

REPORT J

OPERATING INSTRUCTIONS SUSPENDED SEDIMENT HAND SAMPLER, US DH-48

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FEDERAL INTERAGENCY SEDIMENTATION PROJECT

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OPERATING INSTRUCTIONS
SUSPENDED SEDIMENT HAND SAMPLER, US DH-48

The hand sampler, US DH-48, was designed for depth-integration of suspended sediment samples in shallow streams. With this instrument the operator takes the sediment samples while wading in the stream or, if more convenient, by operating from a low bridge. The sampler consists essentially of a streamlined aluminum casting, 13 inches long and weighing approximately 3-1/2 pounds, which encloses the sample container. Specific details of the instrument are illustrated on the attached drawing. The sampler is supported on the standard 1/2-inch round wading rod used in stream gaging. (This wading rod is an item supplied to Federal agencies by the U. S. Geological Survey and is available in one and two-foot sections which are threaded for unit assembly to any desired length.) Any alternate rod or pipe of desired size may be utilized to support the sampler provided that appropriate end fittings are incorporated. A brass nozzle, threaded to permit hand assembly to the streamlined head, projects upstream and provides the intake passage for the sample.

Round pint milk bottles are used for sample containers. Pressure from a spring tensioned operating rod, which is rotated by hand to bear upon the base of the sample bottle, holds and seals the bottle against a rubber gasket within the head casting. The operating rod assembly can be removed from the recess provided at the rear of the support beam, and the pressure exerted by the operating rod can be adjusted by increasing or decreasing the compression on the operating spring. The axis of the sample container is inclined at an angle of 72-1/2 degrees to the vertical which permits sampling to within 3-1/2 inches of the stream bed. With the instrument oriented into the direction of flow (nozzle horizontal and pointed upstream) a continuous stream filament is discharged into the sample bottle during the period of submergence. The air displaced by the sample is ejected through the air escape passage projecting from the instrument alongside the head and oriented to discharge downstream. A fixed static head differential of 11/16 inch between the intake and air exhaust facilitates sampling in low stream velocities and slack waters. Hand samplers are usually equipped with only the 1/4-inch diameter nozzle. However, nozzles with smaller bore may be employed if desired.

A clean bottle should be used for each separate sediment sample. At least one suspended sediment sample is taken at each stream vertical selected in the cross section. In a sampling operation, the intake nozzle is oriented upstream, directly into the current, and held in a horizontal position while the sediment sampler is lowered into the stream. Submerged obstructions directly upstream or adjacent to the sampler should be avoided to preclude interference with the stream filament approaching the intake nozzle. The sampler should be lowered at a uniform rate from the water surface to the bottom of the stream, instantly reversed, and then raised again to the water surface at a uniform but not necessarily an equal rate.

Each filled sample bottle when removed from the instrument should be capped immediately and appropriately marked.

The hand sampler continues to take its sample in flowing water throughout the time of submergence, even after the bottle is completely filled. If the bottle becomes entirely full, the sample may not be representative and it should be discarded. Although the capacity of the sample container is about 470 cc, the tilt of the bottle is such that any sample containing more than 440 cc of a water sediment mixture may be in error. In order to provide sufficient sample for a laboratory analysis, the length of time the instrument remains submerged should be adequate to produce a sample volume greater than 375 cc but not to exceed 440 cc. It is generally preferable to save an initial sample smaller than 375 cc but larger than 300 cc than to discard the sample on the spot and re-sample into the same bottle. Moreover, if the initial sample volume is considerably less than 300 cc, the stream vertical may be integrated a second time, or even a third time, each being additive to the same sample bottle. A minimum sample of 350 cc is suggested. However, sufficient latitude in minimum sample volumes should be permitted to obviate retaking a large number of samples.

