geotech

US DH-95 Depth-Integrating Suspended-Sediment Sampler

Installation and Operation Manual

Rev 5/6/2026 Part # 11000013

Credits and Acknowledgments

Portions of this manual were adapted from the "Instructions for Sampling with the US DH-95 Depth-Integrating Suspended-Sediment Sampler". This content was originally published by the staff of the **Federal Interagency Sedimentation Project (FISP)**. We gratefully acknowledge their contribution and expertise.

Documentation Conventions

This uses the following conventions to present information:

WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.

CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.

NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System Description

Function and Theory

The **US DH-95** is a streamlined, 29-pound suspended-sediment sampler specifically designed to collect depth-integrated, flow-weighted samples in streams up to 15 feet deep. Unlike heavier models, the DH-95 is light enough to be lowered and raised manually ("hand-over-hand") with a flexible suspension line. To maintain the integrity of water-quality data, the sampler features a plastic-coated bronze body and a high-density polyethylene (HDPE) tail section, ensuring no metal contact with the sample.

When the sampler is submerged with the nozzle pointed into the flow, the water-sediment mixture enters through the nozzle and flows into the collection bottle. To ensure isokinetic inflow efficiency, where the velocity of the water entering the nozzle matches the velocity of the stream, air is simultaneously exhausted through a vent hole in the cap. This process ensures the collected sample is a representative cross-section of the stream's sediment concentration and water chemistry.

OPERATIONAL LIMITATIONS

The US DH-95 is engineered to maintain high scientific standards under specific field conditions. Understanding these limitations is critical for ensuring isokinetic sampling and data accuracy.

1. Velocity Limitations

The sampler captures representative flow-weighted samples when stream velocities range between 1.7 and 7.4 ft/sec, depending on the specific nozzle diameter utilized.

- Inflow Efficiency: The DH-95 is designed to operate with an inflow efficiency between 90% and 110%.
- Isokinetic Flow: Achieving an inflow efficiency of 100% (isokinetic) ensures the sample velocity entering the nozzle matches the ambient stream velocity.
- Nozzle-Specific Ranges:
    - 3/16-inch Nozzle: Recommended for velocities between 2.1 and 6.2 ft/sec.
    - 1/4-inch Nozzle: Recommended for velocities between 1.7 and 7.4 ft/sec.
    - 5/16-inch Nozzle: Recommended for velocities between 2.1 and 7.0 ft/sec.

2. Depth Limitations

The maximum operational depth varies according to the nozzle size and the target sample volume.

- Standard Max Depth: The sampler can reach up to 15 ft using the 3/16-inch or 1/4-inch nozzles.
- Large Diameter Nozzle: Depth is restricted to 13.3 ft when using the 5/16-inch nozzle.
- Volume Constraints: Maximum sampling depths are further reduced when the operator adheres to the recommended collection volume of 800 mL.

3. Unsampled Zone
Due to the physical design and the distance between the intake nozzle and the base of the sampler body, the US DH-95 cannot sample the lowest portion of the water column.

- Unsampled Distance: There is a 4.8-inch zone immediately above the streambed that remains unsampled.

4. Transit Rate Limitations

The transit rate refers to the speed at which the sampler is lowered and raised through the sampling vertical.

- Variability: Proper transit rates are determined by the diameter of the intake nozzle and the specific configuration of the sample container.
- Consistency: Maintaining an appropriate transit rate is essential for ensuring the sample collected is representative of the entire depth of the vertical.

System Components

The **US DH-95** is a modular system designed for precise depth-integrated sampling. While the base kit includes the core frame and suspension hardware, several interchangeable components are required to customize the sampler for specific stream velocities (1.7 to 7.4 ft/sec) and water-quality protocols.

