Report O

Instructions for Sampling with Depth-Integrating Suspended-Sediment Samplers US D-49 and DH-59

April 1965

The US D-49 and DH-59 suspended-sediment samplers are depth-integrating instruments designed for use in streams not more than about 15 feet in depth. The samplers have streamlined bodies weighing about 62 and 24 pounds, respectively, which are recessed to accommodate round 1-pint milk bottle sample containers. Tail vanes to orient the instruments into the direction of flow and air escape passages are cast integrally. The heads of the samplers are drilled and tapped to receive the intake nozzles. The D-49 head is hinged, permitting access to the sample bottle cavity by releasing the catch and swinging the head downward, away from the hangar bar support. Nine brass nozzles, three each with 1/4-inch, 3/16-inch, and 1/8-inch diameter bore, threaded for hand assembly to the head, are supplied with each instrument. In the sampling operation, the head is oriented upstream with the nozzle pointing directly into the current, and the sampler is lowered from the water surface to the stream bed and then raised to a position above the water surface. During the period of submergence a continuous filament of stream flow is collected in the sample bottle. Air displaced from the bottle while the sample accumulates is discharged through the air escape passage which points downstream. A fixed static head differential of 1/2-inch between the intake and exhaust facilitates sampling in low stream velocities and slack waters.

Selection of sampling locations requires evaluation of local conditions, a procedure which will not be discussed here. After the sediment sampling station or cross section has been selected, sediment samples are usually taken at verticals that represent equal fractions of stream discharge. One or more samples may be taken at each sampling vertical. For further guidance in this respect see Reports No. 8 or 14 in the series, "A Study of Methods Used in Measurement and Analysis of Sediment Loads in Streams."

Depth-integrating suspended-sediment samplers accumulate a sample of the water-sediment mixture throughout the period of submergence. However, if the container becomes completely filled during a sampling operation, the sample will not be representative and must be discarded.

the stream vertical in both the downward and upward directions. Use of these filling time curves will provide acceptable sample volumes and will permit minor variations in the total time of submergence without invalidating the sample. Enter the sampling time curve with the stream velocity and determine the sampling time to secure a sample volume of 395 cc. for the respective nozzle sizes. Then select the largest diameter nozzle that can be traversed conveniently throughout the depth of the stream in the time indicated, at a uniform rate throughout each direction of travel.

If the estimated mean velocity of flow in a stream vertical is 4 feet per second, a sediment sampler equipped with a 1/4-inch diameter intake nozzle will accumulate a sample of 395 cc. in 10 seconds of submergence. The sampler must be lowered from the water surface to the stream bed at a uniform rate in 5 seconds and raised from the bed of the stream at a uniform rate to break the water surface at the expiration of the remaining 5 seconds. The time used in traversing the stream vertical need not be the same in both directions of travel. However, the rate at which the sampler moves vertically in any one direction must remain uniform. Thus, in the above example, the stream vertical could be traversed at a uniform downward rate in 6 seconds and at a uniform rate upward to clear the water surface in 4 seconds, a total submergence period of 10 seconds. If the 1/4-inch diameter nozzle requires a vertical transit rate greater than allowable for the stream depth then a smaller diameter nozzle should be used.

A clean bottle must be used for each separate sediment sample; at least one suspended-sediment sample is taken at each sampling vertical in the cross section. When a filled sample bottle is removed from the sampler it is immediately capped to prevent contamination and appropriately marked. Pertinent information for every sample should be recorded to include the following:

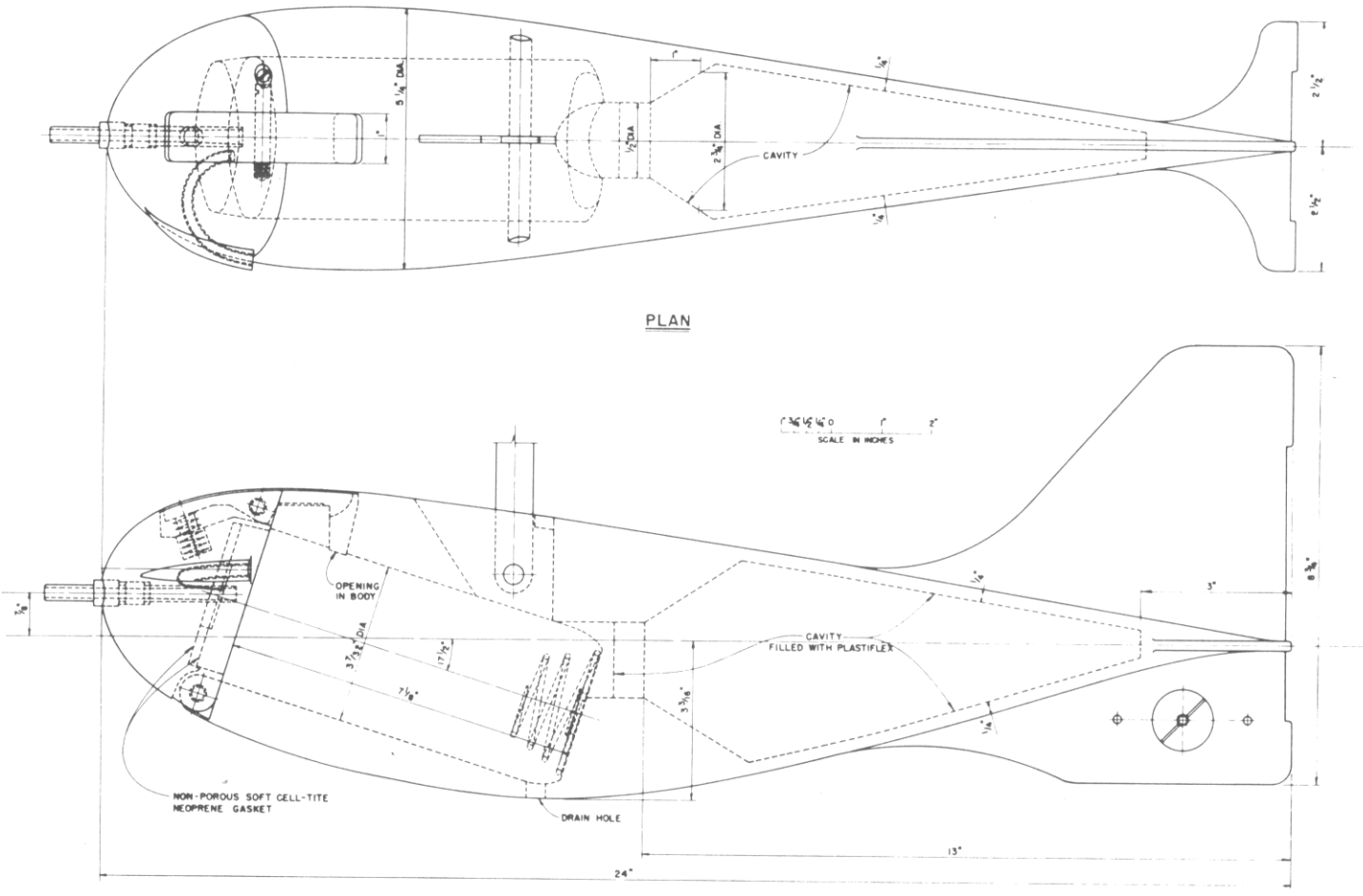
Name of the stream.
Precise location on the stream (vertical).
Location of the cross section.
The stream depth covered by the sample.
Stage of the stream (gage height).
Date.
Time of day.
Identification applied to sampling personnel.

