Designation: D 6883 – 03a

Standard Practice for Manual Sampling of Stationary Coal from Railroad Cars, Barges, Trucks, or Stockpiles[1]

This standard is issued under the fixed designation D 6883; 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 covers procedures for obtaining a manual gross sample from beneath the surface of coal in railroad cars, barges, trucks, or stockpiles. These procedures are to be used to provide gross samples for estimating the quality of the coal. The gross samples are to be crushed, divided, and further prepared for analysis in accordance with Practice D 2013.

1.2 This practice provides instruction for sampling beneath the exposed surface coal to a depth of approximately 61 cm (24 in.). Samples are collected at this depth to get below the surface of the material, ~~where~~ since drying and oxidation may have occurred at, or near the surface. ~~T~~ Change ~~ps~~ in moisture, in ~~po~~particle size, and in other properties continue to ~~avoid collecting increments that are significantly different from~~ occur deeper in the ~~majority of the lot of~~ coal ~~being sampled due~~ and, although not as drastic as near the surface, will cause the method to ~~environmental effects.~~ be biased. The user ~~is cautioned that samples so obtained do not represent material beyond~~ should review the ~~point~~ conditions of the coal (weather conditions, prior transport, settling time, and so forth, see 8.1) so that the interested parties can agree that potential biases are not overly great or that some adjustment in specifiactions is warrented. Sample increments collected from the surface layer(s) of coal in railroad cars, barges, or stockpiles are classified condition "D" (see Practice D 2234 section 6, Increment Collection Classification). It is a good practice to require that "details of sampling procedure shall be agreed upon in advance by all parties concerned" whenever collection of sample increments falls under condition "D." This practice offers a sampling procedure that parties may use to meet requirements of Practice D 2234 for condition "D." The practice does not produce samples that satisfy precision requirements of Practice D 2234 general-purpose sampling, or Practice D 2234 special-purpose sampling.

1.3 The user is cautioned that samples of this type do not satisfy the minimum requirements for probability sampling and as such cannot be used to draw statistical inferences such as precision, standard error, or bias.

1.4 This sampling method is intended for use only when sampling by more reliable methods that provide a probability sample is not possible.

1.5 The quantities stated in either acceptable SI units or in inch-pound units are regarded separately as standard. The quantities stated in each system may not be exact equivalents; therefore, each system must be used independently of the other, without combining quantities in any way.

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

---

[1] This practice is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.23 on Sampling .
Current edition approved ~~April 10,~~ Oct. 1, 2003. Published ~~May~~ October 2003. Orginally approved in 2003. Last previous edition approved in 2003 as D6883–03.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 121 Terminology of Coal and Coke
D 2013 Practice for Preparing Coal Samples for Analysis
D 2234 Practice for Collection of a Gross Sample of Coal
D 4749 Test Method for Performing Sieve Analysis of Coal and Designating Coal Size
D 4916 Practice for Mechanical Auger Sampling
E 105 Practice for Probability Sampling of Materials
E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
E 456 Terminology for Relating to Quality and Statistics

3. Terminology

3.1 *Definitions:*

3.1.1 *consignment, n*—a discrete amount of coal, such as a shipment, a carload, a unit train, or a day's production. A consignment may include more than one lot of coal and may correspond to a specific period of time such as sampling period or billing period.

3.1.2 *particle segregation, n*—the segregation of sized particles to specific areas as a result of the particles rolling, falling, or sliding down the sides of a pile or a result of the peculiarities of a coal handling system used to build the pile. Particle segregation is a process of separation, not exclusively by size, but by size, shape, and density.

3.1.3 *stockpile, n*—material stored or reserved in a stacked pile or heap.

4. Summary of Practice

4.1 Use of this practice is limited to manual collection of sample increments from beneath the surface layer(s) of stationary coal from railroad cars, barges, trucks, or stockpiles for the purpose of acquiring a gross sample.

5. Significance and Use

5.1 These guidelines provide procedures for manually collecting gross samples from beneath the exposed surface of coal in railroad cars, barges, trucks, or stockpiles taking into account the wide variety of conditions that may be encountered. The samples are further processed for the laboratory to provide estimations of the coal quality. The use of this practice is conditional upon agreement among all interested parties concerning all relevant details of sample collection before sampling begins. These include, but are not limited to: lot size; number and mass of increments; the size, shape, and manipulation of the increment collection devices; location of increment collection site or sites; circumstances under which increments are not to be collected or suspended; and safety precautions. It is preferable that such agreements be in writing. The user is cautioned that samples so obtained do not represent material below the point of penetration.

