TABLE 1.—*Laboratory and field test data*

[X-ray mineralogy by T. C. Nichols, Jr., U.S. Geol. Survey, and other laboratory tests by G. S. Erickson, U.S. Geol. Survey; field tests by W. I. Finch]

Map unit	Geologic unit	Field sample No.[1]	Sample description	Median grain size (μ)	X-ray mineralogy: Minerals[2]: Quartz[3]	Feldspar	Clay	Calcite	Dolomite	Siderite	Other	Clay minerals (in order of abundance): Calcium montmorillonite	Mixed layer[4]	Illite[5]	Kaolinite	Chlorite	Vermiculite	pH[6]	Grain specific gravity	Porosity (computed percent)	Bulk density, disturbed[1] (lb per ft³)	In-place dry density (lb per ft³)	Moisture-density[7]: Optimum moisture (percent)	Maximum dry density (lb per ft³)	Consolidation[8]: Percent	c_v (in.² per day)	Natural moisture content (percent)	Atterberg limits[9]: Liquid limit	Plastic limit	Plasticity (index)	Unified soil classification symbol[10]	Compressive strength[11] (tons per ft²; unconfined at optimum moisture): Remolded	Undisturbed[1] (field tests)	Potential volume control (PVC) swell index, remolded[1] (dry)[12]: Pounds per square foot	Rating[13]	Infiltration[14] (inches fall in 30 min)
Smc	Alluvium	PW-1(0–6)	Sand, grayish-brown, very fine to medium-grained, silty, clayey; carbon grains.	137.0																							6.0				SC–SM					
MC	do	D-14-11(2)	Clayey silt, dark-grayish-brown	3.5	35	5	55						1	3	2			4.70	2.72	52	104	72	22.8	99.2	5.4	605	23.6	47	31	16	ML	2.8	4.5	1,700	2.0	0.45
		PW-9(0–9)	Clayey silt, yellowish-brown	3.8	30	5	60			5			1	3	2			4.62	2.50	41	110						18.2	49	29	20	ML			2,550	3.1	
		PW-6(0–9)	Clayey silt, yellowish-brown; sparse mica and abundant iron oxide concretions in upper part; fine-grained quartz in lower part.	12.3	35	5	55						1	3	2			4.62	2.70	33	125						20.7	33	20	13	CL			1,700	2.0	
		D-4-27(8)	Clayey silt, gray to brown; fine-grained quartz, sparse mica.	5.6	35	5	55						1		2			5.18	2.70	54	100	76	22.7	102.4	16.7	615	23.8	42	27	15	ML	2.2	4.5	1,150	1.3	>2.00
		PW-1(6–12)	Clayey and sandy silt, greenish-gray	16.7	45	10	45						2	1	1			6.37	2.65	52	110						34.8	38	26	12	ML–CL			600	0.6	
		PW-4(3–12)	Clayey and silty sand, very fine to fine-grained; abundant white mica.	49.0	40	10	45						1	2	2			5.90	2.68	46	117						24.0	29	19	10	CL			300	0.2	
		PW-4(12–22)	Sand, brown, well-sorted, fine-grained, silty	125.0																							20.4				SC–SM					
	Lacustrine deposits	PW-10(2–12)	Silty clay, yellowish-brown; gray streaks at top; abundant iron oxide concretions; fine-grained quartz.	2.1	30	5	60						1	1	2			4.53	2.68	44	122						24.2	42	22	20	CL			3,400	4.0	
		PW-10(12–17)	Clayey and sandy silt, yellowish-brown; fine-grained quartz.	22.0	35	10	45			5			1	2	3			7.71	2.72	36	132						17.4	27	16	11	CL			1,400	1.6	
		D-14-12(3–4)	Silty clay, grayish-brown, mottled; very fine grained quartz, mica; noncalcareous.	5.9	30	5	60						1	3	2			4.07	2.74	51	103	77	20.6	106.1	5.55	605	25.0	41	28	13	ML	2.7	3.0	2,250	2.7	0.35
		PW-7(2–10)	Sand, yellowish-brown, well-sorted, fine- to medium-grained; sparse mica; clean.	215.0																							0.5				SW					
		PW-8(0–12)	Silty clay, yellowish-brown; abundant iron oxide concretions, very sparse mica.	2.3	20	10	50	5	10	5			3	1	2	3		8.09	2.74	42	120						18.1	40	22	18	CL			1,850	2.2	
