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MINERALOGY OF REPRESENTATIVE SOILS AT THE PAWNEE SITE

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INTRODUCTION

This report gives the results of particle size fractionations of soil samples taken to characterize the mineralogy of soils within the Pawnee Range Site. The objectives of the work are to identify and quantify the mineral types in the clay, silt and sand fractions. The results will furnish basic information for moisture and nutrient cycling studies. The results also pertain to the characterization of sediment movement in a microwatershed area.

PROCEDURE

Soil samples from four soil series, Ascalon, Vona, Renohill, and Shingle, were collected in November 1968. The soils were sampled by genetic horizons at modal or representative locations within the Pawnee range site.[1/] The locations of the sample sites are given in Table 1. Additional samples taken by genetic horizon were obtained in the microwatershed study area during June 1969. These included 16 separate sites on the alluvial bottom, six additional Ascalon sites, three additional Renohill sites, four additional Shingle sites, and one additional Vona site. The locations of these sample sites are shown in Fig. 1.

The soils were dried and sieved to remove gravel. The organic matter and free iron oxides were removed and the samples were fractionated, following the procedure of Kittrick and Hope (1964). After fractionation, the sand and coarse silt fractions of the representative series and part of the microwatershed area samples were examined with binocular and

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1/ The assistance of James Crabb, S.C.S. Soil Scientist, Greeley, Colorado is gratefully acknowledged.

petrographic microscopes to determine the soil mineral assemblages and other properties which would indicate the nature of the parent materials and modes of soil formation and movement.

RESULTS AND DISCUSSION

The separates of the four representative series are shown in Table 1. The separates include five sand-sized, three silt-sized, and two clay-sized fractions. The results for the samples taken within the microwatershed area are given in Table 2.

Nature of the Parent Materials

To a large extent, the differences in the soil series, examined at the Pawnee Range site relate to differences in the geologic parent materials found in the area. The Ascalon series is formed predominantly by fluvial outwash materials. The outwash material consists primarily of granitic sediments in which microcline is the predominant feldspar. Another noticeable feldspar component found mixed in outwash material is a little-weathered euhedral strongly-zoned alkali feldspar. This second feldspar-type appears to decrease with soil depth and thus appears to be a later deposition. A relatively minor amount of volcanic glass, which also decreases with soil depth, is associated with the outwash material. The euhedral zoned feldspar and glass might be a part of an ash-fall covering the area.

The Renohill and Shingle series are formed on shale and siltstone outcrops of the Pierre sedimentary formation. Iron-stained shale and siltstone fragments are characteristic of the disintegrated sedimentary rock found in the sub-horizons of the soils. The basic mineralogic composition of the

Pierre sand- and silt-sized particles consists primarily of quartz, chalcedony, and extensively-weathered microcline.

The parent material of the Vona series appears to be somewhat inconsistent. Within the microwatershed area, the Vona appears to be formed from somewhat coarser outwash material. At another site, the Vona appears to be partially formed from a Pierre sandstone outcrop.

Wind reworking of the soil parent materials in the area is evident. A comparatively recent loessial or wind deposit appears to have covered all the soils at the Pawnee Range site. This deposition consists mainly of the outwash material, but contains semi-rounded iron-stained shale and siltstone fragments indicative of mixing of the parent materials. A relatively small amount of the iron-stained particles was found in an Ascalon soil located at a considerable distance from the Renohill or Shingle soils.

Patterns of Soil Movement

The samples from the microwatershed area were taken to study the past and present sediment movement in the area. The Renohill and Shingle series occupy the more steeply-sloping upland hills and ridges surrounding the closed-basin microwatershed area (Fig. 1). It would be expected that saturation with water, run-off and sedimentation initiation would result more quickly on the Renohill and Shingle soils because of their steeper slopes and relatively greater impermeability to water penetration than the Ascalon or Vona soils. Alluvial depositions are generally characterized by sorting, gradation, and stratification of the sediments as they are moved from steeper to shallower slopes.

Considerable evidence of alluvial or colluvial activity as indicated by stratification was observed on the Renohill and Shingle soils. The loess mantle has been moved downslope and forms or adds to the Ascalon soils which generally occupy the lower and flatter slopes above and around the alluvial plain. After the Renohill or Shingle subsoils have been exposed, it appears that sediment movement takes place at a greater rate than on the loess mantle. A good example of this phenomenon is found in the Renohill No. 1 (Table 2) profile from the microwatershed area. Alluviated subsoil material covers the buried IIA horizon, which is a remnant of the loess mantle.

