Designation: D 4135 – 82 (Reapproved 1998)

Standard Practice for Sampling Phytoplankton With Depth-Integrating Samplers[1]

This standard is issued under the fixed designation D 4135; 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 the procedures for obtaining quantitative samples of a phytoplankton community by use of depth-integrating sampler. The method is suitable for use in flowing waters.

1.2 *This standard does not purport to address all of the safety problems, 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. Fig. 3*

2. Referenced Documents

2.1 *ASTM Standards:*

D 4137 Practice for Preserving Phytoplankton Samples[2]

3. Summary of Practice

3.1 A depth-integrated sample is collected by means of a sampler that integrates stream discharge as a function of depth. The velocity of flow in a stream, as well the density of phytoplankton, varies both vertically and horizontally. Depth integration is used to collect a sample that is weighted according to the velocity at each increment of depth.[3] The phytoplankton may be preserved as dictated by the objectives of the study.

4. Significance and Use

4.1 The *advantages* of the depth-integrating samplers are as follows:

4.1.1 The samplers provide the only means by which a representative sample of phytoplankton can be obtained from a stream.

4.1.2 The variety of sampler designs result in the availability of a sampler that can be used in virtually all velocities of flow.

4.1.3 Samples of known volumes can be obtained.

4.1.4 A quantitative sample is obtained. Nanno- and ultraplankton are not lost from the sampling device.

4.1.5 Some of the samplers can be used in water up to 55 m deep.

4.1.6 Many of the samplers are light-weight and can be used without auxiliary equipment.

4.2 The *disadvantages* of the depth-integrating samplers are as follows:

4.2.1 The samplers can be used only in flowing streams having a velocity greater than 1.5 ft^3/s.

4.2.2 Some of the samplers are heavy and require the use of auxiliary equipment, such as a crane with hoist.

4.2.3 The collection of samples can be very time-consuming.

4.3 There are several *special considerations* that shall be observed when using depth-integrating samplers. They are as follows:

4.3.1 The nozzle of the sampler should be inspected periodically for chips, cracks, or other signs of damage and replaced as necessary.

4.3.2 The sample from each vertical profile must be combined with other similar samples in a common container. If the combined sample is subsequently subdivided, it must be thoroughly mixed before doing so.

5. Apparatus

5.1 Several depth-integrating samplers are in widespread use in water-quality studies and have been described by Subcommittee D19.07 on Sedimentation,[4] (Figs. 1-3). All the samplers have the same basic design. They consist of a hydrodynamically designed, weighted body into which is placed the sample container. The rear of the sampler contains several vanes for stabilizing the sampler into the direction of stream flow. The size and weight of the samplers vary. The common sampler types have been designated as DH-49, DH-74, P-61, and D-77 by Subcommittee D19.07.

[1] This practice is under the jurisdiction of ASTM Committee E47 on Biological Effects and Environmental Fate and is the direct responsibility of Subcommittee E47.01 on Aquatic Assessment and Toxicology.