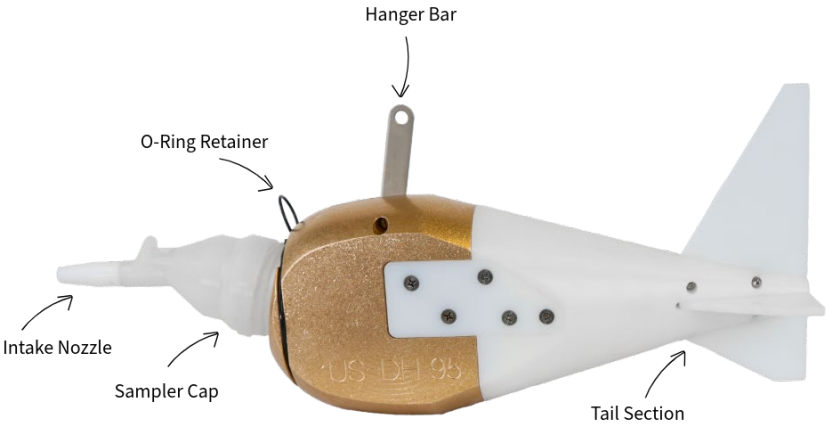

Figure 1: DH-95 Sampler

1. **Sampler Body:** A 29-pound, low-lead bronze casting designed to house the sample container while providing enough weight to remain stable in flowing water.
2. **Tail Section:** Constructed from HDPE plastic, the tail section provides hydrodynamic stability, ensuring the nozzle remains oriented into the stream flow.
3. **Sample Container (not pictured):** Designed to hold a 1-liter bottle. Use FEP for trace-element water quality or HDPE/Plastic for standard sediment analysis.
4. **Sampler Cap:** * US DH-95 Cap: Mates directly with 1-liter FEP bottles.
   US D-77 Cap: Used with 1-liter plastic bottles or with an adapter for FEP bottles.
5. **Intake Nozzles:** Interchangeable nozzles available in 3/16", 1/4", and 5/16" internal diameters. Available in PTFE or Delrin (Plastic) to suit the analytical requirements of the project.
6. **O-Ring Retainer:** Includes a specialized O-ring and strap system to securely lock the bottle and cap assembly within the sampler cavity during deployment.

Section 2: Sampler Preparation & Setup

- Suspension Rigging: Attach the sampler to the hanger bar and suspension cable. Ensure all hardware is as streamlined as possible to minimize downstream drag, which helps maintain a true vertical sampling line.
- Nozzle Integration: Choose the largest nozzle diameter that your specific transit rate and stream depth permit.
- Installation: Screw the nozzle into a clean cap and bottle assembly by hand. Never use a wrench; hand-tight is sufficient. Ensure the threads are free of debris before assembly.
- Securing the Bottle: Lift the O-ring and place the bottle-cap assembly into the sampler cavity, ensuring the ring sits securely over the bottle neck.
- Alignment Check: Rotate the bottle until the air vent hole is positioned vertically. Confirm that both the nozzle intake and the vent hole are completely unobstructed.

Sampling Procedure

- Surface Alignment: Lower the sampler until the tail section touches the water. The DH-95 naturally hangs tail-low in the air, but the buoyancy of the tail will level the sampler to a horizontal position once it is submerged and aligned with the flow.
- Transit Execution: Submerge the sampler using a smooth, constant transit rate.
- The Turnaround: As soon as the sampler touches the streambed, immediately reverse direction and pull it back to the surface at the same steady rate.
- Bed Contact: Avoid striking the streambed forcefully, as this can stir up bed sediment and bias the accuracy of your sample.

Post-Sampling & Documentation

- If samples are not being combined into a composite, cap each bottle immediately. Every label must be filled out completely with the following data:

Required Field	Description
Stream Info	Name of the stream and specific cross-section location
Temporal Data	Date and exact time of day
Hydraulic Data	Gage height, vertical location, and total depth of the vertical

Collection Data	Total sampling duration and water temperature
Personnel	Names of the equipment operators

CAUTION Never use a wrench to tighten a nozzle. If threads are obstructed, clean them with a tap before assembly.

NOTE The US DH-95 will not hang horizontal in the air; the tail section will naturally sit lower. Buoyancy will align the sampler to horizontal once it is submerged.

! WARNING Avoid hitting the streambed forcefully. This can stir up loose sediment and bias the sample concentration.

Guidance Resources & Methods Summary

For detailed sampling instructions, please refer to the following

Edwards, T.K., and Glysson, G.D., 1999, Field Methods for Measurement of Fluvial Sediment: U.S. Geological Survey Techniques of Water Resources Investigations, book 3 chapter C2, 89 p.