The profile of the Vona soil (Table 2) shows a considerable degree of stratification in the subsoil. The coarse material in the C_1 horizon indicates that considerably more active alluviation has taken place in the past. In general, it appears at the present time that the rate of alluvial activity is not great. The presence of plant opal in the surface layer of many of the soils occupying the steeper slopes indicates stability for a sufficient period of time for the plants to absorb silicon and produce the opal.

The textures of the surface soils on the alluvial plain are extremely uniform throughout the microwatershed course. An abrupt textural change occurs only near the edge of the pothole. The clay content of the surface soils on the alluvial plain, except at the edge of the pothole, averages about 15%, with generally less than 3% variation from the average. Also, the sand and silt distribution of the surface soils shows little variation. The lack of gradation down the watershed course suggests a loessial deposit rather than alluvial deposition. However, the presence of iron-stained shale particles in the coarser sand fractions near the Renohill shows that some recent alluviation has taken place. These shale particles are especially noticeable in alluvial samples 1, 2, 5, 6, 8, and 10. Considerable stability appears to have been achieved on the soils on the alluvial plane. The presence of larger amounts of plant opal, eluviation of clay to form B horizons, and the development of a strong prismatic structure in the A_{12} and B horizons are evidence which indicates that the soils on the alluvial plane have achieved a greater stability than the upland soils.

LITERATURE CITED

Kittrick, J. A. and E. W. Hope. 1964. Procedure for the particle-size separation of soils for x-ray diffraction analysis. Soil Sci. 96:319-325.