		PW-8(12–21)	Clayey silt, yellowish-brown; sparse mica	18.2	40	10	50						1	2	2			7.71	2.72	43	120						22.9	24	19	5	ML–CL			1,250	1.4	
		D-4-28(2)	Silty clay, yellowish-brown, mottled gray; abundant iron oxide concretions; noncalcareous.	<1.0	20	5	75						1	3	2		4	4.00	2.77	54	119	70	26.0	96.7	15.0	605	23.3	61	31	30	MH–CH	2.5	3.5	4,650	5.9	0.55
		PW-5(0–12)	Clayey silt, yellowish-brown; sandy in lower part; abundant iron oxide concretions.	13.0	35	10	45						1	1	2	3		8.02	2.71	39	122						15.5	34	19	15	CL			850	0.9	
		D-4-26(2 1/2)	Silty clay, gray, mottled brown; very fine to fine-grained quartz, very sparse chert pebbles (¼–½ in. across).	2.3	*30	5	65						1	3	2		4	4.01	2.71	49	111	73	21.1	105.4	13.5	475	22.3	51	27	24	CH–MH	3.2	3.5	4,200	5.3	1.20
		PW-3(0–12)	Clay-silt, sandy, yellowish-brown; fine-to medium-grained quartz; abundant mica.	11.7	35	10	45		10				1	2	3	4		8.06	2.73	43	115						17.9	25	17	8	CL			1,000	1.1	
		PW-3(12–20)	Silty and clayey sand, yellowish-brown, very fine to medium-grained.	21.3	55	5	35		5				1	2	3			7.91	2.69	41	117						14.8	23	14	9	CL			800	0.8	
	Loess	M-4(0–12)	Clayey silt, yellowish-brown; sparse very fine to medium-grained quartz; sparse iron oxide concretions.	17.2	50	10	35						1		2			4.91	2.69	41	126						19.8	28	18	10	CL			1,100	1.2	
		PW-12(2–12)	Clayey silt, yellowish-brown; abundant iron oxide concretions in lower part.	11.0	40	5	45						1					6.38	2.71	43	112						16.7	47	24	23	CL			2,800	3.5	
		PW-13(1–11)	Clayey silt, yellowish-brown; abundant iron oxide concretions.	14.4	45	10	40						1					5.00	2.69	41	122						19.2	32	17	15	CL			1,600	1.9	
		D-8-4(4 1/2)	Clayey silt, gray, mottled brown, noncalcareous	13.0	35	10	50						1	3	2			4.10	2.71	51	101	80	19.3	106.3	10.0	695	21.4	41	28	13	ML	2.5	4.5+	2,100	2.5	0.80
	Silt and sand deposits	M-4(27–42)	Clayey and silty sand, yellowish-brown; well-sorted fine- to medium-grained quartz; sparse chert granules.	42.0	*50	10	40						2	3	1			6.20	2.69	33	132						16.1	25	15	10	CL			1,300	1.5	
		PW-12(12–17)	Clayey silt, yellowish-brown; sparse fine- to medium-grained quartz and granules of chert.	11.9	*40	5	50						1					6.05	2.71	30	135						13.1	35	20	15	CL			2,000	2.4	
		PW-13(11–16)	Clayey silt, yellowish-brown; very fine to medium-grained quartz; sparse chert granules and pebbles.	13.7	*40	5	50						1					5.39	2.71	38	127						17.9	37	17	20	CL			2,500	3.1	
CS	Wilcox Formation	D-20-37(10)	Clayey and silty "sawdust" sand, tan, speckled white, well-sorted, very fine grained.	73.0	55		40						3	2	1			5.85	2.66	42	117						17.7					0.3		250	0.1	
Cl	do	D-18-6(10)	Clayey silt, white; sparse very fine quartz	9.1	45		55						2	3	1			6.43	2.68	29	135						13.5	29	20	9				700	0.7	
Cp	Porters Creek Clay	PW-10(44–55)	Silty clay, sandy in part, greenish-black; sparse very fine to fine-grained glauconite and quartz.	2.7	10		70				[13]15	1		2	2			5.61	2.70	70	105						53.4	85	62	23				10,650	9.0	
SCM	Clayton(?) and McNairy Formations.	PW-7(49–57)	Clayey silt, black; blebs of micaceous very fine grained quartz sand.	9.3	35	5	60						1	2	1			3.43	2.66	58	102						29.6	51	28	23				3,650	4.6	
		PW-1(71–82)	do	29.0	50	10	30						2	1	1			5.90	2.64	51	110						29.6	31	23	8				450	0.3	
		PW-3(36–42)	do	12.9	40		60						1	2	2			4.52	2.63	60	94						33.7	56	26	30				2,400	2.7	