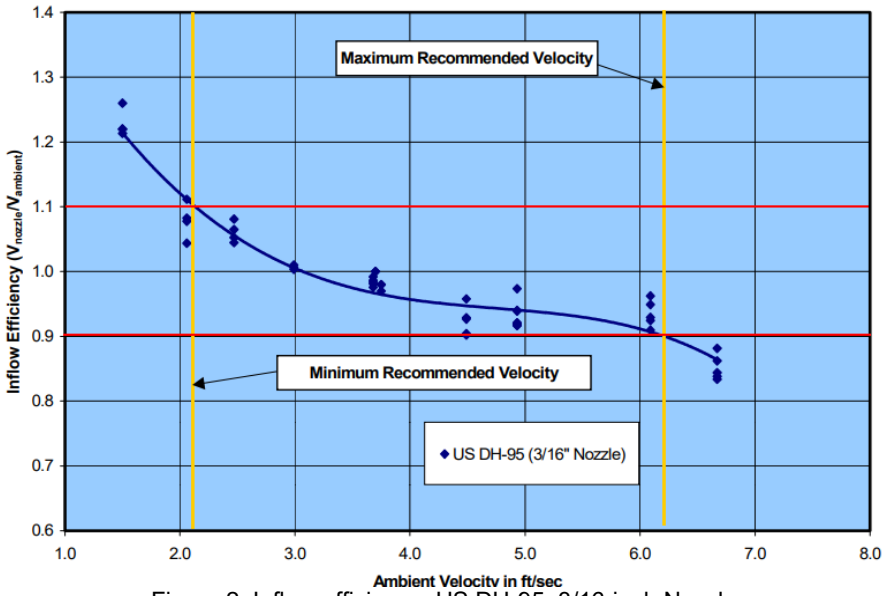

Figure 2: Inflow efficiency, US DH-95, 3/16-inch Nozzle

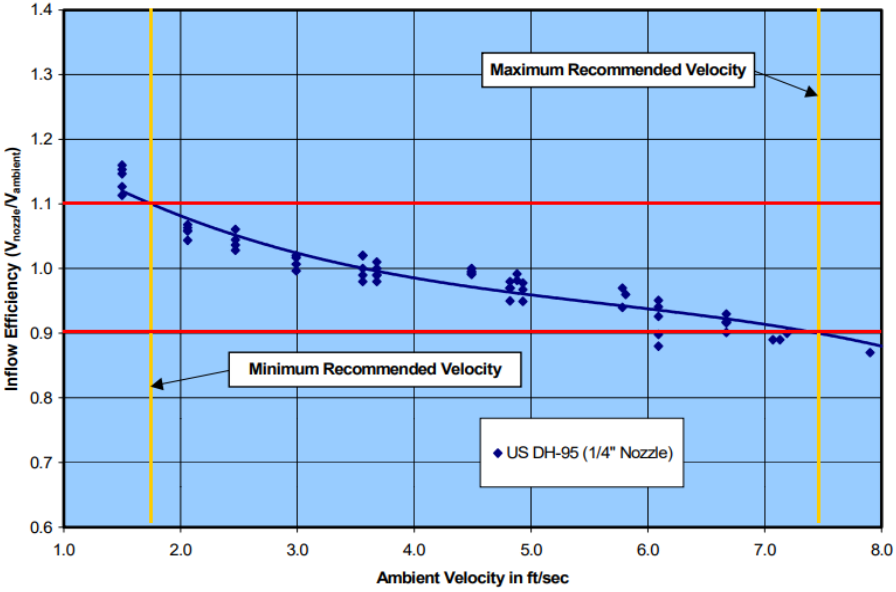

Figure 3: Inflow Efficiency, US DH-95, 1/4-inch Nozzle

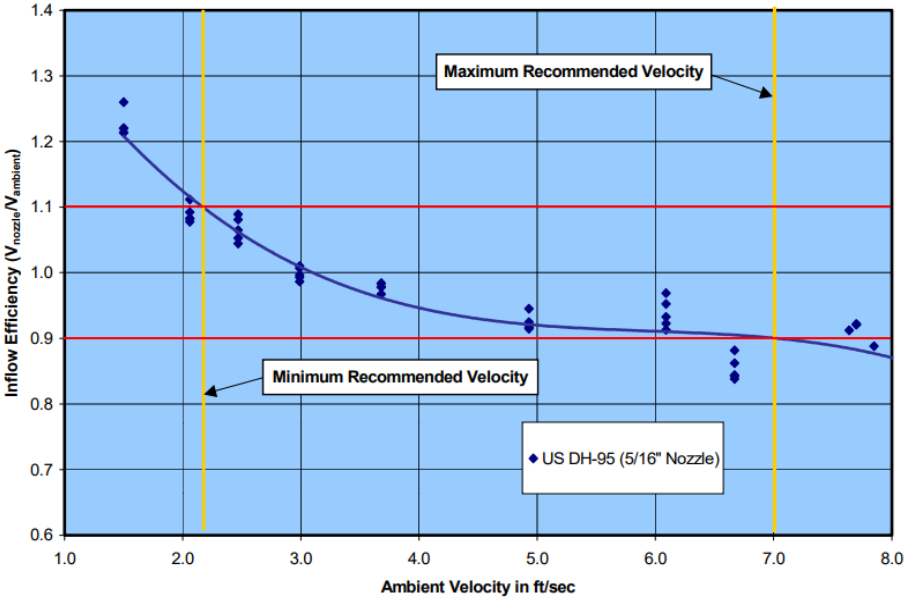

Figure 4: Inflow Efficiency, US DH-95, 5/16-inch Nozzle

NOTE

The following configuration and volumes were used to produce this diagram. The total volume of the sampler container is 1215 mL, which includes a polypropylene bottle and US D-77 cap. The maximum recommended sample volume is 800 mL. The maximum acceptable sample volume is 1000 mL.