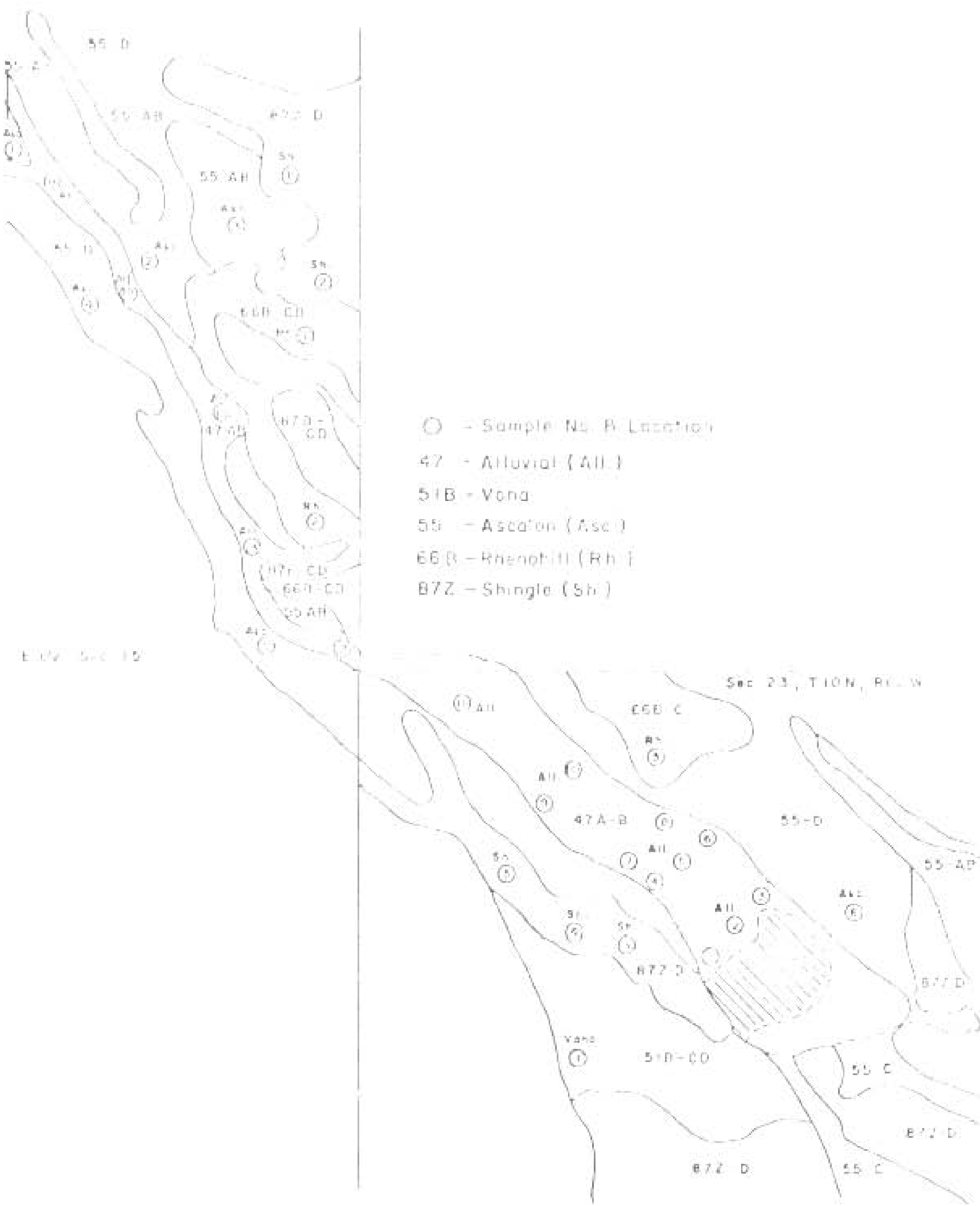

Figure 1. Map of soils in microwatershed area and locations of soil samples.

Table 1. Per cent organic matter- and lime-free soil separates of representative soil series in the IBP intensive study area.

Soil and horizon[1]	Depth (cm)	Gravel[2] >2mm	Sand (mm) 2-1	1-.5	.5-.25	.25-.1	.1-.05	Total	Silt (µ) 50-20	20-5	5-2	Total	Clay (µ) 2-.2	<.2	Total
Ascalon															
A	0-6	2.4	3.7	9.2	[illegible]	26.4	14.3	54.2	12.3	4.8	1.9	[illegible]	5.4	11.4	16.8
B2t	6-11	0.7	2.0	7.4	9.9	23.8	12.6	55.5	12.8	[illegible]	[illegible]	[illegible]	6.4	19.9	[illegible]
B3t	11-15	0.2	1.9	6.9	9.4	23.9	13.8	55.4	11.0	5.4	1.5	17.9	5.6	20.4	26.2
Cca	24-30	0.3	1.7	8.0	13.0	39.8	13.0	75.6	5.6	5.0	1.9	11.6	4.6	8.9	13.5
C2	30-48	14.3	3.9	9.4	12.8	34.5	13.9	74.5	6.2	3.0	1.9	11.1	4.4	10.7	14.4
Vona															
A	0-7	-	0.8	9.4	18.3	34.7	10.8	74.0	6.1	4.6	2.1	12.8	6.4	6.8	13.2
B2	7-14	-	0.3	6.1	18.3	39.4	8.5	72.6	3.4	2.2	1.9	7.5	4.9	15.0	19.9
B3	14-30	-	0.2	4.1	14.4	47.3	10.0	76.0	3.6	2.9	2.1	8.6	5.9	9.5	15.4
C1	30-36	-	0.5	8.2	21.8	41.1	8.5	80.1	2.9	1.9	2.0	6.8	4.3	8.8	13.1
C2	36-50	-	1.1	9.4	21.1	38.6	7.5	77.7	2.4	2.0	2.7	7.1	5.6	9.6	15.2
Renohill															
A	0-4	2.4	1.0	4.8	9.7	37.3	15.8	68.6	9.7	4.5	2.2	16.4	6.4	8.6	15.0
B1	4-6	1.4	1.0	6.4	10.3	27.5	11.0	56.2	7.3	4.3	2.6	14.2	12.1	17.5	29.6
B2	6-14	1.3	1.5	7.3	11.1	25.0	8.0	52.9	6.5	6.7	3.1	16.3	12.9	17.9	30.8
C1	14-19	1.2	0.9	3.3	5.2	11.4	6.4	27.2	10.2	13.5	5.3	29.0	16.0	27.8	43.8
R	19-30	25.8	0.3	0.6	0.3	2.3	6.8	10.8	13.6	17.6	7.3	38.5	21.9	28.8	50.7
Shingle															
A1	0-6	-	0.5	3.8	11.2	24.4	13.2	53.1	7.5	10.8	3.0	21.3	10.0	15.5	25.5
A3	6-15	-	0.3	3.4	9.2	17.9	16.2	47.0	8.7	9.5	2.3	20.5	11.6	20.9	32.5
B	15-24	-	-	0.6	2.1	9.6	21.3	33.6	14.6	12.6	3.2	30.4	14.8	21.2	36.0
Cca	24-30	-	0.1	3.8	12.6	31.9	16.5	64.9	6.1	6.6	2.1	14.8	8.5	11.8	20.3

1. Soil sample location description given on separate page.
2. Gravel as percentage of total soil weight.

Table 2. Per cent organic matter- and lime-free soil separates of soils taken within the micro-watershed area in the IBP intensive study area.