The volume of sample collected throughout any stream vertical is dependent primarily upon the mean stream velocity in the vertical, the size of the intake nozzle, and the time of submergence of the instrument. The operator must regulate the size of the sample accumulated by establishing the appropriate time period over which the sample is to be taken. Thus, the volume of the sample may be increased or decreased by varying correspondingly the sampling time. The attached graph shows the relation between stream velocity and filling time to produce samples 395 cc in volume for three different nozzle sizes. The filling time in seconds represents the total time of submergence of the instrument and includes the time involved in traversing the stream vertical in both the downward and upward direction. For example, if the 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 395 cc in volume in 10 seconds of submergence. If the sampler is lowered from the water surface to the stream bed at a uniform rate in 5 seconds, it should be raised at a uniform rate so as to break the water surface at the expiration of the next 5 seconds. The time of traversing the stream vertical need not be the same in both directions of travel. However, the rate at which the sampler moves vertically must remain uniform in each direction of travel. Thus, in the above example, the stream vertical could have been traversed at a uniform rate downward in 4 seconds and the sampler raised at a uniform rate upward to clear the water surface in 6 seconds, the total submergence period still being 10 seconds.

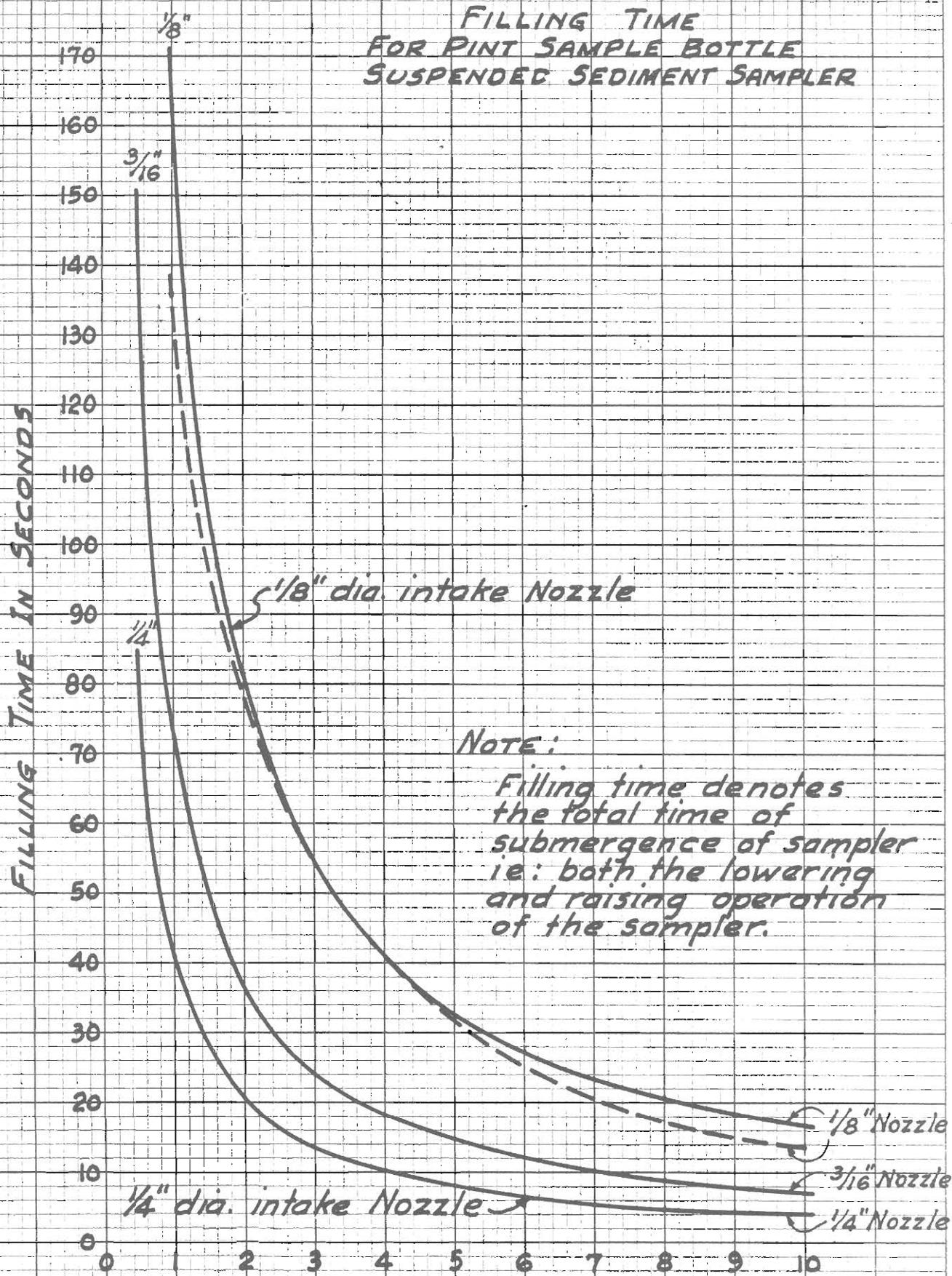
Adequate information and data to identify the sample and to satisfy the purposes of the investigation should be recorded at the time