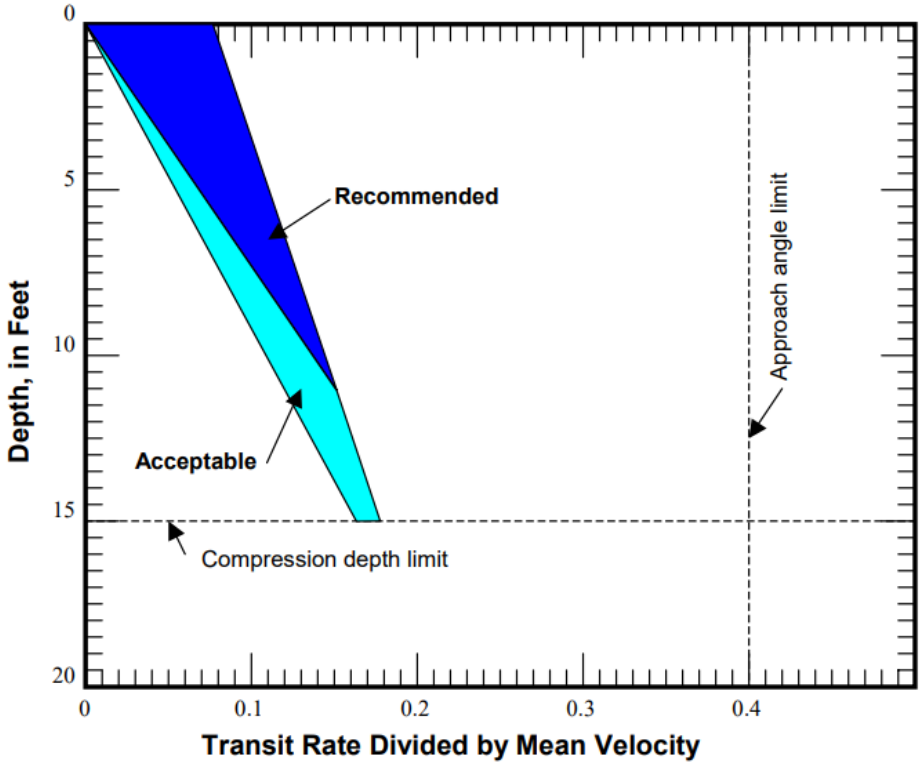

Figure 5: Transit Rate Diagram for US DH-95, 3/16-inch Plastic Nozzle

NOTE

Note: The following configuration and volumes were used to produce this diagram. The total volume of the sampler container is 1215 mL, which includes a polypropylene bottle and US D-77 cap. The maximum recommended sample volume is 800 mL. The maximum acceptable sample volume is 1000 mL.

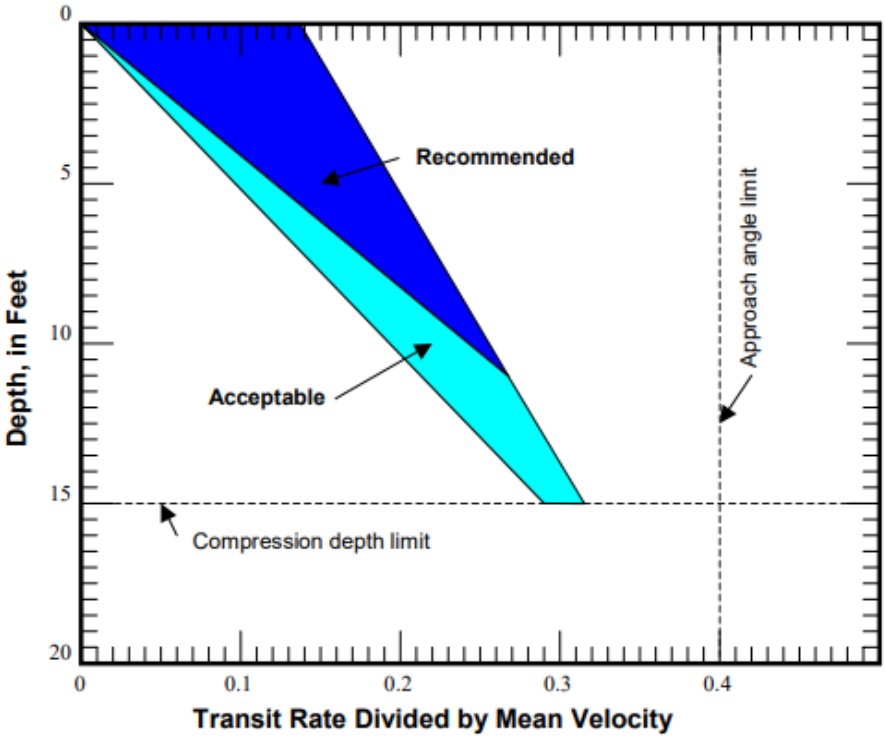

Figure 6: Transit Rate Diagram for US DH-95,1/4-inch Plastic Nozzle

NOTE

Note: The following configuration and volumes were used to produce this diagram. The total volume of the sampler container is 1215 mL, which includes a polypropylene bottle and US D-77 cap. The maximum recommended sample volume is 800 mL. The maximum acceptable sample volume is 1000 mL.