Soil and Horizon	Depth (in.)	Gravel[2] >2mm	Sand (mm) 2-1	1-.5	.5-.25	.25-.1	.1-.05	Total	Silt (u) 50-20	20-5	5-2	Total	Clay (u) 2-.2	<.2	Total
Alluvial No. 1															
A	0-5	-	0.5	3.2	7.9	23.8	16.6	52.1	8.4	9.4	4.3	22.1	16.6	9.2	25.8
B	5-18	-	0.4	2.8	6.9	17.9	14.3	42.3	6.0	12.1	3.4	[illegible]	18.0	17.7	35.7
Alluvial No. 2															
A	0-14	-	1.3	3.3	7.1	17.1	11.0	39.8	7.4	11.6	2.7	21.7	15.3	23.2	38.5
Alluvial No. 3															
B	2-15	-	0.6	3.3	8.0	15.0	9.7	36.6	6.0	11.1	3.6	20.7	20.1	22.6	42.7
Alluvial No. 4															
A11	0-6	-	0.4	3.4	10.0	24.0	17.3	55.1	10.0	11.8	4.5	26.3	11.5	7.1	18.6
A12	6-13	-	0.5	3.5	10.1	24.3	15.8	54.2	7.1	9.9	4.5	21.5	14.5	9.8	24.3
C1	20-30+	-	1.7	10.0	19.3	23.8	8.3	63.1	5.4	4.5	4.5	14.4	7.7	14.8	22.5
Alluvial No. 5															
A11	0-5	-	1.1	4.8	14.3	32.2	18.3	70.7	7.1	5.4	2.6	15.1	8.5	5.7	14.2
A12	5-11	-	0.5	6.0	15.4	29.5	12.4	63.8	5.9	4.3	2.7	12.9	7.6	15.7	23.3
C1	22-31	-	1.3	6.4	19.4	33.8	13.5	74.4	4.4	3.6	2.4	10.4	6.5	8.7	15.2
Alluvial No. 6															
A11	0-5	3.9	2.2	4.2	10.0	26.8	18.0	61.2	10.3	9.4	2.9	22.6	8.4	7.8	16.2
A12	5-12	5.6	2.8	4.1	11.1	26.8	12.4	57.2	6.1	6.4	2.5	15.0	8.3	19.5	27.8
B	12-23	-	0.3	2.1	7.4	20.9	11.5	42.2	8.8	9.8	4.5	23.1	10.5	24.2	34.7
C1	23-26	-	0.3	6.4	14.0	32.1	13.5	66.3	4.0	8.3	3.1	15.4	5.7	12.6	18.3
Alluvial No. 7															
A11	0-6	0.1	0.2	2.8	8.4	28.2	21.4	61.0	9.6	8.4	4.1	22.1	6.6	10.3	16.9
A12	6-16	0.2	1.0	5.7	15.0	29.3	17.0	68.0	6.9	6.1	3.2	16.2	6.1	9.7	15.8
C1	26-32	-	1.3	10.5	18.3	26.8	12.5	69.4	6.0	4.2	2.2	12.4	4.2	14.0	18.2
Alluvial No. 8															
A11	0-5	0.3	0.5	3.6	9.9	25.0	18.0	57.0	11.5	12.0	4.9	28.4	9.1	5.5	14.6
A12	5-9	0.4	0.7	3.9	10.7	21.8	13.1	50.2	6.6	10.4	3.9	20.9	10.5	18.4	28.9
B	9-17	-	0.6	6.6	14.5	27.3	9.0	58.0	4.2	5.5	3.0	12.7	8.0	21.3	29.3
C1	17-26+	-	0.3	7.0	17.0	33.7	12.3	70.3	3.8	3.9	1.2	8.9	9.0	11.8	20.8

