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STATE OF SOUTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES

WATER RESOURCES DIVISION
REPORT 5

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HYDROGEOLOGIC FRAMEWORK OF WEST-CENTRAL SOUTH CAROLINA

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Table 15. Summary of Folk and Ward statistics, gravel-sand-mud percentages, and calculated porosity and permeability values for sand samples from the Crouch Branch confining unit that contain less than 25 percent mud

Parameter	Folk and Ward Statistics				Gravel	Sand	Mud	Porosity	Permeability	
	Mean[1]	Sorting[1]	Skewness	Kurtosis	(%)	(%)	(%)	(%)	(Darcy)	(ft/d)
Arithmetic mean	1.681	1.457	0.267	1.839	2.7	91.9	5.5	32.0	35.8	98.0
Confidence level (95%)	0.137	0.116	0.038	0.137	0.9	1.2	0.9	0.6	7.1	19.5
Number of samples	175	175	175	175	175	170	170	142	142	142
Median	1.624	1.248	0.264	1.525	0.4	94.9	2.6	32.5	22.7	62.1
Mode	1.202	1.503	0.395	1.396	0.0	-	1.7	34.0	29.0	79.3
25th percentile	1.112	0.852	0.073	1.157	0.0	89.4	1.2	28.4	8.3	22.6
75th percentile	2.236	1.939	0.455	2.320	2.0	97.6	8.1	35.0	46.8	127.9
Standard deviation	0.925	0.780	0.259	0.927	6.0	8.0	5.9	3.9	43.3	118.5
Variance	0.856	0.609	0.067	0.859	35.7	63.9	35.1	15.4	1877.1	14045.6
Kurtosis	-0.162	1.396	-0.526	1.848	14.9	3.6	1.8	-1.2	5.2	5.2
Skewness	0.164	1.227	-0.105	1.372	3.6	-1.8	1.6	0.1	2.3	2.3
Range	4.604	3.890	1.269	4.976	40.8	42.9	24.6	14.3	219.6	600.7
Maximum	-0.736	4.282	0.791	5.612	40.8	99.4	24.9	39.9	220.0	601.8
Minimum	3.868	0.392	-0.478	0.636	0.0	56.5	0.3	25.6	0.4	1.1
Trimean (5%)	1.679	1.422	0.269	1.793	2.1	92.4	5.1	32.0	33.0	90.4
Geometric mean	-	-	-	-	-	-	-	-	18.2	49.8
Harmonic mean	-	-	-	-	-	-	-	-	7.0	19.1

[1] Values are in phi units

of 10^{-3} to 10^{-5} ft/d. At the MSB-47 well, a vertical hydraulic conductivity of 1×10^{-7} cm/s (2.83×10^{-4} ft/d) was obtained for a clay in the Crouch Branch confining unit (Sirrine, 1987a). The large variation in these measurements can be attributed to the difference in the lithology of the sediments tested.

The close correspondence between the geometric mean of the laboratory-derived vertical hydraulic conductivities for the 18 clay to sandy clay samples (1.26×10^{-4} ft/d) analyzed from the Crouch Branch confining unit and the overall geometric mean (1.67×10^{-4} ft/d) for the Tertiary/Cretaceous clay to sandy clay sample suite attests to the validity of using the geometric mean derived from the larger Tertiary/Cretaceous sample suite in calculating hydraulic properties of the unit. Similarly, the correspondence between the geometric mean of the vertical hydraulic conductivities (7.92×10^{-3} ft/d) for the 12 clayey sand samples analyzed from the Crouch Branch confining unit and the geometric mean derived from the entire Tertiary/Cretaceous clayey sand sample suite (8.90×10^{-3} ft/d) again justifies using the values derived from the entire Tertiary/Cretaceous sample suite.

Leakance coefficients were estimated at each well used in the study that penetrated the Crouch Branch confining unit (Appendix 1). Effective leakances, that is, leakance coefficients of the clay and sandy clay beds combined with the leakance coefficients of the clayey sand beds, were estimated from the geometric mean of the laboratory-derived vertical hydraulic conductivities of the various confining lithologies divided by the thickness estimates of each of the lithologies at the wells penetrating the unit. The geographic distribution of leakance coefficient is illustrated in Plate 17. In general, leakance coefficients are on the order of 10^{-6}/d where the Crouch Branch confining unit is part of the Meyers Branch confining system. To the north, beyond the updip limit of the Meyers Branch confining system, leakance coefficients are generally on the order of 10^{-5}/d with some localities devoid of confining beds altogether. In most of the study area, the clay and sandy clay beds of the Crouch Branch confining unit, where it constitutes the Meyers Branch confining system, are sufficiently thick and continuous so that offsets due to the faulting commonly observed in the region (Stieve and others, 1991) do not breach the continuity of the confining unit. North of the updip limit of the confining system, however, where the confining beds of the Crouch Branch confining unit thin and decrease in number, faulting commonly breaches the confining unit and is an important feature controlling the hydrologic characteristics of the unit (Plate 41).

The ground water flow model for the M-Area Settlement Basin and Lost Lake in A-M Area, developed by Papadopulos and Associates (DuPont, 1986), used a calibrated leakance coefficient of 6.4×10^{-6}/d for the Crouch Branch confining unit established at well P-4A. This value was determined by calibrating the model to reproduce the water level measured in the "Tuscaloosa" (Crouch Branch aquifer of this report) at the P-4A well-cluster location. This leakance coefficient is about one order of magnitude lower than the values used in the model in the vicinity of A-M Area, but it is consistent with the point-source laboratory-derived leakance coefficient of 2.58×10^{-6}/d calculated for the Crouch Branch confining unit