



Standard Practice for Soil Sample Preparation for the Determination of Radionuclides¹

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1. Scope

1.1 This practice covers the preparation of surface soil samples collected for chemical analysis of radionuclides, particularly uranium and plutonium. This practice describes one acceptable approach to the preparation of soil samples for radiochemical analysis.

1.2 *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 and health practices and determine the applicability of regulatory limitations prior to use.* A specific hazard statement is given in Note 1.

2. Referenced Documents

2.1 ASTM Standards:

C 998 Practice for Sampling Surface Soil for Radionuclides²

3. Summary of Practice

3.1 Guidance is provided for the preparation of a homogeneous soil sample from ten composited core samples (aggregate weight of 4 to 5 kg) collected as to be representative of the area.

4. Significance and Use

4.1 Soil samples prepared for radionuclide analyses by this practice are used to monitor fallout distribution from nuclear facilities. This practice is intended to produce a homogeneous sample from which a relatively small aliquot (10 g) may be drawn for radiochemical analyses.

4.2 Most nuclear facilities fulfill major requirements of their monitoring programs by gamma-ray spectrometry measurements of soil. A widely used practice for these measurements is to fill a calibrated sample container, such as a Marinelli beaker (~600-mL volume), with a homogenized soil sample. By preparing the entire soil core collection, sufficient homogeneous sample is available for radiochemical and gamma-ray spectrometry measurements.

5. Apparatus

- 5.1 *Scale*, capacity of 10 kg.
- 5.2 *Drying Oven*, able to maintain $\pm 2^\circ\text{C}$.
- 5.3 *Pans*, disposable aluminum.
- 5.4 *Jar Mill*, capacity for 7.57-L (2-gal) cans.
- 5.5 *Steel Cans and Lids*, 7.57-L (2-gal).
- 5.6 *Ceramic Rods*, 21 mm by 21 mm (13/16 in. by 13/16 in.) or steel grinding balls, 25.4-mm (1-in.) diameter.
- 5.7 *Sieve*, U.S. Series No. 35 (500- μm or 32 mesh).
- 5.8 *Plastic Bottles*, 7.57-L.

6. Procedure

- 6.1 Label a cleaned 7.57-L (2-gal) steel can and lid with a laboratory code number.
- 6.2 Weigh the labeled steel can and lid. Record the weight.
- 6.3 Transfer the ten soil cores (including vegetation) from the field collection containers into the labeled, preweighed steel can. Do not pack the can full. Place the steel lid loosely on the can.

NOTE 1—**Precaution:** Wear gloves throughout the preparation procedure to minimize the possibility of fungus infection.

- 6.4 Weigh the sample cores, steel can, and lid to ± 50 g. Record the weight.
- 6.5 Remove the lid and place the sample in a 110°C drying oven for 24 h or longer, depending on the depth of soil in the can, until the sample has reached constant weight.
- 6.6 Remove the sample from the oven, cap the can with its lid, and cool to room temperature.
- 6.7 Weigh the dried sample cores, steel can, and lid to ± 50 g. Record the weight.
- 6.8 Remove the can lid and add 10 to 12 ceramic rods (21 mm by 21 mm) or steel balls (25.4-mm diameter) to the can.
- 6.9 Replace the lid and tightly seal the sample can.
- 6.10 Place the sample can on a jar mill for at least 4 h, or overnight if possible, at 30 r/min.
- 6.11 Remove the sample can from the mill and place in a hood.
- 6.12 Allow the sample to settle for a few minutes.
- 6.13 Label a 7.57-L (2-gal) plastic jar and cap with the laboratory code number of the sample.
- 6.14 Remove the lid from the sample can and transfer a portion of the sample to a U.S. Series No. 35 (500- μm or 32 mesh) sieve.

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² *Annual Book of ASTM Standards*, Vol 12.01.