(continued)

Table 2. (continued)

Soil and Horizon[1]	Depth (in.)	Gravel[2] >2mm	Sand (mm) 2-1	1-.5	.5-.25	.25-.1	.1-.05	Total	Silt (μ) 50-20	20-5	5-2	Total	Clay (μ) 2-.2	<.2	Total
Alluvial No. 9															
A11	0-6	1.4	0.3	4.6	14.7	32.3	15.9	68.0	8.1	7.4	3.3	18.8	9.3	3.9	13.2
A12	6-12	-	0.6	4.5	15.5	32.3	14.6	67.5	5.8	7.3	1.8	14.9	7.9	9.7	17.6
B	12-23	-	1.3	4.4	11.1	25.1	12.6	54.5	7.5	7.0	1.8	16.3	10.8	16.3	29.1
C1	23-34+	-	1.6	3.2	7.8	16.1	11.4	40.1	9.5	11.5	0.9	21.7	17.2	21.0	38.2
Alluvial No. 10															
A11	0-6	-	1.7	4.3	15.0	30.9	13.0	64.9	6.0	8.8	1.5	16.3	11.5	7.3	18.8
A12	6-16	-	0.1	4.0	16.4	31.0	11.7	63.2	4.1	4.9	0.7	9.7	8.8	18.3	27.1
C1	16-23	-	0.2	4.8	14.7	34.8	15.9	70.4	3.5	3.7	0.8	8.0	5.9	15.7	21.6
C2	23-32	-	0.2	1.8	5.7	22.7	17.1	47.5	9.3	9.6	3.7	22.6	11.8	18.1	29.9
Alluvial No. 11															
A11	0-7	-	0.4	3.6	11.3	29.3	20.0	64.6	8.9	9.0	3.0	20.9	8.6	5.7	14.3
A12	7-19	-	0.3	3.1	10.9	29.9	16.6	60.7	8.3	9.2	2.5	20.0	8.0	11.3	19.3
C1	19-25+	-	0.7	3.9	10.7	22.8	15.1	53.2	8.3	10.8	3.0	22.1	9.1	15.6	24.7
Alluvial No. 12															
A1	0-6	-	0.3	3.9	11.8	29.3	16.3	61.6	8.5	10.2	2.4	21.1	10.2	7.1	17.3
A3	6-12	-	0.4	3.7	11.2	28.5	17.4	61.2	7.2	9.4	2.4	19.0	9.9	9.9	19.8
B	12-22	-	1.2	5.4	11.9	25.3	15.1	58.9	8.5	7.2	2.1	17.8	7.1	16.2	23.3
C1	22-28+	-	1.4	7.8	17.5	26.5	13.2	66.4	5.6	4.8	2.1	12.5	5.2	15.9	21.1
Alluvial No. 13															
A11	0-6	-	0.2	6.2	15.2	33.0	14.2	68.8	6.7	6.0	3.8	16.5	9.3	5.4	14.7
A12	6-20	-	0.2	4.9	15.4	33.6	14.9	69.0	5.4	5.8	3.3	14.5	7.2	9.3	16.5
B	20-29+	-	0.1	2.7	10.4	31.7	15.6	60.5	6.6	7.7	2.6	16.9	9.0	13.6	22.6
Alluvial No. 14															
A11	0-6	-	0.1	3.7	11.3	35.3	20.6	71.0	7.0	6.4	2.7	16.1	8.0	4.9	12.9
A12	6-18	-	0.5	4.1	11.6	33.4	18.1	67.7	7.5	6.8	2.4	16.7	6.6	9.0	15.6
B	18-27+	-	0.7	3.9	10.7	25.8	15.9	57.0	8.4	6.4	2.4	17.2	8.0	17.8	25.8
Alluvial No. 15															
A1	0-6	-	0.4	2.7	6.1	20.3	20.6	50.1	7.4	22.0	4.1	33.5	10.2	6.2	16.4
A3	6-16	-	0.3	2.8	7.1	19.2	17.3	46.9	9.3	12.1	4.3	25.7	12.9	14.5	27.4
B	16-30	-	0.6	3.6	8.4	21.2	18.5	52.3	7.7	8.3	1.8	17.8	11.4	18.5	29.9

(continued)

Table 2. (continued)

