Designation: D6907 – 05(Reapproved 2010)

Standard Practice for Sampling Soils and Contaminated Media with Hand-Operated Bucket Augers[1]

This standard is issued under the fixed designation D6907; 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 practice describes the procedures and equipment used to collect surface and subsurface soil and contaminated media samples for chemical analysis using a hand-operated bucket auger (hereafter referred to as a bucket auger; sometimes referred to as a barrel auger). Several types of bucket augers exist and are designed for sampling various types of soil. All bucket augers collect disturbed samples, but bucket augers can also be used to auger to the desired sampling depth and then, using a core-type sampler, collect a relatively undisturbed sample.

1.2 This practice does not cover the use of large (12-in. or greater diameter) bucket augers mechanically operated by large drill rigs or similar equipment, such as those described in Practice D1452, section 3.2.4.

1.3 The term bucket auger is used to differentiate this type of hand operated auger from others of the solid or hollow stem types that are also hand held or operated.

1.4 This practice does not address sampling objectives (see Practice D5792), general sample planning (see Guide D4687), sampling design (for example, where to collect samples and what depth to sample [see Guide D6044]), sampling for volatile organic compounds (see Guide D4547), equipment cleaning and decontamination (see Practice D5088), sample handling after collection such as compositing and subsampling (see Guide D6051), and sample preservation. For information on other types of augers, see Practice D1452 and Guide D4700.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1452 Practice for Soil Exploration and Sampling by Auger Borings
D4547 Guide for Sampling Waste and Soils for Volatile Organic Compounds
D4687 Guide for General Planning of Waste Sampling
D4700 Guide for Soil Sampling from the Vadose Zone
D5088 Practice for Decontamination of Field Equipment Used at Waste Sites
D5283 Practice for Generation of Environmental Data Related to Waste Management Activities: Quality Assurance and Quality Control Planning and Implementation
D5434 Guide for Field Logging of Subsurface Explorations of Soil and Rock
D5681 Terminology for Waste and Waste Management
D5792 Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives
D6044 Guide for Representative Sampling for Management of Waste and Contaminated Media
D6051 Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities
D6232 Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities
D6282 Guide for Direct Push Soil Sampling for Environmental Site Characterizations (Withdrawn 2014)[3]
D6286 Guide for Selection of Drilling Methods for Environmental Site Characterization

3. Terminology

3.1 *Definitions*—Except where noted, all terms and symbols in this practice are in accordance with the following publications. In order of consideration they are:

3.1.1 Terminology D5681 for Waste and Waste Management,

[1] This practice is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.03 on Sampling Equipment.

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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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

3.1.2 Compilation of ASTM Standard Terminology, and
3.1.3 Webster's New Collegiate Dictionary.

4. Summary of Practice

4.1 Typically, bucket augers are tubular devices with cutting bits on the bottom that are pushed and twisted into the media and removed when the tubular "bucket" section is full. The borehole is advanced one bucket at a time. The practical depth of investigation using a bucket auger is related to the material being sampled.

4.2 When a sampling interval starting at the surface is to be sampled, the same auger can be used to collect all materials to the bottom of the interval. However, if discrete grab samples are to be collected to characterize multiple depths or a depth interval commences below the surface, a clean bucket auger should be used to collect the sample. The top material in a bucket should generally be discarded to minimize chances of cross-contamination of the sample from material that sloughs from the borehole wall.

4.3 All augers collect disturbed samples that are generally not suitable for analysis of volatile organic compounds.

NOTE 1—Bucket augers may be used to obtain samples of materials containing volatile organic compounds for field screening purposes. A core or tube type sampler can be pushed into undisturbed soil at the bottom of an augered hole to collect a relatively undisturbed sample suitable for chemical analysis.

5. Significance and Use

5.1 Bucket augers are relatively inexpensive, readily available, available in different types depending on the media to be sampled, and most can be easily operated by one person. They collect a reasonably cylindrical but disturbed sample of surface or subsurface soil or waste. They are generally not suited for sampling gravelly or coarser soil and are unsuitable for sampling rock.

5.2 Bucket augers are commonly used equipment because they are inexpensive to operate, especially compared to powered equipment (that is, direct push and drill rigs). When evaluated against screw augers, bucket augers generally collect larger samples with less chance of mixing with soil from shallow depths because the sample is retained within the auger barrel. Bucket augers are commonly used to depths of 3 m but have been used to much greater depths depending upon the soil or waste characteristics. The sampling depth is limited by the force required to rotate the auger and the depth at which the borehole collapses (unless bore casings or liners are used).

5.3 Bucket augers may not be suitable for the collection of samples for determination of volatile organic compounds because the sample is disturbed during the collection process, which may lead to losses resulting in a chemically unrepresentative sample.

6. Apparatus

6.1 *Bucket Augers:*

6.1.1 Bucket augers for soil sampling generally consist of a tubular auger head with cutting bits, an extension rod or rods, and a "T" handle (see Fig. 1). The auger is rotated using the "T" handle until the bucket is full, the device retrieved and emptied, and the process repeated.

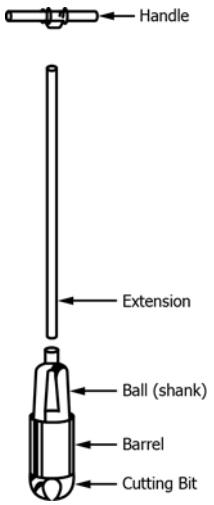

FIG. 1 Bucket Auger

6.1.2 The advantages and disadvantages of bucket augers are listed in Table 1.

6.1.3 Bucket augers are generally available with tungsten carbide hard surface carbon steel bits, stainless steel cylinder and carbon steel bail (shank), or in all stainless steel (see Fig. 1). Several types of bucket augers are described below. In use, bits should be kept sharp for efficient sampling.

6.1.4 *Regular Bucket Auger*—Used for ordinary soil and waste sampling and for creating a pilot hole from which subsequent undisturbed core samples can be collected at depth using a core sampler. (See Fig. 2a).

6.1.5 *Sand Bucket Auger*—Designed for use in extremely dry, sandy soils. The bits are specially formed to retain loose sand by being close together (see Fig. 2b).

TABLE 1 Advantages and Disadvantages of Bucket Augers

Advantages	Disadvantages
1. Inexpensive to purchase and operate. 2. Readily available. 3. Operable by one or two people. 4. Available in a variety of types suitable for a wide variety of soil types. 5. Larger volumes of soil obtained compared to hand-held tube samplers. 6. Collect a reasonably cylindrical (representative) sample. 7. Depending upon soil characteristics and the auger, samples may be collected at depths of >3 m or more.	1. Samples from lower depths can be contaminated by cave-in or sloughing of bore walls. 2. Samples are disturbed so it is difficult to generate an accurate soil profile. 3. Samples are generally not suitable for quantitative determination of volatile organic compounds due to disturbance. 4. Sampling depth generally limited to 1-2 m. 5. Metal from bucket augers may contaminate samples (stainless preferred for trace element sampling. 6. Extraction of samples from closed bucket types is cumbersome, and decontamination more difficult than for screw augers. 7. Sampling in or below a water table is difficult.