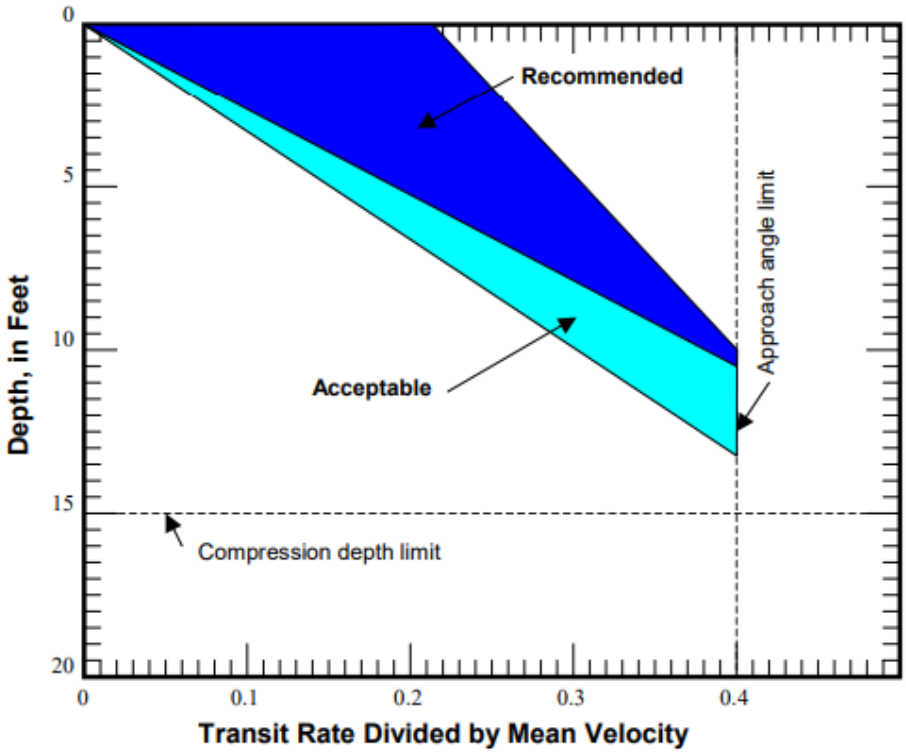

Figure 7: Transit Rate Diagram for US DH-95, 5/16-inch Plastic Nozzle

NOTE

Note: The following configuration and volumes were used to produce this diagram. The total volume of the sampler container is 1265 mL, which includes a FEP bottle, bottle adapter and US D-77 cap. The maximum recommended sample volume is 800 mL. The maximum acceptable sample volume is 1000 mL.

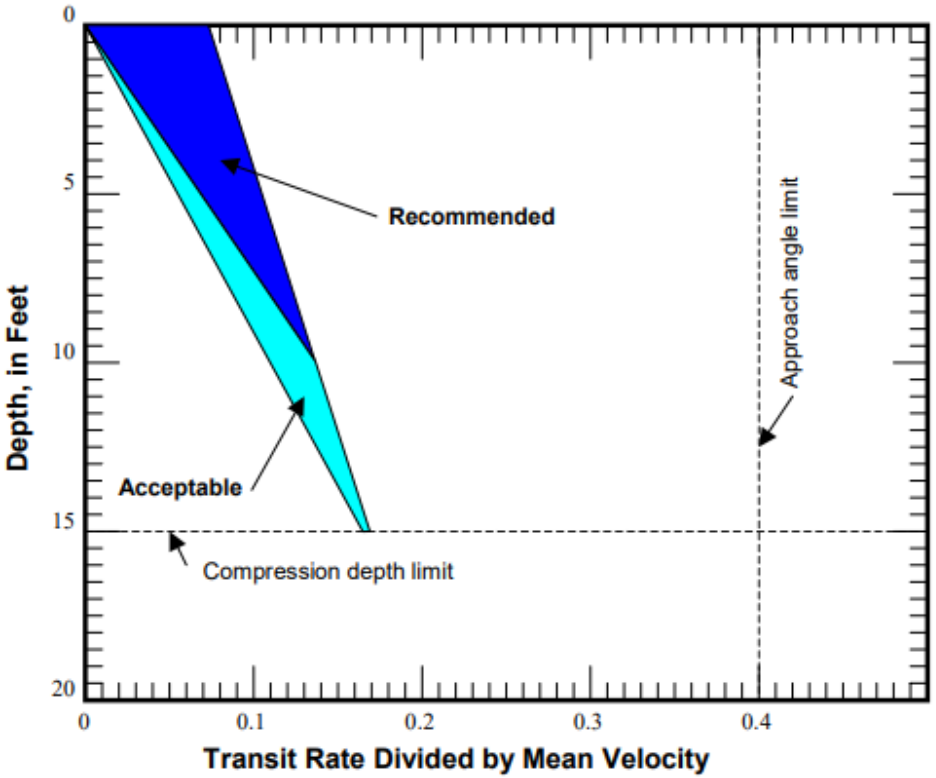

Figure 8: Transit Rate Diagram for US DH-95, 3/16-inch PTFE Nozzle

NOTE

Note: The following configuration and volumes were used to produce this diagram. The total volume of the sampler container is 1265 mL, which includes a PTFE bottle, bottle adapter and US D-77 cap. The maximum recommended sample volume is 800 mL. The maximum acceptable sample volume is 1000 mL.