6. Hazards

6.1 **Warning—**Stockpile sampling involves exposure to hazardous operations, conditions, and equipment. Awareness to personnel safety cannot be overemphasized. Personnel may require approved federal and/or state safety training before taking part in field sampling. Site-specific safety regulations must be observed. This includes personnel wearing all specified personal protection equipment. The general safety precautions necessary when working around moving equipment must be observed. Sampling technicians must never work in coal that is piled or in railroad cars over hoppers and/or feeders or where there is the possibility of the coal being eroded from beneath them. Sampling should never be performed near a face of a stockpile where the face extends upward at an angle greater than the angle of repose of the coal.

7. Procedure

7.1 *Observations*—Before sampling a lot of coal using this method, perform a visual inspection for particle distribution and possible particle segregation within the stockpile. Notes should be made on the sampling log to reflect these observations. These notes could be useful in understanding differences of analytical test results or in identifying changes in stockpiling characteristics. The approximate top size of the coal on the surface layer should be estimated in this step.

7.2 *Lot Size*—All interested parties should agree to the size of the lot to be represented by one gross sample before sampling begins.

7.3 *Weight of Increments*—Increment weights are to be equal to, or in excess of, those contained in Table 2 of Practice D 2234. All increments should be of approximately equal mass.

7.4 *Number of Increments*—Meaningful levels of precision cannot be obtained with the methods described herein. Determine the number of ~~primary~~ increments to be collected for one gross sample using Eq 1. Fewer ~~primary~~ increments are permissible if

[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*, ~~Vol 05.06~~ volume information, refer to the standard's Document Summary page on the ASTM website.

agreed upon in ~~advance, but are not recommended. It is good practice for manual sampling of stationary coal, that the details of the sampling procedure be agreed upon in advance by all parties concerned.~~ advance. Since meaningful levels of precision cannot be obtained for these samples, any multiplier can be considered valid in place of the number 35 in Eq 1 if agreed upon by the parties concerned.

$$N = 35\sqrt{\frac{\text{total lot size (Mg or tons)}}{\text{908 Mg or 1000 tons}}} \quad (1)$$

where:

N = number of increments.

7.5 *Increment Collection*—Collect increments from a depth of approximately 61 cm (24 in.), on top of conveyances, around the base of the stockpile, and up the slopes of the pile. The angles of the sides of the holes should be less than the angle of repose. Place the coal that is removed from the holes away from the sampling area. Remove the increment from the bottom of the hole and place it into the container. Avoid any spillage.

7.5.1 The pattern of increment placement can be dependent upon the size and number of conveyances or height and shape of the stockpile. Space the increments over the surface of the coal so that each increment will represent equally sized areas. This will require different spacing of increments as the size and number of conveyances or the profile of the pile changes. The Appendix contains a discussion of pattern selection for collection of increments from coal in conveyances.

7.5.2 As increments are collected, protect them from contamination and moisture change. Place the increments in plastic-lined canvas bags, metal drums with plastic liners, plastic buckets with airtight lids, or other moisture impervious containers. Each sample must be clearly identified. Place a moisture-proof identification tag inside the sample container and attach another securely on the outside of the sample container. Sample identification shall include the sampling technician's initials, the date, the location, weather conditions, the number of increments, and the sampling method used. This information will become part of the analytical report. Other notes or pertinent information can be recorded in the sampling log (see Section 8). This information may or may not be in the report, but it shall be retained as a part of the laboratory record.

7.6 *Collection Devices*—The estimated top size of the coal ascertained in 7.1 should be used to determine the opening size of the increment collection device. It should be a minimum of two and one half times the top size of the coal. Types and dimensions of sampling implements should be agreed upon by all interested parties before commencement of sampling. A common flat, square shovel with the two sides and the back built up with metal plates which are at least 10 cm (4 in.) high is a device that is commonly used to obtain manual samples See Fig. 1.

