Designation: D5495 – 21

Standard Practice for Sampling with a Composite Liquid Waste Sampler (COLIWASA)[1]

This standard is issued under the fixed designation D5495; 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 procedure for sampling liquids with the composite liquid waste sampler, or "COLIWASA." The COLIWASA is an appropriate device for obtaining a representative sample from stratified or unstratified liquids. Its most common use is for sampling containerized liquids, such as tanks, barrels, and drums. It may also be used for pools and other open bodies of stagnant liquid.

NOTE 1—A limitation of the COLIWASA is that the stopper mechanism may not allow collection of approximately the bottom 2.54 cm (1 in.) of material, depending on construction of the stopper.

1.2 The COLIWASA should not be used to sample flowing or moving liquids.

1.3 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.

1.4 *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.*

1.5 *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]

D4687 Guide for General Planning of Waste Sampling

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

D5681 Terminology for Waste and Waste Management

D5743 Practice for Sampling Single or Multilayered Liquids, With or Without Solids, in Drums or Similar Containers

D6026 Practice for Using Significant Digits in Geotechnical Data

D6232 Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities

3. Terminology

3.1 *Definitions*—For definitions of terms used in this standard, see Terminology D5681.

4. Summary of Practice

4.1 A clean device is slowly lowered into the liquid to be sampled. After it has filled, the bottom of the sampling tube is closed and the device is retrieved. The contents are subsequently discharged into a sample container.

5. Significance and Use

5.1 This practice is applicable to sampling liquid wastes and other stratified liquids. The COLIWASA is used to obtain a vertical column of liquid representing an accurate cross section of the sampled material. To obtain a representative sample of stratified liquids, the COLIWASA should be open at both ends

[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.

so that material flows through it as it is slowly lowered to the desired sampling depth. The COLIWASA must not be lowered with the stopper in place. Opening the stopper after the tube is submerged will cause material to flow in from the bottom layer only, resulting in gross over-representation of that layer.

5.2 This practice is to be used by personnel acquiring samples.

5.3 This practice should be used in conjunction with Guide D4687 which covers sampling plans, safety, QA, preservation, decontamination, labeling, and chain-of-custody procedures; Practice D5088 which covers decontamination of field equipment used at waste sites; Practice D5283 which covers project specifications and practices for environmental field operations; and Practice D5743 which covers drum sampling.

6. Sampling Equipment

6.1 COLIWASAs are available commercially with different types of stoppers and locking mechanisms, but they all operate using the same principle. They can also be constructed from materials such as polyvinylchloride (PVC), glass, metal, or polytetrafluoroethylene (PTFE). A traditional model of the COLIWASA is shown in Fig. 1 (de Vera et al.);[3,4] however, the design can be modified or adapted, or both, to meet the needs of the sampler. COLIWASAs must be selected that are constructed of materials compatible with the waste being sampled and with the analyses or tests to be performed. Due to the unknown nature of most containerized liquid wastes, COLIWASAs made of glass or polytetrafluoroethylene are best for general use.

7. Sample Containers

7.1 Plastic, glass, or other nonreactive containers should be used. Refer to Guide D6232 for further information on containers.

8. Procedure

8.1 Make certain the COLIWASA is clean and functioning properly. It is essential that the stopper at the bottom of the sampling tube closes securely.

8.2 Open the COLIWASA by placing the stopper mechanism in the open position.

[3] de Vera, E. R., Simmons, B. P., Stephens, R. C., and Storm, D. L., "Samplers and Sampling Procedures for Hazardous Waste Streams," EPA-600/2-80-018, January 1980.

[4] Ford, P. J., Turina, P. J., and Seeley, D. E., "Characterization of Hazardous Waste Sites—A Methods Manual: Volume II," Available Sampling Methods, Second Edition, EPA-600/4-84-076, December 1984.