Soil and Horizon[1]	Depth (in.)	Gravel[2] > 2mm	Sand (mm) 2-1	1-.5	.5-.25	.25-.1	.1-.05	Total	Silt (u) 50-20	20-5	5-2	Total	Clay (u) 2-.2	.2	Total
Alluvial No. 16															
A1	0-6	0.6	0.7	4.9	8.4	24.1	19.2	57.8	9.8	13.8	4.2	[illegible]	[illegible]	[illegible]	16.4
A3	6-16	-	0.5	3.5	8.5	21.3	18.2	52.0	8.8	11.2	3.6	23.6	15.5	8.9	24.4
B	16-26+	-	0.5	2.6	5.6	15.9	15.1	39.7	10.0	10.6	3.3	23.9	15.7	20.7	36.4
Ascalon No. 1															
A11	0-7	-	4.3	8.0	12.2	28.1	17.4	70.0	8.4	3.4	1.3	13.1	7.1	9.8	16.9
A12	7-12	5.5	2.2	6.9	13.3	28.7	17.3	68.4	6.4	4.3	1.2	11.9	5.9	13.8	19.7
C_{ca}	12-30	-	1.5	10.0	16.0	35.1	13.4	76.0	4.1	4.0	1.7	9.8	6.5	7.7	14.2
Ascalon No. 2															
A	0-6	-	0.5	5.5	14.3	31.0	17.8	69.1	5.9	8.1	1.8	15.8	9.0	8.2	17.2
B	6-18	-	0.4	3.8	9.3	22.6	16.8	52.9	11.1	5.5	2.5	19.1	7.5	20.5	28.0
C_1 & C_{2ca}	18-30+	-	0.1	1.7	3.4	10.1	23.0	38.3	17.2	11.7	4.5	33.4	10.0	18.3	28.3
Ascalon No. 3															
A	0-6	-	0.3	4.3	13.9	31.2	16.5	66.2	8.8	8.2	3.7	20.7	6.4	6.7	13.1
B	6-19	-	0.3	3.6	12.1	19.0	16.5	51.5	10.0	9.0	3.9	22.9	9.6	16.0	25.6
C_{ca}	19-26+	-	0.1	1.4	4.7	14.3	21.6	42.1	16.2	11.4	3.5	31.1	10.6	16.2	26.8
Ascalon No. 4															
A	0-6		4.7	8.6	12.1	27.6	20.2	73.2	6.8	4.6	2.0	13.4	4.6	8.8	13.4
B1 & 2t	6-15		2.6	7.4	12.9	23.4	17.0	63.3	7.3	5.0	2.0	14.3	6.0	16.4	22.4
C_1 & C_{2ca}	15-32+		2.8	10.5	17.6	29.0	12.5	72.4	5.3	5.0	2.1	12.4	5.6	9.6	15.2
Ascalon No. 5															
A	0-6		2.1	7.3	13.8	28.6	18.2	70.0	7.4	5.9	1.8	15.1	5.6	9.3	14.9
B	6-16		1.4	9.2	18.1	30.5	10.9	70.1	5.4	4.7	1.8	11.9	5.0	13.0	18.0
C_1 & C_{2ca}	16-31+		3.0	11.7	20.3	31.0	12.4	78.4	3.5	4.1	1.5	9.1	4.8	7.7	12.5
Ascalon No. 6															
A	0-5		1.0	6.2	13.0	31.8	17.2	69.2	8.4	6.9	2.2	17.5	7.4	5.9	13.3
B	5-15		1.4	5.5	12.1	27.5	15.2	61.7	5.9	6.2	2.3	14.4	8.7	15.2	23.9
C_1	16-22		3.7	4.3	12.9	27.2	13.3	66.4	5.8	6.4	2.3	14.5	7.7	11.4	19.1
C_2 & C_{3ca}	22-32+		0.4	3.0	8.6	24.1	14.9	51.0	10.4	8.6	2.4	21.4	10.4	17.2	27.6

(continued)

Table 2. (continued)