[1] D, hand-dug sample; PW or M, auger sample; depth of sample in feet shown in parentheses. Hand-dug samples taken November 1963 except for samples D–18–6 and D–20–37, which were taken in April 1964, and except for all consolidation samples, which were taken in October 1964. Auger samples were taken October through December 1963. Undisturbed samples are those that sustained little or no distortion during sampling. Disturbed samples are those that have been distorted but not disaggregated during sampling. Remolded samples are those that have been completely reworked in the laboratory.

[2] Mineral percent stated to nearest 5 percent (estimated to nearest 1 part in 20 by analyst, T. C. Nichols, Jr., U.S. Geol. Survey). Small quantities of minerals not identified where total identified minerals is less than 100 percent.

[3] Asterisk (*) indicates some chert.

[4] Mixed-layer clay consists predominantly of aluminum-interlayered vermiculite, montmorillonite (calcium-montmorillonite in some samples), kaolinite, and rarely illite.

[5] Includes all mica present.

[6] The pH was determined with a Beckman pH meter, model N, from a slurry of sample in distilled water having a consistency slightly less than that of its liquid limit. The third, generally stable, reading taken at 5-minute intervals is that given below.

[7] Moisture-density tests were run by the method described by Wilson (1958), which is a modification of the Proctor soil compaction test (Jumikis, 1962, p. 103–104) using a tamper adjusted for a 40-pound compaction effort on an air-dried sample. The optimum moisture content is the moisture content at the maximum density of the soil.

[8] Consolidation tests were run on undisturbed samples 3 inches in diameter and 0.625 inches thick at the following natural moisture contents: D–4–26, 22.8 percent; D–4–27, 23.2 percent; D–8–4, 24.6 percent; D–14–11, 25.3 percent; D–14–12, 21.9 percent; D–4–28, 14.0 percent. Samples were inundated and subjected to stress increments of 1, 2, 4, and 8 tons per ft² (except for D–14–12, which was 1, 2, 3, and 4 tons per ft²), each stressed for an interval of 24 hours. Percent consolidation is determined at end of test. Based on method described by Holtz and Gibbs (1958). Calculation of consolidation coefficient, c_v, based on method described by Peck, Hanson, and Thornburn (1953, p. 80–86) and made by W. I. Finch, U.S. Geol. Survey, on bases of graphs drawn by G. S. Erickson, U.S. Geol. Survey.

[9] The plastic limit is the moisture content, in percent, at which the material becomes plastic. The liquid limit is the moisture content at which the material changes from a plastic state to a liquid state. The plasticity index is the difference between the liquid limit and the plastic limit.

[10] Based on grain-size analyses and Atterberg limits using the Unified Soil Classification System (U.S. Federal Housing Admin., 1961, p. 45, 51). Fine-grained soils (median grain size of material smaller than 74μ or No. 200 sieve size) with a liquid limit less than 50 percent are classed as CL and ML (C denotes clay, M denotes silt, L denotes low compressibility), and more than 50 percent as CH and MH (H denotes high compressibility), coarse-grained soils (median grain size larger than 74μ) of more than half sand size with appreciable fines are classed as SC and SM; and well-graded soils with little or no fines as SW. Not applicable to samples from the Wilcox, Porters Creek, and Clayton and McNairy Formations.

[11] Determined in most cases by using a pocket penetrometer.

[12] Samples tested in a dry condition in a swell-index device according to procedures described by Lambe (1960).

[13] <2, noncritical; 2–4, marginal; 4–9, critical; >9, very critical.

[14] Test run in field on flat surface cut at depth of sampling, using a plastic cylinder about 8 inches in diameter and 6 inches high (water to 3-inch level) embedded ¼ inch into surface and sealed against side flow. Water was added to a depth of 3 inches and the amount of fall at the end of 30 minutes was recorded.

[15] Includes 10 percent clinoptilolite (a zeolite of the mordenite group) and 5 percent gypsum.