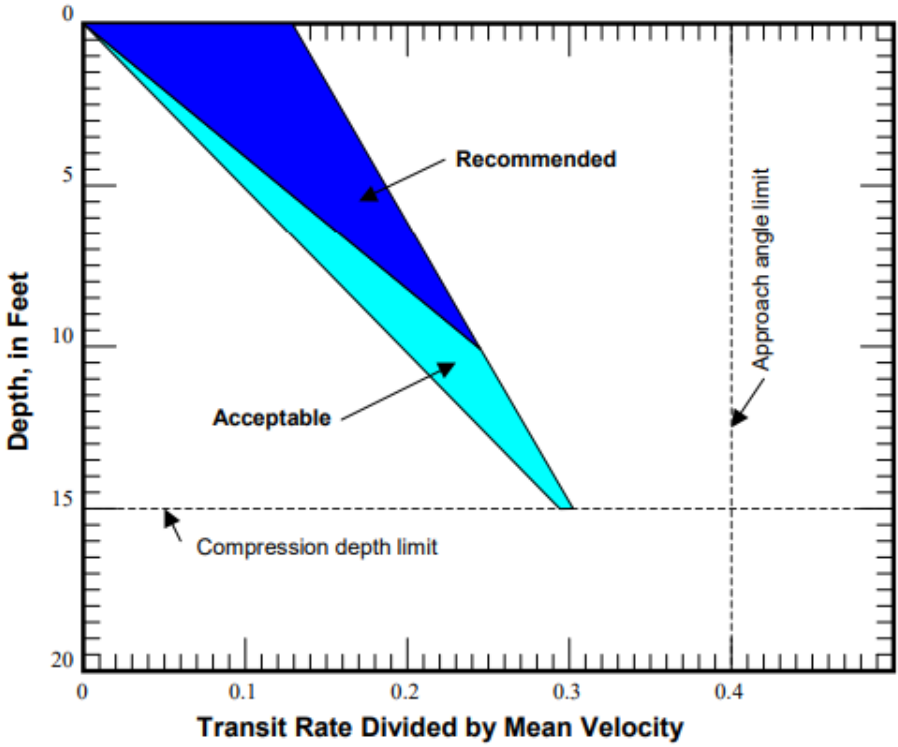

Figure 9: Transit Rate Diagram for US DH-95, 1/4-inch PTFE Nozzle

NOTE

Note: The following configuration and volumes were used to produce this diagram. The total volume of the sampler container is 1265 mL, which includes a FEP bottle, bottle adapter and US D-77 cap. The maximum recommended sample volume is 800 mL. The maximum acceptable sample volume is 1000 mL.

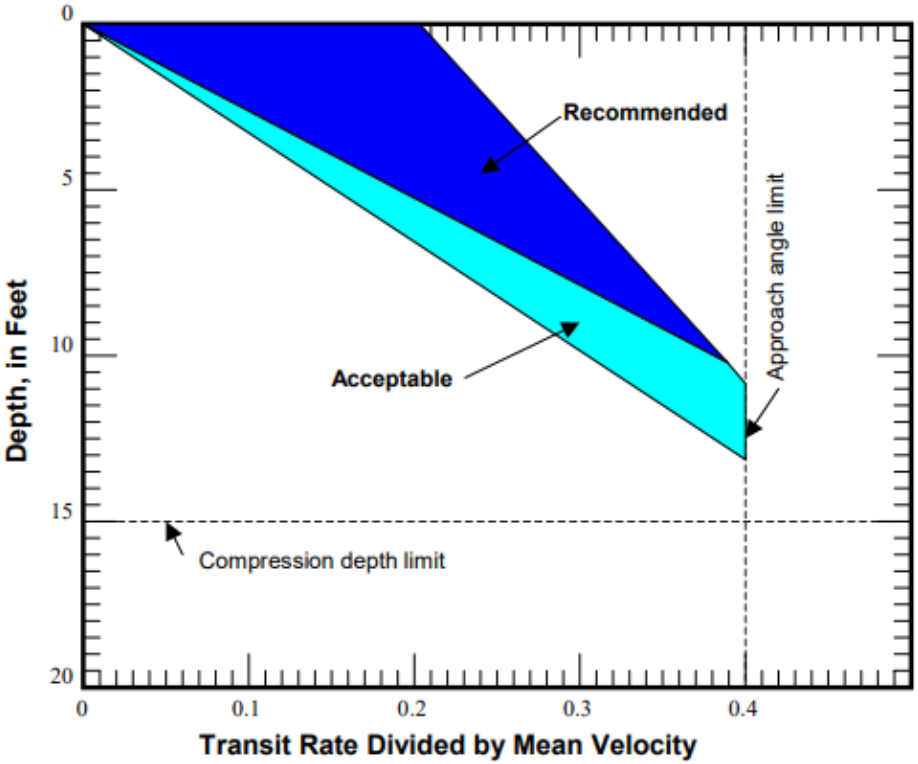

Figure 10: Transit Rate Diagram for US DH-95, 5/16-inch PTFE Nozzle

Section 4: System Maintenance

Body Coating Repair

The protective Delrin coating is essential for water-quality sampling. If the coating is chipped or worn, it can be repaired using commercially available "PlastiDip".