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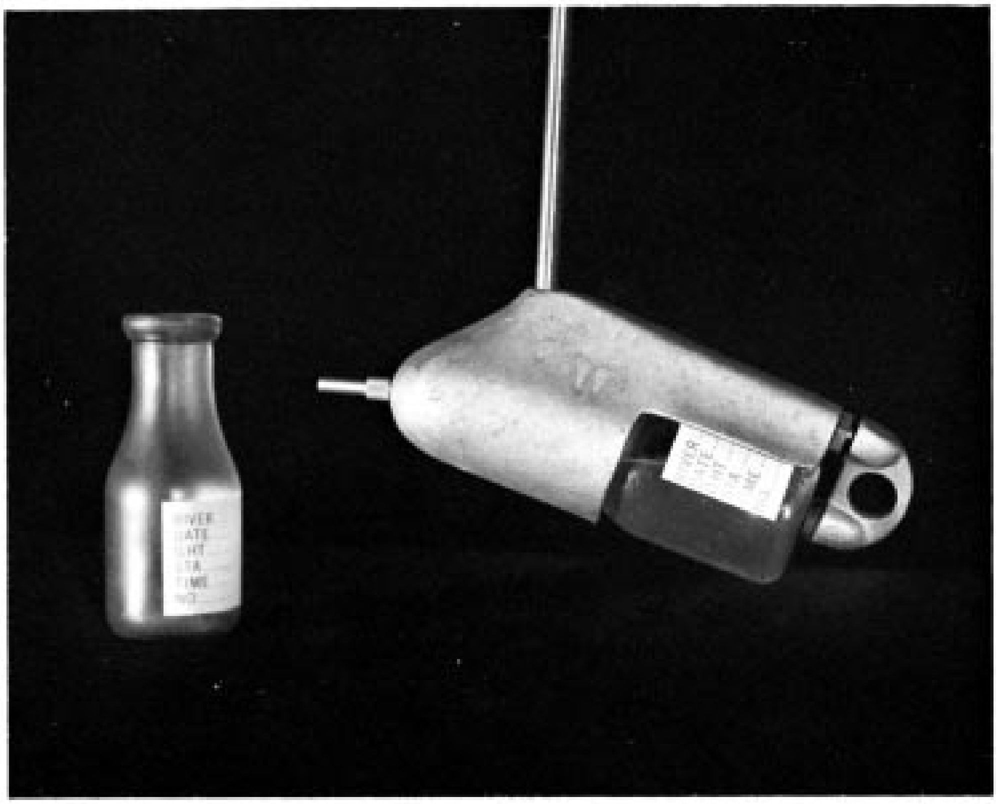
[2] *Annual Book of ASTM Standards*, Vol 11.05.

[3] Colby, B. R., "Relationship of Sediment Discharge to Streamflow," *U.S. Geology Survey*, Open-File Report, 1956, 170 pp.

[4] Subcommittee on Sedimentation, Interagency Committee on Water Resources," Determination of Fluvial Sediment Discharge," *Federal Interagency Commission on Water Resources*, Minneapolis, MN, Report, Vol 14, 1963, 151 pp.