In addition to the above, the following information may be useful also:

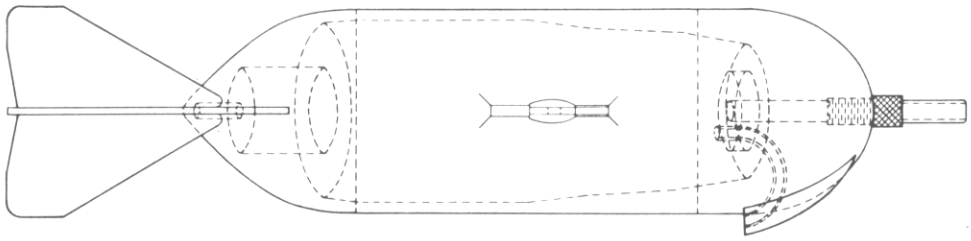
Sampling time (sampler submergence time).
Water temperature.
Coordination with sample groups.
Individual identifying sample number.

A portion of the exterior of the glass bottle may be etched or otherwise treated to provide a surface suitable for recording all the essential information for each sample.

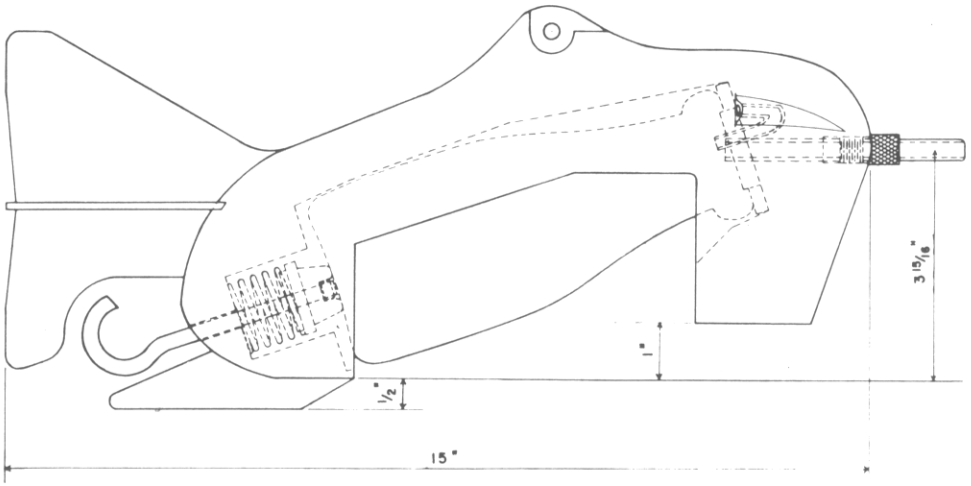
Methods of analyzing sediment samples are discussed in Reports Nos. 4, 7 and 11 of the series of reports on "A Study of Methods Used in Measurement and Analysis of Sediment Loads in Streams," sponsored by the Subcommittee on Sedimentation, Inter-Agency Committee on Water Resources.