7.6.1 There are occasions when the use of an unloading device can expose multiple faces and increase the access to material for sampling. One example is to use heavy equipment, such as an end loader, to remove outside material of a stockpile thus

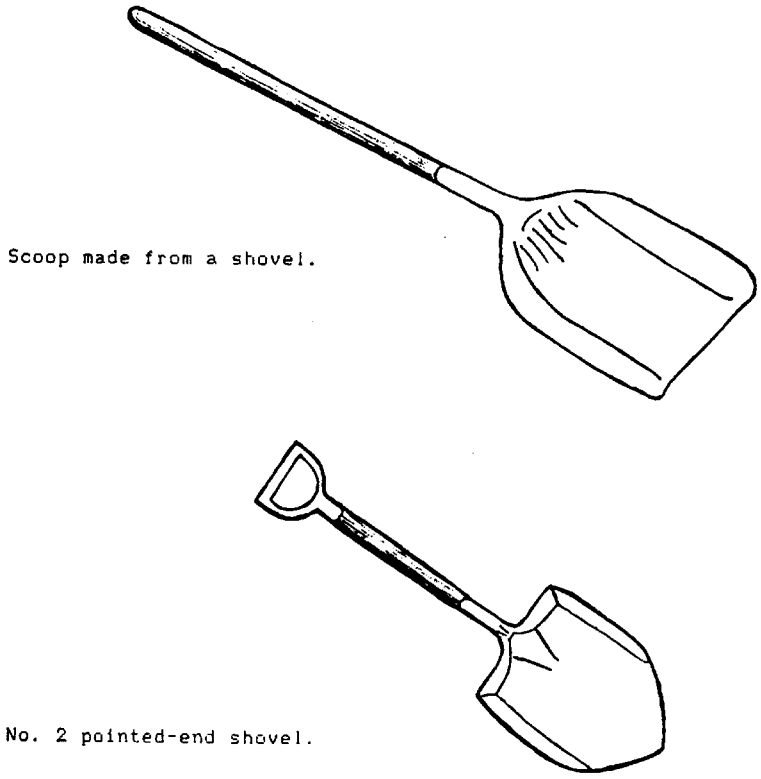

FIG. 1 Commonly Used Manual Sampling Implements

allowing increments to be taken from a freshly exposed face. A second example is to have the end loader bucket remove primary increments from a stockpile and then manually subsample each increment with a manual sampling implement (see Fig. 1). A third example is to have a clamshell bucket remove primary increments from a barge and then manually subsample each increment.

7.6.2 Use of mechanical equipment such as auger samplers and core drill rigs are not in the scope of this procedure and are addressed by other guides (Practice D 4916) or working papers.

7.7 In extremely cold weather, coal can become frozen on the surface as well as inside the stockpiles. It is preferable not to collect increments manually from frozen coal. Wait until it thaws. If sampling is necessary while coal is frozen, make note of the coal's condition when it was sampled. It will be extremely difficult or even impossible to collect increments properly.

8. Sampling Log

8.1 Sampling technicians should keep a written log. A sampling log contains sample identification and also notations of conditions encountered during increment collection. Entries to be noted include, but are not limited to: size of stockpile, number of railroad cars, barges, trucks or size segregation patterns, general configuration of stockpile, compaction of stockpile, perimeter conditions of pile, degree of contamination, the visual appearance of the material, date, and weather conditions.

8.2 Any modifications to a sampling plan should be discussed with the interested parties, if possible. Any changes to the agreed upon sampling plan are to be documented on the sampling log. If it is not possible or feasible to discuss modifications, both the fact that discussion was not possible, and the actual modifications that were made, are to be documented on the sampling log.

9. Personnel

9.1 Sampling technicians using this practice should be ~~trained~~ instructed in the particular manual sampling ~~and be familiar with Practice D 2234, as well as this procedure.~~ practice agreed upon.

9.2 Field situations often dictate on-site modifications of sampling plans. Modifications of a sampling plan should be made only by personnel with an understanding of and a sense of responsibility for the potential effects that the deviations will have on the sample being taken.

10. Precision and Bias

~~10.1 Analysis of the samples collected by this practice will only produce an estimate of the coal quality.~~

~~10.2 The~~

10.1 The samples obtained using this practice are non-probability samples and as such they cannot be used to calculate meaningful statistical inferences such as the levels of precision and bias. The user of this practice is referred to Practice E 105 for further information concerning probability sampling of materials.

11. Keywords

11.1 barges; manual sampling; rail cars; railroad cars; stockpiles

APPENDIXES

(Nonmandatory Information)

X1. SAMPLING PATTERN SELECTION

X1.1 Increment Positions

X1.1.1 Sampling pattern and increment placement should be agreed upon by all concerned parties. To determine potential positions of increments, use of one of the following options is recommended:

X1.1.2 *Option 1*—Divide the conveyance length into as many equal sections as the required number of increments and divide the width into three or more equal sections, depending on the required number of increments per lot. An imaginary grid is formed dividing the surface of the coal into equal rectangular sections which are the potential positions for the removal of increments.