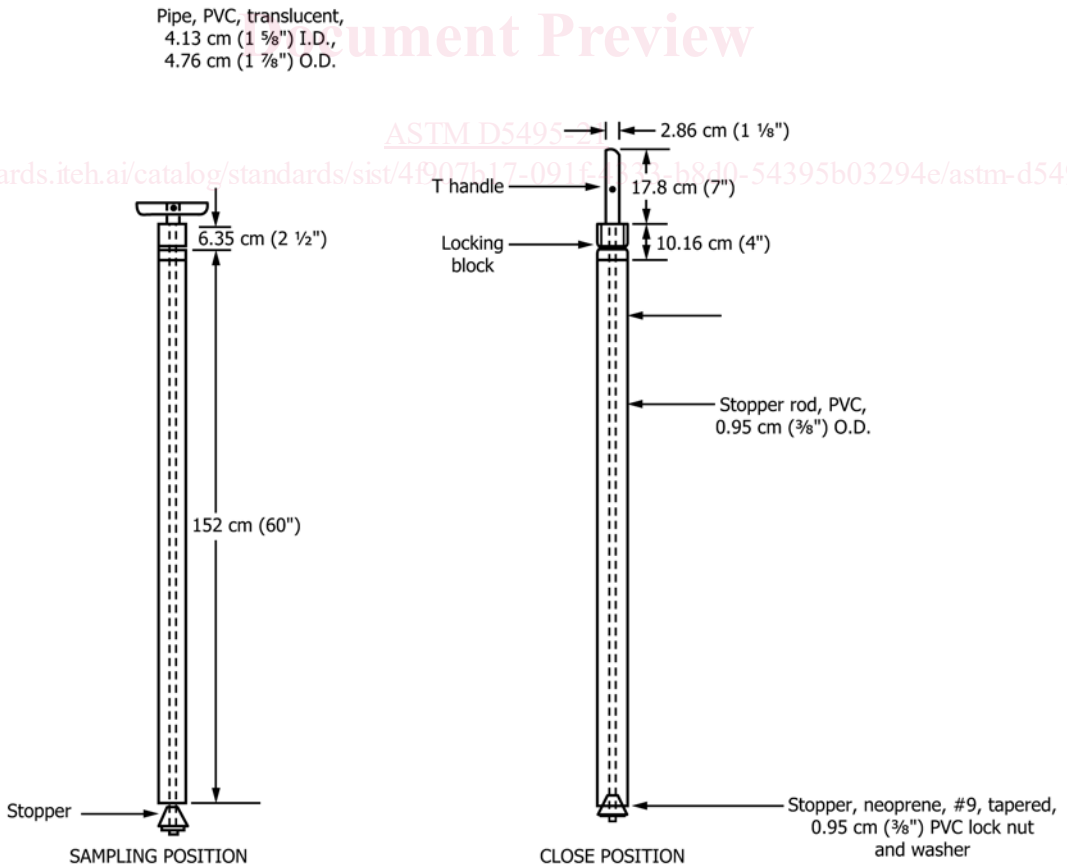

FIG. 1 Composite Liquid Waste Sampler (COLIWASA) (Typical)

8.3 Lower the COLIWASA into the liquid slowly so that the levels of the liquid inside and outside the sampler tube remain about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and a nonrepresentative sample will result.

8.4 Use the stopper mechanism to close the COLIWASA when it reaches the desired depth in the liquid.

8.5 Withdraw the sampler from the liquid. Either wipe the exterior of the sampler tube with a disposable cloth or rag or allow excess liquid to drain back into the waste container.

8.6 Carefully discharge the sample into a suitable container by slowly opening the stopper mechanism while the lower end of the COLIWASA is positioned in the sample container.

8.7 Seal the sample container, attach the label and seal, record in the field logbook, and complete the chain-of-custody record.

8.8 Decontaminate the used equipment in accordance with Practice D5088.

9. Keywords

9.1 COLIWASA; drum sampling; liquid sampling; sampling; waste

APPENDIX

(Nonmandatory Information)

X1. PERFORMANCE DATA FOR THE COLIWASA

X1.1 Independent testing was conducted to determine the bias and precision of using a COLIWASA for the collection of stratified liquids from drums or simulated drums. Results from a single set of experiments are presented. Improper procedural use or bias by a sampler may adversely impact the precision of a sample by a COLIWASA sampling device. Refer to Practice D5743.

X1.2 Experimental Design

X1.2.1 All samples were collected under controlled laboratory conditions. Samples were collected from 55-gal drums or a 34-in. acrylic cylinder (that is, simulated drum).

X1.2.2 Measured volumes of corn oil and water were placed in the drums or cylinders to known stratified conditions of 5:95, 50:50, and 95:5 corn oil:water.

X1.2.3 A single operator tested each of the three corn oil:water ratios using a 250-mL and 1000-mL COLIWASA. Thirty-six samples were collected from each corn oil:water ratio.

X1.3 Bias

X1.3.1 Bias was determined by comparing the known volumes of corn oil and water to the volumes collected by the two different size COLIWASAs.

X1.3.2 For the 50:50 corn oil:water sample, the 250-mL COLIWASA over sampled the water by approximately 5 % and the 1000-mL COLIWASA over sampled the water by approximately 9 %.

X1.3.3 For the 95:5 corn oil:water sample, the 250-mL COLIWASA over sampled the water by approximately 2 % and the 1000-mL COLIWASA over sampled the water by approximately 5 %.

X1.3.4 For the 5:95 corn oil:water sample, the 250-mL COLIWASA over-sampled the water by approximately 70 % and the 1000-mL COLIWASA over-sampled the water by approximately 4 %. The distinctly larger over-sampling of the upper corn oil layer by the 250-mL COLIWASA was attributed to the stopper interfering with the uptake of the thin corn oil layer during sampler insertion.

X1.4 Precision

X1.4.1 Precision was measured by calculating the percent relative standard deviation (% RSD) from 50 sets of five measurements of the 50:50 corn oil:water sample by a single sampler. The precision for both the 250-mL COLIWASA and 1000-mL COLIWASA was less than 3 % RSD.