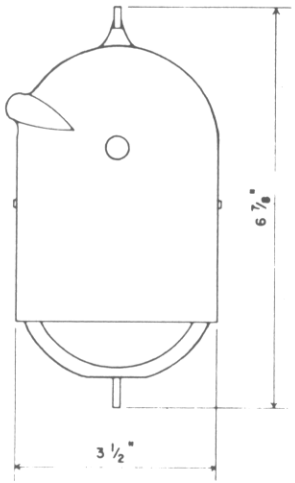
·DEPTH-INTEGRATING SAMPLER, US D-49



PLAN

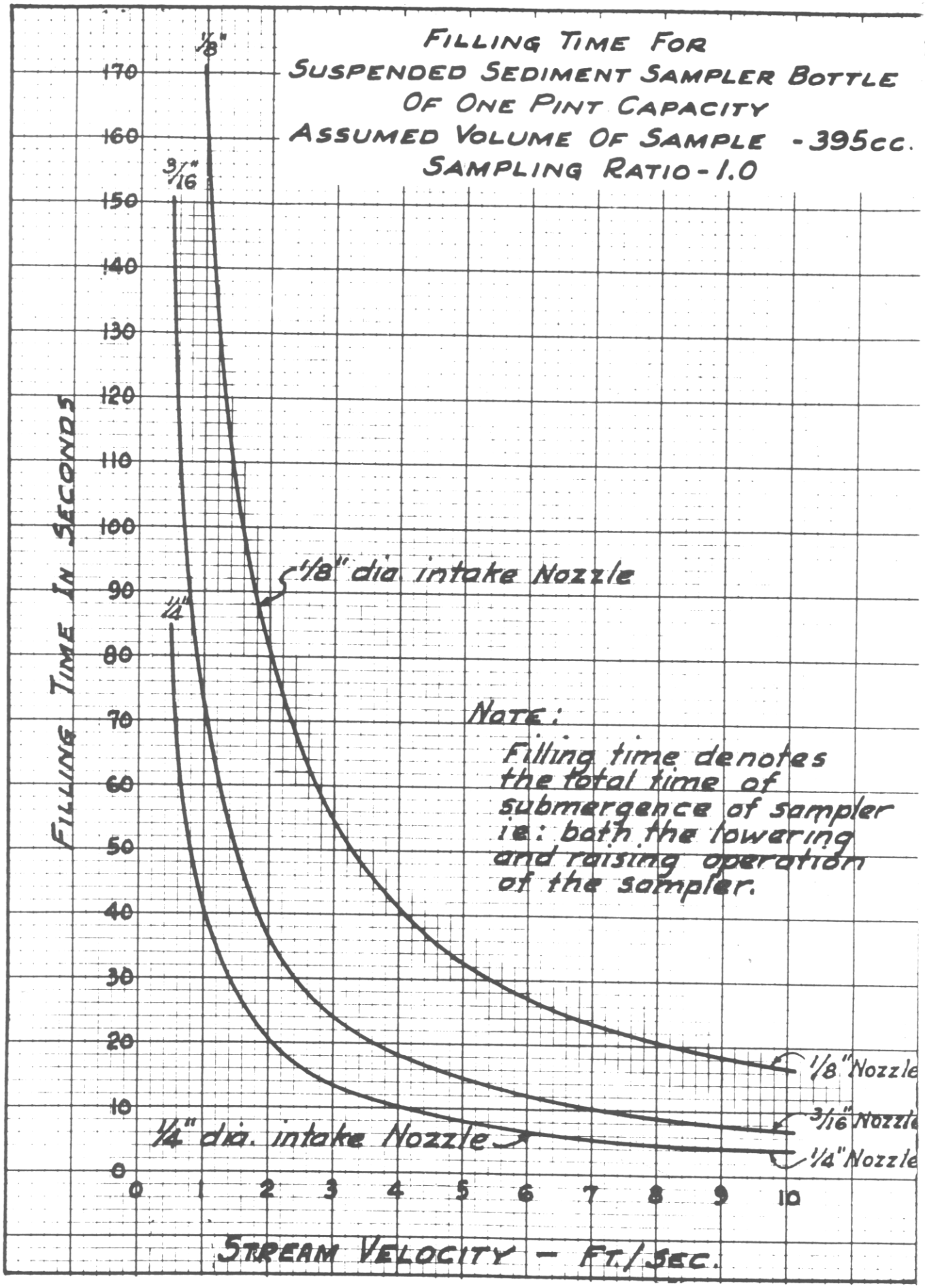


ELEVATION



FRONT

·DEPTH-INTEGRATING HAND LINE SAMPLER, US DH-59


FILLING TIME FOR
SUSPENDED SEDIMENT SAMPLER BOTTLE
OF ONE PINT CAPACITY
ASSUMED VOLUME OF SAMPLE - 395cc.
SAMPLING RATIO - 1.0
FILLING TIME IN SECONDS
STREAM VELOCITY - FT./SEC.
1/8"
3/16"
1/4"
1/8" dia. intake Nozzle
1/4" dia. intake Nozzle
NOTE:
Filling time denotes the total time of submergence of sampler ie: both the lowering and raising operation of the sampler.
1/8" Nozzle
3/16" Nozzle
1/4" Nozzle
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
0
1
2
3
4
5
6
7
8
9
10