Nozzles and Caps

- **Inspection:** Periodically check nozzle threads for debris or damage.
- **Cleaning:** Use a 9/16-18 NF threading tap to clean cap threads if they become difficult to turn.
- **O-Ring:** Inspect the o-ring for cracks or loss of elasticity; replace if the bottle is not held firmly.

Section 5: System Troubleshooting

Isokinetic Inflow Issues: If inflow efficiency falls outside the 90%–110% range, verify that the air vent hole is not obstructed and the nozzle is pointed directly into the flow.

Contact Information: For technical support or replacement parts, contact **Geotech Environmental Equipment, Inc.** at 1-800-833-7958 or visit www.geotechenv.com.

Section 6: System Specifications

TABLE 1. Filling Times for the US D-95 Sampler

		3/16-inch Nozzle	1/4-inch Nozzle	5/16-inch Nozzle
Velocity in ft/sec	Volume in mL	Time in seconds	Time in seconds	Time in seconds
1.4	800	105	59	38
1.6	800	92	52	33
1.8	800	82	46	29
2.0	800	74	41	27
2.2	800	67	38	24
2.4	800	61	35	22
2.6	800	57	32	20
2.8	800	53	30	19
3.0	800	49	28	18
3.2	800	46	26	17
3.4	800	43	24	16
3.6	800	41	23	15
3.8	800	39	22	14
4.0	800	37	21	13
4.2	800	35	20	13
4.4	800	33	19	12
4.6	800	32	18	12
4.8	800	31	17	11
5.0	800	29	17	11
5.2	800	28	16	10
5.4	800	27	15	10
5.6	800	26	15	9
5.8	800	25	14	9
6.0	800	25	14	9
6.2	800	24	13	9
6.4	800	23	13	8
6.6	800	22	13	8
6.8	800	22	12	8
7.0	800	21	12	8
7.2	800	20	12	7
7.4	800	20	11	7
7.6	800	19	11	7

RECOMMENDED VELOCITY RANGE

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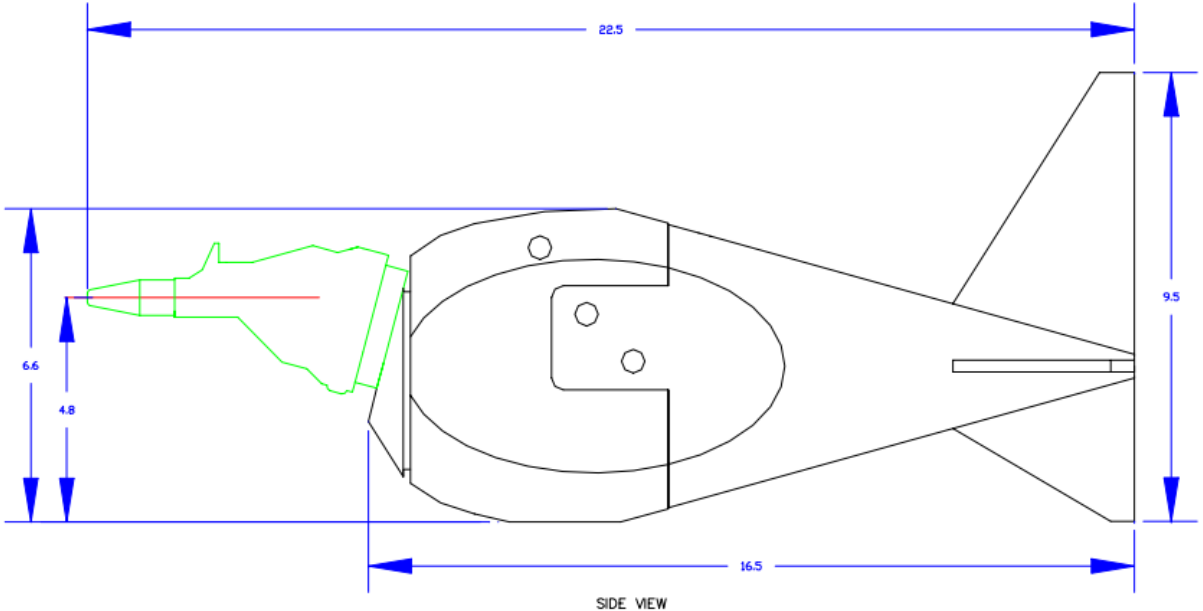
Technical Specification			
Nozzle	3/16”	¼"	5/16”
Velocity Range	2.0 to 6.2 ft/sec	1.5 to 7.5 ft/sec	2.0 to 7.0 ft/sec
Total Length	26 in (66 cm) with bottle and nozzle attached		
Nozzle Material	Delrin or PTFE		
Body Material	coated bronze body and tail section		
Weight	29 lbs. (13.15 kg)		
Max Recommended Sample Depth	15 ft at Sea Level		
Unsampled Zone	<4.8 in (12.2 cm)		
Hanger Bar and Pin			
Material	Stainless Steel		
Bottles			
Nominal Volume	1 Liter		
Suggested Sample Volume	800ml		