Soil and Horizon[1]	Depth (in.)	Gravel[2] < 2mm	Sand (mm) 2-1	1-.5	.5-.25	.25-.1	.1-.05	Total	Silt (μ) 50-20	20-5	5-2	Total	Clay (μ) 2-.2	.2	Total
Renohill No. 1															
A	0-5		2.0	8.6	14.4	22.8	13.5	61.3	7.5	7.4	2.2	17.1	8.3	13.3	21.6
IIA	5-11		3.7	17.7	21.0	21.3	5.0	68.7	5.1	7.0	2.2	14.3	6.9	10.1	17.0
IIC_1	11-18		0.1	0.6	0.9	1.0	0.9	3.5	7.6	26.3	12.0	45.9	20.7	29.9	50.6
IIC_{ca}	18-24		0.3	0.5	0.3	0.5	8.8	10.4	26.3	25.6	4.3	56.2	21.2	12.2	33.4
Renohill No. 2															
A	0-5		0.6	2.8	8.2	20.8	17.7	50.1	10.6	8.2	2.6	21.4	11.2	17.3	28.5
B	5-9		0.2	1.6	3.4	15.8	20.9	41.9	12.4	10.6	3.2	26.2	14.3	17.6	31.9
C	9-16			0.2	0.2	1.6	22.5	24.5	18.8	17.8	5.1	41.7	22.5	11.3	33.8
Renohill No. 3															
A	0-4		0.5	2.8	12.4	31.7	13.8	61.2	8.4	7.0	2.1	17.5	9.3	12.0	21.3
B	4-12		0.3	1.3	6.3	15.1	10.4	33.4	10.9	15.4	4.9	31.2	16.2	19.2	35.4
C_{ca}	12-22		0.2	0.3	0.6	1.4	7.4	10.0	21.0	24.4	5.6	51.0	25.1	13.9	39.0
$C2_{ca}$ & R_{ca}	22-25+		0.1	0.1	0.1	0.4	14.0	14.7	24.6	21.1	5.0	50.7	21.5	13.1	34.6
Shingle No. 2															
A_1	0-6		1.1	4.8	16.6	28.3	13.0	63.8	6.4	6.2	1.6	14.7	11.9	9.6	21.5
A_3	6-15		0.9	3.8	9.3	16.1	16.0	46.1	10.4	8.4	2.1	20.9	14.1	18.9	33.0
B	15-24		0.1	1.6	3.8	9.0	19.6	34.1	17.0	10.3	3.6	30.9	16.3	18.7	35.0
C_{ca}	24-30+		0.2	2.6	8.5	25.0	16.8	53.1	11.3	8.3	3.1	22.7	10.1	14.1	24.2
Shingle No. 3															
A	0-4		0.3	1.1	4.9	18.7	7.8	32.8	8.1	15.3	4.8	28.2	21.1	17.9	39.0
B	4-8		0.2	0.3	0.5	1.8	2.7	5.5	2.5	20.5	9.8	32.8	38.1	23.6	61.7
C_{ca}	8-20			0.1	0.2	2.5	7.8	10.6	9.0	19.3	9.8	38.1	30.5	20.8	51.3

(continued)

Table 2. (continued)

Soil and Horizon[1/]	Depth (in.)	Gravel[2/] 2mm	Sand (mm) 2-1	1-.5	.5-.25	.25-.1	.1-.05	Total	Silt (μ) 50-20	20-5	5-2	Total	Clay (μ) 2-.12	.2	Total
Shingle No. 4															
C_{ca}	9-17		0.1	0.2	0.3	0.7	26.0	27.3	22.0	10.6	6.5	39.1	17.1	16.5	[illegible]
Shingle No. 5															
A_{12}	12-23	28.1	13.8	21.0	19.9	21.6	5.5	81.8	3.0	2.6	1.7	7.3	[illegible]	[illegible]	[illegible]
C_1	23-29	19.8	3.9	5.8	14.9	16.8	11.1	52.5	4.8	5.7	3.1	13.6	10.4	23.5	33.9
Vona No. 1															
A	0-4		2.9	11.9	18.6	31.8	12.5	77.7	7.3	4.3	1.4	13.0	5.5	3.8	9.3
B	4-15		3.8	14.4	22.8	31.2	8.6	80.8	2.1	1.9	0.9	4.9	4.1	10.2	14.3
C_1	15-18	0.2	16.5	17.2	19.2	24.7	6.1	83.7	2.7	1.1	0.8	4.6	4.0	7.7	11.7
C_2	18-32		1.5	17.5	31.6	30.7	5.2	86.5	1.0	0.9	0.8	2.7	4.0	6.8	10.8

1/ Soil sample location shown in Figure 1.

2/ Gravel as a percentage of total soil weight.