of sampling. The following items are suggested:

- Name of stream
- Location of the cross section
- Location of vertical
- Stream depth covered by the sample
- Stage of the stream
- Date
- Time of day
- Identification of personnel
- Sampling time
- Water temperature
- Coordination with sample groups
- Serial number of sample

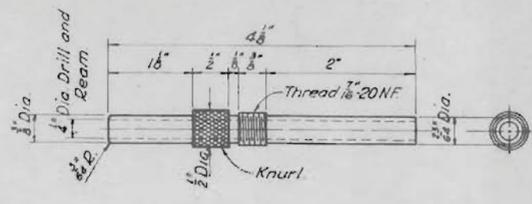
A portion of the exterior face of the glass bottle may be etched or otherwise treated to provide a surface suitable for marking and for recording the essential information regarding each sample. Before the bottles are reused they should be washed clean inside and outside to avoid contamination of future samples and to remove data referring to previous samples.

FILLING TIME FOR PINT SAMPLE BOTTLE SUSPENDED SEDIMENT SAMPLER

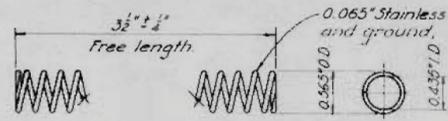


STREAM VELOCITY - FT./SEC.