Length	22 in (56 cm) with bottle, cap, and nozzle
Diameter	6.6” (16.76cm)
Materials	HDPE or FEP

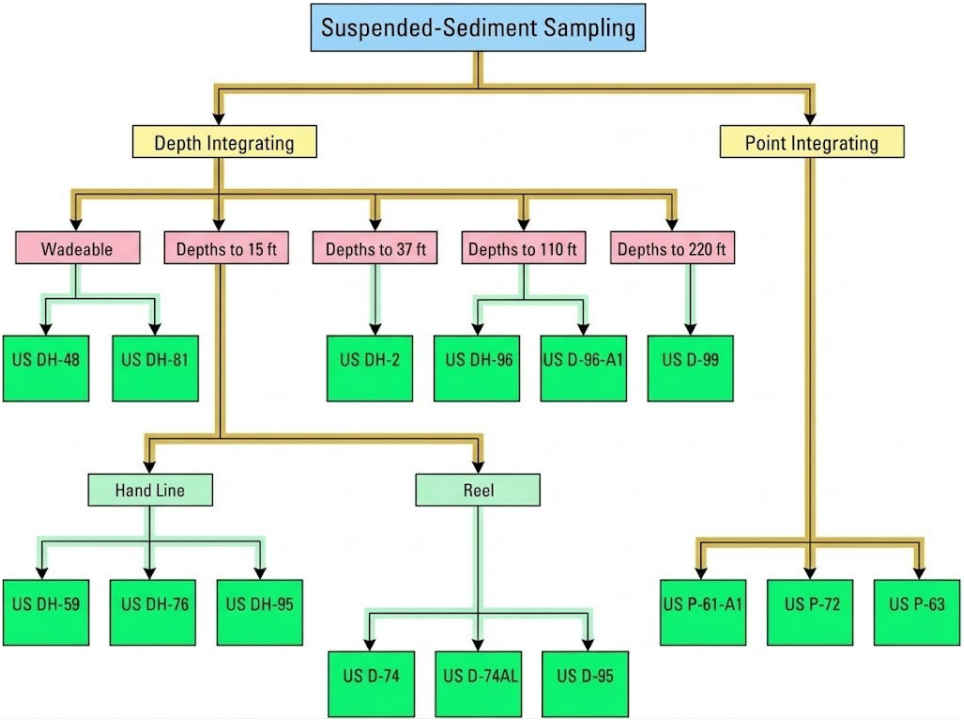


SIDE VIEW

FEDERAL INTERAGENCY SEDEMENTATION PROJECT
US DH-95 SAMPLER

NOTE:
ALL DIMENSIONS IN INCHES

DH-95 SAMPLER		
71000033	SAMPLER,SEDIMENT,DH-95,W/CASE	4101014, HIFF
DH-95 PARTS		
57500011	HOLDER CAP,NOZZLE,POLY,D77/DH81/D95/DH95	4107034, HIFF
71000028	NOZZLE,DELRIN,3/16",D77/DH81/D95/DH95	4107084,HIF,WHITE,2.0-6.2FT/SE
71000029	NOZZLE,DELRIN,1/4",D77/DH81/D95/DH95	4107085,HIF,WHITE,1.5-7.6FT/SE
71000030	NOZZLE,DELRIN,5/16",D77/DH81/D95/DH95	4107086,HIF,WHITE,2.0-7.0FT/SE
71000003	HDPE,SINGLE BOTTLE,1LITER,D77,DH81	4107020, HIFF
71000002	HOLDER CAP,NOZZLE,PTFE,D95/DH81	4107036, HIFF
71000032	NOZZLE,PTFE,3/16",D77/DH81/D95/DH95	4107087,HIF,2.0-6.2FT/SEC
71000031	NOZZLE,PTFE,1/4",D77/DH81/D95/DH95	4107088,HIF,1.5-7.6FT/SEC
71000020	NOZZLE,PTFE,5/16",D77/DH81/D95/DH95	4107089,2.0-7.0FT/SEC
71000007	BOTTLE,FEP,1 LITER,D95/DH81	4107021,HIF
	LID, PTFE FOR 1-LITER BOTTLE	4107037, HIFF
71000069	O-RING RETAINER FOR BOTTLE DH-95,D95	4107109, HIFF
71000039	HANGER,BAR & PIN,D74/DH2/D95/DH95/D96	4107055, HIFF
71000075	TAIL SECTION FOR DH-95 SAMPLER	4107115, HIFF



Version History		
Project #	**Description**	**Date**
M2601	Created Manual – AL	4/29/2026

NOTES

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all

warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____
Serial Number: _____
Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used. Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate the equipment for a fee, which will be applied to the repair order invoice.

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue Denver, Colorado 80205
(303) 320-4764 ● **(800) 833-7958** ● FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com