X1.1.3 *Example*—For a lot consisting of six 1362 Mg (1500 tons) barges 18 increments per barge would be required. Therefore, the grids according to X1.1.2 for the barges could be:

18 sections long by 3 sections wide
18 sections long by 4 sections wide
18 sections long by 5 sections wide
18 sections long by 6 sections wide

X1.1.4 *Option 2*—Divide the conveyance width into two, three, four, five, or six equal sections, depending on which number is divisible and desirable, into the required number of increments per conveyance. Divide the required number of increments by this number to determine the number of equal length sections that will be required. An imaginary grid is formed dividing the surface of the barge into equal rectangular sections which are the potential positions for the removal of increments.

X1.1.5 *Example*—For the lot and barge combination described in X1.1.3, the grids according to X1.1.4 for the barges could be:

9 sections long by 2 sections wide
6 sections long by 3 sections wide
3 sections long by 6 sections wide

X1.2 Fig. X1.1 provides some illustrations of imaginary grid patterns.

X1.3 When increment positions are selected by a pattern in which the number of grid sections is greater than the number of increments required, ensure that an equal number of increments are collected from each width section and each length section throughout the lot being sampled. If multiple conveyances are to be sampled in the lot, the sampling pattern should be reversed after each pattern cycle.

X1.4 When 15 or more increments are collected from a railroad car or barge, it can be helpful to the sampling personnel to establish the grid by referencing to the ribs in the conveyance or by placing chalk marks along the side of the railroad car or along the barge coaming or gunnel.

X2. RATIONALE

X2.1 A need in the industry was identified to provide some estimate of the quality of coal contained in railroad cars, barges, trucks, or stockpiles when obtaining a probability sample (Conditions A or B in Practice D 2234) is not physically or economically feasible or both. The procedures described here are designed to provide guidelines for conducting sampling under these conditions.

X2.2 It is recognized that obtaining a sample of a single lot of coal from railroad cars, barges, trucks, or a stockpile that provides a reasonable estimate of the quality of the lot from which it was taken presents some unique problems. This sample represents only the coal immediately below the surface layer(s) of coal in conveyances or stockpiles, and may not provide an estimate of the quality of the entire lot. This sampling practice should not be considered as a substitute for a more reliable sampling method, for example, full-stream mechanical sampling.

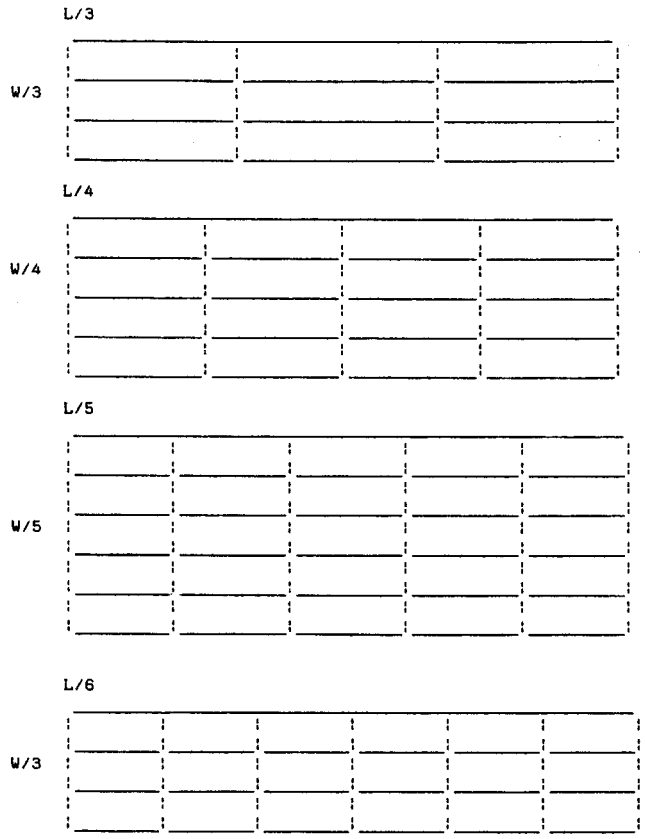

FIG. X1.1 Illustration of Imaginary Grids