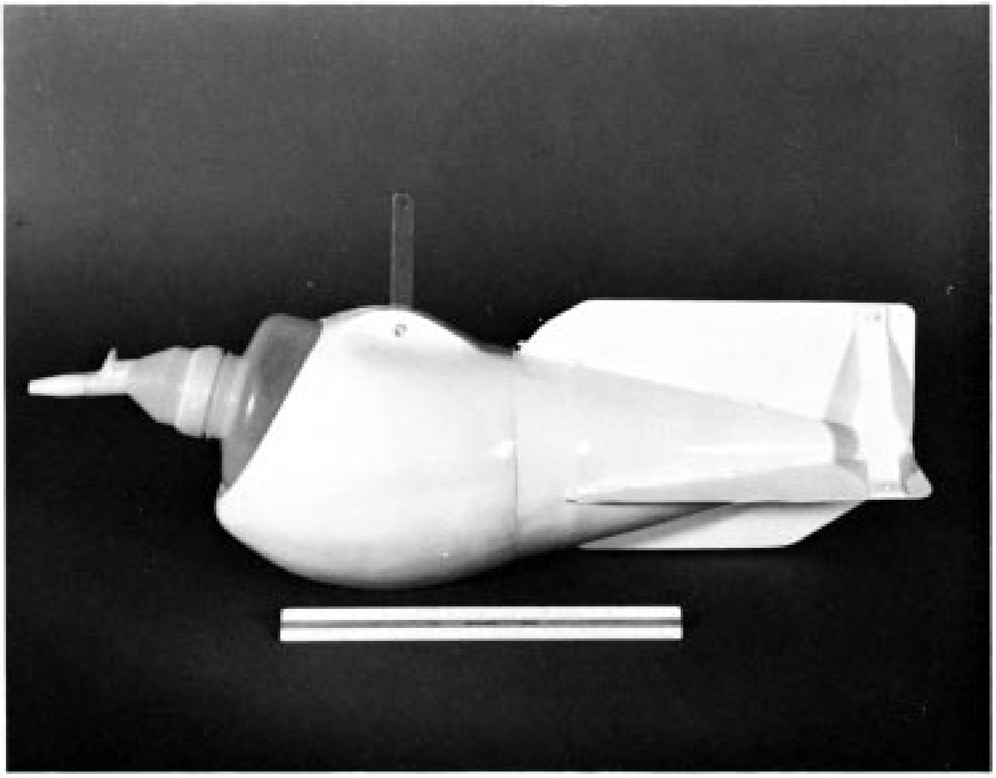
(*a*) D-11-48

FIG. 1 Depth-Integrating Samplers

6. Procedure

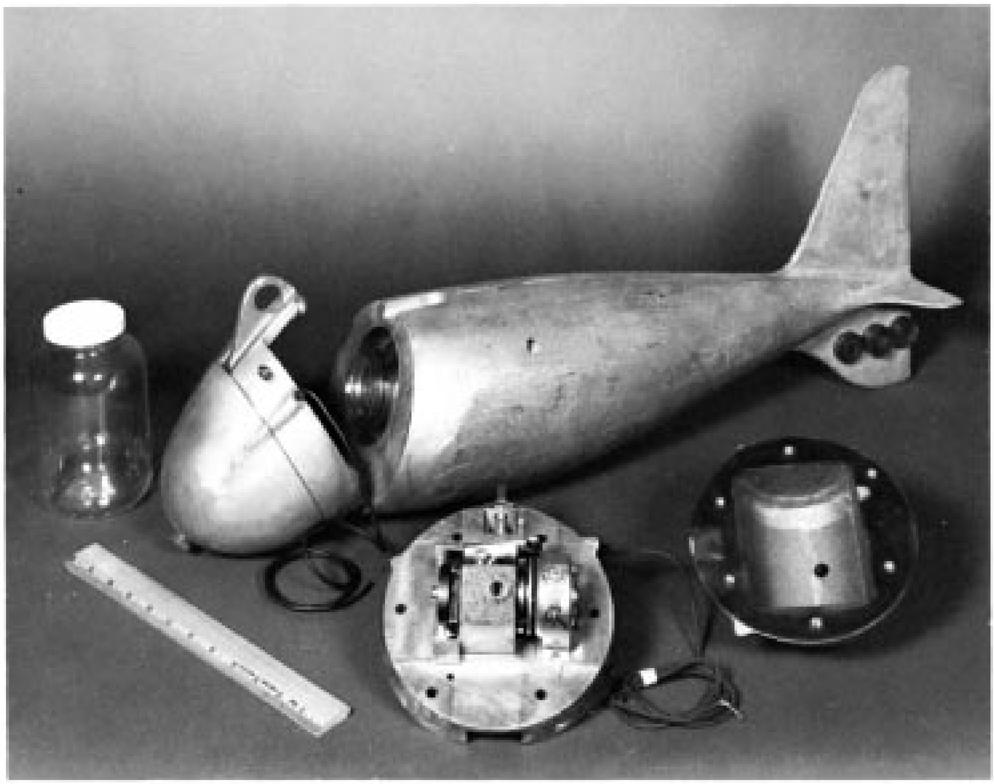
6.1 One of the best sampling techniques currently accepted by hydrologists for use in such situations is the equal-transit rate (ETR) method.[5] In this method, the standard suspended-sediment sampler is used to collect a discharge-weighted sample. Samples are taken at a number of equally spaced verticals in the cross section. The transit rate of the sampler, which is the rate of movement of the sampler from the water surface to the stream bed and back to the surface, should be the same at all verticals. Samples collected in each vertical are composited into a single sample that is representative of the entire flow in the cross section. Preserve the plankton as described in Practice D 4137.

[5] Guy, H. P., and Norman, V. W., "Field Methods of Measurement of Fluvial Sediment," *U.S. Geological Survey, Technology of Water-Resources Investigations*, Book 3, Chapter C2, 1970, 59 pp.



(*b*) D-77

FIG. 2 Depth-Integrating Samplers



(*c*) P-61

FIG. 3 Depth-Integrating Samplers