

Appendix 3: Sump Depths

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HydroDome Removal Efficiency Testing with 4-ft and 5-ft Sump Depths

Comparative sediment removal and scour testing was conducted at Alden Research Laboratory, Holden, MA, on a Hydroworks 3-ft diameter HydroDome (HD 3) manufactured treatment device (MTD), with 4-ft and 5-ft sump depths. All testing was conducted in accordance with the “New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device” (2021). The removal efficiency testing utilized the mass capture testing methodology, with the NJDEP sediment particle size distribution of 1-1000 microns and influent concentration of 200 mg/L. The scour testing was conducted with the sump preloaded to the 50% capture capacity with the NJDEP psd of 50-1000 microns.

Three removal tests were conducted at approximate flows of 100, 175 and 243 gpm. The removal efficiencies of the 4-ft and 5-ft sumps were within approximately 3 percentage points of each other, which is considered to be within the repeatability of the testing, taking into account slight deviations in flow and sediment psd. The removal data is shown in Table 1 and the two removal curves are shown on figure 1.

Table 1
HD 3 Removal Efficiency Data with 4-ft and 5-ft Collection Sumps

HD3	5-ft Sump	4-ft Sump
flow (gpm)	mass capture removal	mass capture removal
94.4	60.1%	
104		59.4%
173.5		52.4%
173.9	49.8%	
243.1	42.7%	
243.3		46.0%

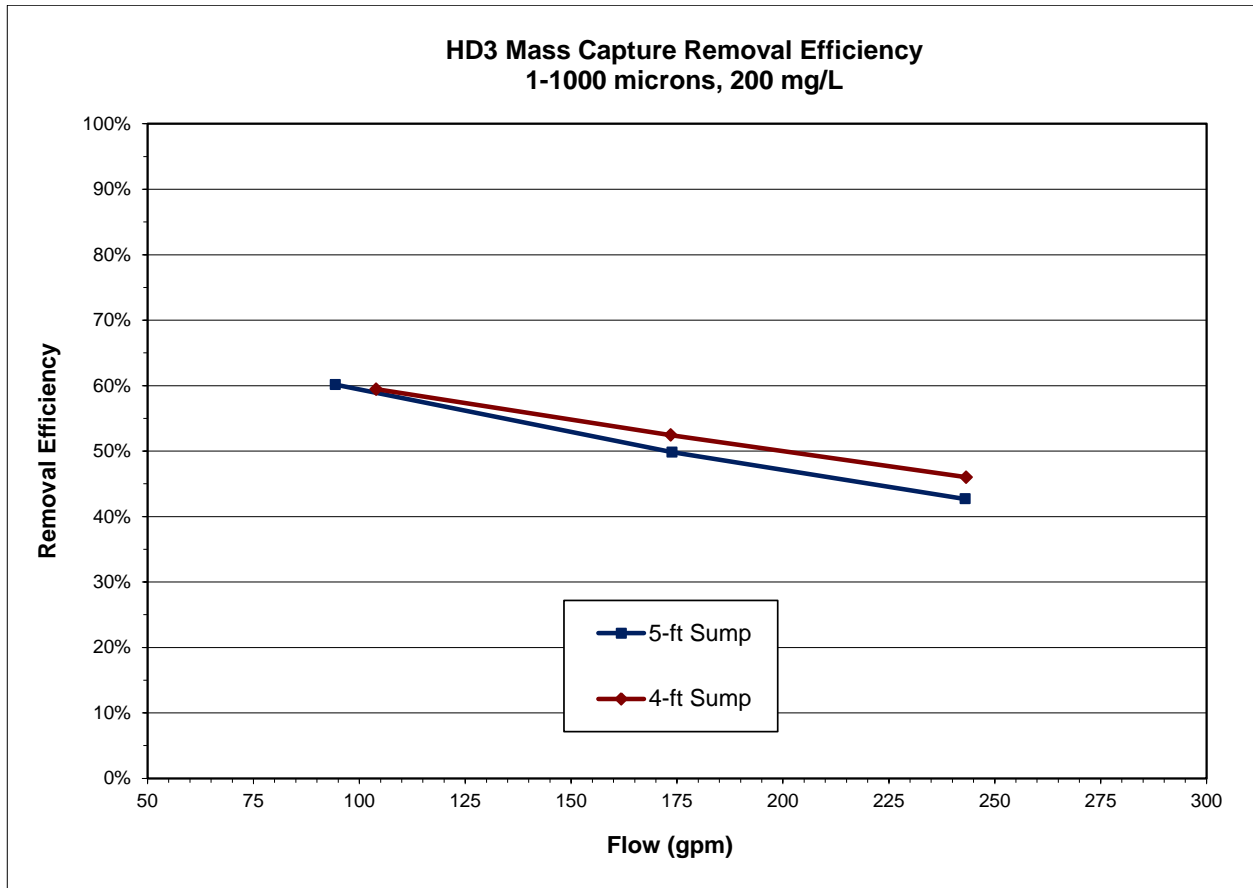


Figure 1: HD 3 Removal Efficiency Curves

The scour tests were conducted at approximately 910 gpm (240% MTFR). The average effluent concentrations for the 4-ft and 5-ft sumps were 1.6 mg/L and 2.1 mg/L, respectively. The effluent data for both tests is shown in Table 2.



Table 2
HD 3 Scour Effluent Concentrations

Sample ID	Timestamp (minutes)	4-ft Effluent Concentration (mg/L)	5-ft Effluent Concentration (mg/L)
EFF 1	7	1.77	2.45
EFF 2	9	1.65	2.58
EFF 3	11	1.51	1.96
EFF 4	13	1.84	2.09
EFF 5	15	1.30	2.37
EFF 6	17	0.85	2.84
EFF 7	19	1.26	2.70
EFF 8	21	1.37	2.21
EFF 9	23	2.32	1.53
EFF 10	25	1.54	1.42
EFF 11	27	1.92	1.60
EFF 12	29	1.63	2.04
EFF 13	31	1.55	1.99
EFF 14	33	1.68	1.62
EFF 15	35	1.54	1.68
	Average	1.58	2.07

In conclusion, the lack of statistical difference between the results of the 4-ft and 5-ft sump depths indicates that a HD 3 with a 4 ft sump will perform the same for TSS removal and scour protection as the deeper 5 ft sump.

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