hydrocarbon to enable the correct percentage mass loss for the sample to be determined.

¹ This guide is under the jurisdiction of ASTM Committee F20 on Hazardous Substances and Oil Spill Response and is the direct responsibility of Subcommittee F20.16 on Surveillance and Tracking.

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² 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.