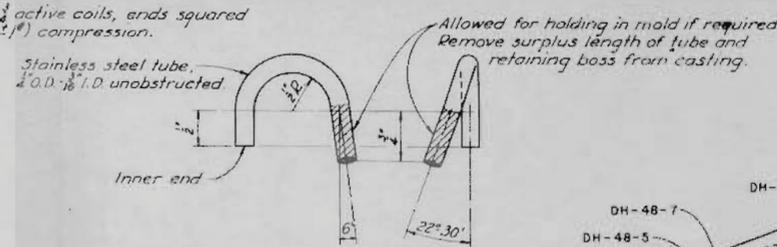
Volume = 395 c.c. Sampling Ratio = 1.0



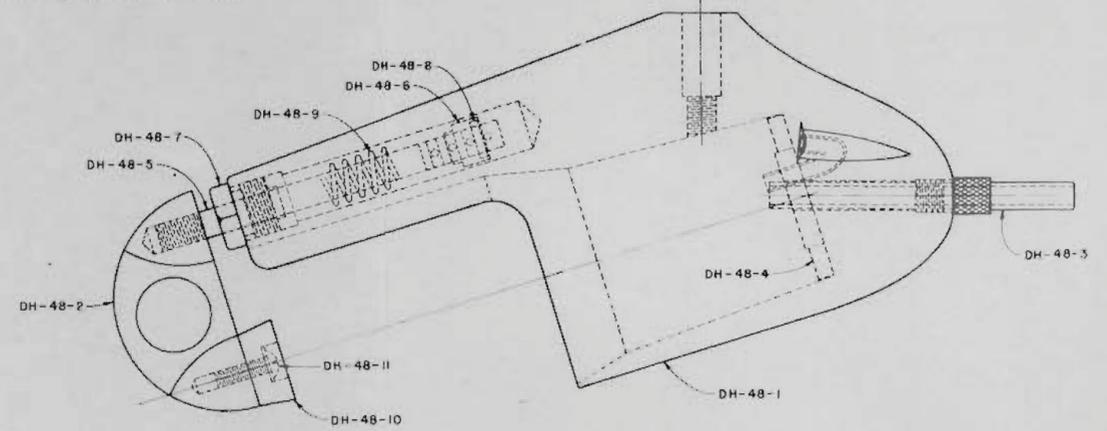
INTAKE NOZZLE
DH-48-3



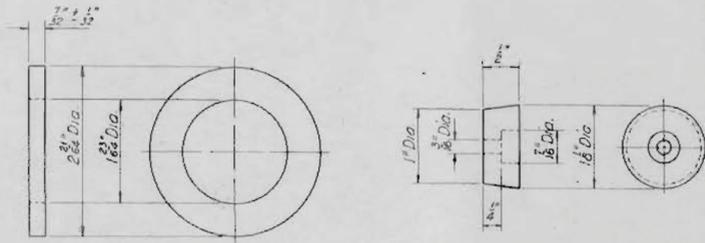
SPRING
DH-48-9



VENT TUBE

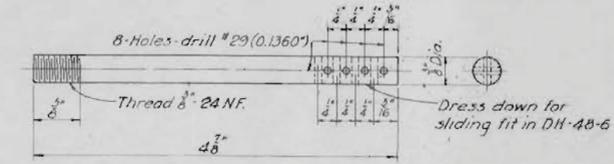


ASSEMBLY

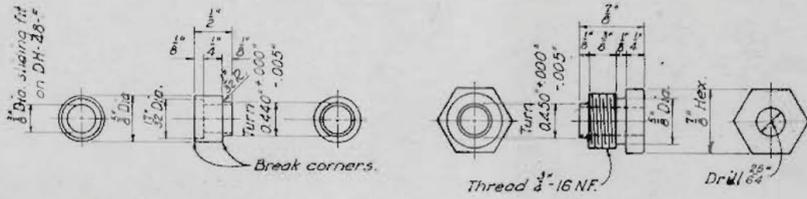


GASKET
DH-48-4

PAD
DH-48-10
or recessed type rubber bumper
Layella Rubber Co. No. 777-K or equal

