

CHESAPEAKE BAY  
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MAP 5-3

WATER CONTENT

BY

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EXPLANATION

CONTOUR INTERVAL  
15% WET WEIGHT

WATER CONTENT

In the characterization of the surficial sediments of the Chesapeake Bay bottom, the moisture content is a key parameter. This parameter is defined as the weight of water (expressed as a percentage of the dry weight of the sediment) in the surficial sediments.

The weight of water is determined as the difference between the wet weight and the weight of the sample after drying at 105°C. In engineering studies, water content is expressed as a percentage of the dry weight of the sample instead of the wet weight as reported here.

Water content is closely related to various physical and geochemical properties of the sediments. Numerous investigations have shown that water content is directly proportional to silt and clay content and inversely proportional to sand weight and grain size (Skempton, et al., 1958; Van der Zanden, 1975). There is also a strong correlation between water content and the plasticity index (PI) of the sediments. In general, the higher the water content, the higher the plasticity index.

Distribution  
Water content, as determined from the analysis of 613 samples, is generally highest in the lower Chesapeake Bay (30-40%) and lowest in the upper Chesapeake Bay (10-15%). The distribution of water content is related to the marine facies of the sediments.

It is also related to other geologic processes, such as compaction. As time passes, the weight of the overlying sediments causes the sediments to compact and expel water. The amount of water expelled is related to the grain size of the sediments and also to the overburden pressure and the length of burial time.

The lower water contents observed in the CLAYEY SILT (CL1), SILTY CLAY (CL2), and SILTY SAND (CL3) facies indicate sediments that have undergone burial. Expansion of moisture potential porosity suggests that these facies sediments are composed of "loose" silt and sand. The "loose" nature of these sediments is supported by the fact that they have been historically identified as the Magothy and Choptank Formations.

and in the Pleistocene Kent Island Formation. Field observations indicate that, in these materials, the water content is generally higher than in the Pleistocene Kent Island Formation. This is probably due to the fact that these materials are more recent and have not undergone as much compaction as the Pleistocene materials.

The distribution of water content in the lower Chesapeake Bay is related to the facies of the sediments. The CLAYEY SILT (CL1) facies generally has the highest water content, while the SILTY SAND (CL3) facies generally has the lowest water content.

Table 1. Percent water measured in the different sediment size classifications.

TYPE	FAKES (CL 1-3)	MEAN (CL 1-3)	RANGE
SAND	10-15%	12.5%	10-15%
SILTY SAND	15-20%	17.5%	15-20%
CLAYEY SAND	20-25%	22.5%	20-25%
SILT	25-30%	27.5%	25-30%
SILTY SILT	30-35%	32.5%	30-35%
CLAYEY SILT	35-40%	37.5%	35-40%
CLAY	40-45%	42.5%	40-45%

References  
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Keller, G. 1974. Marine geotechnical properties: Interpretation and relationships to data of nature. In: A. S. Idriss, ed., *Soils and Foundations*. Prentice-Hall, Englewood Cliffs, New Jersey, pp. 71-77.

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