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Re: Hydraulic Conductivity of Essentially Saturated Peat

The Savannah River National Laboratory measured the hydraulic conductivity of peat samples using method ASTM D4511-00. Four samples of peat were packed into 73mm diameter plastic tubes and saturated from the bottom up with water. The columns were packed with Premier ProMoss III TBK peat to a dry density of approximately 0.16 gm/cc (10 lb/ft³). One column was packed using oven dried peat and the other 3 were packed using as delivered peat. The oven dried sample was the most difficult to saturate. All of the peat samples expanded during saturation resulting in a sample length (L) that was longer than when the sample was initially packed. Table 1 contains information related to the column packing. After saturation the hydraulic conductivity test was conducted using the apparatus shown in Figure 1. Three of the samples were tested at 2 different flow conductivities, 1 high and 1 low. Table 2 and Figure 2 contain the results of the hydraulic conductivity testing. Each test was run for a minimum of 40 minutes to allow the test conditions to stabilize. The hydraulic conductivity at the end of each test is reported as the hydraulic conductivity for that test.

The hydraulic conductivity of the 4 peat samples is 0.0052 ± 0.0009 cm/sec. This result compares well with the hydraulic conductivity measured in the pilot scale peat bed after approximately 2 months of operation. The similarity in results between the dry pack sample and moist pack samples shows the moisture content at the time of packing had a minimal effect on the hydraulic conductivity. Additionally, similarity between the results shows the test is reproducible. The hydraulic conductivity results are similar to those reported by other tests of peat samples reported in the literature.



Figure 1 Apparatus used for measuring hydraulic conductivity of essentially saturated peat.

Table 1 Test conditions.

Sample	Diameter (cm)	As packed		Dry bulk density, (gm/cc)	Saturated	
		θ (w/w)	Length, L (cm)		θ (w/w)	Length, L (cm)
Bag 1, Sample 1	7.3	0	11	0.17	nm	13.3
Bag 2, Sample 1	7.3	0.61	11	0.16	nm	12.0
Bag 2, Sample 2	7.3	0.61	11	0.16	0.88	13.2
Bag 3, Sample 3	7.3	0.61	11	0.17	0.86	14.0

Note: 1 gm/cc = 62.43 lb/ft³
 θ = gravimetric water content

Table 2 Test results.

Sample	Δh , cm		Flowrate (cc/sec)		Hydraulic Conductivity, K (cm/sec)	
	1	2	1	2	1	2
Bag 1, Sample 1	21.3	na	0.28	na	0.0042	na
Bag 2, Sample 1	21.3	15	0.39	0.24	0.0052	0.0046
Bag 2, Sample 2	17.7	22.5	0.39	0.43	0.0070	0.0061
Bag 3, Sample 3	21.6	16.2	0.32	0.22	0.0049	0.0045

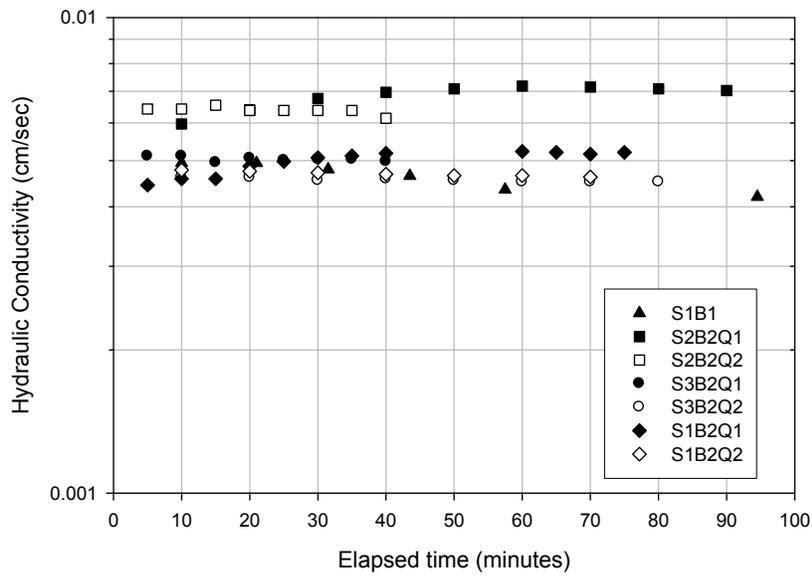


Figure 2 Results from hydraulic conductivity testing, Sample#Bag#Q#(flowrate).