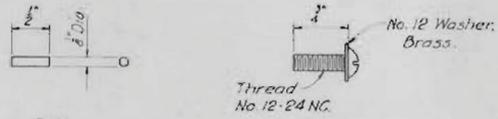


OPERATING ROD
DH-48-5



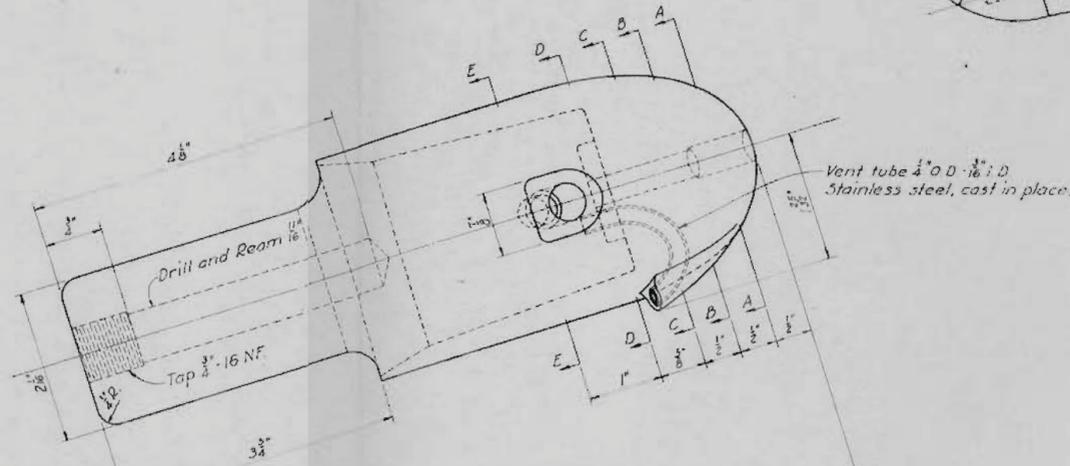
ROD GUIDE
DH-48-6

ROD NUT
DH-48-7



PIN
DH-48-8

SCREW
DH-48-11

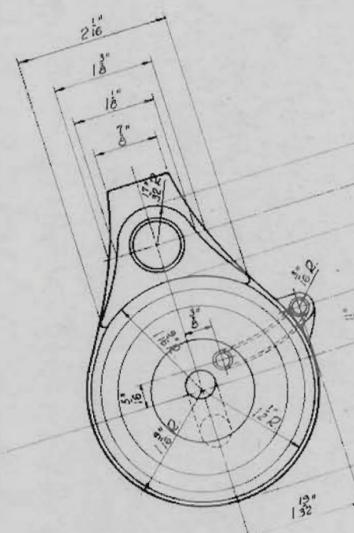


BODY CASTING
DH-48-1

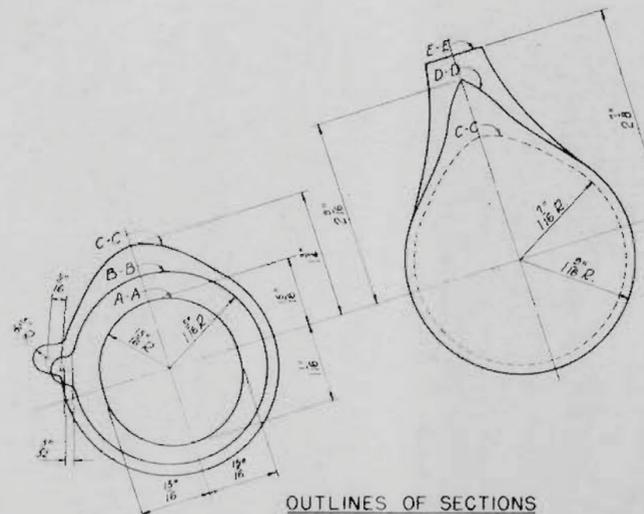
Counterbore 0.505" ± 0.001"
Drill 2 1/8" - tap 3/8" - 20 NF for hand fit with sample rod.
(One sample section of a wading rod will be furnished the manufacturer by the contracting agent.)

Tap 1/8" - 20 NF for hand fit with DH-48-3.
Drill 1/8" Dia.

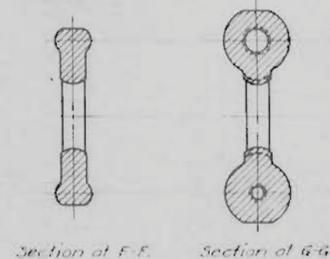
FRONT ELEVATION



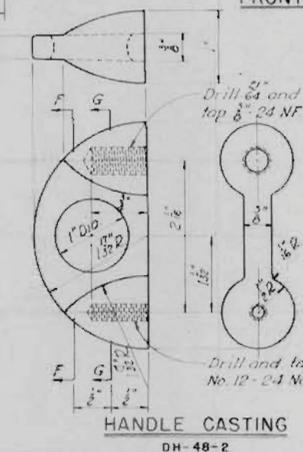
REAR VIEW



OUTLINES OF SECTIONS



Section at F-F. Section at G-G



HANDLE CASTING
DH-48-2

PARTS LIST			
PART NUMBER	PARTS REQ'D	NAME	MATERIAL *
DH-48-1	1	BODY CASTING (WITH STAINLESS STEEL TUBE)	ALUMINUM
DH-48-2	1	HANDLE CASTING	ALUMINUM
DH-48-3	2	INTAKE NOZZLE	BRASS
DH-48-4	2	GASKET	NEOP CELLTITE
DH-48-5	1	OPERATING ROD	BRASS
DH-48-6	1	ROD GUIDE	BRASS
DH-48-7	1	ROD NUT	BRASS
DH-48-8	1	PIN	BRASS
DH-48-9	1	SPRING	STAINLESS STEEL
DH-48-10	1	PAD	RUBBER
DH-48-11	1	NO. 12 MACHINE SCREW	BRASS

* = AS SPECIFIED.

U.S. DH-48
SEDIMENT SAMPLER
SCALE: FULL SIZE
ST. ANTHONY FALLS HYDRAULIC LABORATORY
MINNEAPOLIS, MINNESOTA. JUNE, 1948

REVISION	DATE	DESCRIPTION	BY
1	11-26-48	Note added beneath Pad DH-48-10	M.S.